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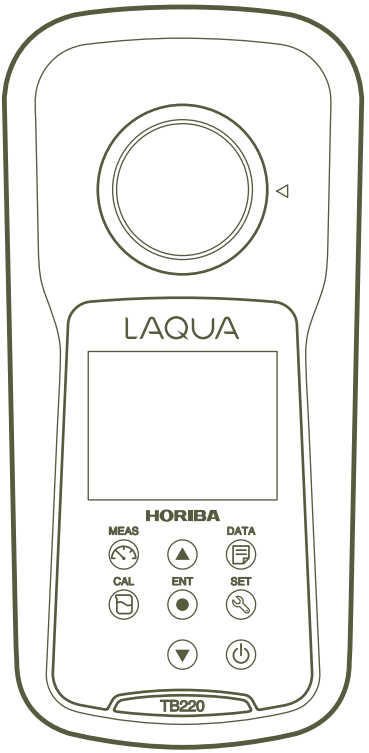
HORIBA

Instruction Manual

Portable Turbidity Meter
LAQUA-TB220



LAQUA
Portable pH・Water Quality Meter

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Be sure to read this manual before using the product to ensure proper and safe operation of the product. Also, safely store the manual so it is readily available whenever necessary. Product specifications and appearance, as well as the contents of this manual are subject to change without notice.

• Preface

• Warranty and responsibility

HORIBA Advanced Techno Co., Ltd. warrants that the product shall be free from defects in material and workmanship and agrees to repair or replace free of charge, at option of HORIBA Advanced Techno Co., Ltd., any malfunctioned or damaged product attributable to responsibility of HORIBA Advanced Techno Co., Ltd. for a period of Three (3) years from the delivery unless otherwise agreed in a written statement. In any one of the following cases, none of the warranties set forth herein shall be extended:

- Any malfunction or damage attributable to improper operation
- Any malfunction attributable to repair or modification by any person not authorized by HORIBA Advanced Techno, Co., Ltd.
- Any malfunction or damage attributable to the use in an environment not specified in this manual
- Any malfunction or damage attributable to violation of the instructions in this manual, or operations in the manner not specified in this manual
- Any malfunction or damage attributable to any cause or causes beyond the reasonable control of HORIBA Advanced Techno, Co., Ltd., such as natural disasters or the product falling over/being dropped.
- Any malfunction or damage attributable to corrosion and/or rust, or deterioration or the body
- Any malfunction or damage attributable to condensation
- Consumables including the calibration solution

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• For Your Safety

• Hazard classification and warning symbols

Warning messages are described in the following manner. Read the messages and follow the instructions carefully.

• Hazard classification

⚠ DANGER	This indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This is to be limited to the most extreme situations.
⚠ WARNING	This indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	This indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, and/or property damage. It may also be used to alert against unsafe practices.

• Warning symbols

	Description of what should be done, or what should be followed
	Description of what should never be done, or what is prohibited

• Safety precautions

This section provides precautions to enable you to use the product safely and correctly and to prevent injury and damage. The terms of DANGER, WARNING, and CAUTION indicate the degree of imminency and hazardous situations. Read the precautions carefully as it contains important safety messages.

• Meter

WARNING
Do not disassemble or remodel. Failure to follow this may result in fire or accidents due to overheating or ignition.

• About chemicals

CAUTION
Calibration solution The calibration solution includes SDVB (Styrene/divinylbenzene copolymer). If the calibration solution comes into contact with hands and/or skin in any other area, immediately rinse with clean water. In the event that it gets into the eyes, immediately rinse the eyes with clean water, and seek medical attention.
Silicone oil The silicone oil is used when polishing the surface of the vial container. After using, rinse your hands with clean water. In the case it gets into the eyes, immediately rinse the eyes with clean water, and seek medical attention.

• Regarding the vial container

CAUTION
The vial is made of glass. Be careful not to break it. Failure to follow this may result in injury from the broken glass.

• Batteries

⚠ WARNING	
	Keep the batteries out of the reach of children. In the event that a battery is swallowed accidentally, seek medical attention immediately.
	If the alkaline liquid from the battery gets into the eyes, do not rub them but immediately wash the eyes with clean water and seek medical attention. Failure to follow this may result in blindness and/or other disabilities.
	Do not put the batteries in fire, expose to heat, disassemble, or modify them. Failure to follow this may result in leakage, heat generation, and/or explosion.
	Do not measure samples based on solvents or flammables.

• Operational precautions

• Handling of the meter

- Only use the product including accessories for their intended purpose.
  Do not drop or physically impact the instrument.
  The instrument is made of solvent-resistant materials but that does not mean it is resistant to all chemicals. Do not expose the instrument in strong acid or alkali solution, or wipe with such solution.
  If the instrument is dropped into water or gets wet, wipe it using soft cloth. Do not heat to dry it.
- Except for the vial mounting section, the meter is equipped with a dustproof and waterproof structure equivalent to JIS protection code IP67. As long as the meter is handled correctly in accordance with the instructions in this manual, dustproof and waterproof performance equivalent to JIS protection code IP67 is guaranteed. Waterproof performance equivalent to JIS protection code IP67 means that the device will operate without malfunctions even when immersed in water up to one meter deep for 30 minutes. We do not guarantee that the meter will be free of damage, malfunction, dustproof, or waterproof performance under all conditions.
- When replacing the batteries and/or connecting each type of communication cable, we cannot guarantee dustproof or waterproof performance. Only when the battery cover and connector cover have been mounted correctly is the dustproof and/or waterproof performance provided.
- We do not guarantee that the vial mounting section is waterproof or dustproof. Prevent moisture and/or dust from entering.
- After replacing the batteries or removing each type of communication cable that has been connected, be sure to check that no foreign objects have adhered to the waterproof packing attached to the cover, as well as that the packing has not become warped or discolored. If foreign objects adhere to the waterproof packing, or the packing has been deformed or changed in color, it may allow dust and dirt to get in and cause water leakage, which may lead to malfunction of the meter.
- When removing each type of communication cable from the meter, hold the cable connector section and remove the cable. Removing the cable by holding the cable section may result in damage to the connector on the side of the meter, which may lead to its malfunction.
- Communication between the meter and a personal computer (hereinafter referred to as a PC) using the communication cable may not be established due to environmental conditions, such as an environment with electromagnetic noise.
- Do not replace the batteries in places subject to a lot of dust and dirt, or while hands are wet. Failure to follow this may result in malfunction if any dust, dirt, and/or moisture enter the inside of the meter.
- Do not press the keys using an object with a sharp tip.
- If the power supply is interrupted while measurement data is being saved to the meter, the data may be corrupted.
- The meter can use nickel-metal hydride rechargeable batteries.

