

CDQ-T0C Weather Station Operating Instruction & Communication Protocol

CODA

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CODA

1 Product Brief

CDQ-T0C Automatic Weather Station is used for atmospheric temperature, relative humidity, atmospheric pressure, wind speed & direction, solar radiation, light, rainfall, soil temperature and humidity parameters measurement. The station consists of various types of sensors, LCD screen, meteorological data collector, chassis, support and other parts. It can be widely used in meteorology, hydrology, agriculture, forestry, scientific research and other fields.

Note: The manual contains instructions for the solar control system. If you have not purchased it, please skip that part.

1.1 Application

- Agricultural
- Forestry
- Highways and railways
- Solar or wind power generation
- Greenhouse, breeding
- Scenic region
- Meteorological science research

1.2 Features

- High accuracy
- Strong resistance to harsh environment
- Strong corrosion resistant ability
- Automatic storage and backup
- Convenient data download
- All-metal construction of bracket
- Solar power supply optional
- Free PC software



2.5m Tripod



2.5m Supporting rod



10m Supporting rod

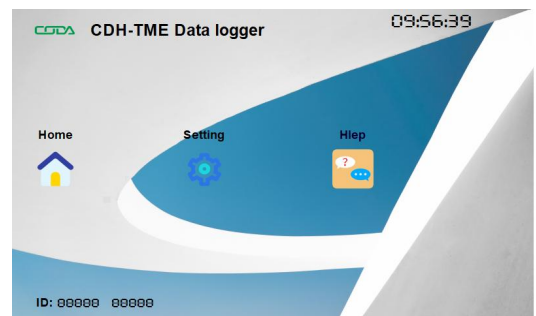
1.3 Product Technical Data

Item	Details
Display	7" color touch screen with backlight
Screen sleep	Support
Backlight adjustable	Support
Communication status indication	Support
Internal storage	It allows storage of every hour for 6 years; every 10 minutes for 1 year; and very minute for 3 months.
Sensor connection	Waterproof connector
Communication interface	RS485, Ethernet, GPRS/2G/3G/4G, WIFI
	Lora (optional)
	Zigbee (optional)
Communication protocol	Modbus-Rtu
Supply	Solar power, DC12-24V, AC100-240V
Measurement parameters	32 max.
Recording interval	1-240min settable
U_disk download	Support
Relay output	customized
Average consumption	<3.5W
CPU	ARM Cortex-A8 (720MHZ)
ESD	Class 4, ±8kV
Operation temperature	-40-+75℃
Shock	10-25Hz (X,Y,Z 2g@30min)
FCC	Class A
CE	EN55022 & EN55024
Protection box	400*500*200mm, support solar power system
IP(with protection box)	IP55

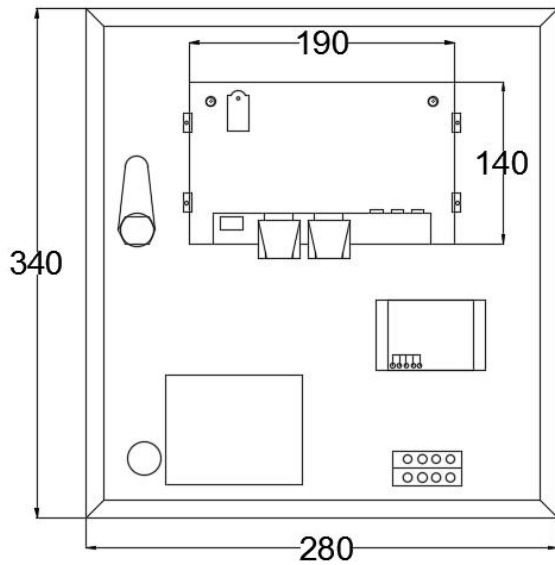
1.4 Protective Housing Dimensions



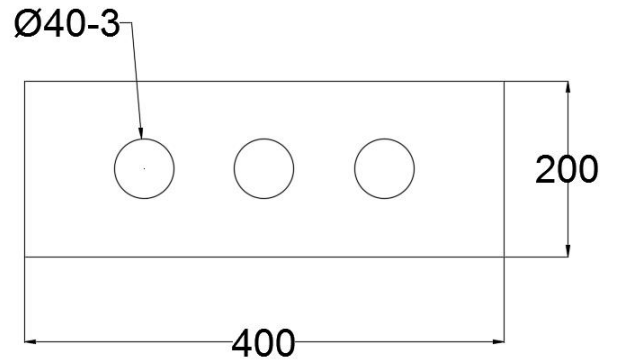
Dimensions



7 inch HMI



Inner size



Bottom size

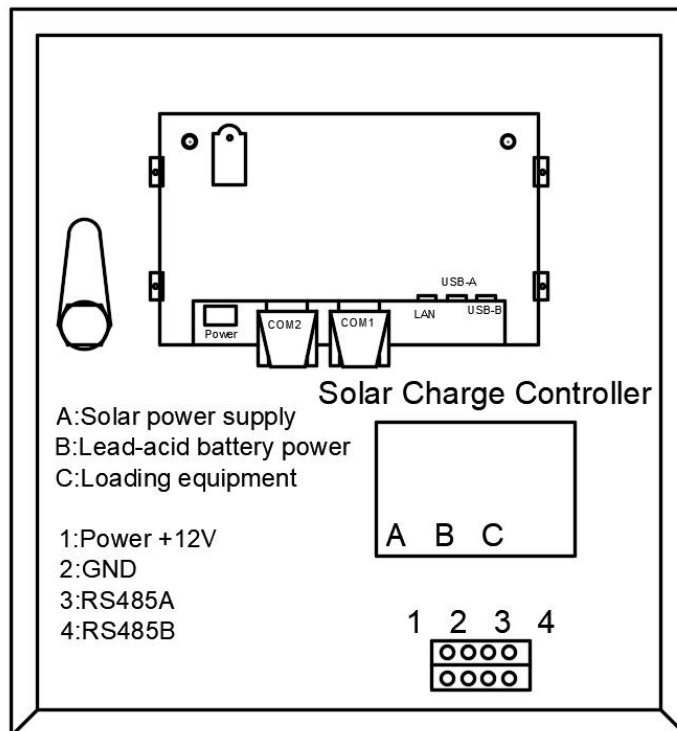
Instructions:

- 1.The datalogger works directly after power-on, without switch.
- 2.Rotating handle: Use this handle to open or lock the inner door.

