ATMITRO®

ATMITRO Compact Weather Station

User Manual

Intelligent sensors and solution Related to Sun, Air, Soil and Water !

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Chapter 1 About this document

1.1 Version Information

Version	Date	Revision Notes
V1.0	2026-04	Initial release

1.2 Related Manuals

This manual is ATMITRO User manual for the compact weather station (XF-80X series). For any questions , please contact your dedicated sales representative :

1.3 Documentation Conventions

This manual uses the following notation conventions:

Label	Meaning
Warn	**Failure to comply with these instructions may result in equipment damage or personal injury. Please be sure to follow them strictly.**
Notice	**Key operational points that require special attention should not be overlooked, as neglecting them may affect equipment performance or measurement accuracy.**
Hint	**Suggestions and instructions to help you use this product better and more efficiently**

1.4 Trademarks and Copyrights

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Chapter 2 Product Introduction

2.1 Product Overview

ATMITRO The compact weather station (XF-80X series) is a highly integrated instrument designed for meteorological monitoring needs in multiple fields. It adopts an integrated structural design and can simultaneously achieve 24-hour continuous online monitoring of eight meteorological parameters: atmospheric temperature, air humidity, wind speed, wind direction, atmospheric pressure, rainfall, illuminance, and total radiation. All data can be output at once through a digital communication interface.

The product uses ultrasonic wind measurement technology and radar rainfall measurement technology. It has no moving parts, requires little maintenance, and is suitable for long-term unattended operation scenarios.

Application areas:

Meteorological monitoring, micro-environmental monitoring, grid-based environmental monitoring, agricultural meteorological monitoring, traffic meteorological monitoring, photovoltaic environmental monitoring, wind power meteorological monitoring

Features:

- Miniaturized, integrated design for easy installation
- High integration, eight parameters output per device
- Ultrasonic wind measurement, no moving parts, maintenance-free.
- Radar rain measurement, real-time rainfall monitoring
- The radiation shield uses a special heat insulation process.
- Supports extended parameter measurement
- Standard RS485 / Modbus RTU interface
- Free accompanying host computer software (XF_PcSoftV1.5)

2.2 Product Technical Parameters

Monitoring parameters	Measurement range	Accuracy	Resolution	Sampling frequency
Air temperature	-40-85℃	±0.3℃ (@25℃)	0.01℃	1 Hz
Air humidity	0-100%RH	±3%RH (10%~80%RH, no condensation)	0.01%RH	1 Hz
Wind speed	0-60 m/s	±(0.5+0.05V) m/s V represents the wind tunnel calibration wind speed (m/s).	0.01 m/s	4 Hz
Wind direction	0-359.9°	±5° (@10 m/s)	0.1°	4 Hz
Atmospheric pressure	500-1100 hPa	±0.5 hPa (@25℃, 950~1100 hPa)	0.1 hPa	1 Hz
Rainfall	0-200 mm/h	±10% (wind speed ≤ 5 m/s)	0.01 mm	1 Hz
Illumination	0-100 Klux	±3% FS	10 Lux	1 Hz
Total radiation	0-1500 W/㎡	±5%	1 W/㎡	1 Hz

Overall parameters	Specification
Operating temperature	-20℃ ~ 60℃
Output interface	RS485, Modbus RTU
Maximum output frequency	Passive mode: 1 time/second; Active mode: 1 time/minute
Power supply voltage	DC 9 ~ 24V (DC 12V recommended)
Protection level	IP65
Fixing method	Sleeve type (standard); flange type, bent plate type (optional)
Standard cable	3 meters (10 meters optional)

Note: Specifications are subject to change without notice. Please refer to the actual product and the latest manual for accurate information.

2.3 Product Selection Table

	XF-802	XF-805	XF-806	XF-808
Air temperature		☑	☑	☑
Air humidity		☑	☑	☑
Wind speed	☑	☑	☑	☑
Wind direction	☑	☑	☑	☑
Atmospheric pressure		☑	☑	☑

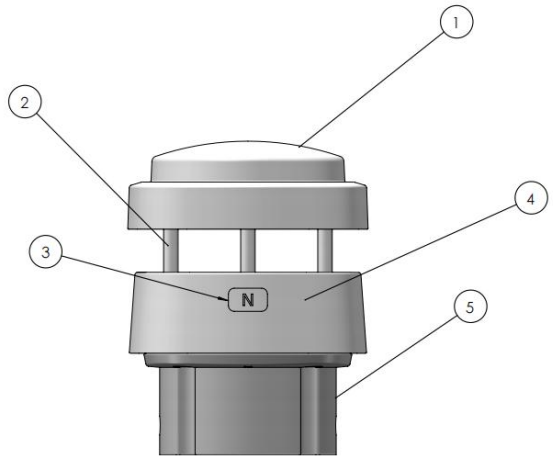
Rainfall			☑	☑
Illumination				☑
Total radiation				☑

2.4 Components

The standard packaging includes the following components; please check them one by one upon receipt:

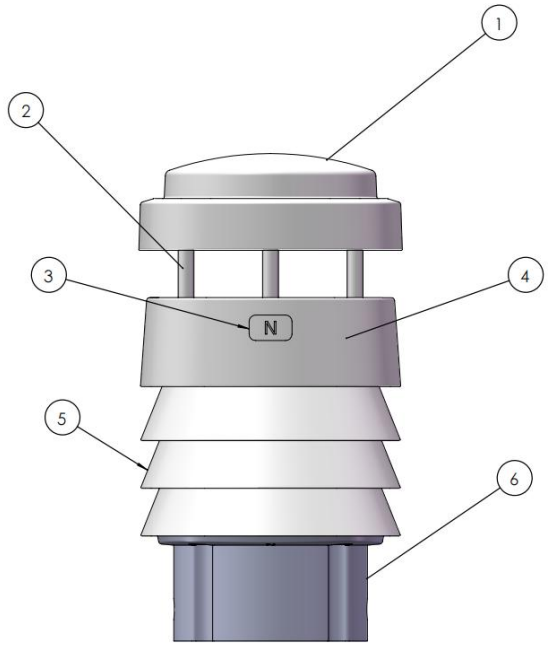
No.	Component Name	Quantity	Illustrate
1	Compact weather station main unit	1 unit	XF-80X series
2	Communication cables	1 root	Standard configuration: 3 meters, including aviation connector
3	Fixing screws	4	M6 is used for fixing the seat and locking.

