BioLAB

Operation Manual

BMET-701

Turbidity Meter

Index

01 Installation

1.1 Unpacking

In the packing case, the following parts can be found:
1．BMET-701 Portable Turbidity Meterl pc
2．Accessories（See the packing list）1set

1.2 Instrument Structure and installation

1.2.1 Front panel view of the meter
As shown in figure 1

Figure 1

1.2.2 Under panel view of the meter

As shown in figure 2, from left to right is power socket and mini USB socket respectively. If mini USB socket is connected to the computer, the meter is powered by the computer, the power socket don't have to be connected to the power.
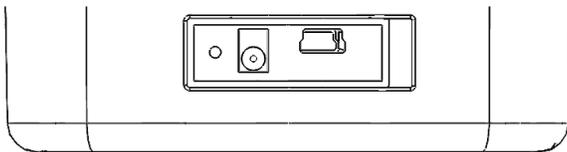
Figure 2

1.2.3 Battery

Open the battery box cover at the button of the instrument, install four AA batteries for power supply.

1.2.4 Accessories, options and appendixes

a. Turbidity bottle, there is "+" mark printed on the bottle. When inserting the turbidity bottle into the meter, make sure the vertical mark is aligned with the center position of the slit.
b. USB power cord is needed when the meter is powered by the computer, connect one end to BNC, the other end to mini USB plug.

02 Operation

2.1 Introduction

2.1.1 Technical characteristics To meet standard ISO7072; Automatic range switch; Auto power-off;
Under-voltage prompt;
Power-off protection function. When the meter is shut down, the stored calibration data and setting parameters will not be lost.
2.1.2 Specifications
• Measurement range： (0.00～20.00) NTU, (20.0～200.0) NTU (automatic range switch).
• Zero drift: ≤±0.5％FS/30 min
• stability: ≤±1.0％FS/30 min
• Repeatability: ≤1.0%
• Indication error: ≤ ±8%
• Working Environment
a. Ambience temperature: 5℃~35℃
b. Relative humidity: ≤85%
c. Power supply: DC voltage (4.8～6)V, the supply current not less than 300mA;
d. No corrosive gas exist in the surrounding air;
e. No vibration that could affect performance exist;
f. No strong electromagnetic interference to surrounding except the geomagnetic field
• Dimensions (mm):220×100×80 (l×w×h).
• Weight (kg): About 0.8kg.

2.1.3 Keypad
As shown in figure 3
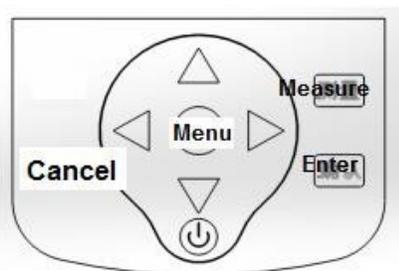
The meter consists of nine keys, respectively "Measure",

Enter", "Cancel", "Menu", "▲", "▼", "◄", "►" and "Power".

Figure 3

• Measure: After start up, the meter enters into standby status. In the standby status, press this key to start measurement and display the measurement results, and then return to standby mode automatically.
◦ Enter: In the menu status, press this key to confirm the last operation.
◦ Cancel: In the menu status, press this key to cancel the last operation.

◦ Menu: In the standby status, press this key to enter the meter menu, and then by pressing the "▲", "▼", "◀", "▶", "Enter" or "Cancel" button to select.

◦ ▲: When users need to select up and down in the menu status, press this key (white on black means selected) to select up; When users need to adjust the numbers, press this key to increase number

◦ ▼: When users need to select up and down in the menu status, press this key (white on black means selected) to select down; When users need to adjust the numbers, press this key to decrease number.

◦ ◀: When users need to select left and right in the menu status, press this key to select left (white on black means selected).

◦ ▶: When users need to select left and right in the menu status, press this key to select right (white on black means selected

◦ Power: The power switch button. In shutdown status, press this key to start up; In the boot status, press this key for a few seconds, then the screen will prompt instrument is shutting down, then release the button to turn it off.

2.1.4 Main display interface
As shown in figure 4.

Figure 4

2.2 Operation

2.2.1 Menu
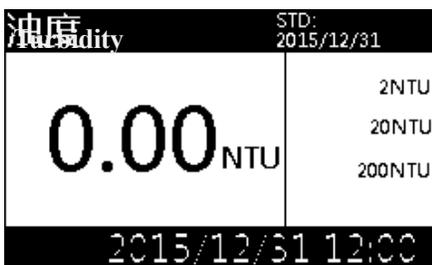In the standby status, press "Menu" key to enter main menu interface, as shown in figure 5, there are options "Zero", "Calibrate" and "Date &Time". Press the "▲", "▼" key to choose, black on white means current item. Press "Enter" key to enter the corresponding menu; Press "Cancel" key to exit the main menu and return to the standby status.

