VEVOR

Affordable. Reliable. Home Improvement.

PORTABLE TURBIDITY METER

MODEL:TN400

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(The picture is for reference only; please refer to the actual object)

This is the original instruction, please read all manual instructions carefully before operating. VEVOR reserves a clear interpretation of our user manual. The appearance of the product shall be subject to the product you received. Please forgive us that we won't inform you again if there are any technology or software updates on our product.

1.INTRODUCTION

Thank you for purchasing Apera Instruments TN400 Portable Turbidity Meter (hereafter referred to as the instrument). The instrument uses infrared light emitting diode (LED 860±30nm) as the light source and 90° scattering method, which is compliant with ISO 7027 and DIN EN 27027 standards for the determination of turbidity for water solutions. TN400 allows you to measure turbidity in a reliable and simple manner wherever you are.

Main features and functions

- Large TFT color screen with clear on-screen instructions for easy operation.
- Average measurement mode automatically takes 10 sets of readings consecutively and display the average. It improves the accuracy of the measurement, especially suitable for sample solutions with rapid settling and continuous measurement changes.
- U.S. EPA certified, non-toxic, easy-to-use polymer standard calibration solutions
- Rugged design, suitable for use in harsh environments.
- Everything comes in a carrying case, including accessories such as calibration solutions, sample vials, and more.

2.TECHNICAL SPECIFICATIONS

Measurement Method	ISO 7027 and DIN EN 27027 compliant nephelometric method (90°)
Light Source	ISO 7027 and DIN EN 27027 compliant nephelometric method (90°)
Measuring Range	0 to 1000 NTU (FNU), automatic range switch 0.01 to 19.99 NTU (FNU);20.0 to 99.9 NTU (FNU) 100 to 1000 NTU (FNU)
Accuracy	≤ ±2% of reading+ stray light
Repeatability	≤ ±1% of reading or 0.02 NTU(FNU) (whichever is greater)
Resolution	0.01/0.1/1 NTU (FNU)
Stray Light	≤0.02 NTU (FNU)
Calibration Standard	Polymer solution or Formazin Solution: 0, 20, 100, 400 and 800 NTU(FNU)
Detector	Silicone photovoltaic
Measuring Mode	Normal measurement; Average Measurement
Display	TFT color screen
Power supply	4× AA Alkaline Batteries
Working Condition	Temperature: 0 to 50°C （32°F to 122°F)； Relative humidity： 0 to 90% at 30°C, 0 to 80% at 40°C, 0 to 70% at 50°C, no condensation
Storage Condition	Instrument: -40 to 60°C (-40 to 140°F) Calibration Solution: 5 to 30°C (41 to 86°F)
Limited Warranty	2 years

3.INSTRUMENTATION ILLUSTRATION

3.1 Overview

Diagram 1

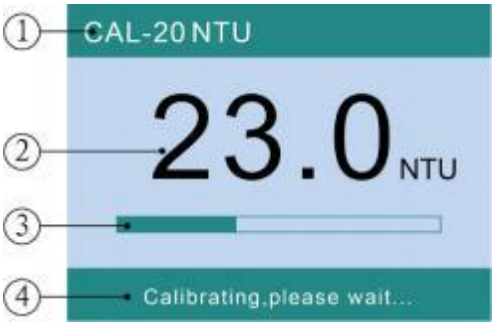
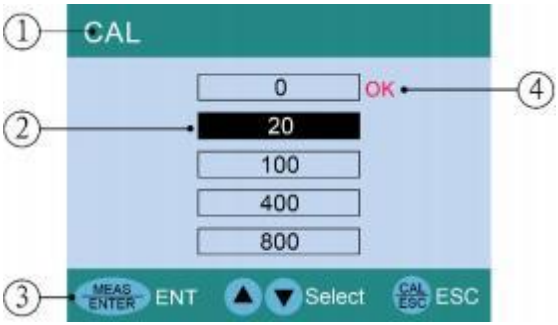
①	Flip cover of the sample vial holder (Close the cover when measuring)	⑥	Dust-proof plug (Take off the plug when measuring)
②	Housing	⑦	Sample vial holder
③	Display	⑧	Calibration vials or sample vials
④	Keypad	⑨	mark on the calibration vial or sample vial)
⑤	Battery cover		

