



Portable pH Conductivity Meter NPCM-103

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1. Safety Measures

Kindly read the entire contents of this manual carefully before use and kindly keep this manual properly. The user must use the instrument following this manual to avoid damage to the user and equipment.

Before using the meter, read the following notes:

Do not disassemble the device for inspection or repair.

To prevent electric shock or damage to the device.

Do not place cables and connectors in any liquid, wet or corrosive environment. v
Kindly use the default power adapter.

Do not use it if the power cord is damaged (the wire is exposed or broken).

Do not use it in flammable and explosive environments.

Do not use if the user finds any abnormalities such as damage or deformation of the device.

Terms Explanation

pH/pX Slope: The amount of potential change generated by each 1 pH/pX change, expressed in mV/pH or by 100% Theoretical Slope (PTS). $pX = -\log[X]$, where $[X]$ means molar concentration (mol/L) of X ions.

E0 of pH: Also known as "zero potential", it usually refers to the potential value at a pH of 7.

One-point calibration: Calibration with a standard solution.

Two-point calibration: Calibration with two standard solutions.

Multi-point calibration: Calibration with more than two standard solutions.

2. Introduction

Portable pH Conductivity Meter NPCM-103 offers a pH range from -2.00 to 20.00 with an accuracy of ± 0.01 pH. It features a clear digital display for easy reading and real-time monitoring. This unit supports USB communication for quick and efficient data transfer. It includes an auto-hold function for stable and precise results. Our pH conductivity meter ensures accurate readings with both automatic and manual temperature compensation.

3. Features

- ✓ Waterproof protection
- ✓ Compact design
- ✓ Easy calibration
- ✓ Multi-reading modes
- ✓ Auto-power off function
- ✓ High sensitivity

Portable pH Conductivity Meter NPCM-103

4. Specifications

Model No	NPCM-103
pH Range	-2.00 to 20.00 pH
pH Resolution	0.1, 0.01 pH
pH Accuracy	±0.01 pH
pH Calibration Points	Up to 5
pH Standard Recognition	NIST, GB, USA, and DIN buffers
pH Electrode	BNC(Q9)
mV Range	-2000 to 2000 mV
mV Resolution	0.1
mV Accuracy	±0.3 mV or ±0.1%
Temperature Range	-5 to 110°C, 23 to 230°F
Temperature Unit	°C, °F
Temperature Resolution	0.1
Temperature Accuracy	±0.2°C
Temperature Probe	4-pin aviation connector
IP Rating	IP65
Battery Type	Rechargeable Lithium battery
Power Supply	100 to 240V AC input, DC5V output
Overall Dimensions	80 × 255 × 35 mm
Packing Dimensions	410 × 330 × 165 mm
Net Weight	400 g
Gross Weight	5.5 kg

5. Applications

Portable PH Conductivity Meter NPCM-103 is used in water quality monitoring, labs, industry, agriculture, and food processing for accurate pH and conductivity analysis.

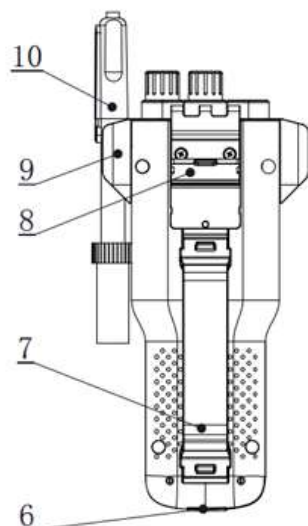
6. Instrument Introduction

6.1 Overview



- 1) Meter Body
- 2) Power Key
- 3) Function key
- 4) Display
- 5) Socket Cap

Figure-1 Front View



- 6) Power sockets
- 7) Wristbands
- 8) Flip Tilting Stand
- 9) Electrode Holder
- 10) Electrodes

