Three-phase Multifunctional Power Quality Analyzer

PEM5000

Modbus Protocol

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Revision history

Revision	Date	Modification
V1.0	2024/05/20	Create documents
V1.1	2025/03/14	Added relay output control
V1.2	2025/03/24	Added UInt32 energy registers
V1.3	2025/12/03	Added Model Naming Conventions

Contents

Modbus Communication

Communication interface	Communication protocol
RJ45-LAN	Modbus-TCP/IP
RS485	Modbus-RTU

The analyzer is equipped with RJ45 Ethernet communication interface and RS485 communication interface, which can be used for Modbus TCP / IP and Modbus RTU communication.

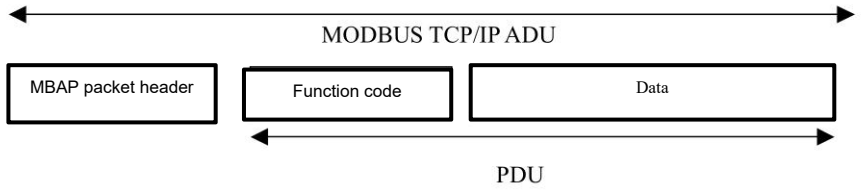
1.1 Modbus-TCP communication

Before Modbus TCP communication, the following parameters need to be set through the interface of the analyzer:

Parameter	Effective value	Default value
IP address	-	192.168.1.55
Subnet mask	-	255.255.255.0
Gateway address	-	192.168.1.1
Modbus protocol port number	-	502

1.1.1 Modbus-TCP/IP data frame

When transmitted over TCP / IP Ethernet, Modbus TCP / IP data frame includes 3 parts: packet header, function code and data.



MBAP packet header (MBAP,Modbus Application Protocol,Modbus application Protocol) is divided into 4 fields with 7 bytes in total.

MBAPpacket header

Field	Length	Description	Client	Server
Transaction meta identifier	2 bytes	MODBUS ID of the request / response transaction	Client startup	The server replicates from the received request.
Protocol identifier	2 bytes	0=MODBUS Protocol	Client startup	The server replicates from the received request.
Length	2 bytes	Number of bytes	Client startup(request)	Server (response) start
Unit identifier	1 byte	Identification code of remote slave station connected on serial link or other bus	Client startup	The server replicates from the received request.

The packet header is 7 bytes length:

- Transaction identifier: used for transaction pairing. In response, the Modbus server copies the

transaction identifier of the request.

- Protocol identifier: used for multiplexing in the system. The Modbus protocol is identified by a value of 0.
- Length: the length field is the number of bytes of the next field, including unit identifier and data field.
- Unit identifier: this field is used for intra system routing. It is specially used for TCP-IP network and MODBUS string over Ethernet.
- The gateway between row links communicates with the slave station of Modbus or MODBUS + serial link. Modbus client is set in the request.
- This field. In the response, the server must return this field with the same value.
- PDU includes two parts: function code and data. Function code is used to distinguish functions, and data is used to explain specific meanings.

Function code	Data
8-Bits	N×8-Bits

Function codes are used to indicate how the analyzer processes the instruction. The following table shows the available function codes and their descriptions.

Function code		Name of function code	Function	Remarks
Decimal system	Hexadecimal			
3	03H	Read holding register	Used to read analyzer's parameters	
16	10H	Write multiple registers	Used to configure analyzer parameters	

1.1.2 Modbus-TCP/IP Function code operation instructions

1.1.2.1 Function code(0x03=3) operation instructions

The function code (0x03=3) is used to read the parameters of the analyzer register. Its request data and return data format are as follows:

Request data format:

Serial No.	Name	Type	Range (Decimal)	Description
1	Transaction unit ID	UInt16		High byte first (sending sequence)
2	Protocol identifier	UInt16	0=MODBUS	High byte first (sending sequence)
3	Data byte length	UInt16		High byte first (sending sequence)
4	Unit identifier	UInt8		
5	Function code	UInt8	3	
6	The beginning register address	UInt16	-	High byte first (sending sequence)