Operational precautions

• Handling of batteries

- Do not short-circuit the batteries.
- Correctly set the positive (+)/negative (-) poles of the batteries.
- When batteries have run out, or the meter will not be used for a long period of time, remove the batteries. Failure to follow this may result in battery leakage.
- Among the specified types of batteries, be sure to use four batteries of the same type.
- Do not use new and used batteries together.
- Do not use fully charged and partially charged nickel-metal hydride rechargeable batteries together.
- Do not charge non-rechargeable batteries.

• Operating/storage environment of the meter

Store the meter under the following environmental conditions.

- A location where the temperature is 5°C to 50°C, the relative humidity is 80% or less, and without dew condensation.

• Avoid storing in the following locations.

- Sloping location
- A location subject to strong vibration
- A location subject to direct sunlight
- A location exposed to corrosive gas
- A location near heating and cooling appliances
- A location subject to direct wind
- A location exposed to a lot of dust and dirt

• Transportation of the meter

When transporting the meter, use the package box it came in at the time of delivery. Transporting in packaging other than that specified may result in damage to the meter.

• Disposal

When disposing of the meter, accessories such as batteries, and/or calibration solution, follow the related laws and/or regulations of each local government.

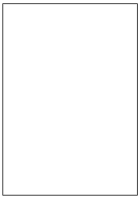
Contents

■ Product overview

This chapter explains the product content, main features, and components.

Main unit of the meter

Instruction manual (this document)



Quick manual

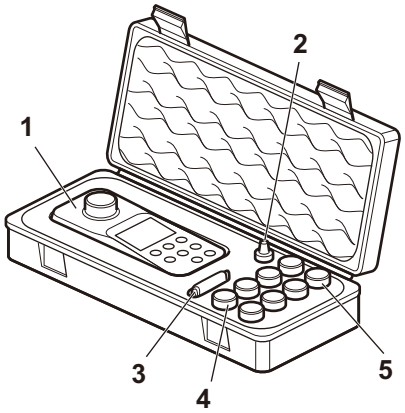
Turbidity (SDVB) standard solutions

Vials for sample measurement

Silicone oil

Cloth

● How to store in the carrying case



No.	Name
1	Meter
2	Silicone oil
3	Cloth
4	Vials for sample measurement
5	Turbidity (SDVB) standard solution

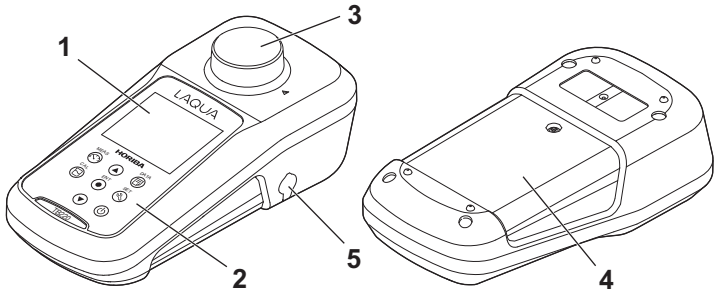
Note

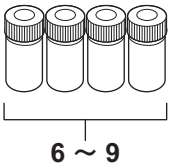
- The accessories are not waterproof.
- Four AA batteries are required for use. Batteries are not included and should be purchased seperately.
- Handle the vial with care to avoid scratching or cracking it.

● Main features

- One-piece molded body made of special rubber and polycarbonate that is shock-resistant and easy to hold
- Large monochrome LCD (50 × 40 mm) with white LED backlight
- Simple user interface
- Up to 2000 items of data memory function
- Auto power off function (OFF, between 1 minute to 30 minutes)
- With smiley reading stability indicator
- Powered by four AA batteries
- PC (standard USB) / Printer (25 pin serial) connection via 2.5 mm diameter phone jack
- IP67 rating waterproof and dustproof (excluding the vial mounting section)

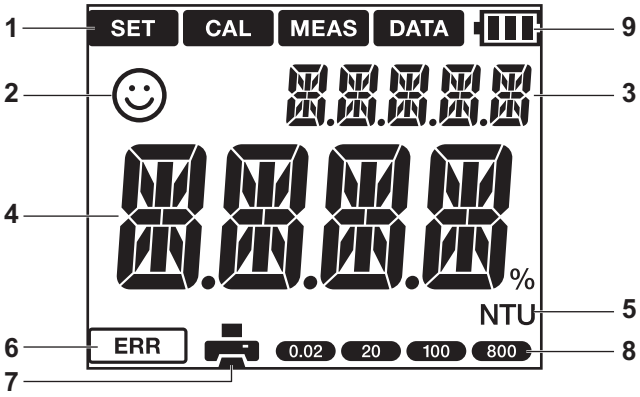
● Components





No.	Name	Function
1	Monochrome LCD	Displays measurement values.
2	Operation keys	Used to operate the meter.
3	Vial cover	Used for calibration and measurement.
4	Battery cover	Open/close it when setting/removing batteries.
5	Communication connector	Used to connect the USB communication cable and printer cable.
6	Turbidity (SDVB) standard solution 0.02 NTU	Used for calibration.
7	Turbidity (SDVB) standard solution 20 NTU	
8	Turbidity (SDVB) standard solution 100 NTU	
9	Turbidity (SDVB) standard solution 800 NTU	