Figure-2 Back View

Portable pH Conductivity Meter NPCM-103

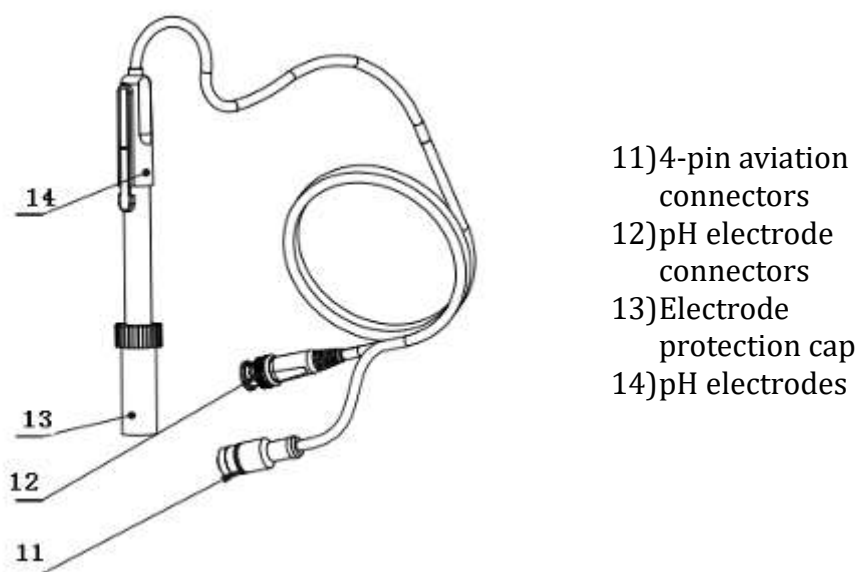


Figure-3 Electrodes and Connector

Connector Specifications

Electrode type	Connector specifications	Electrodes Connection	Electrode type
pH electrode	BNC(Q9)	pH electrode, ORP electrode, ISE probe	pH electrode
Temp electrode	4-pin aviation	ATC probe	Temp electrode

The Portable pH Conductivity Meter NPCM-103 adopted a pH combination Electrode with a four-pin aviation connector. For replacement, kindly choose electrodes with the proper connector.

6.2 Function Introduction

	Function	Explanation
Basic Function	Backlight adjustment	●
	Automatic diagnostics	●
	Factory reset	●
	Default parameter	●
	Prompt Sound	●
	Time settings	●
	Power failure protection	●
	Firmware upgrade	●
	Anti-interference automatic recovery	●
	Automatic shutdown	●
	Protection	IP65
Reading Function	Reading balance settings	●

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	Auto-lock reading	•
	Reading Mode	•
	Sample ID	•
Data Management	Storage	500 sets of measurement parameters each
	View	•
	Delete	•
	GLP	•
Communications and external devices	Printer connection	•
	Content and format customization	•
	Connect to a PC for instrument control	•
pH/mV Measurement	pH electrode status/performance	Slope, Electrode status
	Multi-point calibration	5 points
	Automatic standard solutions recognition	4 groups
	Standards customization	•
	Standard groups customization	1 group
	Automatic temperature compensation	•
	Manual temperature compensation	•
	pH electrode diagnostics	•
Temperature Measurement	Temperature units	°C, °F

7. Installation

7.1 Electrodes Stand Installation



Figure-4 Wristband Installation

Installation:



- 1) Pull the wristband switch at the head of the wrist so that its closed round hole opens.
- 2) Snap the opened round hole card slot into the shaft of the corresponding instrument housing and close the round hole.
- 3) The lower wristband card slot is also operated as above.

7.2 Electrode Connection

Push the pH Electrode into the electrode holder. Remove the socket protector cap of the pH electrode. Connect the pH electrode to the right socket. If the ATC probe is applied, or ATC has been integrated into the pH probe, kindly connect the ATC probe to the DO/T electrode socket.

8. Operations

8.1 Switch On/Off

Press and release  to switch on the meter. The startup screen shows the software version and other related information. After the self-test program, the screen turns to the homepage and the meter is ready to measure. If the meter does not turn on, charge the meter for 15 minutes. The meter is equipped with 7 function keys. Users press and hold  the key for more than 3 seconds and release to shut down.

