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AWT100 Data Conversion Module

Installation Manual V1.4

Acrel Co., Ltd.

DECLARATION

The company reserves the right to modify the product specifications described in the manual without notice. Before placing an order, please consult your local agent for the new specifications of this product.

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1 Overview

At present, wireless technology relies on the advantages of easy deployment, low construction cost, and wide application environment. Data diversification has gradually become an important direction for network development and application in the future industrial Internet. AWT100 data conversion module is a new data conversion DTU launched by Acrel Electric. Communication data conversion includes 4G, LoRa, LoRaWAN, GPS, WiFi, CE and other communication methods. The downlink interface provides a standard RS485 data interface. It can be easily connected to power meters, RTUs, PLCs, industrial computers and other equipment, and only needs to complete the initial configuration at a time to complete the data collection of the MODBUS equipment; at the same time, the AWT100 series of wireless communication terminals use powerful micro-processing chips to cooperate Built-in watchdog technology, reliable and stable performance.

The appearance is shown in Figure 1.

Figure 1 AWT100 Wireless communication terminal

Features:

■Using single-mode guide rail shape, small size, flexible and convenient installation;

■A variety of mainstream wireless modules, suitable for various on-site environments;

■Multiple hardware interface modes, easy to use with other products;

■Rich communication interface protocols can meet the different needs of customers.

The applicable industries are as follows:

■Wireless meter reading;

■Building automation and security;

■Robot control;

■Power distribution network monitoring, power load monitoring;

■Intelligent lighting control;

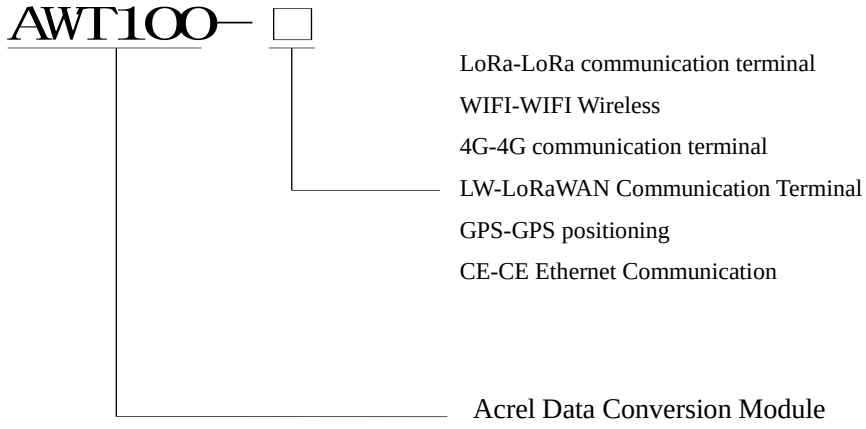
■Automatic data collection;

■Industrial remote control and telemetry;

■Highway and railway data transmission;

■Other power and industrial control industries, etc.

2 Product Model



3 Features

■Support serial MODBUS RTU protocol data collection, and communicate with Acrel server through Acrel platform protocol①.

■Support data collection of up to 30 MODBUS RTU devices.

■Supports 8 types of device acquisition templates, and each template can have a maximum of 640 points.

■A total of 3,000 electrical parameters can be collected.

■Support server MODBUS or LoRa transparent transmission communication.

■Support fixed IP and dynamic domain name resolution methods to connect to the data center.

■Support transparent transmission protocol, general mode (active round copy, regular report), MQTT protocol, smart power wireless protocol, prepaid wireless protocol It can be customized and developed.

■ AWT100-LW wireless communication terminal can upload data to the server through LoRa communication.

■ AWT100-GPS wireless module can measure geographic location, obtain latitude and longitude and satellite time.

■ The AWT100-WiFi wireless module can automatically access the WIFI hotspot according to the hotspot name and password, realize the transparent transmission of 485 and WIFI data, and also use our cloud platform protocol.

■ AWT100-CE can realize data transmission from 485 to Ethernet. It can be used as a TCP client and supports transparent transmission or our cloud platform protocol.

4 Typical Applications

Typical application connections are shown in Figure 2 and Figure 3. Connect the on-site 485 devices to the AWT100 wireless communication terminal. The AWT100 wireless communication terminal will actively collect the data of the 485 device according to its own configuration, and then communicate with the Acrel server.

