GPQM144

Power Quality Meter

Modbus Register Manual

CONTENT

Chapter 1 Introduction

This communication protocol describes the input and output of instruction, information and data of GPQM144 with MODBUS communication, which bring convenience for the usage and development of the third party.

1.1 The purpose of the serial communication protocol

The role of communication protocols is to exchange the information and data between the host computer (master) and the GPQM144, which includes:

1) Allow the master to access and set all the parameters of GPQM144.
2) Allow access to all measurement data and event records of GPQM144

1.2 MODBUS communication protocol version

This communication protocol suits for all versions of GPQM144 of Eetarp. Any changes will be specified in the future.

Chapter 2 Detailed Description of MODBUS serial communication for GPQM144

2.1 Basic rules for GPQM144-the MODBUS protocol

The following rules are used for RS485 or RS232C circuit controller and other equipments with RS485 serial communication circuit:

1) All RS485 circuit communication shall be subject to the master / slave mode. In this manner, the information and data is exchanged between a single master station and up to 32 slave stations (monitoring equipments).

2) The master station will initialize and control all the information in the RS485 communication circuits.

3) Communication can not be started from any slave station.

4) All communication of the RS485 circuits happened with the mode of "package", and one package is a simple to the "package". A parcel is a simple string (each string, 8digits). A package can contain up to 255 bytes. These bytes of the package constitute a standard asynchronous serial data and transfer in the mode of eight data bits, 1 stop bit, no parity bit. Serial data stream is generated from the similar equipments used by the RS232C.

5) The package sent from master station is named request, and the one from slave station os named response.

6) The slave station can only respond to one request from the master station in any case.

2.2 Transfer Mode

MODBUS protocol can transfer data in ASCII or RTU mode. GPQM144 supports only the RTU mode, eight data bits, no parity, 1 stop bit.

2.3 MODBUS Package Structure Description

Each the MODBUS parcel consists of the following parts：

1) Address field
2) Function code field
3) Data field
4) Checksum field

2.3.1 Address Field

The length of the Address Field of MODBUS slave station is 1 byte, including the address of slave station sent from the package. The valid slave station address is ranged from 1 to 247. When the slave station received the package information of Address Field in the slave station which can match its own address, it should implement the command in the package. The domain of the package in response in the slave station is its own address.

2.3.2 Function Code Field

The length of function field in the package is 1 byte, which is used to inform the slave station what to operate. The package of response of the slave station, should include the same the same function field bytes. The function codes of GPQM144 are the following：

Function Code	Definitaion	Functions
0x01	Read relay status	Get the status of one or more relays in the current GPQM144 (0/1)
0x02	Read switch status	Get the status of one or more switch inputs in the current GPQM144 (0/1)
0x03	Read Register	Get one or more current register values in the current GPQM144
0x05	Remote Control Relay	Remote Control GPQM144 Relay
0x10	Set Register	Writes the specified value to one or more registers inside the GPQM144

2.3.3 Data Field

The length of Data Field is varies in length depending on its function. In general, MODBUS supports “BIG INDIAN” mode, it means high-order byte first, low-order byte second.
For example:
One 16 byte register value is 0x12AB; register is transmitted in below sequence:
High-order byte = 0x12
Low-order byte = 0x0AB

2.3.4 Check Field

The MODBUS-RTU mode uses a 16-bit CRC check. The transmitting device shall perform a CRC16 calculation on each of the data in the package, and the final result is stored in the inspection domain. The receiving device should also perform CRC16 calculation on each data in the package (except the check field) and compare the result field check fields. Only the same package can be accepted. The specific CRC check algorithm refers to Chapter 4.

2.4 Exception Responses

If a Modbus master device sends a noneffective command to a GPQM144 or attempts to read a noneffective holding register, an exception response will be generated. The exception response consists of the slave address, function code, error code, and error check field. The high order bit of the function code is set to 1 to indicate that the packet is an exception response.
Below list describes the meanings of exception codes:

Function Code	Meaning
01 illegal function code	GPQM144-Modbus support the function code include: 01H, 02H, 03H, 05H, and 10H. This code means the slave device receive an illegal function code, or the GPQM144 receive the error command.
02 illegal function code	GPQM144 receive the address referenced in the data field is an invalid address.
03 illegal function code	The requested register number is too long.

2.5 Broadcast Packets

The GPQM144 support broadcast commands when communicating in MODBUS mode.
Do write command 0x10 for timing.

Chapter 3 Communication Package

GPQM144-MODBUS supports 5 function codes. The standard MODBUS protocol only supports 16-bit data mode, which means that any measurement value can be transmitted up to 65535.
Section 3.1 describes the format of the GPQM144 read relay status package and response package. Section 3.2 describes the format of the GPQM144 read switch input status package and response package. Section 3.3 describes the format of the GPQM144 read data package and response package. The commands for relay control are described in Section 3.4. Section 3.5 will explain the format of the GPQM144 to write the data package and response package.

3.1 Read the Relay Output Status (Function Code 01H)

Use 01 command to read the relay status. Relays are addressed starting at 0: relay 1 is addressed as 0.

The relay status data in response packet is packed as one bit for one relay. 1= ON, 0 = OFF.
The LSB (Least Significant Bit) of the first data byte contains the request addressing output. Other relay is same as this, until to the high bit of this byte, and rank from low bit to high bit in the followed byte. If the return output Num. is not a multiple of 8, it will use zero to fill in the remainder bit of last data byte (until to the high bit of the byte). The byte count field specifies all byte num. of the data.

Request Packet (Master→GPQM144)			Response Packet （GPQM144→Master）	
Unit ID/ Slave	1 byte		Unit ID/ Slave address	1 byte

address				
01H (Function Code)	1 byte		01H (Function Code)	1 byte
Starting address	2 bytes		Byte num. (N)	1 byte
Relay num.	2 bytes		Relay status	N bytes
CRC check code	2 bytes		CRC check code	2 bytes

N = output num.÷ 8, if remainder ≠0, then N=N+1.

3.2 Read the Digital Input Status (Function Code 02H)

Use 02 command to read the status. Digital input are addressed starting at 0: Digital input 1 is addressed as 0.

The DI data in response packet is packed as one bit for one DI. 1= ON, 0 = OFF.
The LSB (Least Significant Bit) of the first data byte contains the request addressing output. Other DI is same as this, until to the high bit of this byte, and rank from low bit to high bit in the followed byte.
If the return output Num. is not a multiple of 8, it will use zero to fill in the remainder bit of last data byte (until to the high bit of the byte). The byte count field specifies all byte num. of the data.

Request Packet (Master→GPQM144)			Response Packet （GPQM144→Master）	
Unit ID/ Slave address	1 byte		Unit ID/ Slave address	1 byte
02H (Function Code)	1 byte		02H (Function Code)	1 byte
Starting address	2 bytes		Byte num. (N)	1 byte
DI num.	2 bytes		DI status	N bytes
CRC check code	2 bytes		CRC check code	2 bytes

N = output num.÷ 8, if remainder ≠0, then N=N+1.

3.3 Read Registers (Function Code 03H)

This command packet requests that the GPQM144 responds all valid registers. The value of reserved registers is 0.

Request Packet (Master→GPQM144)			Response Packet (GPQM144→Master)	
Unit ID/ Slave address	1 byte		Unit ID/ Slave address	1 byte
03 H (Function Code)	1 byte		03 H (Function Code)	1 byte
Start register address	2 bytes		Byte num. (2 * register num.)	1 byte

Registers num.	2 bytes		First register data	2 bytes
CRC check code	2 bytes		Second register data	2 bytes
			... ...	
			CRC check code	2 bytes

3.4 Relay Control (Function Code 05H)

The general relay can be operated with the 05 command, and the address starts from 0 (DO, RO sort: DO1.DO2, RO1~RO4).

The data field is 0xFF00, the relay is closed; the data field is 0x0000, and the relay is disconnected.

Request Packet (Master→GPQM144)			Response Packet (GPQM144→Master)	
Unit ID/ Slave address	1 byte		Unit ID/ Slave address	1 byte
05 H (Function Code)	1 byte		05 H (Function Code)	1 byte
Start register address	2 bytes		Start register address	2 bytes
Data field	FF		Data field	FF
Data field	00		Data field	00
CRC check code	2 bytes		CRC check code	2 bytes

3.5Write register (function code 16H)

This command allows the primary station to configure the GPQM144 operating parameters. The following is the data format：

Request Packet (Master→GPQM144)			Response Packet (GPQM144→Master)	
Slave address	1 byte		Slave address	1 byte
Function code 10H	1 byte		Function code 10H	1 byte
Start address	2 bytes		Start address	2 bytes
Number of registers	2 bytes		Number of registers	2 bytes
Number of bytes (2* number of registers)	1 byte		CRC check code	2 bytes
First register data				
Second register data				
…….				
CRC check code	2 bytes			

Note: GPQM144 presume all registers are continuous from the first one.

Chapter 4 CRC-16 Calculation

This part describes CRC-16 calculation process. Bytes in the frame is defined as a string of binary data (0,1). The 16th checksum obtained in this way: the serial data stream to be multiplied by 216, then dividing by the generator polynomial (X16 + X15, + X2 + 1), the process in binary is 1100000000000101. Quotient is ignored, the16bytes remainder is the CRC value. In the calculation of the CRC-16 value, all arithmetic modulo is the modulo two or XOR (X0R) algorithm.

To generate CRC-16 checksum, follow these steps:

1）The most significant bit of omission generator, and reverse the bits order, form a new polynomial, the result is 1010000000000001 or hexadecimal A001.

2）Put all 1 or hexadecimal FFFF into 16-bit register.

3）Use 16 medium or low-order byte to carry out XOR calculation of the first data byte, the result to be stored in 16 registers.

4）Move the 16-bit register one bit to the right, If the overflow bit is 1, then turn to Step 5, otherwise turn to Step 6.

5）Use the new generator polynomial to carry out the MOR calculation to the 16-bit registers, and store the result to 16 steps.

6）Repeat step 4, until the shift bit unit is 8 times.

7）Use first order bytes of 16-bit register to implement XOR calculation to the next data bytes, and store the result to 16-bit register.

8）Repeat step 4-7, until all the bytes in the package all calculated by 16-bit register.

The content of 16-bit register is CRC-16.

The following example is CRC calculation for hex bytes 6403.

steps	bytes	action	register	bit#	Bit shift
2		Primary value	1111 1111 1111 1111		
	1	Input the first byte	0000 0000 0110 0100		
3		XOR	1111 1111 1001 1011		
4		Right 1 bit	0111 1111 1100 1101	1	1
5a		XOR polynomial	1101 1111 1100 1100		
4		Right 1 bit	0110 1111 1110 0110	2	0
4		Right 1 bit	0011 0111 1111 0011	3	0
4		Right 1 bit	0001 1011 1111 1001	4	1
5a		XOR polynomial	1011 1011 1111 1000		
4		Right 1 bit	0101 1101 1111 1100	5	0
4		Right 1 bit	0010 1110 1111 1110	6	0
4		Right 1 bit	0001 0111 0111 1111	7	0

4		Right 1 bit	0000 1011 1011 1111	8	1
5a		XOR polynomial	1010 1011 1011 1110		
	2	Put to the second byte	0000 0000 0000 0011		
7		XOR	1010 1011 1011 1101		
4		Right 1 bit	0101 0101 1101 1110	1	1
5a		XOR polynomial	1111 0101 1101 1111		
4		Right 1 bit	0111 1010 1110 1111	2	1
5a		XOR polynomial	1101 1010 1110 1110		
4		Right 1 bit	0110 1101 0111 0111	3	0
4		Right 1 bit	0011 0110 1011 1011	4	1
5a		XOR polynomial	1001 0110 1011 1010		
4		Right 1 bit	0100 1011 0101 1101	5	0
4		Right 1 bit	0010 0101 1010 1110	6	1
5a		XOR polynomial	1000 0101 1010 1111		
4		Right 1 bit	0100 0010 1101 0111	7	1
5a		XOR polynomial	1110 0010 1101 0110		
4		Right 1 bit	0111 0001 0110 1011	8	0
		CRC-16	0111 0001 0110 1011		

Chapter 5 GPQM144 Register Instruction

All GPQM144 registers in the following documents do not contain the base address. When a register with address XXXXX in GPQM144 is requested, the primary station actually reads XXXXX. For example, request 100 registers in GPQM144, the actual station register number is 100.

Data type description

type of data	description
U8	Unsigned 8-bit integer
S8	Signed 8-bit integer
U16	Unsigned 16-bit integer
S16	Signed 16-bit integer
U32	Unsigned 32-bit integer
S32	Signed 32-bit integer

FP32	Single precision floating point number
U64	Unsigned 64-bit integer
S64	Signed 64-bit integer

5.1 Real-time data register

5.1.1 Basic data register

Register	Attribute	Description	Data Type	Remarks
0	RO	AB line voltage	FP32	V
2	RO	BC line voltage	FP32	V
4	RO	CA line voltage	FP32	V
6	RO	Three-phase average line voltage	FP32	V
8	RO	Phase A voltage	FP32	V[Note 1]
10	RO	Phase B voltage	FP32	V
12	RO	Phase C voltage	FP32	V
14	RO	Three-phase average voltage	FP32	V
16	RO	Phase A current	FP32	A
18	RO	Phase B current	FP32	A
20	RO	Phase C current	FP32	A
22	RO	Three-phase average current	FP32	A
24	RO	Neutral line voltage	FP32	V
26	RO	Neutral current	FP32	A
28	RO	frequency	FP32	Hz
30	RO	Phase A active power	FP32	W
32	RO	Phase B active power	FP32	W
34	RO	Phase C active power	FP32	W
36	RO	Total active power	FP32	W
38	RO	Phase A reactive power	FP32	var
40	RO	Phase B reactive power	FP32	var
42	RO	Phase C reactive power	FP32	var
44	RO	Total reactive power	FP32	var
46	RO	A phase apparent power	FP32	VA
48	RO	B phase apparent power	FP32	VA
50	RO	C-phase apparent power	FP32	VA
52	RO	Total apparent power	FP32	VA
54	RO	Phase A power factor	FP32	
56	RO	B phase power factor	FP32	
58	RO	Phase C power factor	FP32	

60	RO	Total power factor	FP32	
80	RO	Switch input state	U16	
81	RO	Reserved		
82	RO	Relay output status	U16	[Note 2]
83	RO	Reserved		
84	RO	Reserved	U32	
86	RO	operation hours	U32	×0.1 hour
88	RO	Overrun status	U32	[Note 3]
90	RO	SOE record count	U32	
92	RO	PQ record count	U32	
94	RO	Waveform record group 1 count	U32	
96	RO	Waveform record group 2 count	U32	

[Note 1] For DELTA wiring, phase voltage and phase split power data are invalid. This type of data is valid only for WYE wiring.

[Note 2] Relay output status sequence is RO1~RO4, DO1~DO2

[Note 3] Overrun status register

……	Bit23	……	Bit3	Bit2	Bit1	Bit0
……	Over limit 24	……	Over limit 4	Over limit 3	Over limit 2	Over limit 1

Alarm status register, bits 0 to 23 indicate the status of the over-limit group 1 to 24: 1 indicates that the over-limit event occurs, and 0 indicates that the over-limit event has not occurred or is not input.

5.1.2Fundamental data register

Register	Attribute	Description	Data Type	Remarks
120	RO	A phase / AB line fundamental voltage rms value	FP32	V[Note 1]
122	RO	B phase / BC line fundamental voltage rms	FP32	V
124	RO	C-phase / CA line fundamental voltage rms	FP32	V
126	RO	A phase fundamental current RMS	FP32	A
128	RO	B-phase fundamental current RMS	FP32	A
130	RO	C-phase fundamental current RMS	FP32	A
132	RO	Neutral line fundamental voltage rms	FP32	V

134	RO	Neutral line fundamental current RMS	FP32	A
136	RO	A-phase fundamental active power	FP32	W
138	RO	B-phase fundamental active power	FP32	W
140	RO	C-phase fundamental active power	FP32	W
142	RO	Total fundamental active power	FP32	W
144	RO	Phase A fundamental reactive power	FP32	var
146	RO	B-phase fundamental reactive power	FP32	var
148	RO	C-phase fundamental reactive power	FP32	var
150	RO	Total fundamental reactive power	FP32	var
152	RO	Phase A fundamental wave apparent power	FP32	VA
154	RO	B-phase fundamental wave apparent power	FP32	VA
156	RO	C-phase fundamental wave apparent power	FP32	VA
158	RO	Total fundamental apparent power	FP32	VA
160	RO	Phase A fundamental power factor	FP32	VA
162	RO	B-phase fundamental power factor	FP32	VA
164	RO	C-phase fundamental power factor	FP32	VA
166	RO	Total fundamental power factor	FP32	VA
168	RO	Phase A fundamental voltage phase angle	FP32	°
170	RO	Phase B fundamental voltage phase angle	FP32	°
172	RO	Phase C fundamental voltage phase angle	FP32	°
174	RO	Phase A fundamental wave phase angle	FP32	°
176	RO	Phase B fundamental current phase angle	FP32	°

178	R0	Phase C fundamental wave phase angle	FP32	°
180	R0	Neutral line fundamental voltage phase angle	FP32	°
182	R0	Neutral line fundamental current phase angle	FP32	°

[Note 1] When DELTA is wired, the fundamental RMS value of the line voltage is transmitted, and the phase-separated fundamental power data is invalid.

