GIBERTINI
PRECISION SCALES



USER MANUAL

MicroDens

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MICRODENS USER MANUAL

1 Introduction

Thank you for choosing MicroDens, the portable precision digital density meter from Gibertini Elettronica. MicroDens is a professional instrument based on MEMS (Micro-Electro-Mechanical Systems) technology for the accurate measurement of density, specific gravity, and related parameters in industrial, winemaking, petrochemical, and laboratory applications. This manual applies to MicroDens models with firmware version 1.0.0000 or later and provides all the information necessary for installation, adjustment, use, and maintenance of the instrument.

1.1 User Responsibility

- The manual is an integral part of the product. Keep it for the entire working life of the product and make it easily accessible to all those involved in using the instrument.
- The results provided by the instrument depend not only on its proper functioning, but also on several other factors. It is therefore recommended that the results be verified by qualified personnel before taking any action.
- This document does not aim to address all safety issues associated with the use of the instrument and samples. It is the user's responsibility to establish health and safety practices and determine the applicability of regulatory restrictions.
- The instrument is intended for use by qualified and trained technical personnel. It is not intended for home use.

2 Safety instructions

2.1 Safety Message Conventions

This document uses the following safety message conventions:



WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.



NOTICE indicates a situation which, if not avoided, could result in property damage.

2.2 Responsibility

Description



- Use the instrument only for the purpose described in the document.
- Gibertini Elettronica guarantees the correct functioning of the instrument only if no modifications are made to the mechanics, electronics, or software.
- Ensure that all operators have been trained in advance to use the Instrument safely and correctly.
- Use only accessories, consumables or spare parts supplied or approved by Gibertini Elettronica.
- Ensure that the instrument is sufficiently supervised during operation.

2.3 Installation and use

Description



- Please read this document before using the Instrument.
- Please follow all suggestions and instructions in this document to ensure proper execution.

2.4 Specific precautions

Description



- RISK OF MEASURING CELL BREAKAGE Do not expose the instrument to temperatures below 0°C (32°F) when the cell contains water. Freezing causes irreversible destruction of the MEMS sensor.
  ACTION: Always empty the cell before storing in cold environments. If damaged or malfunctioning, do not continue to use the instrument.
- Do not use the instrument in conditions that could cause damage to property or personal injury.



- Before a measurement, check the chemical resistance of the wettable parts of the instrument to the samples and cleaning agents used.
- Damage to the measuring cell due to solidifying samples. Hot samples cool during measurement. If samples solidify in the measuring cell, it will no longer be possible to empty the measuring cell.
- Only measure samples with viscosity less than 50 mPa*s at room temperature.



- Each time the instrument is turned on (whether after manual or automatic shutdown), the MicroDens automatically calibrates the motorized system and empties the cell if it contains liquid. Always place the fill tube in a waste container before turning the instrument back on.

2.5 Precautions for samples

Description



- Observe and comply with national safety regulations regarding the handling of all substances associated with measurements.
- Store only the minimum required amount of sample, cleaning agents, and other flammable materials near the instrument.
- Do not spill samples/cleaners and do not leave containers uncovered.
- Remove spilled sample/cleaning agents immediately.

2.6 Batteries

Description



- Observe the correct polarity when inserting the batteries.
- Use only batteries of the same type and with the same charge level.
- Replace batteries only when the instrument is turned off.



- Do not store or use the battery at temperatures below -20°C or above 60°C.
- Do not subject the battery to mechanical stress such as pressure, bending or shock.

2.7 Assistance and repairs

Description



- Service and repair procedures can only be performed by Gibertini Elettronica or authorized personnel.
- Disassemble the measuring cell by unauthorized persons will void any warranty.

2.8 Disposal

Description



- When disposing of the instrument, please observe the legal requirements of your country.

3 Package contents and first start-up

3.1 Package Contents

The MicroDens comes in a custom case designed to protect the instrument during transport and store it safely. The case is also ideal for taking the instrument into the field when needed.

Upon opening, you will find the following components:

	Component	Description
	Body of the instrument	The main unit of the MicroDens Digital Density Meter
	Lithium battery	Rechargeable lithium battery - Capacity: 2500 mAh - Battery life: up to 10 hours of continuous use - Charging time: 3-4 hours - The battery may be partially charged. A full charge is recommended before first use.
	Filling tube	PTFE (Polytetrafluoroethylene) Filling Tube - Quantity: 2 pieces (1 use + 1 spare) - Material: Chemical resistant PTFE - Length: 150 mm - Diameter: Compatible with instrument connector - NOTE: Replace if damaged or after 1000 use cycles
	USB – USB-C Cable	For charging the instrument and connecting to the PC
	Quick User Guide	Documentation for first start of the Instrument
	Calibration certificate	Document certifying factory calibration

Please verify that all components are included in the package. If any are missing or damaged, contact your Gibertini Elettronica representative immediately.

3.2 First Setup

Before using the MicroDens for the first time, you need to assemble it by following these simple steps:

3.2.1 Installing the battery



1. Place the instrument on a flat, stable surface, with the display facing down.
2. Locate the battery compartment on the back of the instrument
3. Open the battery door by pressing the locking clip
4. Insert the lithium battery into the appropriate housing - the instrument is equipped with a directional connector that prevents the battery from being connected with the wrong polarity
5. Replace the battery compartment cover.

3.2.2 Plugging the filler tube



The MicroDens comes with two filling tubes: one for use and one as a spare.

1. Take one of the filling tubes provided (they are ready to use)
2. Screw the tube into the appropriate fitting on the body of the instrument
3. Make sure the tube is screwed on tightly but without over-tightening, to ensure a proper seal.

The second tube included in the package is a spare part to be kept for possible future use.

3.3 First start

Once assembly is complete, the Instrument will turn on automatically.

If this does not happen, press the Power button (PWR)

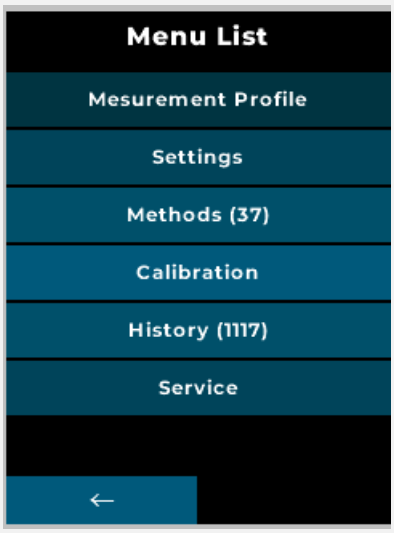
Power off. To turn the instrument off, press and hold the PWR button. If the cell contains liquid, the instrument does not turn off and shows the «Power Off» window with the message «Tank full! Empty before turning off.». Place the filling tube in a waste container and tap Empty: the instrument drains the cell and then turns itself off. Tap Cancel to continue working. The same window appears when the automatic power-off is triggered with the cell full.

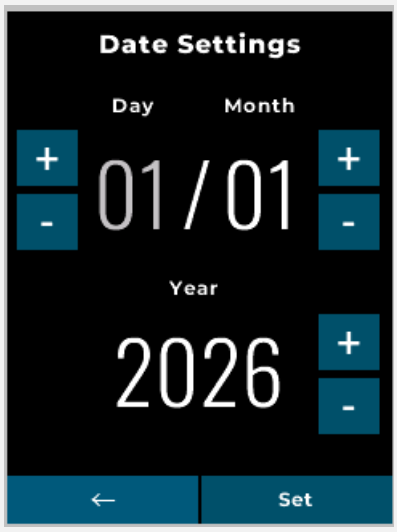
Low battery at power-on. If the battery charge is 5 % or less at power-on, the instrument shows «LOW BATTERY - RECHARGE!» and turns off. Charge the battery (see «Charging the batteries») before turning the instrument on again.

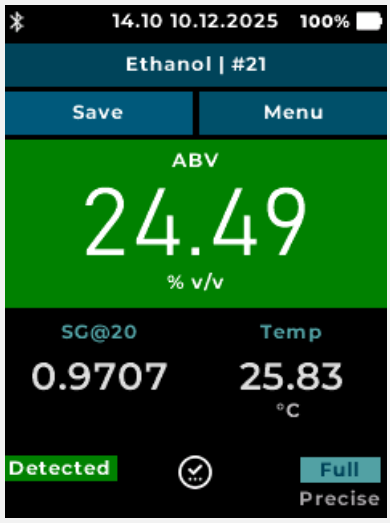
3.3.1 First set up

When you first start up the MicroDens, it automatically initializes. To take measurements, you can customize basic parameters, such as date, time, and measurement method, using the setup menu.

1. Language: Select your preferred language from the available list using the arrow keys and confirm with the SET key (paragraph 6.2)
    - Menu → Settings → Device Settings → Language
2. Date and Time: Set the current date and time: (section 7.3)
    - Menu → Settings → Device Settings → Date and time → Set date
    - Use the arrow keys to change the values
    - Press SET to confirm each value and move to the next one.
    - Confirm the final setting to complete the setup
3. Units: Check the default measurement units and change them if necessary: (section 7.5)
    - Menu → Settings → Global Units
    - Select your preferred units for density and temperature







System Check

Before using the instrument for measurements, it is advisable to perform a quick check of the system:

1. Check the battery level (the battery icon should indicate a full charge)
2. Make sure the filler tube is fitted correctly

3.4 Preparing for the first measurement

After completing the initial setup and system verification, the MicroDens is ready for the first measurement:

1. Select an appropriate method for your sample (the "Ethanol" method is set as default)
2. Immerse the filling tube in the sample
3. Press the PUSH button to draw the sample into the measuring cell
4. The measurement will start automatically

Before performing measurements on real samples, it is advisable to practice the filling and cleaning procedure using distilled water to familiarize yourself with the operation of the instrument.

4 Measuring principle

4.1 Definition of density

The density (ρ) of a sample is defined as its mass (m) divided by its volume (V):

$\rho = m/V$

Since volume changes with temperature, density is a temperature-dependent unit of measurement.

4.2 Measurement method system (MEMS)

The MicroDens operates on the principle of MEMS (microelectromechanical system) technology, a miniaturized and advanced version of the traditional oscillating U-tube method.

Rather than using a conventional glass tube, the MicroDens uses a silicon microcircuit with an omega-shaped channel etched into it. This microchannel is electrostatically excited to oscillate in a vacuum environment. The characteristic oscillation frequency changes depending on the density of the sample filling the microchannel.

The resonant frequency of the microchannel depends on the total mass of the oscillating system, which includes the mass of the channel itself and the mass of the sample inside it. As the sample density increases, the oscillation frequency decreases.

A platinum resistor-based temperature sensor integrated into the MEMS chip precisely measures the sample temperature directly at the measurement point, enabling automatic temperature compensation in real time.

4.3 Concentration

In binary mixtures, the density of the mixture is a function of its composition. Therefore, with the help of density/concentration and temperature tables, the density and temperature values of a binary mixture can be used to calculate its composition.

This procedure is also applicable to so-called quasi-binary mixtures, which contain two main components and some additional ones in concentrations very small compared to the two main components.

For example:

- Decarbonated soft drinks can be considered quasi-binary mixtures of sugar and water
- Determination of alcohol concentration in distilled spirits
- Analysis of chemical solutions such as acids, bases and solvents

The Digital Density Meter uses built-in conversion algorithms that allow you to directly display results in application-specific units, such as °Brix, °Plato, alcohol percentage, or other concentration parameters.

5 MicroDens - An Overview

The MicroDens represents the latest generation of portable digital density meters, designed specifically for industrial environments by Gibertini Elettronica. This precision instrument offers reliable density and concentration measurements for a wide range of industrial, scientific, and quality control applications.

5.1 Main features

- High precision: Density measurements with accuracy up to ±0.0001 g/cm^3
- Touchscreen display: Graphical interface with 2.8" touch control
- Method storage: 44 predefined in the firmware, available according to the application package (standard: Food & Beverage); up to 20 user methods
- 5 flexible measurement modes: Precise, Fast, Manual, Slow, and Viscous
- Automatic temperature compensation
- Calculation of derived parameters
- Connectivity: Integrated Bluetooth for data transfer and printing

6 Description of the instrument

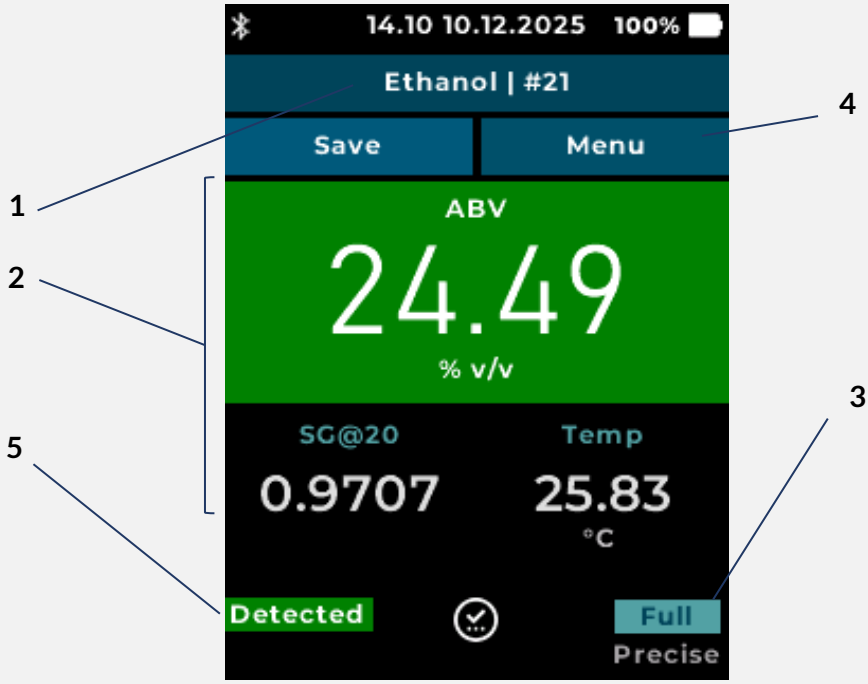
6.1 Front/Rear View



N.	Component Name	Function
1	Power button (PWR)	To turn the instrument on and off
2	Touchscreen display	2.8" TFT color display shows results, menus and system information
3	Navigation keys	UP and DOWN buttons to navigate menus or change values
4	PUSH physical button	To activate the filling/cleaning pump
5	SET button	To confirm selections or access submenus
6	USB-C connector	For charging and communication with PC
7	Battery compartment	For battery housing
8	Sampling syringe window	To access the O-ring for the greasing procedure
9	Measuring cell	
10	Filling tube	For sample suction into the measuring cell

6.2 Home Page

The main screen displays all essential information relating to the measurement and status of the device



N.	Section	Element	Description
1	Header	Method	Displays the measurement method (e.g. "Ethanol")
		Sample ID	Shows the identifier assigned to the sample under examination
		Battery symbol and perc.	Indicates the battery charge level
		Current time	Displays the current time (e.g. 14.10)
		Date	Displays the current date (e.g. 10/12/25)
		Connectivity indicators	Shows the status of Bluetooth connections
2	Results display fields	Main field	Displays the value of the selected primary parameter (e.g. 24.49 v/v % ABV)
			The green background indicates that the data is stable based on the chosen measurement mode, if limits are used, the green color signals the data compliance.
		Secondary fields	Density/ SG (e.g. 0.9707)
			Temperature (e.g. 25.83 °C)
3	Status bar	Mode	Indicates the active measurement mode (e.g. "Precise")
		Cell state	Indicates the cell's filling status (e.g. "Full")
		Central icon	Measurement status indicator
4	Key functions	Save	Save the measurement result to the internal memory
		Menu	Access the device's main menu
5	Indicator/Status	Learning	SmartStabilizer status: “Learning” until the sample is detected, “Detected” once the sample is detected and the reading is stable.
		Detected	

6.2.1 Navigation

To navigate through the various functions of the device:

- Use the function keys displayed at the bottom of the screen
- To save a measurement, press the "Save" button
- To access the main menu and settings, press the "Menu" button

6.2.2 Physical buttons and touch pad

The MicroDens features an intuitive control system that combines physical buttons and a capacitive touch pad that allows you to control the instrument simply by touching the buttons on the screen.

