

Lovibond® Water Testing

Tintometer® Group



Photometer-System



MD 100 • MD 110 • MD 200



Instruction Manual

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www.lovibond.com

Konformitätserklärung mit gefordertem Inhalt gemäß EN ISO/IEC 17050-1
Supplier's declaration of conformity in accordance with EN ISO/IEC 17050-1

EU-Konformitätserklärung / EU-Declaration of Conformity

Dokument-Nr. / Monat.Jahr: 3 / 9.2016
Document No. / Month.Year:

Für das nachfolgend bezeichnete Erzeugnis / For the following mentioned product

Bezeichnung / Name, Modellnummer / Model No.	MD 110 AL 110, alle Typen - all types
-------------------------------------------------	---------------------------------------

wird hiermit erklärt, dass es den grundlegenden Anforderungen entspricht, die in den nachfolgend bezeichneten Harmonisierungsrechtsvorschriften festgelegt sind; / it is hereby declared that it complies with the essential requirements which are determined in the following harmonisation rules:

RICHTLINIE 1999/5/EG DES EUROPÄISCHEN PARLAMENTS UND DES RATES vom 9. März 1999 über Funkanlagen und Telekommunikationsendeinrichtungen und die gegenseitige Anerkennung ihrer Konformität
DIRECTIVE 1999/5/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity

RICHTLINIE 2011/65/EU DES EUROPÄISCHEN PARLAMENTS UND DES RATES vom 8. Juni 2011 zur Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten

Angabe der einschlägigen harmonisierten Normen, die zugrunde gelegt wurden, oder Angabe der Spezifikationen, für die die Konformität erklärt wird; / Information of relevant harmonised standards and specifications on which the conformity is based:

Fundstelle / Reference	Ausgabedatum/ Edition	Titel / Title
------------------------	--------------------------	---------------

Harmonisierte Normen / Harmonised Standards

ETSI 301 489 - 1	V1.9.2	Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements
ETSI 301 489 - 17	V2.2.1	Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment; Part 17: Specific conditions for Broadband Data Transmission Systems
ETSI 300 328	V1.9.1	Electromagnetic compatibility and Radio spectrum Matters (ERM); Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive
DIN EN 55022	2011-12	Einrichtungen der Informationstechnik - Funkstöreigenschaften - Grenzwerte und Messverfahren (CISPR 22:2008, modifiziert); Deutsche Fassung EN 55022:2010
DIN EN 61010-1	2011-07	Sicherheitsbestimmungen für elektrische Mess-, Steuer-, Regel- und Laborgeräte - Teil 1: Allgemeine Anforderungen (IEC 61010-1:2010 + Cor. :2011); Deutsche Fassung EN 61010-1:2010
DIN EN 50581	2013-02	Technische Dokumentation zur Beurteilung von Elektro- und Elektronikgeräten hinsichtlich der Beschränkung gefährlicher Stoffe; Deutsche Fassung EN 50581:2012

Weitere angewandte technische Spezifikationen (z.B. nicht im EU-Amtsblatt veröffentlicht) / Further applied technical specifications (e.g. not published in the Official Journal of the EU)

Bluetooth Modul: EN 60950-1	2006+A11:2009+A1:2010+A12:20	Einrichtungen der Informationstechnik - Sicherheit - Teil 1: Allgemeine Anforderungen
Bluetooth Modul: EN 300 328	V1.7.1	Electromagnetic compatibility and Radio spectrum Matters (ERM); Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques; Harmonized EN covering essential requirements under article 3.2 of the R&TTE Directive

Diese Erklärung wird verantwortlich für den Hersteller oder seinem Bevollmächtigten / This declaration is made for and on behalf of the manufacturer or his representatives

