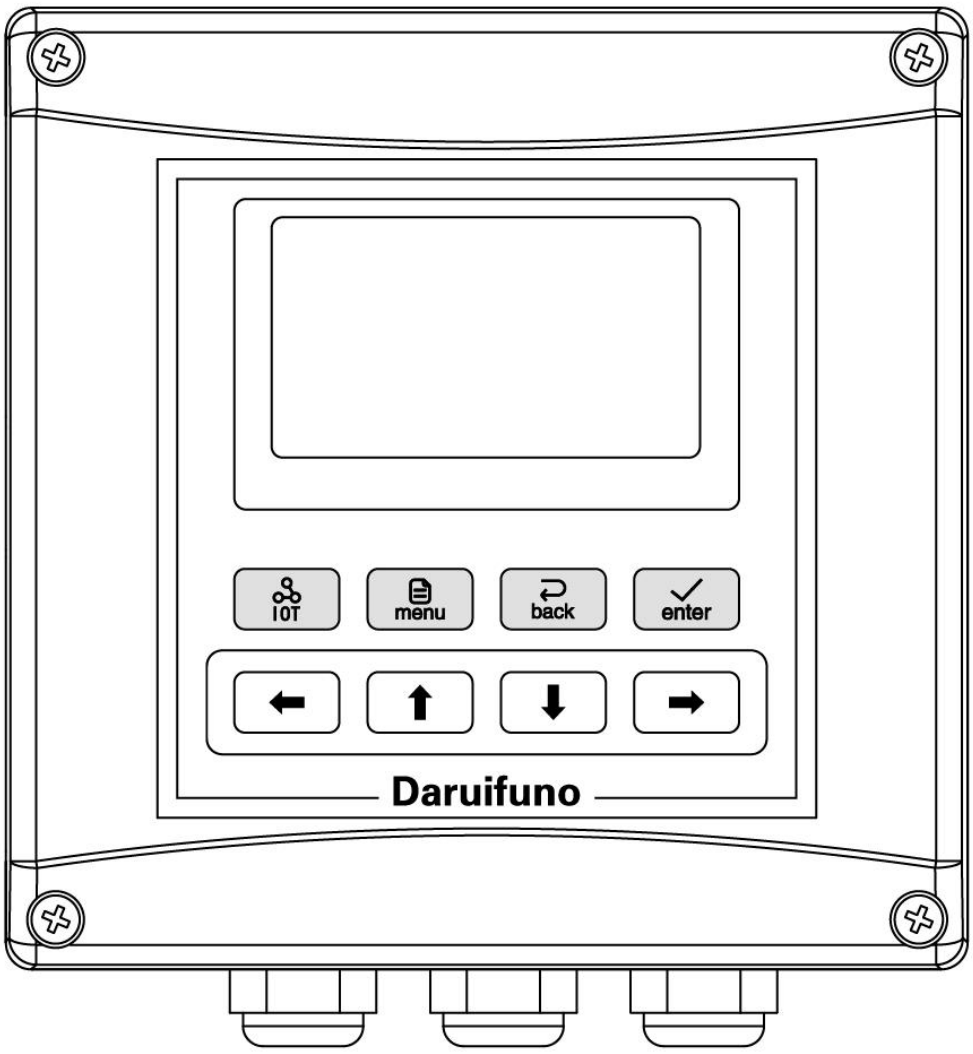
Online pH/ORP Controller

User Manual



Model: APX2-C1/C1Z

Version 1.15.00.00

CONTENTS

Chapter 1 Overview

The online pH/ORP controllers are suitable for continuous monitoring of pH or ORP values of aqueous solutions in various industries.

1.1 Technical Parameters

Display Range	pH: 0~14pH
	ORP: -2000mV~2000mV
	Temp.:-10~+150℃
Resolution	pH: 0.01pH ORP: 1mV Temp.: 0.1℃
Accuracy	±0.02pH/±2mV
Temp. Compensation	NTC10K/PT1000 automatic or manual
Relay Control	Channel Quantity: 2
	Control Type: main value control/temp. control/wash control
	Contact Type: SPST
	Contact Capacity: 3A 250V AC
Current Output	Channel Quantity: 1
	Output Type: active 4~20mA or 0~20mA
	Max. Load: 1000Ω
Comm. Interface	A RS485 MODBUS-RTU ***Note: Only APX2-C1Z has comm. functions***
Display Screen	3.2 inch graphic LCD display
Configuration information	Power failure protection, parameters are retained indefinitely
Operating Environment	0~+60℃, relative humidity 0~95%, no condensation
Storage Environment	-20~+70℃, relative humidity 0~55%, no condensation
Power Supply	100~240VAC or 18~36VDC, 3W Max
Installation Method	Panel / wall / pipe mounting
Instrument Dimension	144*144*120 (unit: mm)
Protection Grade	IP66
Instrument Weight	About 800g