2 Product Wiring

2.1 Layout

The manual contains instructions for the solar control system. If you have not purchase it, please skip that part.



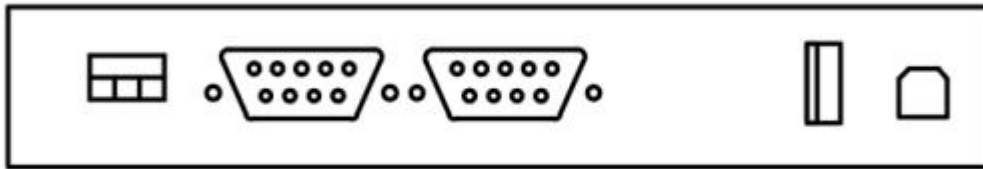
Sensor cable sequence Reference Instructions

If you have any questions, contact Coda.

Note: The power cables cannot be reversed

2.2 Port Description

HMI interface



HMI Power

Com2

Com1

USB-A

USB-B

HMI Power:Power supply.

COM2: Output---RS485(Modbus-rtu,Blue-RS485A,Brown-RS485B).
Connect to the server or computer.

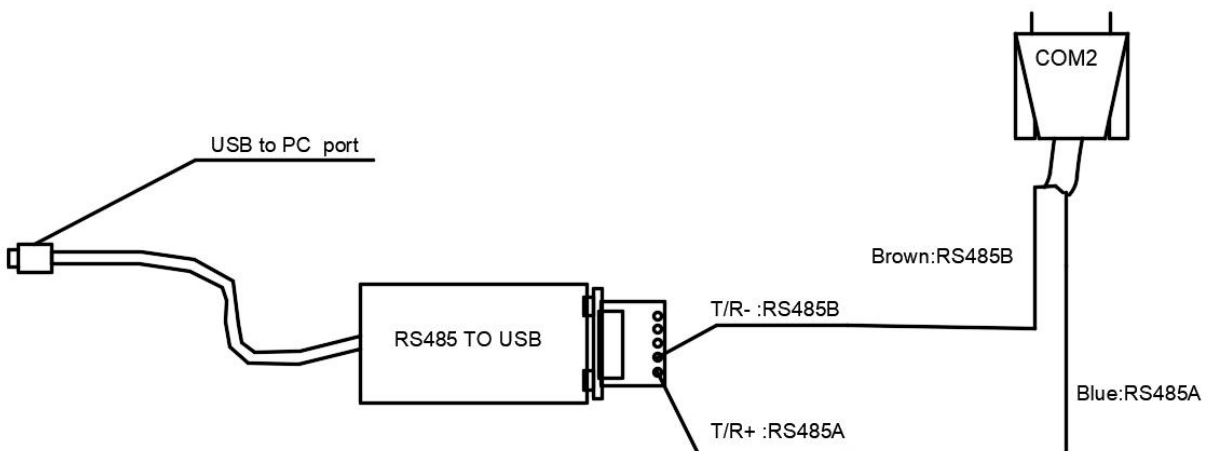
COM1: Input---RS485(Modbus-rtu,Blue-RS485A,Brown-RS485B).
Connect to the sensor.

USB-A:Export data from U disk or Update the HMI program.

USB-B:The programmer downloads the program, the operator does not need to use it.

RS485 to USB converter: to connect COM2 port

(Modbus-RTU Reference Protocol)



HMI Power Indicator

DEVICE STATUS	Green LED(PWR)	Yellow LED (RUN)	Yellow LED (COM)
no power	○	○	○
power on	●		
CPU works fine	●	●	
Communicate with connected devices	●	●	※
○: LED off ●: LED on ※: LED flashes			

2.3 Sensor Wiring

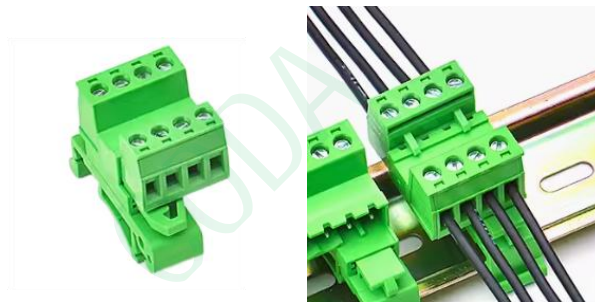
Communicates with the recorder via the 4-core terminal.

Wire: Red: 12VDC

Black: GND

Yellow: RS485A

Green: RS485B



The factory will be connected to the terminal, only need to plug the male connector and the female connector.

2.4 Sensor Power

If you don't choose solar power:

After connecting the terminal, you can use the 12V adapter to supply power directly



Adapter Specification :

Input:AC 100V-240V 50-60Hz

Output:12V 2A

Wire length:1m(Customizable length)

Output Voltage Accuracy:95%

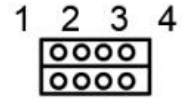
If you choose solar power:

Please first connect the loads,
Then the batteries and the end
Connect solar panels one by one.

A:Solar power supply
B:Lead-acid battery power
C:Loading equipment

1:Power +12V
2:GND
3:RS485A
4:RS485B

Solar Charge Controller



Red : Solar panel charging indicator

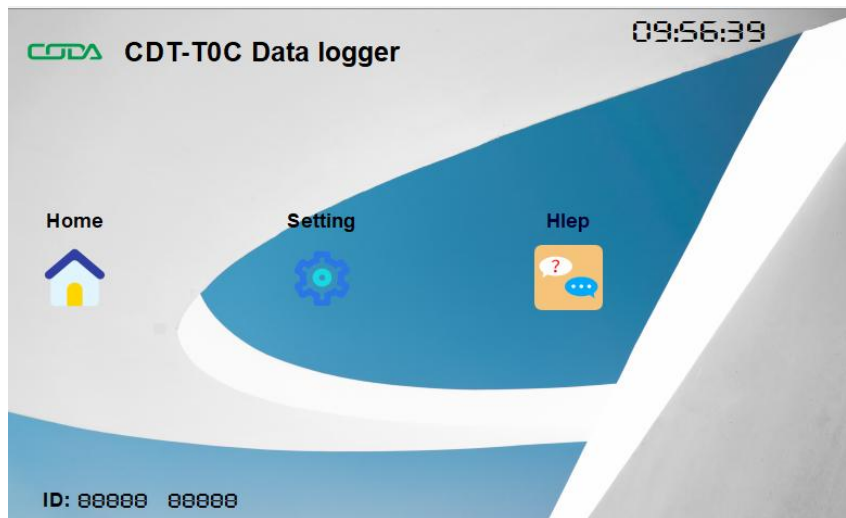
Red/Green color:Battery level indicator

Green: Load status light

LED indicating lamp	Colour	Expression content	State	Function
	Green	Discharge	Light on	Normal output
			Light off	Undervoltage protection No output
	Red/Green	Electric quantity	Blinking red lamp	Battery discharge protection
			Red light on	Battery low
			Green light on	Normal battery power
	Red	Charge	Light on	Charging
			Light off	Cannot charge

