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Acrel

ADW310 Wireless Metering Meter

Installation and Use ManualV1.0

Acrel Electric Co., Ltd

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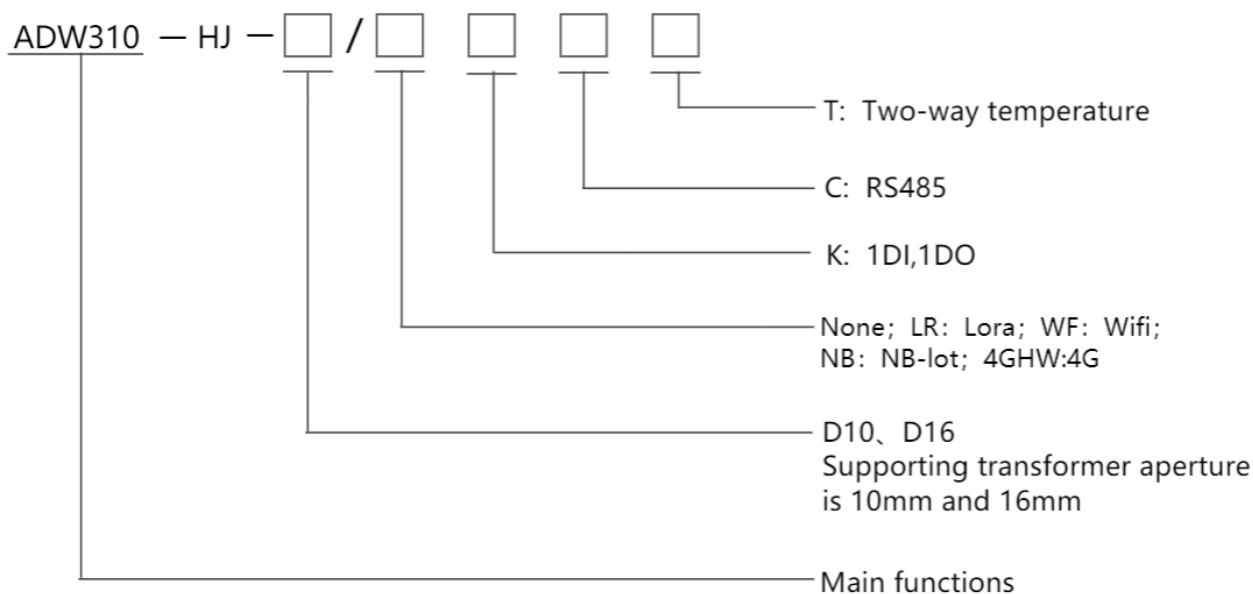
Contents

1 Overview

ADW310 wireless metering meters are mainly used to measure the active power of low-voltage networks,The product boasts of advantages including compact size, high precision, rich features. According to different requirements, there are many communications functions like RS485 communication,lora,NB,4G,WIFI adding the new current sampling mode using external transformer. It can be flexibly installed in the distribution box to achieve sub-item electric energy metering, operation and maintenance supervision or power monitoring requirements for different regions and different loads.

2 Product model and specification

2.1 ADW310Wireless MeInstument amingRules


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ADW310 — HJ — □ / □   □   □   □
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- T: Two-way temperature
- C: RS485
- K: 1DI,1DO
- None; LR: Lora; WF: Wifi; NB: NB-lot; 4GHW:4G
- D10、D16 Supporting transformer aperture is 10mm and 16mm
- Main functions

2.2 Functional Characteristics

Table 1 Main functions of ADW310

Functions	function declaration
Display mode	LCD (field type)
Energy metering	Active electric energy metering (positive and reverse),
Electrical measurement	Voltage, current, power factor, frequency, active power, reactive power, dependent power

Pulse output	Active pulse output
Temperature measurement	Two temperature measurements (optional T)
DI/DO	1DI, 1DO (optional K)
LED display	Pulse light indication
External current transformer	External open-type transformer
Electrical parameter	Underpressure, overpressure, undercurrent, overcurrent, underload, overload, etc
Communication	RS485 interface (optional C)
	470MHz Wireless Transmission (LR)
	4G Wireless Transmission (4G optional)
	WIFI wireless communication (optional WF)

