METRIA

METRIA M10 Portable Turbidity Meter

Instruction Manual

Introduction

Thank you for selecting the METRIA M10 portable turbidity meter. This manual provides a step-by-step guide to help you operate the meter, please carefully read the following instructions before use.

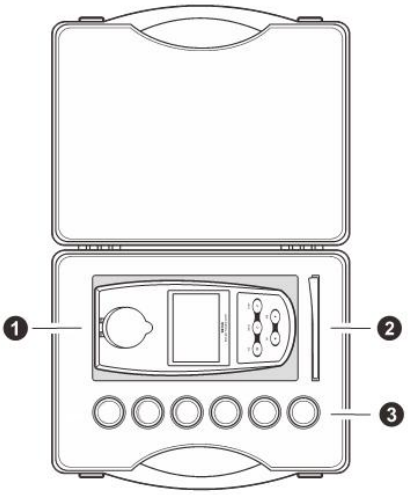
Unpacking

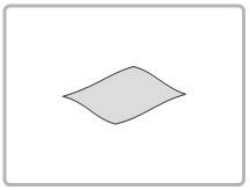
Before unpacking, ensure that the current work environment meets the following conditions.

- Relative humidity is less than 80%.
- Ambient temperature is greater than 0°C/32°F and less than 50°C/122°F.
- No potential magnetic fields and ambient light interference.

The following list describes the standard components of meter. After the unpacking, please check all components are complete. If any are
damaged or missing, please contact the supplier.

1. METRIA M10 turbidity meter



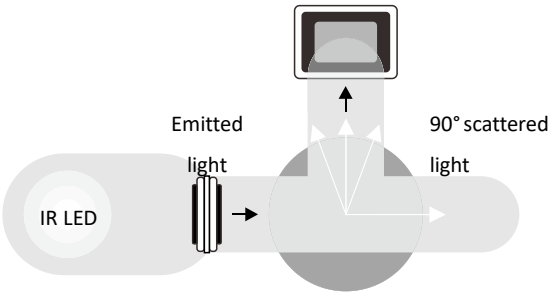


2. Lint-free cloth

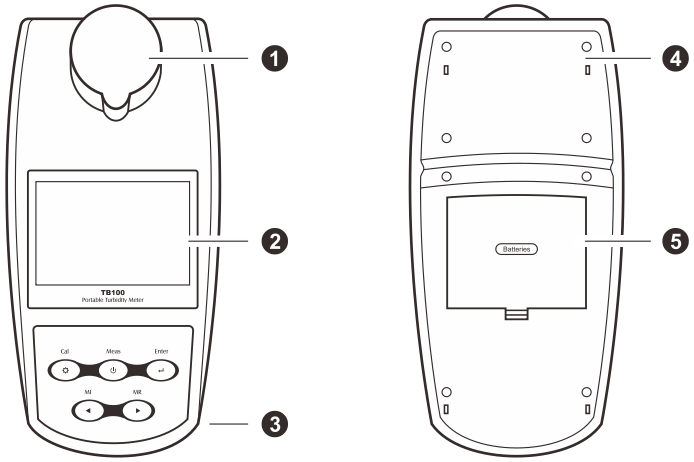
3. Sample vials

Operating principles

The METRIA M10 turbidity meter operates on the nephelometric principle of turbidity measurement and is designed to meet the criteria specified in ISO 7027. The following figure shows the basic optical system of meter. It includes a light source and a detector to monitor the light scattered at 90° with respect to the incident beam.

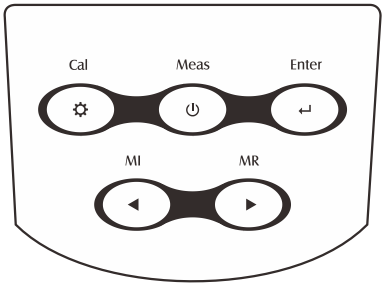


Meter Overview



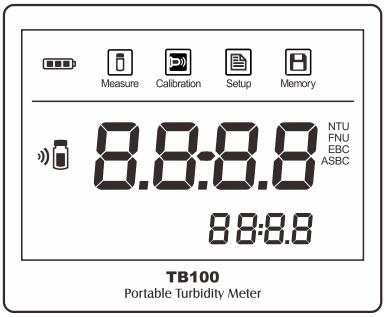
1. Measurement chamber
2. LCD display
3. USB interface
4. Measurement module
5. Battery compartment