● Meter screen display

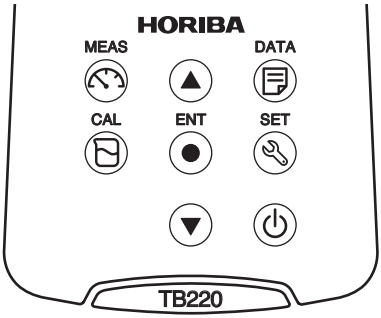


No.	Name	Function
1	Status icons	Displays the current operation mode (SET, CAL, MEAS, or DATA mode).
2	☺	Indicates that measurement can be performed, or that measurement is complete and data can be read.
3	Mode display	Displays the currently selected mode.
4	Measurement value	Displays measurement values.
5	NTU	Displays the unit.
6	ERR	Displays the error status.
7	🖶	Indicates that data is being transferred to a printer or PC.
8	Calibration turbidity display	Displays the standard solution turbidity that has been calibrated.
9	🔋	Displays the battery level.

● Battery level display

Screen display	Battery level
	100%
	60%
	40%
	Batteries are running out. Replace the batteries.
BATT LOW	When “BATT LOW” is displayed, refer to page 26 and take appropriate action.

● Keypad operation



Keypad	Name	Function
	MEAS key	Switches the operation mode to the measurement mode. Start measurement in measurement mode.
	CAL key	Switches from measurement mode to calibration mode.
▲	UP key	In the setup mode, navigates between various setups. Selects preferred option in some setup screens. Increases or decreases selected digit when entering numbers.
▼	DOWN key	
●	ENT key	Determines the selection or setup. Used to start calibration in calibration mode. Used to save and print data at the same time when a printer is connected.
	DATA key	Switches from measurement mode to data mode.
	SET key	Switches from measurement mode to setting mode.
	POWER key	Powers ON/OFF the instrument.

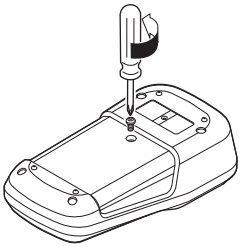
■ Basic operation

This chapter explains the functions of each part as well as basic operations.

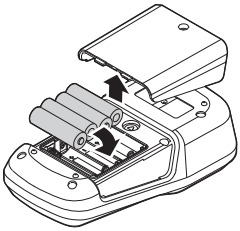
● Place batteries into the main unit.

The meter is operated by batteries. Batteries are not supplied with the meter. Batteries are not included and should be purchased seperately.
The meter can use AA batteries or Ni-MH rechargeable batteries. Perform the following procedure to insert batteries in the instrument.

1. Unscrew the battery cover on the back of the instrument counter-clock wise to unlock the battery cover.

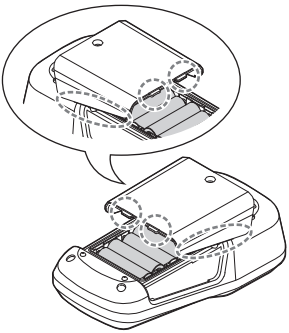


2. Remove the battery cover and insert the batteries.

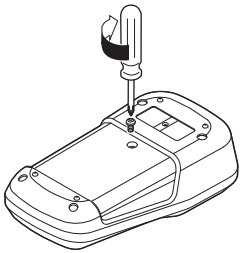


3. Replace battery cover.

* To maintain waterproofing, please check the following.
- There is no distortion in the waterproof gasket.
- There are no foreign objects stuck in the gasket.
- The main unit and battery cover are properly connected.



4. Screw the battery cover on the back of the instrument clockwise to lock the battery cover.



Note

- Do not replace the batteries in places subject to a lot of dust and dirt, or while hands are wet. Failure to follow this may result in malfunction if any dust, dirt, and/or moisture enter the inside of the meter.
- Do not short-circuit the batteries.
- Note polarity as shown in the battery compartment.
- When the batteries are depleted or the meter will not be used for a long period of time, remove the batteries.
- Among the specified types of batteries, be sure to use four batteries of the same type.
- Do not use new and used batteries together.
- When the batteries have been removed, the clock data will be initialized.

