

# HydroTest

**HTTURB**

**Portable Turbidity**

**Meter**

**Instruction Manual**

## Introduction

Thank you for selecting the HTTURB 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 THE METER

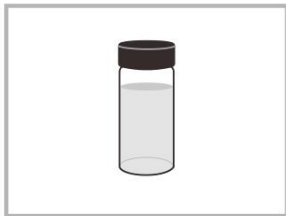
Before unpacking, ensure that the current work environment meets the following conditions.

- Relative humidity is less than 80%.
- Ambient temperature is greater than 0°C and less than 50°C.
- No potential ambient light interference or electromagnetic interference.

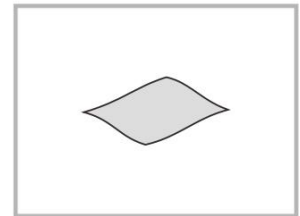
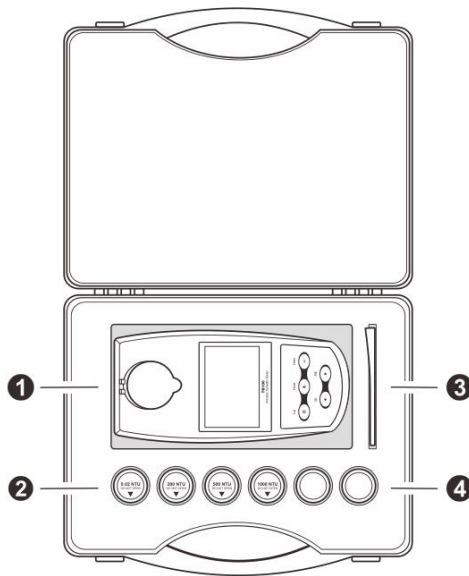
The following list describes the standard accessories for the meter. After unpacking, please check all accessories are complete. If any are damaged or missing, please contact your nearest distributor.



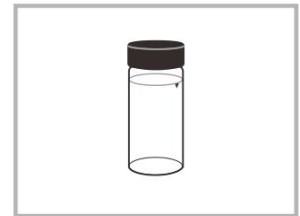
1. TB100 turbidity meter



2. Calibration standards



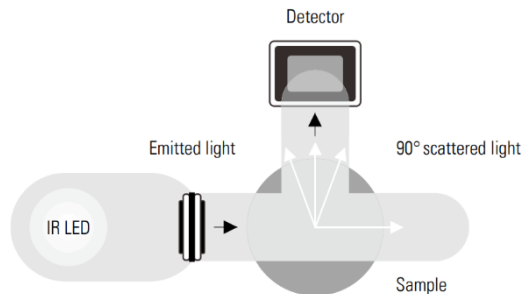
3. Lint-free cloth



4. Sample vials

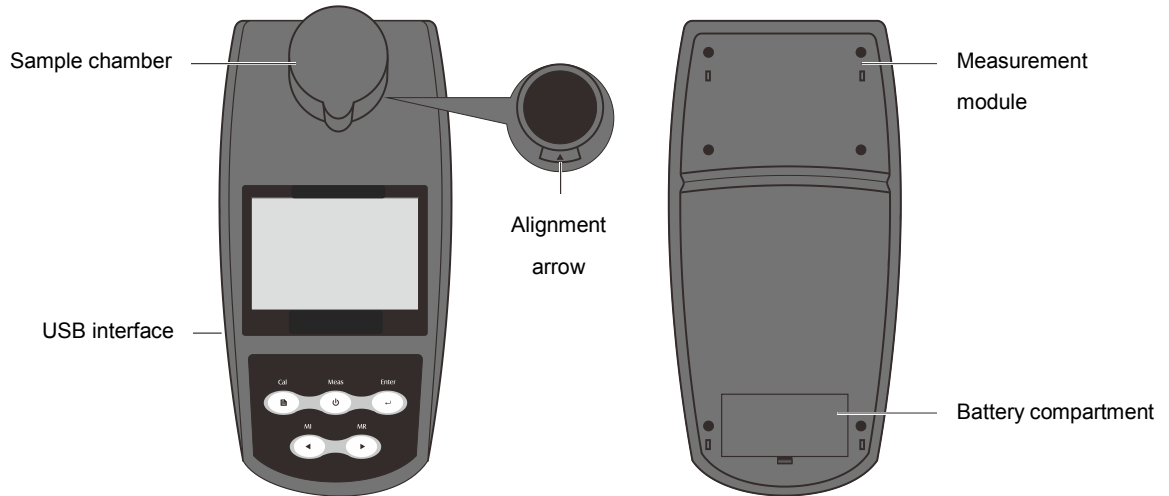
## Operating Principles

The HTTURB portable 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 the meter. It includes a light source and a detector to monitor the light scattered at 90° with respect to the incident beam.

