Lovibond® Water Testing

Tintometer® Group

Photometer-System

MD50 • MD150

Table of Contents

Photometer Series

1 Introduction

1.1 General Information

1.1.1 Read instructions before use

This manual provides important information on the safe operation of the product. Please read this manual carefully and familiarize yourself with the product before use.

1.1.2 Purpose of the Product

Lovibond photometers are designed to measure different parameters in aqueous samples in a variety of applications such as e.g. drinking water, waste water, industrial processing water, pool water and science & research.
Lovibond photometers are suitable to be used in laboratory settings as benchtop as well as in the field as portable instrument. For portability instruments are delivered in robust carrying cases with required accessories.
Performance of the instruments can be impacted by exposure to extreme light and temperature that is why the instruments should always be used under recommended environmental conditions.

1.1.3 Authorized use

The manufacturer's liability and warranty for damage is voided with improper use, failure to follow this manual, use by unqualified personnel, or unauthorized changes to the product.
The manufacturer is not liable for costs or damages that arise from the user or third parties due to the use of this product, especially in cases of improper use of the product or misuse or faults in the connection of the product.
The manufacturer assumes no liability for print errors.

1.1.4 Requirements for safe use

Note the following points for safe use:

- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
- The product may only be used according to the authorized use specified above.
- The product may only be supplied with power by the energy sources mentioned in this operating manual.
- The product may only be used under the environmental conditions mentioned in this operating manual.
- The product must not be opened or modified.

The product must not be used if:

- it is visibly damaged (e.g. after being transported)
- it was stored under adverse conditions for a lengthy period of time (storage conditions, see chapter "Specifications")

1.1.5 Keep instructions

The manual must be kept in the vicinity of the product so you can always find the information you need.

1.1.6 User qualification

The operating personnel must be able to understand and correctly implement the safety labels and safety instructions on the packages and inserts of the products.
The user must be capable and able to read and understand this manual in order to familiarize themselves with the handling and to ensure safe use.

1.1.7 Handling of hazardous chemicals

Chemical and/or biological hazards may exist where this product is used. Abide by all governing laws, regulations and protocols when using this product.
For the development of products, Lovibond® pays close attention to safety. Some hazards from dangerous substances cannot be avoided. If self-produced tests or solutions are used, the responsibility concerning any risks caused by those tests or solutions lies with the user (personal responsibility).

1.1.8 Disposal notes

Dispose of the batteries and electrical devices at a suitable facility according to local legal requirements.
It is illegal to dispose of the batteries with household waste.
Within the European Union, the batteries are removed at a specialized treatment center at the instrument's end of life.

Instruments marked with this symbol must not be disposed of in normal domestic waste.

1.2 List of all used signs in the document

The following symbols are used in this manual to identify sections that require special attention:

Danger!

A hazard exists that will result in death or severe injury if not avoided.

Warning!

Improper handling of certain reagents can cause damage to your health. In any case follow the safety labels on the packing, the safety instructions of the package insert and available SDS. Protective measures specified there have to be followed exactly.

Caution!	A hazard exists that may result in minor or moderate injury.

Notice!	Important information or specifc instructions need to be strictly followed.

2 Product overview

2.1 Guide to symbols

Labels attached to the product should be strictly observed to avoid personal injury or damage to the product. Refer to this chapter for information regarding the nature of the danger or risk before taking any action where such label is present.

EN

For professional users in the European Union:
If you wish to discard electrical and electronic equipment (EEE), please contact your dealer or supplier for further information.
For disposal in countries outside of the European Union:
This symbol is only valid in the European Union (EU). If you wish to discard this product please contact your local authorities or dealer and ask for the correct method of disposal.

2.3 Features

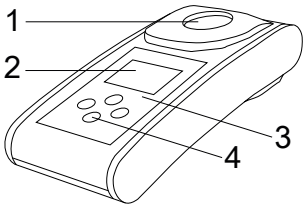
Lovibond MD50 and MD150 photometers provide high level of accuracy and efficiency with user friendly interface.