● Mode and measurement

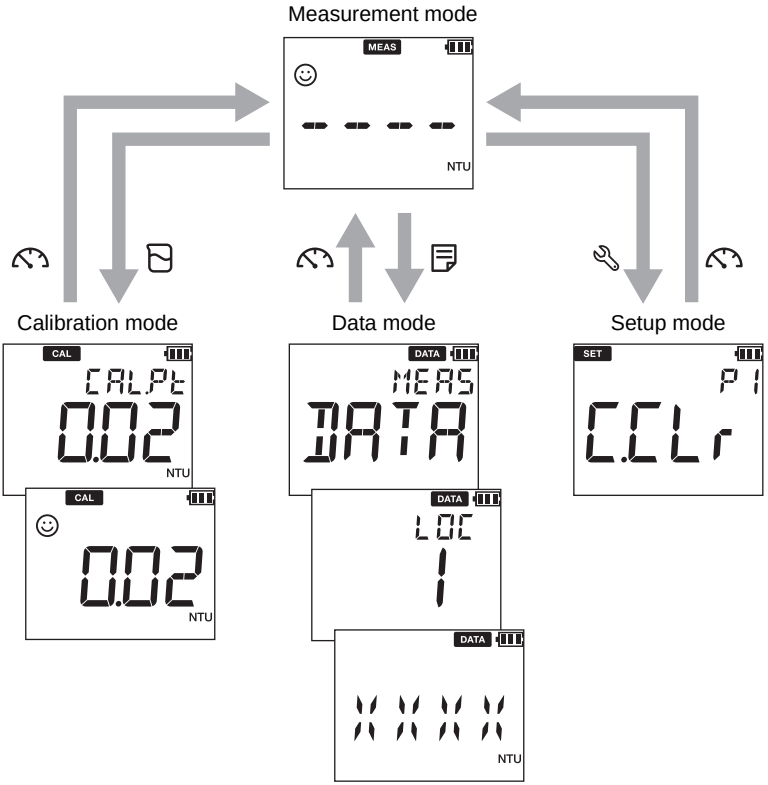
Switching operation mode

You can switch between four operation modes based on the intended use. The status icon indicates the current mode.

Icons	Name	Function
SET	Setup mode	Perform various setup functions.
CAL	Calibration mode	Performs calibration.
MEAS	Measurement mode	Performs measurement.
DATA	Data mode	Performs data setup. Displays the saved data.

You can change the operation mode using the corresponding key.

- **Measurement mode:** Press in modes other than measurement mode to switch to measurement mode.
- **Calibration mode:** Press in measurement mode to switch to calibration mode.
- **Data mode:** Press in measurement mode to change to data mode.
- **Setup mode:** Press in measurement mode to change to setup mode.


Measurement mode
MEAS
NTU
Calibration mode
CAL
CALPt
0.02
NTU
CAL
0.02
NTU
Data mode
DATA
MEAS
DATA
DATA
LOC
1
DATA
NTU
Setup mode
SET
P1
C.CLr

■ Calibration

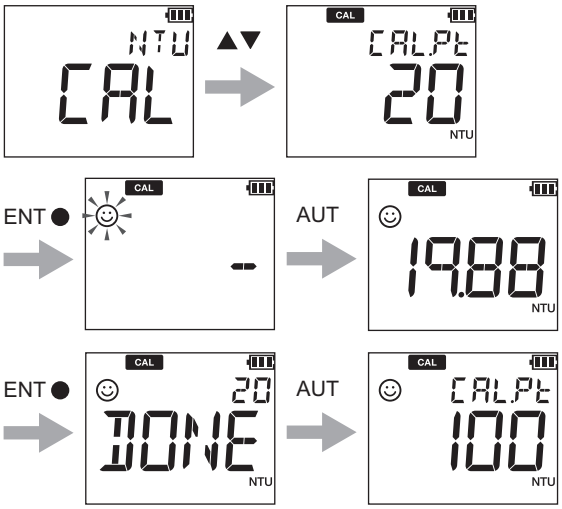
This chapter explains the calibration procedure for the TB220 turbidity meter.
Use the four turbidity (SDVB) standard solutions (0.02, 20, 100, and 800 NTU) supplied with the meter for calibration.
Refer to the following steps to perform calibration.
Hereafter, the turbidity (SDVB) standard solution will be referred to as the calibration solution.

Preparation before calibration

- Prepare the 0.02, 20, 100, and 800 NTU calibration solutions in their respective vials.
- Mix each calibration solution gently by inverting the vial a few times.
- Check that the calibration solution vial is free from stains and/or smudges such as fingerprints.
  If the surface is dirty, wipe it off with the supplied cloth.
  Use the silicone oil depending on the degree of dirt.

Calibration

1. Press ⎋ on the meter to switch to calibration mode. The calibration point 0.02 NTU will be displayed on the screen.
2. Place the 0.02 NTU calibration solution vial into the meter, aligning the arrows on the vial and the meter, and close the cover.
3. Wait until the calibration solution level stops fluctuating.
4. Press **ENT** ● to start the calibration.
5. When ☺ stops flashing, press **ENT** ● to confirm the calibration.
6. The turbidity will be displayed on the screen.
7. For other calibration points, repeat steps 2. to 5.



Note

- Perform calibration on a flat surface to prevent the main unit from tilting.
- Do not move the main unit or apply any vibration during calibration.
- If the ambient temperature and humidity differ after relocation, wait until the main unit acclimates to the new conditions.
- If the ambient temperature at the calibration site differs significantly from that at the measurement site, recalibration at the measurement site is recommended.
- Note that dirt or scratches on the side of the vial will affect the measurement value.
- Do not shake the calibration solution. Air bubbles can prevent accurate calibration.

Tip

- Press MEAS to abort the calibration process.
- Before calibration, we recommend deleting the previous calibration data. If not deleted, the previous calibration results will affect the measurement results.
- For instructions on deleting calibration data, refer to "Settings" on page 19.
- Calibration points can be selected using the up and down keys. Calibration using the standard solutions with lower and higher turbidity than sample provides a more accurate measurement. When the sample more than 800 NTU, use 800 NTU standard solution. We recommend calibrating all four points to ensure accurate measurements across the entire measurement range.

■ Measurement

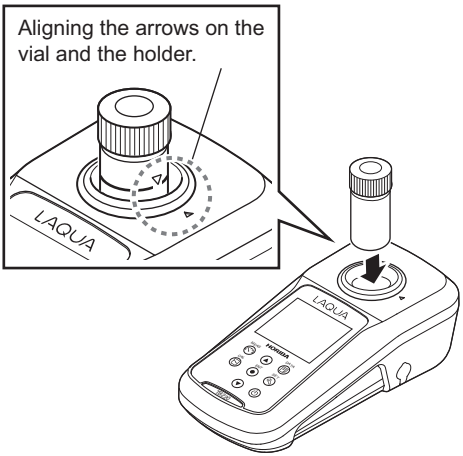
This chapter explains the measurement procedure for the TB220 turbidity meter.
Use thoroughly cleaned vials for measurement.

