

SenseCAP Radar Rainfall All-in-One Weather Station User Manual

Version: V1.1

Date: 2025-02-18



1 Product Parameters

Basic parameters	
Product Model	SenseCAP ONE S700-A/S700-C/S100
Power Supply	12-24V
Heating Power Supply	24V
Radar (Rain Sensor)	60GHz, bandwidth 4GHz
Support Protocols	RS485 (MODBUS-RTU)/SDI-12
IP Rating	IP66
Working Temperature	-40°C ~ +85°C
Working Humidity	0 to 100%RH (non-condensing)

Product Model: S700-A (7-in-1 Radar Rainfall)			
Measurement Parameter	Measurement Range	Measurement Accuracy	Resolution
Air temperature	-40°C ~85°C	±0.1°C	0.01°C
Air humidity	0~100%RH	±1.5%RH	0.01%RH
Barometric pressure	300~1250hPa	±50Pa	10 Pa
Wind speed	0~60 m/s standard range 0~75m/s extended range Up to 80m/s withstand range	±0.3m/s(≤10m/s) ±3%(10m/s ~ 50m/s) ±5%(>50m/s)	0.1m/s
Direction of the wind	0~360° (@-40°C~60°C)	±3.0°	0.1°
Light intensity	0~188000 Lux	5% * reading	5Lux
Rain intensity	0~300mm/h	±10%	0.01mm
Product Model: S700-C (7-in-1 Radar Rainfall and Solar Radiation)			
Measurement Parameter	Measurement Range	Measurement Accuracy	Resolution
Air temperature	-40°C ~85°C	±0.1°C	0.01°C
Air humidity	0~100%RH	±1.5%RH	0.01%RH
Barometric pressure	300~1250hPa	±50Pa	10 Pa
Wind speed	0~60 m/s standard range 0~75m/s extended range Up to 80m/s withstand range	±0.3m/s(≤10m/s) ±3%(10m/s ~ 50m/s) ±5%(>50m/s)	0.1m/s
Direction of the wind	0~360° (@-40°C~60°C)	±3.0°	0.1°
Global solar radiation	0~2000 W/m ²	±5%	1W/m ²

Sunshine duration	0-6553.5 h	±3%	0.1h
Rain intensity	0~300 mm/h	±10%	0.01mm
Product Model: S100 (SenseCAP S100 Radar Rain Sensor)			
Measurement Parameter	Measurement Range	Measurement Accuracy	Resolution
Rain intensity	0~300 mm/h	±10%	0.01mm