3 Technical Parameter

3.1 Electrical Performance

Table 2. Electrical Characteristics of ADW310

Voltage input	rated voltage	220V
	reference frequency	50Hz
	power dissipation	<0.5VA(Each phase)
current input	input currenton	AC 20(100)A
	starting current	1‰Ib(0.5S class)，4‰Ib(1 class)
	power dissipation	<1VA(Each phase)
accessory power supply	service voltage	AC 85~265V
	power dissipation	<2W
Measurement performance	meet a criterion	GB/T17215.322-2008，GB/T17215.321-2008
	Accuracy of active power	1class
	Temperature accuracy	±2℃
impulse	pulse length	80±20ms
	Pulse constant	1600imp/kWh
communication	wireless	Transmission on 470MHz and maximum distance in open space is 1km；4G
	interface	RS485(A、B)
	Connection mode	Shielded twisted pair conductors
	Protocol	MODBUS-RTU、DL/T 645-07

3.2 Work environment

Temperature range	Operating temperature	-20℃~55℃
	Storage temperature	-40℃~70℃
Humidity		≤95% (No condensation)
Altitude		<2000m

4 External dimensions and installation instructions (unit: mm)
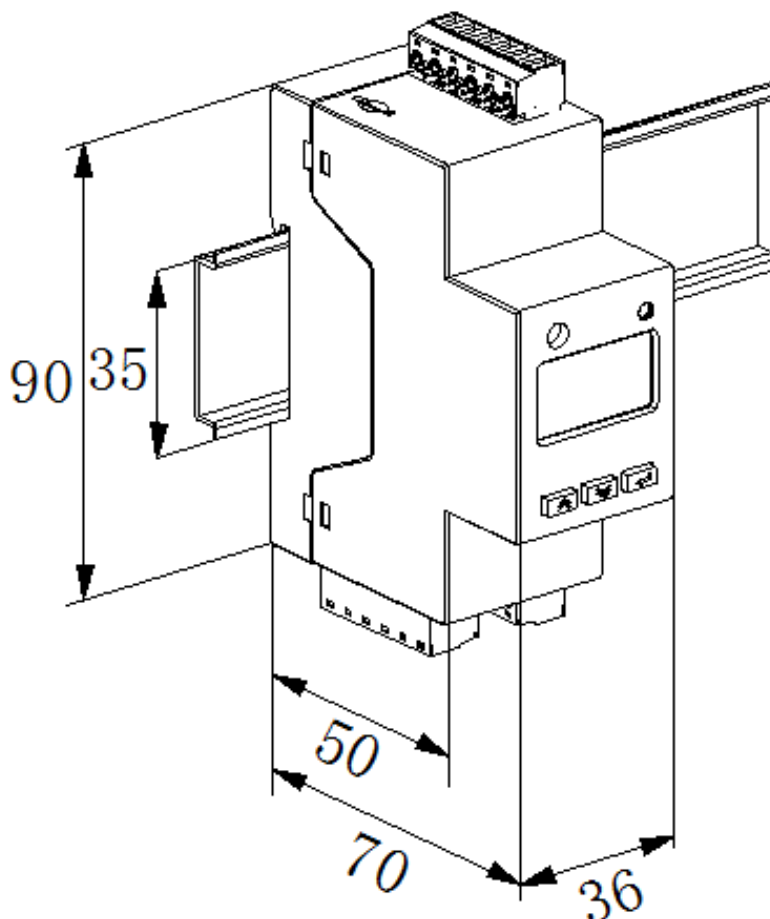
4.1 External size (unit: mm)