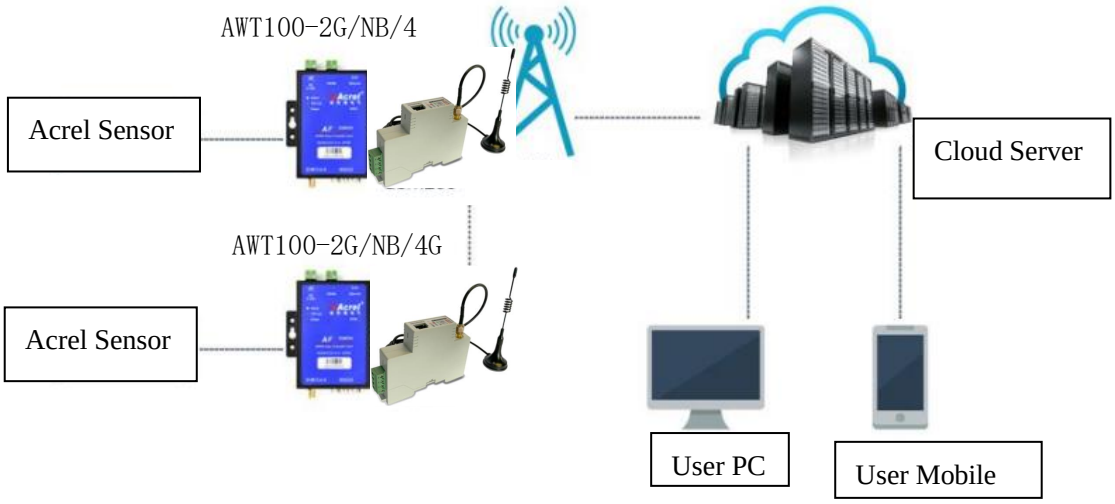


Figure 2 AWT100-4G Typical application of wireless communication terminal

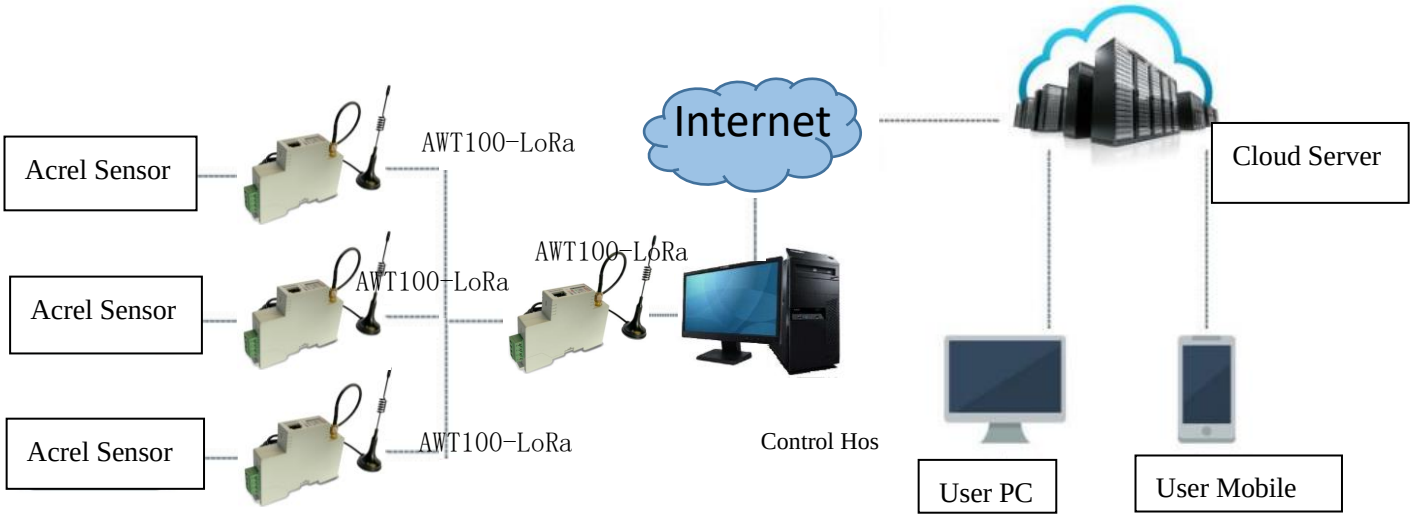


Figure 3 AWT100-LoRaTypical application of wireless communication terminal

5 Technical Parameters

Parameter Name	AWT100-4G	AWT100-LoRa /AWT100-LW
Downlink	RS485 Communication	
Uplink	4G Communication	LoRa Communication
SIM card voltage	3V，1.8V	/
Working current	Static power：≤1W，Transient power consumption：≤3W	Static power：≤0.5W，Transient power consumption：≤1W
Antenna interface	50Ω/SMA（Faucet）	
Serial port type	RS-485	
Baud rate	4800bps、9600bps、19200bps、38400bps（default 9600bps）	
Operating Voltage	DC24V or AC/DC220V①	
Operating temperature	-20℃～60℃	
Storage temperature	-40℃～85℃	
Humidity range	0～95% Non-condensing	