Key	Function
PWR	To turn the instrument on and off.
UP	Allows you to scroll up through options or increase values
DOWN	Allows you to scroll down through options or decrease values
SET	Confirms the current selection or accesses the selected submenu
PUSH	Single physical button : activates the pump to fill or empty the measuring cell

The integrated touchpad allows for quick and intuitive navigation through the user interface. Simply touch the on-screen buttons to:

- Select options from the menus
- Confirm or cancel operations
- Save measurement results
- Navigate between different pages and screens

The integration between physical keys and the touchpad offers flexible user experience, allowing you to interact with the instrument in the most comfortable way according to the operating situation.

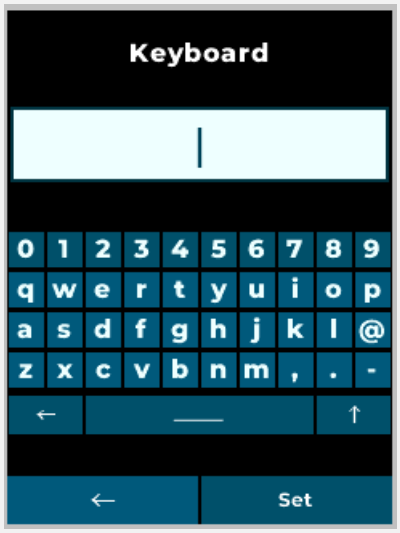
Quick Return to the Home page
At any point in the menu or on any firmware page, tapping the page title automatically returns you to the Home page. This shortcut is always active and allows you to quickly exit submenus or advanced functions without having to repeatedly press the Back button.

Auto-scroll
By briefly holding down the UP or DOWN key, the cursor automatically begins scrolling through the available options, eliminating the need to repeatedly press the key. This feature is particularly useful for quickly navigating through menus with many items or for entering characters into the virtual keyboard. Releasing the key stops scrolling immediately at the selected item.

6.3 Alphanumeric keyboard

When you need to enter text (e.g., a method name, sample ID), MicroDens displays the alphanumeric keyboard screen.
You can fill in the text field in two ways:

- Using the touch screen
  - Directly touch the keys with the desired letters or numbers.
  - Tap the back arrow key to delete the last character entered.
  - When the text is complete, tap Set to confirm and return to the previous screen

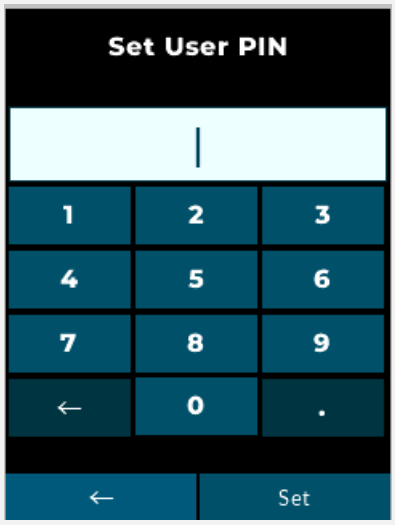


- Using the physical keys (UP/DOWN/SET)
  - Use the UP/DOWN keys to move the highlight to the on-screen keyboard keys.
  - Press the SET button to enter the selected character.
  - Move to the back arrow key and press SET to delete the last character.
  - Move to the Set button and press SET to confirm the entered text.

6.4 Numeric Pad

To enter numeric values (temperatures, limits, coefficients, PINs, etc.), the instrument displays a simplified numeric keypad.

- Using the touch screen
  - Tap the desired numbers in the correct order.
  - Use the left arrow key to delete the last digit entered.
  - Use the "." key to enter the decimal separator when prompted.
  - Touch Set to confirm the value and return to the previous screen .



- Using the physical buttons (UP/DOWN/SET)
  - Use UP/DOWN to select the number key on the display.
  - Press SET to enter the selected digit.
  - Select the back arrow and press SET to delete the last digit.
  - Select Set and press SET to confirm the entered value.

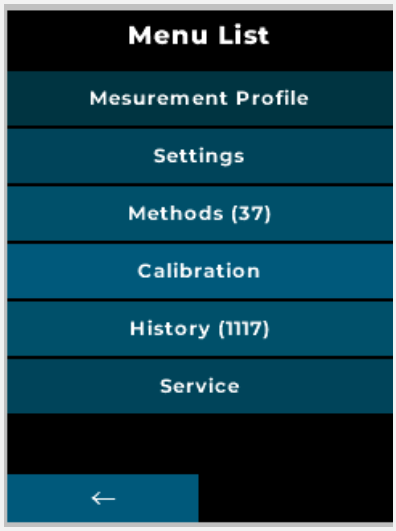
7 Instrument Settings

This chapter illustrates all the available settings that allow you to customize your MicroDens portable Digital Density Meter to your specific needs and preferences.

7.1 Accessing the Settings Menu

To access the instrument settings:

1. From the Home Page, tap the Menu button
2. Select Settings from the main menu
3. Navigate through the settings using the arrow keys or by tapping the fields on the screen directly.
4. Press the Set button to confirm your selections



7.1.1 Device Information

To view the technical information of your device:

1. Tap Menu → Settings → Device Information
2. Information Available
    - Model: Model Name of the instrument
    - Firmware Version: Current software version
    - Device serial number: Unique identifier of the device
    - Manufacturing Date
    - Sensor Info: Sensor type
    - Sensor Serial Number

This information is required for technical support.

7.2 Language Setting

1. Tap Menu → Settings → Device Settings → Language
2. Use the arrow keys to select your preferred language from those available
3. Press SET to confirm your selection

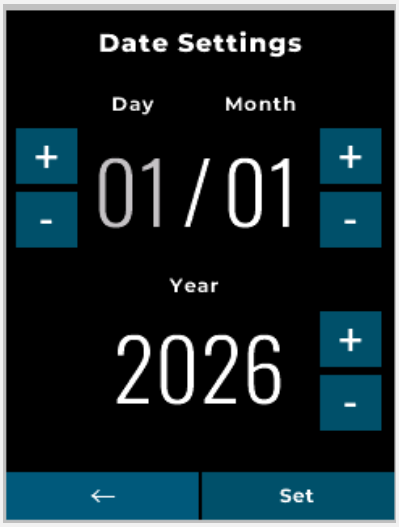
Changing the language is immediately applied to all instrument screens and menus.

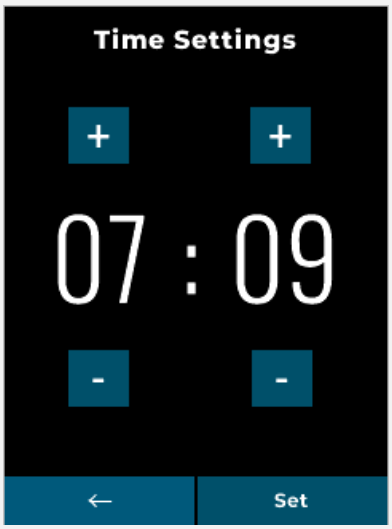
7.3 Date and Time Settings

The date and time information is automatically saved with each measurement and displayed in the header of the main screen.

7.3.1 To set the date or time:

1. Tap Menu → Settings → Device Settings → Date and time
2. Select **Set date** or **Set time**, then press SET
3. Enter the current date or time
4. Tap **SET** to confirm





7.3.2 To set the date or time format:

1. Tap Menu → Settings → Device Settings → Date and time
2. Select **Date Format** or **Time format**, then press SET
3. For the date format, select one of three options:
    - DD.MM.YYYY (Day.Month.Year)
    - YYYY-MM-DD (Year-Month-Day)
    - MM/DD/YYYY (Month/Day/Year)
4. For the time format, select one of two formats:
    - 24 hours (24-hour clock)
    - AM/PM (12-hour clock)

7.4 PIN protection

You can protect access to the menu with a PIN (Personal Identification Number). Once PIN protection is enabled, you can still use all the functions in the quick access area (perform measurements and checks, select methods and sample IDs, etc.) without having to enter a PIN.

7.4.1 To activate PIN protection / New PIN :

1. Tap Menu → Settings → Device Settings → PIN Setting
2. Select **Activate PIN**
3. Enter a 4-digit PIN on the numeric pad and confirm with SET. PIN protection is activated.
4. To change the PIN later, select **Change PIN**
5. Enter the new 4-digit PIN and confirm with SET

7.4.2 To disable PIN protection:

1. Tap Menu → Settings → Device Settings → PIN Setting
2. Enter the active PIN when prompted (when opening **Settings**)
3. Tap **Deactivate PIN**. The instrument shows «PIN deactivated successfully».

Be sure to remember the PIN you set, as you won't be able to disable PIN protection without it.

7.5 Global Units (Density and Temperature)

The MicroDens Density Meter allows you to select different Measurement Units to display density and temperature results based on your preferences or the specific requirements of your application.

7.5.1 Set the density unit:

1. Tap Menu → Settings → Global Units
2. Select **Density Units**, then press SET
3. Use the arrow keys to select the desired density unit:
    - g/cm^3 (grams per cubic centimeter)
    - kg/m^3 (kilograms per cubic meter, where 1 g/cm^3 = 1000 kg/m^3)
    - lb/gal (US) (pounds per US gallon, where 1 g/cm^3 = 8.3454 lb/gal)
    - lb/gal (IP) (pounds per imperial gallon, where 1 g/cm^3 = 10.0224 lb/gal)
4. Press SET to confirm your selection

7.5.2 Set the temperature unit:

1. Tap Menu → Settings → Global Units
2. Select **Temperature Units**, then press SET
3. Use the arrow keys to select the desired temperature unit:
    - C (Celsius degrees)
    - F (Fahrenheit degrees)
    - K (Kelvin)
4. Press SET to confirm your selection

7.5.3 Notes on using Measurement Units

- The selected units are applied to all measurement methods and will be used to display the results on the main screen.
- The values saved in the internal memory maintain the Measurement Units selected at the time of measurement
- Changing the Measurement Units does not affect the accuracy of the measurement, but only the way the results are displayed and stored.
- The instrument's adjustment includes an offset always expressed in g/cm^3 with an accuracy of up to five decimal places.

7.5.4 Common Conversion Factors

From	TO	Conversion factor
g/cm^3	kg/m^3	× 1000
g/cm^3	lb/gal (US)	× 8.3454
g/cm^3	lb/gal (IP)	× 10.0224
°C	°F	(°C × 9/5) + 32
°C	K	°C + 273.15

Conversions are handled automatically by the MicroDens firmware; this table is provided for reference only.

7.6 Display Settings

7.6.1 Set the display brightness:

1. Tap Menu → Settings → Display
2. Select **Display brightness**, then press SET
3. Use the arrow keys to select the desired brightness level (from 20% to 100%)
4. Press SET to confirm your selection

7.6.2 Set display dimming or reduce screen brightness:

1. Tap Menu → Settings → Display
2. Select **Display Dimming**, then press SET
3. Select a timeout option for attenuation:
    - Off (disabled - no automatic dimming)
    - 30 seconds
    - 60 seconds
    - 90 seconds
    - 120 seconds
4. Press SET to confirm your selection

When dimming is enabled, the display will automatically dim after the selected period of inactivity to conserve power. Tap any button or the screen to restore normal brightness.

7.6.3 Auto Stand-by

This feature allows you to set a period of inactivity after which the device automatically enters standby mode, reducing power consumption without shutting down completely.

Path: Menu → Settings → Display → **Auto Stand-by**. Select the desired interval.

The available options are:

- Off (disabled)
- 60 seconds
- 90 seconds
- 120 seconds
- 180 seconds

When the set time elapses without any interaction, the device goes into standby. To reactivate it, simply press a button.

7.6.4 Set auto power off:

1. Tap Menu → Settings → Display
2. Select **Auto power off**, then press SET
3. Select a timeout option for automatic shutdown:
    - Off - Disabled (no automatic shutdown)
    - 5 minutes
    - 10 minutes
    - 15 minutes
    - 30 minutes
4. Press SET to confirm your selection

When the auto-off feature is enabled, the device will automatically turn off after the selected period of inactivity to conserve power. Press and hold the power button (PWR) for 3 seconds to turn the device back on.

7.7 Connections

The MicroDens supports several connection modes for data export and printing.

7.7.1 Export Destination Configuration

To set the destination:

1. Tap Menu → Settings → Connections → Export destination → Destination
2. Select one of the available options:
    - None: Disable external connections (maximum power saving)
    - Bluetooth Printer: For direct printing via a compatible BLE Bluetooth printer
    - Computer: For data transfer to the PC via the MicroDens BLE dongle.

On the same page, the **Save Only If Offline** option (ON/OFF) determines whether a measurement sent to the PC with **Save** is also kept in the instrument memory. The option is off by default (OFF): the instrument also keeps in memory the measurements sent to the computer. Tap the item to switch between ON and OFF:

- ON: with destination **Computer**, the measurement is saved in memory only if sending to the PC fails (BLE dongle not connected or transmission error). If sending succeeds, the measurement is not saved in the instrument.
- OFF (factory default): the measurement is always saved in the instrument memory, even when sending to the PC succeeds. With destination **None** or **Bluetooth Printer** the option has no effect: the measurement is always saved.

7.7.2 Connection Mode

Bluetooth printer

- Use the Bluetooth (BLE) thermal printer supplied by Gibertini
- The instrument connects automatically to the switched-on printer, without pairing
- Automatic printing when the measurement is saved (if the method includes printing) or from Menu → History → **Print Last**

Currently, the instrument's software is designed to communicate only with the printer supplied by Gibertini. It is not possible to connect or use Bluetooth printers from other manufacturers with the MicroDens.

PC with MicroDens BLE dongle

- Connect the BLE dongle to the PC
- Each BLE dongle is identified by its own unique serial number (S/N), shown in the name with which the dongle appears on the instrument in the **Select Dongle** page (format MicroDensDongle-<S/N>). An operator using multiple dongles can thus recognise the workstation to which the instrument sends data.
- Start the receiving software on the PC (MicroDens Data Logger or MicroDens Logger Pro)
- Export data via Menu → History → Send Data

PC-USB Direct

- Connect USB-C cable to PC
- Use terminal software or dedicated application
- Serial communication at 115200 baud, 8N1

For complete details on USB commands and communication parameters, see Appendix E—PC-USB Communication.