1. **Prewash inside of the measurement vial with the sample.**

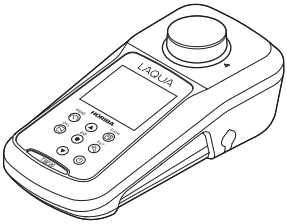
2. **Fill the measurement vial with the sample up to the marked line (10 mL) and close the cap.**

3. **Wipe the vial with the supplied cloth.**
   Fingerprints or dirt and scratches on the glass surface can prevent accurate measurement. For scratches, apply a thin layer of silicone oil to create a smooth, clear surface, ensuring more reliable and consistent turbidity readings.

4. **After gently mixing the sample by inverting the vial a few times, place the vial into the meter.**
   Align the arrows on the vial and the meter for proper positioning.

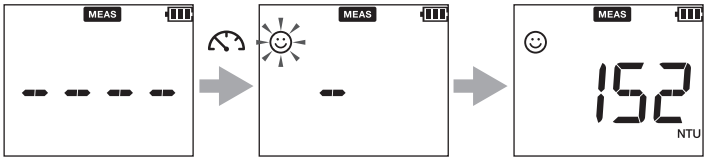


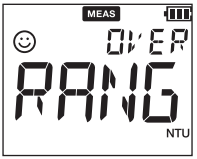
5. Place the vial cover securely.



6. Press .

7. When the ☺ changes from flashing to lit, the measurement is complete.





When the turbidity exceeds 2000 NTU, or detected light intensity is too low, "OVER RANG" is displayed.

Tip

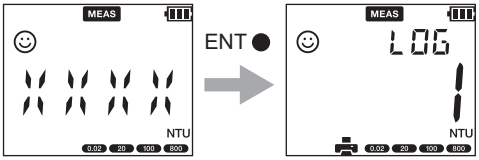
- If the measurement result is "OVER RANG", data saving and printout will not be performed even if the ENT key is pressed after measurement.
- For accurate measurement of samples such as 1 NTU or less, it is recommended to let the vial stand for at least 3 minutes after setting.

■ Data

● Saving the data

Data measured by the instrument can be stored in the internal memory.
To save the measured data:

- Press **ENT** ● to save the displayed data.
- Meter displays the saved data for 2 seconds and then the display returns to the previous screen automatically.

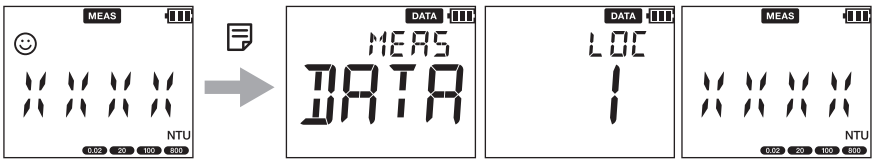


Note

- When saving the data with the printer connected, the data will be saved and printed at the same time.
- If the amount of saved data reaches the limit, an insufficient memory error will occur and MEM FULL will be displayed, preventing further data from being saved.

● Viewing stored data

- To view stored data, press .
- Use ▲▼ keys to review different stored records.
- Press to return to measurement mode.



● Transferring the data to a PC

The saved data can be transferred to a PC by connecting the meter to a PC using a USB communication cable (sold separately). To transfer the data, the driver for the USB communication cable and data acquisition software DAS20 are required.
Please download the driver and data acquisition software from our water quality meter comprehensive website.

● Printing the data

How to select and print the data:

1. Connect an optional printer to the communication connector on the meter.
2. When the meter is in measurement mode, press .
3. Select the data to be printed using ▲▼.
4. Press **ENT●** to print the selected data.

● Printing format - Measurement

Model	: HORIBA TB220
S/No	: 12345678
SW Rev	: 1.00
Date	: 20 Aug 2018
Time	: 10:10:28
TURB	: 0.02 NTU
User Name	:
Signature	:

Tip

To print entire stored data log, refer to "Data settings" (page 20).

Note

Be sure to exit the DAS software before disconnecting the communication cable; if the communication cable is disconnected before exiting the DAS software, the data printing format to the printer may change. In such a case, start up the DAS software with the communication cable connected again, exit the software, and then disconnect the communication cable.

● Check the turbidity for which calibration has been performed

Of the four calibration points, you can check the turbidity for which calibration has been performed.

1. Press  .
2. Press  .
3. The turbidity that has been calibrated will be displayed in order.
4. Press  to return to the measurement screen.

■ Settings

The measurement items can be set, and the data can be deleted. For the items that can be set, refer to the following table.

● Basic operation

1. Press in measurement mode.
2. Use ▲▼ to select the measurement or setting item and press **ENT**●.
   The selected measurement or setting item is displayed.
3. Use ▲▼ to change the detail item and press **ENT**●.
   The selected detail item is displayed.
4. Use ▲▼ to change the item or value and press **ENT**●.
   The changed item or value will be established.

● Setting item list

Level 1		Level 2	
Setting item	**Setting item**	**Detail item**	**Setting description**
C.CLr	Clear calibration	C.CLr	Clear calibration
DATA	Data settings	PrNT	All data printing settings
		D.CLr	Delete all saved data
GEN	General settings	A.OFF	Auto power off setting
		r.SET	Factory reset
CLK	Date and time settings	DATE	Year, month, and day settings
		TIME	Time settings

Note

The data transferred to the PC and printed data will show the date and time of the measurement.

● Data settings

Press . → Use ▲▼ to select DATA and press **ENT●**. → Use ▲▼ to select the setting item (see below). → Press **ENT●** to reflect the settings.
The options in bold in the table are the initial setting values.