Note: If you selected flanges, extension cables, or pole supports when ordering, please also check that all optional accessories are included. If any are missing or damaged, please contact sales personnel within 48 hours of receiving the goods.



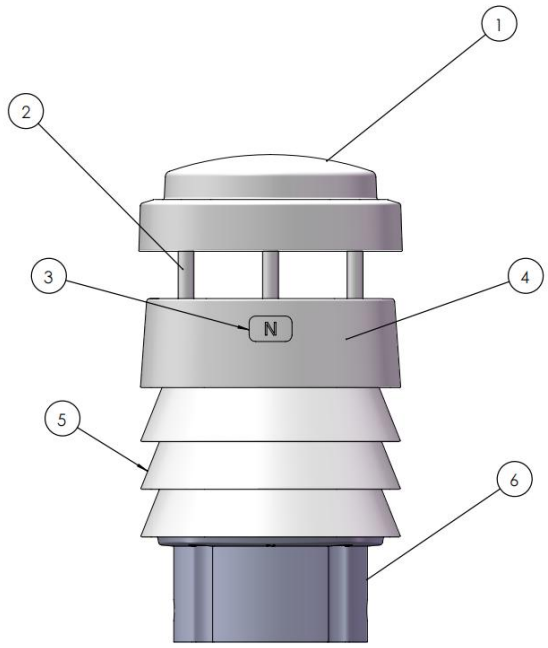
XF802

1. **Sensor Top**
2. **Conduit for wiring**
3. **North Indicating Markings**
4. **Wind Measurement Section**
5. **Installation of the fixing base**



XF805

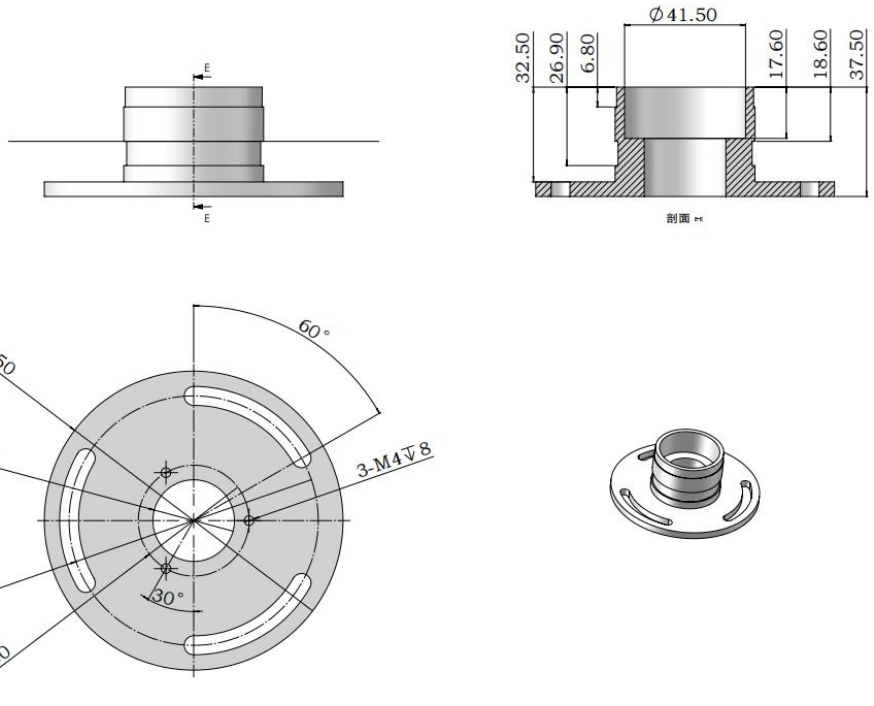
1. **Sensor Top**
2. **Conduit for wiring**
3. **North Indicating Markings**
4. **Wind Measurement Section**
5. **Radiation Protection Cover**
6. **Installation of the fixing base**



XF806/808

1. **Rainfall/Radiation and Light Measurement Section**
2. **Conduit for wiring**
3. **North Indicating Markings**
4. **Wind Measurement Section**
5. **Radiation Protection Cover**
6. **Installation of the fixing base**

Installation kit

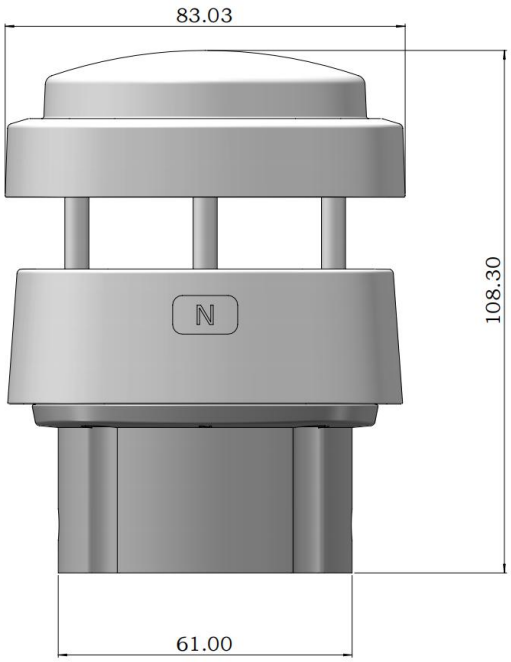


Optional flanges are available to accommodate different installation methods.