5.1.3 Pulse count register

Register	Attribute	Description	Data Type	Remarks
200	R0	DI1 pulse count	U32	
202	R0	DI2 pulse count	U32	
204	R0	DI3 pulse count	U32	
206	R0	DI4 pulse count	U32	
208	R0	DI5 pulse count	U32	
210	R0	DI6 pulse count	U32	
212	R0	DI7 pulse count	U32	
214	R0	DI8 pulse count	U32	

5.2Energy data register

5.2.1Full wave energy data register

Register	Attribute	Description	Data Type	Remarks
300	R0	Input active energy (integer)	U32	kWh
302	R0	Input active energy (decimal places)	U16	×0.001kWh
303	R0	Output active energy (integer bit)	U32	kWh
305	R0	Output active energy (decimal places)	U16	×0.001kWh
306	R0	Active energy sum (integer)	U32	kWh
308	R0	Sum of active energy (decimal places)	U16	×0.001kWh
309	R0	Active energy net value (integer number)	U32	kWh
311	R0	Active energy net value (decimal places)	U16	×0.001kWh
312	R0	Input reactive energy (integer)	U32	kvarh

314	RO	Input reactive energy (decimal places)	U16	×0.001kvarh
315	RO	Output reactive energy (integer bit)	U32	kvarh
317	RO	Output reactive energy (decimal places)	U16	×0.001kvarh
318	RO	Sum of reactive energy (integer)	U32	kvarh
320	RO	Sum of reactive energy (decimal places)	U16	×0.001kvarh
321	RO	Reactive energy net value (integer number)	U32	kvarh
323	RO	Reactive energy net value (decimal places)	U16	×0.001kvarh
324	RO	Input apparent energy (integer)	U32	kVAh
326	RO	Input apparent energy (decimal places)	U16	×0.001kVAh
327	RO	Output apparent energy (integer)	U32	kVAh
329	RO	Output apparent energy (decimal places)	U16	×0.001kVAh
330	RO	Apparent energy sum (integer)	U32	kVAh
332	RO	Apparent energy sum (decimal places)	U16	×0.001kVAh
333	RO	Apparent electricity net value (integer number)	U32	kVAh
335	RO	Apparent electricity net value (decimal places)	U16	×0.001kVAh
336	RO	First quadrant reactive energy (integer position)	U32	kvarh
338	RO	First quadrant reactive energy (decimal places)	U16	×0.001kvarh
339	RO	Second quadrant reactive energy (integer position)	U32	kvarh
341	RO	Second quadrant reactive energy (decimal places)	U16	×0.001kvarh
342	RO	Third quadrant reactive energy (integer position)	U32	kvarh
344	RO	Third quadrant reactive energy (decimal places)	U16	×0.001kvarh
345	RO	Fourth quadrant reactive energy (integer position)	U32	kvarh

347	RO	Fourth quadrant reactive energy (decimal places)	U16	×0.001kvarh
348	RO	Phase A input active energy (integer position)	U32	kWh[Note 1]
350	RO	Phase A input active energy (decimal places)	U16	×0.001kWh
351	RO	Phase A output active energy (integer position)	U32	kWh
353	RO	Phase A output active energy (decimal places)	U16	×0.001kWh
354	RO	Phase A input reactive energy (integer)	U32	kvarh
356	RO	Phase A input reactive energy (decimal places)	U16	×0.001kvarh
357	RO	Phase A output reactive energy (integer)	U32	kvarh
359	RO	Phase A output reactive energy (decimal places)	U16	×0.001kvarh
360	RO	Phase B input active energy (integer position)	U32	kWh
362	RO	Phase B input active energy (decimal places)	U16	×0.001kWh
363	RO	Phase B output active energy (integer position)	U32	kWh
365	RO	Phase B output active energy (decimal places)	U16	×0.001kWh
366	RO	Phase B input reactive energy (integer position)	U32	kvarh
368	RO	Phase B input reactive energy (decimal places)	U16	×0.001kvarh
369	RO	Phase B output reactive energy (integer)	U32	kvarh
371	RO	Phase B output reactive energy (decimal places)	U16	×0.001kvarh
372	RO	Phase C input active energy (integer position)	U32	kWh
374	RO	Phase C input active energy (decimal places)	U16	×0.001kWh
375	RO	Phase C output active energy (integer position)	U32	kWh

377	RO	Phase C output active energy (decimal places)	U16	×0.001kWh
378	RO	Phase C input reactive energy (integer position)	U32	kvarh
380	RO	Phase C input reactive energy (decimal places)	U16	×0.001kvarh
381	RO	Phase C output reactive energy (integer position)	U32	kvarh
383	RO	Phase C output reactive energy (decimal places)	U16	×0.001kvarh

[Note 1] In the DELTA mode, the phase-separated energy data is invalid.

5.2.2 Fundamental and harmonic energy data registers

Register	Attribute	Description	Data Type	Remarks
400	RO	Fundamental input active energy (integer bit)	U32	kWh
402	RO	Fundamental input active energy (decimal places)	U16	×0.001kWh
403	RO	Fundamental output active energy (integer bit)	U32	kWh
405	RO	Fundamental output active energy (decimal places)	U16	×0.001kWh
406	RO	Fundamental input reactive energy (integer bit)	U32	kvarh
408	RO	Fundamental input reactive energy (decimal places)	U16	×0.001kvarh
409	RO	Fundamental output reactive energy (integer bit)	U32	kvarh
411	RO	Fundamental output reactive energy (decimal places)	U16	×0.001kvarh
412	RO	2nd harmonic input active energy (integer bit)	U32	kWh
414	RO	2nd harmonic input active energy (decimal places)	U16	×0.001kWh
415	RO	2nd harmonic output active energy (integer bit)	U32	kWh
417	RO	2nd harmonic output active energy (decimal places)	U16	×0.001kWh
418	RO	2nd harmonic input reactive energy (integer bit)	U32	kvarh

420	RO	2nd harmonic input reactive energy (decimal places)	U16	×0.001kvarh
421	RO	2nd harmonic wave output reactive energy (integer bit)	U32	kvarh
423	RO	2nd harmonic wave output reactive energy (decimal places)	U16	×0.001kvarh
424	RO	3rd harmonic input active energy (integer bit)	U32	kWh
426	RO	3rd harmonic input active energy (decimal places)	U16	×0.001kWh
427	RO	3rd harmonic output active energy (integer bit)	U32	kWh
429	RO	3rd harmonic output active energy (decimal places)	U16	×0.001kWh
430	RO	3rd harmonic input reactive energy (integer position)	U32	kvarh
432	RO	3rd harmonic input reactive energy (decimal places)	U16	×0.001kvarh
433	RO	3rd harmonic wave output reactive energy (integer bit)	U32	kvarh
435	RO	3rd harmonic wave output reactive energy (decimal places)	U16	×0.001kvarh
436	RO	4th harmonic input active energy (integer position)	U32	kWh
438	RO	4th harmonic input active energy (decimal places)	U16	×0.001kWh
439	RO	4th harmonic output active energy (integer bit)	U32	kWh
441	RO	4th harmonic output active energy (decimal places)	U16	×0.001kWh
442	RO	4th harmonic input reactive energy (integer bit)	U32	kvarh
444	RO	4th harmonic input reactive energy (decimal places)	U16	×0.001kvarh
445	RO	4th harmonic wave output reactive energy (integer bit)	U32	kvarh
447	RO	4th harmonic wave output reactive energy (decimal places)	U16	×0.001kvarh
448	RO	5th harmonic input active energy (integer position)	U32	kWh

450	RO	5th harmonic input active energy (decimal places)	U16	×0.001kWh
451	RO	5th harmonic output active energy (integer position)	U32	kWh
453	RO	5th harmonic output active energy (decimal places)	U16	×0.001kWh
454	RO	5th harmonic input reactive energy (integer bit)	U32	kvarh
456	RO	5th harmonic input reactive energy (decimal places)	U16	×0.001kvarh
457	RO	5th harmonic wave output reactive energy (integer bit)	U32	kvarh
459	RO	5th harmonic wave output reactive energy (decimal places)	U16	×0.001kvarh
460~471	RO	6		
472~483	RO	7		
484~495	RO	8		
496~507	RO	9		
508~519	RO	10		
520~531	RO	11		
532~543	RO	12		
544~555	RO	13		
556~567	RO	14		
568~579	RO	15		
580~591	RO	16		
592~603	RO	17		
604~615	RO	18		
616~627	RO	19		
628~639	RO	20		
640~651	RO	21		
652~663	RO	22		
664~675	RO	23		
676~687	RO	24		
688~699	RO	25		
700~711	RO	26		
712~723	RO	27		
724~735	RO	28		
736~747	RO	29		
748~759	RO	30		
760~771	RO	31		

5.3 energy quality data register

5.3.1 Basic data register

Register	Attribute	Description	Data Type	Remarks
800	RO	Phase A voltage total harmonic distortion rate	FP32	100%[Note 1]
802	RO	Phase B voltage total harmonic distortion rate	FP32	100%[Note 2]
804	RO	Phase C voltage total harmonic distortion rate	FP32	100%
806	RO	Phase A current total harmonic distortion rate	FP32	100%
808	RO	Phase B current total harmonic distortion rate	FP32	100%
810	RO	Phase C current total harmonic distortion rate	FP32	100%
812	RO	Neutral line voltage total harmonic distortion rate	FP32	100%
814	RO	Neutral current total harmonic distortion rate	FP32	100%
816	RO	Phase A voltage crest factor	FP32	
818	RO	Phase B voltage crest factor	FP32	
820	RO	Phase C voltage crest factor	FP32	
822	RO	Phase A current crest factor	FP32	
824	RO	Phase B current crest factor	FP32	
826	RO	Phase C current crest factor	FP32	
828	RO	Phase A current K factor	FP32	
830	RO	Phase B current K factor	FP32	
832	RO	Phase C current K factor	FP32	
834	RO	Positive sequence voltage	FP32	V
836	RO	Negative sequence voltage	FP32	V
838	RO	Zero sequence voltage	FP32	V
840	RO	Positive sequence current	FP32	A
842	RO	Negative sequence current	FP32	A
844	RO	Zero sequence current	FP32	A
846	RO	Negative sequence voltage imbalance	FP32	100%
848	RO	Zero sequence voltage imbalance	FP32	100%

850	R0	Negative sequence current imbalance	FP32	100%
852	R0	Zero sequence current imbalance	FP32	100%
854	R0	Phase A voltage deviation	FP32	100%
856	R0	B phase voltage deviation	FP32	100%
858	R0	Phase C voltage deviation	FP32	100%
860	R0	AB line voltage deviation	FP32	100%
862	R0	BC line voltage deviation	FP32	100%
864	R0	CA line voltage deviation	FP32	100%
866	R0	Deviation of phase A voltage	FP32	100%
868	R0	Biphase voltage deviation	FP32	100%
870	R0	Deviation under C-phase voltage	FP32	100%
872	R0	Deviation under the line voltage of AB	FP32	100%
874	R0	BC line voltage deviation	FP32	100%
876	R0	Deviation under CA line voltage	FP32	100%
878	R0	Frequency deviation	FP32	Hz
880	R0	Phase A voltage short-time flicker	FP32	
882	R0	B phase voltage short time flicker	FP32	
884	R0	C-phase voltage short-time flicker	FP32	
886	R0	Phase A voltage flicker	FP32	
888	R0	B phase voltage long time flicker	FP32	
890	R0	Long-term flicker of phase C voltage	FP32	

[Note 1] When DELTA is wired, the voltage distortion rate and the flicker data register transmit the line voltage data; when WYE is wired, the corresponding register transmits the phase voltage data.
[Note 2] The meaning of 100% in this paragraph: the unit is %, the actual data needs to be multiplied by 100.

5.3.2 Harmonic data register

Register	Attribute	Description	Data Type	Remarks
900	R0	Phase A 2nd harmonic voltage content rate	FP32	100%[Note 1]
902	R0	Phase A 3rd harmonic voltage content rate	FP32	100%

904	R0	Phase A 4th harmonic voltage content rate	FP32	100%
	R0	...		
1022	R0	A-phase 63th harmonic voltage content rate	FP32	100%
1024	R0	B phase 2nd harmonic voltage content rate	FP32	100%
	R0	B-phase 3rd harmonic voltage content rate	FP32	100%
	R0	B phase 4th harmonic voltage content rate	FP32	100%
	R0	...		
1146	R0	B-phase 63th harmonic voltage content rate	FP32	100%
1148	R0	C-phase 2nd harmonic voltage content rate	FP32	100%
	R0	C-phase 3rd harmonic voltage content rate	FP32	100%
	R0	C-phase 4th harmonic voltage content rate	FP32	100%
	R0	...		
	R0	C-phase 63th harmonic voltage content rate	FP32	100%
1272	R0	A phase 2 harmonic current content rate	FP32	100%
	R0	Phase A 3rd harmonic current content	FP32	100%
	R0	A phase 4th harmonic current content rate	FP32	100%
	R0	...		
	R0	A phase 63 harmonic current content rate	FP32	100%
1396	R0	B phase 2 harmonic current content rate	FP32	100%
	R0	B-phase 3rd harmonic current content rate	FP32	100%
	R0	B phase 4th harmonic current content rate	FP32	100%
	R0	...		
	R0	B-phase 63th harmonic current content rate	FP32	100%

1520	R0	C-phase 2nd harmonic current content rate	FP32	100%
	R0	C-phase 3rd harmonic current content rate	FP32	100%
	R0	C-phase 4th harmonic current content rate	FP32	100%
	R0	...		
	R0	C-phase 63th harmonic current content rate	FP32	100%
1644	R0	Neutral 2nd harmonic voltage content rate	FP32	100%
	R0	Neutral 2nd harmonic voltage content rate	FP32	100%
	R0	Neutral 2nd harmonic voltage content rate	FP32	100%
	R0	...		
	R0	Neutral 63rd harmonic voltage content rate	FP32	100%
1768	R0	Neutral second harmonic current content	FP32	100%
	R0	Neutral second harmonic current content	FP32	100%
	R0	Neutral second harmonic current content	FP32	100%
	R0	...		
	R0	Neutral 63rd harmonic current content rate	FP32	100%
1892	R0	Phase A 2nd harmonic voltage RMS	FP32	V
	R0	Phase A 3rd harmonic voltage RMS	FP32	V
	R0	A phase 4th harmonic voltage RMS	FP32	V
	R0	...		
	R0	A phase 63 harmonic voltage RMS	FP32	V
2016	R0	B phase 2nd harmonic voltage RMS	FP32	V

	RO	B phase 3rd harmonic voltage RMS	FP32	V
	RO	B phase 4th harmonic voltage RMS	FP32	V
	RO	...		
	RO	B phase 63th harmonic voltage RMS	FP32	V
2140	RO	C-phase 2nd harmonic voltage RMS	FP32	V
	RO	C-phase 3rd harmonic voltage RMS	FP32	V
	RO	C-phase 4th harmonic voltage RMS	FP32	V
	RO	...		
	RO	Phase C 63th harmonic voltage RMS	FP32	V
2264	RO	A phase 2 harmonic current RMS	FP32	A
	RO	Phase A 3rd harmonic current RMS	FP32	A
	RO	A phase 4th harmonic current RMS	FP32	A
	RO	...		
	RO	A phase 63 harmonic current RMS	FP32	A
2388	RO	B phase 2nd harmonic current RMS	FP32	A
	RO	B phase 3rd harmonic current RMS	FP32	A
	RO	B phase 4th harmonic current RMS	FP32	A
	RO	...		
	RO	B phase 63 harmonic current RMS	FP32	A
2512	RO	C-phase 2nd harmonic current RMS	FP32	A
	RO	C-phase 3rd harmonic current RMS	FP32	A

	RO	C-phase 4th harmonic current RMS	FP32	A
	RO	...		
	RO	C-phase 63th harmonic current RMS	FP32	A
2636	RO	Neutral 2nd harmonic voltage RMS	FP32	V
	RO	Neutral 3rd harmonic voltage RMS	FP32	V
	RO	Neutral 4th harmonic voltage RMS	FP32	V
	RO	...		
	RO	Neutral 63rd harmonic voltage RMS	FP32	V
2760	RO	Neutral 2nd harmonic current RMS	FP32	A
	RO	Neutral 3rd harmonic current RMS	FP32	A
	RO	Neutral 4th harmonic current RMS	FP32	A
	RO	...		
	RO	Neutral 63rd harmonic current RMS	FP32	A
2884	RO	Phase A 2nd harmonic active power	FP32	W
	RO	Phase A 3rd harmonic active power	FP32	W
	RO	Phase A 4th harmonic active power	FP32	W
	RO	...		
	RO	Phase A 63rd harmonic active power	FP32	W
3008	RO	B-phase 2nd harmonic active power	FP32	W
	RO	B-phase 3rd harmonic active power	FP32	W
	RO	B-phase 4th harmonic active power	FP32	W
	RO	...		

	RO	Phase B 63th harmonic active power	FP32	W
3132	RO	C-phase 2nd harmonic active power	FP32	W
	RO	C-phase 3rd harmonic active power	FP32	W
	RO	C-phase 4th harmonic active power	FP32	W
	RO	...		
	RO	Phase C 63rd harmonic active power	FP32	W
3256	RO	Phase A 2nd harmonic reactive power	FP32	var
	RO	Phase A 3rd harmonic reactive power	FP32	var
	RO	Phase A 4th harmonic reactive power	FP32	var
	RO	...		
	RO	Phase A 63rd harmonic reactive power	FP32	var
3380	RO	B-phase 2nd harmonic reactive power	FP32	var
	RO	B-phase 3rd harmonic reactive power	FP32	var
	RO	B-phase 4th harmonic reactive power	FP32	var
	RO	...		
	RO	Phase B 63 harmonic reactive power	FP32	var
3504	RO	C-phase 2nd harmonic reactive power	FP32	var
	RO	C-phase 3rd harmonic reactive power	FP32	var
	RO	C-phase 4th harmonic reactive power	FP32	var
	RO	...		
	RO	Phase C 63rd harmonic reactive power	FP32	var
3628	RO	Phase A 2nd harmonic apparent power	FP32	VA

	RO	Phase A 3rd harmonic apparent power	FP32	VA
	RO	Phase A 4th harmonic apparent power	FP32	VA
	RO	...		
	RO	A phase 63 harmonic apparent power	FP32	VA
3752	RO	B-phase 2nd harmonic apparent power	FP32	VA
	RO	B-phase 3rd harmonic apparent power	FP32	VA
	RO	B-phase 4th harmonic apparent power	FP32	VA
	RO	...		
	RO	B phase 63 harmonic apparent power	FP32	VA
3876	RO	C-phase 2nd harmonic apparent power	FP32	VA
	RO	C-phase 3rd harmonic apparent power	FP32	VA
	RO	C-phase 4th harmonic apparent power	FP32	VA
	RO	...		
	RO	C-phase 63 harmonic apparent power	FP32	VA
4000	RO	Phase A 2nd harmonic voltage phase angle	FP32	°
	RO	Phase A 3rd harmonic voltage phase angle	FP32	°
	RO	Phase A 4th harmonic voltage phase angle	FP32	°
	RO	...		
	RO	Phase A 63rd harmonic voltage phase angle	FP32	°
4124	RO	Phase B second harmonic voltage phase angle	FP32	°
	RO	Phase B 3rd harmonic voltage phase angle	FP32	°
	RO	B phase 4th harmonic voltage phase angle	FP32	°

	R0	...		
	R0	Phase B 63th harmonic voltage phase angle	FP32	°
4248	R0	Phase C second harmonic voltage phase angle	FP32	°
	R0	Phase C 3rd harmonic voltage phase angle	FP32	°
	R0	Phase C 4th harmonic voltage phase angle	FP32	°
	R0	...		
	R0	Phase C 63th harmonic voltage phase angle	FP32	°
4372	R0	Phase A 2nd harmonic current phase angle	FP32	°
	R0	Phase A 3rd harmonic current phase angle	FP32	°
	R0	Phase A 4th harmonic current phase angle	FP32	°
	R0	...		
	R0	Phase A 63rd harmonic current phase angle	FP32	°
4496	R0	Phase B second harmonic current phase angle	FP32	°
	R0	Phase B 3rd harmonic current phase angle	FP32	°
	R0	Phase B 4th harmonic current phase angle	FP32	°
	R0	...		
	R0	Phase B 63th harmonic current phase angle	FP32	°
4620	R0	Phase C harmonic current phase angle	FP32	°
	R0	Phase C 3rd harmonic current phase angle	FP32	°
	R0	Phase C harmonic current phase angle	FP32	°
	R0	...		
	R0	Phase C 63th harmonic current phase angle	FP32	°

4744	R0	Neutral 2nd harmonic voltage phase angle	FP32	°
	R0	Neutral 3rd harmonic voltage phase angle	FP32	°
	R0	Neutral 4th harmonic voltage phase angle	FP32	°
	R0	...		
	R0	Neutral 63th harmonic voltage phase angle	FP32	°
4868	R0	Neutral second harmonic current phase angle	FP32	°
	R0	Neutral 3rd harmonic current phase angle	FP32	°
	R0	Neutral 4th harmonic current phase angle	FP32	°
	R0	...		
4990	R0	Neutral 63th harmonic current phase angle	FP32	°

[Note 1] The meaning of 100% in this paragraph: the unit is %, the actual data needs to be multiplied by 100.