8.2 Screen Icons

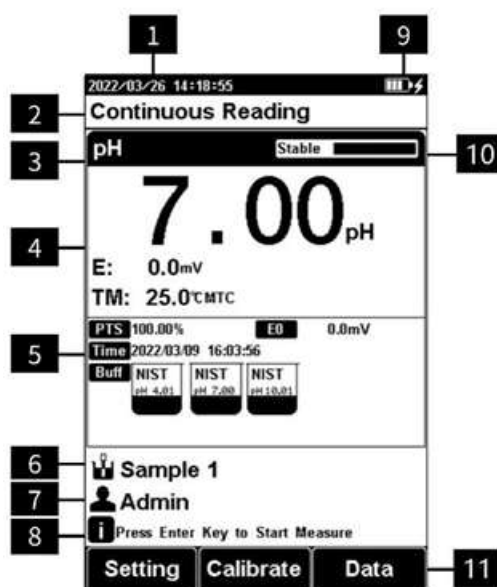












Figure-5 Screen Icons Explanation

- | | |
|-----------------------------|-------------------------|
| 1) System time. | 7) User ID. |
| 2) Reading mode. | 8) Operation tips. |
| 3) Measurement parameters. | 9) Power information. |
| 4) Measurement information. | 10) Reading status. |
| 5) Calibration information. | 11) Soft function keys. |
| 6) Sample ID. | |

The instrument displays symbol identification that has the following functional implications.

Portable pH Conductivity Meter NPCM-103

Symbol	Explanation
	Reading status, display the measurement status of reading, stable, locked each indicates that the processing, stable, and reading completed.
	The percentage slope of the electrode calibration data
	Standard buffer solution for calibration
	Time to Calibrate Electrodes
	Standard buffer solution used to calibrate the electrode
	Automatic temperature compensation
	Manual temperature compensation
	User ID
	Sample ID
	Operation Tips

8.3 Function Key

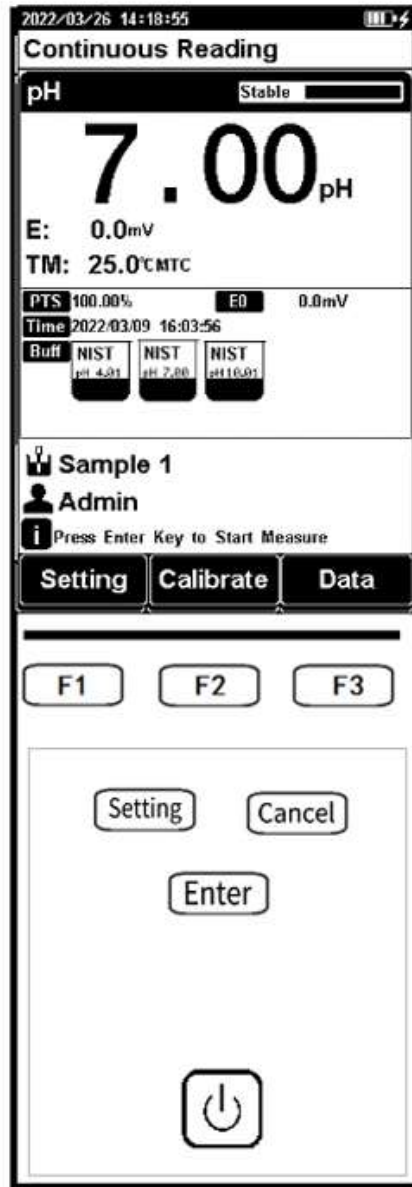




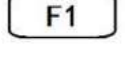
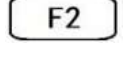
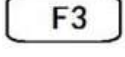


Figure-6 Function Keys Explanation

Key Function Explanation

Key	Explanation	Note
	Power	Press to switch on/off.
	Setting	Set the parameters and settings.