3.2 Configuration

Diagram 2

①	Calibration Solutions ： 0.0, 20.0,100, 400, 800 NTU
②	Carrying case
③	TN400 Turbidimeter
④	Microfiber cloth
⑤	Screwdriver (to remove battery cover)
⑥	Silicone oil (10 ml)
⑦	AA Alkaline battery×4
⑧	Sample vial×6
⑨	User Manual

3.3 Display Mode

Measuring Mode		① Measurement Mode ② Measurements and unit ③ Operation Guide ④ Battery icon
Calibration Mode		① Calibration solution ② Measurements and unit ③ Progress bar ④ Operation guide
Calibration Menu		① Calibration mode ② Standard values ③ Operation guide ④ Finished calibration indicator

3.4 Keypad

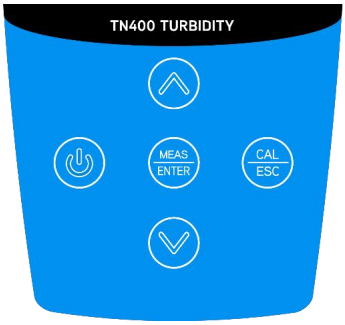


Diagram 3

Keypad	Functions
	● Power on/off
	● In measurement mode: press to enter calibration mode ● In calibration mode: press to exit calibration mode ● In measurement mode: long press to switch measurement units NTU-FTU
	● In measuring mode: Short press the key to perform normal measurement; long press the key to perform average measurement ● In calibration mode: press the key to confirm the calibration.
	● In calibration mode, press the key to select standard solution.

3.5 Power Supply

1.The instrument adopts 4 pieces of AA alkaline battery. Make sure there is no mixture of new & old batteries or different models of batteries.

2.Battery capacity indication

Battery capacity icon:  , please replace new batteries when  icon displays to ensure measuring accuracy; when  icon displays, the battery must be replaced, otherwise the instrument cannot work properly. To extend battery life, user can setup auto-power off timer in Parameter Setup P6 according to usage requirements

3.Use the screwdriver to remove the four screws on the battery cover and open the battery cover. Insert 4 pieces of AA alkaline battery. Please make sure the polarity is correct. Put on the battery cover and screw tightly.

4.METER CALIBRATION

4.1 Preparation for Calibration

a) Calibration Point

The instrument has 5 calibration points: 0 NTU, 20 NTU, 100 NTU, 400 NTU, and 800 NTU. Among them, 0 NTU point uses 0.0 NTU calibration solution or laboratory distilled water, and the remaining 4 calibration points use polymer solutions. Note that the cap of the 0.0 NTU solution vial can be unscrewed. After the solution is invalidated, users can replace the 0.0 NTU calibration solution or use fresh laboratory distilled water. The 0.0 NTU calibration solution refill can be purchased from the supplier; For the remaining 4 calibration solutions, their vial caps cannot be opened. Simply dispose the solutions after they are expired or invalidated and buy new ones from your supplier to replace.

b) Replace zero turbidity solution

• Open the 0.0 NTU vial cap, pour out the original solution, add 1/2 distilled water, screw on the cap and shake the vial to rinse it off and pour out the water. Repeat it 3 times. Shake off the distilled water in the vial. Pour in new

0.0 NTU calibration solution or fresh laboratory distilled water. Then close the vial cap.

• 0.0 NTU calibration solution has 6 to 12 months of shelf-life, distilled water is only valid for a couple of days.0.0 NTU solution is provided in the default kit.

c) Clean vial surface

Apply a small drop of silicone oil on the surface of the vial and wipe it off with a lint-free cloth to evenly distribute the silicone oil on the surface in order to cover smudges and scratches, which helps light scattering. But please pay attention to the following points:

① The silicone oil applied should not be too much. After wiping with lint-free cloth, please wipe with filter paper or high-quality tissue paper to clean off. Excessive residual silicone oil on the vial surface will affect the measurement accuracy.