5.3.3 Interharmonic data register

Register	Attribute	Description	Data Type	Remarks
5000	R0	A-phase voltage harmonic total distortion rate	FP32	100%[Note 1]
5002	R0	Total distortion rate of phase B voltage	FP32	100%
5004	R0	C-phase voltage harmonic total distortion rate	FP32	100%
5006	R0	Total phase distortion of phase A current	FP32	100%
5008	R0	Total phase distortion of phase B current	FP32	100%
5010	R0	C-phase current harmonic total distortion rate	FP32	100%
5012	R0	Neutral line voltage harmonic total distortion rate	FP32	100%
5014	R0	Neutral current interharmonic total distortion rate	FP32	100%
5016	R0	Phase A harmonic voltage content rate	FP32	100%

	RO	A-phase 2nd harmonic voltage content rate	FP32	100%
	RO	Phase A 3rd harmonic voltage content rate	FP32	100%
	RO	A-phase 4th harmonic voltage content rate	FP32	100%
	RO	...		
	RO	A phase 63 interharmonic voltage content rate	FP32	100%
5142	RO	B-phase 1st harmonic voltage content rate	FP32	100%
	RO	B-phase 2nd harmonic voltage content rate	FP32	100%
	RO	B-phase 3rd harmonic voltage content rate	FP32	100%
	RO	B phase 4th harmonic voltage content rate	FP32	100%
	RO	...		
	RO	Phase B 63 interharmonic voltage content	FP32	100%
5268	RO	Phase C interharmonic voltage content	FP32	100%
	RO	C-phase 2nd harmonic voltage content rate	FP32	100%
	RO	C-phase 3rd harmonic voltage content rate	FP32	100%
	RO	C-phase 4th harmonic voltage content rate	FP32	100%
	RO	...		
	RO	C-phase 63 interharmonic voltage content rate	FP32	100%
5394	RO	Phase A harmonic current content rate	FP32	100%
	RO	Phase A 2 interharmonic current content	FP32	100%
	RO	A-phase 3rd harmonic current content rate	FP32	100%
	RO	A phase 4th harmonic current content rate	FP32	100%
	RO	...		

	RO	A phase 63 interharmonic current content rate	FP32	100%
5520	RO	B-phase 1st harmonic current content rate	FP32	100%
	RO	B-phase 2nd harmonic current content rate	FP32	100%
	RO	B-phase 3rd harmonic current content rate	FP32	100%
	RO	B-phase 4th harmonic current content rate	FP32	100%
	RO	...		
	RO	Phase B 63 interharmonic current content	FP32	100%
5646	RO	Phase C harmonic current content	FP32	100%
	RO	C-phase 2nd harmonic current content rate	FP32	100%
	RO	C-phase 3rd harmonic current content rate	FP32	100%
	RO	C-phase 4th harmonic current content rate	FP32	100%
	RO	...		
	RO	C-phase 63 interharmonic current content	FP32	100%
5772	RO	Neutral line 1st harmonic voltage content rate	FP32	100%
	RO	Neutral 2nd harmonic voltage content rate	FP32	100%
	RO	Neutral line 3rd harmonic voltage content rate	FP32	100%
	RO	Neutral 4th harmonic voltage content rate	FP32	100%
	RO	...		
	RO	Neutral line 63 interharmonic voltage content rate	FP32	100%
5898	RO	Neutral line harmonic current content	FP32	100%
	RO	Neutral line 2 interharmonic current content	FP32	100%

	RO	Neutral line 3 interharmonic current content	FP32	100%
	RO	Neutral 4th harmonic current content rate	FP32	100%
	RO	...		
	RO	Neutral line 63 interharmonic current content rate	FP32	100%
6024	RO	A phase 1 interharmonic voltage rms value	FP32	V
	RO	A phase 2 interharmonic voltage rms value	FP32	V
	RO	A phase 3 interharmonic voltage rms value	FP32	V
	RO	A phase 4th harmonic voltage RMS	FP32	V
	RO	...		
	RO	A phase 63 interharmonic voltage rms value	FP32	V
6150	RO	B phase 1st harmonic voltage RMS	FP32	V
	RO	B phase 2nd harmonic voltage RMS	FP32	V
	RO	B phase 3rd harmonic voltage RMS	FP32	V
	RO	B phase 4th harmonic voltage rms value	FP32	V
	RO	...		
	RO	B phase 63 interharmonic voltage RMS	FP32	V
6276	RO	Phase C harmonic voltage RMS value	FP32	V
	RO	C-phase 2nd harmonic voltage RMS	FP32	V
	RO	Phase C harmonic voltage RMS value	FP32	V
	RO	Phase C harmonic voltage RMS value	FP32	V
	RO	...		
	RO	C-phase 63 interharmonic voltage RMS	FP32	V

6402	RO	A phase 1 interharmonic current RMS	FP32	A
	RO	A phase 2 interharmonic current RMS	FP32	A
	RO	A phase 3 interharmonic current RMS	FP32	A
	RO	A phase 4 interharmonic current RMS	FP32	A
	RO	...		
	RO	A phase 63 interharmonic current RMS	FP32	A
6528	RO	B phase 1 interharmonic current RMS	FP32	A
	RO	B phase 2nd harmonic current RMS	FP32	A
	RO	B phase 3 interharmonic current RMS	FP32	A
	RO	B phase 4th harmonic current RMS	FP32	A
	RO	...		
	RO	B phase 63 interharmonic current RMS	FP32	A
6654	RO	Phase C harmonic current RMS	FP32	A
	RO	C-phase 2nd harmonic current RMS	FP32	A
	RO	C-phase 3rd harmonic current RMS	FP32	A
	RO	C-phase 4th harmonic current RMS	FP32	A
	RO	...		
	RO	C phase 63 interharmonic current RMS	FP32	A
6780	RO	Neutral line 1st harmonic voltage RMS	FP32	V
	RO	Neutral line 2nd harmonic voltage RMS	FP32	V
	RO	Neutral line 3 times harmonic voltage RMS	FP32	V

	RO	Neutral line 4th harmonic voltage RMS	FP32	V
	RO	...		
	RO	Neutral line 63 interharmonic voltage rms	FP32	V
6906	RO	Neutral line 1st harmonic current RMS	FP32	A
	RO	Neutral line 2 interharmonic current RMS	FP32	A
	RO	Neutral line 3 interharmonic current RMS	FP32	A
	RO	Neutral line 4th harmonic current RMS	FP32	A
	RO	...		
	RO	Neutral line 63 interharmonic current RMS	FP32	A

[Note 1] The meaning of 100% in this paragraph: the unit is %, the actual data needs to be multiplied by 100.

5.4 Demand data register

Real-time demand：

Register	Attribute	Description	Data Type	Remarks
7100	RO	Phase A current demand	FP32	A
7102	RO	Phase B current demand	FP32	A
7104	RO	Phase C current demand	FP32	A
7106	RO	Input total active power demand	FP32	W
7108	RO	Output total active power demand	FP32	W
7110	RO	Input total reactive power demand	FP32	var
7112	RO	Output total reactive power demand	FP32	var
7114	RO	Input total apparent power demand	FP32	VA
7116	RO	Output total apparent power demand	FP32	VA

Forecast demand：

Register	Attribute	Description	Data Type	Remarks
7120	RO	Phase A current demand	FP32	A
7122	RO	Phase B current demand	FP32	A
7124	RO	Phase C current demand	FP32	A
7126	RO	Input total active power demand	FP32	W
7128	RO	Output total active power demand	FP32	W
7130	RO	Input total reactive power demand	FP32	var
7132	RO	Output total reactive power demand	FP32	var
7134	RO	Input total apparent power demand	FP32	VA
7136	RO	Output total apparent power demand	FP32	VA

Maximum demand

Register	Attribute	Description	Data Type	Remarks
7140	RO	Phase A current demand	FP32	A
7142	RO	time	U32	UNIX time
7144	RO	Phase B current demand	FP32	A
7146	RO	time	U32	UNIX time
7148	RO	Phase C current demand	FP32	A
7150	RO	time	U32	UNIX time
7152	RO	Input total active power demand	FP32	W
7154	RO	time	U32	UNIX time
7156	RO	Output total active power demand	FP32	W
7158	RO	time	U32	UNIX time
7160	RO	Input total reactive power demand	FP32	Var
7162	RO	time	U32	UNIX time
7164	RO	Output total reactive power demand	FP32	Var
7166	RO	time	U32	UNIX time
7168	RO	Input total apparent power demand	FP32	VA

7170	R0	time	U32	UNIX time
7172	R0	Output total apparent power demand	FP32	VA
7174	R0	time	U32	UNIX time

5.5 Maximum value data register

5.5.1 Real-time maximum value record register

Maximum

Register	Attribute	Description	Data Type	Remarks
7200	R0	AB line voltage maximum	FP32	V
7202	R0	time	U32	UNIX time
7204	R0	BC line voltage maximum	FP32	V
7206	R0	time	U32	UNIX time
7208	R0	CA line voltage maximum	FP32	V
7210	R0	time	U32	UNIX time
7212	R0	Three-phase average line voltage maximum	FP32	V
7214	R0	time	U32	UNIX time
7216	R0	Phase A voltage maximum	FP32	V
7218	R0	time	U32	UNIX time
7220	R0	B phase voltage maximum	FP32	V
7222	R0	time	U32	UNIX time
7224	R0	Phase C voltage maximum	FP32	V
7226	R0	time	U32	UNIX time
7228	R0	Three-phase average voltage maximum	FP32	V
7230	R0	time	U32	UNIX time
7232	R0	Phase A current maximum	FP32	A
7234	R0	time	U32	UNIX time
7236	R0	B phase current maximum	FP32	A
7238	R0	time	U32	UNIX time
7240	R0	Phase C current maximum	FP32	A
7242	R0	time	U32	UNIX time
7244	R0	Three-phase average current maximum	FP32	A
7246	R0	time	U32	UNIX time
7248	R0	Neutral line voltage maximum	FP32	V
7250	R0	time	U32	UNIX time
7252	R0	Neutral current maximum	FP32	A

7254	R0	time	U32	UNIX time
7256	R0	Frequency maximum	FP32	Hz
7258	R0	time	U32	UNIX time
7260	R0	A phase active power maximum	FP32	W
7262	R0	time	U32	UNIX time
7264	R0	B phase active power maximum	FP32	W
7266	R0	time	U32	UNIX time
7268	R0	Phase C active power maximum	FP32	W
7270	R0	time	U32	UNIX time
7272	R0	Total active power maximum	FP32	W
7274	R0	time	U32	UNIX time
7276	R0	Phase A reactive power maximum	FP32	Var
7278	R0	time	U32	UNIX time
7280	R0	B phase reactive power maximum	FP32	Var
7282	R0	time	U32	UNIX time
7284	R0	Phase C reactive power maximum	FP32	Var
7286	R0	time	U32	UNIX time
7288	R0	Total reactive power maximum	FP32	Var
7290	R0	time	U32	UNIX time
7292	R0	A phase apparent power maximum	FP32	VA
7294	R0	time	U32	UNIX time
7296	R0	B phase apparent power maximum	FP32	VA
7298	R0	time	U32	UNIX time
7300	R0	C phase apparent power maximum	FP32	VA
7302	R0	time	U32	UNIX time
7304	R0	Total apparent power	FP32	VA
7306	R0	time	U32	UNIX time
7308	R0	A phase voltage harmonic total distortion rate maximum	FP32	100%
7310	R0	time	U32	UNIX time
7312	R0	B phase voltage harmonic total distortion rate maximum	FP32	100%[Note 1]
7314	R0	time	U32	UNIX time
7316	R0	C-phase voltage harmonic total distortion rate maximum	FP32	100%
7318	R0	time	U32	UNIX time

7320	RO	A phase current harmonic total distortion rate maximum	FP32	100%
7322	RO	time	U32	UNIX time
7324	RO	B phase current harmonic total distortion rate maximum	FP32	100%
7326	RO	time	U32	UNIX time
7328	RO	C-phase current harmonic total distortion rate maximum	FP32	100%
7330	RO	time	U32	UNIX time
7332	RO	A phase current K factor maximum	FP32	
7334	RO	time	U32	UNIX time
7336	RO	B phase current K factor maximum	FP32	
7338	RO	time	U32	UNIX time
7340	RO	Phase C current K factor maximum	FP32	
7342	RO	time	U32	UNIX time
7344	RO	Voltage negative sequence imbalance	FP32	100%
7346	RO	time	U32	UNIX time
7348	RO	Voltage zero sequence imbalance	FP32	100%
7350	RO	time	U32	UNIX time
7352	RO	Current negative sequence imbalance	FP32	100%
7354	RO	time	U32	UNIX time
7356	RO	Current zero sequence imbalance	FP32	100%
7358	RO	time	U32	UNIX time
7360	RO	A phase short-term flicker maximum	FP32	
7362	RO	time	U32	UNIX time
7364	RO	B phase short-term flicker maximum	FP32	
7366	RO	time	U32	UNIX time
7368	RO	C-phase short-time flicker maximum	FP32	
7370	RO	time	U32	UNIX time
7372	RO	A phase long time flicker maximum	FP32	
7374	RO	time	U32	UNIX time

7376	RO	B phase long time flicker maximum	FP32	
7378	RO	time	U32	UNIX time
7380	RO	C phase long time flicker maximum	FP32	
7382	RO	time	U32	UNIX time

[Note 1] The meaning of 100% in this paragraph: the unit is %, the actual data needs to be multiplied by 100, and the meaning is also in the maximum and minimum values below.

Minimum

Register	Attribute	Description	Data Type	Remarks
7400	RO	AB line voltage minimum	FP32	V
7402	RO	time	U32	UNIX time
7404	RO	BC line voltage minimum	FP32	V
7406	RO	time	U32	UNIX time
7408	RO	CA line voltage minimum	FP32	V
7410	RO	time	U32	UNIX time
7412	RO	Three-phase average line voltage minimum	FP32	V
7414	RO	time	U32	UNIX time
7416	RO	Phase A voltage minimum	FP32	V
7418	RO	time	U32	UNIX time
7420	RO	B phase voltage minimum	FP32	V
7422	RO	time	U32	UNIX time
7424	RO	Phase C voltage minimum	FP32	V
7426	RO	time	U32	UNIX time
7428	RO	Three-phase average voltage minimum	FP32	V
7430	RO	time	U32	UNIX time
7432	RO	Phase A current minimum	FP32	A
7434	RO	time	U32	UNIX time
7436	RO	B phase current minimum	FP32	A
7438	RO	time	U32	UNIX time
7440	RO	C phase current minimum	FP32	A
7442	RO	time	U32	UNIX time
7444	RO	Three-phase average current minimum	FP32	A
7446	RO	time	U32	UNIX time
7448	RO	Neutral line voltage minimum	FP32	V

7450	RO	time	U32	UNIX time
7452	RO	Neutral current minimum	FP32	A
7454	RO	time	U32	UNIX time
7456	RO	Frequency minimum	FP32	Hz
7458	RO	time	U32	UNIX time
7460	RO	A phase active power minimum	FP32	W
7462	RO	time	U32	UNIX time
7464	RO	B phase active power minimum	FP32	W
7466	RO	time	U32	UNIX time
7468	RO	Phase C active power minimum	FP32	W
7470	RO	time	U32	UNIX time
7472	RO	Total active power minimum	FP32	W
7474	RO	time	U32	UNIX time
7476	RO	Phase A reactive power minimum	FP32	Var
7478	RO	time	U32	UNIX time
7480	RO	Phase B reactive power minimum	FP32	Var
7482	RO	time	U32	UNIX time
7484	RO	Phase C reactive power minimum	FP32	Var
7486	RO	time	U32	UNIX time
7488	RO	Total reactive power minimum	FP32	Var
7490	RO	time	U32	UNIX time
7492	RO	A phase apparent power minimum	FP32	VA
7494	RO	time	U32	UNIX time
7496	RO	B phase apparent power minimum	FP32	VA
7498	RO	time	U32	UNIX time
7500	RO	C phase apparent power minimum	FP32	VA
7502	RO	time	U32	UNIX time
7504	RO	Total apparent power minimum	FP32	VA
7506	RO	time	U32	UNIX time
7508	RO	A phase voltage harmonic total distortion rate minimum	FP32	100%
7510	RO	time	U32	UNIX time
7512	RO	B phase voltage harmonic total distortion rate minimum	FP32	100%
7514	RO	time	U32	UNIX time