7.7.3 Selecting and managing dongles (multiple dongles)

When the destination (**Export destination**) is set to **Computer**, the device connects via Bluetooth to a BLE dongle. If there is more than one dongle switched on in the environment, MicroDens allows you to choose which one to connect to and remembers your choice.

7.7.3.1 Where to find the list of visible dongles on the device

Tap Menu → Settings → Connections → BLE Dongle.

- The **Select Dongle** page opens, listing all dongles within range.
- Each entry is identified by the dongle's name/serial number (format: MicroDensDongle-<S/N>) and the list is sorted by signal strength: the nearest dongle appears at the top.

- Tap an entry to connect to that dongle; the Back button cancels without changing the connection.

7.7.3.2 Automatic behaviour and priority

To avoid disrupting the most common usage (1 instrument ↔ 1 dongle), in most cases you do not need to do anything. The instrument decides in the following order:

1. A previously paired dongle is present → it reconnects automatically and silently, recognising it by its unique address (even after the instrument has been switched off or restarted). (Highest priority.)
2. No paired dongle and only one dongle within range → automatic connection, and that dongle is saved as the default.
3. No paired dongle and two or more dongles within range → the **Select Dongle** page opens automatically.

4. Paired dongle not present, but others available → the device does not automatically connect to another dongle (to avoid sending data to the wrong workstation): the selection page is displayed.
5. No dongles within range → the search continues in the background, without displaying any message.

7.7.3.3 Changing the Dongle device (reassignment)

To move the device to another dongle (e.g. 'today I'm sending the data to another location'), open

Menu → Settings → Connections → BLE Dongle

The device will disconnect from the current dongle, refresh the list in real time and display the available dongles.
Select the one you want: the new selection replaces the previous one and is saved.

How to identify the correct dongle
- Name in the list: each entry shows the dongle serial number (format MicroDensDongle-<S/N>), to be compared with the serial number of the dongle connected to the PC.
- Position in the list: the dongle with the strongest signal (the closest one) is at the top.

7.8 Factory Reset

Tap Menu → Settings → Factory Reset, then tap **OK** to confirm. The instrument shows «Factory reset completed successfully».

This action resets most of the instrument's settings to their factory default values. In detail:

What is restored:
- Language: Set to the default language (English).
- Measurement methods: The factory default methods are restored. User-created custom methods are not deleted by the reset: they remain stored and remain available. To delete a custom method, use the dedicated function on the Menu → Method Manager → Delete page.
- Active method: Set to "Ethanol".
- Sample ID: Set to running counter mode.
- Date and time formats: Date in DD.MM.YYYY format, 24-hour clock.
- Measurement mode: set to "Precise".
- Export destination: None.
- Export data format: delimiter set to comma (,), decimal separator set to dot (.).
- Measurement Units: temperature in °C, density in g/cm^3.
- PIN protection: disabled.
- Factory preset custom parameters, including display parameters, power saving, connections, firmware settings, data export and other general settings.

What is automatically preserved and restored:
- Device serial number
- Unique device ID
- Factory calibration
- Custom user information (e.g. operator name or notes)
- Hardware and software versions
- Saved adjustment parameters, including adjustment offsets accurate to five decimal places in g/cm^3
- Specific parameters (number of decimal places for density, alcohol and temperature)
- Active sensor parameters (software options, liquid type, sensor offset)

- Stored measurements, sample IDs and adjustment history

This data is retained to ensure operational continuity and traceability, preventing it from being deleted during the reset.

7.9 Methods

Methods are sets of pre-configured measurement settings that allow you to quickly switch between applications without having to manually reconfigure each parameter.

7.9.1 Structure of the methods

Each MicroDens method includes the following settings:

- Method Name : The method identifier (up to 20 characters, can contain letters "A-Z", digits "0-9", special characters ".", "-", "@", and spaces)
- Measurement parameters :
  - Parameter 1 : The main parameter displayed (e.g. density, °Brix, %alcohol)
  - Parameter 2 : An optional secondary parameter
- Limits : Minimum and maximum acceptable values for Parameter 1
  - Results outside these limits are highlighted with a red background.
  - Useful for immediately identifying out-of-spec samples
- Temperature Coefficient Alpha: Used to calculate density at temperatures other than the measurement temperature
- Measuring Way: Precise, Fast, Manual, Slow, Viscous
- Print:
  - No Print: Does not print automatically
  - Data: Print only the essential values
  - GLP: Print a comprehensive Good Laboratory Practice compliant report, including all measurement details, date, time, instrument and adjustment.

7.9.2 Mode (Measuring Way)

MicroDens uses advanced digital filtering algorithms to ensure accurate and stable results. Each mode implements optimized parameters to balance accuracy and speed.

Precise Mode (PRECISE)

- When to use: For measurements requiring maximum accuracy and repeatability
- Algorithm: Adaptive stability system with automatic detection of changes
- Stability Criterion: The instrument waits for a series of stable consecutive readings before showing the result as stable
- Time: Variable based on temperature and sample stability
- Visual indicator: Green background when stable, blue when not stable, red if out of tolerance

Fast Mode (FAST)

- When to use: For routine checks where response time is important
- Algorithm: Filtering optimized for speed while maintaining good accuracy
- Stability Criterion: The instrument waits for stable readings using a less strict criterion than Precise mode: the result is available sooner but is less repeatable
- Time: Variable, significantly faster than Precise mode
- Visual indicator: Green background when stable, red if out of tolerance

Manual Mode (MANUAL)

- When to use: For problematic samples or when direct operator control is required
- Algorithm: Minimal filtering with continuous real-time value display
- Storage: Press the Save button when the displayed value is deemed stable by the operator
- Time: Instant on user command
- Note: No automatic stability criteria - operator's responsibility

Slow Mode (SLOW)

- When to use it: For moderately viscous samples such as light oils, diluted syrups or solutions with viscosity between 5-15 mPaS
- Algorithm: Same adaptive stability system as Precise mode, combined with reduced motor speed and maximum motor torque (100%)
- Stability Criterion: Identical to Precise mode
- Stabilization time: Variable based on sample viscosity and temperature
- Visual indicator: Green background when stable, blue when not stable, red if out of tolerance
- Note: Reduced motor speed prevents over-agitation of the sample, ensuring more stable readings with viscous liquids

Viscous Mode (VISCO)

- When to use it: For highly viscous samples such as thick oils, concentrated syrups, honey, or solutions with viscosity greater than 15 mPaS
- Algorithm: Same adaptive stability system as Precise mode, with minimum motor speed and maximum motor torque (100%)
- Stability Criterion: Identical to Precise mode
- Stabilization time: Variable based on sample viscosity and temperature
- Visual indicator: Green background when stable, blue when not stable, red if out of tolerance
- Note: Designed for the most demanding viscous samples. The very low motor speed, combined with maximum torque, ensures reliable sample handling and accurate measurements even with dense fluids.

Comparison of Measurement Modes

Mode	Target Samples	Motor Speed	Precision	Typical Time
Precise	Standard liquids	Normal	Maximum	Variable
Fast	Routine checks	Normal	Good	Short
Manual	Problematic samples	Normal	At the operator's discretion	Instant
Slow	Moderately viscous	Reduced	Maximum	Longer
Viscous	Highly viscous	Minimum	Maximum	Longer

For most applications, start with Precise mode. Switch to Fast mode only if the measurement times are too long and the application allows for lower accuracy.

7.9.3 Predefined methods and application packages

The methods available on the instrument depend on the installed application package; the standard package is Food & Beverage. Up to 20 user methods can be added. The standard package is complemented by application packages dedicated to different sectors, which can be unlocked to extend the instrument's capabilities with specific methods. The method library is therefore constantly evolving and can be expanded over time with firmware releases and the activation of new packages.

All methods, whether predefined or packaged, can be customized: modifying a method automatically generates a copy as a user method, adaptable to your needs (name, control limits, measurement settings), while the manufacturer-certified original remains available and unchanged. The actual list of methods present on your instrument can be consulted at any time via Menu → Method Manager.

Spirits US: predefined method for the strength of spirits as used in the United States. Parameter 1 is US Proof and parameter 2 is ABV @60F (% vol at 60 °F); both are referred to 60 °F and calculated on the basis of the AOAC/TTB tables (27 CFR 30.66, Table 6). The calculation applies to water-ethanol mixtures and to distillates. For liqueurs and aged spirits, the true strength is determined on the distillate.

The Spirits US method is intended for quality control and label verification of alcoholic strength. It does not replace instruments approved for the fiscal determination of proof. For Canada, where alcoholic strength is referred to 20 °C, the Ethanol method applies. For use in the United States, setting the temperature unit to °F is recommended (section 7.5.2). The ABV @60F and SG 60/60F parameters can also be selected in user methods (Appendix D.2).

7.10 Method Management

The system allows you to create custom methods and modify existing ones. The methods are divided into:

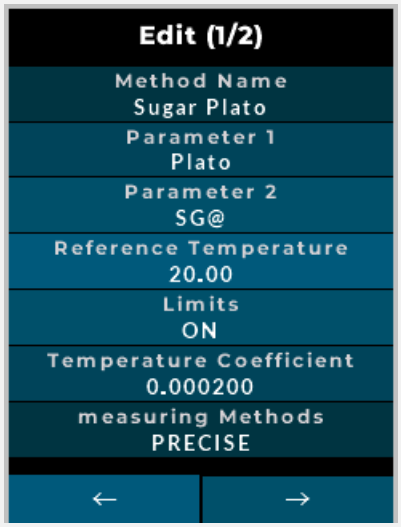
- Default methods: Provided by the system; cannot be modified or deleted
- User Methods: Created by the user or duplicated from predefined methods, fully customizable

7.10.1 Creating a New Method

Path: Menu → Method Manager → Create New

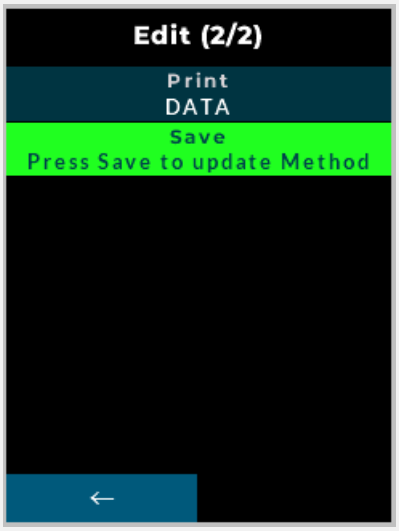
The configuration screen opens with the following settings:

1. Configurable parameters (Page 1):



- Method Name: Enter a unique and descriptive name (max 20 characters)
- Parameter 1: Select the main parameter to display
- Parameter 2: Select the second parameter (based on Parameter 1)
- Reference Temperature: Set the reference temperature (default 20°C)
- Limits: Enable and configure upper and lower limits for quality control
- Temperature Coefficient (α): Set the thermal expansion coefficient (if applicable)
- Offset: bias correction of Parameter 1
- Tap ► to go to the next page

Configurable parameters (Page 2):



- Print: Select the print mode (No Print, Data, GLP)
- Measuring Way: Select the measuring mode (Precise, Fast, Manual, Slow, Viscous)

2. Once setup is complete, press Save
3. The method is saved and added to the user methods list
4. Press Back to return to the Method Management menu

The method name must be unique and cannot be the same as that of an existing method (built-in or user-defined). All user-defined methods are displayed in the list after the built-in methods

7.10.2Modifying an Existing Method

Path: Menu → Method Manager → Edit

Procedure:

1. The complete list of methods (default + user) is displayed.
2. Scroll through the list using ◄ and ►
3. Tap the method you want to change
4. The editing screen opens with all the method parameters

Default Method	User Method
• The system automatically duplicates the method as a new method	• The method is modified directly
• The original default method remains unchanged	• All changes overwrite the existing configuration
• You can change all parameters of the new method, including the name.	• Make the desired changes to the parameters
• The new method is saved in the user methods list	• Press Save to confirm the changes

If you modify the default “Ethanol” method, the system automatically creates a new user method that you can rename and customize as you like.

7.10.3Deleting a Method

Path: Menu → Method Manager → Delete

Procedure:

1. The list of user methods is displayed
2. Scroll through the list using ◄ and ►
3. Tap the method you want to delete
4. A confirmation message appears: Title: “Delete Method” text: "[Name] Confirm action?"
5. Tap OK to confirm
6. The method is permanently removed from memory
7. Tap Back to return to the Method Management menu

Special cases	Default Methods
• *“No user methods found” is displayed.*	• They can be selected for measurements
• Method currently in use: You can also delete the currently selected method for measurements (the system automatically returns to the default method)	• They CANNOT be modified directly
	• They do NOT appear in the delete list
	• They CANNOT be deleted

This protection ensures that the manufacturer's certified methods always remain available and unchanged.

7.10.4Complete Flow Example

Scenario: Customizing the default "Ethanol" method

1. Menu → Method Manager → Edit
2. Select "Ethanol" from the list
3. The system automatically duplicates the method by creating "Ethanol" (user method)
4. Change the name to "MyMet"
5. Change control limits: Min = 39.5%, Max = 40.5%
6. Press Save
7. The new method " MyMet" is now available in the methods list after the default methods.
8. The default "Ethanol" method remains unchanged

7.11 Assigning a Method to a Measurement

To select the method to use for measurements:

Path: Menu → Measurement Profile → Methods

or

press the touch screen near the preset method (blue button at the top of the screen, then press Methods)

Procedure:

1. The list of available methods is displayed
2. Scroll through the list using the ◄ (previous page) and ► (next page) buttons
3. Tap the desired method to select it

Confirm selection:

- The selected method is displayed in the top button of the Home Page
- All subsequent measurements will use this method until a different one is selected.

Example:
If you select the "Beer DryExt" method, the Home button will show:

Beer DryExt | #127 (where #127 is the progressive measurement counter or the selected Sample ID)

The button always displays the current method along with the sample ID or the running counter, depending on the configuration.

7.12 Defining and Displaying Control Limits

Quality control limits allow you to automatically identify when measurement results fall outside the desired specifications.

7.12.1Configuring Limits

Path: Menu → Method Manager → Edit → [Select Method] → Limits

Procedure:

1. Select the method to add/edit limits to
2. On the method setup page, tap Limits
3. The limits configuration screen opens with two fields:
    - Upper Limit (Max): Maximum acceptable value
    - Lower Limit (Min): Minimum acceptable value
4. Tap Upper Limit and enter the desired maximum value
5. Press Set to confirm
6. Tap Lower Limit and enter the desired minimum value
7. Press Set to confirm
8. Press Back to return to the method setup page
9. Press Save to save your changes

Automatic activation: Limits are automatically activated when a value other than zero is entered for the upper or lower limit.

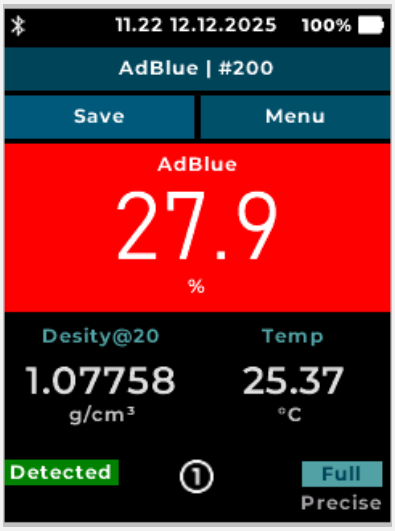
7.12.2To Which Parameters Do the Limits Apply ?