Portable pH Conductivity Meter NPCM-103

	Cancel	Cancel the operation.
	Enter	Confirm the option.
	F1	Function key, Corresponds to the function options on the screen.
	F2	Function key, Corresponds to the function options on the screen.
	F3	Function key, Corresponds to the function options on the screen.

8.4 Parameter Settings

When the meter is in the standby status or measuring status, press "**Setting**" to reset the instrument setting.

8.4.1 Tutorial Settings

For the first use, kindly follow the guide to setting the measurement parameters. After all the settings, press "Enter" to return to the previous page.

8.4.2 Reading mode settings

The meter provides three reading modes, including continuous reading, auto reading, and timed reading.

Continuous reading: The instrument displays real-time measurement results. Users can end the measurement at any time and save the last result.

Auto-reading: The measurement reached the balance, and the meter locked the reading result. The meter offers "Fast", "Medium", "Strict" and "Custom" four options for endpoint detection conditions.

Time reading method: Timed Reading contains two kinds of timed reading methods: "Interval measurement" and "Timed measurement".

"Interval Measurement" provides measurement results at interval time and timed reading provides measurement results after a set time.

Reading Parameter Settings

Stability Type		pH
Fast	Stable time	4s
	Fluctuation	1mV
Medium	Stable time	6s
	Fluctuation	0.5mV
Strict	Stable time	8s
	Fluctuation	0.1mV
	Stable time	1 to 30s

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Custom (Recommended Value)	Fluctuation	0.1~1mV
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8.4.3 pH Standard Settings

8.4.3.1 pH Standard Groups

The meter provides various Standards Groups including DIN, NIST, and USA. And allows the user to prepare customized Standard groups.

Groups	Contents
NIST	1.68pH, 4.01pH, 6.86pH, 7.00pH, 7.42pH, 10.01pH, 12.47pH
USA	1.680pH, 4.010pH, 7.000pH, 10.010pH
DIN	1.68pH, 3.56pH, 4.00pH, 6.86pH, 7.41pH, 9.18pH, 12.46pH

The meter supports up to five-point calibrations. Neighboring standards (pH gap<2) choice in the group may be frozen for accurate calibration. For neighboring standards, kindly choose customization to perform calibration.

Note: If the selected standard solution group is different from the pH standard buffer solution used, it will lead to wrong calibration results.

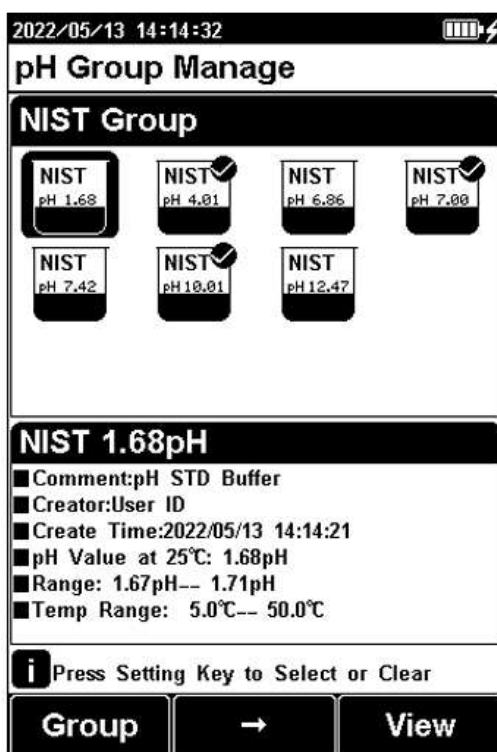


Figure-7 Selection of standard groups and standard solution

8.4.3.2 Recognition

Auto Mode and Manual Mode.

In some special cases, it is necessary to use some non-standard pH buffer solutions or two very close pH standard buffer solutions for electrode calibration. In this case, the manual standard solution identification function can be used. When set to "Manual Mode", the pH value of the current standard solution can be input during and used for electrode calibration.