Figure 1. ADW310 effect dimensions diagram

(2) Supporting the transformer external type size

Table 5 Specification and dimensions of supporting transformer

Table 5 Specification and dimensions of supporting transformer	External size（mm）					The perforated size（mm）		common difference（mm）
	W	H	D	M	N	Φ1	Φ2	
AKH-0.66/K-∅ 10N	27	44	32	25	36	10	9	±1
AKH-0.66/K-∅ 16N	31	50	36	27	42	16	17	
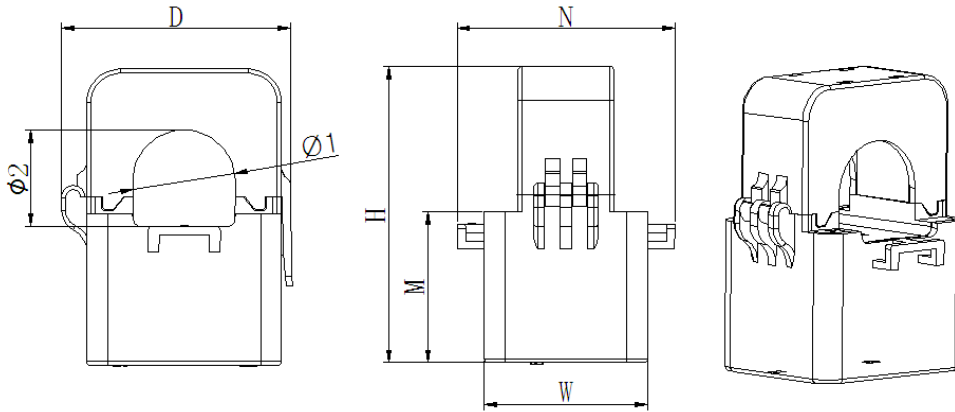
Supporting transformer size diagram

4.2 RS485 communication terminal, pulse output terminal
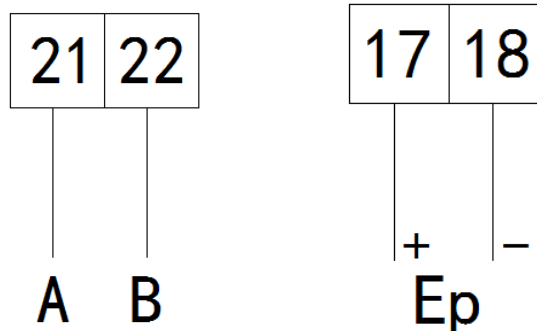
```
21 22          17 18

 A  B           +  −
               Ep
communication interface    Pulse port
```

4.3 Switch quantity input / output terminals

Switch volume input is all switch signal input, the instrument is equipped with + 12V working power supply, without external power supply. When the external input is on or off, the on or off information is collected through the instrument switch input module and displayed locally through the instrument. The Switch volume input can not only collect and display the local switch information, but also realize the remote transmission function, namely the "remote communication" function, through the RS485 of the instrument.

Switch volume output is relay output, which can realize "remote control" and alarm output.
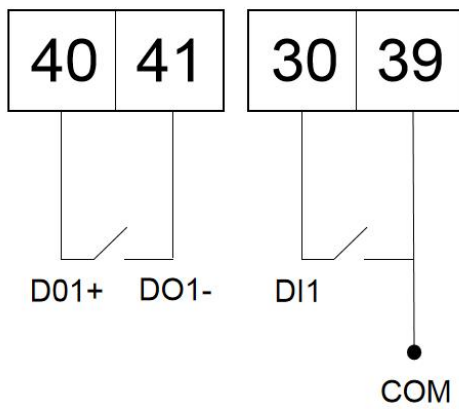
Switch quantity input and output