Chapter 2 Mechanical Installation

2.1 Dimension

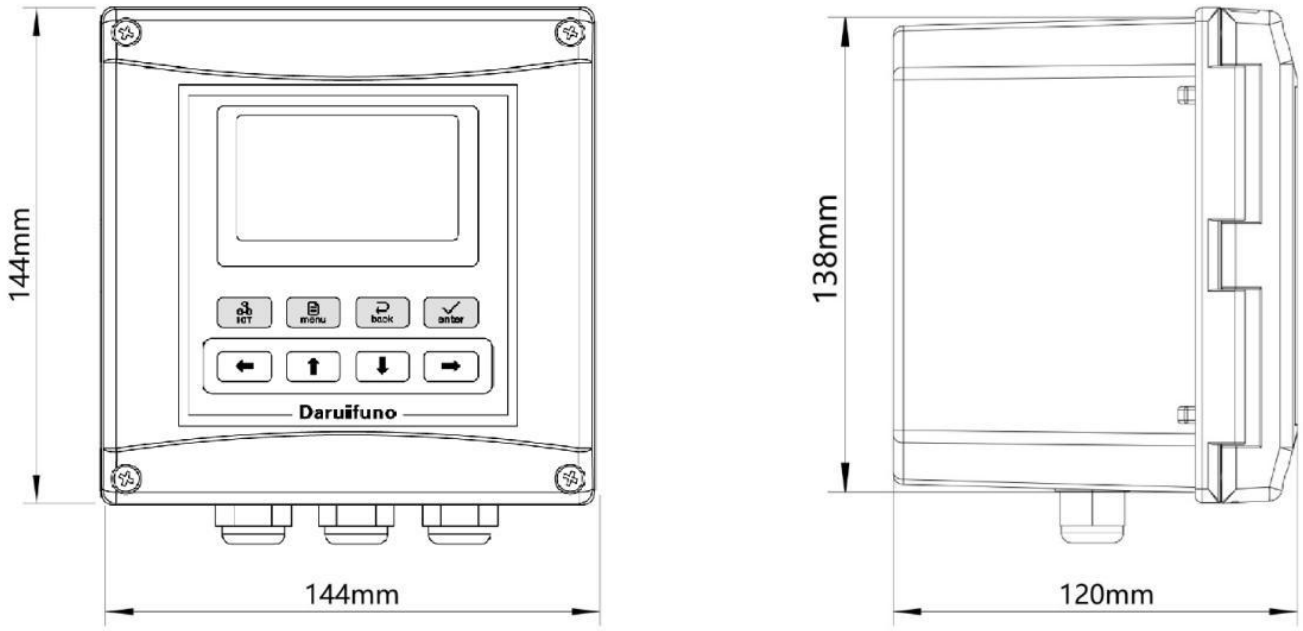


Figure 2-1 Instrument dimension

2.2 Installation

- Panel installation

When selecting a rack mount for the meter, use 2 mounting brackets to secure the meter, and the installation diagram is shown below:

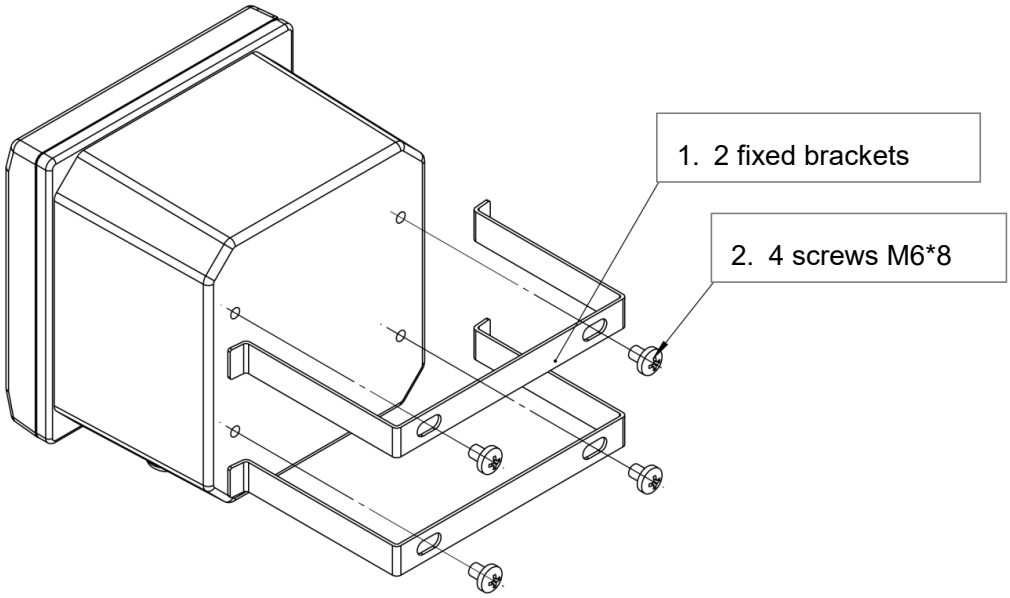


Figure 2-2 Panel mounting

- Wall installation

Connect the gray backplate to the meter, and then install it on the box or wall sidewall, the installation dimensions and schematic diagram are as follows:

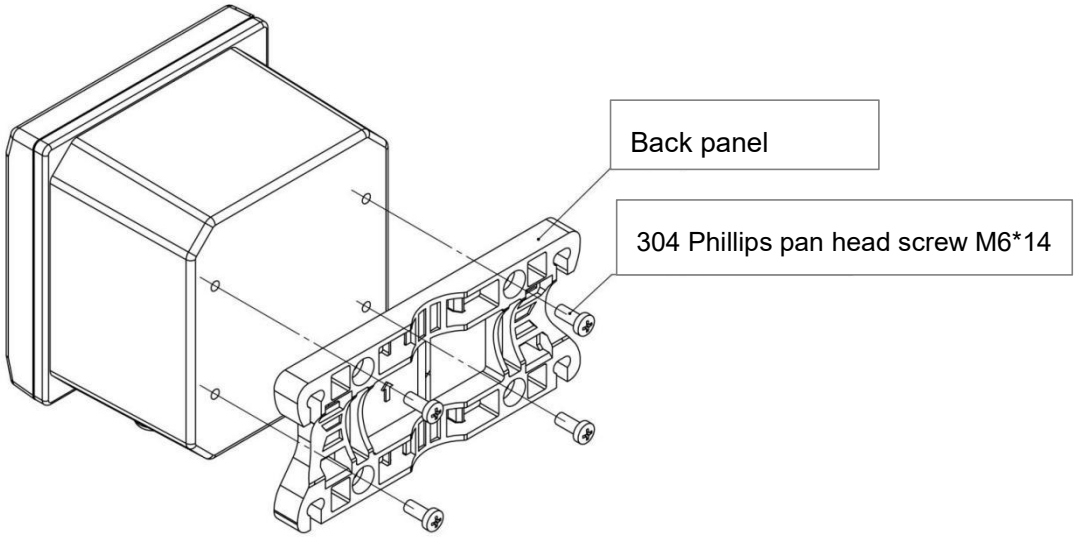


Figure 2-3 Wall mounting

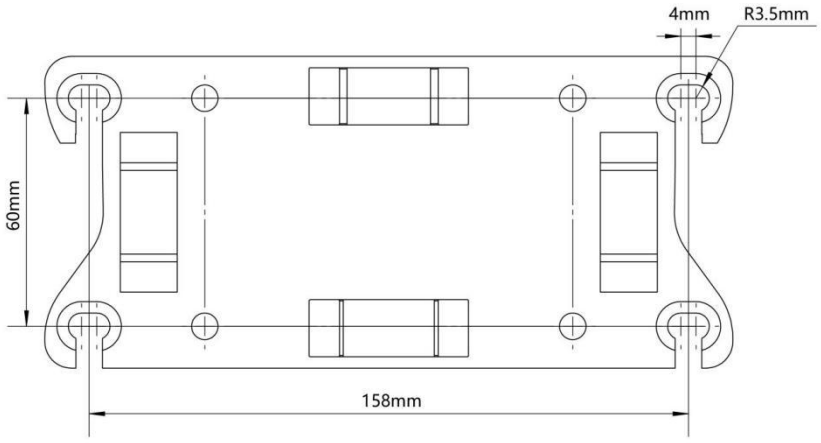
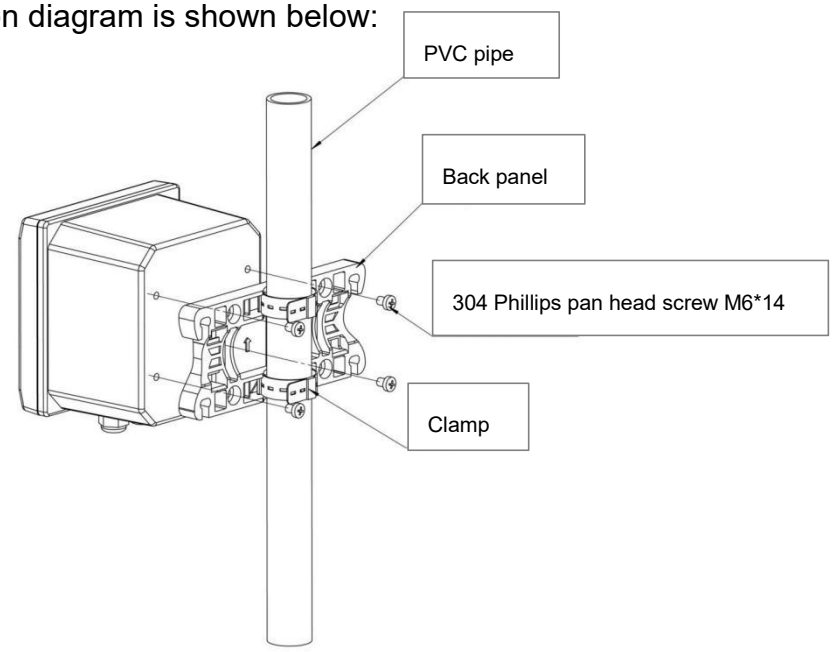


Figure 2-4 Wall mounting hole size dimensional drawing

- Pipe installation

Connect the gray backplate to the meter, and then fix the backplate to the horizontal or vertical pipe with a clamp, the installation diagram is shown below:



Chapter 3 Electrical Installation

3.1 Power Connection

After unscrewing the screws on the back of the meter, remove the cover and see the terminal blocks. According to the power supply type of the instrument, access 100~240VAC or 18~36VDC.

Note: Before connecting AC power, be sure to cut off the power supply !