Parameter Name	AWT100-LoRa	AWT100-LW	AWT100-LW868	AWT100-LW923	AWT100-LORAHW
Working frequency	460～510MHz	470MHZ	863-870MHZ	920-928MHZ	860-935MHZ
Transmission rate	LoRa 62.5kbps				
Downlink	RS485 Communication				
Uplink	LoRa Communication				
Working current	Static power：≤0.5W，Transient power consumption：≤1W				
Antenna interface	50Ω/SMA（Faucet）				
Serial port type	RS-485				
Baud rate	4800bps、9600bps、19200bps、38400bps（default 9600bps）				
Operating Voltage	DC24V or AC/DC220V①				
Operating temperature	-20℃～60℃				
Storage temperature	-40℃～85℃				
Humidity range	0～95% Non-condensing				

parameter name	AWT100-GPS	AWT100-WiFi	AWT100-CE
Work	Positioning accuracy: 2.5-5m	support 2.4G frequency band WiFi rate: 115200bps	Ethernet rate 10/100M adaptive
Downlink	RS485 Communication		
Uplink	GPS positioning	WiFi wireless	Ethernet communication
Working current	Static power consumption：≤1W，transient power consumption：≤3W		
interface	50Ω/SMA（Faucet）		RJ45
Serial port type	RS-485 Communication		
Baud rate	4800bps、9600bps、19200bps、38400bps（Default 9600bps）		
Operating Voltage	DC24V or AC/DC220V①		
Operating temperature	-20℃～60℃		
Storage temperature	-40℃～85℃		
Humidity range	0～95% Non-condensing		

Note:

1、AC/DC220V power supply requires external AWT100-POW power supply module.

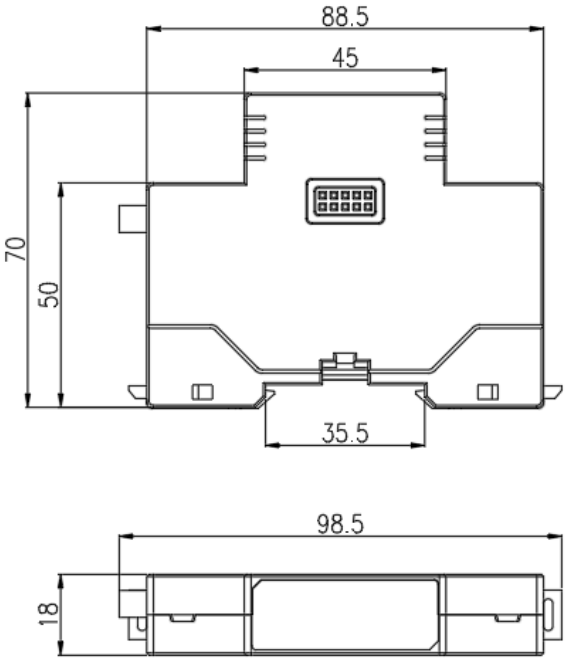
2、Data exchange length: total input length<=120 bytes, total output length<=120 bytes.

3、Number of downstream instrument connections: 1-30.

4、AWT100-4G/CE/WIFI is a domestic version, and there are also overseas versions, corresponding models are AWT100-4GHW/CWHW/WFHW. The overseas version uses the MQTT protocol and the data format is JSON.

6 Installation and wiring instructions

6.1 Outline and installation dimensions

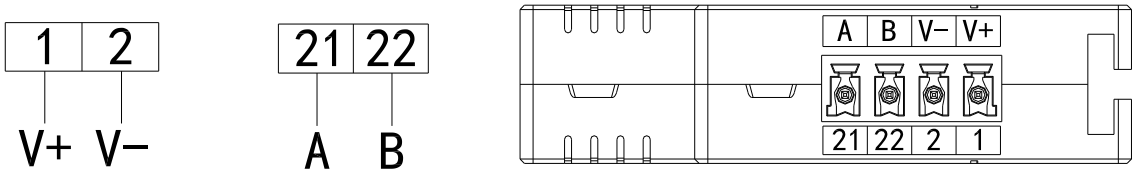


6.2 Product installation

Adopt standard DIN35mm rail type installation.