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Anschrift / Address:	Schleefstr. 8-12, 44287 Dortmund, Germany

abgegeben durch / declared by

Name, Vorname / First name:	Dr. Grabert, Elmar
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Bevollmächtigte Person im Sinne des Anhangs II Nr. 1. A. Nr. 2, 2006/42/EG für die Zusammenstellung der technischen Unterlagen / Authorized person for compilation of technical documents on behalf of Annex II No. 1. A. No. 2, 2006/42/EC:

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Dortmund 20.9.2016



Ort, Datum / Place and date of issue

Rechtsgültige Unterschrift / Authorized signature

Diese Erklärung bescheinigt die Übereinstimmung mit den so genannten Harmonisierungsrechtsvorschriften, beinhaltet jedoch keine Zusicherung von Eigenschaften. / This declaration certifies the conformity to the specified directives but contains no assurance of properties.

Zusatzangaben / Additional details:

Diese Erklärung gilt für alle Exemplare, die nach den entsprechenden Fertigungszeichnungen - die Bestandteil der technischen Unterlagen sind - hergestellt werden. Weitere Angaben über die Einhaltung obiger Fundstellen enthält die beifolgende Konformitätsausgabe unterstützende Begleitdokumentation. / This statement is valid for all copies which were manufactured in accordance with the technical drawings which are part of the technical documentation. More details about compliance of the above mentioned references includes the supporting documentation.

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Important Information for consumers in the EU

Disposal instructions for batteries and accumulators



EC Guideline 2006/66/EC requires users to return all used and worn-out batteries and accumulators. They must not be disposed of in normal domestic waste. Because our products include batteries and accumulators in the delivery package our advice is as follows : Used batteries and accumulators are not items of domestic waste. They must be disposed of in a proper manner. Your local authority may have a disposal facility; alternatively you can hand them in at any shop selling batteries and accumulators. You can also return them to the company which supplied them to you; the company is obliged to accept them.

Disposal of Electrical Equipment



Because of the European Directive 2012/19/EU your electrical instrument must not be disposed of with normal household waste! We will dispose of your electrical instrument in a professional and environmentally responsible manner. This service, excluding the cost of transportation is free of charge. This service only applies to electrical instruments purchased after 13th August 2005. Send your electrical Tintometer instrument for disposal freight prepaid to your supplier.

Safety - General instructions

The manufacturer's liability and warranty for damage and consequential damages lapses with improper use, failure to follow this operating manual, use of insufficiently qualified specialized personnel or unauthorized changes to the instrument. The manufacturer is not liable for costs or damages that arise for the user or third parties due to the use of this instrument, especially in case of improper use of the instrument or misuse or faults in the connection or of the instrument. The manufacturer assumes no liability for print errors.

Safety information in the operating manual

This operating manual provides important information on the safe operation of the product. Read this operating manual thoroughly and make yourself familiar with the product before putting it into operation or working with it. The operating manual must be kept in the vicinity of the product so you can always find the information you need.



Note:

The description of the methods and reagent handling is not included in this manual. They are on the supplied storage media or can be downloaded from our website.

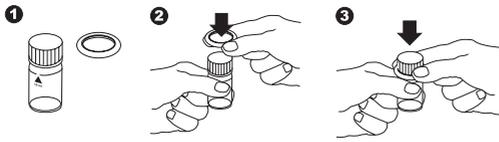
Guidelines for photometric measurements

1. Vials, caps and stirring rods should be cleaned thoroughly **after each analysis** to prevent interference. Even minor reagent residues can cause errors in the test result.
2. The outside of the vial must be clean and dry before starting the analysis. Clean the outside of the vials with a towel to remove fingerprints or other marks.
3. Zero calibration and test must be carried out with the same vial as there may be slight differences in optical performance between vials.
4. The vials must be positioned in the sample chamber for zeroing and test with the Δ mark on the vial aligned with the ∇ mark on the instrument.
5. Always perform zeroing and test with the vial cap tightly closed. Only use the cap with a sealing ring.
6. Bubbles on the inside wall of the vial lead to incorrect measurements. To prevent this, remove the bubbles by swirling the vial before performing the test.
7. Avoid spillage of water into the sample chamber because this can lead to incorrect test results.
8. Contamination of the transparent cell chamber can result in wrong readings. Check at regular intervals and – if necessary – clean the transparent cell chamber using lint-free, moist cloths (oil-free) or cotton buds.
9. Large temperature differences between the instrument and the environment can lead to errors – e.g. due to the formation of condensation in the cell chamber or on the vial.
10. To avoid errors caused by stray light do not use the instrument in bright sunlight.
11. Always add the reagent tablets to the water sample straight from the foil without touching them with the fingers.
12. The reagents must be added in the correct sequence.