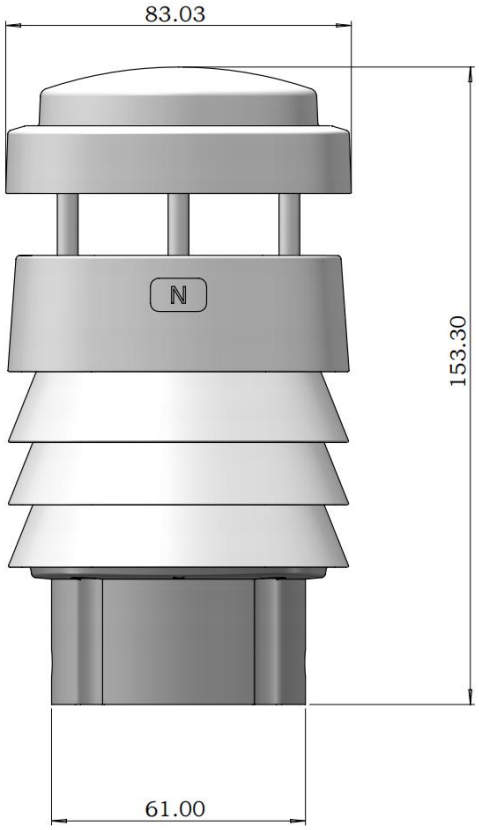
2.5 Product Dimensions

2.5.1 Product appearance size diagram

XF802



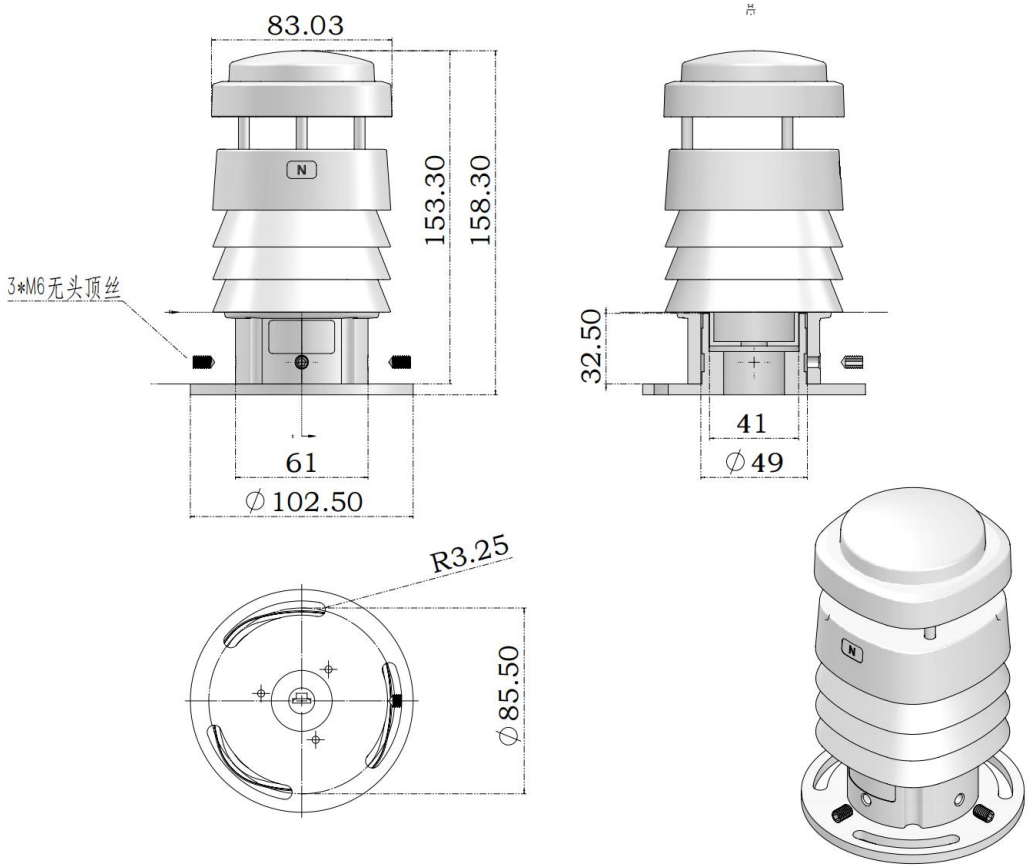
XF805/XF806/XF808



Main dimensions and weight reference:

Model	Size items	Numerical values
XF802	Overall height	108.3 mm
	Overall diameter	83.03 mm
	Inner diameter of mounting bracket	49 mm
XF805/XF806/XF808	Overall height	153.3 mm
	Overall diameter	83.03 mm
	Inner diameter of mounting bracket	49 mm

2.5.2 Product Installation Dimensions



2.6 Supporting host computer software

XF_PcSoftV1.5 is a host computer reading software specifically for the XF-80X series compact weather stations. It runs on the Windows operating system and its main functions include:

- Real-time reading and display of eight meteorological parameters
- Supports data recording and export
- Supports configuration of communication parameters such as device address and baud rate.
- Supports sensor drift calibration operation

Note: Please obtain the XF_PcSoftV1.5 installation package from your dedicated sales representative or download it from www.nong-iot.com .

Chapter 3 Introduction to Principles

3.1 Wind Measurement Principle

The XF-80X series uses ultrasonic wind measurement technology, which arranges three ultrasonic probes at equal intervals on a horizontal plane. By measuring the phase change of ultrasonic waves propagating between each group of probes, wind speed and wind direction are inverted, without any mechanical rotating parts.