4.4 Temperature measurement terminal
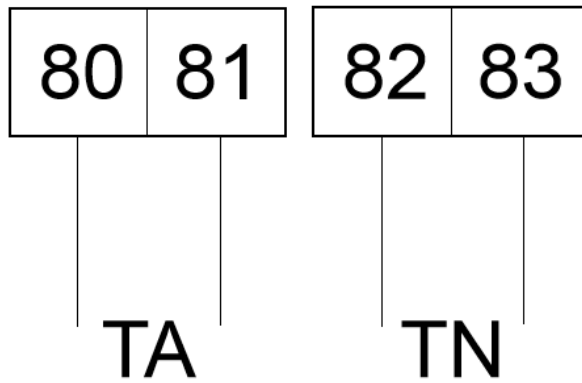
Temperature input

4.5 The wiring instructions

5 Main functional characteristics

5.1 Measurement function

Measure all electrical parameters，Including voltage (U), current (I), active power (P), reactive power (Q), apparent power (S), power factor (PF), voltage and current phase angle (Φ), frequency (F), 31 subsubharmonic, odd and even total harmonic content and total harmonic content. The voltage (U) keeps 1 decimal, frequency (F) 2 decimal, current (I) 3 decimal, power (P) 4 decimal, phase Angle (Φ) keeps 2 decimal.
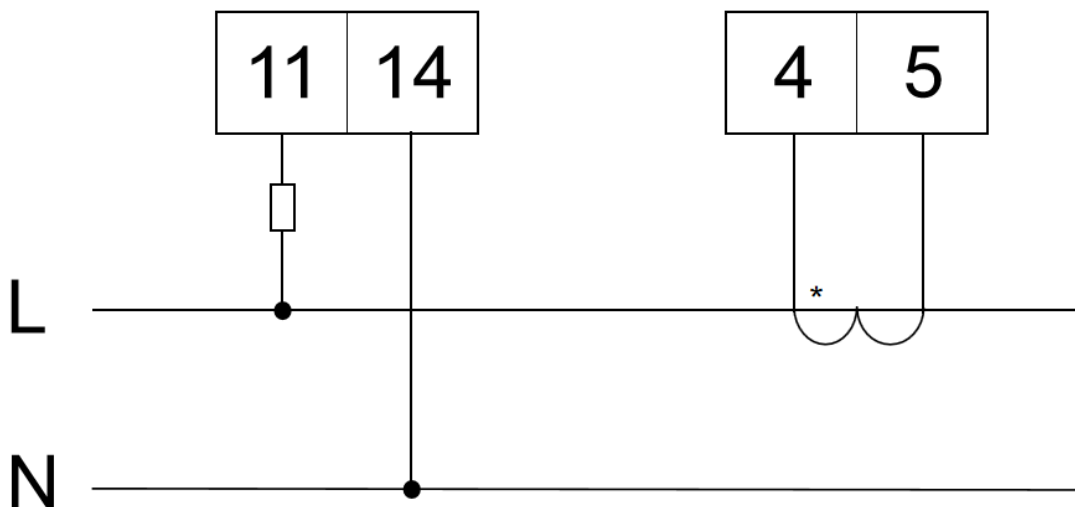
如：U＝220.1V，f＝49.98HZ, I＝1.999A, P＝0.2199KW, Φ＝60.00°。

Support 2-road temperature measurement, temperature measurement range: -40~99℃, precision ± 2℃

5.2 Measurement function

It can measure the current combined active power, positive active power, reverse active power, inductive reactive power, capacitive reactive power, as seen in the electric power.

5.3 Time-sharing function

Two sets of time tables, a year can be divided into 4 time zones, each set of time tables can be set up for 12-day time periods, 4 rates (F1, F2, F3, F4, namely the sharp peak flat valley). The basic idea of time-sharing billing is to take electric energy as a commodity and use economic leverage to raise the electricity price in the peak period and lower the electricity price when low, so as to cut the peak and fill the valley, improve the quality of electricity consumption and improve the comprehensive economic benefits.

5.4 Demand

Demand-related concepts are listed as follows：

Demand	Average power measured during the demand period
Max. demand	Maximum amount of demand during a specified period of time
Sliding window time	A recurrence method to measure the demand from any time point during a period shorter than the demand period. The demand measured by this means is called sliding demand. The recurrence time is sliding window time.
Demand period	Time interval when the same average power is measured continuously, also known as window time

Measure eight maximum demands, i.e. A/B/C three-phase current ,positive active, negative active, inductive reactive , capacitive reactive and apparent power demands and the time of maximum demand.

5.5 Digital input/ output

There is 1 switch output, 1 switch input, switch output is relay output，The Digital output is realized by relay for remote control and alarm output. The Digital input not only collects and displays the local break-time information but also provides the remote transmission, i.e. remote communication, with RS485.

5.6 Wireless Communication Function

ADW310 supports 470MHz LORA communication and 4G communication. The specific agreement on 4G communication can be obtained by contacting the relevant personnel of our company.

6 Communication instruction

6.1 Protocol

This instrument uses the MODBUS-RTU protocol or the DL / T645 statute. Please refer to the relevant protocol standards for the specific protocol format, and it will not be repeated here.