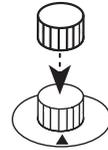
Method notes

- Prior to measurement ensure that the sample is suitable for analysis (no major interferences) and does not require any preparation i.e. pH adjustment, filtration etc.
- Different Refill Packs available on request.
- Reagents are designed for use in chemical analysis only and should be kept well out of the reach of children.
- Ensure proper disposal of reagent solutions.
- Material Safety Data Sheets are available on request (Internet: www.lovibond.com)

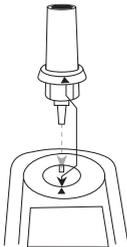
Placing the seal ring:



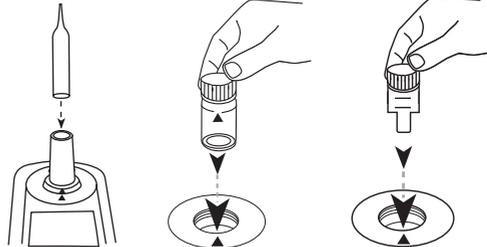
Placing the seal cap:



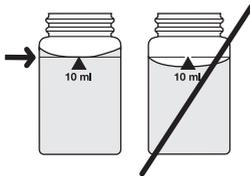
Positioning the adapter:



Positioning the vials:

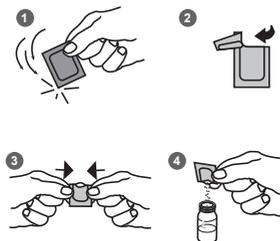


Correct filling of the vial:



Correct handling of the reagents:

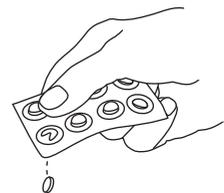
Powder Packs



Liquid reagents

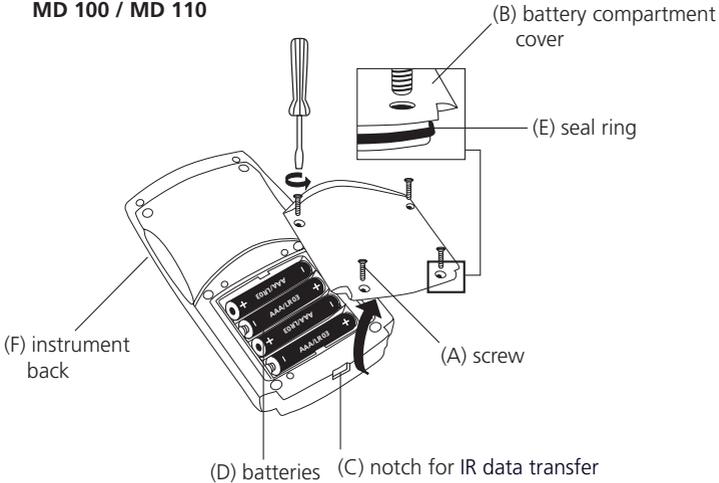


Blister-tablets

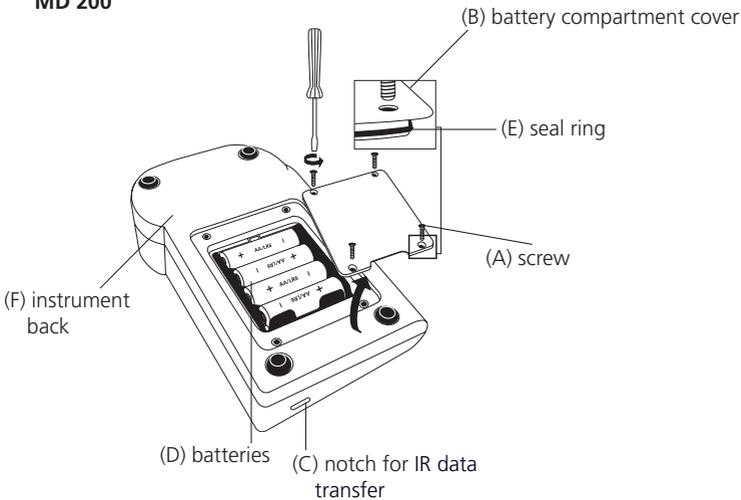


Replacement of batteries:

MD 100 / MD 110



MD 200



CAUTION:

To ensure that the instrument is water proof:

- seal ring (E) must be in position
- battery compartment cover (B) must be fixed with the four screws

If the batteries are removed for more than one minute the date and time menu starts automatically when the photometer is switched on the next time.

Operation



Switch the unit on



Selecting a method



Scroll Memory (SM)

To avoid unnecessary scrolling for the required test method, the instrument memorizes the last method used before being switched off. When the instrument is switched on again, the scroll list comes up with the last used test method first.



Note:

The description of the methods and reagent handling is not included in this manual; it is contained in a separate document.



Fluoride method

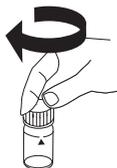
Caution:

A calibration of the method has to be performed before the first use (see ▼ calibration mode Fluoride). The same batch of SPADNS reagent solution must be used for adjustment and test. The adjustment process needs to be performed for each new batch of SPADNS reagent solution.

Performing zero



Fill 24 mm vial with 10 ml sample



Close vial



Place sample vial in the sample chamber.
Pay attention to the positioning.

GB Functional description



Press [ZERO/TEST] button



Remove the vial from the sample chamber

OTZ (One Time Zero)

The One Time Zero is available for all photometer variants whereby the zero adjustment is carried out in a 24-mm round vial with sample water. It can be used if different tests are carried out with identical test conditions and the same water sample. When changing methods, it is not necessary to carry out another zero adjustment; the next test can begin immediately. The zero adjustment is saved until the device is switched off.

The zero setting can be repeated each time if necessary.



One Time Zero (OTZ), 1x performing zero, then parameter measurement



Repeating the zero, Press the key for 2 seconds.

Performing test procedure

Add reagent (f.e. a reagent tablet) (see method description)



Close vial



Place sample vial in the sample chamber.
Pay attention to the positioning.



Press [ZERO/TEST] button

Display backlight



press, the backlight is switched off automatically during the measurement

Countdown / reaction period

For methods with a reaction time, a countdown function can be switched on during the test for some methods.

press and hold

press

release

Countdown/reaction time runs, measurement takes place automatically after the time runs out.

Interrupt countdown/reaction time

Attention:

Non-compliance with reaction periods leads to incorrect test results.



Note:

The description of the methods and reagent handling is not included in this manual; it is contained in a separate document.



Recall of stored data

The device has a ring memory. The last 16 measured values can be retrieved.



Switch the unit on



press for more than 4 seconds , then release, to access the recall menu



Scroll through data sets



Repeat the data set



Return to measurement mode

Display in the following format (automatically proceeds every 3 seconds until result is displayed):

Number n xx (xx: 16...1)
Year YYYY (e.g. 2014)
Date mm.dd (monthmonth:dayday)
Time hh:mm (hourhour:minute)
Test Method
Result x.xx

Retrieve menu

Device is switched off

press and hold

press briefly, release

release



Menu selections

press to select a menu point (scroll)

Selection of the following menu points:

diS recall stored data

Prt printing stored data

setting the date and time

user calibration

The selected menu is indicated by an arrow in the display.



depending on
device variant

diS – Recall of stored data

Retrieve menu (see "Retrieve menu")

Scroll through data sets

Repeat the data set

Return to measurement mode

The device has a ring memory. The last 16 measured values can be retrieved.