Setting item	Setting	Details
PRINT All data printing settings	・**NO** ・YES	All measurement data that has been saved can be printed collectively. When printing the data items one by one, refer to "Printing the data" (page 17).
D.CLR Delete all saved data	・**NO** ・YES	Delete all measurement data that has been saved. When selecting YES and pressing **ENT●**, DONE will be displayed. The data will be deleted, and the screen will automatically return to the previous screen. The data items cannot be deleted one by one.

● General settings

Press . → Use ▲▼ to select GEN and press **ENT●**. → Use ▲▼ to select the setting item (see below). → Press **ENT●** to reflect the settings.
The options in bold in the table are the initial setting values.

Setting item	Setting	Details
A.OFF Auto power off setting	OFF: ----, 1 minute to 30 minutes **Initial setting: 30 minutes**	Set the time until the power automatically turns off if no buttons are being pressed. The display being set to "----" indicates that auto power off has not been set.
R.SET Factory reset	・**NO** ・YES	The meter can be reset to the factory settings. When selecting YES and pressing **ENT●**, DONE will be displayed and the power will automatically turn off.

● Date and time settings

Press . → Use ▲▼ to select CLK and press ENT. → Use ▲▼ to select the setting item (see below). → Press **ENT●** to reflect the settings.

Setting item	Setting	Details
DATE Year, month, and day settings	YYYY: Year MM: Month DD: Day	Set the year, month, and day. Change the values in the order of year, month, and day.
TIME Time settings	HOUR: hour (24-hour clock) MIN: minute	Set the time. Change the value in the order of hour and minute.

■ Maintenance and storage

● Maintenance parts list

● Main unit

Product code	Product name	Specification
3201073569	LAQUA-TB220-K	Turbidity handheld meter in carrying case with 4 empty measurement vials, 4 calibration vials (0.02, 20, 100 & 800 NTU), Silicone oil, Cloth, instruction manual and quick guide
3201068607	LAQUA-TB220	TB220 Turbidity meter only
3201063378	550-TBP-4	Standard solution set (0.02, 20, 100 & 800 NTU), 50 mL each
3201063380	550-TBP-2L	Standard solution set (0.02 & 20 NTU), 50 mL each
3201063381	550-TBP-2H	Standard solution set (100 & 800 NTU), 50 mL each
3201067504	TB220-OIL-CLOTH	Silicone oil (1 × 10 mL) and cloth for cleaning vials
3201067927	TB220-VIAL 4SET	Set containing 4 empty sample vials
3201068032	CC-TB220	Empty carrying case for TB220
3201068357	TB220-VIAL COVER	Vial light shield cover for TB220

● Related to communication and printing

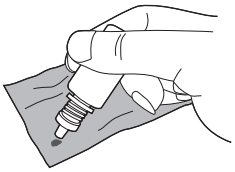
Product name	Product code	Note
USB cable 1.8 m	3201055470	Cable for PC communication
Printer cable 1.5 m	3200779638	Cable for a printer
Plain paper printer	3014030145 (100 V)	AC adapter × 1, printer roll paper × 1, and ink ribbon × 1 are included. *Printer cables are sold separately.
	3014030146 (120 V)	
	3014030147 (230 V)	
Ink ribbon	3014030150	Set of 5 pieces (for plain paper printer)
Printer roll paper	3014030149	Set of 20 pieces (for plain paper printer)

<Vial container>

● How to use the silicon oil

More accurate measurements can be achieved by wiping the vial container with the supplied silicon oil.

• Put a drop of the silicon oil on the supplied cloth and spread a thin layer on the side of the vial.



• Carefully wipe the sides of the vial with the dry part of the cloth. We recommend holding the cap instead of the sides of the vial to avoid dirtying the sides.

● How to wash the vial container

If the inside becomes dirty, wash it with ethanol or a similar agent and then dry the inside thoroughly.
Do not wipe the inside of the vial with paper, cloth or a brush to prevent the inner wall from being scratched.

<Meter>

● Maintenance

- If the meter becomes dirty, wipe lightly with a dry soft cloth. If very dirty, wipe lightly with a cloth dampened in alcohol.
- The meter uses solvent-resistant materials, but it is not resistant to all chemicals. Do not immerse it in a strong acid or an alkali solution, or wipe it off using any solution containing them.
- Do not wipe the meter using materials that include abrasives such as polishing powder.
- Prevent moisture and/or dust from entering the vial mounting section.

● Storage

Store the meter under the following environment.

- A location where the ambient temperature is -5°C to 50°C, the relative humidity is 80% or less, and without dew condensation.

● Avoid storing in the following locations.

- A location exposed to a lot of dust and dirt
- A location subject to strong vibration
- A location subject to direct sunlight
- A location exposed to corrosive gas
- A location near heating and cooling appliances
- A location subject to direct wind

<Calibration solution>

The expiration date of the calibration solution is printed on each vial.
Calibration solution needs to be replaced if it has passed its expiration date. The recommended storage temperature for standard solutions is 5°C to 35°C.
The calibration solutions in the vials provided in the kit are accurate to within ±0.03 NTU (0.02 NTU calibration solution) or ±5% (20 NTU, 100 NTU, 800 NTU calibration solutions) when unopened and stored at the recommended temperature.
For more accurate calibration, please purchase the turbidity standard (SDVB) set in the "Maintenance parts list" (page 22).

After the expiration date, dispose of the expired calibration solution according to the user's regulations.

● Standard solution replacement procedure

1. Discard old samples or standard solutions in the vial.
2. Check that the vial is free of scratches, dirt, and impurities. If any are found, wash the vial or replace it with a new one, as they may affect the measurement results.
3. Gently invert and mix the standard solution in the 50 mL bottle about 5 times. *Do not shake the bottle vigorously, as this may cause bubbles to form and affect the measurement results.
4. Pour 3-4 mL of the standard solution to be used into the vial, close the cap, and invert it about 5 times to perform a prewash. Discard the standard solution after prewash.
5. Repeat the prewash in step 4. twice.
6. Fill the vial to the 10 mL mark with standard solution and close the cap.
7. Wipe the outside of the vial with a cloth to remove all moisture, fingerprints, and other contaminants.
8. Repeat steps 1.-7. to replace the standard solution for all four concentrations.