- Robust design, Water & Dust proof.
- Innovative optics system to provide higher accuracy.
- Multi-coloured backlight .
- Updateable to include the latest methods.
- Non lingual UI with icons and symbols for global use.
- Memory capacity up to 100 data sets.
- Wireless data transfer via NFC to AquaLX App.
- Wired data transfer via USB Cable to PC.
- PC software to import one user method and update the instrument.

2.4 Product description

Lovibond's MD50 and MD150 are series of single and multiparameter photometers designed specially for customers who wants to measure specific parameters in either Pool water, drinking water, industrial water or wastewater applications. With high quality stable LED and mounted Light guides to achieve sufficient light on detector, the instruments provide high accuracy in measurement results and operational efficiency. MD50 and MD150's Compact design makes them a perfect handheld instruments ideal in the field. Lovibond instruments with the help of locally produced reagents and test standards provide a complete solution to meet requirements in the water analysis industry.

2.4.1 Instrument view



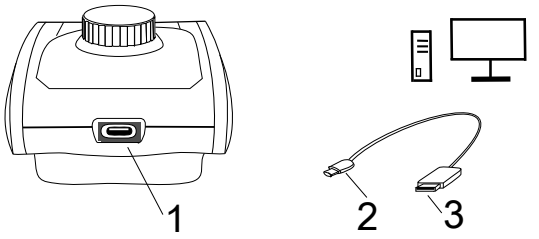
Front Side
1 - Sample Chamber
2 - Display
3 - Variant Name
4 - Power button

2.4.2 Description of the keys and switches

Key	Function
	**Down key** Turns Instrument on or off Used for scrolling downward
	**Test key** Measure sample Select or confirm an action
	**Back key** Go back to previous menu Turns backlight on or off
	**Up key** Scroll lists upward Go into settings menu

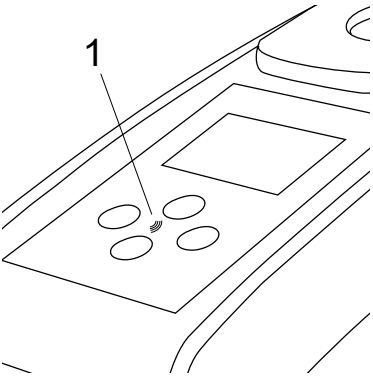
2.4.3 Interface description

1. USB–C port for data transfer, updates and method import via PC software.



1. USB-C Port (waterproof)
2. USB-C
3. USB-A

2. NFC for wireless data transfer to smart devices via App.



1. NFC field

3 Commissioning

3.1 Operating environment

The instrument can be used in any indoor or outdoor environment that is deemed safe for an operator to perform the analysis. However it is recommended to not use instrument in bright sunlight to avoid errors caused by stray light. This environment includes a temperature range from 5 to 50 degrees C with a non-condensing humidity up to 90%. Large temperature differences between the instrument and the environment can lead to errors – e.g. due to the formation of condensation in the area of the lens or on the vial.

3.2 Contents of delivery

Instrument

2 Batteries (AA)

3 Vials 24 mm ∅

3 Plastic stirring rods 10 cm

Brush 11 cm

Screw driver

Syringe 10 mL

USB Cable

Instruction manual

Methods manual (QR Code)

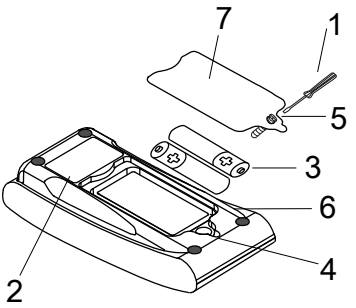
Certificate of Compliance

Warranty Information

Carrying case with Foam insert

Reagents for methods

3.3 Inserting and replacing the batteries



1 - screw driver
2 - instrument back
3 - battery
4 - notch
5 - screw
6 - seal ring
7 - battery compartment cover