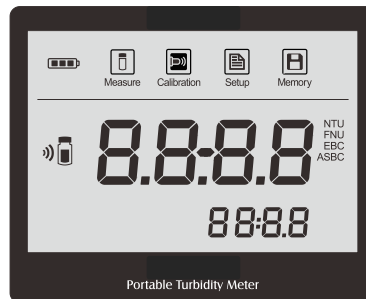


## Overview







- The HTTURB portable turbidity meter measures turbidity from 0 to 1100 NTU/FNU, or 0 to 275 EBC, or 0 to 9999 ASBC.
- Seven optional parameters can be chosen in the setup menu.
- Data can be stored and transferred to a computer by the USB interface.



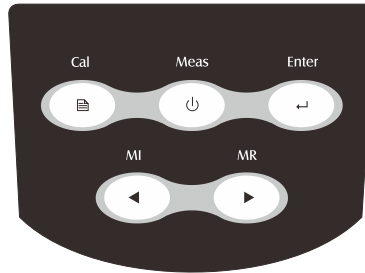
## Display



## INDEX:

	Low battery alarm When the battery is depleted, this icon will disappear.		Setup mode icon Indicates the meter is in setup mode.
	Measure mode icon Indicates the meter is in measure mode.		Memory mode icon Indicates data is stored into memory.
	Calibration mode icon Indicates the meter is in calibration mode.		Calibration icon Indicates the meter is calibrating.

## Keypad



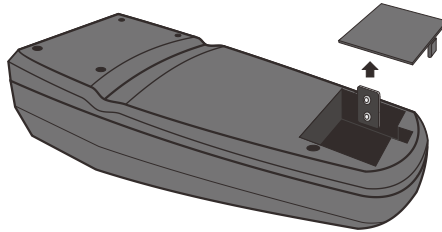
### INDEX:

KEY	FUNCTION
MEAS	<ul style="list-style-type: none"><li>• Switches the meter on or off.</li><li>• When in Measurement mode, press this key to take a measurement.</li><li>• When in Calibration mode or Settings, press this key to exit to the Measurement mode.</li></ul>
CAL	<ul style="list-style-type: none"><li>• Press this key to enter Calibration mode.</li><li>• Press and hold this key for 3 seconds to enter the Setup menu.</li></ul>
MI	<ul style="list-style-type: none"><li>• Press this key to store the current measured value to memory.</li><li>• Press this key to increase the value or scroll up through the menu.</li></ul>
MR	<ul style="list-style-type: none"><li>• Press this key to view stored data.</li><li>• Press this  key to decrease the value or scroll down through the menu.</li></ul>
ENTER	<ul style="list-style-type: none"><li>• Confirms the calibration setting, parameter value, or displayed option.</li></ul>

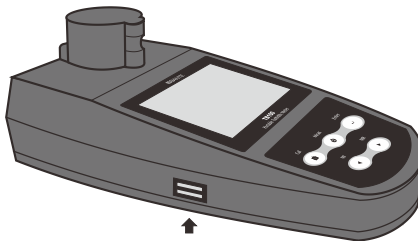
## Inserting the Battery

The HTTURB portable turbidity meter is packaged with one 9V battery. Before using the device insert the battery into the battery compartment following the procedure outlined below.



1. Remove the battery compartment cover from the meter's case.
2. Insert the 9V battery into the battery compartment. Note the polarity of the terminals.
3. Replace the battery compartment cover to its original position.
4. Installation is complete.

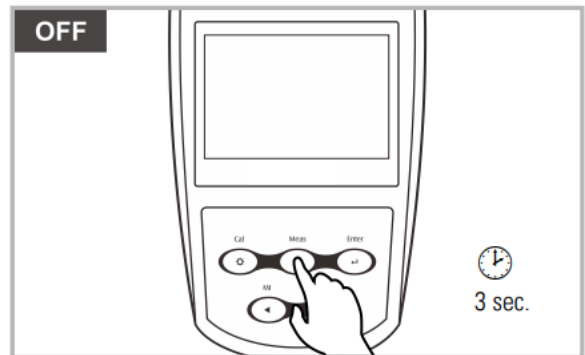
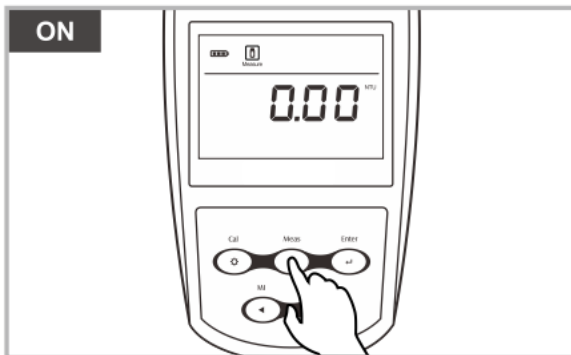


**i** When the battery is depleted, the meter allows you to use a USB cable connected to a computer as a temporary power supply.