The specific principle is as follows: When the ambient wind speed is zero, the phase change of the ultrasonic wave along each path is zero; when there is wind, the propagation speed of the sound wave in the downwind direction increases, and the phase change decreases, while

the opposite is true in the upwind direction. The sensor collects the phase change on the three paths, and after trigonometric function calculations, it obtains the horizontal wind speed and wind direction, and can simultaneously output multiple data such as instantaneous wind speed, instantaneous wind direction, average wind speed, and average wind direction.

Note: Ultrasonic wind measurement has no mechanical wear, making it suitable for long-term unattended scenarios.

3.2 Rainfall Measurement Principle

The XF-80X series uses a small 24 GHz radar module to achieve real-time rainfall measurement. The radar module continuously emits electromagnetic waves into the air and receives the reflected signals from raindrops. It uses the Doppler effect to calculate the falling velocity and particle size distribution of the raindrops, and then calculates the real-time rainfall amount and intensity.

Compared with traditional tipping bucket rain gauges, radar rainfall measurement has the following advantages:

- Without a mechanical tipping structure, it is unaffected by blockages or evaporation.
- Real-time output of rainfall intensity, fast response speed
- It can maintain high measurement accuracy in low rainfall scenarios.

Note: Under strong wind conditions (wind speed > 5 m/s), the raindrop trajectory may be deflected, which may have a certain impact on the rainfall measurement results. For accuracy, please refer to the notes in the parameter table in Chapter 2.

Chapter 4 Installation Guide

4.1 Unpacking and Inspection

The equipment is usually shipped via express delivery. After receiving the goods, please follow the steps below to open and inspect the package:

1. Check the outer packaging for any obvious damage or deformation. If any abnormalities are found, please take photos for record-keeping before opening the box.
2. Refer to the component list in Section 2.4 to check whether all items in the box are complete.
3. Check that the main unit of the equipment is in good condition, and that the connectors and cables are undamaged.
4. Check that the retaining sleeve and screws are complete.

Note: If any missing or damaged items are found, please contact the sales staff within 48 hours of receiving the goods and provide photos for record-keeping so that the issue can be addressed promptly.

4.2 Installation Location Selection

The choice of installation location directly affects the representativeness and accuracy of the measurement data. Please follow these principles:

1. Choose an open and representative location to avoid local microclimate interference.
2. The horizontal distance between the equipment and surrounding obstacles (buildings, trees, etc.) should be no less than 10 times the height of the obstacle.
3. Avoid installing near sources of strong electromagnetic interference (such as high-voltage lines, high-power motors, radar equipment, etc.) to prevent affecting communication stability.
4. Avoid installing near heat sources or strong radiators (such as air conditioner outdoor units, metal roofs, etc.) to prevent affecting the accuracy of temperature, humidity, and radiation measurements.

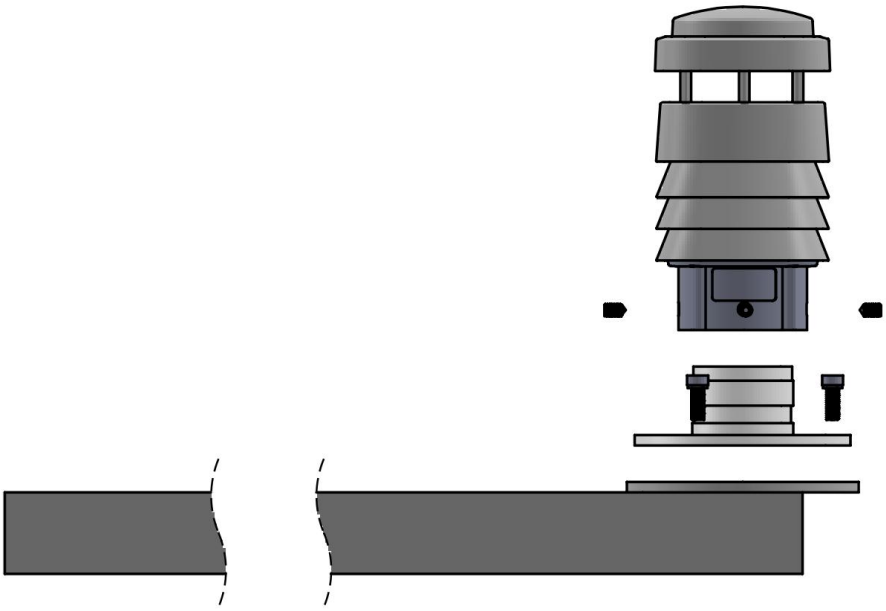
5. The installation height should follow local meteorological observation standards, generally 1.5 to 10 meters above the ground.

Note: If used for agricultural meteorology or photovoltaic power station monitoring, it is recommended to install the equipment at the same height as the crop canopy or module to obtain more representative microclimate data.

4.3 Mechanical Installation

4.3.1 Flange Installation

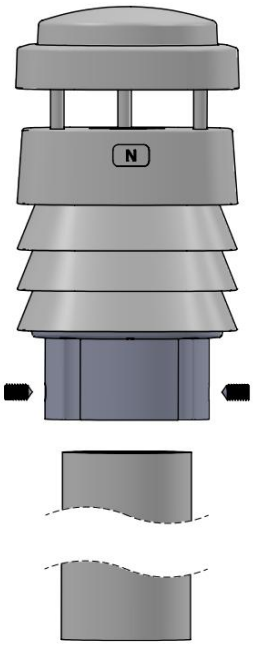
1. Align the optional flange with the mounting holes on the crossarm and secure it with M6 screws.
2. Place the main unit of the equipment on the flange and adjust its orientation so that **the north indicator on the machine body points to true north.**
3. Tighten the three fixing screws on the mounting base evenly to ensure the equipment is level and free from wobbling.