3 Recorder Operation

3.1 Main interface



Main interface information:

Home button:

View real-time data, historical data tables and curves, download historical data.

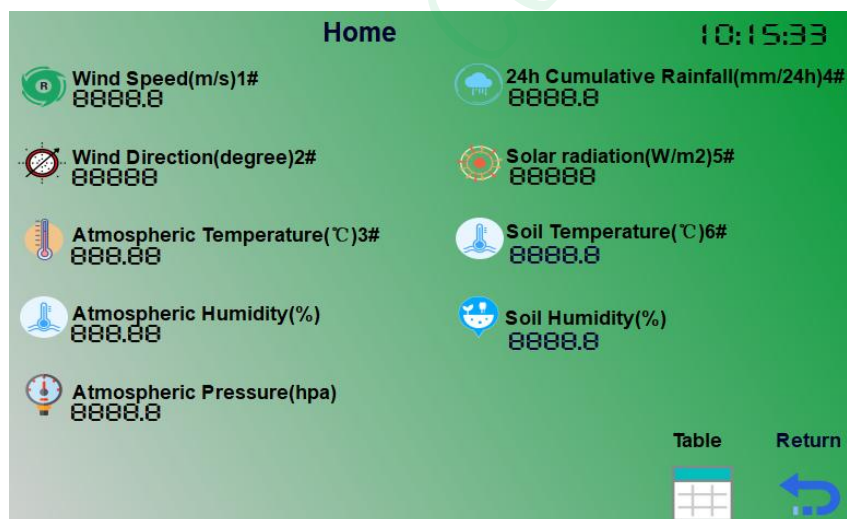
Setting button:

To enter the recorder setting interface

Help button:

Help information can be viewed.

3.2 Home interface

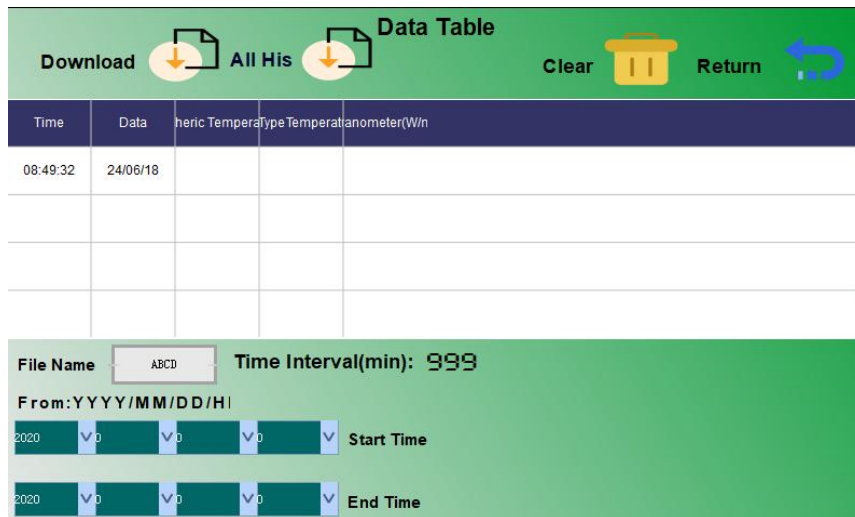


After entering the HOME interface, you can view real-time sensor data.

Table button:

View historical data table.

3.3 Table interface



To download historical data, you need to plug in a USB flash drive.(SCV(Excel) format)

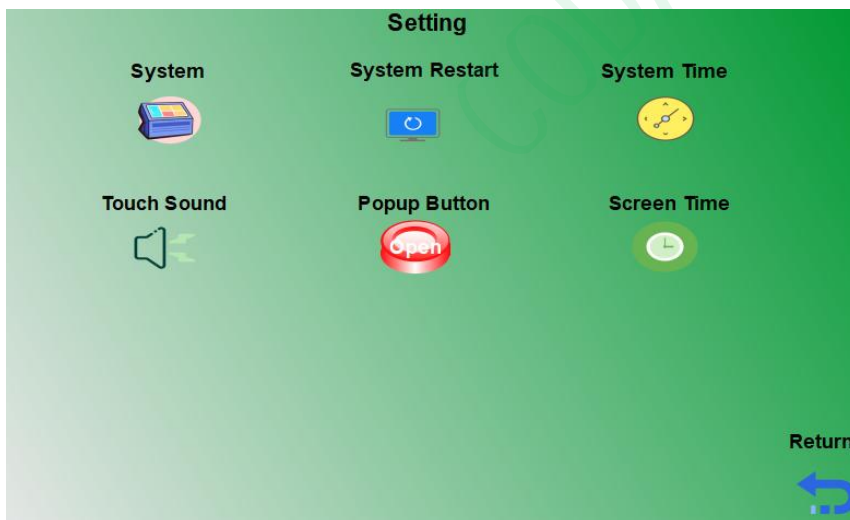
Download button:Download the historical data for the time period of your choice.

All His button:Download historical data for all time periods.

Clear button:Delete all historical data.

Time interval input:Historical data collection interval(min)

3.4 Setting interface



System button:Set system parameters.

System restart button:Restart recorder.