Keypad



Name and Icon	Function
Meas ⏻	• Switch the meter On/Off. • Press the key to take a measurement. • Exit the calibration or setting and return to the measurement mode.
Cal ☼	• Start calibration. • Enter the setup menu (Press and hold the key for 3 seconds).
MI ◄	• Store current reading to memory. • Increase value or scroll up through the menu item.
MR ►	• View the data log. • Decrease value or scroll down through the menu item.
Enter ↵	• Confirm the calibration, setting or displayed option.

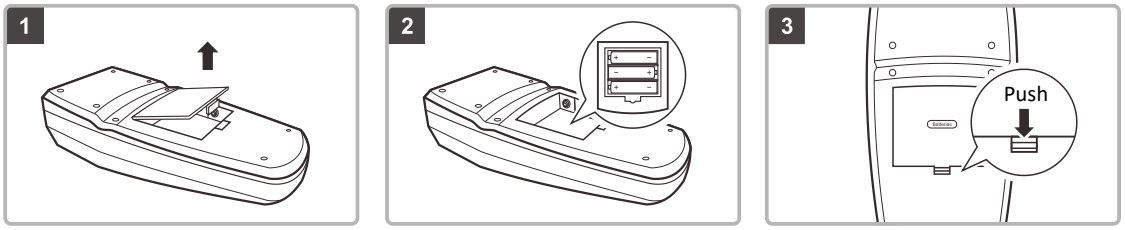
Display



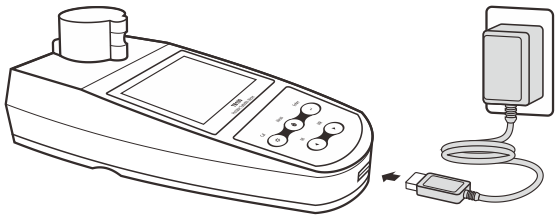
	Low battery alarm: When the battery is depleted, the icon will disappear.	Setup	Setting mode icon: Indicates the meter is in the setting mode.
Measure	Measurement mode icon: Indicates the meter is in the measurement mode.	Memory	Data log icon: Indicates the data is stored into memory.
Calibration	Calibration mode icon: Indicates the meter is in the calibration mode.		Calibration icon: Indicates the meter is calibrating.

Installing the Batteries

1. Remove the battery compartment cover from the backside of meter.
2. Insert the three AA batteries into the battery compartment, note polarity.
3. Replace the battery compartment cover to its original position. Push the limiter until it locks.

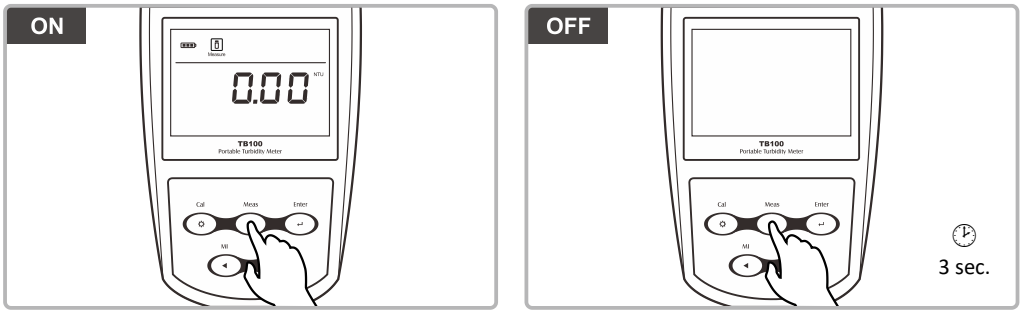


ⓘ If the batteries are depleted, the meter allows using the DC5V power adapter or the USB port on computer as a temporary power supply. Note, take out the batteries.



Switching the Meter On and Off

- Press and release the ⏻ key to switch on the meter.
- Press and hold the ⏻ key for 3 seconds to switch off the meter.