7516	RO	C-phase voltage harmonic total distortion rate minimum	FP32	100%
7518	RO	time	U32	UNIX time
7520	RO	A phase current harmonic total distortion rate minimum	FP32	100%
7522	RO	time	U32	UNIX time
7524	RO	B phase current harmonic total distortion rate minimum	FP32	100%
7526	RO	time	U32	UNIX time
7528	RO	C-phase current harmonic total distortion rate minimum	FP32	100%
7530	RO	time	U32	UNIX time
7532	RO	A phase current K factor minimum	FP32	
7534	RO	time	U32	UNIX time
7536	RO	B phase current K factor minimum	FP32	
7538	RO	time	U32	UNIX time
7540	RO	Phase C current K factor minimum	FP32	
7542	RO	time	U32	UNIX time
7544	RO	Voltage negative sequence imbalance	FP32	100%
7546	RO	time	U32	UNIX time
7548	RO	Voltage zero sequence imbalance minimum	FP32	100%
7550	RO	time	U32	UNIX time
7552	RO	Current negative sequence imbalance	FP32	100%
7554	RO	time	U32	UNIX time
7556	RO	Current zero sequence imbalance	FP32	100%
7558	RO	time	U32	UNIX time
7560	RO	A phase short-term flicker minimum	FP32	
7562	RO	time	U32	UNIX time
7564	RO	B phase short-term flicker minimum	FP32	
7566	RO	time	U32	UNIX time
7568	RO	C-phase short-time flicker minimum	FP32	

7570	RO	time	U32	UNIX time
7572	RO	A phase long time flicker minimum	FP32	
7574	RO	time	U32	UNIX time
7576	RO	B phase long time flicker minimum	FP32	
7578	RO	time	U32	UNIX time
7580	RO	C phase long time flicker minimum	FP32	
7582	RO	time	U32	UNIX time

5.6Multiple tariff data register

Register	Attribute	Description	Data Type	Remarks
7600	RO	1# tariff input active energy (integer position)	U32	kWh
7602	RO	1# tariff input active energy (decimal places)	U16	×0.001kWh
7603	RO	1# tariff output active energy (integer position)	U32	kWh
7605	RO	1# tariff output active energy (decimal places)	U16	×0.001kWh
7606	RO	1# tariff input reactive energy (integer)	U32	kvarh
7608	RO	1# tariff input reactive energy (decimal places)	U16	×0.001kvarh
7609	RO	1# tariff output reactive energy (integer position)	U32	kvarh
7611	RO	1# tariff output reactive energy (decimal places)	U16	×0.001kvarh
7612	RO	1# tariff input apparent energy (integer)	U32	kVAh
7614	RO	1# tariff input apparent electricity (decimal places)	U16	×0.001 kVAh
7615	RO	1# tariff output apparent energy (integer)	U32	kVAh
7617	RO	1# tariff output apparent energy (decimal places)	U16	×0.001kVAh
7618~7635		2# tariff		
7636~7653		3# tariff		

7654~7671		4# tariff		
----------Read divider----------				
7672		1# tariff input maximum total active power demand	FP32	W
7674	RO	time	U32	UNIX time
7676		1# tariff output maximum total active power demand	FP32	W
7678	RO	time	U32	UNIX time
7680		1# tariff input maximum total reactive power demand	FP32	Var
7682	RO	time	U32	UNIX time
7684		1# tariff output maximum total reactive power demand	FP32	Var
7686	RO	time	U32	UNIX time
7688		1# tariff input apparent power demand	FP32	VA
7690	RO	time	U32	UNIX time
7692		1# tariff output apparent power demand	FP32	VA
7694	RO	time	U32	UNIX time
7696~7719		2# tariff maximum demand		
7720~7743		3# tariff maximum demand		
7744~7767		4# tariff maximum demand		

5.7 Device parameter register

5.7.1 Basic parameter register

Register	Attribute	Description	Data Type	Remarks
8000	RW	Wiring mode	U16	1: star (three-phase four-wire) 2: Angle (three-phase three-wire) Default star connection
8001	RW	PT primary side	U32	100~1000000
8003	RW	PT secondary side	U16	100~690
8004	RW	CT primary side	U16	1~50000
8005	RW	CT secondary side	U16	1~5
8006	RW	V4 PT primary side	U32	100~1000000
8008	RW	V4 PT secondary side	U16	100~690
8009	RW	I4 CT primary side	U16	1~50000

8010	RW	I4 CT secondary side	U16	1~5
8011	RW	Reserved		
8012	RW	Reserved		
8013	RW	Reserved		
8014	RW	Reserved		
8015	RW	Reserved		
8016	RW	Demand mode	U16	0: fixed mode 1: slip mode
8017	RW	Demand cycle	U16	0：5min 1：10min 2：15min 3：30min 4：60min
8018	RW	Sliding window size	U16	0：1min 1：2min 2：3min 3：5min
8019	RW	Predicted demand sensitivity	U16	70~99, default 70
8020	RO	Secondary side rated voltage	U16	100~690V[Note 1]
8021	RO	Secondary side rated current	U16	1~5A[Note 1]
8022	RO	Rated frequency	U16	0:50 Hz 1:60 Hz [Note 1]
8023	RO	DI wet and dry node selection	U16	0 means DI dry contact (passive)
8024	RW	Set interval	U16	1 indicates DI wet contact (active)
8025	RW	Whether the tag data is included in the statistics	U16	Default: 0[Note 1]

[Note 1] Factory configuration, user can not write

5.7.2 Communication parameter register

Register	Attribute	Description	Data Type	Remarks

8050	RW	RS485 port 1 protocol selection	U16	0：Modbus RTU
8051	RW	RS485 port 1 address	U16	1-247(Modbus RTU)
8052	RW	RS485 port 1 baud rate	U16	0：2400 1：4800 2：9600 3：19200 4：38400
8053	RW	RS485 port 1 check digit	U16	0: no parity; 1: odd parity; 2: even parity
8054	RW	RS485 port 1 stop position	U16	0:1 bit; 1:2 bit
8055	RW	RS485 port 2 protocol selection	U16	0：Modbus RTU
8056	RW	RS485 port 2 address	U16	1-247(Modbus RTU)
8057	RW	RS485 port 2 baud rate	U16	0：2400 1：4800 2：9600 3：19200 4：38400
8058	RW	RS485 port 2 check digit	U16	0: no parity; 1: odd parity; 2: even parity
8059	RW	RS485 port 2 stop position	U16	0:1 bit; 1:2 bit
8060	RW	Ethernet port - IP address	U32	The default 192.168.0.100 corresponds to 0xC0A80064
8062	RW	Ethernet port - subnet mask	U32	Default 255.255.255.0
8064	RW	Ethernet port - gateway address	U32	Default 192.168.0.1
8066	RW	Ethernet port - broadcast address	U32	Default 192.168.0.255
8068	RW	DNS	U32	Default 202.96.128.86
8070	RW	SNTP time interval	U16	10~1440 minutes, default 60 minutes [Note 1]
8071~8102	RW	SNTP time server address	U16	
8103	RW	System timing mode	U16	0: local time 1: network time 2: differential second pulse time 3: IRIG-B time

[Note 1] SNTP time interval: When the time is greater than 60 minutes, the time interval is "SNTP time interval" / 60 = every few hours (full hour).

5.7.3 IO parameter register

Register	Attribute	Description	Data Type	Remarks
8200	RW	Switch input 1 mode selection	U16	0: ordinary digital input 1: pulse count 2: PPS second pulse [Note 1]
8201	RW	Switch input 2 mode selection	U16	0: ordinary digital input 1: pulse count 2: PPS second pulse
8202	RW	Switch input 3 mode selection	U16	0: ordinary digital input 1: pulse count 2: PPS second pulse
8203	RW	Switch input 4 mode selection	U16	0: ordinary digital input 1: pulse count 2: PPS second pulse
8204	RW	Switch input 5 mode selection	U16	0: ordinary digital input 1: pulse count 2: PPS second pulse
8205	RW	Switch input 6 mode selection	U16	0: ordinary digital input 1: pulse count 2: PPS second pulse
8206	RW	Switch input 7 mode selection	U16	0: ordinary digital input 1: pulse count 2: PPS second pulse
8207	RW	Switch input 8 mode selection	U16	0: ordinary digital input 1: pulse count 2: PPS second pulse
8208	RW	Switch input 1 debounce delay	U16	1~9999ms, default 20ms
8209	RW	Switch input 2 debounce delay	U16	1~9999ms, default 20ms
8210	RW	Switch input 3 debounce delay	U16	1~9999ms, default 20ms
8211	RW	Switch input 4 debounce delay	U16	1~9999ms, default 20ms

8212	RW	Switch input 5 debounce delay	U16	1~9999ms, default 20ms
8213	RW	Switch input 6 debounce delay	U16	1~9999ms, default 20ms
8214	RW	Switch input 7 debounce delay	U16	1~9999ms, default 20ms
8215	RW	Switch input 8 debounce delay	U16	1~9999ms, default 20ms
8216	RW	Relay RO1 return time	U16	0~600, 0 means hold; Unit 0.1s, default 1s
8217	RW	Relay RO2 return time	U16	0~600, 0 means hold; Unit 0.1s, default 1s
8218	RW	Relay RO3 return time	U16	0~600, 0 means hold; Unit 0.1s, default 1s
8219	RW	Relay RO4 return time	U16	0~600, 0 means hold; Unit 0.1s, default 1s
8220	RW	Active energy pulse constant	U16	0~4 [Note 2]
8221	RW	Active energy pulse width	U16	60~100ms, default 80ms
8222	RW	Reactive energy pulse constant	U16	0~4 [Note 2]
8223	RW	Reactive power pulse width	U16	60~100ms, default 80ms
8224~8225		2-way DO function configuration (occupies two registers)	U16	0 means alarm exit, 1 means active energy pulse output, 2 means reactive power pulse output
8226	RW	DO1 return time	U16	0~600, 0 means hold; Unit 0.1s, default 1s
8227	RW	DO2 return time	U16	0~600, 0 means hold; Unit 0.1s, default 1s
8228	RW	DO1 control mode	U16	0 means local control mode 1 means remote control mode
8229	RW	DO2 control mode	U16	0 means local control mode 1 means remote control mode
8230	RW	RO1 control mode	U16	0 means local control mode 1 means remote control mode
8231	RW	RO2 control mode	U16	0 means local control mode 1 means remote control mode
8232	RW	RO3 control mode	U16	0 means local control mode 1 means remote control mode
8233	RW	RO4 control mode	U16	0 means local control mode

				1 means remote control mode
8234	WO	DO1 remote control	U16	0 means no remote control 1 means remote control closed 2 means remote disconnection
8235	WO	DO2 remote control	U16	0 means no remote control 1 means remote control closed 2 means remote disconnection
8236	WO	RO1 remote control	U16	0 means no remote control 1 means remote control closed 2 means remote disconnection
8237	WO	RO2 remote control	U16	0 means no remote control 1 means remote control closed 2 means remote disconnection
8238	WO	RO3 remote control	U16	0 means no remote control 1 means remote control closed 2 means remote disconnection
8239	WO	RO4 remote control	U16	0 means no remote control 1 means remote control closed 2 means remote disconnection

[Note 1] If more than one digital input is set to the PPS second pulse interface, only the first second pulse input is active.

[Note 2] The pulse constant corresponding to the register selection range 0-4：

0:1000
1:3200
2:5000
3:6400
4:12800

The selection range of the energy pulse constant is determined by the product of the secondary side voltage and current level of the device. See the table below:

Voltage × current	Pulse constant register selectable range	Corresponding to domestic common voltage and current levels
≤500	1000/3200/5000/6400/12800	100V/1(2)A 100V/5(10)A 380V/1(2)A

⩽690	1000/3200/5000	690V/1(2)A
⩽1900	1000/3200	380V/5(10)A
> 1900	1000	690V/5(10)A

5.7.4 PQ parameter register

Register	Attribute	Description	Data Type	Remarks
8250	RW	Voltage transient	U16	0: Exit 1: input [Note 1]
8251	RW	Transient reference voltage	U16	0:Udin 1:Usr
8252	RW	Voltage swell threshold	U16	110~200 Unit 0.01Ue
8253	RW	Voltage dip threshold	U16	10~90 [Note 2] Unit 0.01Ue
8254	RW	Voltage interruption threshold	U16	5～10 [Note 2] Unit 0.01Ue
8255	RW	Voltage stagnation hysteresis	U16	5~100 Unit 0.001 Ue
8256	RW	Voltage sag hysteresis	U16	5~100 Unit 0.001 Ue
8257	RW	Voltage interruption hysteresis	U16	5~100 Unit 0.001 Ue
8258	RW	Voltage sag sag trigger result 1	U16	0~8 [Note 3]
8259	RW	Voltage sag sag trigger result 2	U16	[Note 3]
8260	RW	Voltage transient disturbance	U16	0: Exit 1: input
8261	RW	Voltage transient disturbance threshold	U16	10~500 Unit: 0.01Ue
8262	RW	Voltage transient disturbance trigger action 1	U16	[Note 3]
8263	RW	Voltage transient disturbance trigger action 2	U16	[Note 3]

8264	RW	Fast voltage change	U16	0: Exit 1: input
8265	RW	Minimum voltage change rate	U16	1~10 Unit 0.01Ue/s
8266	RW	stable schedule	U16	5~50 Unit 0.1 second
8267	RW	Minimum step size	U16	1~50 Unit 0.001Ue
8268	RW	Voltage tolerance	U16	1~10 Unit 0.001Ue
8269	RW	Detection mode	U16	0~1 0 based on steady state value; 1 based on maximum varying voltage;;
8270	RW	Fast voltage change trigger action 1	U16	[Note 3]
8271	RW	Fast voltage change trigger action 2	U16	[Note 3]
8280	RW	Flicker weighting curve	U16	0~1 0 means 120v; 1 means 230v;

[Note 1] The PQ record is the phase voltage monitored by the star connection mode, and the angular connection mode is the line voltage.

[Note 2] The set voltage interrupt setting must be less than the voltage sag threshold.

[Note 3] Transient, transient capture, fast voltage change trigger action parameter table。

KEY value	description
0	no
1~4	Relay output 1~ relay output 4
5~6	Optocoupler output 1 ~ optocoupler output 2
7~8	Fault recording 1~2

5.7.5 Fault recording parameter register

Register	Attribute	Description	Data Type	Remarks
8282	RW	Fault recording mode 1	U16	0~6 0：1024points/cycle@50cycle 1：512points/cycle@100cycle 2：256points/cycle@200cycle 3：128points/cycle@400cycle 4：64points/cycle@800cycle 5：32points/cycle@1600cycle 6：16points/cycle@3200cycle
8283	RW	Cycle number 1 before failure	U16	[Note1]
8284	RW	Fault recording mode 2	U16	0~6 0：1024points/cycle@50cycle 1：512points/cycle@100cycle 2：256points/cycle@200cycle 3：128points/cycle@400cycle 4：64points/cycle@800cycle 5：32points/cycle@1600cycle 6：16points/cycle@3200cycle
8285	RW	Cycle number 2 before failure	U16	[Note1]

[note 1]: the cycle number before failure does not exceed the cycle number in the super recording mode. It is also suggested that the cycle number before failure is generally set to 10%~20% of the entire cycle number.

5.7.6 Limit parameter register

Register	Attribute	Description	Data Type	Remarks

8300	RW	First sets of threshold triggering mode	U16	0: no trigger; 1: the upper limit; 2: the lower limit
8301	RW	First sets of monitoring objects	U16	Note 1
8302	RW	First groups of over limit action values	FP32	Unlimited range of values
8304	RW	First sets of return values	FP32	Unlimited range of values
8306	RW	First sets of over limit action delay	U16	0~999s
8307	RW	First sets of return delay time delay	U16	0~999s
8308	RW	First sets of trigger action 1	U16	Note 2
8309	RW	First sets of trigger action 2	U16	Note 2
8310~8319	RW	Second sets of limit		
8320~8329	RW	Third sets of limit		
8330~8339	RW	Fourth sets of limit		
8340~8349	RW	Fifth sets of limit		
8350~8359	RW	Sixth sets of limit		
8360~8369	RW	Seventh sets of limit		
8370~8379	RW	Eighth sets of limit		
8380~8389	RW	Ninth sets of limit		
8390~8399	RW	Tenth sets of limit		
8400~8409	RW	Eleventh sets of limit		
8410~8419	RW	Twelfth sets of limit		
8420~8429	RW	Thirteenth sets of limit		

8430~8439	RW	Fourteenth sets of limit		
8440~8449	RW	Fifteenth sets of limit		
8450~8459	RW	Sixteenth sets of limit		
8460~8469	RW	Seventeenth sets of limit		
8470~8479	RW	Eighteenth sets of limit		
8480~8489	RW	Nineteenth sets of limit		
8490~8499	RW	Twentieth sets of limit		
8500~8509	RW	Twenty-first sets of limit		
8510~8519	RW	Twenty-second sets of limit		
8520~8529	RW	Twenty-third sets of limit		
8530~8539	RW	Twenty-fourth sets of limit		

[Note 1]: Over-limit object list

No.	Description	Unit
0	No monitoring object	
1	Phase voltage	V
2	Line voltage	V
3	Phase current	A
4	Neutral line voltage	V
5	Neutral current	A
6	frequency	Hz
7	Total active power	W
8	Total reactive power	var
9	Total apparent power	VA
10	Total power factor	
11	Displacement power factor	
12	Input total active power real-time demand	W

13	Output total active power real-time demand	W
14	Input total reactive power real-time demand	var
15	Output total reactive power real-time demand	var
16	Input total apparent power real-time demand	VA
17	Output total apparent power real-time demand	VA
18	Input total active power forecast demand	W
19	Output total active power forecast demand	W
20	Input total reactive power forecast demand	var
21	Output total reactive power forecast demand	var
22	Input total apparent power forecast demand	VA
23	Output total apparent power forecast demand	VA
24	Total voltage distortion rate	100%
25	Current distortion rate	100%
26	Voltage negative sequence imbalance	100%
27	Voltage zero sequence imbalance	100%
28	Current negative sequence imbalance	100%
29	Current zero sequence imbalance	100%
30	Short-time flashover	
31	Long-term flashover	
32	Voltage 3rd harmonic content rate	100%
33	Voltage 5th harmonic content rate	100%
34	Voltage 7th harmonic content rate	100%
35	Voltage 9th harmonic content rate	100%
36	Voltage 11th harmonic content rate	100%
37	Voltage 13th harmonic content rate	100%

38	Current 3rd harmonic content rate	100%
39	Current 5th harmonic content rate	100%
40	Current 7th harmonic content rate	100%
41	Current 9th harmonic content rate	100%
42	Current 11th harmonic content rate	100%
43	Current 13th harmonic content rate	100%

[note 2]: limit trigger action：

KEY value	description
0	no
1~4	Relay output 1~ relay output 4
5~6	Optocoupler output 1 ~ optocoupler output 2
7~8	Fault recording 1~2

5.7.7 Tariff rate parameter register

There are two sets of rate schemes in GPQM144. Each rate scheme includes time zone setting registers, diurnal time table settings, and special day settings. The first set of rate schemes has a register base of 8600 and the second set rate scheme has a register base of 9000.