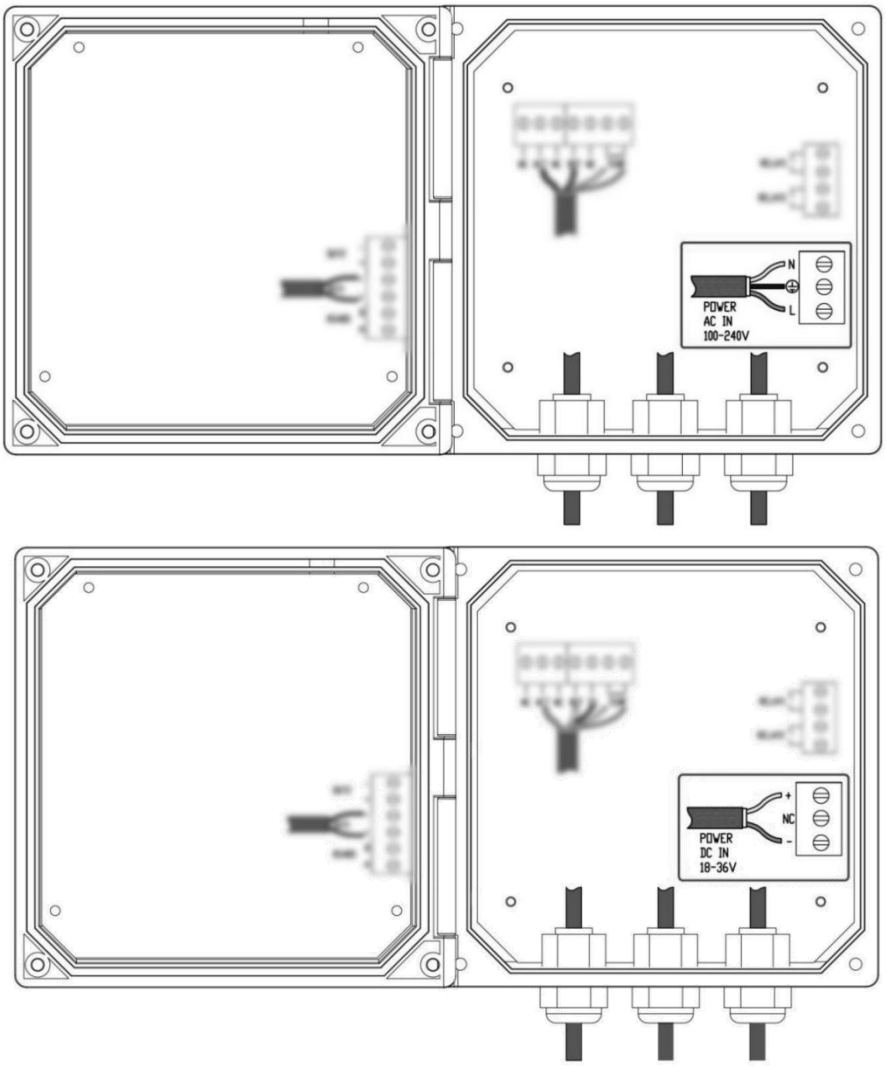


Figure 3-1 Two types of power terminals

Two kinds of power terminals are defined in the Table:

POWER AC IN 100-240V	L	AC power LIVE wire	POWER DC IN 18-36V	+	DC power positive
	⏚	AC power ground wire		NC	Floating terminal
	N	AC power NEUTRAL wire		-	DC power negative

3.2 Terminal Definition

The electrode cable is connected to the ACT, REF, TEMP terminals, and the rest are connected according to actual needs.