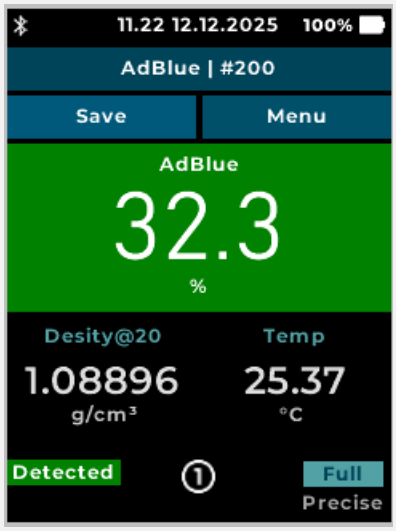
The system allows you to configure limits for Parameter 1 of the method:

- Parameter 1: Limits configurable via the user interface

Quality Control:
For the final quality control of the measurement, only Parameter 1 is checked:

- If Parameter 1 is out of limit → The measurement is marked as OUT_OF_LIMITS





7.12.3Displaying Limits During Measurement

When taking a measurement with a method that has limits enabled:

During measurement (Home Page):

- The system automatically checks whether Parameter 1 is within the limits
- A confirmation screen appears with:
  - GREEN background if Parameter 1 is stable within limits (OK)
  - RED background if Parameter 1 is out of limits (OUT_OF_LIMITS)

7.12.4View in History

The measurements saved are marked according to their quality status:

In the history list:

- Green icon or "OK" indicator: Parameter 1 within limits
- Red icon or indicator "OUT_OF_LIMITS": Parameter 1 out of limits

7.12.5Disabling Limits

To disable the limits of a method:

1. Access the method configuration (Edit → *Select Method* → Limits)
2. Set both limits (upper and lower) to 0.0000
3. Press Save

When limits are disabled, all measurements are considered OK regardless of their value.

7.12.6Default Limits

The manufacturer's default methods have preconfigured limits based on technical specifications. When you duplicate a default method, the limits are automatically copied to the new user method and can be freely modified.

Important Notes

- The limits apply to the units shown on the display (taking into account any active conversions)
- If you change the unit of measurement for Parameter 1, the limits must be updated accordingly
- The limits are permanently saved with the method and applied to all subsequent measurements
- Limit checking occurs in real time during measurement
- Measurements outside the limits are still saved (they are not rejected), but marked for traceability

7.13 Method offset

7.13.1Purpose

Each method has an Offset field: a correction value that can be set manually and independently for each method, which is automatically added to Parameter 1 in every measurement performed using that method.
It is a fine-tuning tool available to the operator, which allows—when deemed appropriate—the reading of Parameter 1 to be aligned with a reference value. The correction is limited to the individual method and does not alter the instrument's adjustment in any way.
The field is optional: if left at 0, the method operates without any correction. The offset is set in the unit of measurement displayed for Parameter 1 and can be positive or negative.

7.13.2Difference from Adjustment (Water / Standard)

It is important not to confuse the two functions which operate at different levels:

	Adjustment (water / standard)	Method offset
What it affects	the measuring cell (the entire instrument)	only Parameter 1 of the specific method
Scope	global, applies to all methods	limited to that method
When to use it	to bring the cell back to true value (e.g., distilled water)	to align a specific product with the laboratory reference

Adjustment keeps the cell "true" and should not be used to correct for the bias of a single product (it would throw off all other measurements). The method offset applies the correction exactly where it's needed, without affecting the cell adjustment. The two levels are independent and add up.

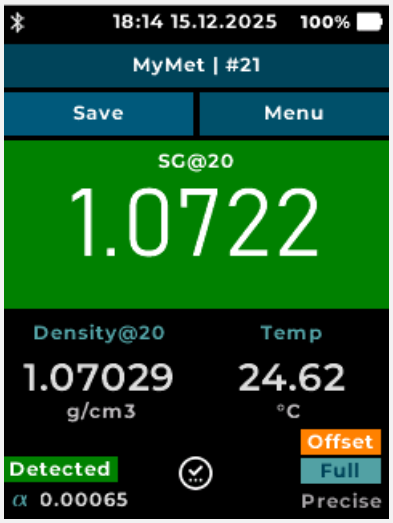
7.13.3How To Set it Up

- Open Menu → Method Manager → Edit (or create a new method) and select the desired method.
- On page 1 of the editor, select the Offset option.
- Enter the offset value using the numeric keypad (as an absolute value) and confirm with SET.
- Select the sign on the screen that appears:
  - Add (+) → the offset is added to the result;
  - Subtract (−) → the offset is subtracted from the result.
- Go back and save the method.

The offset is entered in the unit of measurement currently displayed for Parameter 1. If you leave the value at 0, the offset is disabled and the method behaves exactly as before.

The change takes effect immediately: if you modify the offset of the active method and save, the correction is applied immediately to subsequent measurements, without having to restart the instrument or reselect the method.

7.13.4The “Offset” Badge on the HomePage



When a measurement is in progress with a result displayed on the screen and the active method has a non-zero offset, the “Offset” indicator appears on the Home Page. This serves to remind the operator that the displayed value includes an offset correction. The indicator disappears when the chamber is empty or if no offset is set for the method.

(Similarly, the temperature coefficient α indicator appears when the method applies an α correction.)

- The offset affects only Parameter 1; Parameter 2 remains unchanged.
- The offset is a property of the method: each method has its own, and it is saved along with the method.
- Use the offset only when you have a reliable laboratory reference for the product: an incorrect offset will skew all measurements for that method.

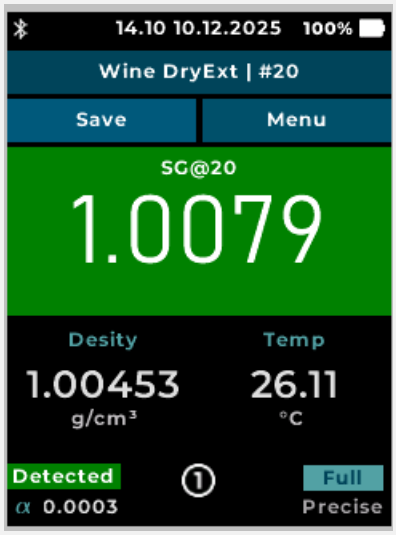
7.14 Double reading methods

Some MicroDens methods, such as BeerQuick, Beer DryExt, and Wine DryExt, use a two-reading, correlated procedure to calculate advanced parameters (alcohol, true/dry extract, attenuation, etc.). The first reading records the sample “as is”/OG, the second reading is performed on a linked sample (fermentation or distillate), and the results are automatically combined using a unique sample ID.

7.14.1Operating principle

With the first reading, the instrument measures the density of the product (e.g., beer wort, grape must, finished beer, finished wine) and saves the value along with a sample ID, date, and time.
With the second reading, the instrument measures the density of the related sample (e.g., fermenting beer/wine or distillate) and uses the pair of readings associated with the same ID to calculate all the parameters required by the method.

7.14.2Common operational flow



1. First Reading (First Reading / As -Is)
   - Select the special method (BeerQuick, Beer DryExt or Wine DryExt).
   - Prepare the sample according to the method instructions (degassing, filtration, if necessary, temperature close to 20 °C).
   - Perform the measurement as a normal measurement.
   - When the value is stable, the top left button displays **Save**. Tap it: the instrument proposes a sample ID on the keyboard (e.g. W_0001, B_0001, BQ_0001), which can be edited. Confirm the ID: the reading is saved as the first reading with that ID.

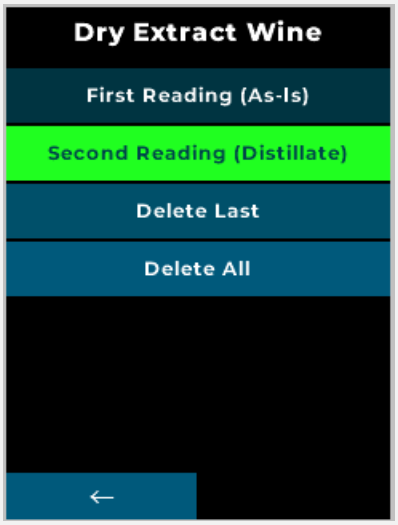
2. Rinse the instrument and prepare for the second reading
   - Flush and rinse the measuring cell according to the recommended cleaning procedures.
   - Prepare the sample for the second reading (fermenting beer, beer distillate, wine distillate) from the same batch as the first reading, if you intend to proceed immediately.

Quick Access to the Reading Selection from the Home Page
When a dual-reading method is active (Wine DryExt, Beer DryExt, or BeerQuick), an icon displaying the current reading number (1 or 2) appears on the Home Page. Tapping this icon opens the reading type selection page directly, allowing the operator to quickly switch between the first and second readings without having to navigate through the menu.

3. Non-consecutive reading management
   Using these methods does not require the two readings to be performed one after the other, but it is possible, for example:

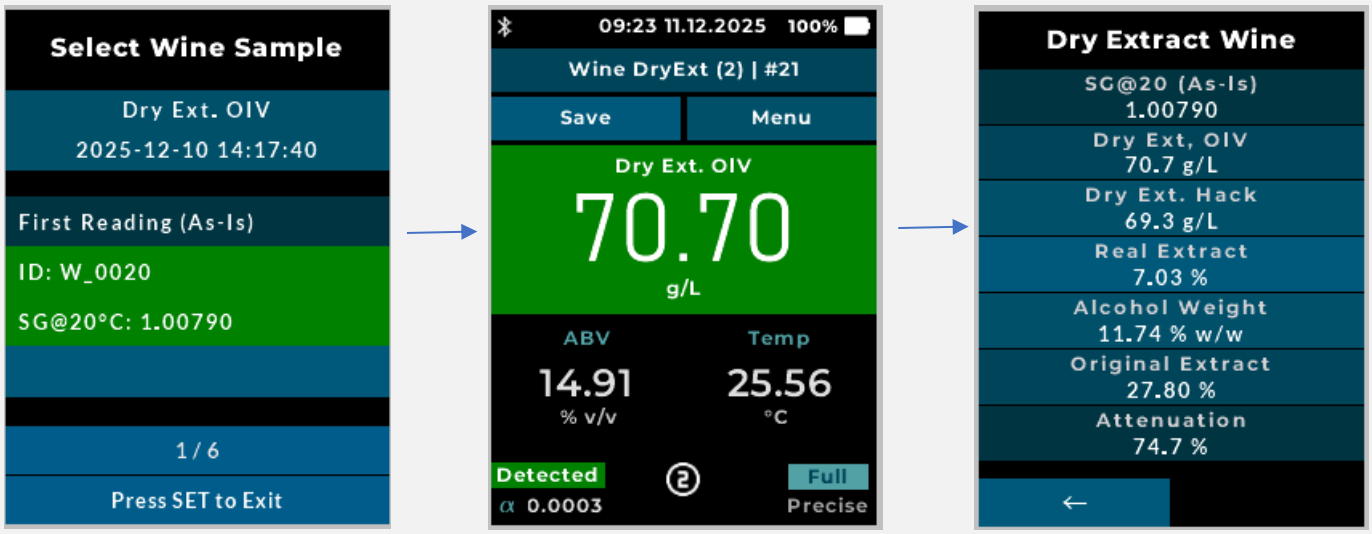
- perform and save all the first readings of a batch (must, wines, finished beers) during the day;
- Later you can recall the saved IDs and proceed with the second readings (intermediate fermentations, distillates) by associating them with the corresponding first readings.
  The first readings remain available until they are manually deleted or exceed the set validity period (default 30 days).

4. Access to the reading management menu (Select button)
   - When you re-enter one of these methods with the cell empty, the button that normally shows Save is replaced by Select.
   - Pressing Select opens the reading management menu, which typically contains:
     - First Reading (As -Is) – for BeerQuick: Original Reading (Wort): to record a new first reading or repeat it.
     - Second Reading (Distillate) – for BeerQuick: Fermentation Reading: to perform a second reading by associating it with an already saved ID.
     - Delete Last: to delete the last reading (As-Is)
     - Delete All: to delete all saved readings for that method.



This behavior of the Save → Select button is specific to double-read methods and is the only exception to the standard operation.

5. Second Reading
   - From the management menu, choose **Second Reading (Distillate)** (for BeerQuick: **Fermentation Reading**).
   - The Instrument displays the list of available sample IDs related to the first saved readings.
   - Select the ID that corresponds to the batch you want to complete and confirm.
   - Fill the cell with the sample for the second reading, wait for stabilization and press Save.
   - The instrument automatically associates the new reading with the selected ID and calculates all derived parameters.


Select Wine Sample
Dry Ext. OIV
2025-12-10 14:17:40
First Reading (As-Is)
ID: W_0020
SG@20°C: 1.00790
1 / 6
Press SET to Exit
09:23 11.12.2025 100%
Wine DryExt (2) | #21
Save
Menu
Dry Ext. OIV
70.70
g/L
ABV
14.91
% v/v
Temp
25.56
°C
Detected
α 0.0003
Full
Precise
Dry Extract Wine
SG@20 (As-Is)
1.00790
Dry Ext, OIV
70.7 g/L
Dry Ext. Hack
69.3 g/L
Real Extract
7.03 %
Alcohol Weight
11.74 % w/w
Original Extract
27.80 %
Attenuation
74.7 %
←

7.14.3Viewing Results

After the second reading, each double reading method presents:

- a main page with key parameters (e.g. ABV and real extract for BeerQuick, real extract and alcohol for Beer DryExt, dry extract and alcohol for Wine DryExt);
- a dedicated results page with all the parameters calculated for that application (reconstructed OG, apparent or dry extract, attenuations, density difference, alcohol by volume and weight, etc.).
    - To access the results page, touch the screen corresponding to the parameter 1 (green) value

Pairs of readings linked by the same sample ID are stored and can be exported via BLE for analysis or traceability.
For these methods, after the base measurement line the instrument sends an extended line with the calculated parameters (see section 10.5.1).

7.15 Sample IDs

Sample IDs allow you to label and track your measurements, making it easier to identify and organize your data.

7.15.1Sample ID Characteristics:

- You can define up to 35 sample IDs
- Each ID can contain up to 19 characters
- Allowed characters: letters "A-Z", digits "0-9", special characters ".", "-", "@" and spaces
- IDs with a counter (containing the "@" character) are limited to 20

The MicroDens offers two types of counters to automatically number measurements:

7.15.1.1 Custom IDs:

- Insert a sequence of "@" characters into the sample ID where you want the counter
- Example: "Tank@@ PV1" in measurement becomes

  "Tank01 PV1", "Tank02 PV1", "Tank03 PV1", etc.

- The number of "@" characters determines the minimum number of digits in the counter (@@ = 2 digits, @@@ = 3 digits). Use at most 4 consecutive "@" characters
- Each ID with a counter has its own counter, which is not reset when another sample ID is selected. The counter returns to 1 only with Delete All in the History menu or with a Factory Reset

7.15.1.2 Counter ID:

- A Counter ID activates a progressive counter with at least 3 digits (e.g. #001)
- This counter continues to count even when you change the sample ID.
- It has no maximum value: it is reset only with Delete All in the History menu or with a Factory Reset

Use custom IDs when you want to track different batches or samples separately. Use the “Counter” ID when you want to maintain a continuous sequential numbering system regardless of the sample.

