

CDT-11A
PH Sensor
Manual

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CDT-11A PH Sensor

◆ Product Brief

CDT-11A PH sensors measure the pH value should be a good solution without professional calibration instruments, complex operation, expensive and difficult to carry, can be for continuous measurement of soil, waste water pH value, suitable for agriculture, sewage treatment plant, chemical industry, printing and dyeing, paper making, pharmacy, electroplating and environmental protection and other fields.

◆ Application

- Meteorological Monitoring
- Micro Environmental Monitoring
- Grid Environment Monitoring
- Agricultural Meteorological Monitoring
- Meteorological Traffic Monitoring
- Photovoltaic Environment Monitoring
- Meteorological Environment Monitoring for Smart Cities

◆ Features

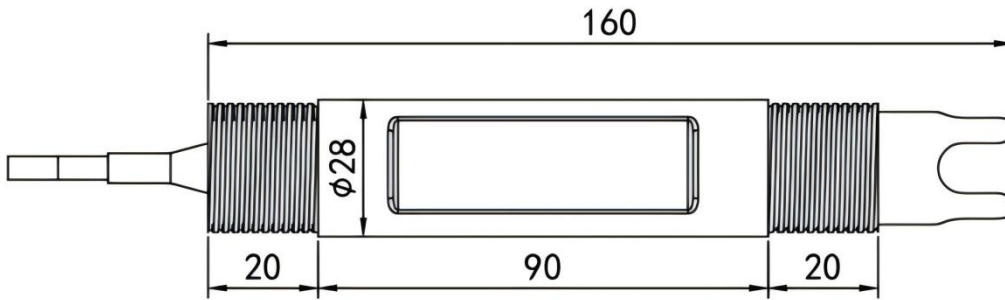
- Small in size
- High integration
- Easy to install
- Free testing software MODBUS - poll V1.0 (ask your salesperson for it)
- Integrated design
- Low starting threshold
- One year warranty

◆ **Technical Parameters**

Parameters	Measuring Range	Accuracy	Resolution
PH	0-14	±0.1@25℃	0.01
Temperature	0-80℃	±0.3℃	0.1℃
Operating Temperature	0℃—80℃		
Output	Standard product with RS485 interface, MODBUS RTU; 4-20mA / 0-5V / 0-10V		
Power Supply	DC10-30V		
Protection Level	IP68		
Cable Length	5m (10m 15m 20m can customize)		
Repeatability Error	±0.02		
Power Consumption	RS485 0.6W / Analog:1.2W		
Electrode Type	Conventional electrode / Glass electrode / Teflon electrode / Sulfur removal electrode		
Operating Environment	Seawater / Freshwater / Strong acids and strong bases / Organic matter water quality		
Temperature compensation	Default temperature :25℃ (can set 0-80℃)		
Controller	Power	22VAC or 10-30VDC	
	Communication	RS485	
	Output	Relay output AC220V	
	Data storage	72 pieces of data (3 Days)	
	Protection Level	IP54	
	Power Consumption	DC24V : <1.6W AC220V : <15W	

★ Specifications may be updated without prior notice.