## Power On/Off

- Press the  key to turn on the meter. The display will show measuring values and mode icons.
- Press and hold the  key for 3 seconds to turn off the meter.








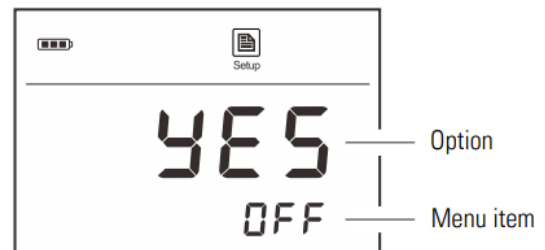
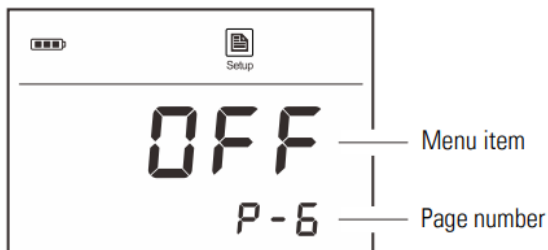
## Setup Menu

The HTTURB portable turbidity meter contains an integrated setup menu that allows you to customise display information, such as date and time, as well as measurement settings, such as measurement resolution and turbidity units.





PARAMETER	DESCRIPTION	OPTIONS	DESCRIPTION	DEFAULT
<i>CAL</i>	Set the number of calibration points	<i>2</i>	2 to 5 points	2
<i>DATE</i>	Date and Time	---	Sets the date and time for data log	---
<i>UNIT</i>	Sets the default turbidity unit	NTU	Nephelometric Turbidity Unit	NTU
		FNU	Formazin Nephelometric Unit	
		EBC	Turbidity scale of the European Brewery Commission	
		ASBC	Turbidity scale of the American Society of Brewing Chemists	
<i>RESO</i>	Sets the resolution for measurement	<i>0.1</i>	Resolution: 0.1	0.01
		<i>0.01</i>	Resolution: 0.01	
<i>HOLD</i>	Set the measurement mode	<i>YES</i>	Single measurement	YES
		<i>NO</i>	Continuous measurement	
<i>OFF</i>	Auto-power off	<i>YES</i>	Enable	NO
		<i>NO</i>	Disable	
<i>CLR</i>	Clear all stored data	<i>YES</i>	Enable	NO
		<i>NO</i>	Disable	
<i>RES</i>	Restore factory settings	<i>YES</i>	Enable	NO
		<i>NO</i>	Disable	

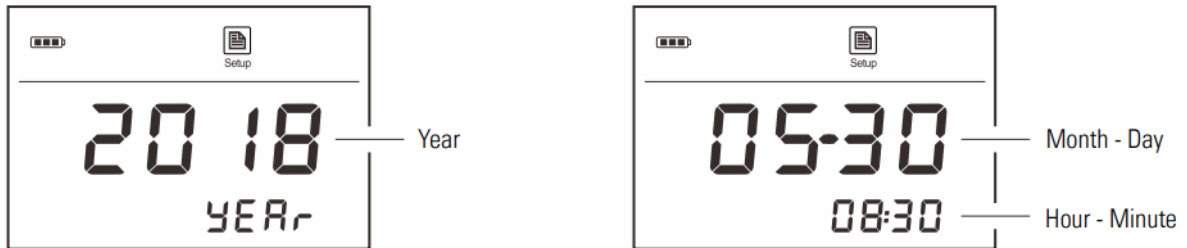
### SETTING THE DEFAULT OPTION

- 1.1 Press and hold the  key for 3 seconds to enter the setup menu.
- 1.2 Press the  or  key to select a menu item, press the enter key to confirm
- 1.3 Press the  or  key to select a desired option, press the enter key to confirm and return to measurement mode.





## SETTING THE DATE AND TIME

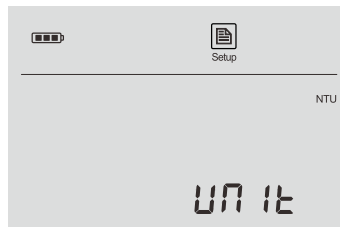
- 1.1 Press and hold the  key for 3 seconds to enter the setup menu.
- 1.2 Press the  key once, the display will show DATE/P-2.
- 1.3 Press the enter key to confirm. The meter will show the year and the value will flash.
- 1.4 Press the  or  key to set the year and the enter key to confirm.
- 1.5 Repeat step 2.4 to set the month, day and time. When the setting is complete, the meter will return to the measurement mode automatically.