6.3 Terminals and wiring

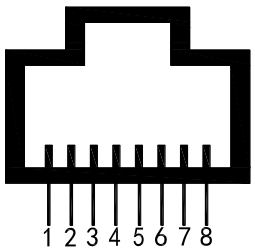
6.3.1 AWT100-4G/LoRa/LW/GPS/WiFi terminal and wiring



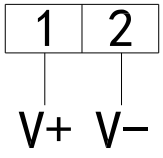
Auxiliary power（DC24V） RS485 Communication

The function of the network port is the power interface and the RS485 interface. The specific definitions are as follows:

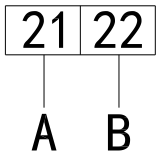
1	2	3	4	5	6	7	8
POWER（DC12V）		GND		TX	RX	485A	485B



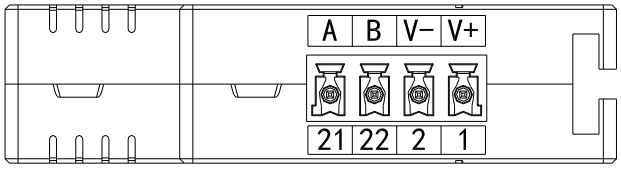
6.3.2 AWT100-CE terminal and wiring

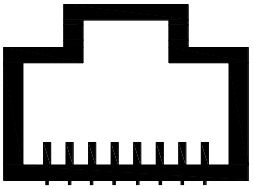


Auxiliary power



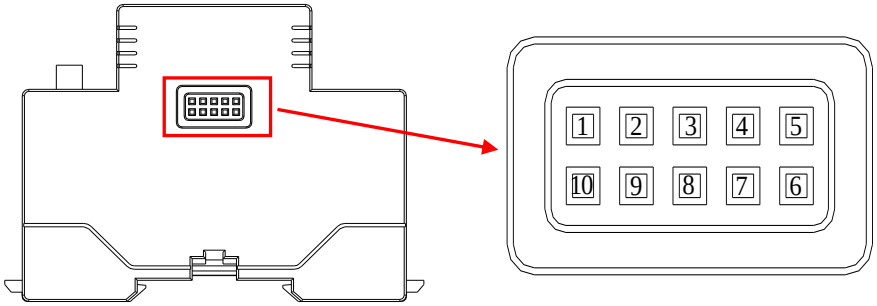
RS485 Communication





Ethernet communication

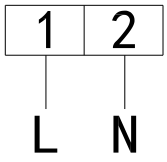
6.3.3 AWT100-4G/LoRa/LW/GPS/WiFi/CE side interface definition



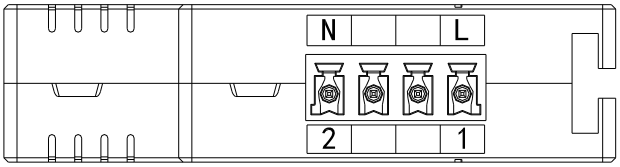
1	2	3	4	5	6	7	8	9	10
NC	+5V	GND	485A	NC		485B	GND	+5V	NC

Note: The two interfaces of network port and terminal can only be used by one of the two (except for AWT100-CE), and cannot be used at the same time.

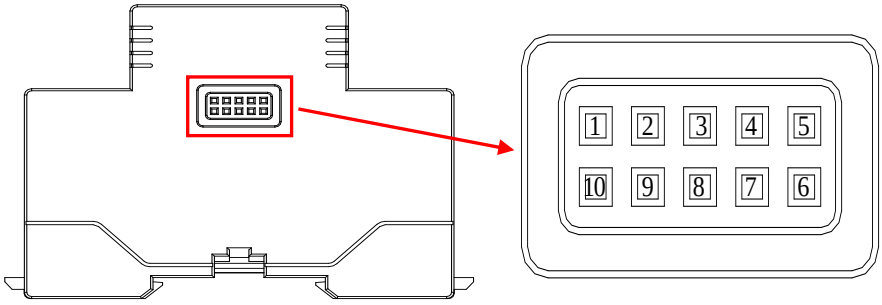
Power module terminal definition



Auxiliary power（AC/DC 220V）



Side interface definition



1	2	3	4	5	6	7	8	9	10
NC		GND	+5V	NC		+5V	GND	NC	

The side interface is used for the AWT100 wireless communication terminal to supply power through the AWT100-POW power module AC220V. The AWT100 wireless communication terminal is connected to the AWT100-POW power supply module through pins and fixed together by a buckle. The connection diagram is shown in Figure 4:

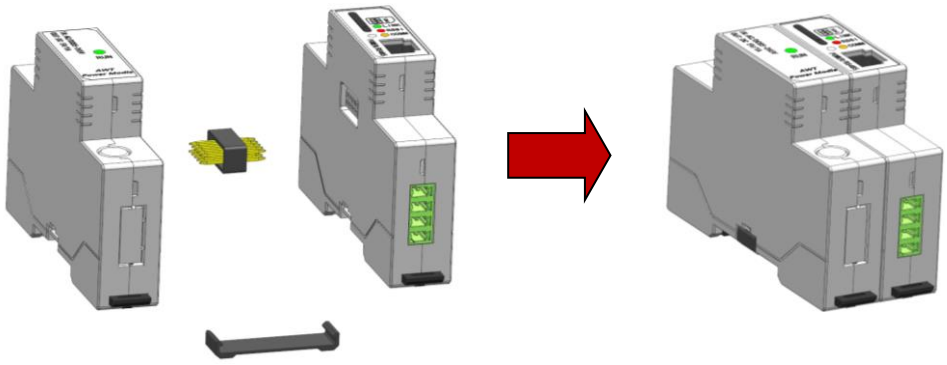


Figure 4

Installation Notes:

①When the AWT100 wireless communication terminal is powered by the AWT100-POW power supply module, the auxiliary power terminal and network port of the AWT100 wireless communication terminal The 24V power supply cannot be connected again.

② Antenna installation, the antenna interface of the AWT100 wireless communication terminal adopts 50Ω/SMA (female), and the external antenna must be an antenna suitable for the working band. If other unmatched antennas are used, it may affect or even damage the equipment.

③When installing the SIM card, make sure that the device is not powered on. The SIM card of the AWT100 wireless communication terminal adopts a card tray installation method. You need to put the SIM card in the card tray correctly, and then insert the SIM card into the card holder of the device.

6.4 Panel light definition

6.4.1 Definition of AWT100-4G wireless communication terminal panel lights

LINK (Green).	RSSI (Red).	COMM (Orange).
The green indicator flashes for 0.5 seconds and is getting the configuration.	When there is 485 receiving and sending data, the red indicator flashes for 1 second.	Flashes when initializing the module.
The green indicator flashes for 2 seconds, and the net is being injected.		
The green indicator flashes for 1 second, and the server is being connected.		
A solid green indicator indicates that the server has been connected.		

6.4.2 Definition of AWT100-LoRa wireless communication terminal panel light

RUN（Green）	LoRa（Red）	COMM（Orange）
The green indicator light is always on, indicating that the meter has been able to operate normally.	The red indicator light flashes for 1 second when there is a LoRa signal to receive and send data.	The orange indicator light flashes for 1 second when there is 485 to receive and send data.

6.4.3 AWT100-LW Definition of wireless communication terminal panel lights

RUN：（Green）	LoRa（Red）	COMM（Orange）
The green indicator flashes for 1 second and the gateway is connecting.	The red indicator flashes for 1 second when there is LoRa signal to receive and send data.	The orange indicator flashes for 1 second when there is 485 to receive and send data.
The green indicator light is always on to indicate that the gateway has been connected		

6.4.4 AWT100-GPS Definition of wireless communication terminal panel lights

RUN（Green）	LoRa（Red）
The green indicator light is always on, indicating that the power supply voltage is normal.	After the positioning is successful, it flashes for 1 second and the green indicator light is off

6.4.5 AWT100-WiFi Definition of wireless communication terminal panel lights

LINK (Green).	RSSI (Red).	COMM (Orange).
The green indicator flashes for 0.5 seconds and is getting the configuration.	When there is 485 receiving and sending data, the red indicator flashes for 1 second.	Flashes when initializing the module.
The green indicator flashes for 2 seconds, and the network is being connected.		
The green indicator flashes for 1 second, and the server is being connected.		
A solid green indicator indicates that the server has been connected.		

6.4.6 AWT100-CE Ethernet communication panel light definition

RJ45: Ethernet interface

LINK (Green).	RSSI (Red).	COMM (Orange).
The green indicator flashes for 0.5 seconds and is getting the configuration.	When there is 485 receiving and sending data, the red indicator flashes for 1 second.	Flashes when initializing the module.
The green indicator flashes for 2 seconds, and the network port is being checked.		
The green indicator flashes for 1 second, and the server is being connected.		
A solid green indicator indicates that the server has been connected.		