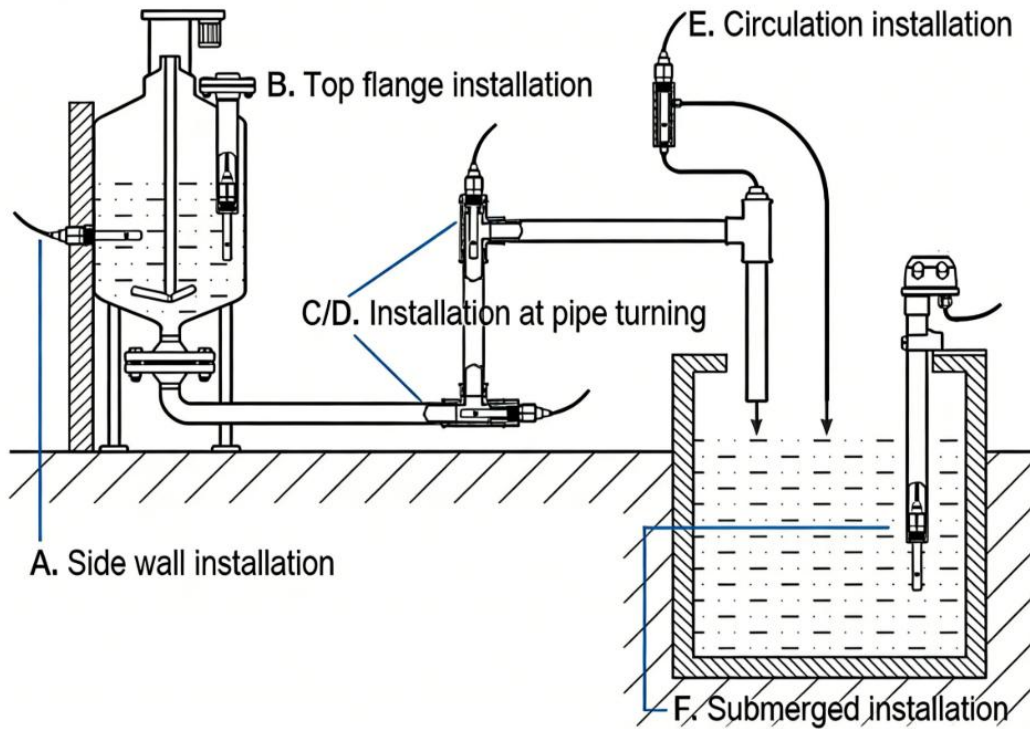
◆ **Product Size**



Size : 96*96*110mm Electrode thread: NPT3/4
Installation opening dimensions :92*92mm

◆ **Accessories:**

Mounting Manner:



MODBUS RTU Communication Protocol

(Apply to CDT-11A product)

Baud Rate: 4800
Data Bits: 8
Stop Bit: 1
Check Bit: None

1.1 CRC Description:

Among all the following instructions, the two bytes of CRC16 in MODBUS RTU protocol are as follows: the low byte comes before and the high byte comes after.

In the following instructions, the assumed sensor address is 0x01 (the default sensor address is 01).

1.2 Return Error Code Rule:

When receive error instruction (including CRC16 validation error), no error codes will be returned. It is considered to be a failure, when there is no return data in 200ms after the instruction is issued. Upper computer may resend instruction.

1.3 Standard MODBUS register description

Special Notice:

The quantity or length of the register in MODBUS is two bytes with 16 bits as a unit (the high byte comes first, and the low bytes follows), instead of one byte with 8 bits as a unit.

User shall ensure that the address and quantity of register in command are confined within the range specified by the system. Otherwise, the output of the sensor will be unpredictable. Users shall ensure that the MODBUS command complies with the requirements of this manual in the software design of the upper computer and the minimum query period supported is 1s/ time.

Input register: read with function code 03

Address	Operation	Contents	Note
0x0000	Read-only	PH, a hexadecimal number magnified by 100 times. For example, 0x02AD indicates 685/100=6.85	
0x0001	Read-only	Temperature, a hexadecimal number magnified by 10 times. For example, 0x0100 indicates 256/10=25.6°C	
0x07D0	Read/Write	Device Address(1-255)	Default address 01
0x07D1	Read/Write	0 represents 2400 1 represents 4800 2 represents 9600 3 represents 19200 4 represents 38400 5 represents 57600 6 represents 115200 7 represents 1200	Default Baud rate 4800

1.4 Electrical Connections

Connector(cable)	Voltage	Current	RS485
Pin 1(red)	V+	V+	V+
Pin 2(yellow)	V- out	I -out	RS485A
Pin 3(black/green)	V-	V-	V-
Pin 4(blue)			RS485B

1.5 Communication Example

The following is an example of how to use MODBUS RTU commands to access system registers:

1. Read multiple input registers (real time data) command

Send: 01 03 00 00 00 02 C4 0B

01	03	00 00	00 02	C4 0B
System Address	Function Code	Register Address	Number of Registers	CRC16 check digit automatically generated by software

Answer: 01 03 04 03 16 01 09 B8 BE

01	03	04	03 16 01 09	B8 BE
System Address	Function Code	The number of bytes in a data segment	Segment Data	CRC16 check bit

Analytical Data:

$$0x0316 = 0x03 * 256 + 0x16 = 790$$

$$PH = 790/100 = 7.9$$

$$0x0109 = 0x01 * 256 + 0x09 = 265$$

$$Temperature = 265/10 = 26.5^{\circ}C$$

2. Controller menu

Measurement Mode Interface

Interface display description:

The first line: Displays the current time;

The second line: Displays the measured PH or ORP value;

The third line: Displays the current measured temperature value and the output 4-20mA current value;

Function key instructions:

Press "ESC" to return to the previous interface.

Press "↵" to enter the menu interface. Please enter the correct password before proceeding. The default password is 0000; scroll horizontally.

Press "▲" to scroll up and view parameter items or increase data.

Press "▼" to scroll down and view parameter items or decrease data.

Press "Confirm" to store the modified parameter values.