## SETTING THE TURBIDITY UNIT

The HTTURB portable turbidity meter is capable of measuring results with one of four turbidity units, including the NTU, FNU, EBC, and ASBC. The default setting is NTU. The following steps describe how to change the turbidity units of the instrument.



- 2.1 Press and hold the  key for 3 seconds to enter the setup menu.
- 2.2 Press the  key until the display shows UNIT/P-3.
- 2.3 Press the enter key to confirm. The meter will show the default turbidity unit.

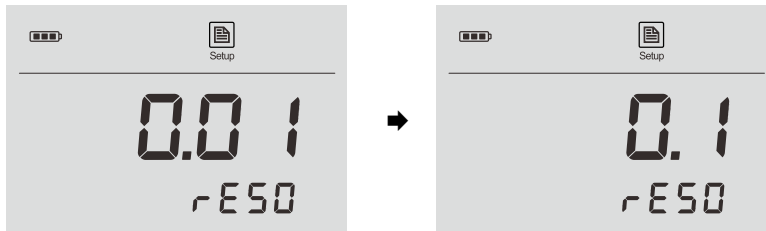


- 2.4 Press the  or  key to select the desired measurement unit.
- 2.5 Press the enter key to confirm and the meter will return to the measurement mode automatically.

## SETTING THE RESOLUTION

The meter contains two resolution options. For high-accuracy measurements we recommend that you select 0.01. The default option is 0.01. The following steps describe how to change the measuring resolution of the instrument.

- 3.1 Press and hold the  key for 3 seconds to enter the setup menu.
- 3.2 Press the  key until the display shows RESO/P-4.
- 3.3 Press the enter key to confirm. The meter will show 0.01/rESO



3.4 Press the ◀ or ▶ key to select the desired resolution (0.1 or 0.01 NTU).


3.5 Press the enter key to confirm and the meter will return to measurement mode automatically.

#### CLEAR ALL STORED DATA

Please refer to page 17 (Clear Stored Data).

#### AUTO-POWER OFF

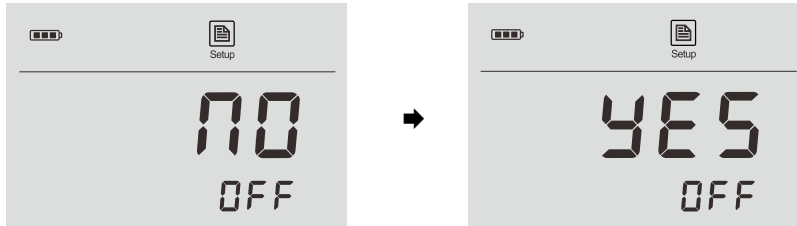
The HTTURB portable turbidity meter has an auto-power off function. When the auto-power off function is enabled the meter will automatically turn off if you do not press any key within 15 minutes. The following steps describe how to set the auto-power off function of the instrument.

4.1 Press and hold the  key for 3 seconds to enter the setup menu.

4.2 Press the ◀ or ▶ key until the display shows OFF/P-6.

4.3 Press the enter key to confirm. The meter will now show NO/OFF indicating that the auto-power off function is disabled.


4.4 Press the ◀ or ▶ key to enable or disable this function.



4.5 Press the enter key to confirm and the meter will return to measurement mode automatically.

#### RESTORE FACTORY SETTINGS

The factory reset option is used to restore the meter back to default settings. If enabled, all of the calibration data and selected options will be lost or reset; the meter must be recalibrated. If during calibration, the meter shows ERR and it cannot be corrected by recalibration, the reset function will need to be enabled.

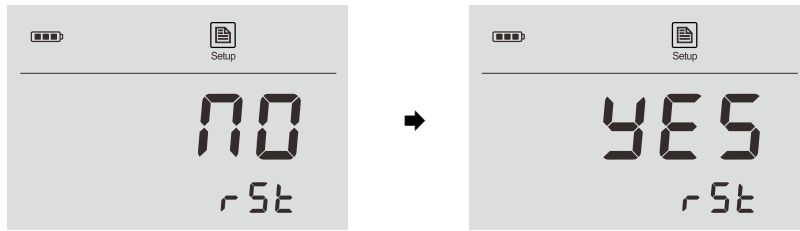
5.1 Press and hold the  key for 3 seconds to enter the setup menu

5.2 Press the ◀ or ▶ key until the display shows RST/P-8.

5.3 Press the enter key to confirm. The meter will show NO/rST which indicates the meter will not be reset.

5.4 Press the ◀ or ▶ key to enable or disable this function.









5.5 Press the enter key to confirm and the meter will return to measurement mode automatically. The instrument is now restored to factory settings.