Note: The accuracy of the north direction directly affects the measurement results of the wind direction data. It is recommended to use a compass or mobile phone compass for calibration during installation.

4.3.2 Direct installation of uprights

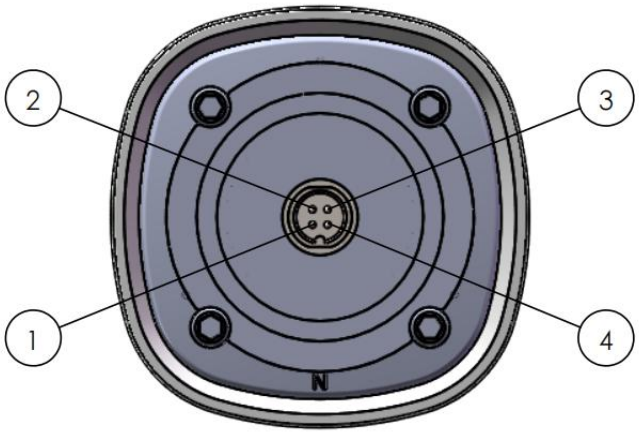
1. Insert the main unit of the equipment onto the pole and adjust its orientation so that **the north marker points due north.**
2. Tighten the three fixing screws on the mounting base evenly to ensure the equipment is stable and does not wobble.
3. Confirm that the entire equipment is level.



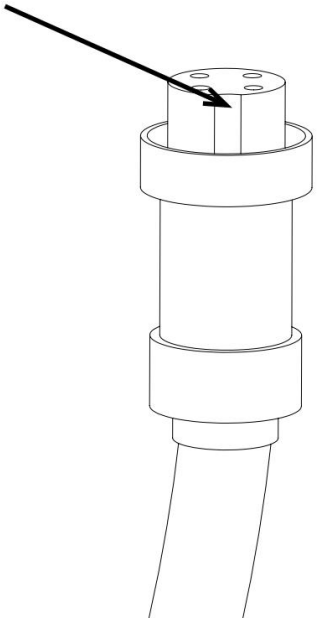
Note: The diameter of the upright must be within the range of the equipment fixing sleeve. Please refer to the installation dimension diagram in Section 2.5.2 to confirm the matching size before installation.

4.4 Electrical Connections

4.4.1 Interface wiring diagram



1. Power Supply Positive Terminal
2. Power Supply Negative Terminal
3. RS485A
4. RS485B



The equipment comes standard with an aviation connector. When connecting, please align the groove of the male connector with the protrusion of the female connector and insert it. Then tighten the screw clockwise to ensure a reliable seal at the interface.

4.4.2 Wiring Definition

Cable color	Definition	Specifications
Red	Positive power supply	DC 9 ~ 24V, DC 12V recommended
Black	Negative power supply	—
Yellow	RS485 A	—
Blue	RS485 B	—

Warning: Ensure the power supply is disconnected before wiring. Do not operate while the power is on. Do not reverse the positive and negative terminals of the power supply, as this may cause permanent damage to the equipment. Do not short-circuit or connect the RS485 A/B lines incorrectly to avoid communication problems.

Chapter 5 Power and Communication Management

5.1 Power Requirements

Voltage range and power consumption

The XF-80X series supports wide voltage DC power supply. Specific parameters are as follows:

Parameter	Specification
Power supply voltage range	DC 9 ~ 24V
Recommended power supply voltage	DC 12V
Typical power consumption	XF802/XF805:<0.2W;XF806/XF808: <0.4W
Power ripple requirements	≤ 200 mV

Warning: The power supply voltage must not exceed DC 24V. Overvoltage may cause permanent damage to the equipment. It is recommended to install a suitable surge protection device in the power supply line, especially for long-term outdoor deployment scenarios.

Note: If using a solar power system, it is recommended to configure a battery pack to ensure continuous power supply at night and on cloudy days. The controller output voltage must be stable within the range of DC 9 ~ 24V.

5.2 Communication Interface Configuration

5.2.1 Modbus RTU Parameters

The device's default communication parameters are as follows:

Parameter	Default value	Configurable range
Device address	0xFF	0x01 ~ 0xFE
Baud rate	9600 bps	2400 / 4800 / 9600 / 19200 / 38400 / 57600 / 115200
Data bits	8-bit	—
Stop bit	1 person	—
Check bit	none	—

Note: Baud rate changes must be executed via Modbus write commands and will take effect immediately. The host computer must be synchronized to the same baud rate for communication to continue. Non-professionals should not arbitrarily change the baud rate to avoid communication interruption. See Section 6.3.7 for specific modification commands .

5.2.2 Data Frame Format

The XF-80X series uses the standard Modbus RTU frame format, and the data frame structure is as follows:

Fields	Length	Illustrate
Device address	1 byte	Identify target device
Function code	1 byte	03: Read input register; 06: Write single register
Register address	2 bytes	High byte first, low byte last
Number of data/registers	2 bytes	High byte first, low byte last
CRC16 check	2 bytes	Low byte first, high byte last

Note: The CRC16 check byte order is the reverse of the register address byte order, with the low byte first and the high byte last. Please pay attention to this distinction during host computer development to avoid check errors.

5.3 Wiring Diagram

5.3.1 Power and Communication Terminal Definitions

Typical wiring methods are as follows:

Device side	Connected to
Red (positive power supply)	DC power supply positive output terminal
Black (negative power supply)	DC power supply negative output terminal
Yellow (RS485 A)	Host computer/data acquisition unit RS485 A terminal
Blue (RS485 B)	Host computer/data acquisition unit RS485 B terminal

5.3.2 Shielding and Grounding Treatment

In outdoor long-distance cabling scenarios, the following shielding and grounding measures are recommended to ensure communication stability:

1. Shielded twisted pair (STP) cable is used as the RS485 communication cable, with the shield grounded at one end.
2. The RS485 bus is recommended to use a daisy-chain topology, avoiding star connections.
3. It is recommended to install a 120Ω terminating resistor at each end of the bus, especially when the communication distance exceeds 100 meters or the number of nodes is large.
4. It is recommended that the equipment installation pole be properly grounded for lightning protection, and the grounding resistance should not exceed 4Ω.
5. When laying cables in conduits, high-voltage and low-voltage cables should be run in separate conduits with a spacing of not less than 200 mm.