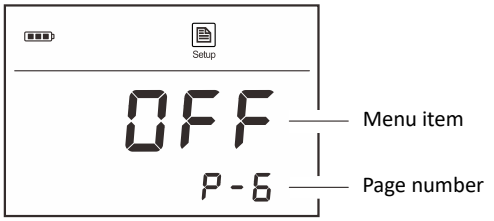
Setup Menu

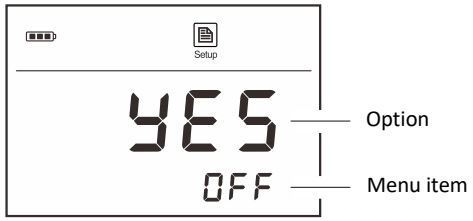
The METRIA M10 portable turbidity meter contains an integrated setup menu that is used to customize the displayed option to meet measurement
requirement. The following table describes the functions of each menu item.

Menu	Description	Options	Description	Default
CAL	Set the number of calibration points	2	2 to 5 points	2
dAtE	Set the date and time	---	Year, month, day, hour, minute	---
UNIt	Set the default turbidity unit	NTU	Nephelometric turbidity unit	NTU
		FNU	Formazin nephelometric unit	
		EBC	Turbidity unit of the European Brewery Commission	
		ASBC	Turbidity unit of the American Society of Brewing Chemists	
rESO	Set the resolution of measurement	0.01	0.01	0.01
		0.1	0.1	
HOLd	Set the measurement mode	YES	Single measurement	Yes
		nO	Continuous measurements	
OFF	Auto-power off	YES	Enable	No
		nO	Disable	
CLr	Clear all data logs	YES	Enable	No
		nO	Disable	
rSt	Reset the meter to default settings	YES	Enable	No
		nO	Disable	

Setting the default option

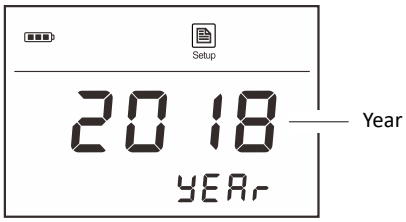
1. Press and hold the ☼ key for 3 seconds to enter the setup menu.
2. Press the ◄ / ► key to select a menu item, press the **Enter** key to confirm.
3. Press the ◄ / ► key to select an option, press the **Enter** key to return to the measurement mode.





Setting the date and time

1. Press and hold the ☼ key for 3 seconds to enter the setup menu.
2. Press the ► key, the display shows dAtE/P-2 (Date/Page 2).
3. Press the **Enter** key, the YEAr characters begin flashing.
4. Press the ◄ / ► key to set the year and the **Enter** key to confirm.
5. Repeat the step 4 to set the date and time. When the setting is completed, the meter will return to the measurement mode automatically.



Restore factory settings

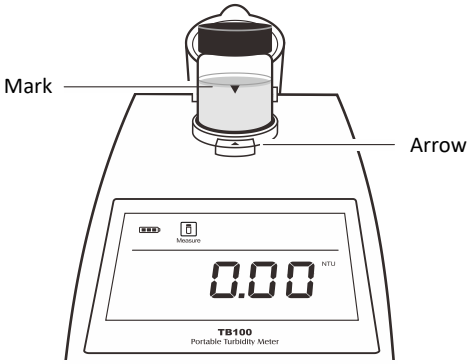
The rSt (Reset) option is used to restore the meter back to default settings. If enabled, all of the calibration data and selected options will be deleted or reset, the meter must be recalibrated.

1. Press and hold the ☼ key for 3 seconds to enter the setup menu.
2. Press the ◄ key, the display shows rSt/P-8 (Reset/Page 8).
3. Press the **Enter** key, the display shows nO/rSt indicating that do not reset the meter.
4. Press the ► key to select the YES/rSt, press the **Enter** key to confirm.

ⓘ To exit the setup menu without saving changes, press the **Meas** key.

Measurement and Calibration Hints

- Do not hold the meter in the hand during the measurement and calibration.
- Ensure that the sample in vial is homogeneous and preventing air bubbles.
- Before starting the measurement, the outside of vial must be clean and dry. Wipe the vial with a lint-free cloth to remove fingerprints and waterdrops.
- If the vial has minor scratches or scuffs, add a few drops of silicone oil to outside of the vial. Wipe with lint-free cloth.
- Ensure that the vial is positioned in the measurement chamber, the mark on the vial must be aligned with the arrow on the meter.