EN

1. Switch the instrument off.
2. If necessary remove vial from the sample chamber.
3. Place the instrument upside down on a clean and even surface.
4. Unscrew the one screw (5) of the battery compartment cover (7).
5. Lift off battery compartment cover (7) at the notch (4).
6. Remove old batteries (3).
7. Place 2 new batteries.
   Ensuring the correct polarity!
8. Close the battery compartment cover (7).
   Check the seal ring (6) of the notch to make sure if is tight-fitting.
9. Tighten the screws (5) carefully.

Caution!

To ensure that the instrument is water proof:
- Seal ring must be in position
- Battery compartment cover must be fxed with all screws

Caution!

Dispose of used batteries in accordance with all federal, state and local regulations.

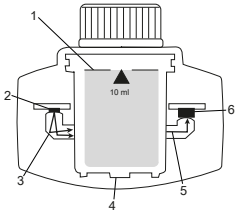
4 Operation

4.1 First start up

- Insert the batteries as described in chapter 3.3.
- Turn the instrument on by pressing Down key.
- The instrument will show company logo in sequence.
- Instrument's firmware version will be displayed on screen for a short while.
- Set date and time by following procedure described in 4.3.1.
- Choose reagent type to display your desired methods only. For more details please follow procedure described in 4.3.1
- A methods' list will appear which will be the home screen of the instrument.

Note: Instrument backlight will turn on by default, to turn the backlight off, please press Back key for 3 seconds.

4.2 General operation principles

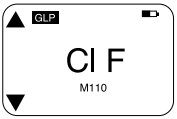
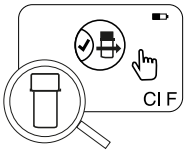


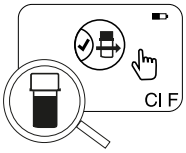
1. Sample vial
2. Light source
3. Lightguide
4. Sample chamber
5. Lightbeam
6. Spectrometric sensor + detector

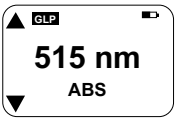
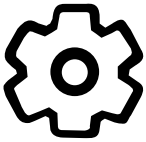
The photometer has pre-programmed methods which are derived from standard analytical procedures. To ensure simplified and error free analysis, necessary calibration curves with reagents, reaction times and sequences are all programmed into these methods. The optical setup of photometer consists of a light source, interference filters (specific variants) and a spectrometric sensor. Lovibond photometers use LEDs as light source which are highly energy efficient and have a long life to last as long as the life of the photometer itself. A high quality spectrometric sensor is used to collect and measure the amount of light transmitted through the sample and transfers it to a microprocessor which digitally calculates the concentration and displays results in respective units.

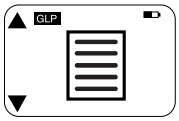
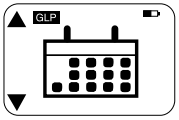
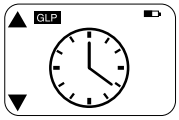
4.3 Control elements

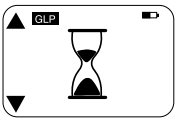
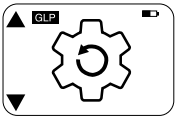
4.3.1 List of control elements and their function

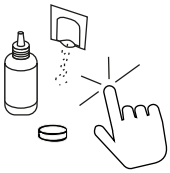
Function	Description	How to execute function
	Turn Instrument on/off	• Press Down key to turn on the instrument. • Press and hold Down key to turn off the instrument.
	Backlight	• Press and hold the Back key for 3 seconds to turn the backlight on or off.
	Measurement mode	• Last used method will be shown on the display. • Navigate through the method list and select the desired method. • Press the Test key to select method.
	Back to previous view	• Press the Back key to go back to previous screen.
	Perform Zero	• Fill 24 mm vial with 10 ml sample, or use 16 mm reagent blank vial where necessary. **Note:** Each method has different blank requirements, please follow the methods procedure to correctly blanking the instrument. Please download the methods description by scanning the QR code on the last page. • Close vial. • Place sample vial in the sample chamber. Pay attention to the positioning! • Press Test key to blank the instrument. • In case of countdowns, measurement takes place automatically after the countdown is finished.