Warning: Outdoor wiring must be properly waterproofed. All joints and junction boxes must meet the corresponding protection level requirements to avoid damage to equipment or wiring due to water ingress.

Chapter 6 Communication Protocol

6.1 Communication Parameters

The XF-80X series uses the standard Modbus RTU protocol, and the factory default communication parameters are as follows:

Parameter	Default value
Baud rate	9600 bps
Data bits	8-bit
Stop bit	1 person
Check bit	none
Device address	0xFF

6.2 Agreement Description

6.2.1 CRC Description

This protocol uses the Modbus standard CRC16 checksum algorithm. The CRC16 checksum is 2 bytes, with the low byte first and the high byte last, as per Modbus specifications. The host computer must calculate and append a correct CRC16 checksum before sending each instruction; the device will not respond to instructions with incorrect checksums.

6.2.2 Error Code Specification

The device handles all erroneous commands (including CRC16 checksum errors) without returning an error code. If the host computer does not receive a return data within 200 ms after the command is sent, it can determine that the command transmission has failed and can resend the command.

6.2.3 Standard Modbus Register Description

Note: In Modbus instructions, register addresses and quantities are in 2-byte (16-bit) units, with the high byte first and the low byte last, not in single-byte (8-bit) units. Register addresses and quantities must be within the range specified in this manual; otherwise, the device output will be unpredictable. The system supports a minimum polling cycle of 1 second.

Input register (Function code 03 Read)

Register address	Operate	Content	Conversion Explanation
0x0001-0x0008	Read-only	Reserve	—
0x0009	Read-only	Air temperature	Original value ÷ 100 − 40, unit: °C. For example, 0x1B00 = 6912, 6912 ÷ 100 − 40 = 29.12 °C.
0x000A	Read-only	Air humidity	Original value ÷ 100, unit: %RH. For example, 0x1603 = 5635, 5635 ÷ 100 = 56.35%RH
0x000B	Read-only	Atmospheric pressure	Original value ÷ 10, unit hPa. For example, 0x2784 = 10116, 10116 ÷ 10 = 1011.6 hPa
0x000C	Read-only	Wind speed	Original value ÷ 100, unit: m/s. For example, 0x0125 = 293, 293 ÷ 100 = 2.93 m/s
0x000D	Read-only	Wind direction	Original value ÷ 10, unit: degrees, north is 0°. For example, 0x0C14 = 3092, 3092 ÷ 10 = 309.2°
0x000E	Read-only	Cumulative rainfall	Original value ÷ 100, unit: mm. For example, 0x0016 = 22, 22 ÷ 100 = 0.22 mm.
0x000F	Read-only	Total radiation	The original value is the radiation intensity, measured in W/m². For example, 0x0172 = 370 W/m².
0x0010	Read-only	Illumination	Original value ÷ 100, unit: Klux. For example, 0x0123 = 291, 291 ÷ 100 = 2.91 Klux.
.....			
0x0015	Read-only	Average wind speed	Original value ÷ 100, unit: m/s. For example, 0x0125 = 293, 293 ÷ 100 = 2.93 m/s
0x0016	Read-only	Average wind direction	Original value ÷ 10, unit: degrees, north is 0°. For example, 0x0C14 = 3092, 3092 ÷ 10 = 309.2°

6.3 Communication Example

6.3.1 Reading multiple input registers (5 real-time data)

Send: FF 03 00 09 00 05 40 15

Fields	FF	03	00 09	00 05	40 15
Meaning	Device address	Function code	Register start address	Number of registers read	CRC16 check

Return: FF 03 0A 1A 57 0C 5F 27 83 00 11 0C 14 30 1C

Fields	FF	03	0A	1A 57 0C 5F 27 83 00 11 0C 14	30 1C
Meaning	Device address	Function code	Data bytes	Data segment	CRC16 check

Data Analysis:

Raw data	Conversion process	Result
0x1A57 = 6743	6743 ÷ 100 − 40	Temperature = 27.43℃
0x0C5F = 3167	3167 ÷ 100	Humidity = 31.67%RH
0x2783 = 10115	10115 ÷ 10	Atmospheric pressure = 1011.5 hPa
0x0011 = 17	17 ÷ 100	Wind speed = 0.17 m/s
0x0C14 = 3092	3092 ÷ 10	Wind direction = 309.2°

6.3.2 Reading a single input register

The following example reads wind speed data (register address 0x000C):

Send: FF 03 00 0C 00 01 51 D7

Fields	**FF**	**03**	**00 0C**	**00 01**	**51 D7**
Meaning	Device address	Function code	Register address	Number of registers	CRC16 check

Return: FF 03 02 01 25 XX XX

Fields	**FF**	**03**	**02**	**01 25**	**XX XX**
Meaning	Device address	Function code	Data bytes	Data segment	CRC16 check

Data analysis: 0x0125 = 293, 293 ÷ 100 = 2.93 m/s

Note: The CRC16 checksum (XX XX) in the returned data is automatically calculated and verified by the host computer software based on the actual returned data, and is not listed here.