② It's not necessary to use silicone oil for each calibration and measurement. Apply silicone oil every several days or once a week. In between, just clean the surface with filter paper or high- quality tissue paper.

③ Clean the calibration vial and sample vial together and keep the steps and actions consistent to achieve same degree of cleanliness.

④ Stability of calibration solutions

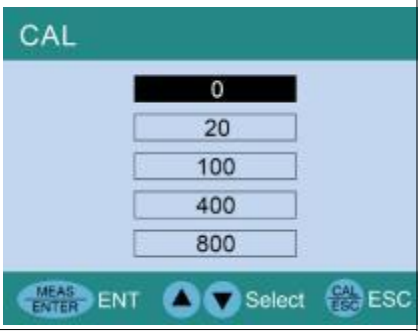
The ISO 7027 and DIN EN 27027 standards approved polymer standard calibration solution is very uniform and stable. It does not precipitate, drift or condense. Generally, it can be used directly without shaking or flipping the vial (to make the solution even). For polymer calibration solutions that have not been used for a long time, slowly flip the vial twice and let it stand for 2 minutes. Be careful not to shake the solution vigorously, as this will create air bubbles which will destabilize the measurement;For 0.0 NTU calibration solution,Do not shake or flip. If using Formazin calibration solution, as it tends to precipitate easily, each time users must flip and shake the vial to make the solution even. But sediment can still occur during tests and would make the measurement unstable. Users need to have rich experience handling Formazin calibration solutions.

4.2 Calibration Procedure (Take 0 NTU and 20 NTU as an example)

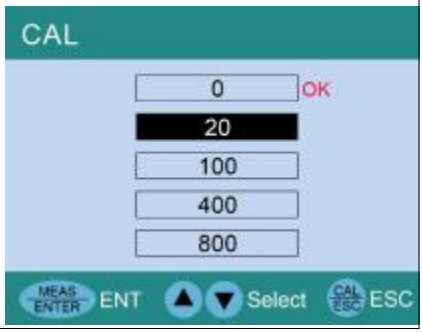
1) Instrument warm up (only required for low-range or high-accuracy measurement): Power on the instrument, set parameter P2 (continuous measurement time) to 5 times. Long press MEAS ENTER to start continuous measurement (don't insert the vial), then wait for 3 to 5 minutes.

2) Open the flip cover and place the 0.0 NTU calibration vial. Align the arrow on the vial lid with the arrow on the sample vial holder and close the flip cover.

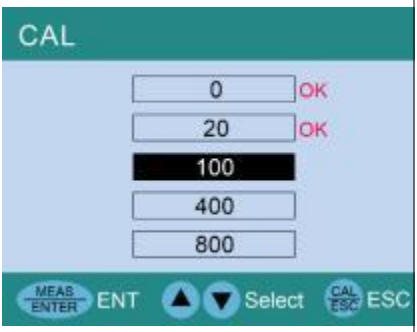
3) Press CAL ESC to enter the calibration menu, the cursor is at 0 NTU. Press MEAS ENTER to start calibration.



4) After calibration is done, press MEAS ENTER to confirm. The instrument will return to the calibration menu (see Diagram on the right side). The OK sign indicates that 0 NTU has been calibrated and prompt to calibrate 20 NTU.



5) Place the 20.0 NTU calibration vial in the sample vial holder, press MEAS ENTER to start 20 NTU calibration. After calibration is done, press MEAS ENTER to confirm. The instrument will return to the calibration menu (see diagram on the right side). The OK sign indicates that 20 NTU has been calibrated.