Function	Description	How to execute function
		• The countdown can be skipped by pressing the test button again, but it is strongly recommended that you follow the procedure. • After the measurement, the empty cuvette symbol changes to a full cuvette (bottom left of the display). **Note:** You can disable timers for all methods from settings. **Attention:** The accuracy of tests cannot be guaranteed if method procedures are not followed.
	Perform Test	Please prepare sample vial following the procedure in the method description. Please download the methods description by scanning the QR code on the last page. • Press Test key to perform the test. • Some methods have integrated timers before or after pressing Test key. The instrument will perform measurement once countdown is finished. • A user can skip the countdown by pressing Test key again, however it is highly recommended to follow the method procedure. **Note:** You can disable timers for all methods from settings. **Attention:** The accuracy of tests cannot be guaranteed if method procedures are not followed.
Cl_2 F + Cl_2 T = mg/L Cl_2 comb	Concatenated methods	Some methods are linked together to calculate concentration of specific parameters. In this case result of the first part method will not be displayed and the instrument will continue for the second part method. When procedure is finished press Up or Down key to switch between final calculated result and part method result.

Function	Description	How to execute function
mg/L Cl_2 F ⇄ mg/L Br_2	Change citation form	• Result is displayed in default citation form. • Press Up or Down key to change the citation form. • The new chosen citation form is saved by the instrument as default and will show results in this citation form unless reset to default.
	User calibration	• For user calibration, select and perform test using standard of known concentration instead of water sample. • Hold Test key for 3 seconds when results are displayed. • The instrument goes into the calibration mode. • Press Up key or Down key to decrease / increase displayed value to match with target value. • Press Test key to accept adjusted value. You can cancel the calibration at any time by pressing Back key. • A log entry will be created with method number. “Calib” and Calibration factor with date and time stamp.
	Absorbance measurement	Absorbance measurement will follow the same procedure as concentration methods. Scroll methods list to select the absorbance method. Absorbance methods for each available wavelength will be displayed in the list.
	Settings menu	• When in home menu, press and hold Up key for 3 seconds to enter settings menu. • Scroll up and down to view different setting options.

Function	Description	How to execute function
	Enter logs menu	• When log symbol is displayed press Test key to enter logs. • The instrument displays a list of all saved results/ protocols • Press Up or Down key to scroll through the results in the list. • All results and protocols are preselected by default for transfer. • Press Test key to select/unselect individual results to transfer. • Press and hold Test key for 3 seconds to select / unselect all results. • Press and hold Up key for 3 seconds to transfer results via NFC. • Press Back key to go back to previous menu.
	Date setting	• Press Test key to open date setting menu. • Press Up or Down key to toggle through the format. • Press Test key to confirm format. • Press Up or Down key to adjust date. • When the arrow is on the last digit, press the Test key to confirm or press the Back key to return to the previous position. The date is set and the instrument goes back to settings menu. • A protocol entry will be created in logs for the date change.
	Time setting	• Press Test key to open time setting menu. • Press the Up or Down key to decrease or increase the value. • When the arrow is at the last position, press the Test key to confirm or press the Back key to go back or cancel the setting. • A protocol entry will be created in logs for time change.