2 Installation

2.1 Device Interface Introduction



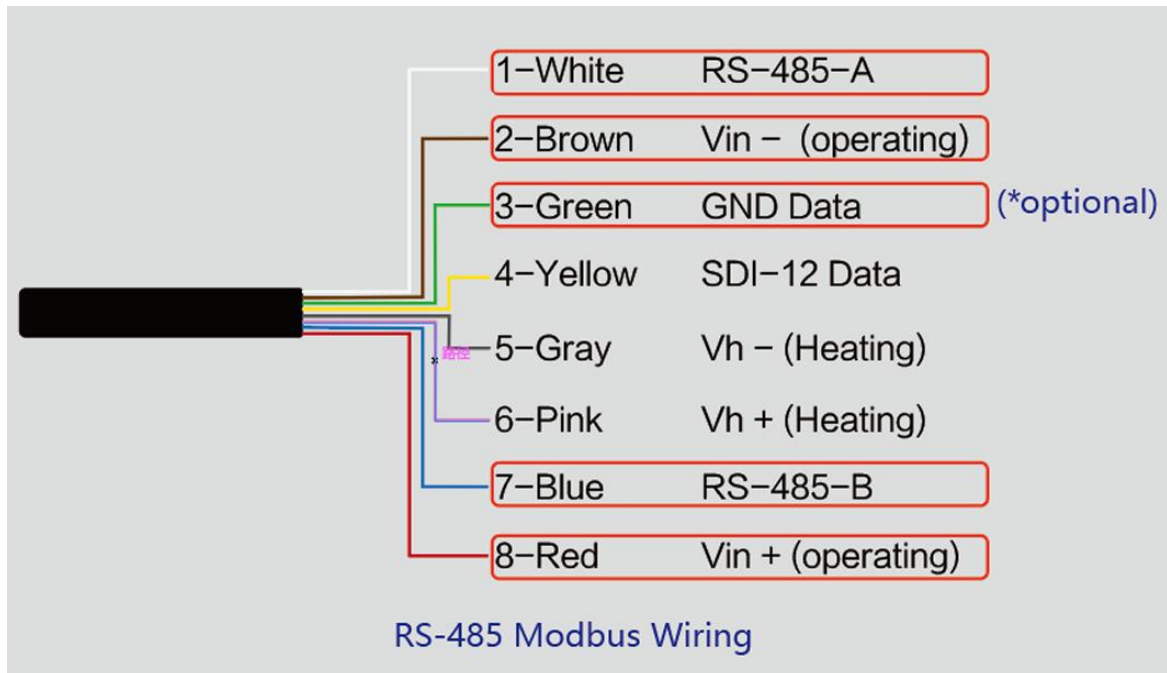
Data and power connector

(1) Plug in the cable and tighten it clockwise

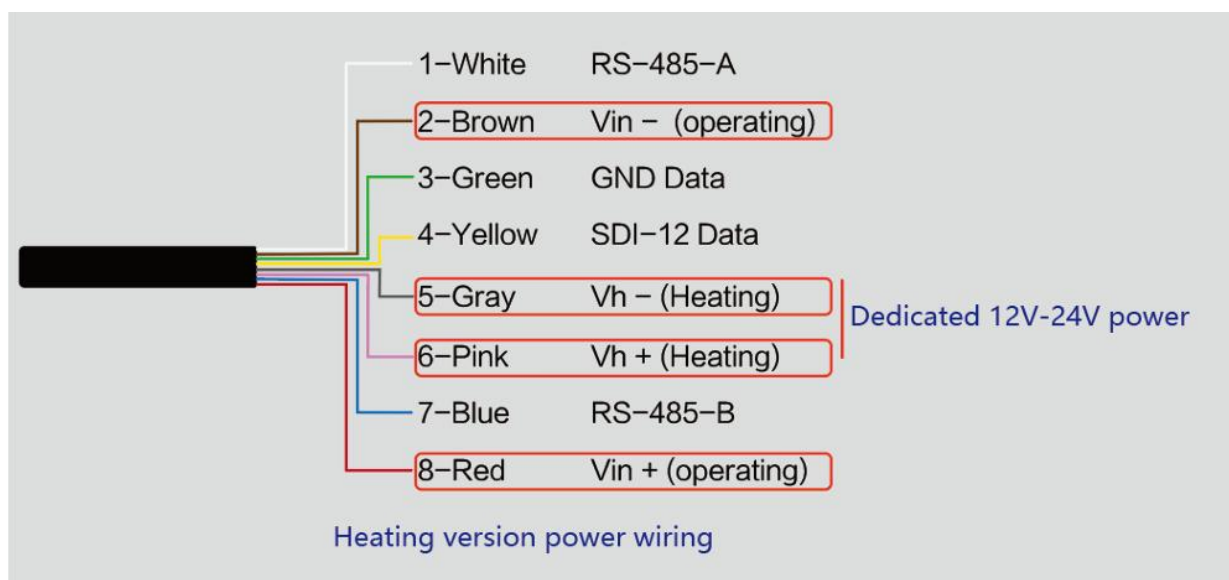
Note: the cable is aimed at with the bottom before inserting it into the bottom. Otherwise, the pins are skewed may cause the communication is abnormal.