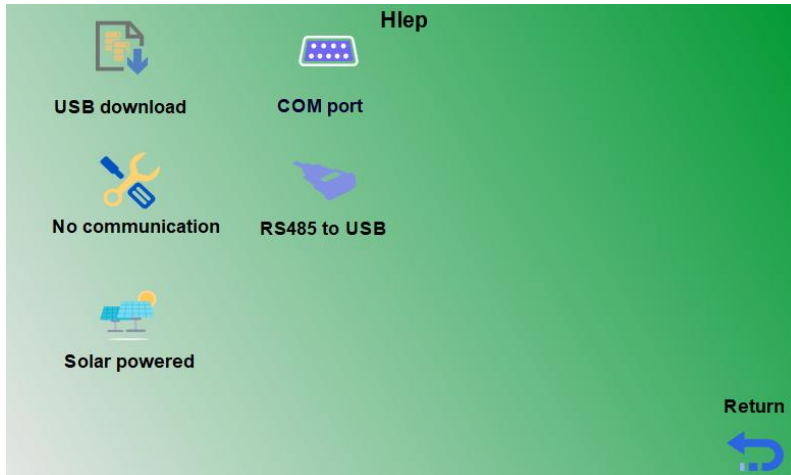
System time button:System time setting.

Touch sound button:Touch sound switch.

Popup button button:Popup close button.

Screen time button:Screen saver time Settings.

3.5 Help interface



USB download button:About U disk download data

Com port button:COM port description.

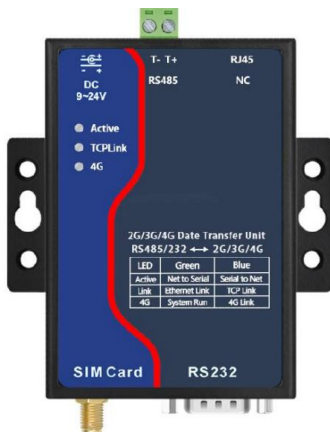
No communication button:No reason for the communication check.

Rs485 to USB button:485 communication.

Solar powered button:Solar power supply introduction.

4 Transmission Module Introduction

4.1 4G/GMS Module



Indicator Light	Green	Blue
Active indicator	The network sends data to the serial port	Serial port sends data to the network
Link indicator	The network cable is connected	Steady blue indicates that the TCP connection has been established
4G indicator	Power indicator	Blinking blue means 4G is dialing, 40 seconds after the system is powered on Start dialing, usually within 10 seconds. Steady blue indicates 4G connection status

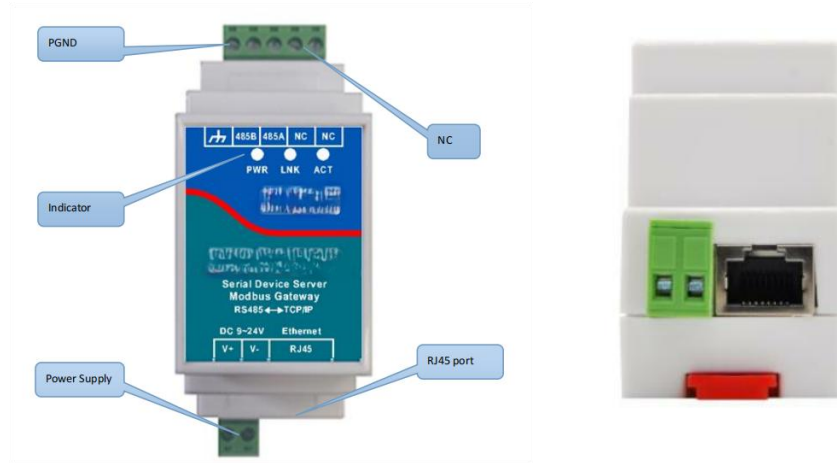
Item	Details
Support mode	B1(Up1920-1980MHz, Down 2110-2170MHz) /B3(Up710-1785MHz,Down 1805-1880MHz) /B5(Up824-849MHz,Down 869-894MHz) /B8(Up880-915MHz,Down 925-960MHz)@FDD LTE B34(Up2010-2025MHz, Down 2010-2025MHz) /B38(Up2570-2620MHz, Down 2570-2620MHz) /B39(Up1880-1920MHz, Down 1880-1920MHz) /B40(Up2300-2400MHz, Down 2300-2400MHz) /B41(Up2496-2690MHz, Down 2496-2690MHz)@TDD-LTE B3(900MHz) /B8(1900MHz)@GSM If the frequency band is not supported, please choose a custom GSM module.
Transmission rate	LTE: Max 10Mbps (downlink)/Max 5Mbps (uplink) GPRS: 85.6Kbps (downlink)/Max85.6Kbps (uplink)
SIM card	Voltage: 3V, 1.8V; size: large card (small card can be purchased with card sleeves)
Antenna interface	50Ω/SMA glue stick antenna or suction cup antenna optional
Serial port type	RS232/RS485
Serial port parameters	Baud rate: 1200~460800bps; data bits: 5~8 bits; stop bits: 1~2 Bit; flow control: hard flow control, soft flow control; parity bit: none, even, odd, mark, space.
Power interface	Q2.1 socket, can be customized as a power terminal block type input.
Input voltage	DC9V~24V
Working current	90mA@12V (150mA@12V when dialing)
Operating temperature	-40 °C~85 °C
Storage temperature	-40 °C~120 °C
Humidity range	0~95% non-condensing
Product Size	Length×width×height=9.4cm×6.5cm×2.5cm
Internet access	2G/3G/4G

4.2 WIFI Module



Figure			
Interface:	485: Terminal; 232; DB9; 422: Terminal		
Power Supply:	Inside positive outside negative, standard outlet; Two lines terminal		
Size:	L x W x H =9.4cm×6.5cm×2.5cm		
Communicate Interface			
Wifi	802.11b/g		
Serial	RS232/485/422×1: RXD, TXD, GND, CTS, RTS		
Serial Parameters			
Baud rate:	1200~115200bps	Parity:	None, Odd, Even, Mark, Space
Data size:	5~9	Flow control:	RTS/CTS, XON/XOFF, NONE
WLAN			
WLAN Standard:	802.11 b/g		
Frequency Range	2.412GHz-2.484GHz		
Transmit Power	802.11b: +20dBm(Max.); 802.11g: +18dBm(Max.);		
Receiving Sensitivity	802.11b: -89dBm; 802.11g: -81dBm;		
Antenna Choice	External: external antenna		
Hardware			
Ethernet	10M/100M		
Power	9~48V, <1W		
Work Temperature	-40~85℃		
Storage Temperature	-45~125℃		
Software			
WLAN Work Mode	STA/AP		
Security Mechanism	WEP/WPA-PSK/WPA2-PSK		
Encryption Type	WEP64/WEP128/TKIP/AES		
Protocol	TCP/UDP/ARP/ICMP/DHCP/DNS/HTTP		
Net communication method:	Socket, virtual serial port		
User Configuration	Web Server, Windows configuration tool ZLVircom		