■ Troubleshooting

● Error messages

This chapter explains the assumed causes of representative errors and how to solve them.

If ERR is displayed during use of the meter, check the error contents, assumed causes, and countermeasures in the following table.

Meter screen display	Error contents	Assumed causes and countermeasures
BATT LOW	Low battery	The battery level is low. Replace with new batteries.
MEM FULL	Memory data is over the limit	The number of the saved data items exceeds the specified limit. Print or transfer the data. Alternatively, delete the saved data.
	When a user selects **ENT** ● before the value stabilizes in calibration mode	• **ENT** ● has been pressed before the calibration value has stabilized. Press **ENT** ● after the value stabilizes. • If an invalid operation is performed, ERR is displayed.
	When a different calibration solution is set	Check that the calibration solution turbidity displayed in the meter screen matches the calibration solution that has been set.
	Error contents • Exceeds the upper limit of the measurement range. • Detected light intensity is too low.	Assumed causes and countermeasures • The turbidity exceeds 2000 NTU or the sample solution significantly absorbs light from the light source. Dilute the sample solution to 2000 NTU or less, and calculate the turbidity from the measurement value and dilution rate. • The LED or detector may be broken. Please contact with your supplier.

● Troubleshooting

Measurement values have no repeatability

Causes	Countermeasures
Condensation occurs on the lens inside the device	Allow the device to acclimate to the ambient temperature. Then perform calibration.
The meter was used in a location with a sudden temperature change	Allow the device to acclimate to the ambient temperature. Then perform calibration.
Measurement was performed with the main unit tilted	Perform measurement on a flat surface.
Stray light enters the device	Mount the vial cover correctly.
Measurement was performed in a location subject to vibration	Perform measurement in a location free from vibration.
Condensation occurs on the vial	Wipe off any condensation on the surface of the vial and retry measurement.
The vial has scratches	If the scratches are minor, wipe them using the silicon oil and they should disappear, but if they are still present, purchase a new vial.
The vial is dirty	Wipe off any dirt on the outside of the vial, and wash out any dirt on the inside with ethanol or a similar agent.
The vial direction is not constant	Align the arrows of the vial and the meter and retry measurement.
Insertion depth is insufficient	Check that there are no foreign objects on the bottom. If any are found, remove them and insert the vial to the end before measurement.
Silicon oil remains on the surface of the vial	Wipe off the vialf with a dry cloth and retry measurement.
Air bubbles occur in the sample water	Leave it to stand or gently mix by inverting the vial before measurement until all air bubbles have disappeared.
The sample fluctuates	Leave it to stand for a few to a dozen seconds before measurement.
A part of the sample water precipitates	For sample water that precipitates, gently mix by inverting the vial before measurement.
The sample water contains large particles	For sample water that contains large particles, measurement values may fluctuate. We recommend taking the average value of several measurements.

Causes	Countermeasures
Impure substances get mixed in with the sample water	Wash the vial well and perform sampling to prevent any impure substances that are not the sample from being mixed. If impure substances enter the calibration vial, replace the content.

Measurement values do not change

Cause	Countermeasures
Sensor unit is clogged with foreign objects	Remove the foreign objects.
The LED malfunctions	Replacement is necessary. If malfunctions occur in the product during the warranty period, we will perform repair or replace parts or replace meter. Note that if any malfunctions have resulted from the product being submerged or dropped, the warranty will not apply. Refer to "Warranty and responsibility" (page I).
The detector malfunctions	
The main circuit board malfunctions	

Nothing is displayed even after turning on the power

Cause	Countermeasures
No power is being supplied	Set the batteries correctly.
⊕ and ⊖ of the battery have been set reversely	Correctly set ⊕ and ⊖ of the battery.
The battery level is low	Replace the batteries.
Meter failure	Please contact your supplier.

No keystrokes

Cause	Countermeasures
This can happen when unexpected communication (e.g., PC or printer) occurs during measurement	Remove the battery once and reinstall it before starting up the device.

A part of the display is missing

Cause	Countermeasures
Meter failure	Please contact your supplier.

■ Appendix

● Regulations

1. EU and UK regulations

■ Conformable standards

This equipment conforms to the following standards

EMC: EN IEC 61326-1
Class B, Industrial electromagnetic environment
RoHS: EN IEC 63000
9. Monitoring and control instruments including industrial monitoring and control instruments

EMC: BS EN IEC 61326-1
Class B, Industrial electromagnetic environment
RoHS: BS EN IEC 63000
9. Monitoring and control instruments including industrial monitoring and control instruments

Warning

This product is not intended for use in industrial environments. In an industrial environment, electromagnetic environmental effects may cause the incorrect performance of the product in which case the user may be required to take adequate measures.

■ Information on disposal of electrical and electronic equipment and on disposal of batteries

The symbol for separate collection of batteries shown on the product or accompanying documents indicates the product requires appropriate treatment, collection and recycle for waste electrical and electronic equipment (WEEE) under the Directive 2012/19/EU, and/or waste batteries under the REGULATION (EU) 2023/1542 in the European Union.
This product should not be disposed of as unsorted household waste.

Your correct disposal of WEEE, waste batteries and accumulators will contribute to reducing wasteful consumption of natural resources, and protecting human health and the environment from potential negative effects caused by hazardous substance in products.
Contact your supplier for information on applicable disposal methods.