- (2) When using **Modbus-RTU** communication, the M12 data cable of the device needs to be connected to the RS-485 interface of the host device, and the host needs to supply power to the device, and the recommended power supply voltage is **DC 12V-24V/1.5A**. The following figure shows the wiring schematic diagram and the definition of wire sequence:



Reminding: When using the device with a heating function, a separate 24V (24V@2A is recommended) power supply is required. Gray wire #5 is connected to the negative



2.2 RS485 Modbus RTU Protocols

2.2.1 Protocol communication parameters:

Data Format	1 start bit, 8 Data bits, None parity, 1 Stop bits.		
Baud Rate	9600bps (default) , which can be modified by configuration.		
Default Device Address (Decimal)	S700-A (radar rainfall)	20	
	S700-C (radar rainfall & total solar radiation)	60	

2.2.2 Register Address Definition:

Register Type	Address	Name	Unit	values range	Number of registers	Register status	Note
Input register	0x0000	Air temperature	°C	-40000~85000	2	R	Big endian Data format int32
	0x0002	Air humidity	%RH	0~100000	2	R	
	0x0004	barometric pressure	Pa	30000000~125000000	2	R	Divide the data value by 1000 to get the true

	0x0006	Light intensity	Lux	0~188000000	2	R	measurements
	0x0008	Minimum wind direction	°	0~360000	2	R	
	0x000A	Maximum wind direction	°	0~360000	2	R	
	0x000C	Average wind direction	°	0~360000	2	R	
	0x000E	Minimum wind speed	m/s	0~60000	2	R	
	0x0010	Maximum wind speed	m/s	0~60000	2	R	
	0x0012	Average wind speed	m/s	0~60000	2	R	
	0x0014	Accumulated rainfall	mm	0~80000000	2	R	
	0x0016	Accumulated rainfall duration	s	0~2000000000	2	R	
	0x0018	Rain intensity	mm/h	0~200000	2	R	
	0x001A	Maximum rainfall intensity	mm/h	0~600000	2	R	
	0x001C	Heating Temperature	°C	-40000~85000	2	R	
	0x001E	The dumping of state		0 or 1000 (The dumping of state is 1000, The vertical of state is 0)	2	R	
	0x0024	Rainfall intensity per minute (mm/min)	mm/min	0~4000	2	R	
	0x004A	Global solar radiation	W/m ²	0 ~ 2000000	2	R	
	0x004C	Sunshine duration	h	0 ~ 6553500	2	R	
Holding register	0x1000	Device address			1	R/W	The default address is 1 Can be set to 1 - 247
	0x1001	Baud rate			1	R/W	The default is 96, which means 9600. It can be set to: 12=1200 24=2400 48=4800 96=9600

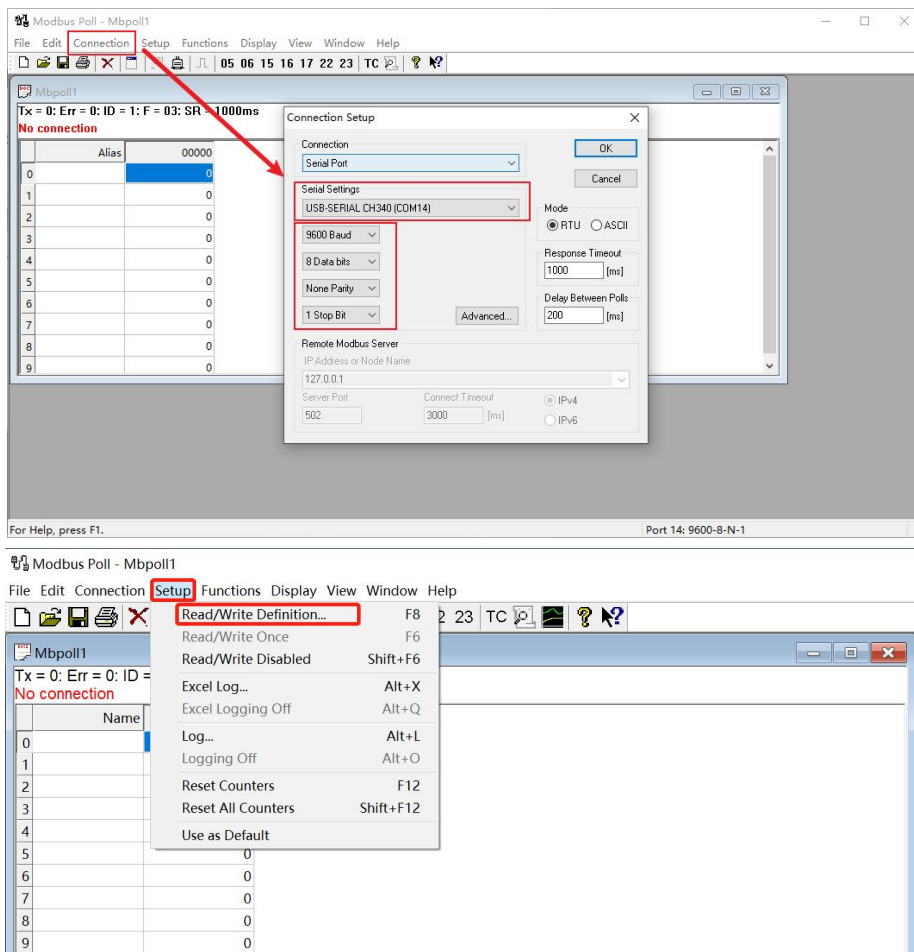
							192=19200 384=38400 576=57600 1152=115200
	0x2000	Set the accumulated rainfall to 0			1	R/W	Write 1 to set accumulated rainfall to 0. Read back 1 to confirm that the setting is finished. Read back 0 indicates that the setting failed
	0x2002	Set the sunshine duration to 0			1	R/W	
	0x2001	Set the rainfall duration to 0			1	R/W	