6.2 MODBUS

MODBUS-RTU protocol has 03H and 10H command to read and write registers respectively. The following chart is registers' address list:

Start Address （Hexadecimal）	Start Address （Decimal）	Variable	Length	R/W
1000H	address	2	R/W	1～247
1001H	Baud rate	2	R/W	1：1200bps 2：2400bps 3：4800bps 4：9600bps 5：19200bps 6：38400bps
1002H	check bit	2	R/W	lower byte 0：No check 1：odd 2：even high byte 0：1 stop bit

				1：1.5 stop bit
				2：2 stop bit
1003H-1005H	obligate			
1006H	645 Address	6	R/W	BCD code high in the front
1009H	serial number	14	R/W	The 14 ASCII codes of the No
1010H	wiring system	2	R/W	0:3P4L 1:3P3L
1011H	Secondary voltage rating value	2	R/W	1 decimal places V
1012H	Current secondary rating value	2	R/W	2 decimal places A
1013H-101CH	obligate			
101DH	password	2	R/W	1-9999
101EH	Pulse constant	2	R/W	1600
101FH	Voltage shielding	2	R/W	0~655.35%
1020H	Current shielding	2	R/W	0~655.35%
1021H-1025H	obligate			
1026H	Demand period	2	R/W	unit min（1-30）
1027H-102DH	obligate			
102EH	Backlit time	2	R/W	0: Often bright 1: 1s 2:2s
102FH	time	10	R/W	Second、minute、hour date、month、year
1034H-1035H	obligate			
1036H	DO state	2	R/W	Bit0:DO1 Bit1: DO2... 0: open 1: close
1037H	DI state	2	R	Bit0:DI1 Bit1: DI2... 0: open 1: close

1038H	1.First time zone period table number The first zone begins month, the first zone day 2.Second time zone period table number Second zone start month, the second zone day 3.Third time zone period table number The third zone begins month, the third zone day 4.Fourth time zone period table number The fourth zone begins month, the fourth zone day 5.Fifth time zone period table number Fifth zone begins month, fifth zone day 6.Sixth time zone period table number Sixth zone start month, sixth zone day 7.Seventh time zone period table number Seventh zone start month, Seventh zone day 8.Eighth time zone period table number Zone 8th hours start month, the 8th hours zone day	12	R/W	Time table number: In Period 1, In Period 2, In Period 3, In Period 4, Start month: 1-12 Start date: 1-31
1044H	The first set of time schedule, Each time period takes up up to three bytes, Rate rate, at the beginning, start		R/W	rate: 0 1 sharp, 2 peak 3 flat, 4 valley Begin hour: 0-23 Begin minute: 1-59
1059H	The second set of time schedules, Each time period takes up up to three bytes, Are "rate" " Begin hour" "Begin minute" respectively		R/W	Srate: 0 1 sharp, 2 peak 3 flat, 4 valley Begin hour: 0-23 Begin minute: 1-59
106EH	The third set of time schedules, Each time period takes up up to three bytes, Are "rate" " Begin hour" "Begin minute" respectively		R/W	rate: 0 1 sharp, 2 peak 3 flat, 4 valley Begin hour: 0-23 Begin minute: 1-59
1083H	The fourth set of time schedules, Each time period takes up up to three bytes, Are "rate" " Begin hour" "Begin minute" respectively		R/W	rate: 0 1 sharp, 2 peak 3 flat, 4 valley Begin hour: 0-23 Begin minute: 1-59
1098H	Voltage ratio	4	R/W	Int16
109AH	Current change ratio	4	R/W	Int16

109CH-109FH	obligate			

2000H	voltage	4	R	Int 16 Keep 1 decimal place in V If the value is U=2200, PT=1;U=U*PT=2200*0.1*1=2 20.0V
2001H-200BH	obligate			
200CH	current	4	R	Int 16，unit A Keep 2 decimal places If the value is I=200, CT=10;I=I*CT=200*0.01*10 =20A
200DH-2013H	obligate			
2014H	active power	4	R	Int16 ,There are symbols Unit kW Keep 3 decimal places If the value is 11720, PT=10, CT=10; Then the value = Value * PT * CT =11720*0.001*10*10=1172. 0kW
2016H-201BH	obligate			
201CH	reactive power	4	R	Int16 ,There are symbols Unit kVar Keep 3 decimal places If the value is 11720, PT=10, CT=10; Then the value = Value * PT * CT =11720*0.001*10*10=1172. 0kVar
201EH-2023H	obligate			
2024H	apparent output	4	R	Int ,unit KVA Keep 3 decimal places If the value is 11720, PT=10, CT=10; Then the value = Value * PT * CT =11720*0.001*10*10=1172. 0kVA
2026H-202BH	obligate			
202CH	power factor	4	R	int ,Keep 3 decimal places If the numerical value is 999, The numerical value = 999*0.001=0.999