6.4.7 AWT100-POW Panel light definition of power module

The green indicator light is always on to indicate that the power module is operating normally. If the indicator light is off, it indicates that the module is not powered on or is faulty.

7 AWT100 Wireless Communication Terminal User Guide

7.1 AWT100 wireless communication terminal configuration

Before using the AWT100 wireless communication terminal, the user can configure the parameters of the AWT100 wireless communication terminal according to the actual situation. The operation process is as follows:

(1) The AWT100 wireless communication terminal is powered on, and the working indicator of the AWT100 wireless communication terminal flashes, indicating that the AWT100 wireless communication terminal has started to work.

(2)Start the configuration software of the AWT100 wireless communication terminal, which consists of the computer serial port parameter area, information display area, parameter setting area, parameter reading and setting buttons,

(3) AWT100-LoRa Wireless communication terminal relay/transmission parameters

Relay/transparent transmission setting options are used to set the wireless parameter settings of the AWT100-LoRa wireless communication terminal， Click 

the button can read the wireless parameter settings of the AWT100-LoRa wireless communication terminal. After modifying the wireless parameters of the AWT100-LoRa wireless communication terminal ， Click 

the button to complete parameter setting。

● Relay transmission frequency

The frequency of relay transmission: 460～510MHz.If the working mode of the AWT100-LoRa wireless communication terminal is set to relay mode, the relay transmission frequency must be inconsistent with the transparent transmission frequency.

● Transparent transmission frequency

The frequency of transparent transmission: 460～510MHz.

● Expansion factor

LoRa spreading factor

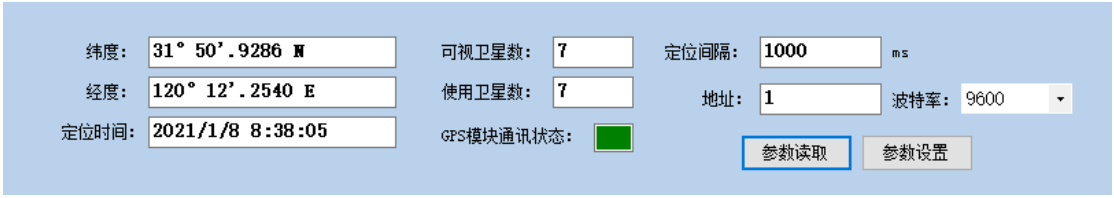
● Signal bandwidth

LoRa signal bandwidth

● Type

Set the working mode of the AWT100-LoRa wireless communication terminal.There are two ways to choose from: transparent transmission and relay.

(4) AWT100-GPS positioning module parameter settings



Positioning interval: latitude and longitude refresh interval.

Positioning time: positioning satellite time.

AWT_GPS modbus register address table and description					
Adress	Register number	name	Number of registers	Attributes(W/R)	Description
0000H	1	contact address	1	W/R	Value range 1~127, universal address 0
0001H	2	Baud rate	1	W/R	0:1200 1:2400 2:4800 3:9600 4:19200 5:38400 6:57600 7:115200
0002H	3	Positioning interval	1	W/R	Value range 100ms~10000ms
0003H	4	Latitude hemisphere	1	R	ASCIICode (0x4E)N,Northern Hemisphere (0x53)S，Southern Hemisphere
0004H	5	latitude	2	R	E.g 3150.7797 -> 31°50′.7797
0005H	6				

0006H	7	Transhemisphere	1	R	ASCII Code (0x45)E,Eastern Hemisphere (0x57)W，Western Hemisphere
0007H	8	longitude	2	R	float E.g 11711.9287 -> 117°11′.9286
0008H	9				
0009H	10	Second	1	R	UTC time
		Minute			
000AH	11	Hour	1	R	
		Day			
000BH	12	Month	1	R	
		Year			
[Note] 1. Modbus read and write reply delay is 300ms~500ms under the default baud rate of 9600, Therefore, the waiting time of Modbus host should be at least more than 300ms;					

8 How to use

After setting the parameters of the AWT100 wireless communication terminal, confirm that the downlink equipment is operating normally and the gateway can communicate with the AWT100 wireless communication terminal normally. Wait for the AWT100 wireless communication terminal to establish a connection with the server, and send the device number to the server to distinguish the devices. At the same time, the AWT100 wireless communication terminal will poll the downstream device to query the online downstream device according to the set query address range and query register address field, and send the polled data to the server for reporting.