Function	Description	How to execute function
	One Time Zero	Some methods offer a One Time Zero to make the measurement process more efficient. • Press Up or Down key to scroll to the OTZ symbol in the settings menu. • Press Test key to enable or disable OTZ. • Perform zero as described in the method, the instrument saves this zero and uses it for next measurements unless the instrument is turned off or a new zero is performed. • An OTZ icon will be displayed on screen during measurement and will be protocolled in the logs as a separate entry. **Note:** You can always overwrite OTZ by pressing back key and performing a new zero.
	Timers on/off	• Press Up or Down key to scroll to Timers icon from the settings menu. • You can deactivate integrated timers for all methods through this setting. • Press Test key to enable/disable timers. • A protocol entry in the logs will be created with the time stamp. **Attention:** It is recommended to follow integrated timers in methods procedures to achieve accurate results.
	Factory reset	• Press the Up or Down key to navigate to the Factory settings menu. • Press the Test key to select the factory settings. • Press the Test key again to confirm the process or press the Back key to cancel the reset. • An entry with a time stamp is created in the logs. **Note:** A reset deletes user methods, user calibration and all saved results.

Function	Description	How to execute function
		Attention: Please transfer all results before resetting the instrument.
	Select reagent type	Selecting the reagent type allows you to display only selected methods in the Home menu and hide methods of other reagent types. • Press the Up or Down key to navigate to the menu for selecting the reagent type. • Press the Test key to access the menu. • Press the Up or Down key to navigate to other options or press the Test key to select the desired reagent type.

4.5 Data transfer

You can transfer all or selected data to either the app or the PC software.
Please select the log icon in the settings menu to display the saved results.
MD 50 provides two options to transfer data:

1. Data transfer via USB cable
2. Data transfer via NFC

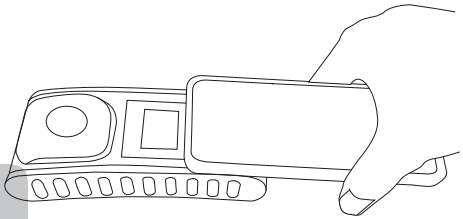
4.5.1 Data transfer via USB

- To transfer data via USB cable Lovibond® Data Expert software is required which is provided free of cost and is available for download on the Lovibond website.
- Please install the software on your PC and follow instructions on the software on how to transfer data.
- Once connected, the instrument will show USB Symbol on the status bar.
- Go to Logs menu as described in chapter 4.3.1 and select specific or all results to transfer via USB.

Note: No action will be required on photometer to initiate the data transfer process.

4.5.2 Data transfer via NFC

- To transfer measurement results via NFC, go to Logs menu as described in chapter 4.3.1 and select specific or all results to transfer via NFC.
- Press and hold Up key to save results in the NFC tag.
- Open the AquaLX® app and bring the smart device close to the instrument to transfer the results (as shown in the picture).
- Press Back key to go back to the settings menu.
  Note: When you return to the settings menu, all data is deleted from the NFC tag.
- Make sure that NFC is enabled on the smart device.



5 Maintenance

5.1 Recommended maintenance schedule

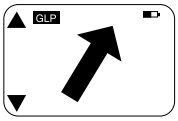
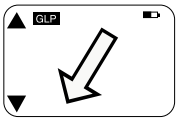
Task	What to Do	What not to do
Clean instrument and measurement chamber	1. Clean measurement chamber using lint-free, moist cloths (oil free) or cotton buds. 2. If the housing surface is dirty, wipe it with a soft cloth and mild soapy water. 3. Remove any chemicals splashes as soon as possible. 4. For disinfection, you can use isopropanol for cleaning for a short time.	1. Do not use vial which is not tightly closed. 2. Do not use detergents that include solvents. 3. Do not spray or pour chemicals directly into the measuring chamber.
Clean accessories	1. Vials, caps and stirring rods should be cleaned thoroughly after each analysis to prevent interference.	1. Do not use vials that have visible scratches. 2. Use vials which are not completely dry from outside.
Battery replacement	1. Remove batteries when storing instrument for longer period of time to avoid battery leakage. 2. Use always non-rechargeable batteries.	1. Do not use unspecified type of battery.
Storage	1. Store the instrument and accessories under ambient conditions specified.	

Warning!