#### EXIT THE SETTINGS

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

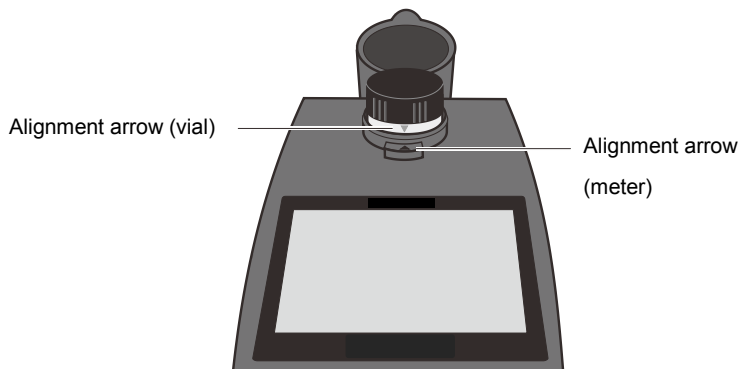
#### SELECTING THE MEASUREMENT MODE

The HTTURB portable turbidity meter contains two measurement modes, single measurement and continuous measurement mode. In the single measurement mode, the meter will automatically recognize and record a stable reading and lock the measurement. In the continuous measurement mode, the meter will continuously update the measured values and can be used to index or match sample vials. For more information, please refer to Addendum 1 (Indexing and Matching Sample Vials).

- 6.1 Press and hold the  key for 3 seconds to enter the setup menu.
- 6.2 Press the  or  key until the display shows HOLD/P-5.
- 6.3 Press the enter key to confirm. The display shows YES/HOLD indicating that the single measurement mode is selected.
- 6.4 Press the  key, the display shows NO/HOLD indicating that the continuous measurement mode is selected.
- 6.5 Select one of the above options, press the enter key to confirm.

#### Important Notes for Measurement and Calibration


- Do not hold the meter by hand during measurements and calibration.
- Ensure that the sample in the vial is homogeneous and without air bubbles.
- Before starting the measurement, the outside of the vial must be clean and dry. Wipe the vial with a lint-free cloth to remove fingerprints and water marks.
- If the vial has minor scratches or scuffs, add a few drops of silicone oil to the outside of the vial. Wipe with a lint-free cloth to remove excess oil.
- Glass vials and caps must be cleaned thoroughly with deionised water after each measurement. Minor residues from previous samples can cause inaccurate readings.
- Avoid spillage of water in the sample chamber as this may cause damage to the meter.
- To prevent errors from ambient light interference, do not use the meter in direct or bright sunlight. Always close the light shield lid during measurements and calibration.
- Ensure that the vial is positioned in the sample chamber correctly, the mark on the vial must be aligned with the arrow on the meter.




## Turbidity Calibration

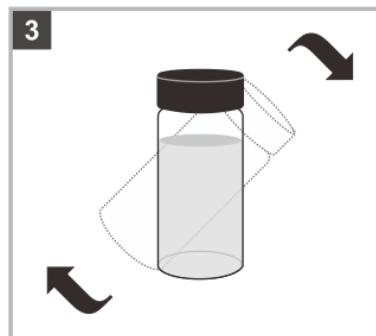
- The HTTURB portable turbidity meter is calibrated with Formazin Standards at the factory and does not require user calibration before use.
- Do not shake or agitate the calibration standard violently; this is to prevent bubble formation.
- In order to get accurate results we recommend that you calibrate the meter at least once a month.
- The meter supports turbidity calibration up to 5 points with minimum of 2 points. The default calibration points include 0.02, 10.00, 200, 500, and 1000 NTU. During the calibration process you are able to modify the calibration point or calibration values by pressing the ◀ or ▶ key. For better accuracy, ensure to select a calibration point close to the sample you are measuring.