Time zone setting register

Register	Attribute	Description	Data Type	Remarks
8600	RW	Time zone 1: start time	U16	Note 1 the starting date is January 1st, and can not be modified to other values.
8601	RW	Time zone 1: working day period table number	U16	Note 2
8602	RW	Time zone 1: day interval table number	U16	Note 2
8603	RW	Time zone 2: start time	U16	Note 1
8604	RW	Time zone 2: working day period table number	U16	
8605	RW	Time zone 2: day interval table number	U16	
8606	RW	Time zone 3: start time	U16	

8607	RW	Time zone 3: working day period table number	U16	
8608	RW	Time zone 3: day interval table number	U16	
8609	RW	Time zone 4: start time	U16	
8610	RW	Time zone 4: working day period table number	U16	
8611	RW	Time zone 4: day interval table number	U16	
8612	RW	Time zone 5: start time	U16	
8613	RW	Time zone 5: working day period table number	U16	
8614	RW	Time zone 5: day interval table number	U16	
8615	RW	Time zone 6: start time	U16	
8616	RW	Time zone 6: working day period table number	U16	
8617	RW	Time zone 6: day interval table number	U16	
8618	RW	Time zone 7: start time	U16	
8619	RW	Time zone 7: working day period table number	U16	
8620	RW	Time zone 7: day interval table number	U16	
8621	RW	Time zone 8: start time	U16	
8622	RW	Time zone 8: working day period table number	U16	
8623	RW	Time zone 8: day interval table number	U16	
8624	RW	Time zone 9: start time	U16	
8625	RW	Time zone 9: working day period table number	U16	
8626	RW	Time zone 9: day interval table number	U16	
8627	RW	Time zone 10: start time	U16	

8628	RW	Time zone 10: working day period table number	U16	
8629	RW	Time zone 10: day interval table number	U16	
8630	RW	Time zone 11: start time	U16	
8631	RW	Time zone 11: working day period table number	U16	
8632	RW	Time zone 11: day interval table number	U16	
8633	RW	Time zone 12: start time	U16	
8634	RW	Time zone 12: working day period table number	U16	
8635	RW	Time zone 12: day interval table number	U16	

[note 1] date using 8 high and low 8 bits to indicate:

High 8 bit	low 8 bit
Month	date

For example, 0x0101 represents January 1st, and if it is set to 0xFFFF or other non existent dates, it is considered invalid. If the date of a time zone in the time zone plan is set to 0xFFFF, all dates after this zone should be set to 0xFFFF. The rule for setting the time zone plan is that the date in the next time zone should be later than the previous time zone unless the time zone in the back is set to 0xFFFF.

[note 2] its value is a daily period table number, and the range is 0~7., for example, if the value is 0, it means that the daily time period table is used in the present time zone as the daily period table 1, and its valid time is: the starting date of the current zone to the starting date of the next time zone, and if the starting date of the next time zone is set to 0xFFFF, its valid time is the starting time zone. The beginning date is over by the end of the year.

Daily time table setting register

Register	**Attribute**	**Description**	**Data Type**	**Remarks**
8636	RW	Day time table 1 time period 1: start time	U16	Note 1 Day time table period 1 start time is 0: 0, can not be modified to other values
8637	RW	Day time table 1 time period 1: rate number	U16	Note 2
8638	RW	Day time table 1 time period 2: start time	U16	

8639	RW	Day Period Table 1 Time Period 2: Rate Number	U16	
8640	RW	Day time table 1 time period 3: start time	U16	
8641	RW	Day Period Table 1 Time Period 3: Rate Number	U16	
8642	RW	Daytime Table 1 Time Period 4: Start Time	U16	
8643	RW	Daytime Table 1 Time Period 4: Rate Number	U16	
8644	RW	Day time table 1 time period 5: start time	U16	
8645	RW	Day Period Table 1 Time Period 5: Rate Number	U16	
8646	RW	Daytime Table 1 Time Period 6: Start Time	U16	
8647	RW	Day Period Table 1 Time Period 6: Rate Number	U16	
8648	RW	Daytime Table 1 Time Period 7: Start Time	U16	
8649	RW	Daytime Table 1 Time Period 7: Rate Number	U16	
8650	RW	Daytime Table 1 Time Period 8: Start Time	U16	
8651	RW	Daytime Table 1 Time Period 8: Rate Number	U16	
8652	RW	Daytime Table 1 Time Period 9: Start Time	U16	
8653	RW	Daytime Table 1 Time Period 9: Rate Number	U16	
8654	RW	Day time table 1 time period 10: start time	U16	
8655	RW	Day Time Table 1 Time Period 10: Rate Number	U16	
8656	RW	Daytime Table 1 Time Period 11: Start Time	U16	

8657	RW	Daytime Table 1 Time Period 11: Rate Number	U16	
8658	RW	Daytime Table 1 Time Period 12: Start Time	U16	
8559	RW	Daytime Table 1 Time Period 12: Rate Number	U16	
8660~8683		Daily time table 2		
8684~8707		Daily time table 3		
8708~8731		Daily time table 4		
8732~8755		Daily time table 5		
8756~8779		Daily time table 6		
8780~8803		Daily time table 7		
8804~8827		Daily time table 8		

[Note 1] The time is expressed by the upper 8 bits and the lower 8 bits:

High 8 bits	low 8 bits
Hour	minute

For example, 0x010F means 1:15, and if set to 0xFFFF, it is considered invalid time. If the time of a certain time period table is set to 0xFFFF, then all time after this time period in this time period table should be set to 0xFFFF. The minute setting can only be an integer multiple of 15.

For each day time table, their time period setting rules are: the latter time period should be later than the previous time period, unless the following time periods are all set to 0xFFFF.

[Note 2] The effective time of the rate number is: the start time of the current time period to the start time of the next time period. If the next time period is set to 0xFFFF, the effective time of the rate number is the start of the segment. The time is up to the end of the day.

The rate number range is 0~3.

Special day setting register

Register	**Attribute**	**Description**	**Data Type**	**Remarks**
8828	RW	Special day 1: date	U16	[Note 1]
8829	RW	Special day 1: day time table number	U16	[Note 2]

8830	RW	Special day 2: date	U16	
8831	RW	Special day 2: day time table number	U16	
8832	RW	Special day 3: date	U16	
8833	RW	Special day 3: day time table number	U16	
8834	RW	Special day 4: date	U16	
8835	RW	Special day 4: day time table number	U16	
8836	RW	Special day 5: date	U16	
8837	RW	Special day 5: day time table number	U16	
8838	RW	Special day 6: date	U16	
8839	RW	Special day 6: day time table number	U16	
8840	RW	Special day 7: date	U16	
8841	RW	Special day 7: day time table number	U16	
8842	RW	Special day 8: date	U16	
8843	RW	Special day 8: day time table number	U16	
8844	RW	Special Day 9: Date	U16	
8845	RW	Special day 9: day time table number	U16	
8846	RW	Special day 10: date	U16	
8847	RW	Special day 10: day time table number	U16	
8848	RW	Special Day 11: Date	U16	
8849	RW	Special day 11: day time table number	U16	
8850	RW	Special day 12: date	U16	
8851	RW	Special day 12: day time table number	U16	
8852	RW	Special Day 13: Date	U16	

8853	RW	Special day 13: day time table number	U16	
8854	RW	Special Day 14: Date	U16	
8855	RW	Special day 14: day time table number	U16	
8856	RW	Special Day 15: Date	U16	
8857	RW	Special day 15: day time table number	U16	
8858	RW	Special day 16: date	U16	
8859	RW	Special day 16: day time table number	U16	
8860	RW	Special Day 17: Date	U16	
8861	RW	Special day 17: day time table number	U16	
8862	RW	Special Day 18: Date	U16	
8863	RW	Special day 18: day time table number	U16	
8864	RW	Special Day 19: Date	U16	
8865	RW	Special day 19: day time table number	U16	
8866	RW	Special day 20: date	U16	
8867	RW	Special day 20: day time table number	U16	
8868	RW	Special Day 21: Date	U16	
8869	RW	Special day 21: day time table number	U16	
8870	RW	Special Day 22: Date	U16	
8871	RW	Special day 22: day time table number	U16	
8872	RW	Special Day 23: Date	U16	
8873	RW	Special day 23: day time table number	U16	
8874	RW	Special Day 24: Date	U16	
8875	RW	Special day 24: day time	U16	

		table number		
8876	RW	Special Day 25: Date	U16	
8877	RW	Special day 25: day time table number	U16	
8878	RW	Special Day 26: Date	U16	
8879	RW	Special day 26: day time table number	U16	
8880	RW	Special Day 27: Date	U16	
8881	RW	Special day 27: day time table number	U16	
8882	RW	Special Day 28: Date	U16	
8883	RW	Special day 28: day time table number	U16	
8884	RW	Special Day 29: Date	U16	
8885	RW	Special day 29: day time table number	U16	
8886	RW	Special day 30: date	U16	
8887	RW	Special day 30: day time table number	U16	
8888	RW	Special Day 31: Date	U16	
8889	RW	Special day 31: day time table number	U16	
8890	RW	Special day 32: date	U16	
8891	RW	Special day 32: day time table number	U16	
8892	RW	Special Day 33: Date	U16	
8893	RW	Special day 33: day time table number	U16	
8894	RW	Special day 34: date	U16	
8895	RW	Special day 34: day time table number	U16	
8896	RW	Special Day 35: Date	U16	
8897	RW	Special day 35: day time table number	U16	

8898	RW	Special Day 36: Date	U16	
8899	RW	Special day 36: day time table number	U16	
8900	RW	Special Day 37: Date	U16	
8901	RW	Special day 37: day time table number	U16	
8902	RW	Special Day 38: Date	U16	
8903	RW	Special day 38: day time table number	U16	
8904	RW	Special Day 39: Date	U16	
8905	RW	Special day 39: day time table number	U16	
8906	RW	Special day 40: date	U16	
8907	RW	Special day 40: day time table number	U16	
8908	RW	Special Day 41: Date	U16	
8909	RW	Special day 41: day time table number	U16	
8910	RW	Special Day 42: Date	U16	
8911	RW	Special day 42: day time table number	U16	
8912	RW	Special Day 43: Date	U16	
8913	RW	Special day 43: day time table number	U16	
8914	RW	Special Day 44: Date	U16	
8915	RW	Special day 44: day time table number	U16	
8916	RW	Special Day 45: Date	U16	
8917	RW	Special day 45: day time table number	U16	
8918	RW	Special Day 46: Date	U16	
8919	RW	Special day 46: day time table number	U16	
8920	RW	Special Day 47: Date	U16	

8921	RW	Special day 47: day time table number	U16	
8922	RW	Special Day 48: Date	U16	
8923	RW	Special day 48: day time table number	U16	
8924	RW	Special Day 49: Date	U16	
8925	RW	Special day 49: day time table number	U16	
8926	RW	Special day 50: date	U16	
8927	RW	Special day 50: day time table number	U16	
8928	RW	Special Day 51: Date	U16	
8929	RW	Special day 51: day time table number	U16	
8930	RW	Special Day 52: Date	U16	
8931	RW	Special day 52: day time table number	U16	
8932	RW	Special Day 53: Date	U16	
8933	RW	Special day 53: day time table number	U16	
8934	RW	Special Day 54: Date	U16	
8935	RW	Special day 54: day time table number	U16	
8936	RW	Special Day 55: Date	U16	
8937	RW	Special day 55: day time table number	U16	
8938	RW	Special Day 56: Date	U16	
8939	RW	Special day 56: day time table number	U16	
8940	RW	Special Day 57: Date	U16	
8941	RW	Special day 57: day time table number	U16	
8942	RW	Special Day 58: Date	U16	
8943	RW	Special day 58: day time	U16	

		table number		
8944	RW	Special Day 59: Date	U16	
8945	RW	Special day 59: day time table number	U16	
8946	RW	Special day 60: date	U16	
8947	RW	Special day 60: day time table number	U16	

[Note 1] The date is represented by 16 digits：

High 8	Low 8
Month	date

[Note 2] The value is the daily time table number, and the range is 0~7. For example, if the value is 1, it means that the daily time table used for the special day is the daily time table 2, and the valid time is: the date register specifies Date of the day.

Second set of multi-tariff register

Time zone setting register

Register	**Attribute**	**Description**	**Data Type**	**Remarks**
9000	RW	Time zone 1: start time	U16	Note 1 The start time is January 1 and cannot be modified to other values.
9001	RW	Time zone 1: Workday timetable table number	U16	Note 2
9002	RW	Time zone 1: Weekend day time table number	U16	Note 2
9003	RW	Time zone 2: start time	U16	Note 1
9004	RW	Time zone 2: weekday timetable table number	U16	
9005	RW	Time zone 2: Weekend day time table number	U16	
9006	RW	Time zone 3: start time	U16	
9007	RW	Time zone 3: weekday timetable table number	U16	
9008	RW	Time zone 3: Weekend day time table number	U16	

9009	RW	Time zone 4: start time	U16	
9010	RW	Time zone 4: Working day timetable table number	U16	
9011	RW	Time zone 4: Weekend day time table number	U16	
9012	RW	Time zone 5: start time	U16	
9013	RW	Time zone 5: weekday timetable table number	U16	
9014	RW	Time zone 5: Weekend day time table number	U16	
9015	RW	Time zone 6: start time	U16	
9016	RW	Time Zone 6: Workday Period Table Number	U16	
9017	RW	Time zone 6: Weekend day time table number	U16	
9018	RW	Time zone 7: start time	U16	
9019	RW	Time zone 7: weekday timetable table number	U16	
9020	RW	Time zone 7: Weekend day time table number	U16	
9021	RW	Time zone 8: start time	U16	
9022	RW	Time zone 8: weekday timetable table number	U16	
9023	RW	Time zone 8: Weekend day time table number	U16	
9024	RW	Time zone 9: start time	U16	
9025	RW	Time zone 9: weekday timetable table number	U16	
9026	RW	Time zone 9: Weekend day time table number	U16	
9027	RW	Time zone 10: start time	U16	
9028	RW	Time zone 10: weekday timetable table number	U16	
9029	RW	Time zone 10: Weekend day time table number	U16	

9030	RW	Time zone 11: start time	U16	
9031	RW	Time zone 11: weekday timetable table number	U16	
9032	RW	Time zone 11: Weekend day time table number	U16	
9033	RW	Time zone 12: start time	U16	
9034	RW	Time zone 12: weekday timetable table number	U16	
9035	RW	Time zone 12: Weekend day time table number	U16	

[Note 1] The date is represented by the high 8 bits and the low 8 bits：

High 8	Low 8
month	date

For example, 0x0101 means January 1st, and if set to 0xFFFF or other non-existent date, it is considered an invalid date. If the date of a time zone in the time zone scenario is set to 0xFFFF, then all dates after this time zone should be set to 0xFFFF. The time zone plan setting rule is: the latter time zone date should be later than the previous time zone, unless the subsequent time zones are all set to 0xFFFF.

[Note 2] The value is the daily time table number, and the range is 0~7. For example, if the value is 0, it means that in the current time zone, the used daily time table is the daily time table 1 and its effective time is: the current time zone. The start date to the start date of the next time zone. If the next time zone start date is set to 0xFFFF, the valid time is the start date of the time zone to the end of the current year.

Daily time table setting register

Register	**Attribute**	**Description**	**Data Type**	**Remarks**
9036	RW	Day time table 1 time period 1: start time	U16	Note 1 Day time table period 1 start time is 0: 0, can not be modified to other values
9037	RW	Day time table 1 time period 1: rate number	U16	Note 2
9038	RW	Day time table 1 time period 2: start time	U16	
9039	RW	Day Period Table 1 Time Period 2: Rate Number	U16	
9040	RW	Day time table 1 time period 3: start time	U16	
9041	RW	Day Period Table 1 Time Period 3: Rate Number	U16	
9042	RW	Daytime Table 1 Time Period	U16	

		4: Start Time		
9043	RW	Daytime Table 1 Time Period 4: Rate Number	U16	
9044	RW	Day time table 1 time period 5: start time	U16	
9045	RW	Day Period Table 1 Time Period 5: Rate Number	U16	
9046	RW	Daytime Table 1 Time Period 6: Start Time	U16	
9047	RW	Day Period Table 1 Time Period 6: Rate Number	U16	
9048	RW	Daytime Table 1 Time Period 7: Start Time	U16	
9049	RW	Daytime Table 1 Time Period 7: Rate Number	U16	
9050	RW	Daytime Table 1 Time Period 8: Start Time	U16	
9051	RW	Daytime Table 1 Time Period 8: Rate Number	U16	
9052	RW	Daytime Table 1 Time Period 9: Start Time	U16	
9053	RW	Daytime Table 1 Time Period 9: Rate Number	U16	
9054	RW	Day time table 1 time period 10: start time	U16	
9055	RW	Day Time Table 1 Time Period 10: Rate Number	U16	
9056	RW	Daytime Table 1 Time Period 11: Start Time	U16	
9057	RW	Daytime Table 1 Time Period 11: Rate Number	U16	
9058	RW	Daytime Table 1 Time Period 12: Start Time	U16	
9059	RW	Daytime Table 1 Time Period 12: Rate Number	U16	

9060~9083		Daily time table 2		
9084~9107		Daily time table 3		
9108~9131		Daily time table 4		
9132~9155		Daily time table 5		
9156~9179		Daily time table 6		
9180~9203		Daily time table 7		
9204~9227		Daily time table 8		

[Note 1] The time is expressed by the high 8 bits and the low 8 bits:

high 8	low 8
Hour	Minute

For example, 0x010F means 1:15, and if set to 0xFFFF, it is considered invalid time. If the time of a certain time period table is set to 0xFFFF, then all time after this time period in this time period table should be set to 0xFFFF. The minute setting can only be an integer multiple of 15.