2.2.3 RS485Modbus-RTU Read

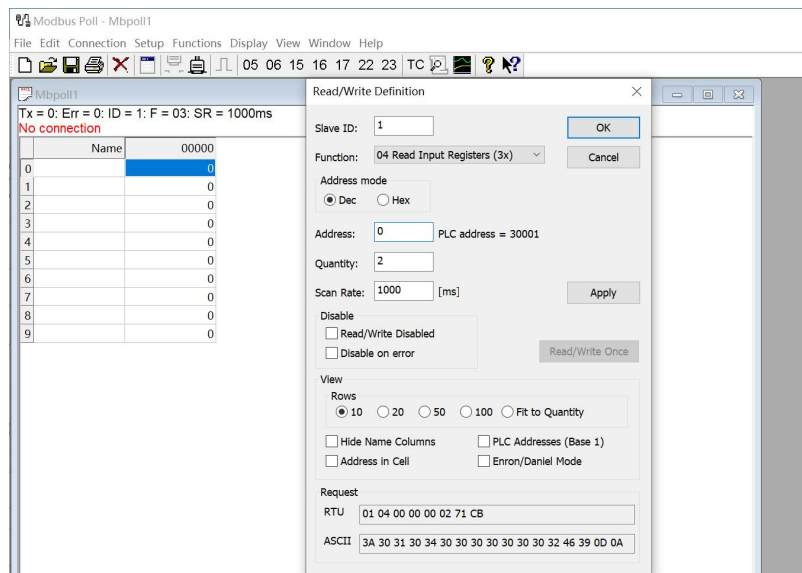
Here is an example of the **Modbus Poll tool**

(download from: <https://www.modbustools.com/download.html>).

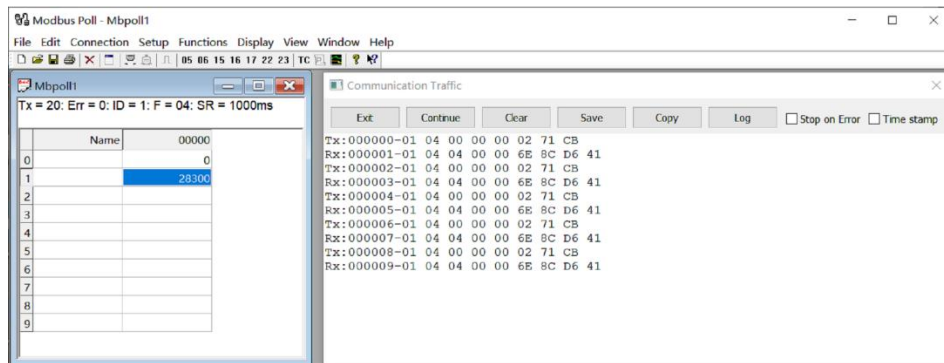
Configuration connection parameters: Baud rate 9600bps, 8 Data bits, None Parity, 1 Stop bits.