Display in the following format (automatically proceeds every 3 seconds until result is displayed):

Number n xx (xx: 16...1)
Year YYYY (e.g. 2014)
Date mm.dd (month:day)
Time hh:mm (hour:minute)
Test Method
Result x.xx

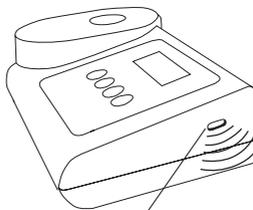
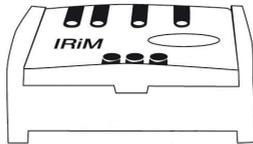




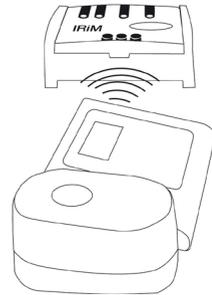
▲ Prt – Transmitting stored data
- to Printer or PC
- at the MD 100 and MD 200



Attention: To print data, or to transmit to a PC, the optional IRiM (Infrared Interface Module) is required. It can be used in combination with the devices MD 100 and MD 200.



notch for IR data transfer



PrtG



E 162

Retrieve menu (see "Retrieve menu")

press

The IRiM Module and the connected printer/PC must be ready. The instrument displays "PrtG" (Printing) for approx. 1 second.

press

All data sets will be transmitted one after the other. After finishing the instrument switches to test mode.

The print job can be cancelled by pressing the [On/Off] key. The instrument switches off.

If the instrument is not able to communicate with the IRiM, a timeout occurs after approx. 2 minutes. The error E 132 is displayed for approx. 4 seconds. Subsequently, the instrument switches to test mode (see also IRiM manual).



**▲ Prt – Transmitting stored data - Bluetooth®
- at the MD 110**

The MD 110 has a Bluetooth® 4.0 interface which enables the wireless transmission of data. Now it is possible to transmit stored results. Bluetooth® 4.0 is also known as Bluetooth® Smart or Bluetooth® LE (Low Energy). Data is transmitted from the photometer as a .csv file. Details on how information is transmitted from the photometer can be found on www.lovibond.com. To receive the data, there are several options on offer from the Tintometer® Group.

The App, AquaLX®, is available for mobile devices such as Smartphones and Tablets and enables the user to manage and graphically chart the received data. Both the data and charts can then be shared via email. AquaLX® can be downloaded free of charge from the iTunes Store® for iOS® and from Google Play™ Store for Android™.

A software tool is available for PCs to receive data stored on the photometer. The data can be exported to an Excel® spreadsheet which enables users to process the information according to their usual practice. If Excel® is not available, the data can be stored as a .txt file for processing at a later date. A Bluetooth® dongle is required to receive the data. This is part of the delivery content of the software.

Description	Part Number
Software, incl. Bluetooth® Dongle	2444480

Retrieve menu (see "Retrieve menu")



press



press

Peripherals must be ready.

The display shows the status of the Bluetooth® connection.

The display shows: „ncon“ (not connecting).



If necessary an update of the list of recognized devices in the software on the peripheral devices may be required. See therefor the instruction of the AquaLX or the data transmission software for the bluetooth® dongle.



The display shows: „con“ (connecting).



Press the [MODE] key to start the transmission, the instrument shows "PrtG" (Printing) during the data transmission and connection.

All data sets will be transmitted one after the other. The measurement results are saved on the photometer. After finishing the instrument switches to test mode and the Bluetooth® connection is interrupted.

Menu options



The transfer can be cancelled at any time by pressing the [On/Off] key. The instrument switches off.