6.3.3 Reading the Device Address Register

Send: 00 03 00 00 00 01 85 DB

Fields	**00**	**03**	**00 00**	**00 01**	**85 DB**
Meaning	Broadcast address	Function code	Register address	Number of registers	CRC16 check

Return: 00 03 02 00 01 44 44

Fields	00	03	02	00 01	44 44
Meaning	Broadcast address	Function code	Data bytes	Data segment	CRC16 check

Data parsing: 0x0001 = 1, indicating that the current device address is 0x01.

6.3.4 Modify Device Address

(Register address 0x0 0 0 0)

The following example modifies the device address to 0x33:

Send: 00 06 00 00 00 33 C8 0E

Fields	00	06	00 00	00 33	C8 0E
Meaning	Broadcast address	Function code	Register address	New device address	CRC16 check

Return: 00 06 00 00 00 33 C8 0E (The returned content is the same as the sent message, indicating successful modification)

6.3.5 Set the cumulative rainfall time

(Register address 0x010 7)

The following example sets the rainfall accumulation time to 10 minutes:

Send: 00 06 01 07 00 0A B8 21

Fields	00	06	01 07	00 0A	B8 21
Meaning	Broadcast address	Function code	Register address	Total time (10 minutes)	CRC16 check

Return: 00 06 01 07 00 0A B8 21 (The returned content is the same as the sent message, indicating successful modification)

Note: The device is set to continuous accumulation without resetting by default. Setting the accumulation time to 0 will prevent the device from automatically resetting and will continue to accumulate rainfall. To manually reset, you can power cycle the device or issue the following command: 00 06 01 07 00 00 38 26

6.3.6 Setting the average wind time

(Register address 0x010 C)

The average time can be set from 3 seconds to 600 seconds, with a default value of 60 seconds.

The following example sets the average wind time to 10 seconds :

Send: 00 06 01 0 C 00 0A C9 E3

Fields	00	06	01 0C	00 0A	C9 E3
Meaning	Broadcast address	Function code	Register address	Total time (10 minutes)	CRC16 check

Return: 00 06 01 0 C 00 0A C9 E3 (The returned content is the same as the sent message, indicating successful modification)

6.3.7 Setting the Baud Rate

(Register address 0x0102)

The baud rate code correspondence is as follows:

Code	Baud rate
00	2400
01	4800
02	9600
03	19200
04	38400
05	57600
06	115200

The following example sets the average wind time to 19200 :

Send: 00 06 01 0 2 00 0 3 68 26

Fields	00	06	01 02	00 03	68 26
Meaning	Broadcast address	Function code	Register address	Total time (10 minutes)	CRC16 check

Return: 00 06 01 0 2 00 0A 68 26 (The returned content is the same as the sent message, indicating successful modification)

Warning: The baud rate change will take effect after a restart . The host computer must be updated to the same baud rate for communication to continue. Non-professionals should not make these changes.

Chapter 7 Sensor Configuration and Calibration

7.1 Wind Drift Calibration

After prolonged use, the ultrasonic anemometer module may experience zero-point drift due to changes in ambient temperature or component aging. Calibration can be performed using the following steps:

1. Move the equipment to a completely windless, enclosed environment and let it stand for at least 5 minutes until it stabilizes.
2. Send a calibration command to the device via RS485: AT+RESET#
3. the device returns OK , wait approximately 1 minute for the calibration to complete.
4. After calibration, reinstall the equipment at the monitoring location and confirm that the north direction is correct.

Note: Calibration must be performed in a completely windless environment; any airflow disturbance will affect the calibration results. It is recommended to operate in a closed indoor space, avoiding areas near air conditioning vents or doors and windows.

7.2 Temperature Drift Calibration

When a persistent deviation is found between the measured temperature value and the reference standard value, calibration can be performed using the following steps:

1. Prepare a metrologically certified reference thermometer, place it in the same environment as the equipment, and let it stand for at least 30 minutes to allow both to fully balance.
2. Data calibration is performed using host computer calibration software .

Notice: For calibration, please contact the technical support department. It is recommended to perform temperature drift calibration at least once a year.

7.3 Humidity Drift Calibration

When a persistent deviation is found between the humidity measurement value and the reference standard value, calibration can be performed using the following steps:

1. Prepare a metrologically certified reference hygrometer and place it in the same environment as the equipment, allowing it to stand for at least 30 minutes.
2. It is recommended to perform calibration within an ambient humidity range of 40% to 70% RH, and avoid operation in extremely high or low humidity environments.
3. Data calibration is performed using host computer calibration software .

Note: Humidity sensors are sensitive to contaminants. If the equipment is deployed in a polluted environment such as a chemical plant or dusty environment for a long period of time, it is recommended to clean the radiation shield and sensor before calibration. Please contact technical support for calibration software .

7.4 Pressure Drift Calibration

Barometric pressure sensors may drift due to changes in altitude and temperature after prolonged use. Calibration can be achieved through the following steps:

1. Prepare a certified reference barometer, place it in the same location as the equipment, and let it stand for at least 15 minutes.
2. Data calibration is performed using host computer calibration software .

Notice: For calibration software , please contact the technical support department.

Chapter 8 Troubleshooting

8.1 Communication Issues

8.1.1 Modbus Connection Failure Handling

When the host computer cannot establish Modbus communication with the device, please troubleshoot step by step using the following steps:

Step	Investigation Project	Processing method
1	Check power supply	Confirm that the equipment's power supply voltage is within the DC 9~24V range and check if the power indicator is normal.
2	Check wiring	Confirm that the RS485 A/B wires are not reversed or short-circuited, and that the aviation connector screw is tightened.
3	Check baud rate	Confirm that the host computer's baud rate is consistent with the device's; the factory default is 9600 bps.
4	Check device address	Confirm that the host computer query address matches the device address; the factory default is 0xFF.
5	Check the terminating resistor	When the communication distance is long, confirm that 120Ω terminating resistors have been installed at both ends of the bus.
6	Check cable quality	Check the cables for open circuits, poor connections, or severe interference.