8.4.3.3 Resolution Settings

The pH measurement resolution of the instrument is adjustable.

pH resolution: 0.01pH and 0.1pH.

mV resolution: 0.1 mV and 1 mV.

8.4.4 Temperature Parameter Settings

The temperature unit of the meter is selectable in °C and °F.

Temperature compensation mode: ATC and MTC.

ATC means automatic compensation.

MTC means manual compensation. It allows the user to input the temperature.

Note:

- ATC input selection. For single-parameter measurements, kindly follow the above instructions.
- When conductivity compensation electrode dissolved oxygen electrode is applied. The default ATC input is from the DO electrode.
- If the ATC input selection is incorrect. Try resetting or manually entering the temperature.

8.4.5 Data Management Settings

8.4.5.1 Sample ID Type

The instrument supports three setting methods of Sample ID: number order, time order, and manual.

Number order: The sample ID No. is increasing with the series number.

Time order: The sample ID No. is increasing with sample measuring time.
Format: Year/Y, Month/M, Day/D, Hour/H, Minutes/M, Second/S

Manual: Manually set the sample ID No. It allows samples to manually enter the sample ID when saving or printing data.

8.4.5.2 Result Autosave

When this function is enabled, the meter saves the results when the reading is stable in the auto-reading and interval-timed reading mode.

8.4.5.3 Data Overwrite

The meter provides 1000 sets of measurement results storage space. When this function is enabled, the results data that exceeds capacity will overwrite the old results data.

8.4.6 Output Option

The data formats are GLP, STD Format, and Custom. It could select one data format to output the result.

8.4.7 User ID settings

Set the user ID.

8.4.8 System Parameter Settings

8.4.8.1 System Date and Time

Settings of system date and time.

8.4.8.2 Buzzer Setting

Users can set the key sound by this setting.

8.4.8.3 Brightness Setting

Users can adjust the screen brightness by this setting.

8.4.8.4 Auto Power Off

The meter provides an auto shutdown function. When the meter is not using, the meter switches off automatically.

8.4.8.5 Restore Default

The meter supports "Restore Default" and "Restore Parameters". "Restoring Default" will restore all meter parameters to the factory state. "Restoring parameters" will restore the measurement parameters to the factory state.

8.4.8.6 Software Version

Users can find the software version information on the general setting page.

8.5 pH Measurement

8.5.1 Calibration Preparation

- The electrode slope and zero potential of pH electrodes drift slightly over time. To accurately measure pH, it is recommended to calibrate the pH electrode before use, the instrument supports 1–5-point calibration.
- One-point calibration is a calibration process with a single standard solution, commonly applied in a quick test. The calibration slope is 100% here. Two-point calibration uses two pH standard buffer solutions to calibrate the electrode and construct a linear calibration curve through two points. Two-point calibration is the most used calibration method, and it is usually recommended that the pH value of the solution to be measured lies between the two standard buffer solutions. Two-point calibration can improve pH measurement accuracy.
- Multi-point calibration is a calibration process with more than one standard solution. It is recommended to calibrate between two standard buffer solutions at the pH of the solution to be tested. Multi-point calibration covers a wider measurement range for accurate pH measurement. Before starting calibration, kindly prepare one or more pH standard buffer solutions.

8.5.2 Standards Group Selection

Before starting calibration, kindly prepare one or more pH standard buffer solutions. The meter has a standards recognition function. Kindly set the Standard Group before the measurement.

You can also set the identification type to "Manual Mode" and manually enter the nominal value during the calibration process.

8.5.3 pH Calibration

Go to pH electrode calibration by "pH Calibration". Connect the ATC probe or enter the reference temperature manually.