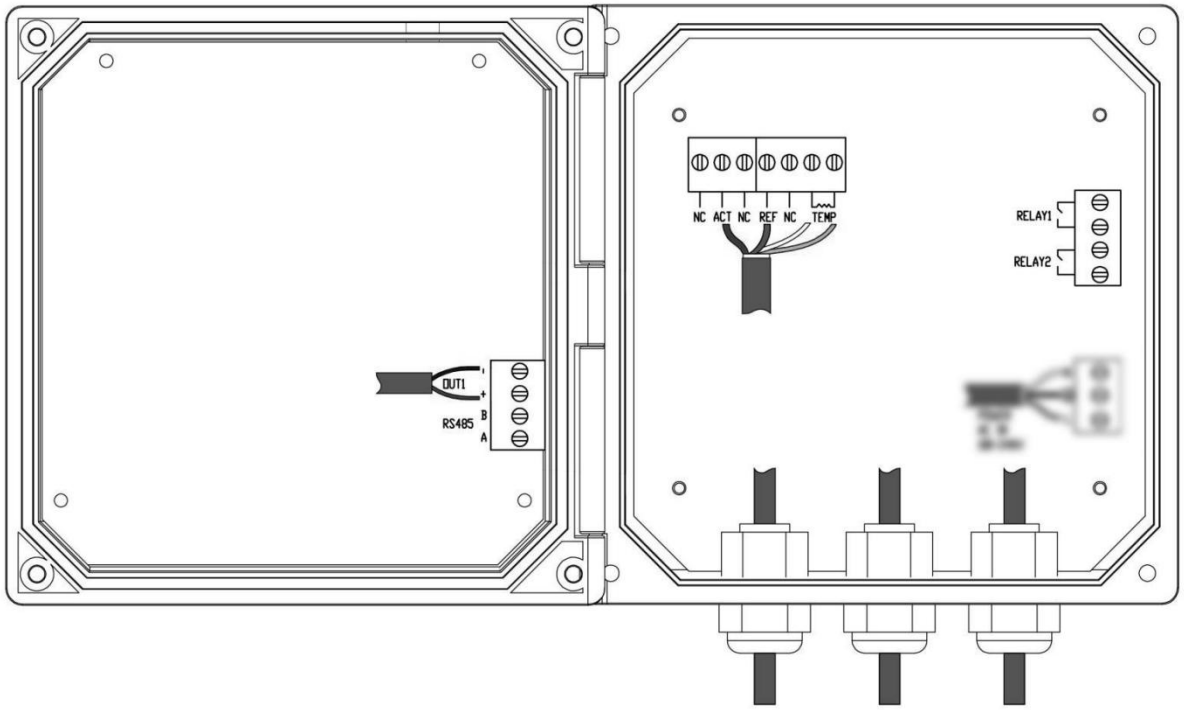


Figure 3-2 terminal blocks

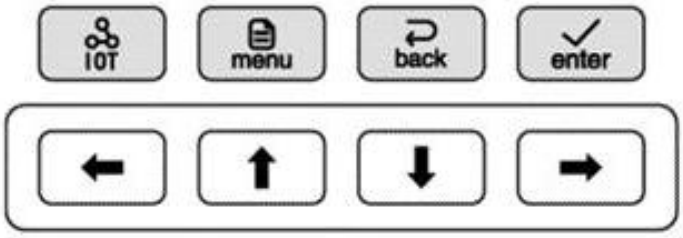
The terminal locations and names are shown in the table below:

OUT1	+	Current Output positive	ACT	pH(ORP) probe indication terminal
	-	Current Output negative	NC	Floating terminal
RS485(1)	A(1)	RS485 signal D+(A) terminal	REF	pH(ORP) probe reference terminal
	B(1)	RS485 signal D-(B) terminal	TEMP	Temperature sensor input terminal
				Temperature sensor input terminal
			RELAY1	Relay 1 contact
				Relay 1 contact
			RELAY2	Relay 2 contact
				Relay 2 contact

Note: (1) only APX2-C1Z has RS485 function, and for APX2-C1, there is no RS485 terminal.

Chapter 4 User Interface

4.1 Panel Button



Up key: In the menu option interface, to move the cursor up;
In the parameter setting interface to increase the data by 1 (change in the order of 0, 1, 2.... 9, 0);
In the measurement interface, can switch the secondary displays: “probe type” → “current value”.

Down key: In the menu option interface to move the cursor down;
In the parameter setting interface to reduce the data by 1 (change in the order of 9, 8, 7... 0, 9);
In the measurement interface, can switch secondary displays: “probe type” → “current value”.

Left key: In the parameter setting interface, to move the cursor left;
In the menu interface, to return to the previous menu;
in the pH measurement, can switch displays “pH measurement” → “mV/pH measurement”.

Right key: In the parameter setting interface, to move the cursor right;
In the pH measurement mode, switch the display “pH measurement” → “mV/pH

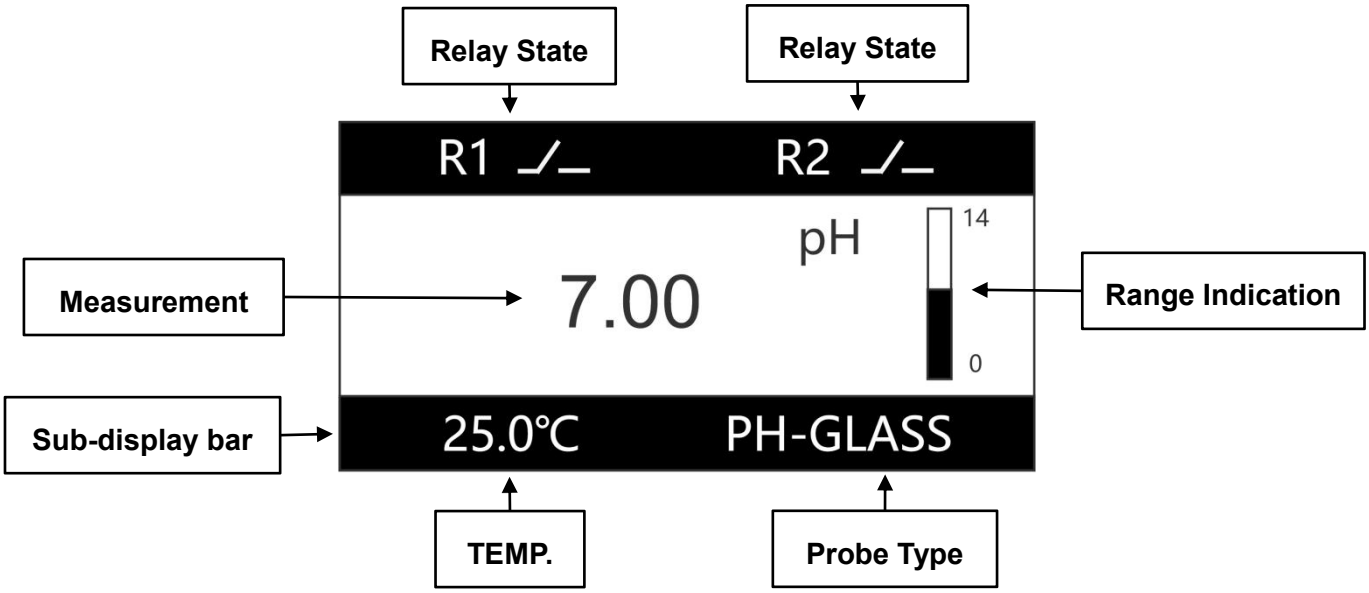
Internet of Things key: has no function
Menu key: In the measurement interface to enter the menu interface,
In the menu option interface to directly return to the measurement state,
In the parameter setting interface to return to the previous menu.