Technical Data

CDT-11A PH Sensor

No.	Menu Item	Setting	Parameter Range	Default Value
1	Alarm Settings	High PH Alarm	0.00~14.00 PH	14.00 PH
		Low PH Alarm	0.00~14.00 PH	0.00 PH
		High ORP Alarm	-1999~1999 mV	1999 mV
		Low ORP Alarm	-1999~1999 mV	-1999 mV
2	Analog Output	PH Corresponding to 4~20mA Output	0.00~14.00 PH	0.00/14.00 PH
		ORP Corresponding to 4~20mA Output	-1999~1999 mV	-1999/1999 mV
3	Temperature Correction	Correction Temperature	-99.9~+99.9 °C	0.0 °C
4	Filter Coefficient	Filter Coefficient Setting(Larger value = more stable)	1~15	15
5	PH Calibration	Two-Point PH Calibration	-	-
		PH Offset	-20.00~20.00 PH	0.00 PH
	Potential Correction	Coefficient Correction	0.900~1.100	1.000
		Potential Offset	-99~99 mV	0 mV
6	Temperature Compensation	Auto Temperature Compensation	-	-
		Manual Temperature Compensation	0.0~99.9 °C	25.0 °C
7	Communication Settings	MODBUS Address	0-255	001
		Baud Rate	1200/2400/4800/9600/19200 /38400/57600/115200	4800
		Parity	None/Even/Odd	None

CSDA Technical Data

CDT-11A PH Sensor

No.	Menu Item	Setting	Parameter Range	Default Value
8	Factory Settings	Restore Factory Settings	-	-
9	Current Correction	Correct 4-20mA Current Output Offset	-9.99~+9.99 mA	0.00 mA
10	History Data	Record Data of Past 3 Days (1 point/hour)	-	-
11	Measurement Mode	Display PH or ORP Value	-	PH Measurement
12	System Settings	Time Settings	-	Current Time
		Password Settings	0000-9999	0000
		Backlight Settings	0~9999 s (0 = Always On)	0
		Buzzer Settings	On/Off	Off
		Contrast Settings	0-32	5

Warranty and After-sales Service:

Warranty: The product warranty period is 12 months from the delivery date (except for the product problems caused by not operating in accordance with corresponding technical requirements or other artificial behavior).

After-sales telephone: 86-0731-86117089 www.codasensor.com Molly@codasensor.com

Other Weather Sensors

Model number	Type	Output	Special features
CDF-10A	Wind speed	Pulses(PNP) RS485 4-20MA 0-5V	Three cup plastic wind speed
CDF-11A	Wind direction	RS485 4-20MA 0-5V	Plastic wind direction sensor
CDW-33A	Atmospheric Temperature, Humidity & Pressure	RS485	Shelter installation
CDY-12A	Economical Tipping Bucket Rainfall	Pulses(@10kΩ&0.01uF),RS485	Diameter :φ200mm, height: 271mm
CDG-10B	Solar Radiation	0-5V,4-20mA,RS485	Spectral range:300~1100nm
CDT-11A	PH sensor	0-2V 0-5V 4-20mA RS485	Probe: Φ28*160mm
CDT-12A	DO sensor	RS485 4-20mA	Range 0-20mg/L(ppm)
CDT-12B	DO sensor(calibrable)	RS485 4-20mA	Range 0-20mg/L(ppm)
CDT-14A	ORP sensor	RS485 4-20mA	Range -1500mV-+1500mV
CDT-15A	Suspended Matter	RS485	Range 0-200mg/L,0-1000mg/L,0-5000mg/L
CDT-17B	Soil PH sensor	RS485 4-20mA	Probe material:304SS
CDT-19B	Turbidity (SS) sensor	RS485 4-20mA	Wavelength of falling radiation: 860nm
CDT-21B	Soil EC_salinity	RS485 4-20mA	Probe material:316L
CDT-22B	Soil Moisture & Temperature	4-20mA ,0-5V,0-2V,RS485 optional	Probe material:316L
CDT-30B	Soil Moisture, Temperature & EC	RS485,0-2V	316L stainless steel
CDT-70B	Soil 7 in 1 Sensor	RS485	Soil Moisture, Temperature & EC & PH & NPK
CDT-1T2B	Seismic Detection Wave	0-20mV RS485	Natural Frequency(Hz):10±2.5%
CDT-1T3B	Soil layers temperature&moisture	RS485	Range 0-100℃ 0-70%
CDT-1T4B	TDS Sensor	RS485 4-20mA	Range 0-2000ppm
CDT-1T5B	Dissolved CO2 Sensor	RS485	Range 0-2000ppm
CDT-1T6B	Residual Chlorine	RS485	Range 2mg/L,8mg/L,20mg/L
CDT-N0C	Multi-parameter water quality Sensor	RS485	Multi-parameter integration

Maintenance

PH Calibration

1.1 Preparation method of electrode soaking solution:

1. Weigh 223.65 grams of potassium chloride reagent and dissolve it in one liter of distilled water or deionized water.
2. Prepare the pH 4.00 standard buffer solution (refer to the section on preparing standard buffer solution).
3. Mix the potassium chloride solution with the pH 4.00 standard buffer solution in a 1:1 ratio to prepare the solution. If you are unable to prepare the electrode soaking solution at present, you can temporarily use tap water instead. Note: Do not use distilled water or pure water to soak the electrode; otherwise, the response speed of the electrode sensor will become extremely sluggish.