For each day time table, their time period setting rules are: the latter time period should be later than the previous time period, unless the following time periods are all set to 0xFFFF.

[Note 2] The effective time of the rate number is: the start time of the current time period to the start time of the next time period. If the next time period is set to 0xFFFF, the effective time of the rate number is the start of the segment. The time is up to the end of the day.

The rate number range is 0~3.

Special day setting register

Register	**Attribute**	**Description**	**Data Type**	**Remarks**
9228	RW	Special day 1: date	U16	[Note 1]
9229	RW	Special day 1: day time table number	U16	[Note 2]
9230	RW	Special day 2: date	U16	
9231	RW	Special day 2: day time table number	U16	
9232	RW	Special day 3: date	U16	
9233	RW	Special day 3: day time table	U16	

		number		
9234	RW	Special day 4: date	U16	
9235	RW	Special day 4: day time table number	U16	
9236	RW	Special day 5: date	U16	
9237	RW	Special day 5: day time table number	U16	
9238	RW	Special day 6: date	U16	
9239	RW	Special day 6: day time table number	U16	
9240	RW	Special day 7: date	U16	
9241	RW	Special day 7: day time table number	U16	
9242	RW	Special day 8: date	U16	
9243	RW	Special day 8: day time table number	U16	
9244	RW	Special Day 9: Date	U16	
9245	RW	Special day 9: day time table number	U16	
9246	RW	Special day 10: date	U16	
9247	RW	Special day 10: day time table number	U16	
9248	RW	Special Day 11: Date	U16	
9249	RW	Special day 11: day time table number	U16	
9250	RW	Special day 12: date	U16	
9251	RW	Special day 12: day time table number	U16	
9252	RW	Special Day 13: Date	U16	
9253	RW	Special day 13: day time table number	U16	
9254	RW	Special Day 14: Date	U16	
9255	RW	Special day 14: day time table number	U16	

9256	RW	Special Day 15: Date	U16	
9257	RW	Special day 15: day time table number	U16	
9258	RW	Special day 16: date	U16	
9259	RW	Special day 16: day time table number	U16	
9260	RW	Special Day 17: Date	U16	
9261	RW	Special day 17: day time table number	U16	
9262	RW	Special Day 18: Date	U16	
9263	RW	Special day 18: day time table number	U16	
9264	RW	Special Day 19: Date	U16	
9265	RW	Special day 19: day time table number	U16	
9266	RW	Special day 20: date	U16	
9267	RW	Special day 20: day time table number	U16	
9268	RW	Special Day 21: Date	U16	
9269	RW	Special day 21: day time table number	U16	
9270	RW	Special Day 22: Date	U16	
9271	RW	Special day 22: day time table number	U16	
9272	RW	Special Day 23: Date	U16	
9273	RW	Special day 23: day time table number	U16	
9274	RW	Special Day 24: Date	U16	
9275	RW	Special day 24: day time table number	U16	
9276	RW	Special Day 25: Date	U16	
9277	RW	Special day 25: day time table number	U16	
9278	RW	Special Day 26: Date	U16	

9279	RW	Special day 26: day time table number	U16	
9280	RW	Special Day 27: Date	U16	
9281	RW	Special day 27: day time table number	U16	
9282	RW	Special Day 28: Date	U16	
9283	RW	Special day 28: day time table number	U16	
9284	RW	Special Day 29: Date	U16	
9285	RW	Special day 29: day time table number	U16	
9286	RW	Special day 30: date	U16	
9287	RW	Special day 30: day time table number	U16	
9288	RW	Special Day 31: Date	U16	
9289	RW	Special day 31: day time table number	U16	
9290	RW	Special day 32: date	U16	
9291	RW	Special day 32: day time table number	U16	
9292	RW	Special Day 33: Date	U16	
9293	RW	Special day 33: day time table number	U16	
9294	RW	Special day 34: date	U16	
9295	RW	Special day 34: day time table number	U16	
9296	RW	Special Day 35: Date	U16	
9297	RW	Special day 35: day time table number	U16	
9298	RW	Special Day 36: Date	U16	
9299	RW	Special day 36: day time table number	U16	
9300	RW	Special Day 37: Date	U16	
9301	RW	Special day 37: day time	U16	

		table number		
9302	RW	Special Day 38: Date	U16	
9303	RW	Special day 38: day time table number	U16	
9304	RW	Special Day 39: Date	U16	
9305	RW	Special day 39: day time table number	U16	
9306	RW	Special day 40: date	U16	
9307	RW	Special day 40: day time table number	U16	
9308	RW	Special Day 41: Date	U16	
9309	RW	Special day 41: day time table number	U16	
9310	RW	Special Day 42: Date	U16	
9311	RW	Special day 42: day time table number	U16	
9312	RW	Special Day 43: Date	U16	
9313	RW	Special day 43: day time table number	U16	
9314	RW	Special Day 44: Date	U16	
9315	RW	Special day 44: day time table number	U16	
9316	RW	Special Day 45: Date	U16	
9317	RW	Special day 45: day time table number	U16	
9318	RW	Special Day 46: Date	U16	
9319	RW	Special day 46: day time table number	U16	
9320	RW	Special Day 47: Date	U16	
9321	RW	Special day 47: day time table number	U16	
9322	RW	Special Day 48: Date	U16	
9323	RW	Special day 48: day time table number	U16	

9324	RW	Special Day 49: Date	U16	
9325	RW	Special day 49: day time table number	U16	
9326	RW	Special day 50: date	U16	
9327	RW	Special day 50: day time table number	U16	
9328	RW	Special Day 51: Date	U16	
9329	RW	Special day 51: day time table number	U16	
9330	RW	Special Day 52: Date	U16	
9331	RW	Special day 52: day time table number	U16	
9332	RW	Special Day 53: Date	U16	
9333	RW	Special day 53: day time table number	U16	
9334	RW	Special Day 54: Date	U16	
9335	RW	Special day 54: day time table number	U16	
9336	RW	Special Day 55: Date	U16	
9337	RW	Special day 55: day time table number	U16	
9338	RW	Special Day 56: Date	U16	
9339	RW	Special day 56: day time table number	U16	
9340	RW	Special Day 57: Date	U16	
9341	RW	Special day 57: day time table number	U16	
9342	RW	Special Day 58: Date	U16	
9343	RW	Special day 58: day time table number	U16	
9344	RW	Special Day 59: Date	U16	
9345	RW	Special day 59: day time table number	U16	
9346	RW	Special day 60: date	U16	

9347	RW	Special day 60: day time table number	U16	

[Note 1] The date is represented by 16 digits：

High	Low
Mouth	Date

[Note 2] The value is the daily time table number, and the range is 0~7. For example, if the value is 1, it means that the daily time table used for the special day is the daily time table 2, and the valid time is: the date register specifies Date of the day.

Register	**Attribute**	**Description**	**Data Type**	**Remarks**
9348	RO	Current rate	U16	
9349	RO	Current billing day type	U16	Note 1
9350	RO	Current day time table number	U16	
9351	RO	Current time period	U16	
9352	RO	Current time zone	U16	
9353	RO	Current TOU operation plan	U16	
9354	RW	Workday setting (Sunday)	U16	Note 2
9355	RW	Workday setting (Monday)	U16	Note 2
9356	RW	Workday setting (Tuesday)	U16	Note 2
9357	RW	Workday setting (Wednesday)	U16	Note 2
9358	RW	Workday setting (Thursday)	U16	Note 2
9359	RW	Workday setting (Friday)	U16	Note 2
9360	RW	Workday setting (Saturday)	U16	Note 2
9361	RW	Two sets of tables (day time table, time zone table, special day table) switching time	U32	The high-to-low byte indicates the year, month, and day.

[Note 1] 0~2 indicates working day/weekend/special day respectively.

[Note 2] 0~1 indicates working day/weekend respectively.

5.7.8 Other parameter register

Register	Attribute	Description	Data Type	Remarks
9400	RW	(reserved)		
9401	RW	(reserved)		
9402	RW	(reserved)		
9403	RW	(reserved)		
9404		Reserved		
9405	RW	Monthly energy freeze transfer time	U16	The default value is 0, which means that the transfer is performed at the end of the month. The other record transfer time settings are: (1~28 days) × 100+ (0~23 hours); the range of the day is 1~28, and the range of hours is 0~ twenty three
9406	RW	Reserved		
9407	RW	PQDIF statistical interval	U16	1~60 minutes; default: 10 minutes
9408	RW	Time setting for PQDIF output report	U16	1~24 hours; default 2 hours
9409	RW	Assessing sampled accumulated data	U16	0:150cycle cumulative data 1:10 minutes of accumulated data 2: 2 hours cumulative data
9410	RW	Assessment period	U16	0: indicates that the report is issued by one day; 1: indicates that the report is issued by one week;

[Note 1] The correspondence between the time zone value and the world time zone list is as follows, where GMT 0:00 represents Greenwich Mean Time, GMT +8:00 is Beijing Standard Time, 8 hours from Greenwich Mean Time, and so on：

Time zone value	Time zone	Time difference (minutes)
0	GMT-12:00	-720

1	GMT-11:00	-660
2	GMT-10:00	-600
3	GMT-9:00	-540
4	GMT-8:00	-480
5	GMT-7:00	-420
6	GMT-6:00	-360
7	GMT-5:00	-300
8	GMT-4:00	-240
9	GMT-3:30	-210
10	GMT-3:00	-180
11	GMT-2:00	-120
12	GMT-1:00	-60
13	GMT 0:00	0
14	GMT+1:00	+60
15	GMT+2:00	+120
16	GMT+3:00	+180
17	GMT+3:30	+210
18	GMT+4:00	+240
19	GMT+4:30	+270
20	GMT+5:00	+300
21	GMT+5:30	+330
22	GMT+5:45	+345
23	GMT+6:00	+360
24	GMT+6:30	+390
25	GMT+7:00	+420
26	GMT+8:00 (Beijing Chongqing Hong Kong Special Administrative Region, Urumqi)	+480
27	GMT+9:00	+540
28	GMT+9:30	+570
29	GMT+10:00	+600
30	GMT+11:00	+660
31	GMT+12:00	+720

32	GMT+13:00	+780

5.8 Command data register

Register	Attribute	Description	Data Type	Remarks
9600	WO	U16	Clear real-time electricity	Write 0xFF00
9601	WO	U16	Clear SOE record	Write 0xFF00
9602	WO	U16	Clear PQ record	Write 0xFF00
9603	WO	U16	Clear the most value record	Write 0xFF00
9604	WO	U16	Clear maximum demand	Write 0xFF00
9605	WO	U16	Clear historical data	Write 0xFF00
9606	WO	U16	Clear run time	Write 0xFF00
9607	WO	U16	Clear waveform record 1	Write 0xFF00
9608	WO	U16	Clear waveform record 2	Write 0xFF00
9609	WO	U16	Clear DI pulse count	Write 0xFF00
9610	WO	U16	reset	Write 0xFF00
9611	WO	U16	Manually trigger waveform record 1	Write 0xFF00
9612	WO	U16	Manually trigger waveform record 2	Write 0xFF00
9613	WO	U16	Clear assessment history	Write 0xFF00
9614	WO	U16	Clear PQDIF report	Write 0xFF00
9668	WO	U16	Reserved	

5.9 Device information register

Register	Attribute	Data Type	Description	Remarks

9501	RO	U16	Software standard version number	-
9502	RO	U16	Test program version number	-
9503-9534	RO	U16	Custom order information	
9535-9563	RO	U16	Reserved	
9564	RO	U16	Hardware version number	
9566	RO	U32	system status	0: indicates the initial state of the data; 1: indicates the source of data; 2: indicates the data source SD card; 3: indicates that the data access is abnormal; the firmware needs to be rewritten. 4: The SD card is abnormal;
9570	RW	U16	Greenwich time low word	Seconds from January 1, 1970, Greenwich Mean Time
9571	RW	U16	Greenwich time high word	
	RO	U16	error code	
9590	RO		MAC: AA-BB	The MAC address is: AA-BB-CC-DD-EE-FF
9591	RO		MAC: CC-DD	
9592	RO		MAC: EE-FF	
9701	RW	U16	Equipment Identity	
9702	RW	U16	Serial number	
9703	RO	U32	DSP software version	Bit8~15: Revised version number; bit16~Bit23 is the minor version number;

				bit24~bit32 bit major version number
9705	RO	U32	DSP shared area version	Bit8~15: Revised version number; bit16~Bit23 is the minor version number; bit24~bit32 bit major version number
9707	RO	U32	UI version	Bit8~15: Revised version number; bit16~Bit23 is the minor version number; bit24~bit32 bit major version number
9709	RO	U32	Cooperation_manage collaborative management process version	Bit8~15: Revised version number; bit16~Bit23 is the minor version number; bit24~bit32 bit major version number
9711	RO	U32	Data_manage data management process version	
9713	RO	U32	energy_manage Power management process version	
9715	RO	U32	modbus_primary modbusRTU process version	
9717	RO	U32	Modbus_tcp process version	
9719	RO	U32	Record_manage record management process version	
9721	RO	U32	Tou_manage process version	
9723	RO	U32	61850Ver	
9725	RO	U32	KelnelVer	
9727	RO	U32	FilesystemlVer	
9729	RO	U32	event_manage	
9731	**RO**	**U32**	Stats_manage	

9733	RO	U32	Stats_record_manage	

Note: Unix time register 9570~9571 must be read and written once.

5.10 SOE record register

Register	Attribute	Description	Data Type	Remarks
10000-10009	RO	Article 1 SOE record	U16	Must read the entire article
10010-10019	RO	Article 2 SOE record	U16	Must read the entire article
10020-20230	RO	...		
20230-20239	RO	Article 1024 SOE record	U16	Must read the entire article

Note: The order of the SOE record registers is not saved and uploaded in the order in which the events occur. The event record is saved by the loop overlay method. The location of the latest event record is obtained by the following formula: SOE record count %1024, If the calculation result is 0, the latest event storage location is 1024.

SOE record format definition

Register	Attribute	Data Type	Description
1	RO	U8	Class (high)
		U8	Subclass (lower)
2	RO	U16	Event occurs UNIX seconds low word
3	RO	U16	Event occurs UNIX high word
4	RO	U16	Time occurs in milliseconds
5	RO	FP32	Record value 1
6	RO		
7	RO	FP32	Record value 2
8	RO		
9	RO	FP32	Record value 3
10	RO		

Event type definition

Class	Subclass	SOE record	value
1（Switching displacemen	1	Recorded value (FP32): 1/0	DI1 closed / open
	2	Recorded value (FP32): 1/0	DI2 closed / open
	3	Recorded value (FP32): 1/0	DI3 closed / open
	4	Recorded value (FP32): 1/0	DI4 closed / open

t）	5	Recorded value (FP32): 1/0	DI5 closed / open
	6	Recorded value (FP32): 1/0	DI6 closed / open
	7	Recorded value (FP32): 1/0	DI7 closed / open
	8	Recorded value (FP32): 1/0	DI8 closed / open
2（Relay output）	1	Recorded value (FP32): trigger reason 0: Remote trigger 1: Overrun trigger 2: Transient disturbance trigger 3: Transient disturbance trigger 4: Fast voltage change trigger	RO1 relay action
	2		RO2 relay action
	3		RO3 relay action
	4		RO4 relay action
	5		DO1 action
	6		DO2 action
	7		RO1 relay returns
	8		RO2 relay returns
	9		RO3 relay returns
	10		RO4 relay returns
	11		DO1 returns
	12		DO2 return
3 (Over limit)	1	Recorded value (FP32): Phase A voltage	The upper limit of the phase voltage
		Recorded value (FP32): Phase B voltage	The upper limit of the phase voltage
		Recorded value (FP32): Phase C voltage	The upper limit of the phase voltage
	2	Recorded value (FP32): AB line voltage	The upper limit of the line voltage
		Recorded value (FP32): BC line voltage	The upper limit of the line voltage
		Recorded value (FP32): CA line voltage	The upper limit of the line voltage
	3	Recorded value (FP32): Phase A current	The upper limit of the current
		Recorded value (FP32): Phase B current	The upper limit of the current
		Recorded value (FP32): Phase C current	The upper limit of the current
	4	Recorded value (FP32): neutral line voltage	Neutral line voltage upper limit
	5	Recorded value (FP32): neutral current	The upper limit of the

			neutral current
	6	Recorded value (FP32): frequency	The upper limit of the frequency
	7	Recorded value (FP32): total active power	The upper limit of total active power
	8	Recorded value (FP32): total reactive power	The total reactive power is upper limit
	9	Recorded value (FP32): total apparent power	Total apparent power limit
	10	Recorded value (FP32): total power factor	The upper limit of the total power factor
	11	Recorded value (FP32): displacement power factor	The upper limit of the displacement power factor
	12	Recorded value (FP32): input total active power real-time demand	Input total active power real-time demand exceeds the upper limit
	13	Recorded value (FP32): Output total active power real-time demand	Output total active power real-time demand exceeds the upper limit
	14	Recorded value (FP32): input total reactive power real-time demand	Input total reactive power real-time demand exceeds the upper limit
	15	Recorded value (FP32): Output total reactive power real-time demand	Output total reactive power real-time demand exceeds the upper limit
	16	Recorded value (FP32): input total apparent power real-time demand	Enter the total apparent power real-time demand limit
	17	Recorded value (FP32): Output total apparent power real-time demand	Output total apparent power real-time demand exceeds the upper limit
	18	Recorded value (FP32): Input total active power forecast demand	Enter the total active power forecast demand limit
	19	Recorded value (FP32): Output total active power forecast demand	Output total active power forecast demand

			exceeds the upper limit
	20	Recorded value (FP32): Input total reactive power forecast demand	Input total reactive power forecast demand exceeds the upper limit
	21	Recorded value (FP32): Output total reactive power forecast demand	Output total reactive power forecast demand exceeds the upper limit
	22	Recorded value (FP32): Input total apparent power forecast demand	Enter the total apparent power forecast demand limit
	23	Recorded value (FP32): Output total apparent power forecast demand	Output total apparent power forecast demand exceeds the upper limit
	24	Recorded value (FP32): total phase A voltage distortion rate	The upper limit of the total voltage distortion rate
		Recorded value (FP32): total phase B voltage distortion rate	The upper limit of the total voltage distortion rate
		Recorded value (FP32): total distortion rate of phase C voltage	The upper limit of the total voltage distortion rate
	25	Recorded value (FP32): total phase A current distortion rate	The upper limit of the total current distortion rate
		Recorded value (FP32): total distortion rate of phase B current	The upper limit of the total current distortion rate
		Recorded value (FP32): total distortion rate of phase C current	The upper limit of the total current distortion rate
	26	Recorded value (FP32): voltage negative sequence imbalance	The upper limit of the voltage negative sequence imbalance
	27	Recorded value (FP32): voltage zero sequence imbalance	The upper limit of the voltage zero sequence imbalance
	28	Recorded value (FP32): current negative sequence imbalance	The upper limit of current negative sequence imbalance
	29	Recorded value (FP32): current zero	The upper limit of the

		sequence imbalance	current zero sequence imbalance
	30	Recorded value (FP32): A phase voltage short-time flicker	Voltage short time flicker upper limit
		Recorded value (FP32): B-phase voltage short-time flicker	Voltage short time flicker upper limit
		Recorded value (FP32): Short-time flicker of phase C voltage	Voltage short time flicker upper limit
	31	Recorded value (FP32): A phase voltage long time flicker	Voltage long time flicker upper limit
		Recorded value (FP32): B phase voltage long time flicker	Voltage long time flicker upper limit
		Recorded value (FP32): C-phase voltage long time flicker	Voltage long time flicker upper limit
	32	Record value (FP32): A phase voltage 3 harmonic contain rate.	The upper limit of the 3 harmonic voltage
		Record value (FP32): B phase voltage 3 harmonic contain rate.	The upper limit of the 3 harmonic voltage
		Record value (FP32): C phase voltage 3 harmonic contain rate.	The upper limit of the 3 harmonic voltage
	33	Record value (FP32): A phase voltage 5 harmonic contain rate.	The upper limit of the 5 harmonic voltage
		Record value (FP32): B phase voltage 5 harmonic contain rate.	The upper limit of the 5 harmonic voltage
		Record value (FP32): C phase voltage 5 harmonic contain rate.	The upper limit of the 5 harmonic voltage
	34	Record value (FP32): A phase voltage 7 harmonic contain rate.	The upper limit of the 7 harmonic voltage
		Record value (FP32): B phase voltage 7 harmonic contain rate.	The upper limit of the 7 harmonic voltage
		Record value (FP32): C phase voltage 7 harmonic contain rate.	The upper limit of the 7 harmonic voltage
	35	Record value (FP32): A phase voltage 9 harmonic contain rate.	The upper limit of the 9 harmonic voltage
		Record value (FP32): B phase voltage 9 harmonic contain rate.	The upper limit of the 9 harmonic voltage
		Record value (FP32): C phase voltage 9 harmonic contain rate.	The upper limit of the 9 harmonic voltage