• To prevent the errors from ambient light interference, do not use the meter in direct sunlight. Always close the light shield lid during the measurement and calibration.

• The vial and cap must be cleaned thoroughly with deionised water after each measurement. Any residues can cause inaccurate readings.

Turbidity Calibration

• The METRIA M10 portable turbidity meter is calibrated with Formazin Standards at the factory and does not require user calibration prior to use.

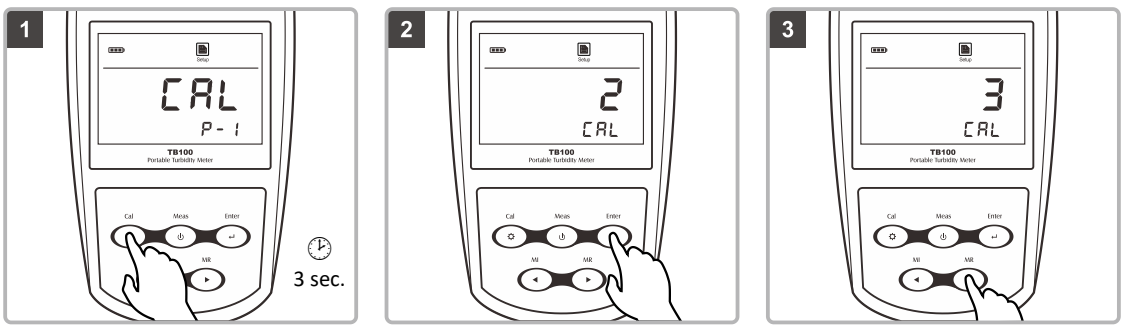
• Do not shake or agitate the calibration standard violently to prevent air bubbles.

• In order to get accurate measuring results, we recommend calibrating the meter at least once a month.

• The meter allows turbidity calibration up to 5 points with minimum of 2 points, the default calibration points include the 0.02, 10.00, 200, 500 and 1000 NTU. For better accuracy, ensure that selecting a calibration point close to the sample value you are measuring.

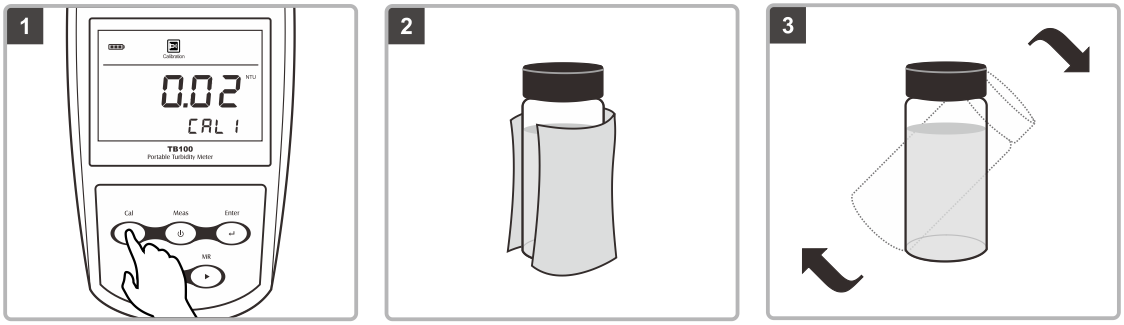
Setting the number of calibration points

1. Press and hold the ☼ key for 3 seconds to enter the setup menu, the display shows CAL/P-1.
2. Press the **Enter** key, the display shows 2/CAL (2 points calibration).
3. Press the ◄ / ► key to select the number of calibration points, press the **Enter** key to confirm.