Serial No.	Name	Type	Range (Decimal)	Description
7	Number of registers	UInt16	1-125	High byte first (sending sequence)

Return data format:

Serial No.	Name	Type	Range (Decimal)	Description
1	Transaction unit ID	UInt16		High byte first (sending sequence)
2	Protocol identifier	UInt16	0=MODBUS	High byte first (sending sequence)
3	Data byte length	UInt16		High byte first (sending sequence)
4	Unit identifier	UInt8		
5	Function code	UInt8	3	
6	Read register bytes	UInt8	-	Read the number of registers*2
7	Value of register 1		-	High byte first
8	…		-	High byte first
9	Value of register n		-	High byte first

For instance:

Read the voltage values of A, B and C (the starting address of the voltage register is 1010)

Serial No.	Name	Type	Range (Decimal)	Range (HEX)	Description
1	Transaction unit ID	UInt16	0	0000	
2	Protocol identifier	UInt16	0	0000	
3	Data byte length	UInt16	6	0006	
4	Unit identifier	UInt8	1	01	
5	Function code	UInt8	3	03	
6	The beginning register address	UInt16	1010	03F2	
7	Number of registers	UInt16	6	0006	

The sequence for sending the bytes of TCP / IP packets is as follows:

00 00 00 00 00 06 01 03 03 F2 00 06

Return data:

00 00 00 00 00 0F 01 03 0C 43 5C 00 00 43 5C 00 00 43 5C 00 00

Serial No.	Name	Type	Hexadecimal	Decimal system
1	Transaction unit ID	UInt16	0000	0
2	Protocol identifier	UInt16	0000	0

3	Data byte length	UInt16	0006	6
4	Unit identifier	UInt8	01	1
5	Function code	UInt8	03	3
6	Read register bytes	UInt8	0C	12
7	Phase A voltage	float32	435C0000	220V
8	Phase B voltage	float32	435C0000	220V
9	Phase C voltage	float32	435C0000	220V

1.1.2.2 Function code(0x10=16) operating instructions

Can use the function code (0x10=16) to write instructions to the analyzer and configure the analyzer parameters.

Analyzer parameter configuration can only be configured by writing the corresponding data to the "configurating instruction register", that is, writing the corresponding data to the address starting from 300 to configure the corresponding parameters.

Configuration results:

The configuration results can be read through registers 424 and 425.

Register address	**Conten**	**Size (16 bits)**	**Data (example)**
424	Configuration instruction code	1	1001 (set time)
425	Result	1	0 = valid operation 80 = invalid instruction code 81 = invalid instruction parameter 82 = number of invalid instruction parameters 83= operation not executed

The request and return data format of Modbus TCP is as follows:

Request data format:

Serial No.	**Name**	**Type**	**Range**	**Description**
1	Transaction unit ID	UInt16		High byte first (sending sequence)
2	Protocol identifier	UInt16	0=MODBUS	High byte first (sending sequence)
3	Data byte length	UInt16		High byte first (sending sequence)
4	Unit identifier	UInt8		
5	Function code	UInt8	16	
6	Register start address	UInt16	300	High byte first (sending sequence)
7	Number of registers	UInt16	1-123	High byte first (sending sequence)
8	Number of register bytes	UInt8		Number of registers *2
9	Written value of register 1	UInt16	-	High byte first (sending sequence)

10	…	UInt16	-	High byte first (sending sequence)
11	Written value of register n	UInt16	-	High byte first (sending sequence)

Return data format:

Serial No.	Name	Type	Range	Description
1	Transaction unit ID	UInt16		High byte first (sending sequence)
2	Protocol identifier	UInt16	0=MODBUS	High byte first (sending sequence)
3	Data byte length	UInt16		High byte first (sending sequence)
4	Unit identifier	UInt8		
5	Function code	UInt8	16	
6	Register start address	UInt16	300	High byte first
7	Number of registers	UInt16	1-123	High byte first

Attention!