	36	Record value (FP32): A phase voltage 11 harmonic contain rate.	The upper limit of the 11 harmonic voltage
		Record value (FP32): B phase voltage 11 harmonic contain rate.	The upper limit of the 11 harmonic voltage
		Record value (FP32): C phase voltage 11 harmonic contain rate.	The upper limit of the 11 harmonic voltage
	37	Record value (FP32): A phase voltage 13 harmonic contain rate.	The upper limit of the 7 harmonic voltage
		Record value (FP32): B phase voltage 13 harmonic contain rate.	The upper limit of the 13 harmonic voltage
		Record value (FP32): C phase voltage 13 harmonic contain rate.	The upper limit of the 13 harmonic voltage
	38	Record value (FP32): A phase current 3 harmonic contain rate.	The upper limit of the 3 harmonic current
		Record value (FP32): B phase current 3 harmonic contain rate.	The upper limit of the 3 harmonic current
		Record value (FP32): C phase current 3 harmonic contain rate.	The upper limit of the 3 harmonic current
	39	Record value (FP32): A phase current 5 harmonic contain rate.	The upper limit of the 5 harmonic current
		Record value (FP32): B phase current 5 harmonic contain rate.	The upper limit of the 5 harmonic current
		Record value (FP32): C phase current 5 harmonic contain rate.	The upper limit of the 5 harmonic current
	40	Record value (FP32): A phase current 7 harmonic contain rate.	The upper limit of the 7 harmonic current
		Record value (FP32): B phase current 7 harmonic contain rate.	The upper limit of the 7 harmonic current
		Record value (FP32): C phase current 7 harmonic contain rate.	The upper limit of the 7 harmonic current
	41	Record value (FP32): A phase current 9 harmonic contain rate.	The upper limit of the 9 harmonic current
		Record value (FP32): B phase current 9 harmonic contain rate.	The upper limit of the 9 harmonic current
		Record value (FP32): C phase current 9 harmonic contain rate.	The upper limit of the 9 harmonic current
	42	Record value (FP32): A phase current 11 harmonic contain rate.	The upper limit of the 11 harmonic current

		Record value (FP32): B phase current 11 harmonic contain rate.	The upper limit of the 11 harmonic current
		Record value (FP32): C phase current 11 harmonic contain rate.	The upper limit of the 11 harmonic current
	43	Record value (FP32): A phase current 13 harmonic contain rate.	The upper limit of the 13 harmonic current
		Record value (FP32): B phase current 13 harmonic contain rate.	The upper limit of the 13 harmonic current
		Record value (FP32): C phase current 13 harmonic contain rate.	The upper limit of the 13 harmonic current
	44	Record value (FP32): A phase voltage	Lower voltage limit
		Record value (FP32): B phase voltage	Lower voltage limit
		Record value (FP32): C phase voltage	Lower voltage limit
	45	Record value (FP32): AB line voltage	Lower limit of line voltage
		Record value (FP32): BC line voltage	Lower limit of line voltage
		Record value (FP32): CA line voltage	Lower limit of line voltage
	46	Record value (FP32): A phase current	Lower current limit
		Record value (FP32): B phase current	Lower current limit
		Record value (FP32): C phase current	Lower current limit
	…	…	…
4（malfunction）	1	0	DSP failure
	2	0	AD sampling failure
	3	0	SD memory failure
	4	0	Ferroelectric memory failure
	5	0	Basic parameter error
	6	0	Communication parameters error
	7	0	IO parameter error
	8	0	PQ parameter error
	9	0	Limit parameter error
	10	0	Tariff parameter error

	11	0	Other parameter errors
	12	0	Internal parameter error
5（operation）	1	0	Power on
	2	0	Power off
	3	0	Panel Modify the basic parameters
	4	0	Panel Modify communication parameters
	5	0	Panel Modify IO parameters
	6	0	Panel Modify PQ Parameters
	7	0	Panel Modify other parameters
	8	0	Panel Modify internal parameters
	9	0	Panel Modify time
	10	0	Panel Clear real-time power
	11	0	Panel Clear SOE records
	12	0	Panel Clear PQ records
	13	0	Panel Clear the record of the most value
	14	0	Panel Clear maximum demand
	15	0	Panel Clear history data
	16	0	Panel Factory reset
	17	0	Panel Clear run time
	18	0	Panel Clear waveform 1
	19	0	Panel Clear waveform 2
	20	0	Panel Clear DI pulse count
	21	0	Communication Modify the basic parameters

	22	0	Communication Modify communication parameters
	23	0	Communication Modify IO parameters
	24	0	Communication Modify PQ Parameters
	25	0	Communication modify limit parameters
	26	0	Communication modify of tariff parameters
	27	0	Communication Modify other parameters
	28	0	Communication Modify internal parameters
	29	0	Communication Clear real-time power
	30	0	Communication Clear SOE records
	31	0	Communication Clear PQ records
	32	0	Communication Clear the record of the most value
	33	0	Communication Clear maximum demand
	34	0	Communication Clear history data
	35	0	Communication Factory reset
	36	0	Communication Clear run time
	37	0	Communication Clear waveform 1
	38	0	Communication Clear waveform 2
	39	0	Communication Clear DI pulse count
	40	0	Communication manual recording 1

	41	0	Communication manual recording 2
	42	0	Clear EN50160 record
	43	0	Clear PQDIF report record

5.11 PQ record register

Register	Attribute	Data Type	Description	Remarks
21000-21013	RO	U16	Article 1 PQ record	Must read the entire article
21014-21027	RO	U16	Article 2 PQ record	Must read the entire article
21028-35321	RO		...	
35322-35335	RO	U16	Article 1024 PQ record	Must read the entire article

Note: The order of PQ record registers is not saved and uploaded in the order in which events occur. It is a method of loop coverage to save event records. The location of the latest event record is obtained by the following formula: PQ record count %1024, If the calculation result is 0, the latest event storage location is 1024.

PQ record format definition

Register	Attribute	Data Type	Description
1	RO	U8	class
		U8	Subclass
2	RO	U16	Event occurs UNIX seconds low word
3	RO	U16	Event occurs UNIX high word
4	RO	U16	Time occurs in milliseconds
5	RO		Record value 1
6	RO		Record value 2
7	RO		Record value 3
8	RO		Record value 4
9	RO		Record value 5
10	RO		class
11	RO		Subclass

12	RO		Event occurs UNIX seconds low word
13	RO		Event occurs UNIX high word
14	RO		

PQ type definition

Class	Subclass	PQ Record Value	Description
1 Transient disturbance	1	Record value 1 (FP32): Trigger channel (BIT0: Phase A; BIT 1: Phase B; BIT 2: Phase C)	Voltage rise start
	2	Recorded value 1 (FP32): Maximum rise voltage amplitude in % Record value 2 (FP32): duration, ms Recorded value 3 (FP32): Phase A voltage residual voltage (maximum value / reference value), in % Recorded value 4 (FP32): Phase B voltage residual voltage (maximum value / reference value), in % Recorded value 5 (FP32): Phase C voltage residual voltage (maximum value / reference value), in % Reference value: Refer to the value set by the 8251 register (transient reference voltage)	End of voltage rise
	3	Same as 1	Voltage dip start
	4	Same as 2	End of voltage dip
	5	Same as 1	Voltage interrupt start
	6	Same as 2	End of voltage interruption
2 Transient disturbance	1	Recorded value 1 (FP32): none Recorded value 2 (FP32): none Recorded value 3 (FP32): none Recorded value 4 (FP32): none Recorded value 5 (FP32): none	Voltage transient disturbance
3 Fast voltage change	1	Recorded value 1 (FP32): Steady-state voltage change rate (steady-state change value / rated value), in % Record value 2 (FP32): duration, ms Recorded value 3 (FP32): Maximum voltage change rate (maximum change value / rated value), in % Record value 4 (FP32): direction of voltage change (0: down; 1: up)	Phase A fast voltage change

		Recorded value 5 (FP32): rate of voltage change in units of 0.01 Ue/s	
	2	Recorded value 1 (FP32): Steady-state voltage change rate (steady-state change value / rated value), in % Record value 2 (FP32): duration, ms Recorded value 3 (FP32): Maximum voltage change rate (maximum change value / rated value), in % Record value 4 (FP32): direction of voltage change (0: down; 1: up) Recorded value 5 (FP32): rate of voltage change in units of 0.01 Ue/s	Phase B fast voltage change
	3	Recorded value 1 (FP32): Steady-state voltage change rate (steady-state change value / rated value), in % Record value 2 (FP32): duration, ms Recorded value 3 (FP32): Maximum voltage change rate (maximum change value / rated value), in % Record value 4 (FP32): direction of voltage change (0: down; 1: up) Recorded value 5 (FP32): rate of voltage change in units of 0.01 Ue/s	Phase C fast voltage change

5.12 Historical data register

5.12.1Historical energy data register

Description: The following registers are historical daily energy registers.

Register	Attribute	Description	Data Type	Remarks
36000	RW	Index register	U16	n(1-31)[Note 1]
36001	RO	time	U32	UNIX time
36003	RO	Input active energy (integer)	U32	kWh
36005	RO	Input active energy (decimal places)	U16	×0.001kWh
36006	RO	Output active energy (integer bit)	U32	kWh
36008	RO	Output active energy (decimal places)	U16	×0.001kWh
36009	RO	Active energy sum (integer)	U32	kWh
36011	RO	Sum of active energy (decimal places)	U16	×0.001kWh
36012	RO	Active energy net value (integer number)	U32	kWh
36014	RO	Active energy net value (decimal places)	U16	×0.001kWh

36015	RO	Input reactive energy (integer)	U32	kvarh
36017	RO	Input reactive energy (decimal places)	U16	×0.001kvarh
36018	RO	Output reactive energy (integer bit)	U32	kvarh
36020	RO	Output reactive energy (decimal places)	U16	×0.001kvarh
36021	RO	Sum of reactive energy (integer)	U32	kvarh
36023	RO	Sum of reactive energy (decimal places)	U16	×0.001kvarh
36024	RO	Reactive energy net value (integer number)	U32	kvarh
36026	RO	Reactive energy net value (decimal places)	U16	×0.001kvarh
36027	RO	Input apparent energy (integer)	U32	kVAh
36029	RO	Input apparent energy (decimal places)	U16	×0.001kVAh
36030	RO	Output apparent energy (integer)	U32	kVAh
36032	RO	Output apparent energy (decimal places)	U16	×0.001kVAh
36033	RO	Apparent energy sum (integer)	U32	kVAh
36035	RO	Apparent energy sum (decimal places)	U16	×0.001kVAh
36036	RO	Apparent electricity net value (integer number)	U32	kVAh
36038	RO	Apparent electricity net value (decimal places)	U16	×0.001kVAh
36039	RO	First quadrant reactive energy (integer position)	U32	kvarh
36041	RO	First quadrant reactive energy (decimal places)	U16	×0.001kvarh
36042	RO	Second quadrant reactive energy (integer position)	U32	kvarh
36044	RO	Second quadrant reactive energy (decimal places)	U16	×0.001kvarh
36045	RO	Third quadrant reactive energy (integer position)	U32	kvarh
36047	RO	Third quadrant reactive energy (decimal places)	U16	×0.001kvarh
36048	RO	Fourth quadrant reactive energy (integer position)	U32	kvarh
36050	RO	Fourth quadrant reactive energy (decimal places)	U16	×0.001kvarh
36051	RO	1#TOU input active energy (integer position)	U32	kWh
36053	RO	1#TOU input active energy (decimal places)	U16	×0.001kWh

36054	RO	1#TOU output active energy (integer position)	U32	kWh
36056	RO	1#TOU output active energy (decimal places)	U16	×0.001kWh
36057	RO	1#TOU input reactive energy (integer position)	U32	kvarh
36059	RO	1#TOU input reactive energy (decimal places)	U16	×0.001kvarh
36060	RO	1#TOU output reactive energy (integer position)	U32	kvarh
36062	RO	1#TOU output reactive energy (decimal places)	U16	×0.001kvarh
36063	RO	1#TOU input apparent energy (integer position)	U32	kVAh
36065	RO	1#TOU input apparent energy (decimal places)	U16	×0.001 kVAh
36066	RO	1#TOU output apparent energy (integer position)	U32	kVAh
36068	RO	1#TOU output apparent energy (decimal places)	U16	×0.001kVAh
36069	RO	2#TOU		
36087	RO	3#TOU		
36105	RO	4#TOU		

Description: The following registers are historical monthly power registers.

37000	**RW**	**Index register**	**U16**	n(1-12)[注 1]
37001	RO	time	U32	UNIX 时间
37003	RO	Input active energy (integer bit)	U32	kWh
37005	RO	Enter active energy (decimal places)	U16	×0.001kWh
37006	RO	Output active energy (integer bit)	U32	kWh
37008	RO	Output active energy (decimal places)	U16	×0.001kWh
37009	RO	Active energy sum (integer)	U32	kWh
37011	RO	Active energy sum (decimal places)	U16	×0.001kWh
37012	RO	Active energy net worth (integer bits)	U32	kWh
37014	RO	Active energy net worth (decimal places)	U16	×0.001kWh
37015	RO	Input reactive energy (integer position)	U32	kvarh
37017	RO	Input reactive energy (decimal places)	U16	×0.001kvarh
37018	RO	Output reactive energy (integer bit)	U32	kvarh
37020	RO	Output reactive energy (decimal places)	U16	×0.001kvarh

37021	RO	Reactive energy sum (integer bits)	U32	kvarh
37023	RO	Reactive energy sum (decimal places)	U16	×0.001kvarh
37024	RO	Reactive energy net worth (integer bits)	U32	kvarh
37026	RO	Reactive energy net worth (decimal places)	U16	×0.001kvarh
37027	RO	Input view energy (integer bit)	U32	kVAh
37029	RO	Input dependent energy (decimal places)	U16	×0.001kVAh
37030	RO	Output apparent energy (integer bit)	U32	kVAh
37032	RO	Output apparent energy (decimal places)	U16	×0.001kVAh
37033	RO	Apparent energy sum (integer)	U32	kVAh
37035	RO	Depending on the energy sum (decimal places)	U16	×0.001kVAh
37036	RO	Apparent energy net value (integer number)	U32	kVAh
37038	RO	Apparent energy net worth (decimal places)	U16	×0.001kVAh
37039	RO	First quadrant reactive energy (integer position)	U32	kvarh
37041	RO	First quadrant reactive energy (decimal places)	U16	×0.001kvarh
37042	RO	Second quadrant reactive energy (integer position)	U32	kvarh
37044	RO	Second quadrant reactive energy (decimal places)	U16	×0.001kvarh
37045	RO	Third quadrant reactive energy (integer position)	U32	kvarh
37047	RO	Third quadrant reactive energy (decimal places)	U16	×0.001kvarh
37048	RO	Fourth quadrant reactive energy (integer position)	U32	kvarh
37050	RO	Fourth quadrant reactive energy (decimal places)	U16	×0.001kvarh
37051	RO	1#TOU input active energy (integer position)	U32	kWh
37053	RO	1#TOU input active energy (decimal places)	U16	×0.001kWh
37054	RO	1#TOU output active energy (integer position)	U32	kWh
37056	RO	1#TOU output active energy (decimal places)	U16	×0.001kWh

37057	RO	1#TOU input reactive energy (integer position)	U32	kvarh
37059	RO	1#TOU input reactive energy (decimal places)	U16	×0.001kvarh
37060	RO	1#TOU output reactive energy (integer position)	U32	kvarh
37062	RO	1#TOU output reactive energy (decimal places)	U16	×0.001kvarh
37063	RO	1#TOU input apparent energy (integer position)	U32	kVAh
37065	RO	1#TOU input apparent energy (decimal places)	U16	×0.001 kVAh
37066	RO	1#TOU output apparent energy (integer position)	U32	kVAh
37068	RO	1#TOU output apparent energy (decimal places)	U16	×0.001kVAh
37069	RO	2#TOU		
37087	RO	3#TOU		
37105	RO	4#TOU		