Back key: return to the previous menu, such as in the parameter setting interface, press this key to abandon the modification and return to the previous menu.

Enter key: In the menu option interface, press this key to select the option; in the parameter setting interface, press this key to confirm and return to the previous menu.

4.2 Display Screen

The meter normally displays the measurement interface after power-on. The specific information is as follows:



- **Relay State:** indicate the current relay state: on or off
- **Measurement:** display the current pH/ORP value, if “ > ” symbol appears in front of the value, it means the measurement is out of the range.

In the pH measurement mode, press the left/right key to switch “ pH measurement ” to “ mV/pH measurement ”

- **Range Indication:** Indicates the ratio of the current measured value to the range.
- **Temperature:** The temp. value is not displayed when the temp. probe is not connected.
- **Probe Type:** Display the currently selected probe type.

  “ PH-GLASS ” means “ pH glass probe ”

  “ PH-ANT ” means “ pH antimony probe ”

  “ ORP ” means “ ORP probe ”

Chapter 5 Menu Description

In the measurement interface, long press the menu button to enter the menu. This chapter describes the main features.

5.1 Probe Setting

Perform sensor calibration and view of sensor status.
After the probe is connected to the controller, it needs to be calibrated first due to the error between the signal of the actual electrode and the standard.

- pH Calibration

1. Preparation before calibration
   - In the menu “ select probe ”, select “ pH Glass probe ” or “ pH Antimony probe ”
   - pH 4.01, 6.86, 9.18 standard solution(1)
   - Deionized cleaning solution and absorbent paper
2. Zero Calibration
   (1) Clean the probe with deionized cleaning solution, dry it with absorbent paper and put it into pH 6.86 standard solution;
   (2) After the measured value is stable, select “ 6.86pH CAL ” to start calibration;
3. Acid slope Calibration
   (1) Clean the probe with deionized cleaning solution, dry it with absorbent paper and put it into pH 4.01 standard solution;
   (2) After the measured value is stable, select “ 4.01pH CAL ” to start calibration;
4. Alkali slope Calibration
   (1) Clean the probe with deionized cleaning solution, dry it with absorbent paper and put it into pH 9.18 standard solution;
   (2) After the measured value is stable, select “ 9.18pH CAL ” to start calibration;

- ORP Calibration

1. Preparation before calibration
   - In the menu “ select probe ”, select “ ORP probe ”
   - ORP 86mV, 256mV standard solution(1)
   - Deionized cleaning solution and absorbent paper
2. Zero Calibration
   (1) Clean the probe with deionized cleaning solution, dry it with absorbent paper and put it into ORP 86mV standard solution ;
   (2) After the measured value is stable, select " 86mV CAL " to start calibration;
3. Slope Calibration
   (1) Clean the probe with deionized cleaning solution, dry it with absorbent paper and put it into ORP 256mV standard solution;
   (2) After the measured value is stable, select " 256mV CAL " to start calibration;

Note: (1) If there is a standard solution with other values, the calibration value can be modified to the actual value after selecting the calibration value.

5.2 Alarm Setting

- **Control function**

  When “ Main value Control ” or “ Temp. Control ” is selected in the “ Function Set ” menu, the relay is a control output relay.
  When “ Main value Control ” is selected, the relay is controlled by the main measurement value;
  When “ Temp. Control ” is selected, the relay is controlled by the temp. measurement.
  When “ On Value ” > “ Off Value ” are set in the menu, the relay is a high alarm control.
  When “ On Value ” < “ Off Value ” are set in the menu, the relay is low alarm control.

- **Buzzer alarm**

  Once turned on, enter the set value.
  When the relay is controlled by a pH high alarm, the buzzer will sound an alarm when the measured value is > (closed value + set value) or the measured value is < (open value - set value);
  When the relay is controlled by pH low alarm, the buzzer will sound an alarm when the measured value is < (closed value - set value) or measured value > (open value + set value).
  The buzzer alarm is only valid for pH measurements, not for ORP measurements.

- **Wash relay**

  When “ wash relay ” is selected in the “ Function Set ” menu, the relay is in the wash output state, and the relay will on and off in the set cycle for wash control.
  When “ Hold ” is selected for “ wash State ”, when cleaning, the measurement display value remains unchanged before the relay is operated.
  When “ constant ” is selected for “ wash State ”, the measurement value is the real-time value of continuous measurement.