7.15.2 Sample ID Management

7.15.2.1 Creating a new sample ID:

1. Press Menu→ Measurement Profile → Sample ID → Custom
2. Press New ID
3. Enter the sample ID name using the keyboard (include "@" if you want a counter)
4. Tap Set to confirm
5. Press Back repeatedly to return to the main screen

7.15.2.2 Deleting a Sample ID:

1. Press Menu → Measurement Profile → Sample ID → Custom
2. Press **Delete ID**
3. Select the sample ID to delete
4. Tap OK to confirm the deletion
5. Press Back repeatedly to return to the main screen

You cannot delete a sample ID that is currently in use. First select another sample ID, then proceed with the deletion.

7.15.3Assigning a Sample ID

To use a specific sample ID for measurements:

1. Press Menu→ Measurement Profile → Sample ID → Custom
2. Press "Select ID"
3. Select the desired sample ID from the list
4. Press Set to confirm
5. Press Back to return to the main screen

The selected Sample ID will appear in the main screen header and will be used for all subsequent measurements until a different one is selected.

7.16 Data storage and management

The MicroDens automatically stores measurements in internal memory, allowing you to recall and analyze them later.

7.16.1Memory capacity and organization:

- Capacity to store up to 2,000 measurements
- Circular buffer system (when memory is full, new measurements automatically overwrite older ones)
- Data stored for each measurement:
  - Date and time of measurement
  - Name of the method used
  - Sample ID
  - Value of the first parameter (with name and unit of measurement)
  - Value of the second parameter (with name and unit of measurement)
  - Measuring temperature (with unit)
  - Quality indicator (parameters within limits)
  - Device serial number

7.16.2Viewing stored data:

1. From the main menu, select History
2. Select Data List to access your stored measurements
3. Use the arrow keys (Up/Down) to scroll through the measurements:
   - Up Arrow: Shows the more recent measurement
   - Down Arrow: Shows the older measurement
4. The information displayed includes:
   - Sample ID (header)
   - Date and time of measurement
   - Name of the method used
   - Measured parameters (e.g. Density, Concentration) with values and units
   - Temperature at the time of measurement
   - Counter: indicates the current position in "X/Y" format (e.g. "1/2000")
5. Color code:
   - GREEN background: parameters within tolerance limits (valid measurement)
   - RED background: parameters outside tolerance limits (attention required)

The measurements are sorted chronologically (the most recent one is displayed first, index 1)
The system always retains the most recent data if the maximum capacity is exceeded
Data access is optimized for read speed

7.16.3Memory alert

When the memory reaches 2000 measurements, the instrument displays the warning «Storage full! Old data will be overwritten.»: from then on each new measurement replaces the oldest one. It is recommended to periodically export important data to a PC or printer to maintain a complete measurement history.

8 Measurement

This chapter describes measurement procedures using the MicroDens portable density meter, from sample preparation to viewing and saving results.

8.1 Pre-Measurement Checks

Before starting a measurement, make sure that all the following conditions are met:

8.1.1 Configuring the Instrument

Method selected correctly

- Verify that the method displayed in the top-center button of the Home Page matches the type of sample you are measuring.
- Changing the method: Home → Measurement Profile → Methods

Sample ID configured (optional)

- If you need to uniquely identify the sample, make sure the correct ID is set
- Visible in the top-center button [Method Name] | [ID or #Counter]
- To configure: Home → Measurement Profile → Sample ID

Adjustment valid

- Check the date of the last adjustment (Menu → Adjustment → Adjustment History)
- Daily Verification with ultrapure water at 20°C ± 2°C is recommended (use the predefined Water Check method)

8.1.2 Sample and Temperature Verification

Instrument operating range: -10°C to +60°C (sample temperature inside the measuring cell)

The system continuously monitors the temperature. If the value stays outside the operating range for 10 seconds, the instrument shows the «Warning» window with the message «Temperature out of range.», the measured temperature and the limits. Tap OK to close the window

8.1.3 Tank Full Warning

The system monitors the sample residence time in the measuring cell. After 5 minutes with the cell full, the instrument automatically displays the warning «Cell needs cleaning» with the message «Tank full. Proceed with rinse?».

Why is it important to rinse:

- Avoid contamination of the measuring cell
- Prevents deposits and encrustations
- Ensures accuracy of subsequent measurements
- Protects the internal parts of the instrument

What to do when the message appears:

1. Tap **OK** to start the automatic emptying and rinsing of the cell
2. Tap **Cancel** to keep the cell full and return to the Home Page. The warning is not repeated until the cell is emptied and filled again.

8.1.4 Samples Chemical Compatibility

Before introducing the sample into the cell:

- Check the chemical resistance of the wettable parts of the instrument
- Consult the safety data sheets (SDS) of the sample
- Check compatibility with the cleaning agents you intend to use

WARNING - Dangerous Samples

Flammable samples (Ethanol, IPA, Acetone, etc.):

- Ensure adequate ventilation of the work area
- Keep sources of ignition away (flames, sparks, hot surfaces)
- Use in non-ATEX classified areas (the instrument is not Ex certified)

Corrosive samples (Acids, Bases):

- Check material compatibility
- Use appropriate PPE (chemical gloves, glasses, gown)
- Prepare neutralizers (bicarbonate for acids, citric acid for bases)

Toxic samples:

- Work under a hood or in a ventilated area
- Use appropriate PPE according to SDS
- Prepare emergency spill kits

High viscosity samples (Oils, syrups):

- Check instrument tolerance with sample datasheets
- Check filling accuracy (absence of air bubbles)
- Use Slow or Viscous mode (see sections 6.9.2 and 7.7.1)

8.1.5 Material Preparation

Cleaning solvents
Prepare the appropriate solvents for cleaning the cell:

- Deionized/ultrapure water: For aqueous samples
- Isopropyl alcohol (IPA) or 96% ethanol: For oily samples or after aqueous samples
- Filtered compressed air: For final drying

Typical cleaning sequence:

1. Rinse with appropriate solvent (2-3 cycles)
2. Rinse with IPA (optional, to remove traces of water)
3. Drying with compressed air or waiting for natural evaporation

Sample quantity

- Minimum volume: ~1 mL (for complete cell filling)
- Recommended volume: 5-10 mL (for ease of injection and subsequent cleanup)

Accessory Instruments

- Used sample collection containers
- Containers for cleaning solvents

8.1.6 Instrument Status

Before you begin, check:

Battery level

- Battery icon on the Home Page
- Charge the instrument if level < 10%

Empty and clean measuring cell

- Make sure the cell is completely empty
- Check for any visible residue or deposits
- If necessary, perform cleaning followed by several cycles of aspiration and release with air to help eliminate residual drops of both the previous sample and the washing liquid.

8.2 Sample filling



The MicroDens uses an optimized motorized syringe system to ensure precise liquid filling:

1. Immerse the filling tube in the sample
2. Lightly press the PUSH button to activate the syringe piston
3. The instrument automatically draws the required amount of sample (approximately 1 ml)

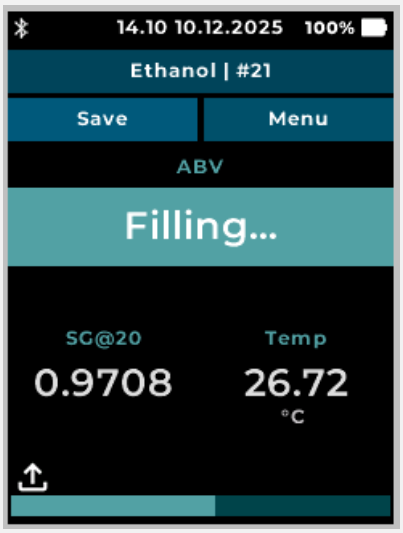
The system has been specially calibrated to ensure optimal filling of the measuring cell.

4. After reading, press the PUSH button again to release the sample. Make sure you have a waste container handy.

This completes the measurement cycle from the filling phase to the sample release after analysis.

8.3 Taking a measurement

Once the measuring cell is filled, the measurement proceeds automatically:



1. Verify that all conditions indicated in section 8.1 are met
2. Fill the sample as described in section 8.2
3. The measurement starts automatically and the instrument sets the motor speed and analyses the data according to the selected measurement mode (Precise, Fast or Manual, Slow or Viscous)
4. During the measurement, a progress bar is displayed indicating the progress of the analysis.
5. Once the measurement is complete, the screen turns green when the result stabilizes, indicating that the analysis is ready.

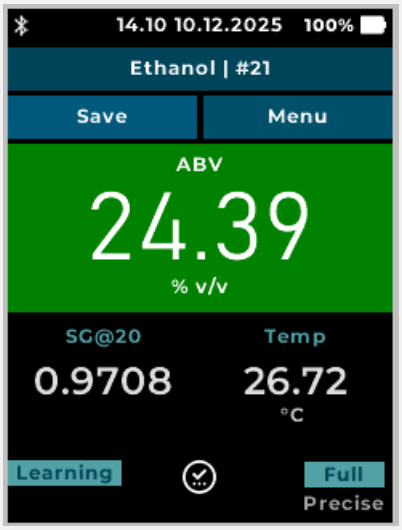
8.3.1 Interpretation of the results

The MicroDens offers several features for easy interpretation of results:

- Background color : Results that fall within the limits defined in the method are displayed with a green background.
- Multiple units : Depending on the selected method, the instrument displays up to three parameters simultaneously (e.g. density, SG and temperature).
- Stability : To ensure accurate results, the instrument applies stability criteria based on the selected measurement mode.

8.4 SmartStabilizer - Sample detection

SmartStabilizer detects the sample automatically. It compares the values measured in successive fillings of the cell and distinguishes a sample from a transient phase, such as cleaning or a sample change. It is active by default and requires no action from the operator.



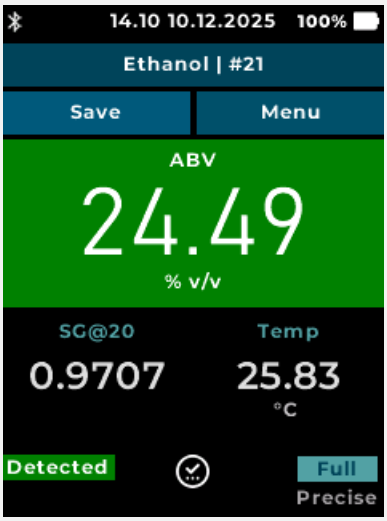
How it works

- Learning: the display shows “Learning” while the cell is empty and until the values of successive fillings agree. A reading affected by residues of the cleaning liquid or of the previous sample does not agree with the following ones and is treated as a transient phase.

- Detected: when several consecutive fillings give the same value and the reading is stable, the instrument detects the sample and the display shows “Detected”. A filling affected by residues does not agree with the following ones and restarts the comparison.

Behavior

- Once the sample is detected, each new filling of the same sample shows “Detected” as soon as the reading is stable.
- A clearly different value, for example after cleaning or with a new sample, cancels the detection and the comparison starts again.
- If the new sample has a value very close to the previous one, the instrument may detect it as the same sample: when changing samples, always perform the rinses described in section 8.5.
- In Manual mode the reading is shown in real time and “Detected” does not appear.
- “Detected” indicates that the reading is stable; saving remains the operator’s choice, with the Save key.



8.5 Best practices for accurate measurements

To ensure accurate reading and prevent cross-contamination between samples, it is essential to follow these operating practices:

- Never pour the measured sample back into its original container: after passing through the measuring cell, the sample may contain residual traces of previous samples or have been exposed to contamination. Always dispose of the analyzed sample in a separate container designated for waste.
- Perform at least 3 rinses when changing samples: Before taking a measurement on a new sample, rinse the measurement cell by aspirating and expelling the new sample for at least 3 consecutive cycles. This ensures that any traces of the previous sample are completely removed and guarantees that the measurement is taken on an uncontaminated sample.

These simple precautions significantly improve measurement repeatability and reduce systematic errors due to contamination.

8.6 Liquid release after measurement and cleaning

After reading the result on the display and saving or sending the measurement (BLE), we recommend expelling the liquid into a container, preferably glass, by placing the outlet tube at an angle so that it touches the wall of the container. This facilitates the flow of the liquid.



It is essential to clean the measuring cell after each measurement session:

1. Immerse the fill tube in a container with suitable cleaning liquid
2. Press the PUSH button and fill the system with the appropriate solvent
3. Press the PUSH button again to release/eject the cleaning liquid into a waste container
4. Repeat the rinsing process several times until the system is completely clean.

For samples that are difficult to remove, use a series of appropriate solvents or a cleaning solution specifically designed for that type of sample. For more details, refer to the chapter on maintenance and cleaning.

8.7 Special considerations for different sample types

8.7.1 Viscous samples (up to 50 mPa s)

- The motor syringe system is designed to handle even moderately viscous samples
- Allow for longer stabilization time
- Use “Slow” or “Viscous” measurement mode for more accurate results
- Clean thoroughly after each measurement to avoid residues

8.7.2 Volatile samples

- Fill quickly to minimize evaporation
- Use "Fast" mode if appropriate
- Consider cooling the sample slightly before measuring
- Avoid exposing the sample to air for prolonged periods.

8.8 Automatic Piston Unstick

The Piston Unstick function automatically attempts to free the piston if it becomes stuck inside the measuring cell. Blockage can occur if the instrument is left unused for a long time, if the O-ring loses lubrication, or if sample residue crystallizes around the piston.

How to access
Tap Menu → Service → **Piston Unstick**.

On the confirmation screen, tap **OK** to start or **Cancel** to go back
The instrument automatically performs a progressive sequence of 13 cycles divided into 4 phases.

The motor operates at maximum torque (100%) and at reduced speed to ensure maximum unlocking force.

The display shows the phase, the current cycle and the overall progress in real time.

Upon completion, the instrument performs a zero-calibration verification

The result is displayed on the screen:

- Green background “Unstick completed! Lubricate O-ring” → It is recommended to lubricate the O-ring as soon as possible.
- Red background — "Unstick FAILED! See O-Ring Maintenance." → Turn off the instrument and perform manual maintenance on the O-ring. If the problem persists, contact Gibertini Elettronica support.

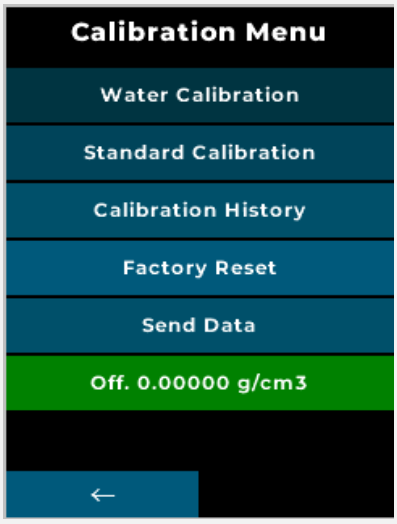
The procedure is safe and can be performed even if the piston is not actually locked
Upon completion, the motor parameters (torque and speed) are automatically reset to their default values. No external connection (dongle, PC) is required.