Zero

Calibrate

Date&Time

Figure 5

Zero:
Select "Zero", the interface is as shown in figure 6. If there is no zero turbidity water, users can also choose low turbidity water such as pure water and press "▲", "▼" key to adjust the zero value to (0.00~0.09) NTU. Then press "Enter" key to start zero calibration, about 1 minute the calibration is completed and automatically return to the main menu; Or press "Cancel" to cancel the zero calibration and return to the main menu

Zero calibrate   0.00NTU

Press "Enter" key to start Press "Cancel"

Figure 6   **key to exit**

Calibrate:
Select "Calibrate", the interface is as shown in figure 7.

Select the first point calibration solution

___2 NTU

The meter can calibrate 2 NTU, 20 NTU and 200 NTU at one time, user can choose the first and the last calibration solution, other solutions in the middle is determined by the meter. Firstly, choose the turbidity value of the first point calibration solution by pressing "▲", "▼" key. Then press "Enter" key, the interface is as shown in figure 8. Press "Enter" key to start the first point calibration, about 1 minute later, the calibration is completed and prompt to prepare for the second point calibration. Repeat the above steps until 200 NTU is finished or user does not need to continue, press the "Cancel" key to finish the calibration and return to the main menu.

First point calibration   2NTU

Press "Enter" key to start
Press "Cancel" key to exit

Date &Time:
Select "Date &Time", the interface is as shown in figure 9. Then press the number keys and the "Enter" key on the meter panel in turn to input the year, month, day, hour and minute. The

effective range: (2000 ~ 2099) years, (1~12) month, (1 ~ 31) day, (0 ~ 23) hour, (0 ~ 59) minute. If press "Cancel" key, the input will not be saved and return to the main menu.

20<u>15</u> Year

Figure 9

2.2.2 Calibrate

The meter operation after a period of time, users should re-calibrate the meter with standard turbidity solution, including zero calibration and sample calibration.
Zero calibration:
In measuring status, put the turbidity bottle with zero turbidity water into the meter according to marking specified location and close the cover. The meter enters into the "Zero" menu, press "Enter" key to start zero calibration. The meter displays the current value of photocell. To keep the meter stable at this time. About 1 minutes later, zero calibration is finished automatically.

Sample calibration:
Enter into the "Calibrate" menu, calibrate according to measurement steps in section 2.2.3. If users need to calibrate a variety of turbidity value, it must be from low turbidity to high turbidity. The principle of choose on standard solution: To make the turbidity of the sample between zero point and standard solution or between two standard solutions, and nearly as much as possible. The meter can save up to three kinds of calibration value of standard solution. After calibration, all previous calibration value is invalid (does not contain zero).
Put the turbidity bottle with sample into the meter according to the marking specified location, close the cover; The display will show the current turbidity value of the sample, the display value should be consistent with the current sample turbidity value. Press the "Enter" key to start calibration, the meter displays the current value of photocell. Keep the meter stable at this time. About 1 minutes later, calibration process is finished automatically, the meter will prompt to continue next sample calibration (if 200 NTU turbidity solution calibration is completed, the calibration will be finished automatically). If users need to continue calibration, repeat the above process; If all the required sample calibration is completed, press the "Cancel" key to return to the main menu.

2.2.3 Measure

Switch the meter on, the meter enters into the standby status. Place the turbidity bottle with sample into the meter according to the marking specified location and close the cover. When it is stable, press the "Measure" key to start measurement. The measurement results show after a few seconds and return to the standby status. the meter will also enter into the standby status when returned from other status. In standby status, the "Turbidity" is displayed on the left upper corner of the LCD.

The sample measurement steps:

A) Wash the turbidity bottle which is used to calibrate the meter clean with zero turbidity water

B) Rinse the turbidity bottle with sample under test for a few times.

C) Add the samples into turbidity bottle to "+" sign, not too little. During operation, carefully take the parts above "+" sign and then close the turbidity cover

D) Hold the turbidity bottle cap, wipe liquid and fingerprint on the turbidity bottle with a soft cloth.

E) Insert the turbidity bottle into the equipment according to specified location, close the cover.

F) In the standby status, press the "Measure" key, the meter will display the measured results after a few seconds.

CAUTION

The turbidity bottles have no obvious scratches and fingerprints.

2.2.4 The Ppuret tphaertautriboinditoyfbtoutrtbleidinittyo tbhoettmleeter according to marking specified position.

 A) ● The Mseulsetcntiootntoouf ctuhrbthideitpylabcoettlbeelow "+" sign.