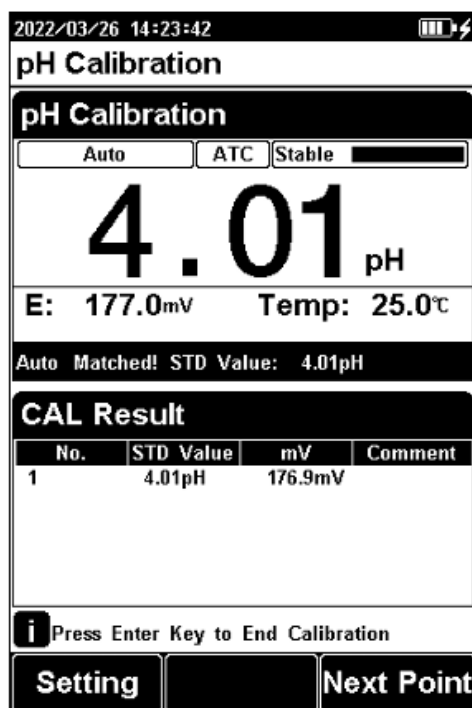


Figure-8 pH electrode calibration information

The Calibration Process is as Follows

- 1) Setting.
 - Set the parameters (e.g. pH).
 - Select the NIST standard solution group, and check pH 4.01, pH 7.00, and pH 10.01 three standard solutions.
 - Set the Auto Mode recognition.
- 2) Connect the ATC probe or enter the temperature manually.
- 3) Press the F2 "Calibrate" for one-parameter measurements or press the F2 "Calibrate"- "pH Calibration" for multi-parameter measurements.
- 4) Put the cleaned electrode into a pH 4.01 standard solution.
- 5) Wait for the instrument to display "Auto Mode Matched".
- 6) If only 1-point calibration is required after 1-point calibration is completed, press the "Enter" key to complete the calibration.
- 7) If multi-point calibration is required, kindly replace the pH7.01 and pH10.01 standard buffer solutions. After cleaning the electrode, put the electrode into the standard solution. After the instrument recognizes it successfully, the instrument reads stably, press the F3 "Next Point" to complete the calibration.
- 8) After completing the calibration, press the "Enter" key to complete the calibration, save the calibration results, and end the calibration, directly enter the start interface. If the checked standard solution group is 5, automatically end the calibration after five points of calibration.

Note: The meter will not save the date if the calibration results are not confirmed.

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8.5.4 pH Measurement

The measurement process is as follows:

- 1) Setting.
 - Set the parameters (e.g. pH).
 - Set the reading mode (e.g. continuous reading, auto reading, or timed format).
- 2) Connect the ATC probe or enter the temperature manually.
- 3) Rinse the pH electrode with DI water and dry it out.
- 4) Put the electrode into the test solution under test.
- 5) Put the measurement end of the electrode into the sample solution.
- 6) In the measurement status, press "Enter" to enter the measurement status.
- 7) When the reading is stable, read the results.



Figure-9

- 8) Press the "Save" to save the measurement results and print the result.
- 9) Between measurements, store the pH electrode in distilled or deionized water.
- 10) After measurement, rinse the pH electrode with deionized water thoroughly.

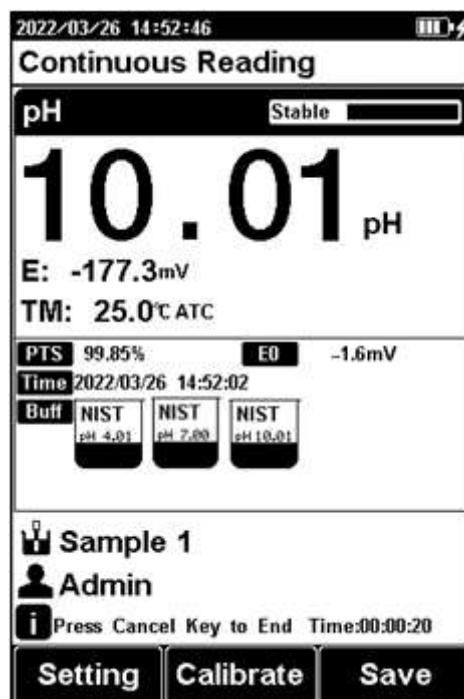


Figure-10 pH Measurement information

Note:

The measurement end of the electrode should well be immersed into the sample solution.