6) If you want to continue to calibrate 100, 400 and 800 NTU, place the 100 NTU calibration vial in the sample vial holder and press MEAS ENTER to calibrate. After calibration is done, press MEAS ENTER to confirm; repeat the steps to calibrate 400 NTU and 800 NTU. After calibration is done, press CAL ESC to return to measurement mode.

7) Press CAL ESC to exit calibration mode, the instrument will return to measurement mode as shown in Diagram on the right side.

4.3 Notes for Calibration

a) Calibration point verification: The calibration point can be verified after the calibration is completed. If the calibration point has a large error, enter the calibration mode and repeat the calibration. For calibration point accuracy, users can refer to the following standards:

Calibration point	Accuracy for reference
0 NTU	≤0.05 NTU
20 NTU	≤±0.2 NTU
100 NTU	≤±2 NTU
400 NTU and 800 NTU	≤±5 NTU

b) Calibration point selection: The instrument has been calibrated at full range before leaving the factory. For subsequent use, you can select 2 or more points as needed, as long as the estimated measurement range is between the two calibration points. In calibration setup mode, press  or  to select the calibration point.

c) Low turbidity calibration requirement

① For low turbidity measurements (measurement less than 2 NTU), please test 0.0 NTU calibration solution. If the accuracy is not meeting requirements, calibrate the instrument at 0.0 NTU and 20.0 NTU before test; then use 1# or 2# sample vial for measurement.

② Using the same sample vial to calibrate and measure can eliminate the error caused by different vials, thus achieving higher accuracy. For example, add laboratory distilled water to 1# vial for calibration and then add sample solution to 1# vial for measurement. Note that the solution vial should be rinsed thoroughly when changing solutions.

d) High turbidity calibration requirement: For turbidity measurement greater than 2 NTU, it is recommended to calibrate once a week, or to test a calibration solution close to the sample solution. If the error is large, the instrument needs to be recalibrated.

e) The instrument does not automatically recognize the calibration solution. If the wrong solution is selected for calibration, the measurement will be completely wrong. In this case, it can be restored by recalibrating with the correct calibration solutions.

f) Place the instrument on a flat and level surface. Do not hold the instrument

in hand while operating.

g) If using Formazin standards for calibration, please make sure to use the freshly made Formazin standard to ensure calibration accuracy.

5.TURBIDITY MEASUREMENT

5.1 Sample Vial Handling

a) 6 sample vials are included in the test kit. The cap is marked with 1# to 6#, and the bottom of the vial also has the same number. The number of the vial and the cap should always be the same. *Pay attention that 1# and 2# vials are only for low turbidity solution measurement. (< 2 NTU)

b) The vial has been rigorously cleaned and sterilized. They can be used directly for the first time. For subsequent uses, follow the steps below to perform a thorough cleaning.

● Clean the sample vial inside and outside with detergent → rinse with distilled water or deionized water multiple times → Rinse the vial twice with the sample solution → Pour the sample solution into the vial → Close the cap.

5.2 Measurement Preparation

a) Collect the sample solution with a clean Container and add the solution to the 4/5 of the vial (about 18ml), see Diagram 4 . Then close the lid.

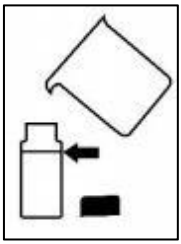


Diagram 4

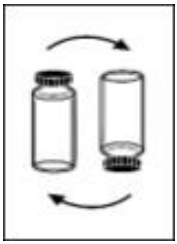


Diagram 5

b) Before the measurement, users can slowly flip the sample vial a few times and let it stand for 2 to 5 minutes to eliminate potential air bubbles(see Diagram 5).

c) Clean off the surface of the vial to ensure it is dry, clean and free of stains. Apply a small drop of silicone oil on the surface of the vial and wipe it off with a micro-fiber cloth. Then wipe again with filter paper or high-quality tissue paper. See section 4.1(c) for details.