202EH-2033H	obligate			
2034H	frequency	4	R	Whole-length type in 2 decimal placesIf the numerical value is 5,000, The numerical value = 5000*0.01=50.00H
2036H-	obligate			
2058H	temperature 1	4	R	Int ,There are symbols Unit 0.1℃
205AH	temperature 2	4	R	Int ,There are symbols Unit 0.1℃

3000H	Total active power secondary value	4	R/W	two decimal places, Kwh
3002H	Positive active power energy quadratic value	4	R/W	two decimal places, Kwh
3004H	Reverse active power secondary value	4	R/W	two decimal places, Kwh
3006H	Total reactive power energy quadratic value	4	R/W	two decimal places, Kvarh
3008H	quadratic value of forward reactive power	4	R/W	two decimal places, Kvarh
300AH	Reverse reactive power energy secondary value	4	R/W	two decimal places, Kvarh
300CH	obligate			
300EH	Total active power energy tip quadratic value	4	R/W	Int , unitkWh Keep 2 decimal places If the value is 120201, PT=10, CT=10; The value = Value * PT * CT=120201*0.01*10*10=120 20
3010H	Secondary peak value of total active power energy	4	R/W	Int , unit kWh Keep 2 decimal places If the value is 120201, PT=10, CT=10; The value = Value * PT * CT =120201*0.01*10*10=12020
3012H	Total active power level quadrvalue	4	R/W	Int , unit kWh Keep 2 decimal places If the value is 120201, PT=10, CT=10; The value = Value * PT * CT =120201*0.01*10*10=12020
3014H	Total active power valley secondary value	4	R/W	Int , unit kWh Keep 2 decimal places If the value is 120201, PT=10, CT=10; The value =

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				Value * PT * CT =120201*0.01*10*10=12020
3016H	Positive active power tip quadratic value	4	R/W	Int , unit kWh Keep 2 decimal places If the value is 120201, PT=10, CT=10; The value = Value * PT * CT =120201*0.01*10*10=12020
3018H	Forward active power peak quadratic value	4	R/W	Int , unit kWh Keep 2 decimal places If the value is 120201, PT=10, CT=10; The value = Value * PT * CT =120201*0.01*10*10=12020
301AH	Positive active power energy level quadratic value	4	R/W	Int , unit kWh Keep 2 decimal places If the value is 120201, PT=10, CT=10; The value = Value * PT * CT =120201*0.01*10*10=12020
301CH	Positive active power valley secondary value	4	R/W	Int , unit kWh Keep 2 decimal places If the value is 120201, PT=10, CT=10; The value = Value * PT * CT =120201*0.01*10*10=12020
301EH	Reverse active power energy tip quadratic value	4	R/W	Int , unit kWh Keep 2 decimal places If the value is 120201, PT=10, CT=10; The value = Value * PT * CT =120201*0.01*10*10=12020
3020H	quadratic value of reverse active power peak	4	R/W	Int , unit kWh Keep 2 decimal places If the value is 120201, PT=10, CT=10; The value = Value * PT * CT =120201*0.01*10*10=12020
3022H	Reverse active power valley quadratic value	4	R/W	Int , unit kWh Keep 2 decimal places If the value is 120201, PT=10, CT=10; The value = Value * PT * CT =120201*0.01*10*10=12020
3024H	Positive reactive power energy tip quadratic value	4	R/W	Int , unit kWh Keep 2 decimal places If