Setting date and time (24-hour-format)

Retrieve menu (see "Retrieve menu")



2x press = arrow symbols on Time & Date



confirm



Increase value



Decrease value



Confirm the respective setting



"IS SET" appears on the display after the final confirmation.

The instrument returns to the measurement mode.



Display of current calibration setting

Retrieve menu (see "Retrieve menu")



3x = arrow symbols on Cal or Cal on the display

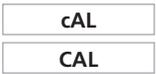
confirm

Display alternates between: CAL/„Methode“.

Note:

User calibration

Factory calibration



4 User calibration

Retrieve menu (see "Retrieve menu")

3x = arrow symbols on Cal or Cal on the display

confirm

Display alternates between: CAL/„Methode“.



selecting a method



Fill 24 mm vial with 10 ml sample.

The sample should consist of colourless and unclouded water (e.g. deionised water, pure drinking water).



close vial

GB User calibration



Place the vial in the sample chamber.
Pay attention to the positioning.

press



flashes for approx. 8 seconds

0.0.0

CAL

The display shows the following in alternating mode:

Zero
Test

Perform the measurement with a known standard concentration.

press



flashes for approx. 3 seconds

RESULT

CAL

The result is shown in the display, alternating with CAL.

If the result matches the value of the standard used (within the relevant tolerance), exit calibration mode.

On
Off

press

If the result is outside of the value (taking into account the tolerance), change the displayed value:

Mode

Press 1 x increases the displayed value by 1 digit.

Zero
Test

Press 1 x decreases the displayed value by 1 digit.

Press the corresponding key until the reading equals the value of the calibration standard.

CAL

RESULT + x

The result is shown in the display, alternating with CAL.

On
Off

press for more than 4 seconds

The user calibration is calculated and stored.

4 Calibration Mode for Fluoride

Calibration takes place also:

0 mg/l and 1.0 mg/l F⁻ standard and a clean vial
(see method description, rem.)

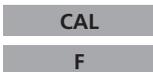
Fluoride calibration:

Retrieve menu (see “Retrieve menu”)



3x = arrow symbols on Cal or Cal on the display

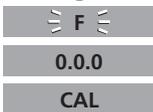
confirm



After confirming the selection with the [MODE] key the instrument will show CAL/F.

Fill a clean vial with 10 ml deionised water, close tightly with the cap.

Place the vial in the sample chamber making sure that the \times marks are aligned.



Press the [ZERO/TEST] key.

The method symbol flashes for approx. 8 seconds.

The display shows the following in alternating mode:

Add **exactly 2 ml SPADNS reagent solution** to the deionised water. Close the vial tightly with the cap and invert several times to mix the contents.

Place the vial in the sample chamber making sure that the \times marks are aligned.



Press the [ZERO/TEST] key.

The method symbol flashes for approx. 3 seconds.

The display shows:

Remove the vial from the sample chamber, empty the vial, rinse vial and cap several times and then fill the vial with **exactly 10 ml Fluoride standard (Concentration 1 mg/l F)**.

Add **exactly 2 ml SPADNS reagent solution** to the Fluoride standard. Close the vial tightly with the cap and invert several times to mix the contents.

Place the vial in the sample chamber making sure that the \times marks are aligned.



Press the [ZERO/TEST] key.

The method symbol flashes for approx. 3 seconds.

GB User calibration

F1



:

The display shows:

By pressing the [ON/OFF] key, the new correction factor is calculated and stored in the user calibration software.

Confirmation of calibration (3 seconds).



SEL

CAL

Factory calibration reset

Resetting the user calibration to the original factory calibration will reset all methods and ranges.

A user calibrated method is indicated by an arrow while the test result is displayed.

In order to reset the device to the factory calibration, proceed as follows:

press and **and hold both**

press briefly, release

release approx. 1 second.