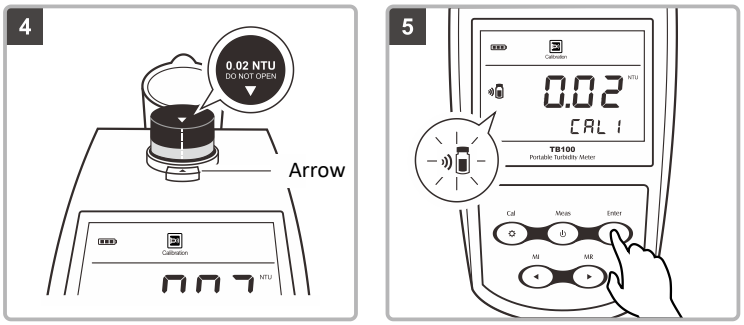


Calibrating the meter

1. Press the **Cal** key to enter the calibration mode, the display shows 0.02NTU/CAL 1. If necessary, press the ◄ / ► key to select a
   desired calibration point.
2. Take out the corresponding calibration standard from carrying case. Wipe the vial with a lint-free cloth to remove fingerprints.
3. Hold the vial cap and gently inverting vial several times. Ensure that the calibration standard is homogeneous and no air bubbles.



4. Insert the calibration standard into the measurement chamber, the mark on the vial cap aligns with the arrow on the meter. Close the light shield lid.
5. Press the **Enter** key, the meter begins the calibration. The Calibration icon continuously flashing.
6. Wait for the reading to stabilize, the meter will show the next calibration point.



7. If necessary, press the ► key to select a desired calibration point.
8. Repeat steps 2 through 5 until the meter shows End. Calibration is completed.

ⓘ To exit the calibration mode without saving the calibration, press the **Meas** key.

Turbidity Measurement

Selecting the measurement mode

The METRIA M10 portable turbidity meter contains two measurement modes. If the single measurement mode is enabled, the meter will automatically recognize a stable reading and lock the measurement. If the continuous measurement mode is enabled, the meter will continuously updating the measured values.

1. Press and hold the ☼ key for 3 seconds to enter the setup menu.
2. Press the ► key until the display shows HOLd/P-5 (Hold/Page 5).
3. Press the **Enter** key, the display shows YES/HOLd indicating that the single measurement mode is selected.
4. Press the ► key, the display shows nO/HOLd indicating that the continuous measurement mode is selected.
5. Select one of the above options, press the **Enter** key to confirm.

Measurement

An accurate turbidity measurement depends on good measurement techniques. Factors such as clean sample vials, positioning of vial in the
measurement chamber, covering the vial with the light shield lid, meter calibration, removal of bubbles, etc. For more information, please refer to page 7 “Measurement and Calibration Hints”.

Single measurement - low turbidity samples (< 200 NTU)

For the low turbidity samples, we recommend using the same vial to perform the measurement and calibration.

1.1. Rinse the vial with approximately 10ml of the sample, capping the vial with the screw cap and gently inverting it several times. Discard the used sample and repeat the rinsing procedure two more times.

1.2. Fill the vial with the sample. Cap the vial.

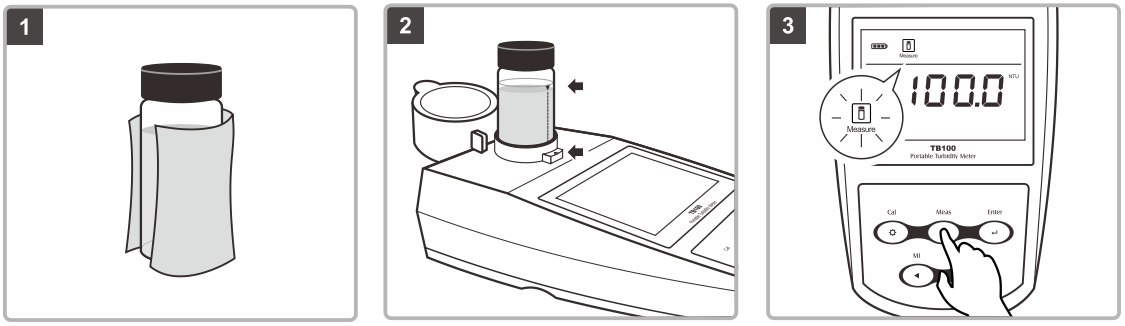
1.3 Wipe the vial with the lint-free cloth to remove waterdrops and fingerprints. Ensure that the outside of vial is dry and clean.

1.4 Place the vial in the measurement chamber. Align the mark on the vial with the arrow on the meter.

1.5 Close the light shield lid. Press the **Meas** key, the Measure icon begins flashing.

1.6 Wait for the reading to stabilize, the Measure icon will stop flashing.

ⓘ Press the **Meas** key, the meter takes a measurement again.