4.3 Ethernet Module



Power Supply:	terminal		
Size:	L x W x H =8.7cm×3.6cm×5.9cm		
Communicate Interface			
Ethernet:	10M/100M, 2KV surge protection		
Serial	RS485×1: RXD, TXD, GND		
Serial Parameters			
Baud rate:	1200~115200bps	Parity:	None, odd check, even check, mark, space
Data bits:	5~9	Flow control:	None
Software			
protocol:	ETHERNET, IP, TCP, UDP, HTTP, ARP, ICMP, DHCP, DNS		
Setting method :	ZLVirCom, WEB browser, device management library		
Net communication method:	TCP/IP direct communicate, Virtual serial		
Work Mode			
TCP server, TCP client, UDP, Real Com Driver			
Power Requirement			
9~24V DC			

5 CODA Cloud Platform Introduction

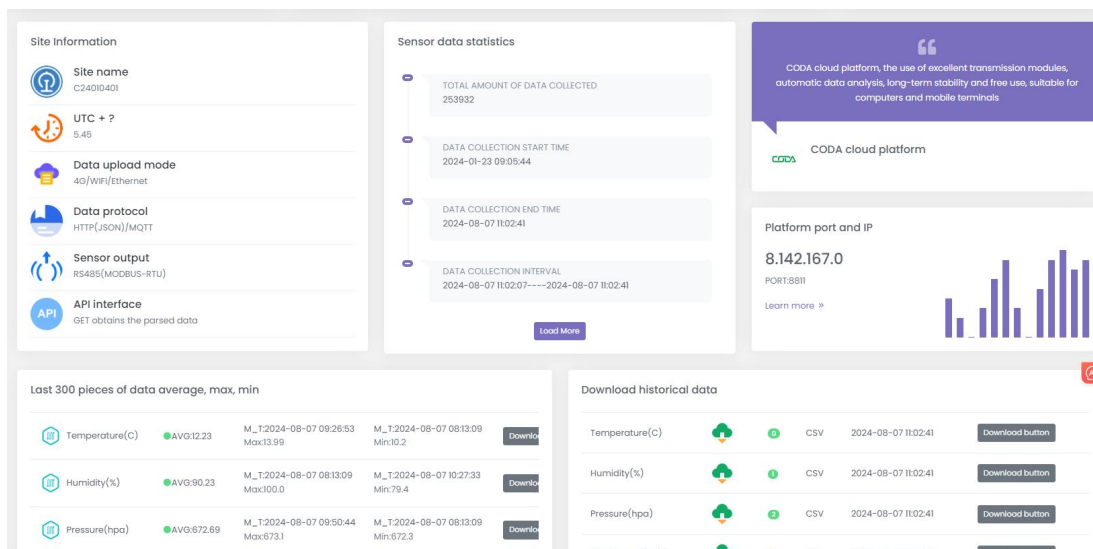
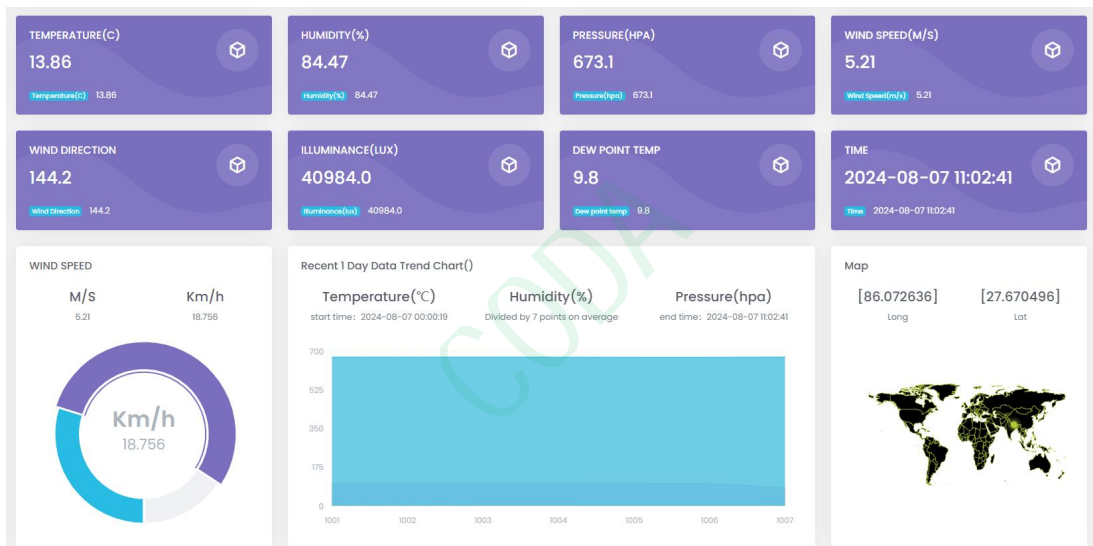
5.1 Login Website

<http://www.codacloud.com.cn:8811/>

Enter the account number and password provided by CODA

5.2 Data Online Display Interface

- Real-time online data display (time interval set by module)
- Meteorological station geographical location display
- Statistics on the maximum and minimum data curve of the current day
- Statistics on the average, maximum, and minimum values of recent data
- Individual weather data elements download



5.3 Historical Data Table (downloadable)

- Export historical data to Excel/PDF
- Column visibility optional element

Data Table

Lexa > Tables > Data Table

The latest 2000 pieces of historical data
To download all historical data, click the button in the upper right corner

Copy Excel PDF Column visibility Search:

Temperature(C)	Humidity(%)	Pressure(hpa)	Wind Speed(m/s)	Wind Direction	Illuminance(lux)	Dew point temp	Time
10.2	100.0	672.3	2.98	225.5	2440.0	10.0	2024-08-07 08:11:50
10.2	100.0	672.3	2.98	225.5	2440.0	10.0	2024-08-07 08:12:24
10.2	100.0	672.3	2.98	225.5	2440.0	10.0	2024-08-07 08:12:58
10.2	100.0	672.3	2.98	225.5	2440.0	10.0	2024-08-07 08:13:32
10.2	100.0	672.3	2.98	225.5	2440.0	10.0	2024-08-07 08:14:06
10.2	100.0	672.3	2.98	225.5	2440.0	10.0	2024-08-07 08:14:40
10.2	100.0	672.3	2.98	225.5	2440.0	10.0	2024-08-07 08:15:14
10.2	100.0	672.3	2.98	225.5	2440.0	10.0	2024-08-07 08:15:48
10.2	100.0	672.3	2.98	225.5	2440.0	10.0	2024-08-07 08:16:22
10.2	100.0	672.3	2.98	225.5	2440.0	10.0	2024-08-07 08:16:56

Showing 1 to 10 of 2,000 entries

Previous 1 2 3 4 5 ... 200 Next

5.4 API Interface Gets The Data

Obtain the current data by POST

The returned data is in list form, sensor name + value Submit IP:8.142.167.0:8811/api/getsensor/ Payload:account

Return data
Data analysis

Sensor name + Sensor value Time 13 bit time stamp(UTC) Station name

Wind Speed(m/s):10.16 1705641846354 @ R*****

GET method

IP:8.142.167.0:8811/api/getsensor/

Payload:account

You can directly output the URL with IP plus parameters

Example:

http://8.142.167.0:8811/api/getsensor/?account=*****

```
[{"Solar radiation(W/m2)": 800}, {"Rain(mm/24h)": 12.5}, {"Rain(mm/min)": 1.2}, {"Time": 1689578292622.0}, {"account": "C23051201"}]
```


- python code
-

```

import requests #import module

payload = {"account":"*****"}#Site parameter

response = requests.get(url="http://8.142.167.0:8811/api/getsensor/", params=payload)
#GET requests

print(response.text)#list and dictionary formats

[{"Solar radiation(W/m2)": 800}, {"Rain(mm/24h)": 12.5}, {"Rain(mm/min)": 1.2}, {"Time": 1689578292622.0}, {"account": "C23051201"}]

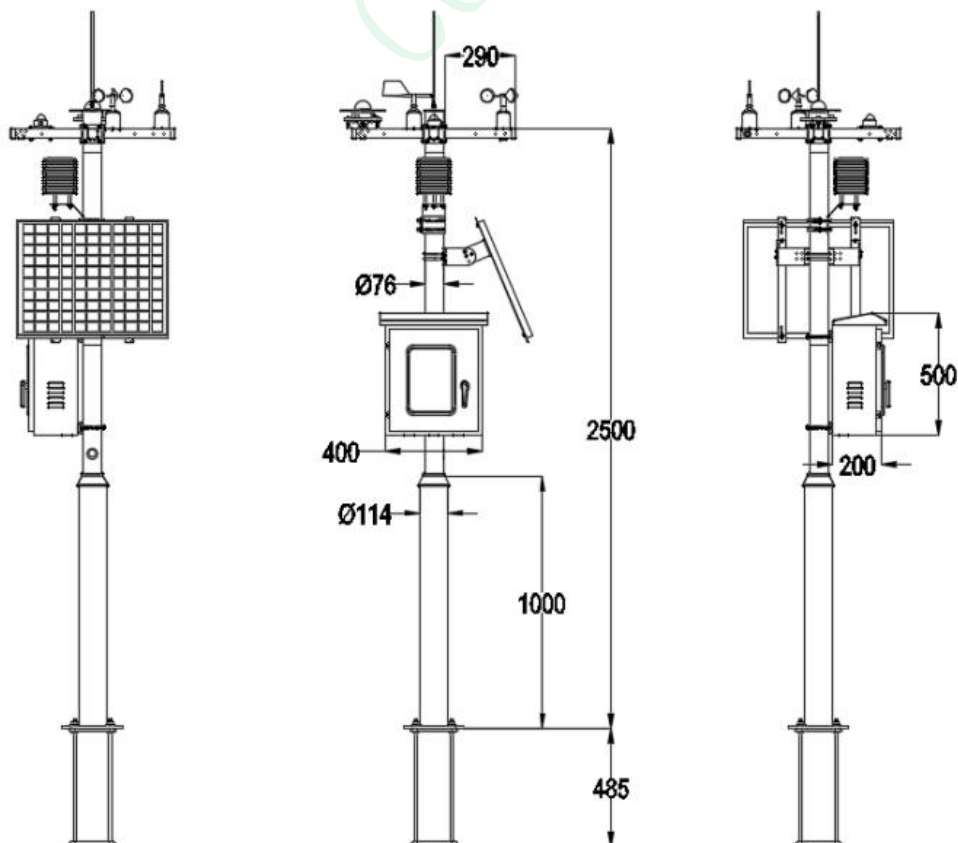
```

6 Weather station support

6.1 2.5m Supporting Rod

In the center of the mounting bracket, dig a rectangular pit with a length of 1 meters and a depth of 0.8 meters.; (Note: one side of the pit is facing the right north, which is convenient for the north adjustment in later installation.)Firstly,