The following messages will appear in turn on the display:

Factory calibration

oder:

User calibration

SEL

cAL

Calibration is reset to the factory setting by pressing the [MODE] key.

Mode

SEL

CAL

The following messages will appear in turn on the display:

On
Off

Switch the unit off.

GB Checking the device



Use a reference standard kit (see page 41 Reference standards-Kits for MD 100, MD 110 and MD 200)

Use the photometer as described in the instructions for the method which correspond with normally used reagent system (tablet, liquid reagent or powder pack). For liquid reagent use the tablet mode.



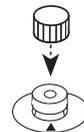
Switch the unit on.



Selecting a method.



Place the Reference standard „Zero“ vial in the sample chamber. Pay attention to the positioning.



Close with the rubber seal cap.



Press the [ZERO/TEST] key.

0.0.0

Confirm the zero adjustment



Remove the vial from the sample chamber.



Set the reference standard for the corresponding method in the sample chamber. Pay attention to the positioning.



Press the [ZERO/TEST] key.

RESULT

The result is compared with the value documented on the test certificate, taking into account the tolerances (standard & device). Ensure the selected reagent systems are correctly assigned.

Checking the device



If the result falls outside of the tolerance, the shelf life of the standard must be checked as well as whether the photometer is in the factory calibration. If this applies, we recommend returning the device to the manufacturer or distributor.

Reference standards-Kits for MD 100, MD 110 and MD 200

The reference standards are only used to check the measurement accuracy for the photometers listed in the test certificate. The calibration of these devices is stable in the long term under normal working conditions. The photometer cannot be calibrated with the reference standard.

The reference standards are delivered in tightly sealed vials.

The target values for each standard are documented in the certificate. The shelf life of the reference standard is two years from the date of manufacture, provided it is used and stored correctly. The outside of the vials must always be cleaned with a clean cloth before use.

Part-Number	Material	range
275650	Kit chlorine for devices with tablet/ liquid reagents	0,2* + 1,0* mg/l
275655	Kit chlorine for devices with tablet/ liquid reagents	0,5* + 2,0* mg/l
275656	Kit chlorine for devices with tablet/ liquid reagents	1,0* + 4,0* mg/l
275660	Kit chlorine for devices with tablet / powder reagents	0,2* + 1,0* mg/l
275670	Kit pH for devices with tablet / liquid reagents	7,45* pH

* Standard value, exact value according to the analysis certificate.

Use of a verification standard kit (see also verification standard kit, page 44)



press and **and hold**



press briefly, release



release

GB Checking the device

AbS

A530

The following appears briefly on the display:
AbS followed by the wavelength to be measured (e.g. A530 for 530 nm).

Mode

For devices with several LEDs, select the desired wavelength by pressing the [Mode] button several times as needed (scroll).

Zero
Test

Position the vial marked "Zero" in the sample chamber. Place the seal cap and press the [Zero/Test] button.

wavelength

flashes for approx. 3 seconds

0.0.0

Confirm the zero adjustment

Zero
Test

Swirl the vial marked with the selected wavelength several times and position it in the sample chamber. Close with the rubber seal cap and press [Zero/Test].

wavelength

flashes for approx. 3 seconds

RESULT

Compare the displayed result with the value printed on the certificate, taking into account the tolerances (see also notes on the certificate).



If the result falls outside of the tolerance and the standards are within the expiration date, we recommend returning the device to the manufacturer or distributor. It is useful to have the manufacturer perform an inspection, as this means the device is checked for technical faults in addition to the calibration.

Verifikationsstandard-Kit

The verification standards for the MD 100 / MD 110 / MD 200 serve to check the accuracy and reproducibility of measurement results based on the integrated wavelengths.

The kit includes a blank and 6 different measuring vials to check 6 different wavelengths. The verification standard kit thus enables the inspection of all MD 100 / MD 110 / MD 200 series photometers.

The shelf life of the standard is two years from the date of manufacture, provided it is used and stored correctly. The measurements are made in units of mAbs.