For high-accuracy measurement, make sure the measurement is carried out at the lab with constant temperature and pressure.

8.6 Data Management

- Press "Data" to view the details of the results. The meter stores the measurement results independently according to the measured parameters. The meter provides data Storage of 500 sets for each parameter (pH/mV).
- The user can press "Delete" in the delete menu. It allows users to select the parameter data or all data to delete.
- The user can view the data filter by parameter and locate No. or stored date. By the filter setting, press "Enter" to look up the data. The filter data is shown in a graph. Press "←" and "→" to choose data. Users can choose one and press the "Enter" key to see the detailed result. Users can press "Operate" to the operation menu. In the operation menu, it allows you to delete the current result, output the current result, output the matched result, and output all results.

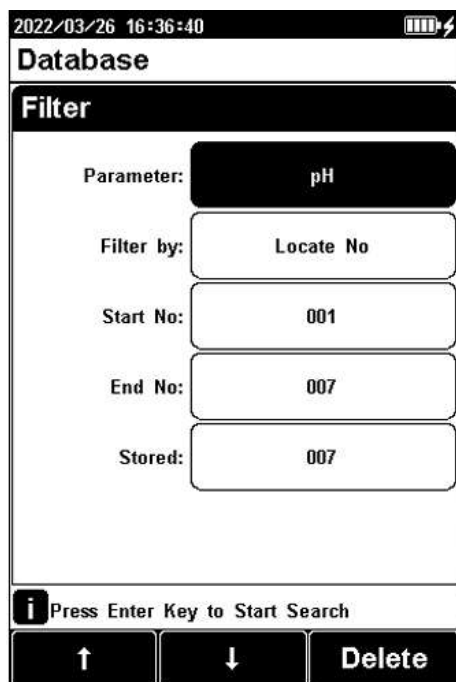


Figure-11 Results setting view

Portable pH Conductivity Meter NPCM-103

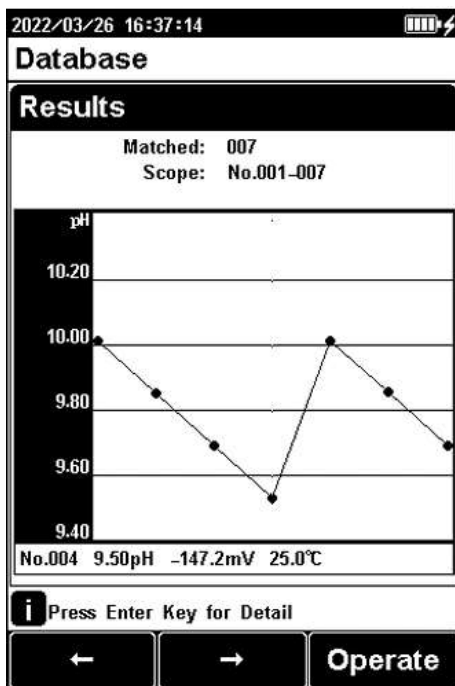


Figure-12 Results data graph

The screenshot shows the 'Output Option' screen. At the top, the date and time are 2022/03/26 16:38:36. Below the title 'Output Option', it says 'Characters a Line 40'. There are three settings: 'Report Title' set to 'Yes', 'Title Name' set to 'Report Title', and 'Output Type' set to 'GLP Format'. At the bottom, there is an information icon and the text 'Press Setting Key to Edit,Enter Key Confirm', along with navigation buttons for up, down, and a third button.

Figure-13 Measurement result output setting

Portable pH Conductivity Meter NPCM-103

Note:

Kindly connect the meter to the printer when the meter is switched off. The Baud rate is 9600bps for printer connecting. The default setting is 8 data bits, one start bit, one stop bit, and no parity.