The turNboidiatyirbboutbtlbelehsasinntoheobtuvribouidsityscbroatttcleh,beesfopreecitaelslyt.the part below "+" sign. The bottom

of the bTohtetlereshisouslodmbee f diftference between different turbidity bottles,in order to ensure the

B) The acclecuarnaincgy ofotfurbmideiatysubroetmtleent use the same turbidity bottle for calibration and

The tumrbeidaitsyurbeomtttelents.

hAotultdhebesacmleeantiminesi,depaayndattoeunttsioidne,tothwe acslehatnuinrbgidoitfy tubrobtitdleityclbeoatntle when

should be extra careful. Firstly, clean the turbidity bottle with detergent. Then it is better to replacing solutions.

soak it in 1:1 nitric acid for a night. Finally clean it with a large amount of DI water several times. Users should take parts above the "+" sign when cleaning, so as not to dirty the bottle leave fingerprint.

2.2.5 Preparation of standard sample

a) Preparation of Zero-Turbidity Water
Using the microporous membrane with the pore size less than 0.2μm to distill DI water (or electro-osmosis pray water and ion-exchanged water), it requires to perform the filtration twice or more. The obtained filtrate is the zero-turbidity water.
b) The selection and preparation of standard sample
The Formazine standard substances is recommended, such as GBW12001 400 degree NTU turbidity (Formazine) standard substance.
When it's difficult to get the Formazine standard substance, user can base on the requirements and methods stipulated by ISO7027 by strictly following the conditions and reagent consumption to make 400NTU Formazine turbidity solution, see appendix 1. Other turbidity standard samples are prepared through the dilution of these two standard solutions and zero turbidity water.
The Formazine standard solution should be stored in the refrigerator (4℃~8℃). The diluted standard solution with low turbidity value has poor instability, and doesn't fit to save, be prepared each time before use.

03 Maintenance and Troubleshooting

3.1 Maintenance

a. To use and place the turbidity bottle carefully, avoid scratches, wear and stains, otherwise it will seriously affect the performance of the meter.
b. After the meter start up, to wait for a period of time before sample measurement. Re-calibration is suggested before each measurement, so as to prevent instrument measuring errors due to drift.
c. The meter should be placed on the solid steady working table, prevent the influence of vibration on the meter measurement.
d. The meter should avoid sun exposure, there should be no heating element around.
e. After use, the turbidity bottles and caps should be immediately washed clean with DI water, and drying under 110 ℃ with oven.

3.2 Troubleshooting

Table 1

Problems	Malfunctions	Solutions
The error of measurement result is too big	1. Turbidity bottle has obvious scratches 2. Attachments on the Turbidity bottle. 3. Turbidity bottle didn't wipe clean, or there are fingerprints; 4. Fail to use the correct standard solution to perform calibration 5. Does not insert the turbidity bottle at specified location	- Re-select the bottle with no obvious scratches. - Soak the bottle with 1:1 nitric acid until attachments fall off. - Wipe the bottle clean until no fingerprints. - Prepare the correct standard solution to re-calibrate according to the calibration procedures. - When placing the turbidity bottle into the meter, pay attention to the specified location.

Appendix 1：

The preparation of turbidity standard solution

1). 4000NTU turbidity standard solution
Accurately weigh 5.0g hexamethylenetetramine (C6H12N4), dissolve in approximately 40ml zero-turbidity water.
Accurately weighed 0.5 hydrazine sulfate (N2H6SO4), dissolve in approximately 40ml zero turbidity water.
Warning (in ISO7027): Hydrazine sulfate is toxic and may be carcinogenic, special attention must be paid on safety when operating.
Get the above two solutions into 100ml volumetric flask, add the zero turbidity water to the mark level and shake to make it completely mixed. The flask is placed in 25℃±1℃ incubator or water bath, staying for 24hrs. The turbidity value of the suspension is set at 4000 NTU. The turbidity standard solution should be kept in the dark place.

2). 400NTU turbidity standard solution
With a pipette to get 4000NTU standard solution 10.00ml to 100ml volumetric flask, and dilute with zero turbidity water to the mark level. After being completely mixed, the solution is the 400NTU turbidity standard solution. The solution should be kept in the dark place.

Packing list

Model BMET-701 Turbidity Meter

No.	Description	Quantity
1	BMET-701 Portable Turbidity Meter	1
2	Turbidity bottle（Φ25×60，with '+'）	2
3	USB power line（USB to Φ5.5×2.1）	1
4	USB communication（A male to mini male , L=1m）	1
5	Adapter HW-050100C01（5V,1A）	1
6	AA (No. 5) battery	4
7	Operation instruction	1

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