Tip: You can use the XF_PcSoftV1.5 host computer software to perform connection tests, which will help you quickly locate problems.

8.1.2 Checksum Error Analysis

If the host computer receives the returned data but the CRC16 check continues to fail, please check the following reasons for troubleshooting:

Possible reasons	Processing method
CRC16 byte order error	Confirm that the low byte comes first and the high byte comes last; see Section 6.2.1 for details.
Cable interference causes data bit flipping	Replace the shielded twisted-pair cable and ensure proper shielding and grounding. See Section 5.3.2 for details.
Incorrect serial port parameter settings on the host computer	Confirmation: 8 data bits, 1 stop bit, no parity.
Signal attenuation due to long communication distance	Shorten the communication distance or install an RS485 repeater
Multiple device address conflicts	Confirm that each device address on the bus is unique and

	there are no duplicates.

Note: The device does not return error codes for commands that fail to verify. If the host computer does not receive a response 200 ms after sending the command, it can determine that the command has failed and can be resent. See Section 6.2.2 for details.

8.2 Measurement Anomalies

8.2.1 Reasons for Data Jumps

If the device output data shows abnormal jumps or values that deviate significantly from the normal range, please check the following causes:

Abnormal phenomena	Possible reasons	Processing method
The wind speed output remains abnormally high.	The installation location is subject to airflow disturbance.	Check for surrounding obstacles and reselect an installation location.
Wind direction data continues to deflect at a fixed angle	North direction installation deviation	Recalibrate the installation orientation, and perform wind drift calibration if necessary (see Section 7.1).
Temperature value is abnormally high	The radiation shield has poor heat dissipation or its installation location is affected by heat sources.	Check that the radiation shield is clean and adjust its installation position to be away from heat sources.
Humidity levels that are consistently low or high	Sensor contamination or aging	Clean the radiation shield and perform humidity drift calibration if necessary (see Section 7.3).
The air pressure value deviates significantly from the reference value.	Altitude change or sensor drift	Perform barometric pressure drift calibration (see Section 7.4).
Rainfall data anomalies	Strong wind interference or radar module obstruction	Confirm that the equipment installation location is open and check whether there are any obstructions on the surface of the radar module.
Abnormally low light or radiation levels	Sensor surface contamination	Clean sensor light-receiving surface

8.2.2 Environmental Interference Response

When the equipment is used in the following special environments, it may be subject to varying degrees of interference. Please refer to the corresponding measures for handling:

Interference type	Influencing parameters	Response measures
Strong electromagnetic interference (high-voltage lines, motors, etc.)	Communication stability, data error rate	Increase shielding and grounding measures, and install signal isolators if necessary.
High temperature and strong radiation environment	Temperature and humidity measurement accuracy	Confirm that the radiation shield is working properly and check whether the installation location is affected by artificial heat sources.
Dust storms and environmental pollution	Accuracy of wind speed, light intensity, and radiation measurement	Increase the frequency of regular cleaning; it is recommended to check and clean once per quarter.
Freezing, condensation	Ultrasonic wind measurement accuracy	The equipment has IP65 protection; it can usually recover on its own after slight icing, but severe icing requires manual cleaning.

Warning: If the problem persists after the above troubleshooting, please do not disassemble the equipment yourself to avoid damaging the waterproof structure or sensors. Please contact the technical support.

Chapter 9 Warranty and Support

9.1 Warranty Commitment

The compact weather station (XF-80X series) is covered by the following warranty:

Project	Illustrate
Warranty period	12 months from the date of product delivery
Warranty Coverage	Product quality problems occurring under normal use conditions
Warranty method	Return to factory for repair or replace with the same model
Warranty fee	Free during the warranty period

The following situations are not covered by the warranty:

- Damage caused by failure to install, wire, or operate in accordance with the technical requirements specified in this manual.
- Damage caused by human-caused collisions, drops, or water ingress (under abnormal use conditions).
- Damage caused by unauthorized disassembly or modification of equipment
- Damage caused by force majeure (natural disasters such as lightning strikes, floods, and earthquakes).

Products beyond the warranty period

Note: When applying for warranty service, please provide proof of purchase and a description of the malfunction so that technicians can quickly determine the cause of the problem and arrange a solution. Shipping costs for return repairs are borne by the sender.

9.2 After-sales support

Providing users with comprehensive technical support services:

Support methods	Contact information	Service Hours
Telephone support	0310-8033736	Weekdays 9:00 ~ 17:30
Official website	www.nong-iot.com	All day
Exclusive Sales	Please contact your dedicated sales representative.	Weekdays

Telephone support services include:

- Product Installation and Wiring Instructions
- Communication parameter configuration and debugging
- Remote diagnosis and troubleshooting suggestions for fault phenomena
- User Guide for Host Computer Software
- Return-to-factory repair application and progress tracking

Tip: When contacting technical support, it is recommended to prepare the following information in advance to get help quickly: product model, device serial number (S/N), purchase date, description of the fault, and relevant photos or data screenshots.

9.3 Recommendations for Regular Maintenance

To ensure long-term stable operation and measurement accuracy of the equipment, it is recommended to perform routine maintenance according to the following schedule:

Maintenance cycle	Maintenance content
Quarterly	Clean the radiation shield, sensor light-receiving surface, and radar module surface; check for any damage to the cables.
Every six months	Check the wiring terminals for oxidation or loosening; perform sensor drift calibration if necessary.
Each year	Conduct a comprehensive inspection of the equipment's condition, perform a complete sensor calibration, and assess whether factory recertification is required.

Note: When cleaning the equipment, please wipe it with a soft, dry or slightly damp cloth. Do not use organic solvents, alcohol, or high-pressure water guns to rinse, as this may damage the sensor or protective coating.