The function code (0x10=16) can only write data to the "configuration instruction register", that is, it can only write data to the register starting from address 300.

For example:

Configure the analyzer time (command =1200, set to: 2022-7-1 12:23:25).

Serial No.	Name	Type	Value (Decimal)	Value (HEX)	Description
1	Transaction unit ID	UInt16	0	0000	
2	Protocol identifier	UInt16	0	0000	
3	Data byte length	UInt16	21	0015	
4	Unit identifier	UInt8	1	01	
5	Function code	UInt8	16	10	
6	The beginning register address	UInt16	300	012C	Write register start address 300
7	Number of registers	UInt16	7	0007	
8	Number of register bytes	UInt8	14	0E	
9	Register 300 written value	UInt16	1200	04B0	Set time instruction 1200
10	Register 301 written value	UInt16	2022	07E6	Year=2022
11	Register 302 written value	UInt16	7	0007	Month=7
12	Register 303 written value	UInt16	1	0001	Date=1
13	Register 304 written value	UInt16	12	000C	Hour=12
14	Register 305 written value	UInt16	23	0017	Minute=23

Serial No.	Name	Type	Value (Decimal)	Value (HEX)	Description
15	Register 306 written value	UInt16	25	0019	Second=25

The sequence for sending bytes of TCP/IP packets is as follows:

00 00 00 00 00 15 01 10 01 2C 00 07 0E 04 B0 07 E6 00 07 00 01 00 0C 00 17 00 19
If the configuration data is correct, will return to the following data:

00 00 00 00 00 06 01 10 01 2C 00 07

Serial No.	Name	Type	Range (HEX)	Range (Decimal)
1	Transaction unit ID	UInt16	0000	0
2	Protocol identifier	UInt16	0000	0
3	Data byte length	UInt16	0006	6
4	Unit identifier	UInt8	01	1
5	Function code	UInt8	10	16
6	The beginning register address	UInt16	012C	300
7	Number of registers	UInt16	0007	7

1.1.2.3 Error response

Error response data format:

Serial No.	Name	Type	Decimal	Hexadecimal	Description
1	Transaction unit ID	UInt16	0	0	
2	Protocol identifier	UInt16	0	0	
3	Data byte length	UInt16	3	0003	
4	Unit identifier	UInt8	1	01	
5	Function code	UInt8	(128+3) (128+16)	(0x80+0x03) (0x80+0x10)	
6	Error code	UInt8			

Modbus Error code:

Code (HEX)	Name	Meaning
0x01	Illegal function code	The function code supported by the analyzer is not used.
0x02	Illegal data address	The register data written or read is not a supported address range.
0x03	Illegal data value	The data value written to the register does not meet the requirements.
0x04	Analyzer error	An unknown error occurred

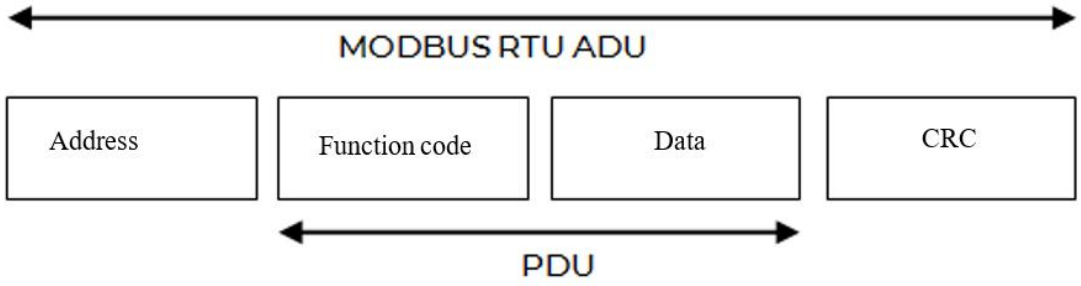
1.2 Modbus-RTU Communication

Before performing the Modbus-RTU communication, the following parameters need to be set through the interface of the meter:

parameter	Effective value	Default value
Address	1 – 247	1
Baud rate	-1200 -2400 -4800 -9600 -19200 -38400 -57600 -115200	9600
Data bits	8	8
Parity check	– None – Odd – Even	None
Stop bit	1-2	1

1.2.1 Modbus-RTU data frame

Modbus RTU data frame includes 4 parts: Address field, Function code, Data and Error verification.