				the value is 120201, PT=10, CT=10; The value = Value * PT * CT =120201*0.01*10*10=12020
3026H	quadratic value of peak forward reactive power	4	R/W	Int , unit kWh Keep 2 decimal places If the value is 120201, PT=10, CT=10; The value = Value * PT * CT =120201*0.01*10*10=12020
3028H	Positive Reactive electric energy level quadratic value	4	R/W	Int , unit kWh Keep 2 decimal places If the value is 120201, PT=10, CT=10; The value = Value * PT * CT =120201*0.01*10*10=12020
302AH	Positive reactive power valley quadratic value	4	R/W	Int , unit kWh Keep 2 decimal places If the value is 120201, PT=10, CT=10; The value = Value * PT * CT =120201*0.01*10*10=12020
302CH	Reverse reactive power energy tip quadratic value	4	R/W	Int , unit kWh Keep 2 decimal places If the value is 120201, PT=10, CT=10; The value = Value * PT * CT =120201*0.01*10*10=12020
302EH	Reverse reactive power energy peak quadratic value	4	R/W	Int , unit kWh Keep 2 decimal places If the value is 120201, PT=10, CT=10; The value = Value * PT * CT =120201*0.01*10*10=12020
3030H	Reverse reactive power energy level quadratic value	4	R/W	Int , unit kWh Keep 2 decimal places If the value is 120201, PT=10, CT=10; The value = Value * PT * CT =120201*0.01*10*10=12020
3032H	Reverse reactive power energy valley quadratic value	4	R/W	Int , unit kWh Keep 2 decimal places If the value is 120201, PT=10, CT=10; The value = Value * PT * CT =120201*0.01*10*10=12020

3034H-	obligate				

4006H	Real-time demand of total active power	4	R	Int , unit kW Keep 3 decimal places
400CH	Total forward active power in real-time demand	4	R	Int , unit kW Keep 3 decimal places
400EH	Total reverse active power real-time power demand	4	R	Int , unit kW Keep 3 decimal places
4010H	Total forward real-time reactive power demand	4	R	Int , unit kW Keep 3 decimal places
4012H	Total reverse reactive power in real-time demand	4	R	Int , unit kW Keep 3 decimal places
4014H-	obligate			

01D0H-01EBH	Data for alarm 1, see section 6.3.1
0216H-0249H	Alarm 2, Alarm 3 related data, see Section 6.3.2
0268H-0169H	Alarm 2, Alarm 3 Alarm status, see Section 6.3.2 for details

6.3 Alarm function-related settings

6.3.1 Alarm 1 Related parameter register address table

Start Address（Hexadecimal）	Start Address（Decimal）	Data item name	Length	R/W	Start Address（Hexadecimal）
01EBH	491	Alarm 1 status	2	R	bit0:Overvoltage alarm bit1:Overvoltage alarm Bit2:Overcurrent alarm Bit3:Under current alarm Bit4:Overpower alarm Bit5:Overpower alarm Bit6:DO1 Is the alarm output bit7:DO2 Is the alarm output Bit8: Bit9: Bit10: Bit11: Bit12: Bit13: Bit14:

					Bit15:Power report
01D0H	464	Alarm 1 allows bits	2	R/W	bit0:Overvoltage alarm bit1:Overvoltage alarm Bit2:Overcurrent alarm Bit3:Under current alarm Bit4:Overpower alarm Bit5:Overpower alarm Bit6:DO1 Is the alarm output bit7:DO2 Is the alarm output Bit8: Bit9: Bit10: Bit11: Bit12: Bit13: Bit14: Bit15:Power report
01D1H	465	Overvoltage alarm threshold value	2	R/W	Int Unit 0.1V
01D2H	466	Overvoltage alarm delay	2	R/W	Int Unit 0.01S
01D3H	467	Undervoltage alarm threshold	2	R/W	Int Unit 0.1V
01D4H	468	Undervoltage alarm delay	2	R/W	Int Unit 0.01S
01D5H	469	Overcurrent alarm threshold value	2	R/W	Int Unit 0.01A
01D6H	470	Overcurrent alarm delay	2	R/W	Int Unit 0.01S
01D7H	471	Undercurrent alarm threshold	2	R/W	Int Unit 0.01A
01D8H	472	Undercurrent alarm delay	2	R/W	Int Unit 0.01S
01D9H	473	Overpower alarm threshold value	2	R/W	Int Unit 0.001kw
01DAH	474	Overpower alarm delay	2	R/W	Int Unit 0.01S
01DBH	475	Underpower alarm threshold	2	R/W	Int Unit 0.001kw
01DCH	476	Underpower alarm delay	2	R/W	Int Unit 0.01S
01DDH	477	DI1 Initial Status	2	R/W	0:often open 1:often close
			2	R/W	0:Not related DO