5.3 Measurement Mode

a) Normal Measurement Mode

Press MEAS ENTER , the screen will display the progress bar, and the measured value will be displayed in 20 seconds. To take the next measurement,

press MEAS ENTER again.

b) Average Measurement Mode

Long press MEAS ENTER button, release it until you hear a beep, then the instrument enters average reading mode. In this mode, the instrument will perform 10 times continuous measurement, measure and display 1 data every 20 seconds, and displays the average value at the end, see diagram 6. The average measurement mode can be used for observing the stabilizing process of turbidity, and is ideal for testing rapid-settling solutions

Diagram 6

5.4 Notes for Measurement

a) **Keep the sample stable**: After the vial is placed into the sample cell, it is recommended to wait for 1 to 2 minutes before calibration, as the solution will experience some shaking when the vial moves, which may result in inaccurate measurements.

b) **Sample Vial cleaning requirement**: Sample vial must be rigorously cleaned and free from smudges and scratches. When wiping, user should grip the cap and bottom to avoid leaving fingerprints on the surface of the vial. Its surface should be applied with a drop of silicone oil be wiped with a micro- fiber cloth. After that, please clean with filter paper or high-quality tissue paper. See section 4.1(c) for details.

c) **Mixing and Degassing**: Samples should not be vigorously shaken or vibrated. It is recommended that users gently shake the sample vial to make solution evenly distributed. Air bubbles in solution will cause big error to turbidity measurement. So, the vial should be left stand still for 2 to 5 minutes to eliminate potential air bubbles before measuring. But mixing and degassing simultaneously is a difficult process to handle, especially for solution with

precipitates, which requires some operating experience or making some limits in test conditions, for example, limiting the mixing condition and waiting time for degassing to be the same before comparing measurements.

d) **Other Requirements**

- On the premise of ensuring evenly distributed samples, sample solution should be measured immediately to prevent temperature changing and precipitates from affecting measurements.
- Avoid sample dilution for measurement as much as possible.
- Avoid operating under direct sunlight.
- Do not pour solution into the vial holder. Sample vials must be used for measurement.
- Please do not wash the vial holder as this may damage its optical structure

6. WARRANTY

We warrant this instrument to be free from defects in material and workmanship and agree to repair or replace free of charge, any malfunctioned or damaged product attributable to the responsibility of vevor for a period of TWO YEARS for the instrument from the delivery.

This limited warranty does NOT cover any issues due to:

- Accidental damage
- Improper use
- Normal wear and tear
- Transportation
- Storage
- Failure to follow the product instructions
- Unauthorized maintenance, modifications, combination or use with any products, materials,processes, systems or other matter
- Unauthorized repair
- External causes or other actions beyond our reasonable control.

FCC Information:

CAUTION: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment!

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
1) This product may cause harmful interference.
2)This product must accept any interference received, including interference that may cause undesired operation.
WARNING: Changes or modifications to this product not expressly approved by the party.responsible for compliance could void the user's authority to operate the product.
Note: This product has been tested and found to comply with the limits for a Class B digital device pursuant to Part 15 of the FCC Rules, These limits are designed to provide reasonable protection against harmful interference in a residential installation.
This product generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this product does cause harmful interference to radio or television reception,which can be determined by turning the product off and on, the user is encouraged to try to correct the interference by one or more of the following measures.
· Reorient or relocate the receiving antenna.
· Increase the distance between the product and receiver.
· Connect the product to an outlet on a circuit different from that to which the receiver is connected.
· Consult the dealer or an experienced radio/TV technician for assistance.

CORRECT DISPOSAL

This product is subject to the provision of european Directive 2012/19/EU. The symbol showing a wheelie bin crossed through indicates that the product requires separate refuse collection in the European Union. This applies to the product and all accessories marked with this symbol. Products marked as such may not be discarded with normal domestic waste, but must be taken to acollection point for recycling electrical and electronic devices.

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