Single measurement - high turbidity samples (>1100 NTU)

For the high turbidity samples, the solution must be diluted prior to measurement. The dilution water can be obtained by filtering deionized water through a < 0.45µm filter membrane.

2.1 Repeat steps 1.1 through 1.5 above and record the measured value.

2.2 Calculate the true turbidity of the original sample using the following formula.

$$T = \frac{T_d\,(V_s + V_d)}{V_s}$$

Where: T = Ture turbidity of the original sample
T_d = Measured value
V_s = Volume of the original sample (ml)
V_d = Volume of the dilution water (ml)

Continuous measurements

3.1 Ensure that the meter is in the continuous measurement mode (Refer to page 8 “Selecting the measurement mode”).

3.2 Fill the vial with the sample. Cap the vial.

3.3 Gently invert the vial several times to mix the sample.

3.4 Wipe the vial with the lint-free cloth to remove waterdrops and fingerprints.

3.5 Place the vial in the measurement chamber. Align the mark on the vial with the arrow on the meter.

3.6 Close the light shield lid. Press the **Meas** key, the Measure icon begins flashing, the meter continuously measures the sample.

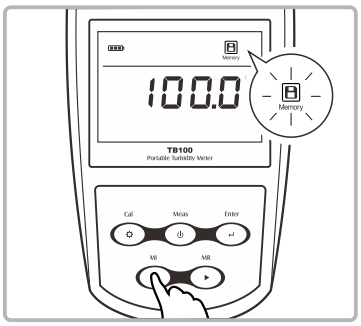
ⓘ To stop the measurement, press the **Meas** key again.

Data Management

The METRIA M10 portable turbidity meter is capable of storing and recalling up to 100 data sets.

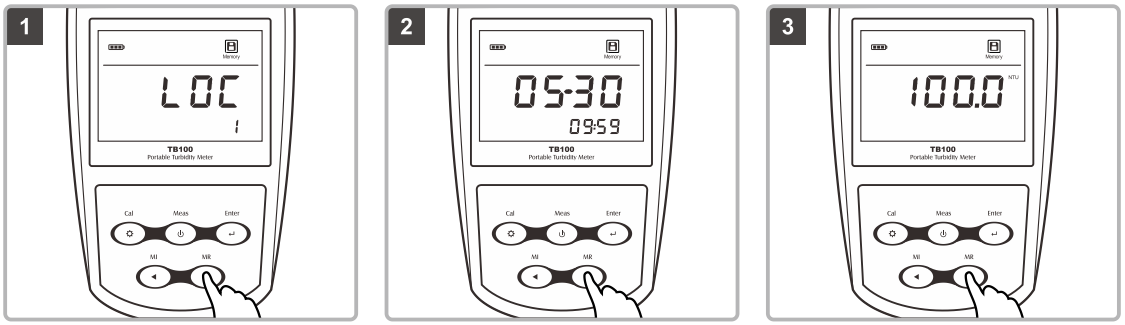
Storing a measurement result

In the measurement process, press the **MI** key to store the reading into the memory, the Memory icon appears on the display.



Viewing the data log

1. Press the **MR** key in the measurement mode, the meter shows the serial number of stored data (e.g. LOC/1).
2. Press the ► key, the display shows the date and time of measurement (Format: mm-dd, hh-mm).
3. Press the ► key, the display shows the stored data.
4. Press the ► key again, the display shows the next data set.
5. Press the **Meas** key, the meter returns to the measurement mode.



Deleting the data log

If the memory is full, the meter will automatically show FULL when the MI key is pressed. To delete data logs, please follow the steps below.

1. Press and hold the ☼ key for 3 seconds to enter the setup menu.
2. Press the ◄ key until the display shows CLr/P-7.
3. Press the **Enter** key, the display shows NO/CLr.
4. Press the ◄ key to select the YES/CLr.
5. Press the **Enter** key to confirm.

Appendix

Indexing a sample vial

The United States Environmental Protection Agency (U.S. EPA) recommends that the vial used for turbidity calibration or sample measurement be indexed. Its purpose is obtain a position which provides the lowest turbidity reading. The indexing methods are as follows.