Start Address（Hexadecimal）	Start Address（Decimal）	Data item name	Length	R/W	Start Address（Hexadecimal）
01DEH	478	DI1 programme			1:relevance DO1 2:relevance DO2
01E5H	485	DO1 Output mode	2	R/W	0:level 1:impulse
01E6H	486	DO1 Related content	2	R/W	0:common DO 1:Total failure 2:Total failure+DI1+DI2 3:DI1 4:DI2 5:DI1+DI2
01E7H	487	DO1 output pulse width	2	R/W	0:无 1:1S 2:2S 3:3S 4:4S 5:5S

6.3.2 Alarm 2, Alarm 3 Related parameter register address table

Start Address（Hexadecimal）	Start Address（Decimal）	Data item name	Length	R/W	Start Address（Hexadecimal）
0216H	534	Alarm 2 allows bits	2	R/W	Bit0:Power factor is too low for the alarm allowable bit Bit1: Bit2: Bit3: Bit4:The first road temperature is too high alarm allowable position Bit5: Bit6: bit7:The second road temperature is too high alarm allowable position Bit8: Bit9: Bit10: Bit11: Bit12: Bit13: Bit14: Bit15:

0268H	616	Alarm 2. Alarm status	2	R	Corresponding to the alarm 2 allowable position
0217H	535	Alarm 3 allows bits	2	R/W	Bit0:The current forward active power demand is too high for the alarm allowable bit Bit1:Current reverse active power demand is too high alarm allowable level Bit2:Current positive reactive power demand is excessive alarm allowable bit Bit3:Current reverse reactive power demand is excessive alarm allowable bit Bit4:The current active demand is too high Bit5-Bit15:obligate
0269H	617	Alarm 3: The alarm status	2	R	Corresponding to the alarm 3 allowable position
0218H	536	Power factor is too high for the alarm threshold	2	R/W	Int unit 0.001
0219H	537	The alarm delay is too high in the power factor	2	R/W	Int unit 0.01S
0220H	544	First road temperature is too high alarm threshold	2	R/W	Int, There are symbols Unit 0.1℃
0221H	545	First road is too high temperature alarm delay	2	R/W	Int Unit 0.01S
0222H	550	Second road is too high temperature alarm threshold	2	R/W	Int, There are symbols Unit 0.1℃
0223H	551	Second road is too high temperature alarm delay	2	R/W	Int Unit 0.01S
0237H	567	Current imbalance over the high alarm delay	2	R/W	Int Unit 0.01S
0238H	568	Current positive active power demand is too high alarm threshold	4	R/W	Int, unit kW Keep 3 decimal places
023AH	570	The current reverse active power demand is too high for the alarm delay	2	R/W	Int Unit 0.01S
023BH	571	Current positive active power demand is too high alarm threshold	4	R/W	Int, unit kW Keep 3 decimal places

023DH	573	The current reverse active power demand is too high for the alarm delay	2	R/W	Int Unit 0.01S
023EH	574	Current forward reactive power demand is too high alarm threshold	4	R/W	Int，unit Kvar Keep 3 decimal places
0240H	576	The current positive reactive power demand is too high for the alarm delay	2	R/W	Int Unit 0.01S
0241H	577	Current reverse reactive power demand is too high for the alarm threshold	4	R/W	Int，unit Kvar Keep 3 decimal places
0243H	579	Current reverse reactive power demand is too high alarm delay	2	R/W	Int Unit 0.01S
0247H	583	Current dependent demand is too high alarm threshold	4	R/W	Int, unit KVA Keep 3 decimal places
0249H	585	Current dependent demand is too high for alarm delay	2	R/W	Int Unit 0.01S

7 Common troubleshooting

7.1 RS485 networking communication failure

Suggestion: Please first confirm whether the RS485 wiring is loose, AB connection reverse and other problems, and then check the table through the button to see if the general selection parameters, such as address, baud rate, check digit, etc., are set correctly.

7.2 Wireless communication failure of instrumentation

Suggestion: Please connect RS485 interface on the meter and USB convert to 485 serial port to read the parameters, and confirm whether the parameters are the same as the upper terminal wireless configuration (channel and spread spectrum factor). If different, please modify the meter's wireless parameters and retest the master terminal after the same, and if the same, it may be the meter and master terminal are in a relative long distance. It is too far to communicate or the scene is seriously disturbed. We can try to use the external antenna at the same time, or consider the newly added wireless master terminals, and then test it.