### SETTING THE NUMBER OF CALIBRATION POINTS

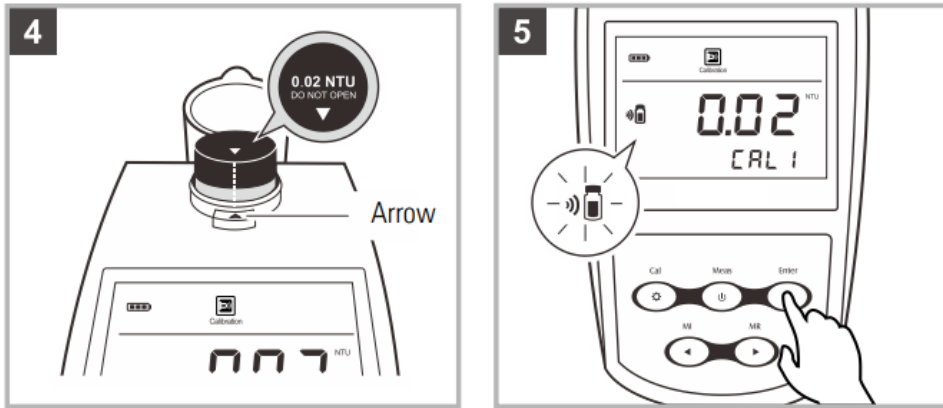
- 1.1 Press and hold the  key for 3 seconds to enter the setup menu. The display will show CAL/P-1.
- 1.2 Press the enter key to confirm. The display will show 2/CAL.
- 1.3 Press the ◀ or ▶ key to select the number of calibration points. Press the enter key to confirm. The meter will return to measurement mode automatically.

### CALIBRATE THE METER

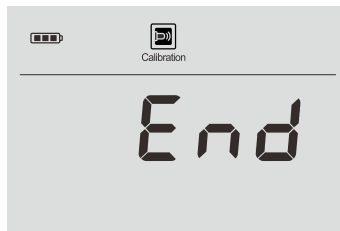
- 2.1 Press the  key to enter the calibration mode. The display will show 0.02NTU/CAL 1. If necessary, press the ◀ or ▶ key to select a calibration point close to the sample value you are measuring.
- 2.2 Take out the corresponding calibration standard from the carrying case. Wipe the vial with a lint-free cloth to remove fingerprints.
- 2.3 Hold the vial cap and gently invert several times. Ensure that the calibration standard is homogeneous and has no air bubbles.



- 2.4 Insert the calibration standard into the measurement chamber, ensuring the mark on the vial cap aligns with the arrow on the meter. Close the light shield lid.
- 2.5 Press the enter key, the meter will begin calibration. The calibration icon will flash continuously.



- 2.6 Wait for the reading to stabilise, the meter will automatically show the next calibration point.
- 2.7 If necessary, press the ► key to select an applicable calibration point.
- 2.8 Repeat steps 2.2-2.5 until the meter shows End. Calibration is complete.




To exit the calibration mode without saving the calibration, press the  key.

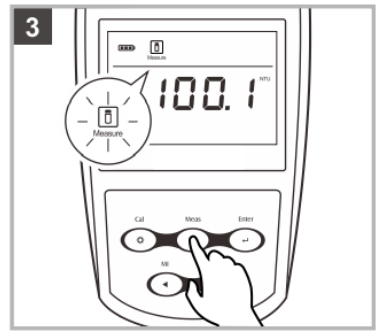
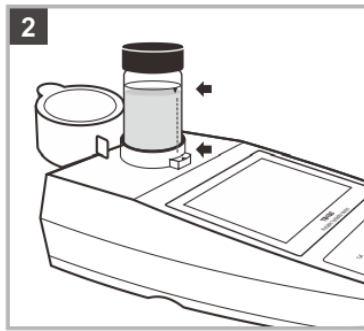
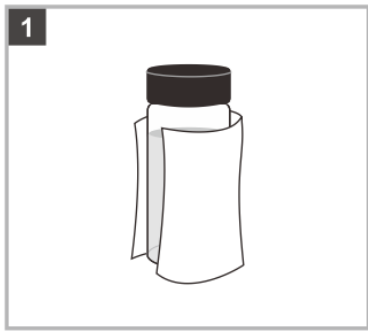
## Turbidity Measurement

An accurate turbidity measurement depends on good measurement techniques. For example, ensuring the sample vials are clean, aligning the vials in the sample chamber correctly, covering the vial with the light shield lid during measurements, regular calibration of the meter, ensuring no bubbles are in the sample, etc. are all ways which will provide reliable results. For more information, please refer to Important Notes for Measurement and Calibration.

### SINGLE MEASUREMENT - SAMPLES WITH LOW TURBIDITY

For low turbidity samples (<200 NTU), we recommend that you use the same vial to perform the measurement and calibration.

- 3.1 Rinse the vial with approximately 10ml of the sample. Cap the vial with the screw cap and gently inverting it several times. Discard the used sample and repeat the rinsing procedure twice more.
- 3.2 Fill the vial with the sample. Cap the vial.
- 3.3 Allow the vial to stand undisturbed for 1 minute so that bubbles can disappear.
- 3.4 Wipe the vial with the lint-free cloth to remove water drops and fingerprints. Ensure that the outside of the vial is dry and clean.
- 3.5 Place the vial in the measurement chamber, ensuring the mark on the vial and the arrow on the meter are aligned.
- 3.6 Close the light shield lid. Press the  key and the measure icon will begin flashing.
- 3.7 Wait for the reading to stabilise, the measure icon will stop flashing.