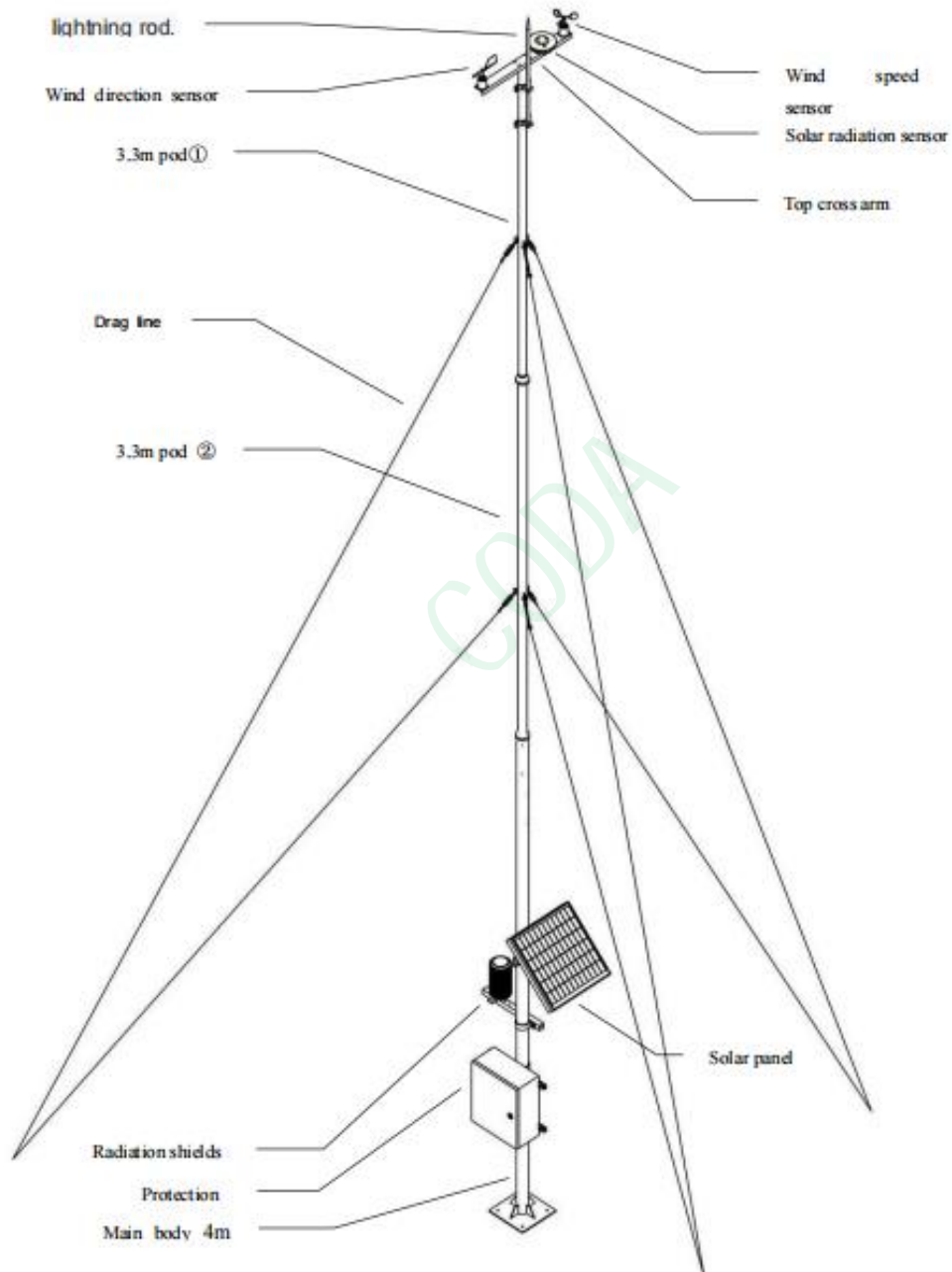
The distribution of the lightning protection net is stud into the foundation, then fix the embedded parts horizontally in the lightning protection network ;finally, pour 800mm deep cement into the pit . Make sure bracket embedded parts horizontal in the process of filling cement.



6.3 10m Supporting Rod

In the center of the mounting bracket, dig a rectangular pit with a length of 1 meters and a depth of 0.8 meters.; (Note: one side of the pit is facing the right north, which is convenient for the north adjustment in later installation.)Firstly,

The distribution of the lightning protection net is stud into the foundation, then fix the embedded parts horizontally in the lightning protection network ;finally, pour 800mm deep cement into the pit . Make sure bracket embedded parts horizontal in the process of filling cement.



7 Weather Station Typical Application

7.1 General Weather Station

Measure item	Measure range	Resolution	Accuracy
Wind speed	0-45m/s	0.1m/s	$\pm (0.3 \pm 0.03V)$ m/s
Wind direction	0-360°	1°	$\pm 3^\circ$
Atmospheric temperature	-50-+100°C	0.1°C	$\pm 0.5^\circ\text{C}$
Atmospheric humidity	0-100%RH	0.1%RH	$\pm 3\%$
Atmospheric pressure	10-1100hPa	0.1hpa	$\pm 0.3\text{hPa}$
Rainfall	0-8mm/min	0.2mm	$\pm 4\%$
Solar radiation	0-2000W/m ²	1W/m ²	$\pm 5\%$

7.2 Photovoltaic Power Generation Weather Station

Measure item	Measure range	Resolution	Accuracy
Wind speed	0-45m/s	0.1m/s	$\pm (0.3 \pm 0.03V)$ m/s
Wind direction	0-360°	1°	$\pm 3^\circ$
Atmospheric temperature	-50-+100°C	0.1°C	$\pm 0.5^\circ\text{C}$
Atmospheric humidity	0-100%RH	0.1%RH	$\pm 3\%$
Atmospheric pressure	10-1100hPa	0.1hpa	$\pm 0.3\text{hPa}$
Photovoltaic panels temperature sensor	-50-+100°C	0.1°C	$\pm 0.5^\circ\text{C}$
Total solar radiation	0-2000W/m ²	1W/m ²	$\pm 3\%$
Rainfall(optional)	0-8mm/min	0.2mm	$\pm 4\%$
Hall current sensor(optional)	0-500V	1V	$\pm 0.5\%$
Hall voltage sensor(optional)	0-150A	0.1A	$\pm 0.5\%$

7.3 Agricultural Weather Station

Measure item	Measure range	Resolution	Accuracy
Wind speed	0-45m/s	0.1m/s	$\pm (0.3 \pm 0.03V)$ m/s
Wind direction	0-360°	1°	$\pm 3^\circ$
Atmospheric temperature	-50-+100°C	0.1°C	$\pm 0.5^\circ\text{C}$
Atmospheric humidity	0-100%RH	0.1%RH	$\pm 3\%$
Atmospheric pressure	10-1100hPa	0.1hpa	$\pm 0.3\text{hPa}$
Solar radiation	0-2000W/m ²	1W/m ²	$\pm 5\%$
PAR sensor	0-2500 $\mu\text{mol}^*\text{m}^2*\text{s}$	1 $\mu\text{mol}^*\text{m}^2*\text{s}$	$\pm 1\%$
Rainfall	0-8mm/min	0.2mm	$\pm 4\%$
Soil temperature	-50-+80°C	0.1°C	$\pm 0.5^\circ\text{C}$
Soil moisture	0-100%	1%	$\pm 3\%$
CO ₂ (optional)	0-5000ppm	1ppm	$\pm 3\%$
Soil PH(optional)	0-14PH	0.1PH	$\pm 0.1\text{PH}$
Soil salinity(optional)	0-15000mg/L	1mg/L	$\pm 5\%$
Soil EC(optional)	0-20mS/cm	0.1mS/cm	$\pm 5\%$