1. Fill the vial using the distilled water (< 0.5 NTU). Cap the vial.
2. Wipe the vial with the lint-free cloth to remove waterdrops and fingerprints.
3. Place the vial in the measurement chamber. Align the mark on the vial with the arrow on the meter.
4. Press the **Meas** key, the meter begins the measurement.
5. Slowly rotate the vial approximately 45 degrees. Close the light shield lid and record the measured value.
6. Repeat the step 5 until the lowest turbidity reading is shown.
7. Mark this position on the vial.

Matching the sample vials

For the best accuracy and repeatability, using one indexed vial is best choice for turbidity measurement. If you need to use a few vials, match
these vials are necessary.

1. Repeat the steps above for each vial and record the measured values.
2. Find the closest position of these vials measuring value and mark it.

Preparing the formazin standards

Preparation of turbidity-free water:

The turbidity-free water is used for preparation of turbidity standards and is prepared by filtering deionized water through a 0.45μm or smaller pore-sized membrane.

Preparation of turbidity standards:

Turbidity Standard	Preparation Method
4000 NTU	• Dissolve 1g hydrazine sulfate [$(NH_2)_2 \bullet H_2SO_4$] in the turbidity-free water and dilute to 100ml in a volumetric flask. • Dissolve 10g hexamethylenetetramine [$(CH_2)_6N_4$] in the turbidity-free water and dilute to 100ml in a volumetric flask. • Mix 5ml of hydrazine sulfate and 5ml of hexamethylenetetramine solutions in a 100ml volumetric flask and let stand 24 hours at 25(±3)°C.
1000 NTU	• Mix 25ml of 4000 NTU standard in a 100ml volumetric flask and dilute to the mark.
500 NTU	• Mix 12.5ml of 4000 NTU standard in a 100ml volumetric flask and dilute to the mark.
200 NTU	• Mix 10ml of 4000 NTU standard in a 100ml volumetric flask and dilute to the mark. • Mix 50ml of above standard in a 100ml volumetric flask and dilute to the mark.
10 NTU	• Mix 10ml of 4000 NTU standard in a 100ml volumetric flask and dilute to the mark. • Mix 2.5ml of above standard in a 100ml volumetric flask and dilute to the mark. Or, mix 2ml of 500 NTU standard in a 100ml volumetric flask and dilute to the mark.

Specifications

Model	METRIA M10
Measurement Method	ISO 7027 nephelometric method (90°)
Range	0~1100 NTU/FNU, 0~275 EBC, 0~9999 ASBC
Resolution	0.01 (0~100 NTU), 0.1 (100~999 NTU), 1 (999~1100 NTU)
Accuracy	±2% (0~500 NTU), ±3% (501~1100 NTU)
Light Source	Infrared-emitting diode
Detector	Silicon photodiode
Stray Light	< 0.02 NTU
Sample Vial	60 (H) × 25 (Dia) mm
Memory	Stores up to 100 data sets
Output	USB communication interface
Display	Segmented LCD, 60 (L) × 40 (W) mm
Operating Temperature	0~50°C, 32~122°F
Power Requirements	3 × 1.5V AA alkaline batteries or DC5V power adapter
Dimensions	180 (L) × 85 (W) × 70 (H) mm
Weight	300g

Optional accessories

Order Code	Description
TB-GV	Sample vial, glass body, 60 (H) × 25 (Dia) mm
USB-A	USB cable, 1 meter
DCPA-5V	DC5V power adapter, european standard plug, 1 meter cable

Hazardous Substance Statement

Labbox Labware is committed to the reduction and eventual elimination of all hazardous substances in both the manufacturing process and finished products we supply. We have an active manufacturing and procurement program to minimize and eliminate the use of harmful heavy metals such as cadmium, lead, mercury and the like. New technologies and design parameters are also promoting these efforts and we expect to have little or no such materials in our product in the coming years. We welcome our customer suggestions on how to speed up these efforts.

Warranty

The warranty period for meter is two years from the date of shipment. Above warranty does not cover the calibration standards. Out of warranty products will be repaired on a charged basis. The warranty on your meter shall not apply to defects resulting from:

- Improper or inadequate maintenance by customer.
- Unauthorized modification or misuse.
- Operation outside of the environment specifications of the products.

For more information, please contact the supplier.