1.2 Precautions before PH calibration:

When using the electrode for the first time, it is necessary to calibrate it with two-point standard solutions. Calibrate it again at regular intervals thereafter. To ensure the measurement accuracy of the instrument, two-point standard solutions must also be used for calibration.

1. Check if the electrode sensor is clean, with no contaminants attached to the sensitive bulb or reference core. Confirm that the standard buffer solution is fresh, accurate, and not contaminated in any way.
2. The sensitive bulb of the PH electrode sensor is very thin. During calibration, please be careful not to collide with it.
3. Before placing the electrode into another solution after taking it out from one solution, it needs to be cleaned in distilled water and dried with filter paper to remove any water droplets on the electrode.
4. Do not wipe the electrode sensor. Otherwise, the electrode will carry static electricity, affecting the calibration accuracy.

Standard Buffer Preparation Method:

1. Take the PH 4.00 standard buffer reagent, cut open the seal, and pour it into a 250ml volumetric flask.
2. Add 250mL distilled water to the volumetric flask and stir the solution until all the reagent in the bottle is dissolved. The preparation methods for different types of bagged standard buffer reagents are the same. After preparation, you should have a PH 4.00/6.86/9.18 standard buffer solution set.

Storage of Standard Buffer:

1. The prepared standard buffer solution must be stored in an airtight container and should avoid direct sunlight.
2. It is recommended that you store the prepared calibration solution at a temperature of 5°C.
3. If there are flocculent substances in the standard buffer solution, do not use it again; otherwise, it will affect the calibration accuracy.

1.3 Calibration

This equipment can be calibrated in two ways: by using two-point standard solutions and by setting the offset based on a known pH value. Two-point calibration:

◆ Press the menu button to enter item 5: PH calibration interface:

```
5 Calibration                1 PH calibration 2 PH offset
6 Temp Comp
7 Communication
8 Factory Reset
```

```
4.00 -- 6.866.86 -- 9.184.00 -- 9.18
```

The calibration range is determined based on the range of pH values that the user needs to test. This table offers three options for the range: "6.86 and 4.00", "6.86 and 9.18", and "4.00 and 9.18".

◆ Select one of these ranges and proceed to the next interface. For example, select "4.00 and 6.86". Press the "Confirm" button, and the instrument will first display the first image in the following picture (the mV values in the picture are for reference only).

◆ After cleaning the electrode, first place it in the 6.86 standard solution and wait for the value to stabilize. This usually takes several minutes. Once it stabilizes, press the "Confirm" button. The instrument will then enter the next "Place in 4.00 standard solution" interface. Take the electrode out of the 6.86 standard solution, clean it, and then put it back into the 4.00 standard solution. Wait for the value to stabilize again, which usually takes several minutes. Once it stabilizes, press the "Confirm" button again. The instrument will display that the calibration is complete.

◆ If the measured mV value deviates significantly during the calibration process, after pressing the confirmation button, the instrument will display "Calibration Failed".

1.4 PH Offset

During the instrument measurement process, if there is a slight deviation in the measurement value, it can be corrected by setting the PH offset.

```
set offset:
+00.00 PH
cancel done
```

If the measured value of the instrument is smaller than the actual value, press the "▲" key to increase the corresponding PH offset; if the measured value of the instrument is larger than the actual value, press the "▼" key to decrease the corresponding PH offset.

High and low alarm settings

The contacts of the instrument alarm relay are used to connect the corresponding control devices (such as solenoid valves, etc.) for the user to form the control system. To prevent the relay contacts from shaking near the alarm point, the secondary meter adopts the method of lagging cancellation.

When the preset alarm upper (lower) limit is reached, the relay closes immediately and the alarm light flashes to indicate the alarm. However, when the PH or ORP value drops (rises) back to the alarm upper (lower) limit, the alarm will not be immediately cancelled. It will only be eliminated when it continues to drop (rise) to the open value.

1 Alarm

2 Analog Output

3 Temperature

4 Filt

1 High alarm 2 Low alarm

pull in value:

4.00 PH

cancel done

drop out value:

4.00 PH

cancel done