■ Authorised representative in EU and UK

- HORIBA Europe GmbH
  Hans-Mess-Str.6, D-61440 Oberursel, Germany
- HORIBA UK Limited
  Kyoto Close, Moulton Park, Northampton, NN3 6FL, UK

2. FCC rules

■ FCC compliance statement

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

■ Responsible party for FCC matter

HORIBA Instruments Incorporated Head Office
9755 Research Drive
Irvine, California 92618 USA
+1 949 250 4811

■ Note

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.
This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

3. Korea certification

■ B 급 기기 (가정용 방송통신기자재)

이 기기는 가정용 (B 급) 전자파적합기기로서 주로 가정에서 사용하는 것을 목적으로 하며 , 모든지역에서 사용할 수 있습니다 .

■ 국립전파연구원의 인터넷 홈페이지 주소

http://www.rra.go.kr/selform/ 관리번호
https://www.rra.go.kr/ko/license/S_c_search.do

4. Taiwan battery recycling mark

5. China regulation

标志的含义
Meaning of Marking
マークの意味

本标志适用于在中华人民共和国境内销售的电器电子产品。标志中央数字代表产品的环保使用年限（非产品质量保证期）。自制造日起，在遵守产品安全及使用规范的前提下，该年限内产品不会对环境、人体健康及财产安全造成严重危害。请勿随意废弃本产品。

This marking is applied to electric and electronic products sold in the People's Republic of China. The figure at the center of the marking indicates the environmental protection use period in years. (It does not indicate a product guarantee period.) It guarantees that the product will not cause environment pollution nor serious influence on human body and property within the period of the indicated years which is counted from the date of manufacture as far as the safety and usage precautions for the product are observed. Do not throw away this product without any good reason.

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产品中有害物质名称及含量信息表
Name and amount of hazardous substance used in a product

部件名称 Unit name	有害物质 Hazardous substance 物质 1： 铅 (Pb)　物质 6： 多溴二苯醚 (PBDE) 物质 2： 汞 (Hg)　物质 7： 邻苯二甲酸二正丁酯 (DBP) 物质 3： 镉 (Cd)　物质 8： 邻苯二甲酸二异丁酯 (DIBP) 物质 4： 六价铬 (Cr (VI))　物质 9： 邻苯二甲酸丁苄酯 (BBP) 物质 5： 多溴联苯 (PBB)　物质 10： 邻苯二甲酸二 2- 乙基己酯 (DEHP)									
	物质 1	物质 2	物质 3	物质 4	物质 5	物质 6	物质 7	物质 8	物质 9	物质 10
本体 Main Unit	×	○	○	○	○	○	○	○	○	○
样品瓶 Vial	×	○	○	○	○	○	○	○	○	○
标准液 Standard solution	○	○	○	○	○	○	○	○	○	○
清洁套装 Cleaning kit	○	○	○	○	○	○	○	○	○	○
手提箱 Case	○	○	○	○	○	○	○	○	○	○
打印机 Printer	×	○	○	○	○	○	○	○	○	○
连接线 Cable	×	○	○	○	○	○	○	○	○	○

注 1：

○： 表示该有害物质在该部件所有均质材料中的含量均不超过电器电子产品有害物质限制使用国家标准要求。
Denotes that the amount of the hazardous substance contained in all of the homogeneous materials used in the component is below the limit on the acceptable amount stipulated in the National standard.

×： 表示该有害物质至少在该部件的某一均质材料中的含量超出电器电子产品有害物质限制使用国家标准要求。
Denotes that the amount of the hazardous substance contained in any of the homogeneous materials used in the component is above the limit on the acceptable amount stipulated in the National standard.

注 2：

以上未列出的部件，表明其有害物质含量均不超出电器电子产品有害物质限制使用国家标准要求。
The parts not listed above indicate the content of hazardous substances does not exceed the National standard requirement for the hazardous substance restrict usage of electrical and electronic products.

● General specifications

Type		LAQUA-TB220
Measurement item		Turbidity
Turbidity	Measurement method	90-degree transmission light scattering method
	Compliance standards	ISO7027, DIN EN 27027
	Light source	Near infrared LED 860 nm
	Detector	Silicon photodiode
	Measurement range	0.00 NTU to 2000 NTU
	Display resolution	Maximum four significant digits 0.00 NTU to 19.99 NTU 20.0 NTU to 199.9 NTU 200 NTU to 2000 NTU
	Accuracy	0.00 NTU to 1000 NTU: The larger of ±2 % of reading or ±0.02 NTU 1001 NTU to 2000 NTU: ±3 % of reading (Excluding errors in vials and standard solutions)
	Repeatability (When measuring standard solution)	The larger of ±2 % of reading or ±0.02 NTU
	Calibration points	Up to four points (0.02, 20, 100, 800 NTU)
	Standard solution	Styrene/divinylbenzene (SDVB) Polymer bead dispersion liquid
	Required sample amount	10 mL
	Measurement time	Approx. 20 seconds
Data memory		2000 (with date and time records)
Auto power off function		OFF, 1 minute to 30 minutes
Battery level display		Available (100%, 60%, 40%)
Error message display		Available
PC connection *1		Available (cable is required separately)

Appendix

Printer connection *2	Available (cable is required separately)
Display	Monochrome custom LCD with backlight
Waterproof and dustproof codes	Equivalent to IP67 (excluding the vial mounting section)
Power supply	Four AA alkali batteries (Ni-MH rechargeable batteries can be used)
Battery power consumption (during standby)	Battery voltage 6 V, 5 mA or less
Battery Life	About 2000 measurements (Depending on settings)
External dimensions	210 (length) × 110 (width) × 55 (height) mm
Weight	Approx. 410 g (excluding batteries)
Ambient operating temperature / humidity	0ºC to 50ºC, Relative humidity of 0% to 80% (without dew condensation)
Storage environment temperature	5°C to 50°C (without freeze in standard solution)

* 1 Optional: PC communication cable is used
* 2 Optional: Printer communication cable is used

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