Set the default slave ID, function code 04, starting address 0, quantity;



Now the computer reads the sensor data every 1 second, and the measurement (line 0 and line 1) is shown in below picture, after dividing the measurement by 1000 you can get the real value;



● S700-A (radar rainfall) :

Read the register 0x0000~ 0x001F, that is, the measurement values of six parameters of **air temperature and humidity, atmospheric pressure, wind direction, wind speed, and rainfall**;

Send command: 14 04 00 00 00 20 F3 17 (Check code) ;

Return: 14 04 40 00 00 70 80 (Temperature) 00 00 95 10 (Humidity) 06 07 94 40 (Air pressure) 00 00 00 00 (Light) 00 00 00 00 (Min wind direction) 00 00 00 00 (Max wind direction) 00 00 00 00 (Avg wind direction) 00 00 00 00 (Min wind speed) 00 00 00 00 (Max wind speed) 00 00 00 00 (Avg wind speed) 00 00 00 00 (Accumulated rainfall) 00 00 00 00 (Accumulated rainfall duration) 00 00 00 00 (Rain intensity) 00 00 00 00 (Maximum rainfall intensity) 00 00 6A 7C (Heating Temperature) 00 00 00 00 (Tipped-over state) 7F B2 (Check code) ;

Note: The data format is intABCD, scaled down 1000 times to get the true value.

● S700-C (radar rainfall & total solar radiation) :

Read the register 0x0000~ 0x001F, that is, the measurement values of six parameters of **air temperature and humidity, atmospheric pressure, wind direction, wind speed, and rainfall**;

Send command: 3C 04 00 00 00 20 F5 3F (Check code) ;

Return: 3C 04 40 00 00 5A 68 (Temperature) 00 00 AE E2 (Humidity) 06 0A 2C 50 (Air pressure) 00 00 00 00 (Light) 00 00 00 00 (Min wind direction) 00 00 00 00 (Max wind direction) 00 00 00 00 (Avg wind direction) 00 00 00 00 (Min wind speed) 00 00 00 00 (Max wind speed) 00 00 00 00 (Avg wind speed) 00 06 59 B4 (Accumulated rainfall) 07 86 31 78 (Accumulated rainfall duration) 00 00 00 00 (Rain intensity) 00 00 00 00 (Maximum rainfall intensity) 00 00 5B F4 (Heating Temperature) 00 00 03 E8 (Tipped-over state) 98 94 (Check code) ;

Reads registers 0x004A to 0x004D, the measured values of total **solar radiation and sunshine hours**;

Send command: 3C 04 00 4A 00 04 D4 F2 (Check code) ;

Return: 3C 04 08 00 00 00 00 (Global solar radiation)00 01 4A 78 (Sunshine duration)86 23 (Check code);

1.2.3 RS485Modbus-RTU Example of Modifying Parameters (S700 example)

(1) Modify Slave Address (Change address from 20 to 01) :

Send command: 14 06 10 00 00 01 4E 0F (Check code) ;

Return: 14 06 10 00 00 01 4E 0F (Check code) ;

(2) Modify slave baud rate (Change baud rate from 20 to 01) :

Send command: 14 06 10 01 00 30 DE 1B (Check code) ;

Return: 14 06 10 01 00 30 DE 1B (Check code) ;

(3) Zeroing accumulated rainfall:

Send command: 14 06 20 00 00 01 41 0F (Check code) ;

Return: 14 06 20 00 00 01 41 0F (Check code) ;

(4) Zeroing the cumulative rainfall time:

Send command: 14 06 20 01 00 01 10 CF (Check code) ;

Return: 14 06 20 01 00 01 10 CF (Check code) ;

3 Document Version

Version	Description	Date	Editor
V1.0	First edition	2025-01-10	Leo Liu
V1.1	Add Product Parameters	2025-02-18	Leo Liu
V1.2	Add S100 model	2025-06-13	Jenkin Lu

FCC Requirement

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) this device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

*RF warning for Mobile device:

This device complies with FCC radiation exposure limits set forth for an uncontrolled environment. This device should be installed and operated with minimum distance 20cm between the radiator & your body.

UWB statements: UWB devices may not be employed for the operation of toys. Operation onboard an aircraft, a ship or a satellite is prohibited.