[Note 1] When n=1, it means that 1 is the most recent first day data, rewriting this register value is 2, then the subsequent register is the data of the last 2nd day, and so on. - The data returned by the history record that does not exist is all 0; the record that is confirmed to be non-existent by the UNIX time is zero

5.15 Evaluation result

Register	attribute	description	data type	Remarks
45100	RO	Report start time	U32	UNIX time
45102	RO	Report end time	U32	UNIX time
45104	RO	Frequency: general conclusion	U32	0: indicates PASS; 1: indicates UNPASS
45106	RO	Frequency: Evaluate effective points	U32	
45108	RO	Frequency: Evaluate invalid points	U32	
45110	RO	Maximum effective frequency	FP32	
45112	RO	Minimum effective frequency	FP32	
45114	RO	Frequency: Broadband - Conclusion	U32	
45116	RO	Frequency: Broadband - limit times	U32	
45118	RO	Frequency: Broadband - qualified rate	FP32	

45120	RO	Frequency: narrowband -- a conclusion	U32	
45122	RO	Frequency: narrow band - time limit times	U32	
45124	RO	Frequency: narrow band - qualified rate	FP32	
----------Separation line----------				
45150	RO	Report start time	U32	Unix time
45152	RO	Report end time	U32	Unix time
45154	RO	Voltage: general conclusion	U32	0: representing PASS; 1: representing UNPASS
45156	RO	Voltage: Evaluate effective points	U32	
45158	RO	Voltage: evaluate invalid points	U32	
45160	RO	Phase A voltage maximum	FP32	
45162	RO	B phase voltage maximum	FP32	
45164	RO	Phase C voltage maximum	FP32	
45166	RO	Phase A voltage minimum	FP32	
45168	RO	B phase voltage minimum	FP32	
45170	RO	Phase C voltage minimum	FP32	
45172	RO	Voltage: Broadband -- a conclusion	U32	
45174	RO	Voltage: broadband --A phase limit times	U32	
45176	RO	Voltage: broadband --B phase limit times	U32	
45178	RO	Voltage: broadband --C phase limit times	U32	
45180	RO	Voltage: broadband --A phase pass rate	FP32	
45182	RO	Voltage: broadband --B phase pass rate	FP32	
45184	RO	Voltage: broadband --C phase pass rate	FP32	
45186	RO	Voltage: narrowband -- a conclusion	U32	
45188	RO	Voltage: the frequency limit times of narrow band --A phase	U32	
45190	RO	Voltage: the frequency limit times of narrow band --B phase	U32	
45192	RO	Voltage: the frequency limit times of narrow band --C phase	U32	
45194	RO	Voltage: pass rate of narrow band --A phase	FP32	
45196	RO	Voltage: pass rate of narrow band --B phase	FP32	
45198	RO	Voltage: pass rate of narrow band --C phase	FP32	
----------Separation line----------				
45300	RO	Report start time	U32	UNIX time
45302	RO	Report end time	U32	UNIX time
45304	RO	Flicker: general conclusion	U32	

45306	RO	Flicker: Evaluate effective points	U32	
45308	RO	Flicker: Evaluate invalid points	U32	
45310	RO	Flicker A phase maximum	FP32	
45312	RO	Flicker B phase maximum	FP32	
45314	RO	Flicker C phase maximum	FP32	
45316	RO	Flicker A phase minimum	FP32	
45318	RO	Flicker B phase minimum	FP32	
45320	RO	Flicker C phase minimum	FP32	
45322	RO	Flicker A phase P95 value	FP32	P95: 95% value
45324	RO	Flicker B phase P95 value	FP32	
45326	RO	Flicker C phase P95 value	FP32	
45328	RO	Flicker: Broadband - Conclusion	U32	
45330	RO	Flicker: Broadband--A phase limit	U32	
45332	RO	Flicker: Broadband--B phase violation limit	U32	
45334	RO	Flicker: Broadband--C phase crossing limit	U32	
45336	RO	Flicker: Broadband--A phase pass rate	FP32	
45338	RO	Flicker: Broadband--B phase pass rate	FP32	
45340	RO	Flicker: Broadband--C phase pass rate	FP32	
----------Separation line----------				
45400	RO	Report start time	U32	UNIX time
45402	RO	Report end time	U32	UNIX time
45404	RO	Unbalance: general conclusion	U32	0: indicates PASS; 1: indicates UNPASS
45406	RO	Unbalance: Evaluate effective points	U32	
45408	RO	Unbalanced: evaluate invalid points	U32	
45410	RO	Unbalanced maximum	FP32	
45412	RO	Unbalanced minimum	FP32	
45414	RO	Unbalanced P95 value	FP32	P95: 95% value
45416	RO	Unbalance: Broadband - Conclusion	U32	
45418	RO	Unbalance: Broadband - the number of times	U32	
45420	RO	Unbalance: Broadband - Pass rate	FP32	
----------Separation line----------				
45500	RO	Report start time	U32	UNIX time
45502	RO	Report end time	U32	UNIX time
45504	RO	Harmonics: general conclusion	U32	

45506	RO	Harmonics: Evaluate effective points	U32	
45508	RO	Harmonics: Evaluating invalid points	U32	
45510	RO	Total harmonic A phase maximum	FP32	
45512	RO	Total harmonic B phase maximum	FP32	
45514	RO	Total harmonic C phase maximum	FP32	
45516	RO	Total harmonic A phase minimum	FP32	
45518	RO	Total harmonic B phase minimum	FP32	
45520	RO	Total harmonic C phase minimum	FP32	
45522	RO	Total harmonic A phase P95 value	FP32	P95: 95% value
45524	RO	Total harmonic B phase P95 value	FP32	
45526	RO	Total harmonic C phase P95 value	FP32	
45528	RO	Total harmonic A phase average	FP32	
45530	RO	Total harmonic B phase average	FP32	
45532	RO	Total harmonic C phase average	FP32	
45534	RO	Total Harmonics: Broadband - Conclusion	U32	
45536	RO	Total Harmonic: Broadband--A Phase Overruns	U32	
45538	RO	Total Harmonic: Broadband--B Phase Overruns	U32	
45540	RO	Total Harmonic: Broadband--C Phase Overruns	U32	
45542	RO	Total Harmonic: Broadband--A Phase Pass Rate	FP32	
45544	RO	Total Harmonic: Broadband--B Phase Eligibility	FP32	
45546	RO	Total Harmonic: Broadband--C Phase Pass Rate	FP32	
----------Statistical value of each harmonic----------				
45548	RO	2nd harmonic A phase maximum	FP32	
	RO	2nd harmonic B phase maximum	FP32	
	RO	2nd harmonic C phase maximum	FP32	
	RO	3rd harmonic A phase maximum	FP32	
	RO	3rd harmonic B phase maximum	FP32	
	RO	3rd harmonic C phase maximum	FP32	
	RO	4th harmonic A phase maximum	FP32	
	RO	4th harmonic B phase maximum	FP32	
	RO	4th harmonic C phase maximum	FP32	
	RO	5th harmonic A phase maximum	FP32	
	RO	5th harmonic B phase maximum	FP32	

	RO	5th harmonic C phase maximum	FP32	
	RO	6th harmonic A phase maximum	FP32	
	RO	6th harmonic B phase maximum	FP32	
	RO	6th harmonic C phase maximum	FP32	
	RO	7th harmonic A phase maximum	FP32	
	RO	7th harmonic B phase maximum	FP32	
	RO	7th harmonic C phase maximum	FP32	
	RO	8th harmonic A phase maximum	FP32	
	RO	8th harmonic B phase maximum	FP32	
	RO	8th harmonic C phase maximum	FP32	
	RO	9th harmonic A phase maximum	FP32	
	RO	9th harmonic B phase maximum	FP32	
	RO	9th harmonic C phase maximum	FP32	
	RO	10th harmonic A phase maximum	FP32	
	RO	10th harmonic B phase maximum	FP32	
	RO	10th harmonic C phase maximum	FP32	
	RO	11th harmonic A phase maximum	FP32	
	RO	11th harmonic B phase maximum	FP32	
	RO	11th harmonic C phase maximum	FP32	
	RO	12th harmonic A phase maximum	FP32	
	RO	12th harmonic B phase maximum	FP32	
	RO	12th harmonic C phase maximum	FP32	
	RO	13th harmonic A phase maximum	FP32	
	RO	13th harmonic B phase maximum	FP32	
	RO	13th harmonic C phase maximum	FP32	
	RO	14th harmonic A phase maximum	FP32	
	RO	14th harmonic B phase maximum	FP32	
	RO	14th harmonic C phase maximum	FP32	
	RO	15th harmonic A phase maximum	FP32	
	RO	15th harmonic B phase maximum	FP32	
	RO	16th harmonic C phase maximum	FP32	
	RO	17th harmonic A phase maximum	FP32	
	RO	17th harmonic B phase maximum	FP32	
	RO	17th harmonic C phase maximum	FP32	
	RO	18th harmonic A phase maximum	FP32	
	RO	18th harmonic B phase maximum	FP32	
	RO	18th harmonic C phase maximum	FP32	
	RO	19th harmonic A phase maximum	FP32	

	RO	19th harmonic B phase maximum	FP32	
	RO	19th harmonic C phase maximum	FP32	
	RO	20th harmonic A phase maximum	FP32	
	RO	20th harmonic B phase maximum	FP32	
	RO	20th harmonic C phase maximum	FP32	
	RO	21th harmonic A phase maximum	FP32	
	RO	21th harmonic B phase maximum	FP32	
	RO	21th harmonic C phase maximum	FP32	
	RO	22th harmonic A phase maximum	FP32	
	RO	22th harmonic B phase maximum	FP32	
	RO	22th harmonic C phase maximum	FP32	
	RO	23th harmonic A phase maximum	FP32	
	RO	23th harmonic B phase maximum	FP32	
	RO	23th harmonic C phase maximum	FP32	
	RO	24th harmonic A phase maximum	FP32	
	RO	24th harmonic B phase maximum	FP32	
	RO	24th harmonic C phase maximum	FP32	
	RO	25th harmonic A phase maximum	FP32	
	RO	25th harmonic B phase maximum	FP32	
45690	RO	25th harmonic C phase maximum	FP32	

45692	RO	2nd harmonic A phase minimum	FP32	
	RO	2nd harmonic B phase minimum	FP32	
	RO	2nd harmonic C phase minimum	FP32	
	...	.....	...	
	RO	25th harmonic A phase minimum	FP32	
	RO	25th harmonic B phase minimum	FP32	
45834	RO	25th harmonic C phase minimum	FP32	

45836	RO	2nd harmonic A phase P95 value	FP32	
...	RO	2nd harmonic B phase P95 value	FP32	
..	RO	2nd harmonic C-phase P95 value	FP32	
	...	.....	...	
	RO	25th harmonic A phase P95 value	FP32	
	RO	25th harmonic B phase P95 value	FP32	
45978	RO	25th harmonic C phase P95 value	FP32	

45980	RO	2nd harmonic A phase average	FP32	
...	RO	2nd harmonic B phase average	FP32	

..	RO	2nd harmonic C-phase average	FP32	
	...	.....	...	
	RO	25th harmonic A phase average	FP32	
	RO	25th harmonic B phase average	FP32	
46122	RO	25th harmonic C phase average	FP32	

46124	RO	2nd harmonic wideband - conclusion	U32	
46126	RO	2nd harmonic A phase broadband - the number of times	U32	
46128	RO	2nd harmonic B phase broadband - the number of times	U32	
46130	RO	2nd harmonic C-phase broadband--the number of times	U32	
46132	RO	2nd harmonic A phase broadband - pass rate	FP32	
46134	RO	2nd harmonic B phase broadband - pass rate	FP32	
46136	RO	2nd harmonic C-phase broadband--qualification rate	FP32	
46138	RO	3rd harmonic wideband - conclusion	U32	
	RO	3rd harmonic A phase broadband - the number of times	U32	
	RO	3rd harmonic B-phase broadband--the number of times	U32	
	RO	3rd harmonic C-phase broadband--the number of times	U32	
	RO	3rd harmonic A phase broadband - pass rate	FP32	
	RO	3rd harmonic B phase broadband - pass rate	FP32	
46150	RO	3rd harmonic C-phase broadband--qualification rate	FP32	
	.....	.....		
	.....	.....		
46432	RO	24th harmonic wideband - conclusion	U32	
46434	RO	24th harmonic A phase broadband - the number of times	U32	
46436	RO	24th harmonic B phase broadband - the number of times	U32	
46438	RO	24th harmonic C-phase broadband--the number of times	U32	
46440	RO	24th harmonic A phase broadband - pass	FP32	

		rate		
46442	RO	24th harmonic B phase broadband - pass rate	FP32	
46444	RO	24th harmonic C-phase broadband--qualification rate	FP32	
46446	RO	25th harmonic wideband - conclusion	U32	
46448	RO	25th harmonic A phase broadband - the number of times	U32	
46450	RO	25th harmonic B-phase broadband--the number of times	U32	
46452	RO	25th harmonic C-phase broadband--the number of times	U32	
46454	RO	25th harmonic A phase broadband - pass rate	FP32	
46456	RO	25th harmonic B phase broadband - pass rate	FP32	
46458	RO	25th harmonic C-phase broadband--qualification rate	FP32	
46460				
----------Interrupt count statistics----------				
46500	RO	Report start time	U32	UNIX time
46502	RO	Report end time	U32	UNIX time
46504	RO	Short interruption count	U32	
46506	RO	Interrupt count	U32	
46508	RO	Long-term interrupt count	U32	
----------Transient occurrence statistics----------				
46520	RO	Report start time	U32	UNIX time
46522	RO	Report end time	U32	UNIX time
46524	RO	Phase A count	U32	Remark: Phase count: the phase with transient disturbance, then count plus 1
46526	RO	Phase B count	U32	
46528	RO	Phase C count	U32	

----------Fast change statistics----------				
46540	RO	Report start time	U32	UNIX time
46542	RO	Report end time	U32	UNIX time
46544	RO	Phase A count	U32	
46546	RO	Phase B count	U32	
46548	RO	Phase C count	U32	
----------Rising, overvoltage statistics----------				
46560	RO	Report start time	U32	UNIX time
46562	RO	Report end time	U32	UNIX time
46564	RO	Overvoltage 120% - less than 500ms	U32	
46566	RO	Overvoltage 120% - 5000ms or less	U32	
46568	RO	Overvoltage 120% - 60000ms	U32	
46570	RO	Overpressure 120% - more than 1 minute	U32	
46572	RO	Overvoltage 140% - less than 500ms	U32	
46574	RO	Overvoltage 140% - 5000ms or less	U32	
46576	RO	Overvoltage 140% - 60000ms	U32	
46578	RO	Overpressure 140% - more than 1 minute	U32	
46580	RO	Overvoltage 160% - less than 500ms	U32	
46582	RO	Overvoltage 160% - 5000ms or less	U32	
46584	RO	Overvoltage within 160%--60000ms	U32	
46586	RO	Overpressure 160% - more than 1 minute	U32	
46588	RO	Overvoltage 200% - less than 500ms	U32	
46590	RO	Overvoltage 200% - 5000ms	U32	
46592	RO	Overvoltage within 200%--60000ms	U32	
46594	RO	Overpressure 200% - more than 1 minute	U32	
46596	RO	Overvoltage is greater than 200% - less than 500ms	U32	
46598	RO	Overvoltage is greater than 200% - 5000ms or less	U32	
46600	RO	Overvoltage is greater than 200% - 60,000ms	U32	
46602	RO	Overpressure is greater than 200% - more than 1 minute	U32	
----------Suspend,loss of pressure statistics----------				
46650	RO	Report start time	U32	UNIX time
46652	RO	Report end time	U32	UNIX time
46654	RO	Residual pressure 5% - within 200ms count	U32	

46656	RO	Residual pressure 5% - 500ms count	U32	
46658	RO	Residual pressure 5%--1s count	U32	
46660	RO6	Residual pressure 5%--5s count	U32	
46662	RO	Residual pressure 5% - 60s count	U32	
46664	RO	Residual pressure 5%--60s or more	U32	
46666	RO	Residual pressure 40% - count within 200ms	U32	
46668	RO	Residual pressure 40% - count within 500ms	U32	
46670	RO	Residual pressure within 40%--1s count	U32	
46672	RO	Residual pressure within 40% - 5s count	U32	
46674	RO	Residual pressure 40% - 60s count	U32	
46676	RO	Residual pressure 40% - above 60s count	U32	
46678	RO	Residual pressure 70% - count within 200ms	U32	
46680	RO	Residual pressure 70% - within 500ms count	U32	
46682	RO	Residual pressure 70% -1s count	U32	
46684	RO	Residual pressure 70% - 5s count	U32	
46686	RO	Residual pressure 70% - 60s count	U32	
46688	RO	Residual pressure 70% - 60s or more count	U32	
46690	RO	Residual pressure 80% - count within 200ms	U32	
46692	RO	Residual pressure 80% - count within 500ms	U32	
46694	RO	Residual pressure 80% -1s count	U32	
46696	RO	Residual pressure 80% - 5s count	U32	
46698	RO	Residual pressure 80% - count within 60s	U32	
46700	RO	Residual pressure 80% - more than 60s count	U32	
46702	RO	Residual pressure 90% - count within 200ms	U32	
46704	RO	Residual pressure 90% - count within 500ms	U32	
46706	RO	Residual pressure count within 90%--1s	U32	
46708	RO	Residual pressure 90% - 5s count	U32	
46710	RO	Residual pressure 90% - count within 60s	U32	
46712	RO	Residual pressure 90% - 60s or more count	U32	

Appendix 1 Waveform Record Reading Method

The waveform record group storage path is /media/card/comtrade/year-month-day-hour-minute-second-millisecond-number_label.cfg, /media/card/comtrade/year-month-day-hour-minute- Seconds-milliseconds_labels.dat

The waveform record has 128 buffers per group. By reading the waveform record group N count register (94, 96), it is judged whether the waveform record count has changed. When the change occurs, the waveform record occurs. The file name of the latest waveform record is The waveform record group N counts %128, finds the file name according to the index found /media/card/comtrade/wave_records.idx index file, and then accesses the file name corresponding to the device through FTP.

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