7.4 Greenhouse Comprehensive Monitoring Station

Measure item	Measure range	Resolution	Accuracy
Wind speed	0-45m/s	0.1m/s	$\pm (0.3 \pm 0.03V)$ m/s
Wind direction	0-360°	1°	$\pm 3^\circ$
Atmospheric temperature	-50-+100°C	0.1°C	$\pm 0.5^\circ\text{C}$
Atmospheric humidity	0-100%RH	0.1%RH	$\pm 3\%$
Atmospheric pressure	10-1100hPa	0.1hpa	$\pm 0.3\text{hPa}$
Rainfall	0-8mm/min	0.2mm	$\pm 4\%$
Uv radiation	0-200W/m ²	1W/m ²	$\pm 5\%$
Ground temperature	-50-+80°C	0.1°C	$\pm 0.5^\circ\text{C}$

7.5 Scenic Area Weather Station

Measure item	Measure range	Resolution	Accuracy
Wind speed	0-45m/s	0.1m/s	$\pm (0.3 \pm 0.03V)$ m/s
Wind direction	0-360°	1°	$\pm 3^\circ$
Atmospheric temperature	-50-+100°C	0.1°C	$\pm 0.5^\circ\text{C}$
Atmospheric humidity	0-100%RH	0.1%RH	$\pm 3\%$
Atmospheric pressure	10-1100hPa	0.1hpa	$\pm 0.3\text{hPa}$
Rainfall	0-8mm/min	0.2mm	$\pm 4\%$
Uv radiation	0-200W/m ²	1W/m ²	$\pm 5\%$
Ground temperature	-50-+80°C	0.1°C	$\pm 0.5^\circ\text{C}$

8 Weather Station Protocol

8.1 MODBUS RTU Communication Protocol

COM2 Port Protocol

You do not need to read this protocol if you choose to send data to the cloud platform

Baud Rate: 9600

Data Bits: 8

Stop Bit: 1

Check Bit: None

Blue:RS485A Brown:RS485B

1.1 CRC Instruction:

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

In the following instructions, the assumed com2 port address is 0x01

1.2 Standard MODBUS register declaration

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.

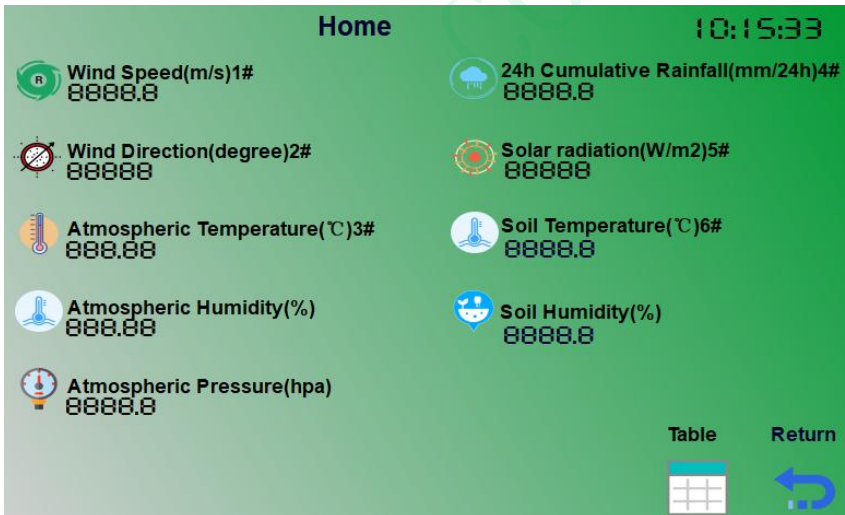
User shall ensure in command, the address and quantity of register, are within the range specified by the system. Otherwise, the output of the sensor will be unpredictable.

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

Example:

The HMI data display screen is as follows(**The sequence starts from the top left**)



Address	Operation	Contents	Note
0x0001	Read-only	Wind Speed, a hexadecimal number amplified by 10 times, such as 0x002B, means 43/10=4.3 m/s	
0x0002	Read-only	Wind Direction, a hexadecimal number amplified by 1 times, such as 0x0109, means 265=265 °	
0x0003	Read-only	Air Temperature, a hexadecimal number amplified by 100 times, such as 0x0934, means 2356=235/100=23.56 °C	

0x0004	Read-only	Air Humidity, a hexadecimal number amplified by 100 times, such as 0x1984, means $6532=6532/100=65.32\%$	
0x0005	Read-only	Air Pressure, a hexadecimal number amplified by 10 times, such as 0x2475, means $10053=10053/10=1005.3\text{ hpa}$	
0x0006	Read-only	24h Rainfall, a hexadecimal number amplified by 10 times, such as 0x0069, means $105=105/10=10.5\text{ mm}/24\text{h}$	
0x0007	Read-only	Solar Radiation, a hexadecimal number amplified by 1 times, such as 0x0380, means $896=896\text{ W}/\text{m}^2$	
0x0008	Read-only	Soil Temp, a hexadecimal number amplified by 10 times, such as 0x00B9, means $185=185/10=18.5\text{ }^\circ\text{C}$	
0x0009	Read-only	Soil Humi, a hexadecimal number amplified by 10 times, such as 0x027B, means $635=635/10=63.5\%$	

Send: 01 03 00 00 00 09 85 CC

01	03	00 00	00 09	85 CC
System Address	Function Code	Register Address	Number of Registers	CRC16 check digit automatically generated by software

Answer:

01 03 12 00 2B 01 09 09 34 19 84 24 75 00 69 03 80 00 B9 02 7B CRC CRC

01	03	12	00 2B 01 09 09 34 19 84 24 75 00 69 03 80 00 B9 02 7B	CRC CRC
System Address	Function Code	The number of bytes in a data segment	Segment Data	CRC16 check bit

All data is in hexadecimal format

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