Press the  $\text{⏻}$  key; the meter will take another measurement.

#### SINGLE MEASUREMENT - SAMPLES WITH HIGH TURBIDITY

For the high turbidity samples, the solution must be diluted prior to measurement. The dilution water can be obtained by filtering deionised water through a  $< 0.45 \mu\text{m}$  filter membrane.

4.1 Repeat steps 3.1 – 3.5 above and record the measured value.

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

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

Where: T = true 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

5.1 Ensure that the meter is in the continuous measurement mode.

5.2 Fill the vial with the sample. Cap the vial.

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

5.4 Wipe the vial with the lint-free cloth to remove water drops and fingerprints.

5.5 Place the vial in the measurement chamber. Ensure the mark on the vial and the arrow on the meter are aligned.

5.6 Close the light shield lid. Press the  $\text{⏻}$  key. The measurement icon will begin flashing, the meter will continuously measure the sample.

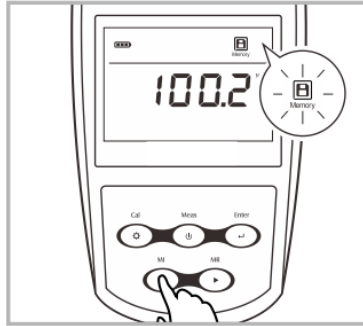
5.7 To stop the measurement, press the  $\text{⏻}$  key again.

## Storing and Recalling Data from Memory

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

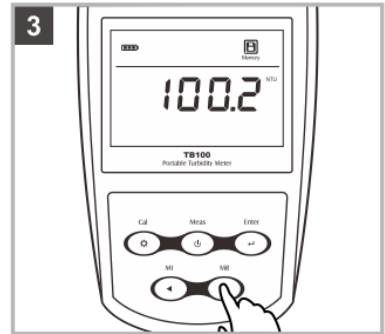
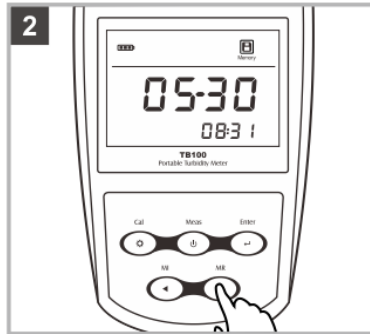
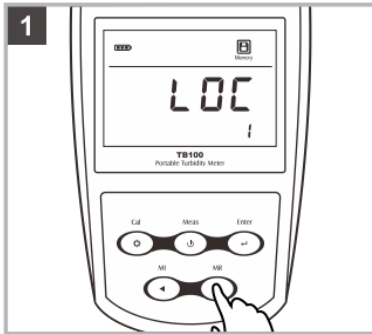
### STORING A MEASUREMENT RESULT

During the measurement process, press the **MI** key to input the measured value into the memory. The memory icon will appear on the display.



### VIEWING THE DATA LOG

1. Press the **MR** key in the Measure mode. The meter will show the latest stored data. E.g., LOC/1 (Data Log/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, the display shows the next data set.
5. Press the **⏻** key, the meter returns to the measurement mode.



If the meter has no stored data in the memory and the **MR** key is pressed, the meter will show - - - -.

## Deleting the data log

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

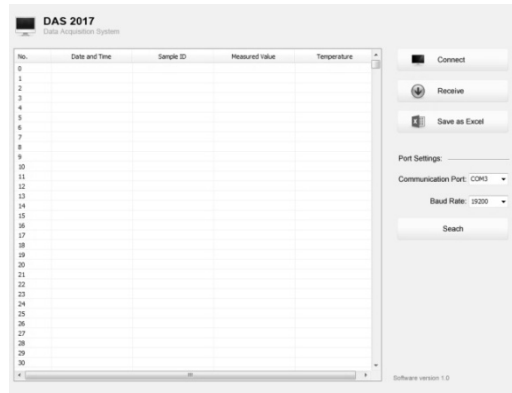
1. Press and hold the **☰** key for 3 seconds to enter the setup menu.
2. Press the **◀** or **▶** key until the display shows CLR/P-7.
3. Press the enter key, the display shows NO/CLr.
4. Press the **►** key to select YES/CLr.
5. Press the enter key to confirm.

## Communication

The HTTURB portable turbidity meter is capable of transferring the data to a computer or importing the data to Excel by a Data Acquisition System software. Before using the software ensure that the Windows 7/8/10 operating system has been installed on your computer.