5.3 Current Setting

Use a current signal to output the measured value.
Set the measured value for the current in “ Channel Select ”.
The measured values corresponding to the current output “ 20mA ” and “ 0mA/4mA ” are set in “ Max. Value ” and “ Min. value ”, respectively.

5.4 Comm. Setting

Output measured values using RS485 interface. Please refer to the appendix for an introduction to the Modbus communication.
Note: Only APX2-C1Z has comm. functions

5.5 Test/Maint.

- **Output Hold**

Upon enabled, the current output, communication output, and relay status will remain unchanged from their states prior to entering the menu. The screen will continue to display real-time measurement values. This feature is particularly beneficial for maintenance purposes, as it prevents erroneous measurement data from being recorded or transmitted due to variations in the measured values, thereby avoiding potential abnormal control operations.

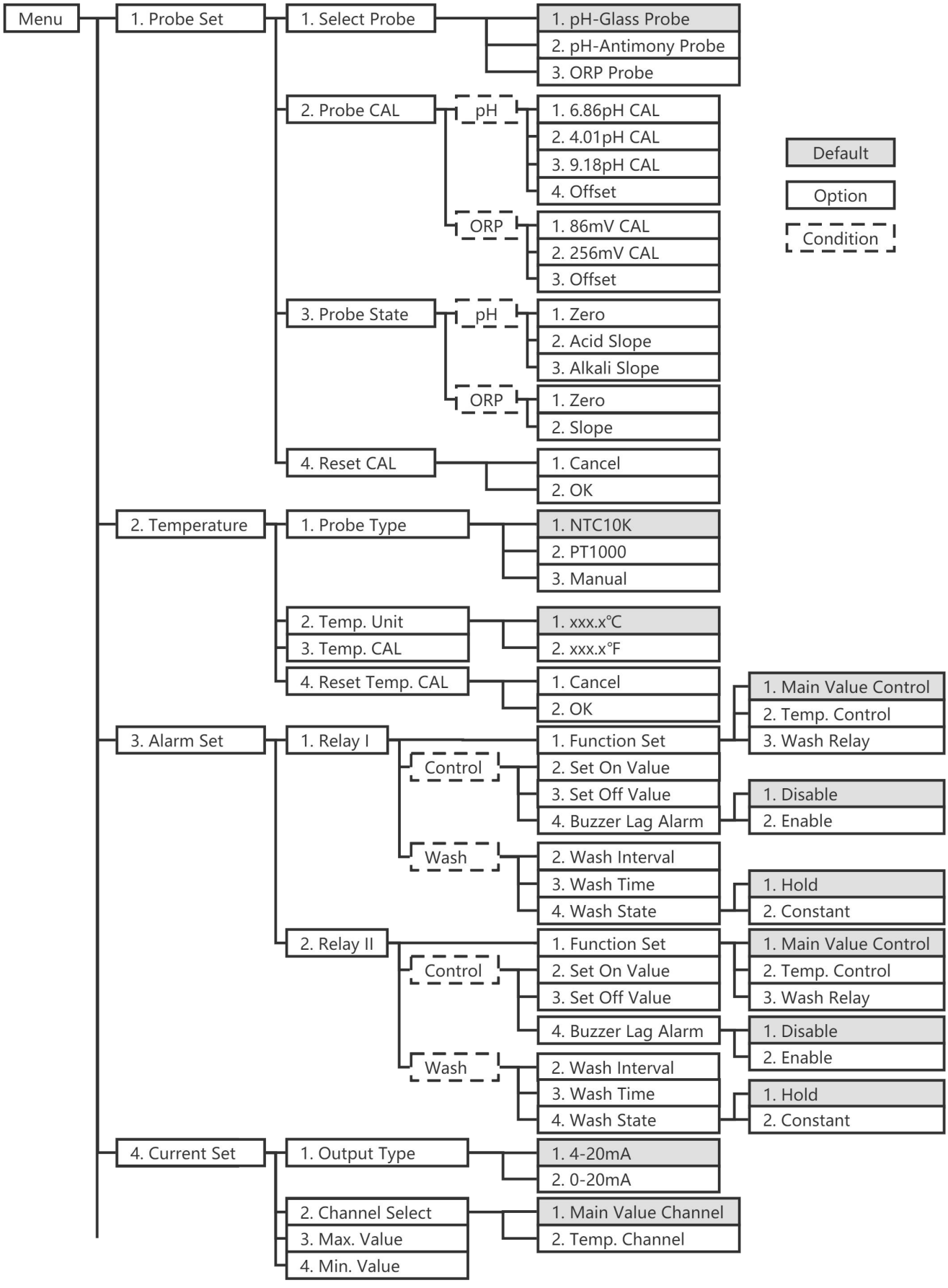
Appendix

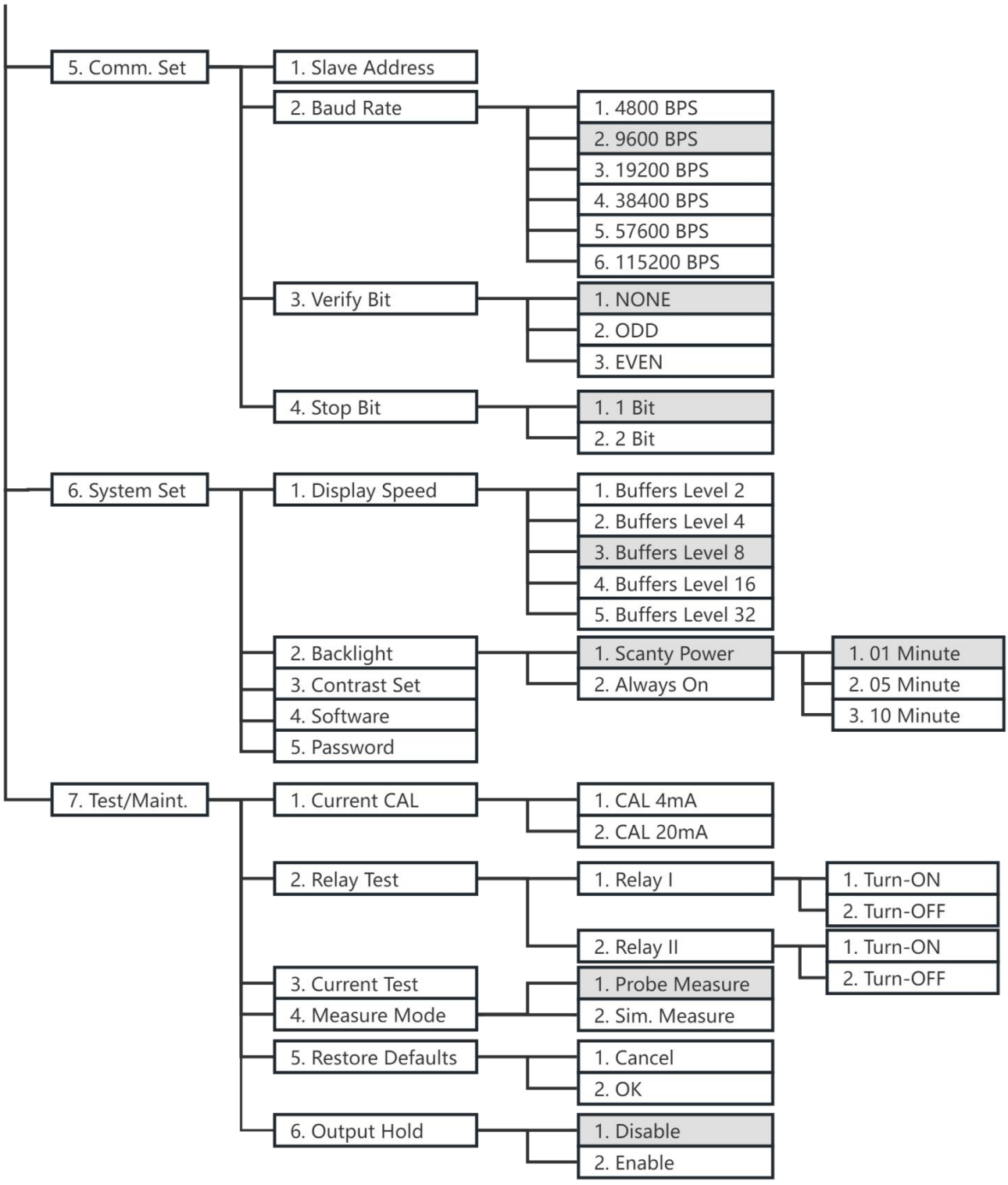
ModBus Register Introduction

The instrument acts as a slave on the network and supports the Modbus RTU communication protocol.