Other Service menu pages
To check the battery, tap Menu → Service → Battery: the page shows battery voltage, current, temperature, charge and status.
To check the values read by the sensor, tap Menu → Service → Sensor Telemetry: the page shows temperature, density, concentration and viscosity. Both pages are for information only.

9 Checks and Adjustment

This chapter describes the procedures for checking and adjusting the MicroDens, ensuring that measurements are accurate and reliable. Performing these checks regularly is essential to maintaining optimal instrument performance.

From the **Adjustment** menu, you can access all the instrument's adjustment and reset functions.



- Water Adjustment: Allows you to adjust with water, setting the density of pure water as the reference.
- Custom Adjustment: Allows adjustment with certified standard solutions (e.g. hydroalcoholic solutions or solutions of known density) .
- Adjustment History: Displays a list of the latest adjustments performed with date, time, and results (up to 30: beyond this number the oldest entry is replaced by the new one).
  This is useful for traceability and for verifying the instrument's stability over time.
- Restore Factory Adj.: Resets the user adjustment offset and returns the instrument to the factory adjustment.
- Send Data: Sends the adjustment history to the PC or to the printer, according to the configured destination.
  It is designed for adjustment reports, audits, or quality archiving.
- *Off: 0.00000 g/cm^3: Displays the user adjustment offset currently applied.*
  The item is for information only: the value changes with a new adjustment or with the factory restore.

Purpose of Adjustment
Under normal operating conditions, it is not necessary to perform a new adjustment: adjustment procedures serve primarily as a periodic check of proper operation.
When should an adjustment be performed?
If operating conditions require it, such as use in specific environments or matrices
To maintain accuracy over time, it is generally sufficient to properly clean the measuring cell and wetted parts according to the procedures outlined in the maintenance section.

9.1 Adjustment with Water

Water adjustment should be performed when daily monitoring indicates significant deviation, or periodically as part of routine maintenance.

Materials needed:

- Ultra-pure water (bi-distilled or deionized)
- Water temperature: 15-30°C (59-86°F)

Procedure:

1. Clean the measuring cell thoroughly
2. Rinse the cell until all detergent residue is removed.
3. Enter Menu → Adjustment → Water Adjustment
4. When you open the page, the Instrument automatically displays:
    - The current temperature of the liquid
    - The theoretical density value of water is automatically calculated based on the detected temperature
    - The field to display the measured density (initially empty)
    - The adjustment offset (which will be calculated after the measurement)
5. Fill the cell with ultra-pure water at a temperature between 15-30°C
6. Press the PUSH button to start sample aspiration
7. Wait for the data to stabilize:
    - During the measurement, the temperature and density values measured are updated in real time on the display.
    - Once the measurement is complete, the Offset field turns green when the value is within the manufacturing tolerance, red if it is out of tolerance.
    - **Warning — do not apply an offset when the field is red**: the instrument applies it anyway and subsequent measurements will be out of specification. Tap Back and repeat the adjustment with clean ultra-pure water at a temperature between 15 and 30 °C. If an offset with a red field has already been applied, repeat the water adjustment in the same way.
8. To apply the new adjustment, tap **SET**. The instrument shows «Water adjustment applied»; tap **OK**
9. To reject the adjustment and exit without changes, tap Back
10. Tap Back repeatedly to return to the Home Page

Adjustment with water permanently changes the instrument's adjustment offset. Be sure to use ultra-pure water of the appropriate quality to avoid systematic errors in subsequent measurements.

9.2 Adjustment with Hydroalcoholic Reference Solution

Adjustment with a hydroalcoholic reference solution is an advanced procedure recommended for:

- Accredited laboratories requiring certified traceability
- Metrological validation according to specific industry regulations
- Periodic verification of the instrument's linearity across the entire measurement range
- Critical applications where maximum accuracy is required
- Compliance with international standards (e.g. ISO 17025, GLP/GMP)

This procedure uses a certified hydroalcoholic solution (ethanol in water) with a certified and traceable density or specific gravity value at 20°C.

9.2.1 Necessary Materials

- Certified hydroalcoholic solution: e.g. 40.00% vol ethanol in water (or other certified concentration)
- Certificate of Analysis: With specific gravity value at 20°C (SG20) and stated uncertainty
- Solution Temperature: Between 18-22°C for greater accuracy
- Clean container for standard solution

The required value is the Specific Gravity at 20°C (SG20), defined as the ratio of the density of the solution at 20°C to the density of water at 20°C.

9.2.2 Performing an Adjustment with Hydroalcoholic Solution

Procedure:

1. Preparation:
    - Clean the measuring cell thoroughly
    - Bring the standard solution to stable room temperature (18-22°C)
    - Have the standard certificate with the declared SG20 value available
2. Opening the page and inserting SG20:
    - Enter Menu → Adjustment → Custom Adjustment
    - When opening the page, the instrument asks for the «Ref. Specific Gravity» value, i.e. the SG20 (Specific Gravity at 20°C) of the reference solution.
    - Consult the certificate provided with the standard and enter the value of SG20 using the numeric keys
    - Press SET to confirm the entered value
3. Adjustment page display:
    - After confirming the value of SG20, the adjustment page opens showing:
        - The current temperature of the sensor
        - The reference SG20 value entered
        - The measured concentration (ABV, % vol) and the measured SG20
        - The reference SG20 value (Ref SG20)
        - The adjustment offset (which will be calculated after the measurement)
4. Measurement:
    - Fill the cell with the certified hydroalcoholic solution
    - Press the PUSH button to start sample aspiration
    - Perform multiple priming cycles
    - Wait for the data to stabilize:
        - During the measurement the values are updated in real time
        - The stability indicator shows when the measurement is complete
        - The Offset field turns green when the adjustment is valid, red if it is out of tolerance.
        - **Warning — do not apply an offset when the field is red**: the instrument applies it anyway and subsequent measurements will be out of specification. Tap Back and repeat the adjustment with clean ultra-pure water at a temperature between 15 and 30 °C (Water Adjustment). If an offset with a red field has already been applied, perform the water adjustment in the same way.
5. Check and save:
    - Check the displayed values:
        - Temp: Measured temperature of the sample
        - ABV: Measured alcohol concentration (should correspond to the value declared on the certificate, e.g. ~40%)
        - SG20: Specific gravity measured at 20°C
        - Ref SG20: Reference SG20 value entered

- Offset: Difference between measured density and reference density

6. Check that the values are consistent:
   - The measured concentration should be close to that declared on the certificate (e.g. 40.0% vol ±0.1%)
   - The offset should be contained (green background = within manufacturing tolerances)
7. To apply the adjustment tap **SET**; to reject it tap Back

9.2.3 Recommendations for Adjustment with Hydroalcoholic Solution

Before the adjustment:

- Store the standard in a tightly closed container to avoid evaporation of alcohol.
- Do not use expired or improperly stored standards
- Allow the standard to stabilise at room temperature for at least 30 minutes
- Verify that the SG20 value on the certificate is clearly legible

9.3 Restoring the Factory Adjustment

If you want to cancel all adjustments performed and restore the instrument to its factory adjustment:

Procedure:

1. Tap Menu → Adjustment → **Restore Factory Adj.**
2. Tap **OK** to confirm. The instrument resets the user adjustment offset and shows «Operation completed successfully».

9.4 Exporting Adjustment Data

The MicroDens automatically records the last 30 adjustments performed (with water, with hydroalcoholic solution and factory resets) in a history that can be consulted and exported for documentation and traceability.

9.4.1 To view the adjustment history:

1. Tap Menu → Adjustment → Adjustment History
2. Scroll through the list with the arrow keys to view previous adjustments
3. For each adjustment the following are shown: date, time, type of adjustment, applied offset, temperature

9.4.2 To export adjustment data:

Before exporting, configure the destination in Menu → Settings → Connections → Export destination → Destination by choosing **Bluetooth Printer** or **Computer**.

- Print to Bluetooth Printer: From the **Adjustment** menu, select **Send Data** and confirm with **OK** to print the report
- Export to PC: Connect the BLE dongle to the PC, then from the **Adjustment** menu select **Send Data** and confirm with **OK**

The adjustment report includes, for each recorded adjustment: date and time, type of adjustment and applied offset.

10 Measurement Data Management

This chapter describes how to view, export, print, and delete measurement data stored in the MicroDens density meter. The instrument automatically saves each measurement to non-volatile memory, allowing you to review it at any time.

Measurement data are automatically stored in the MicroDens density meter's internal memory. The data memory can hold up to 2000 data sets, organized in a circular buffer. When the memory is full, new measurements will automatically overwrite the oldest data sets.

10.1 Memory Capacity and Organization

Data memory features:

- Total capacity: Up to 2000 storable measurements
- Storage system: Circular buffer (when the memory is full, new measurements automatically overwrite the oldest ones, starting from the oldest)
- Auto Save: Every completed measurement is automatically saved
- Non-volatile memory: Data remains saved even after the instrument is turned off

Contents of each stored measurement.
Each saved record contains the following complete information:

Identification:

- Unique progressive number of measurements
- Full date and time (year, month, day, hour, minute, second)
- Sample ID
- Method Name

Measured values:

- Parameter 1: Value, name and unit of measurement (e.g. 40.0 %vol, Concentration)
- Parameter 2: Value, name and unit of measurement (e.g. 0.9352 g/cm^3, Density)
- Temperature: Value and unit of measurement (e.g. 20.55 °C)

Quality information:

- Measurement stability indicator
- Indicator of compliance with the limits set in the method
- Instrument serial number

All of this information is saved exactly as it appears on the display at the time of measurement, ensuring full traceability of the results.

10.2 Accessing the History Menu

The History menu provides access to all the functions for managing stored data. The number in parentheses indicates how many measurements are currently stored in memory.
Path: **Menu → History (xxx)**
Where xxx is the total counter of stored measurements (e.g. "History (127)" indicates 127 saved measurements).
The following functions are available from the History menu:

- Data List: View stored measurements
- Send Data: Sends all measurements and the adjustment history to the PC
- Print Last (or Export Last with destination Computer): Prints or sends the last measurement
- Delete Last: Deletes the last measurement
- Delete All: Clears all measurements

10.2.1Viewing Stored Data

To consult the measurements saved in the memory:
Path: Menu → History (xxx) → Data List
Procedure:

1. Touch Menu on the Home Page
2. Select History (xxx) - the number in brackets shows how many measurements are stored
3. Select Data List
4. The most recent measurement is displayed
5. Use the arrow keys (UP/DOWN) to scroll through the measurements:
    - Down Arrow: older measurement
    - Up Arrow: more recent measurement
6. The display shows for each measurement:
    - Sample ID (in header)
    - Date and time of measurement
    - Method used
    - Parameter 1: Name, value and unit (e.g. Density: 0.9352 g/cm^3)
    - Parameter 2: Name, value and unit (e.g. %vol: 40.0 %vol)
    - Temperature: Value and unit (e.g. Temp.: 20.5 °C)
    - Position: Current Index / Total (e.g. 5/127)
7. Values within the limits are displayed with a green background, those outside the limits with a red background.
8. Tap Back to return to the History menu

Measurements are always sorted from newest to oldest, so when you open the Data List, the most recent measurement is displayed automatically.

10.2.2Export Destination Configuration

Before you print or export, you need to set up the appropriate destination.
Path: Menu → Settings → Connections → Export destination → Destination
Available options:

1. None: Disable printing and exporting (maximum power saving)
2. Bluetooth Printer: To print to a Bluetooth thermal printer
3. Computer: To export data via Bluetooth to the computer

Procedure:

1. Tap Menu → Settings → Connections → Export destination → Destination
2. Select your desired destination:
    - Bluetooth Printer: If you want to print the measurements
    - Computer: If you want to export data to the computer
3. The choice is applied and the instrument returns to the **Export destination** page

The destination you select determines which option appears in the History menu:
- When the destination is Bluetooth Printer or None: The “Print Last” option appears
- When the destination is Computer: The “Export Last” option appears

10.3 Data Printing

10.3.1Print the most recent measurement:

Procedure:
1. Menu → History (xxx) → Print Last
2. A confirmation message appears: "Print Last - Confirm action?"
3. Tap OK to confirm or Cancel to exit
4. If confirmed, the Instrument sends the data to the printer
5. A message shows the print result and closes automatically after about 2 seconds.

10.3.2Print Formats

The print format depends on the settings configured in the measurement method used.

There are three modes:
1. No Print: Does not print automatically after measurement
2. Data: Essential printout containing:
    - Measurement number
    - Date and time
    - Sample ID
    - Method Name
    - Values of the two parameters with Measurement Units
    - Temperature
3. GLP (Good Laboratory Practice): Complete printout compliant with laboratory regulations, containing:
    - All information of the "Data" mode
    - Instrument serial number
    - Firmware version
    - Date of the last adjustment
    - Operator ID (if configured)
    - Measurement quality indicators

10.4 Exporting Data to PC

10.4.1Export Prerequisites

Before exporting data, check:

1. Export destination set to Computer (see section 7.7.1 - Export Destination Configuration)
2. BLE dongle connected to the computer's USB port
3. Accessory software installed on your PC:
    - MicroDens Data Logger: To export data directly to Excel format
    - MicroDens Logger Pro: To view real-time graphs and analyze historical data

10.4.2Exporting the Last Measurement

To export only the most recent measurement via BLE.
Procedure:

1. Make sure the BLE dongle is connected to the PC
2. Start the receiving software on the PC (MicroDens Data Logger or MicroDens Logger Pro)
3. On the MicroDens, tap Menu → History (xxx) → Export Last
4. Confirm the operation by tapping OK
5. Wait for completion ("Starting export...")
6. When finished, it displays "Data sent successfully."
7. The message closes automatically

On PC:
The application automatically receives the data and displays or saves it according to the configured settings.