Improper handling of certain reagents can cause damage to your health. In any case follow the safety labels on the packing, the safety instructions of the package insert and available SDS. Protective measures specified there have to be followed exactly.

6 Troubleshooting

6.1 Error messages and what to do

Display	Possible Causes	What to do
	Over range - Reading is exceeding the range.	Dilute the sample.
	Water sample is too cloudy.	Filtrate water sample.
	Too much light on the detector.	Check the seal on the cuvette cap.
	Under range - The reading is below the detection limit of method.	Make sure that reagents dosing and reaction times have been according to the method's instruction. Check sample to make sure it sufficient concentration of the parameter being measured.
	Insufficient light on detector.	Clean the measurement chamber to clean any dust particles blocking the light.
	Calculation error.	
Instrument shut off immediately	Batterie low 	Replace the batteries.

7 Accessories & Replacement parts

7.1 List of Accessories

250 mL bottle, AF 631	375072
Brush, 11 cm length	380230
Cleaning cloth	197635
Cuvette stand for 6 round cuvettes Ø 24 mm	418951
Factory Calibration certificate ISO 9001 for MD50	999756
Factory Calibration certificate ISO 9001 for method Cl M100 (MD50)	999720
Factory Calibration certificate ISO 9001 for method Cl M110 (MD50)	999721
Fixed price service package for MD50	19802710
Measuring beaker, 100 ml	384801
Mixing cylinder, 25 ml	19802650
Plastic funnel with handle (white)	471007
Reference Standard Kit Chlorine - 0.2 and 1.0 mg/l (MD50)	275620
Reference Standard Kit Chlorine - 0.5 and 2.0 mg/l (MD50)	275621
Reference Standard Kit Chlorine - 1.0 and 4.0 mg/l (MD50)	275622
Round cuvette 24 mm ø, set of 5	197629
Round cuvette 24 mm ø, set of 12	197620
Sealing ring for round vials 24 mm ø, set of 12	197626
Service plan - 3 years for MD50	19802810
Stirring rod, 10 cm length	364109
Stirring rod, 10 cm length, set of 10	364130
Stirring rod, 13 cm length	364100
Stirring rod, 13 cm length, set of 10	364120
USB-C cable 1 m, USB-C to A	19820-081
Verification Standard Kit MD50	215700
Water sampler with bottle 250 mL and lid, AF 631	170500

8 Specifications

Optics	LED, spectrometer sensor, interference filter (selected variants only)
Light Source	LED
Wavelength	Variant specific (415, 445, 480, 515, 530, 555, 590, 630, 680)
Photometric Range	0 - 3 Abs
Photometric Accuracy	3 % FS (T = 20 °C - 25 °C)
Suitable Vials	• Round Cuvettes 13 mm • Round Cuvettes 16 mm • Round Cuvettes 24 mm
Display	Backlit LCD
Interfaces	• NFC (Near Field Communication) • USB-C
Data Transfer Format	.csv
Operation	Foil keypad
Auto – OFF	Yes
Programmability	yes with PC software
Calibration	Factory and user adjustment - return to factory adjustment possible at any time
Updates	Firmware and methods update
Internal Storage	Internal ring memory for 100 data records
Battery Life Time	approx. 5000 measurements (without backlight)
Portability	Portable
Degree of Pollution	2
Maximum altitude above sea level	3500
Environmental Conditions	5 - 50 °C at a relative humidity of 30 - 95 % (non-condensing)
Protection Class	IP 67
Compliance	CE

Languages Full User Manual	• Chinese • Dutch • English • French • German • Italian • Portuguese • Russian • Spanish • Turkish
Dimensions	155 x 76 x 45 mm
Weight	247 g

Caution!

Subject to technical modification!
To ensure maximum accuracy of test results, always use the reagent systems supplied by the instrument manufacturer.

9 Appendix

9.1 Copyright and Trademark Notice

iOS® is a registered trademark of Cisco, Inc. and licensed to Apple, Inc.
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