The main unit can use function code 04 to read the measurement results.
The parameters corresponding to the register address are defined as follows:

Register Start Address	Function Code	Parameters	Number of Registers	Data Format
0	04	Temp value (℃)	2	32-bit floating point default CDAB(3412)
2	04	pH value	2	32-bit floating point default CDAB(3412)
4	04	ORP value(mV)	2	32-bit floating point default CDAB(3412)

Menu Structure Diagram




5. Comm. Set
1. Slave Address
2. Baud Rate
1. 4800 BPS
2. 9600 BPS
3. 19200 BPS
4. 38400 BPS
5. 57600 BPS
6. 115200 BPS
3. Verify Bit
1. NONE
2. ODD
3. EVEN
4. Stop Bit
1. 1 Bit
2. 2 Bit
6. System Set
1. Display Speed
1. Buffers Level 2
2. Buffers Level 4
3. Buffers Level 8
4. Buffers Level 16
5. Buffers Level 32
2. Backlight
1. Scanty Power
1. 01 Minute
2. 05 Minute
3. 10 Minute
2. Always On
3. Contrast Set
4. Software
5. Password
7. Test/Maint.
1. Current CAL
1. CAL 4mA
2. CAL 20mA
2. Relay Test
1. Relay I
1. Turn-ON
2. Turn-OFF
2. Relay II
1. Turn-ON
2. Turn-OFF
3. Current Test
4. Measure Mode
1. Probe Measure
2. Sim. Measure
5. Restore Defaults
1. Cancel
2. OK
6. Output Hold
1. Disable
2. Enable

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