### RECEIVING DATA

- Connect the meter to the computer by a USB cable.
- Click the DAS icon on the computer. The system will automatically scan for an available communication port and show the message box "Found a port on your computer".
- Click the OK button to start the application. If the computer cannot find a communication port, please click the file "CP210xVCPInstaller\_x64.exe" or "CP210xVCPInstaller\_x86.exe" to update the drive programme.



- Click the "Connect" button. The screen will show "Port is connected" indicating that communication between the meter and the computer has been established.
- Click the OK button to confirm.
- Click the Receive button to send any stored data in the meter to the computer.

### CREATE AN EXCEL FILE

- When the transfer is complete click the "Save as Excel" button. The measured values in the data sheet will automatically convert to an Excel file.

### WARNING:

Once the software is closed, all received data will be lost and cannot be recovered.

## Specifications

Model	HTTURB
Measurement Method	ISO 7027 nephelometric method (90°)
Measurement 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)
Calibration Standards	0.02 NTU, 10.00 NTU, 200 NTU, 500 NTU, 1000 NTU
Light Source	Infrared-emitting diode
Detector	Silicon Photodiode
Stray Light	<0.02 NTU
Sample Vials	60(H) ×25(Dia)mm
Memory	Stores up to 100 data sets
Output	USB Communication Interface
Operating Temperature	0~50°C, 32~122°F
Power Requirements	1×9V Battery
Dimensions	180(L)×85(W)×70(H)mm
Weight	300g

### Addendum 1. Indexing and Matching Sample Vials

The United States Environmental Protection Agency (U.S. EPA) recommends that vials used for turbidity meter calibration or sample measurement be indexed.

Its purpose is to obtain a position which provides the lowest turbidity reading. The indexing methods are as follows.

1. Fill the vial using distilled water (<0.5 NTU). Cap the vial.
2. Wipe the vial with a lint-free cloth to remove water marks and fingerprints.
3. Let the vial stand undisturbed for 5 minutes.
4. Place the vial in the sample chamber aligning the arrow on the vial with the arrow on the meter.
5. Press the **Meas** key to begin the measurement.
6. Slowly rotate the vial by approximately 45 degrees. Close the light shield lid and record the measured value.
7. Repeat step 6 until the lowest turbidity reading is shown.
8. Mark this position on the vial with respect to the alignment arrow on the meter.

#### MATCHING SAMPLE VIALS

For the best accuracy and repeatability of turbidity measurements, use of one indexed vial is the best choice. If you need to use several vials, matching of these vials is necessary.

1. Repeat the steps above for each vial and record the measured values.
2. Find the closest measuring value of these vials and mark its position with respect to the alignment arrow on the meter.

## Addendum 2. Preparation of Standard Formazin Solutions

### Preparation of turbidity-free water

- Turbidity-free water is used for the 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	<ul style="list-style-type: none"><li>• Dissolve 1g hydrazine sulfate <math>[(\text{NH}_2)_2 \cdot \text{H}_2\text{SO}_4]</math> in the turbidity-free water and dilute to 100ml in a volumetric flask.</li><li>• Dissolve 10g hexamethylenetetramine <math>[(\text{CH}_2)_6\text{N}_4]</math> in the turbidity-free water and dilute to 100ml in a volumetric flask.</li><li>• Mix 5ml of hydrazine sulfate and 5ml of hexamethylenetetramine solutions in a 100ml volumetric flask and let stand for 24 hours at <math>25(\pm 3)^\circ\text{C}</math>.</li></ul>
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	<ul style="list-style-type: none"><li>• Mix 10ml of 4000 NTU standard in a 100ml volumetric flask and dilute to the mark.</li><li>• Mix 50ml of above standard in a 100ml volumetric flask and dilute to the mark.</li></ul>
10 NTU	<ul style="list-style-type: none"><li>• Mix 10ml of 4000 NTU standard in a 100ml volumetric flask and dilute to the mark.</li><li>• Mix 2.5ml of the above standard in a 100ml volumetric flask and dilute to the mark</li></ul> OR mix 2ml of 500 NTU standard in a 100ml volumetric flask and dilute to the mark.

### Warranty

The warranty period for the meter is one year 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 the customer.
- Unauthorized modification or misuse.
- Operation outside of the environment specifications of the products.

For more information, please contact the nearest authorised distributor.





Trace2o® Limited

The Technology Centre

Wagtech Court

Station Road

Thatcham, Berkshire, RG19 4HZ Tel.: +44 (0)1635 566772

Fax: +44 (0)1635 873509

[sales@Trace2o.com](mailto:sales@Trace2o.com) [www.Trace2o.com](http://www.Trace2o.com)