Part-Number	Material
21 56 70	Verifikationsstandard-Kit MD 100 / MD 110 / MD 200

Technical Data MD 100, MD 110, MD 200

Instrument	automatic wavelength selection, direct reading colorimeter
Light source	LEDs, interference filters (IF) and photosensor in transparent cell chamber Wavelength specifications of the interference filter dependent on the device variant, max. 3 wave lengths Possible built-in wavelengths: 430 nm $\Delta \lambda = 5$ nm 530 nm $\Delta \lambda = 5$ nm 560 nm $\Delta \lambda = 5$ nm 580 nm $\Delta \lambda = 5$ nm 610 nm $\Delta \lambda = 6$ nm 660 nm $\Delta \lambda = 5$ nm
Photometric Range	-2600 - 2600 mAbs
Wavelength accuracy ± 1 nm	
Photometric accuracy*	3 % FS (T = 20 °C – 25 °C)
Photometric resolution	0,01 A
Auto-OFF	automatic switch off 10 respectively 25 minutes after last keypress (different reaction times depending on available method)
Display	backlit LCD (on keypress)
Time	real time clock und date
Calibration	user and factory calibration resetting to factory calibration possible
Ambient conditions	temperature: 5–40 °C rel. humidity: 30–90 % (non-condensing)
Waterproof	floating; as defined in IP 68 (1 hour at 0.1 meter)
CE	Certificate for Declaration of CE-Conformity at www.lovibond.com

**measured with standard solutions*



To ensure maximum accuracy of test results, always use the reagent systems supplied by the instrument manufacturer..

Technical Data MD 100

Batteries	4 micro batteries (AAA/LR 03)
Operating time	17hr operating time or 5000 test measurements in continuous mode when display backlight is off
Storage	internal ring memory for 16 data sets
Serial Interface	IR interface for data transfer
Dimensions	155 x 75 x 35 mm (LxWxH)
Weight	Base unit approx. 260 g (with batteries)

Technical Data MD 110

Batteries	4 micro batteries (AAA/LR 03)
Operating time	17hr operating time or 5000 measurements in constant use when display backlight and Bluetooth® data transfer are off.
Storage	internal ring memory for 125 data sets
Serial Interface	Bluetooth® 4.0 for the transfer of stored measurement data
Bluetooth® Modul:	Specifications: Modul: BLE113-A Bluetooth® 4.0 LE FCC ID: QOQBT113 IC: 5123A-BGTBLE113
Dimensions	155 x 75 x 35 mm (LxWxH)
Weight	Base unit approx. 260 g (with batteries)

Technical Data MD 200

Batteries	4 Batteries (Mignon AA/LR 6)
Operating time	53hr operating time or 15000 test measurements in continuous mode when display backlight is off
Storage	internal ring memory for 16 data sets
Serial Interface	IR interface for data transfer
Dimensions	190 x 110 x 55 mm (LxWxH)
Weight	Base unit approx. 455 g (with batteries)

Operating messages

Hi

Measuring range exceeded or excessive turbidity.

Lo

Result below the lowest limit of the measuring range.



Replace batteries, no further tests possible.

btLo

Battery capacity is too low for the display backlight; measurement is still possible.

Store Cal Date
RESULT
Time Cal

A user calibrated method is indicated by an arrow while the test result is displayed (see "Factory calibration reset").

Error codes

E27 / E28 / E29

Light absorption too great. Reasons: e.g. dirty optics.

E 10 / E 11

Calibration factor "out of range"

E 20 / E 21

Too much light reaching the detector.

E23 / E24 / E25

Too much light reaching the detector.

E 22

Battery capacity was too low during measurement. Change battery.

E 70

These error messages relate to a missing or faulty factory or user calibration. Please contact our Technical Support at techsupport@tintometer.de.

E 71

E 72

⋮

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Technische Änderungen vorbehalten
Printed in Germany 12/20
No.: 00 38 63 88

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