10.4.3Export All Measurements

To export the entire history of stored measurements.
Procedure:

1. Make sure the BLE dongle is connected to the PC
2. Start the receiving software on the PC
3. On the MicroDens, tap Menu → History (xxx) → Send Data
4. Confirm the operation: "Send Data - Confirm action?"
5. Tap OK to start the transfer
6. Please wait for completion (may take a few minutes with many measurements)
7. Export progress is displayed: «Starting export...», the number of measurements sent, «Measurements exported» and «Adjustments exported»
8. At the end: "Export completed"
9. The message closes automatically

Exported data:
The complete export includes:

- All measurements stored
- Adjustment history (date, type, offset, operator)
- System data (serial number, firmware version, settings)

The application allows you to:

- With MicroDens Data Logger: Save directly in .xlsx format with data organized in columns
- With MicroDens Logger Pro: View time graphs, export to different formats, apply filters and statistical analysis

10.4.4Exported Data Format

Each measurement is exported with the following format:

MEAS:Date_Time,Method,Sample_ID,Value1,Parameter1,Unit1,Value2,Parameter2,Unit2,Temperature,Temp_Unit,Status,Device SN,#Counter

Exported fields:

1. Date and Time: YYYY-MM-DD_HH:MM:SS format
2. Method Name: E.g. "Ethanol", "Beer DryExt(2)", "Wine"
3. Sample ID: Sample identifier
4. Parameter Value 1: Numeric value with dynamic decimals
5. Name of Parameter 1: E.g. "Density", "SG@20°C", "TAV"
6. Unit Parameter 1: E.g. "g/cm³", "SG", "%vol"
7. Parameter Value 2: Numeric value with dynamic decimals
8. Parameter 2 Name: E.g. "Concentration", "ABV", "°Plato"
9. Unit Parameter 2: E.g. "%vol", "%wt", "°P"
10. Temperature Value: Measuring temperature
11. Temperature Unit: Ex. "°C", "°F"
12. Status: OK or OUT_OF_LIMITS
13. Serial Number: Serial number of the device
14. Progressive Counter: Unique measurement number

Example of exported line (default delimiter: comma):

MEAS:2025-10-02_14:35:22,Ethanol,SAMPLE01,0.9352,Density,g/cm³,40.0,ABV,%vol,20.5,°C,OK,MD12345678,#127

10.5 Automatic Export during Measurement

When the destination is set to **Computer** and the BLE dongle is plugged in and connected, the behaviour of the **Save** button changes:

IMPORTANT:

- By pressing **Save** at the end of a measurement, the data is sent via BLE to the PC
- With Save Only If Offline ON, the measurement is NOT saved in the internal memory if sending succeeds; if sending fails, it is saved in memory. With the option OFF (factory default), the measurement is always saved in memory as well (see section 7.7.1)
- With the option ON, the transfer does not use internal memory

Conditions for automatic exports:

1. Destination set to Computer (Menu → Settings → Connections → Export destination → Destination)
2. BLE dongle connected to the computer's USB port
3. Receiving software running on the PC (MicroDens Data Logger or MicroDens Logger Pro)
4. BLE connection established (Bluetooth connected icon on display)

Procedure:

1. Perform the measurement normally
2. When finished, press **Save**
3. The device automatically transmits data via BLE
4. The display briefly shows: "Sending data..."
5. Upon completion, with Save Only If Offline ON: "Data sent successfully."; with the option OFF, or if sending fails: "Measurement data saved in history"
6. Tap OK to return to the main screen

The application immediately receives the measurement and displays/saves it according to the configured settings.

Advantages of automatic exports:

- Instant transfer without additional steps
- Saving internal memory
- Data available on PC in real time
- Automatic backup of measurements

When to use saving to memory:

- Field work with no PC available
- Need to validate the measurement before export

Base measurement:
MEAS:YYYY-MM-DD_HH:MM:SS, Method,SampleID,Param1,Name1,Unit1,Param2, Name2,Unit2,Temp,Unit_T,Status,Serial,#Counter

10.5.1Export Requirements

To receive data via BLE:

1. The BLE dongle must be connected to the instrument
2. Destination must be set to Computer (not Bluetooth Printer)
3. The data is sent when **Save** is tapped

- Technical Notes
- For the Wine DryExt(2), Beer DryExt(2), BeerQuick(2) and Wine Must methods, an extended line with the calculated parameters is sent right after the base measurement
- The device's serial number is included in the base measurement

10.6 Data Deletion

Deleting data is irreversible. Be sure to export important data before deleting it from your device's storage.

10.6.1Deleting the Last Measurement

History Menu (with confirmation)
Path: Menu → History (xxx) → Delete Last
Procedure:

1. Tap Menu → History (xxx) → Delete Last
2. A confirmation message appears: "Delete Last - Confirm action?"
3. Tap OK to confirm the deletion or Cancel to exit without deleting.
4. If confirmed:
    - At the end: "Successfully deleted."
5. The counter in the History menu is updated automatically (e.g. from 127 to 126 measurements)

10.6.2Deleting All Measurements

To completely clear data memory:
Path: Menu → History (xxx) → Delete All
Procedure:

1. Tap Menu → History (xxx) → Delete All
2. A confirmation message appears: "Delete All - Confirm action?"
3. Read the warning message carefully
4. Tap OK to confirm the deletion or Cancel to exit without deleting.
5. If confirmed:
    - At the end: "Successfully deleted."
    - All 2000 memory locations are cleared and the progressive measurement counter restarts from 1
6. The counter in the History menu resets to 0: "History (0)"
7. Tap Back to return to the main menu

This operation permanently deletes ALL stored measurements. Data cannot be recovered after deletion.

10.7 Accessories Software

To make the most of the data export and analysis functions, dedicated software applications for PC are available that interface with the MicroDens via the BLE dongle:

- MicroDens Data Logger: Automatically saves data in Excel format (.xlsx)
- MicroDens Logger Pro: Allows real-time viewing of measurements with customizable graphs, statistical analysis and process monitoring

For information on the availability and acquisition of these accessory software, contact your Gibertini Elettronica sales representative or visit www.gibertini.com

11 Maintenance and cleaning

This chapter describes the maintenance and cleaning procedures necessary to ensure optimal operation and a long life for your MicroDens portable Digital Density Meter.

11.1 Cleaning the measuring cell

Regular cleaning of the measuring cell is essential for obtaining accurate results and preventing cross-contamination between different samples. A proper cleaning procedure is especially important when measuring samples with different chemical or physical properties.

11.1.1 General cleaning principles

- Immediate cleaning: Clean the measuring cell immediately after use to prevent residues from drying or adhering to the cell walls.
- Two-Stage Procedure: For most applications, a two-stage cleaning procedure is recommended, first using a solvent specific to the sample being measured, followed by a second solvent for the final rinse.
- Chemical Compatibility: Use only solvents that are compatible with all wettable materials in the instrument, which include the silicon MEMS measuring cell, Pyrex glass, PTFE tubing, Viton O-rings, the Viton syringe seal, and POM (acetal resin) components.

11.1.2 Standard cleaning procedure

1. Emptying the cell:
    - Direct the fill tube into a suitable waste container
    - Press the PUSH button to activate the pump and empty the cell
2. First cleaning phase:
    - Immerse the fill tube in the first cleaning solvent (specific to the sample type)
    - Press the PUSH button to draw the solvent into the cell
    - Wait 5-10 seconds to allow the solvent to dissolve the residue
    - Press the PUSH button again to expel the solvent
    - Repeat this cycle 3-5 times, depending on the nature of the sample.
3. Second cleaning phase (rinsing):
    - Immerse the fill tube in the second cleaning solvent
    - Press the PUSH button to draw the solvent into the cell
    - Wait briefly (2-3 seconds)
    - Press the PUSH button again to expel the solvent
    - Repeat this cycle 2-3 times to ensure a thorough rinse.
4. Drying (when necessary):
    - For aqueous samples, a final rinse with ethanol or isopropanol can facilitate drying.

11.2 Cleaning frequency

The cleaning frequency depends heavily on the application and the type of samples analyzed.

11.2.1Sample replacement (for similar samples)

For samples that are very similar to each other (e.g., different batches of the same product):

- Empty the measuring cell with the initial sample
- Rinse at least 3 times with the next sample before measuring it.
- Perform a thorough cleaning at the end of the measurement series

11.2.2Cleaning after each measurement (for different samples)

Perform a thorough cleaning after each measurement when:

- The samples have different chemical properties
- The samples are immiscible with each other
- Samples are difficult to remove from the measuring cell
- You move from one product to another

11.3 Cleaning protocols specific to sample type

The following table provides detailed recommendations for cleaning the measuring cell based on the type of sample being measured. These protocols have been developed to ensure effective residue removal and prevent interference with subsequent measurements.

11.3.1Table of cleaning protocols by sample category

Sample Category	First solvent	Second solvent	Recommended cycles	Specific notes
Low concentration aqueous solutions	Deionized water	Ultra-pure water	3 cycles first solvent, 2 cycles second	Suitable for solutions with concentrations <5%
Highly concentrated aqueous solutions	Warm water (30-40°C)	Ultra-pure water	5 cycles first solvent, 3 cycles second	For solutions with concentrations >5%
Alcohol and alcoholic beverages (low alcohol)	Deionized water	Ultra-pure water	3 cycles first solvent, 2 cycles second	For beers, wines and low-alcohol drinks
Alcohol and alcoholic beverages (high strength)	40% ethanol	Ultra-pure water	3 cycles first solvent, 3 cycles second	For high-proof spirits and liqueurs
Sugar solutions	Hot water (40-50°C)	Ultra-pure water	5 cycles first solvent, 3 cycles second	Hot water is essential to dissolve the sugar residues
Light petroleum products	Hexane	Ethanol or isopropanol	4 cycles first solvent, 3 cycles second	Use in a well-ventilated area
Lubricants and heavy petroleum products	Hexane	Isopropanol	5 cycles of first solvent, 3 cycles of second solvent	Use in a well-ventilated area
Dilute inorganic acids	Deionized water	Ultra-pure water	5 cycles first solvent, 3 cycles second	Make sure all the acid has been removed
Concentrated inorganic acids	Dilute acid of the same species	Deionized water followed by ultra-pure water	5 cycles of first solvent, 3+2 cycles of second solvents	CAUTION : Dilute gradually, never add water directly to concentrated acid
Bases	Acidulated water (pH ~4)	Ultra-pure water	5 cycles first solvent, 3 cycles second	Acidulated water neutralizes alkaline residues

Sample Category	First solvent	Second solvent	Recommended cycles	Specific notes
Hydrogen peroxide	Deionized water	Ultra-pure water	4 cycles first solvent, 3 cycles second	Avoid organic solvents that may react with peroxide residues
Dairy products	Diluted Enzyme Detergent	Warm water followed by ultra-pure water	3 cycles of first solvent, 3+2 cycles of second solvents	Do not use alcohol for the final rinse, it may cause protein precipitation.
Edible oil products	Dishwashing detergent solution	Warm water followed by isopropanol	4 cycles of first solvent, 3+2 cycles of second solvents	The detergent emulsifies the oils, the isopropanol removes water and residual detergent
Saline solutions	Warm water	Ultra-pure water	4 cycles first solvent, 3 cycles second	Make sure all salts are completely dissolved
Solutions with methanol	Deionized water	Ultra-pure water	3 cycles first solvent, 2 cycles second	For concentrations <50%; for concentrations >50%, use diluted methanol as the first solvent
Low concentration isopropanol	Deionized water	Ultra-pure water	3 cycles first solvent, 2 cycles second	
High concentration isopropanol	30% isopropanol	Ultra-pure water	3 cycles first solvent, 3 cycles second	
High-fructose corn syrups	Hot water (50°C)	Ultra-pure water	5 cycles first solvent, 3 cycles second	High temperature is essential to completely dissolve viscous residues

11.4 Advanced cleaning protocols for special cases

11.4.1Highly viscous samples

For samples with high viscosity (up to 50 mPa s):

1. Empty the cell as much as possible
2. Use a specific heated solvent (30-50°C, depending on compatibility)
3. Increase the contact time between the solvent and the cell (15-30 seconds per cycle)
4. Perform at least 6-8 cleaning cycles with the first solvent
5. Follow with 3-4 rinse cycles with the second solvent/water

11.4.2Samples with insoluble residues

In case of residues that are difficult to remove:

1. Fill the cell with the appropriate primary solvent
2. Leave to act for 2-3 minutes
3. Empty and repeat the process if necessary
4. If the problem persists, consult Gibertini Elettronica technical support

11.4.3Long-term storage protocol

If the instrument will not be used for more than a week:

1. Perform a thorough cleaning as described above
2. Run a final cycle with ultra-pure water
3. Empty the cell completely
4. Leave the cell empty and dry during storage

11.5 Important warnings on chemical compatibility



- NEVER mix incompatible solvents (e.g. concentrated acids with bases or organic solvents)
- NEVER use solvents that may damage the wettable materials of the instrument:
  - Avoid using acetone and strong ketones which may damage Viton O-rings and POM components
  - Do not use aggressive aromatic organic solvents (such as benzene) which may deteriorate the seals
  - Avoid the use of chlorinated hydrocarbons which can damage PTFE and Viton components.
  - Do not use concentrated oxidizing acids (such as nitric acid > 40%) which could compromise the integrity of the metal parts
- NEVER use concentrated caustic solutions (NaOH > 20%) without the gradual dilution procedure
- Take special care when handling concentrated acids (especially H_2SO_4 > 70%), always diluting gradually
- Comply with all local regulations for the disposal of used solvents.
- If in doubt about the compatibility of a solvent with MicroDens materials, always consult the Gibertini documentation or support first.

11.6 O-ring maintenance

The O-ring in the suction system is designed to last a long time under normal operating conditions. It is lubricated at the factory during instrument testing. However, after some time (approximately 9–12 months), it is recommended that you perform maintenance on the O-ring.

11.6.1O-ring maintenance procedure

1. Access the maintenance menu:
   - Tap Menu and select Service
   - Select "Clean Pump"
2. When the warning message appears, read the instructions carefully and tap OK to proceed.
3. The instrument automatically retracts the piston to the maintenance position, shows «COMPLETED! POWER OFF device. Lubricate O-ring. POWER ON» and switches itself off after a few seconds
4. At this point, you can access the O-ring through the intake piston window

   First you need to remove the battery door, and then the screw that holds the maintenance door.

5. Take the brush bottle and lubricate the outer edge of the O-ring with a small amount of grease.



6. Close the maintenance door and the battery door

7. Turn the instrument back on: at power-on it automatically performs the initialization and zero calibration of the piston position.

11.7 Cleaning the housing and display

To keep your MicroDens in top condition:

1. Use a soft cloth moistened with ethanol or warm water to clean the housing.
2. If necessary, you can use a mild detergent (pH < 10)
3. To clean the display, you can use a soft, slightly damp cloth - the display is protected by a scratch-resistant polycarbonate layer that makes it resistant to daily use.
4. Do not use aggressive solvents that may damage the display or housing

11.8 Replacing the battery pack

The MicroDens uses a battery pack designed to provide long operating life. There is no specific indicator that indicates when replacement is necessary. Replacement should only be done when you notice a significant reduction in operating time compared to the original performance.

11.8.1Replacement Instructions:

- If the instrument frequently shuts down unexpectedly
- If the battery life of the instrument is visibly reduced compared to normal performance
- If the instrument does not turn on despite an adequate charging period

11.8.2Procedure for replacing the battery pack

1. Turn off the instrument before replacing the battery pack
2. Gently unclip the battery compartment on the back of the instrument display
3. Replace with new battery pack - the instrument is equipped with a directional connector that prevents connecting the battery with incorrect polarity
4. Reassemble all parts in reverse order



- Use only one battery pack of the same type and with the same charge level
- Make sure the inside of the instrument is completely dry
- The battery compartment cover must always be closed when using the instrument

11.8.3Charging the batteries

The MicroDens is equipped with rechargeable batteries that ensure long periods of operation in the field. To properly charge the batteries:

1. Connect the supplied USB-C cable to the port on your device
2. Connect the other end to a wall charger or a computer's USB port
3. While charging, a charging indicator will appear on the display.
4. With the instrument off, the display shows «Charging...» and then the charge percentage while charging; when charging is complete it shows «Charge Complete».

Do not use the instrument to take measurements while it is charging. This could affect the accuracy of the measurements.

It is recommended to charge the instrument when not in use, such as overnight or during periods of inactivity. A full charge takes approximately 3-4 hours and provides 10 hours of battery life under constant use.

For optimal energy management, you can enable power saving mode from your Settings , which reduces the display brightness and automatically turns off the device after a period of inactivity.