The Output format is as follows

```
*****
Report Title
-----
Measure Time:2021/01/19 12:27:28
Operator: Operator 1
Model: PH310F pH Meter
Serial Number:
SW Version: Ver 1.00
-----
.....MATCHED INFO
Stored Num:                28
Matched Num:                1
Stored No.:                 15
-----
.....CALIB INFO
Calib Operator:            REX Team
Calib Time:                2020/05/13 08:30:00
Calib Num:                 3
-----
.....CALIB RESULT
STD 1: 4.00pH    177.3mV    25.0c
STD 2: 6.86pH    8.0mV     25.0c
STD 3: 9.18pH   -129.1mV   25.0c
pH Slope 1:                100.00%
pH E0 1:                    0.0mV
pH Slope 2:                100.00%
pH E0 2:                    0.0mV
-----
.....BRIEF INFO
Reading Mode:              Timed Reading
Stable Type:               Medium
Temp Comp Type:            ATC
-----
.....SAMPLE INFO
Sample ID:                  Sample 1
-----
.....RESULT
Result:                     7.00pH
Signal Value:               -0.0mV
Temp Value:                 25.0c
-----
Signature:
```

Figure-14

9. Maintenance

9.1 Meter Maintenance

- The correct use and maintenance of the instrument can ensure the accurate and reliable performance of the instrument. Maintenance plays an important role in pH/pX measurements, which have high input impedance and are susceptible to damage from static electricity and electromagnetic field disturbances. Additionally, exposure to chemicals or harsh use environments can affect performance.
- The pH/pX electrode socket has a protective plug, when the meter is not in use, kindly insert the protective plug into the pH/pX socket.
- The protective cover can avoid surface damage.
- Keep the meter and accessories clean and away from acids, alkalis, and any corrosive solutions/gases. Users can clean the meter surface with poor water and detergent.
- The electrode socket of the instrument must be kept clean and dry, and should not be in contact with acid, alkali, and salt solutions.

9.2 Electrodes Maintenance

For more detailed information, kindly refer to the electrode instruction manual.

9.3 Battery Maintenance

The instrument uses a built-in lithium battery. The battery takes 6 hours to fully charge. Follow the below instructions to maintain the battery.

- When the meter is turned on and not charged, the power light flashes four times when the power flashes once when the power is 25% and is 100%.
- When the meter switches off, the power light keeps the lighting for a full charge.

Precautions for the use of lithium batteries:

- Keep the meter away from the high-temperature environment.
- Keep away from water.
- Keep away from flammable and explosive substances.
- Kindly charge for 15 minutes if not in use for a long time.
- Kindly stop charging in time after fully charged.
- Continuous charging may result in decreased battery life.
- Kindly charge and discharge it every 3 months to extend the life of the lithium battery.

10. Troubleshooting

Phenomenon	Probable reasons	Solutions
No Display	Damage to the meter.	Replace or repair as required.
Incorrect mV measurement	1) The electrode is out of service life. 2) The electrode plug is in poor contact.	Replace the electrodes. Connect the protection plug, if the potential is not 0mV.
Incorrect pH measurement	1) Refer to as 2.2. 2) Refer to as 2.2. 3) The electrodes are not calibrated or are calibrated incorrectly.	1) Refer to as 2.2. 2) Refer to as 2.2. 3) Recalibrate the electrode or replace the standard solution.

11. Accessories

Standard Accessories

Accessories	Quantity
PH composite electrode	1 pc
NIST pH standard solution (4.01, 7.00, 10.01)	50ml/vial
Electrode holder	1 pc
Silicone rubber case	1 pc
Wristbands	1 pc
Carrying Case	1 pc

12. Appendix

pH-Temperature Relationship Table of pH Standard Solutions

Temperature(°C)	1.68	4.01	7.00	10.01
5	1.67	4.00	7.09	10.25
10	1.67	4.00	7.06	10.18
15	1.67	4.00	7.04	10.12
20	1.68	4.00	7.02	10.06
25	1.68	4.01	7.00	10.01
30	1.68	4.01	6.99	9.97
35	1.69	4.02	6.98	9.93
40	1.69	4.03	6.97	9.89
45	1.7	4.04	6.97	9.86
50	1.71	4.06	6.97	9.83



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