11.9 Software update



Your Gibertini Elettronica representative will inform you when a new software update is available for your MicroDens.

IMPORTANT : Make sure your instrument's batteries are fully charged before starting a software update.

11.9.1Update procedure:

1. Connect the MicroDens to your PC using the USB-C cable
2. Make sure the MicroDens instrument is turned on (there is no need to set any procedure on the instrument, it is sufficient that it is turned on and connected to the PC)
3. Download Script Runner [1] software and follow the on-screen instructions and those provided by Gibertini Elettronica to complete the update process.
4. The Instrument will automatically restart after the update is complete.



[1] MicroDens Script Runner is the desktop application dedicated to the secure distribution of update packages to MicroDens devices. It allows you to select the officially released file, verifies integrity and compatibility, checks connectivity (USB or BLE), then sequentially executes the transfer, programming, and reboot phases, guiding the operator step by step. During the update, it displays a progress bar and real-time event log, blocks unauthorized operations (disconnection, forced shutdown), and, upon completion, generates a summary of the results.

Do not disconnect the instrument or interrupt the process while the software is being updated. The update procedure ensures the consistency of the data and the custom settings currently saved on the device. However, we recommend that you export and save all important data (methods, sample IDs, custom parameters, measured data, etc.) before performing a software update.

11.10 Storage of the Instrument

Before storing the instrument for a long period:

1. Clean the measuring cell thoroughly as described in section 11.1
2. For storage of less than one day, you can fill the measuring cell with ultra-pure water or a suitable solvent
3. For long-term storage, make sure the cell is completely dry
4. Store the instrument in a cool, dry environment
5. Avoid exposure to extreme temperatures, high humidity, or direct sunlight

Proper maintenance and cleaning of your MicroDens Digital Density Meter will ensure accurate measurements and a long instrument life. By following the procedures described in this chapter, you can keep your instrument in optimal condition and prevent potential problems.

12 Maintenance and repair

12.1 Maintenance performed by an authorized service technician

The instrument does not require periodic maintenance. However, optional services are available upon request from your local Gibertini Elettronica representative.

Any parts damaged as a result of the instrument being dropped are excluded from the warranty

12.2 Repair performed by an authorized representative

If your instrument needs repair, please contact your local Gibertini Elettronica representative, who will take care of the necessary steps. If your instrument needs to be returned, please request an RMA (Return Material Authorization) number. It should not be sent without the RMA and the completed "Instrument Repair Safety Declaration." Make sure it is clean before returning it.

Contact your local Gibertini Elettronica representative from the Gibertini Elettronica website in the "Contact Us" section (https://www.gibertini.com).

Instruments contaminated with radioactive materials, infectious agents, or other harmful substances that pose a health risk may not be returned.

Appendix A: Technical Data

A.1: Specifications

Measuring range	
Density	0.600-1.200 g/cm^3
Temperature (sample)	-10 +60 °C (14-140 °F)
Viscosity	0-50 mPa s (0-5 mPa s calibrated)
Accuracy	
Density	0.0001 g/cm^3
Temperature	0.1 °C (0.2 °F)
Repeatability sd	
Density	0.00005 g/cm^3
Temperature	0.1 °C (0.2 °F)
Resolution	
Density	0.00001 g/cm^3
Temperature	0.01 °C (0.1 °F)
Minimum sample volume	1 ml

A.2: Instrument data and operating conditions

Dimensions (L x W x H)	320 mm x 100 mm x 65 mm
Weight	380 g (battery pack and filling tube included)
Power supply	
Battery type	Battery Pack LI-POL 3.7 volts 2500 mAh
Battery life	10 hours continuous use - 100 hours standby
Ambient temperature	
Storage temperature	max. 55 °C (131 °F) with batteries max. 70 °C (158 °F) without batteries
Air humidity	5-90% relative humidity, non-condensing
Interfaces	Bluetooth®, USB-C
Data memory	2000 sets of measured data / 44 predefined methods in the firmware, available according to the application package (standard: Food & Beverage); up to 20 user methods

A.3: Materials

Stainless steel, epoxy glue, Pyrex glass, silicone	measuring cell (MEMS)
Steel	syringe piston
ABS	Plastic body of the instrument and doors
Fr-4	Printed circuits
PTFE	filling tubes, sensor input adapter
Viton	filling syringe gasket
Viton	Sensor O-ring

POM acetal resin	Syringe chamber
Polycarbonate	Touch pad

Appendix B: Density of Water

Temperature [°C]	Density [g/cm^3]	Temperature [°C]	Density [g/cm^3]
0	0.99984		
1	0.99990	21	0.99799
2	0.99994	22	0.99777
3	0.99996	23	0.99754
4	0.99997	24	0.99730
5	0.99996	25	0.99705
6	0.99994	26	0.99679
7	0.99990	27	0.99652
8	0.99985	28	0.99624
9	0.99978	29	0.99595
10	0.99970	30	0.99565
11	0.99961	31	0.99534
12	0.99950	32	0.99503
13	0.99938	33	0.99471
14	0.99925	34	0.99438
15	0.99910	35	0.99404
16	0.99894	36	0.99369
17	0.99878	37	0.99333
18	0.99860	38	0.99297
19	0.99841	39	0.99260
20	0.99821	40	0.99222

Appendix C: Main temperature compensation coefficients α

Substance	Temperature range [°C]	α • 10^3/°C
Water	15 - 30	0.23
Ethanol	0 - 30	1.09
m-xylene	0 - 30	0.99
p-xylene	15 - 30	1.02
Glycerine	15 - 30	0.49
Chloroform	0 - 30	1.26
Carbon tetrachloride	0 - 30	1.22
Toluene	0 - 30	1.07
Benzene	6 - 30	1.21
Methanol	6 - 30	1.18
Acetone	0 - 30	1.42
Bromobenzene	0 - 30	0.91
Cyclohexane	0 - 30	1.20
Isopropanol	0 - 30	1.06

Substance	Temperature range [°C]	$\alpha \bullet 10^3$/°C
n-nonane	0 - 30	1.08

Appendix D : Measurement Parameters

This appendix provides a complete list of all measurement parameters supported by the MicroDens. The table includes available Measurement Units, typical ranges, and key applications for each parameter.

D.1: Basic Parameters

Parameter	Unit of Measurement	Typical Range	Description
Temperature	°C, °F, K	0-50°C	Temperature of the measured sample
Density	g/cm³, kg/m³, lb/gal	0.6-1.2 g/cm³	Absolute density at measurement temperature
Density@T	g/cm³, kg/m³, lb/gal	0.6-1.2 g/cm³	Density compensated at reference temperature
Specific Gravity (SG)	Dimensionless	0.6-1.2	Ratio between sample density and water density at reference temperature

D.2: Alcohol Parameters

Parameter	Unit of Measurement	Typical Range	Description
Alcohol % v/v	% vol	0-100%	Alcohol content by volume at 20°C
Alcohol % w/w	% weight	0-100%	Percentage of alcohol by weight
US Proof Alcohol	°Proof (US)	0-200	Twice the alcoholic strength by volume at 60 °F, calculated on the basis of the AOAC/TTB tables (27 CFR 30.66, Table 6); 1 decimal
ABV @60F	% v/v	0-100%	Alcoholic strength by volume at 60 °F, calculated on the basis of the AOAC/TTB tables (27 CFR 30.66, Table 6); 2 decimals
SG 60/60F	SG	0.7000-1.0000	True specific gravity 60/60 °F (in vacuum), derived from the strength with the same table; 4 decimals
ABV	% vol	0-100%	Alcohol By Volume (% v/v)
ABW	% weight	0-100%	Alcohol By Weight (% w/w)

Note: US Proof, ABV @60F and SG 60/60F are referred to 60 °F; the other alcohol parameters are referred to 20 °C. For the use of these parameters and their limits of use, see the Spirits US method (section 7.9.3). For use in the United States, setting the temperature unit to °F is recommended.

D.3: Sugar and Extract Parameters

Parameter	Unit of Measurement	Typical Range	Description
Brix	°Brix	0-35	Percentage of sucrose in aqueous solution
Plato	°Plato	0-35	Extract content in the must; g of extract in 100g of solution

Parameter	Unit of Measurement	Typical Range	Description
Babo/ KMW	°Babo	0-30	Measuring the sugar content in the must
Öchsle	°Oe	0-150	German scale for the specific gravity of must
Baumé	°Bé	0-30	Hydrometric scale for solutions heavier than water
Fructose	% w/w	0-50%	Concentration of fructose in aqueous solution
Glucose	% w/w	0-40%	Glucose concentration in aqueous solution
Sucrose	% w/w	0-35%	Concentration of sucrose in aqueous solution
Invert Sugar	% w/w	0-30%	Concentration of invert sugar in solution

Appendix E: PC-USB-C MicroDens Communication

The MicroDens features a USB-C communication interface that allows direct connection to a PC for real-time monitoring, advanced configuration, and data downloading. This feature is particularly useful for laboratories requiring integration with LIMS systems, automated quality control applications, or for developers looking to create custom software.
Communication occurs via a standard serial protocol, making integration simple and compatible with any programming language or terminal software. The system implements an intuitive text-based command protocol, designed to be easily readable by both humans and machines.
The USB-C interface provides power to the device during use, eliminating internal battery drain during extended monitoring or data acquisition sessions.

Connection Parameters

Serial Port Configuration

Parameter	Value
Speed (Baud Rate)	115200 bps
Data Bits	8
Parity	None (N)
Stop Bits	1
Flow Control	None
Format	8N1

Available User Commands

Device Information

Command	Description	Example Use	Answer	Access
fwvr	Firmware Version	fwvr	1.0.0000	R
modl	Model	modl	MicroDens	R
sern	Serial Number	sern	MD123456	R
user	User Information	user =Operator Mario	Quality Control Lab	R/W

Live Measurement Data

Command	Description	Example Use	Answer	Notes
temp	Current Temperature	temp	23.45	Real time
val1	Main Parameter	val1	0.99823	Density/concentration
val2	Secondary Parameter	val2	12.34	If configured
lock	Stability State	lock	1	1=stable, 0=unstable
meth	Active Method	meth	Density@20°C	Method Name
qual	Quality Result	qual	0	0=OK, 1=OUT_OF_LIMITS
live	Full Display Data	live	52.49,ABV,% v/v,0.9286,SG@20„29.00, ?C ,Ethanol,OK,1,2025-05-31_14:22:51	CSV format

Manage Saved Measurements

Command	Description	Response Format	Notes
mcnt	Measurement Count	42	Total number
last	Last Measurement	2025-05-31_14:07:26,Ethanol,#006,52.68,ABV,%v/v,0.92820,SG@20,,28.02, ° C,OK,#23	Full format
meas	Measurement List	P1/23,2025-05-31_14:07:26,Ethanol,#006,52.68,ABV,%v/v,0.92820,SG@20,,28.02, ° C,OK,#23	Automatic pagination

Method Management

Command	Description	Response Format	Notes
mtot	Total Methods	15	Defaults + User
musr	User Methods	3	Custom only
mact	Method Details (one per call)	P1/15:Density@20°C,DENSITY,G_CM3,TEMPERATURE,CELSIUS,20.0,0.000001,PRECISE	Automatic pagination
mall	Method Count	P:44,U:3	P=default, U=user
mfll	Complete Methods List	P:Density@20°C,P:API Gravity,P:Brix Solution,U:Lab Method 1	Detailed

Adjustment History

Command	Description	Response Format	Notes
ccnt	Adjustment Count	5	Total number
clst	Last Adjustment	Water|2025-01-10 09:15|0.000012|System	Type|date and time|offset|operator
call	Adjustment List	P1/5:W|250110|0.000012	Automatic pagination

Legend "Live" Format

Element	Meaning	Example
52.59	Parameter Value 1 (dynamic decimals)	52.5900
ABV	Parameter Name 1	Alcohol By Volume
% v/v	Unit Parameter 1	Volume percentage
0.9284	Parameter Value 2 (dynamic decimals)	0.9284
SG@20	Parameter Name 2	Specific Gravity @20°C
(empty)	Parameter Unit 2	No unit
28.42	Temperature (2 fixed decimals)	28.42°C
°C	Temperature Unit	Degrees Celsius
Ethanol	Active Method Name	Current method
OK	Quality Status	OK/OUT_OF_LIMITS
1	Valid Cache	1=valid, 0=invalid
2024-12-01_14:30:45	RTC Timestamp	Current date-time

Legend Format "meas"/"last"

Element	Meaning	Example
P1/5	Current/Total Page	Measurement 1 of 5
2024-12-01_14:30:45	Timestamp Measurement	Save date-time
Ethanol	Method Name	Method used
#001	Sample ID	Sample ID
52.59	Parameter Value 1	With dynamic decimals
ABV	Parameter Name 1	Parameter type
% v/v	Unit Parameter 1	Unit of measurement
0.9284	Parameter Value 2	With dynamic decimals
SG@20	Parameter Name 2	Parameter type

Element	Meaning	Example
(empty)	Parameter Unit 2	No unit
28.42	Temperature	2 fixed decimals
°C	Temperature Unit	Degrees Celsius
OK	Quality Status	Within/outside limits
324	Counter Measurement	Progressive number

Legend Format "mact"

Element	Meaning	Example
Ethanol	Method Name	Name of the active method
5	Param1 ID	ID of the first parameter
4	Param2 ID	ID of the second parameter
0.000000	Offset	Adjustment offset (6 decimal places)
0.000000	Alpha Coeff	Temperature coefficient (6 decimal places)
20.0	Ref Temp	Reference temperature (1 decimal place)
0	Measure Mode	0=PRECISE, 1=FAST, 2=MANUAL, 3=SLOW, 4=VISCO
1	Print Mode	0=NONE, 1=DATA, 2=GLP
1	Visible	1=visible, 0=hidden
0.000	Param1 Min Limit	Minimum limit parameter 1 (3 decimal places)
100.000	Param1 Max Limit	Maximum limit parameter 1 (3 decimal places)
1	Param1 Has Limits	1=limits active, 0=disabled
0.000	Param2 Min Limit	Minimum limit parameter 2 (3 decimal places)
3.000	Param2 Max Limit	Maximum limit parameter 2 (3 decimal places)
1	Param2 Has Limits	1=limits active, 0=disabled

Full format :
Name,Param1ID,Param2ID,Offset,Alpha,RefTemp,MeasMode,PrintMode,Visible,P1Min,P1Max,P1HasLimits,P2Min,P2Max,P2HasLimits

Legend Format Adjustments

Element	Meaning	Example
P1/5	Page 1 of 5 total	Automatic counter
W	Water adjustment	Adjustment with water
R	Reference adjustment	Adjustment with standards
250110	Date YYMMDD	January 10, 2025
0.000012	Adjustment Offset	6 decimal places precision

Pagination System
The data list commands (meas, call, mact) use an automatic paging system that facilitates sequential downloading:
Standard Response Format
All lists follow the format: P[page]/[total]:[data]
Examples:
P1/42:... = Page 1 of 42 total
P15/42:... = Page 15 of 42 total
P42/42:... = Last page (42 of 42)

Pagination Behavior
- Each call returns one entry
- The counter advances automatically with each call
- Once the last page is reached, it restarts from P1/tot
- Each command maintains its own independent counter