1.2.2 PDU Request data Format

Function code	Data
8-Bits	N×8-Bits

1.2.3 Function code

Function codes are used to indicate how the analyzer processes the instruction. The following table shows the available function codes and their descriptions.

Function code		Name of function code	Function	Remarks
Decimal system	Hexadecimal			
3	03H	Read holding register	Used to read meter's parameters	
16	10H	Write multiple registers	Used to configure meter parameters	

1.2.4 Configure the device via the Modbus-RTU

You can use the function code 16 to write instructions to the device and configure the device parameters.

The device parameter configuration can only be configured by writing the corresponding data to the "configurating instruction register", that is, writing the corresponding data to the address starting from 300 to configure the corresponding parameters.

Configuration results:
The configuration results can be obtained by reading registers 424 and 425.

Register address	Description	Size (UInt16)	Data (example)
424	Configuration instruction code	1	1001(set Date Time)
425	Configuration results	1	0 = configuration successful 80 = invalid instruction code 81 = invalid parameter value 82 = number of invalid parameters 83 = instruction not executed

1.2.5 Modbus-RTU Function code

1.2.5.1 Function code (0x10=16) Operation Instructions

Function code(0x10=16)is used to configure the parameters of the device, and its request and return instructions are defined as follows:

Configuration device parameter command format:

Serial number	Significance	Type	Range(Decimal system)	Description
1	Device address	UInt8	1-247	
2	Function code	UInt8	16	
3	Register start address	UInt16	-	High byte first(sending sequence)
4	Number of configuration registers	UInt16	1-123	High byte first(sending sequence)
5	Data length	UInt8		Number of configuration registers * 2
6	First register configuration data	UInt16	-	High byte first(sending sequence)
7	…	UInt16	-	High byte first(sending sequence)
8	nth register configuration data	UInt16	-	High byte first(sending sequence)
9	CRC-16 parity code	UInt16	-	low byte first(sending sequence)

Return to configuration device parameter command format:

Serial number	Significance	Type	Range(Decimal system)	Description
1	Device address	UInt8	1-247	
2	Function code	UInt8	16	
3	Register start address	UInt16	300	High byte first
4	Number of	UInt16	1-123	High byte first

Serial number	Significance	Type	Range(Decimal system)	Description
	configuration registers			
5	CRC-16 parity code	UInt16	-	low byte first

Attention!

The function code (0x10=16) can only write data to the "configuration instruction register", that is, it can only write data to the register starting from address 300.

For example:

Configure the analyzer time (command =1200, set to: 2022-11-1 12:20:00)

Serial No.	Name	Type	Value (Decimal system)	Value (HEX)	Description
1	Device address	UInt8	1	01	
2	Function code	UInt8	16	10	
3	Data byte length	UInt16	300	012C	Configuration register start address
4	Number of read registers	UInt16	7	0007	Configure Time Command + parameter total 7 registers are occupied
5	Data length	UInt8	14	0E	Number of configuration registers * 2
6	Register 300 write value	UInt16	1200	04B0	Instruction code 1200 to configure time
7	Register 301 write value	UInt16	2022	07E6	Year of configuration time = 2022
8	Register 302 write value	UInt16	11	000B	Month of configuration time = 11
9	Register 303 write value	UInt16	1	0001	Day of configuration time = 1
10	Register 304 write value	UInt16	12	000C	Time of configuration = 12
11	Register 305 write value	UInt16	20	0014	Minutes of configuration time =20
12	Register 306 write value	UInt16	0	0000	Seconds of configuration time = 0
13	CRC-16 parity code	UInt16	35524	8AC4	low byte first(sending sequence)

The order of sending bytes is as follows:

01 10 01 2C 00 07 0E 04 B0 07 E6 00 0B 00 01 00 0C 00 14 00 00 C4 8A

After the configuration is successful, the received data packets are as follows:

01 10 01 2C 00 07 41 FE

Serial number	Significance	Type	Value (decimal)	Value (HEX)
1	Device address	UInt8	01	1
2	Function code	UInt8	10	16

Serial number	Significance	Type	Value (decimal)	Value (HEX)
3	Register start address	UInt16	012C	300
4	Number of configuration registers	UInt16	0007	7
5	CRC-16 parity code	UInt16	41FE	

1.2.5.2 Function code（0x03=3）operation instructions

The function code (0x03=3) is used to read the parameters of the analyzer register. Its request data and return data format are as follows:

Request data format:

Serial No.	Name	Type	Range (Decimal system)	Description
1	Device address	UInt8	1-247	
2	Function code	UInt8	3	
3	Register start address	UInt16	-	High byte first(sending sequence)
4	Number of read registers	UInt16	1-125	High byte first(sending sequence)
5	CRC-16 parity code	UInt16	-	low byte first(sending sequence)

Return data format:

Serial No.	Name	Type	Range (Decimal system)	Description
1	Device address	UInt8	1-247	
2	Function code	UInt8	3	
3	Data byte length	UInt8	-	Number of registers * 2
4	1st register data		-	High byte first
5	…		-	High byte first
6	nth register data		-	High byte first
7	CRC-16 parity code	UInt16	-	Low byte first

Example of reading device parameters:

Read the voltage values of L1, L2 and L3 (the starting address of the voltage register is 1010)：

Serial No.	Name	Type	Range (Decimal system)	Range (HEX)	Description

Serial No.	Name	Type	Range (Decimal system)	Range (HEX)	Description
1	Device address	UInt8	1	0x01	
2	Function code	UInt8	3	0x03	
3	Register start address	UInt16	1010	0x03F2	
4	Number of read registers	UInt16	6	0x0006	
5	CRC-16 parity code	UInt16	32612	0x7F64	low byte first(sending sequence)

The order of sending hexadecimal bytes is as follows:

01 03 03 F2 00 06 64 7F

The received packets are as follows:

01 03 0C 43 5C 00 00 43 5D 00 00 43 5E 00 00 14 AC

Serial No.	Name	Type	Hexadecimal	Decimal system
1	Device address	UInt8	01	1
2	Function code	UInt8	03	3
3	Data byte length	UInt8	0C	12
4	Address 2147 data (phase a voltage)	float32	435C0000	220V
5	Address 2148 data (phase B voltage)	float32	435D0000	221V
6	Address 2149 data (phase C voltage)	float32	435E0000	222V
7	CRC-16 parity code	UInt16	14AC	

1.2.5.3 Error response

Error response data format:

Serial No.	Name	Type	Decimal system	Hexadecimal	Description
1	Device address	UInt8	1-247	0x01-0xF7	
2	Function code	UInt8	(128+3) (128+16)	(0x80+0x03) (0x80+0x10)	
3	Error code	UInt8			
4	CRC-16 parity code	UInt16			low byte first(sending sequence)

Modbus Error code:

Code (HEX)	Name	Meaning

Code (HEX)	Name	Meaning
0x01	Illegal function code	The function code supported by the analyzer is not used.
0x02	Illegal data address	The register data written or read is not a supported address range.
0x03	Illegal data value	The data value written to the register does not meet the requirements.
0x04	Analyzer error	An unknown error occurred

1.3 Data type table

Type	Description	Range
UInt16	Unsigned 16 bits integer	0~65535
Int16	Signed 16 bits integer	-32768~+32767
UInt32	Unsigned 32-bit integer	0~4294967295
UInt64	Unsigned 64 bits integer	0~18446744073709551615
Int64	Signed 64 bits integer	-9223372036854775808 ~ 9223372036854775808
UTF8	8-bit UTF code	Multibyte Unicode encoding
Float32	32-bit floating point	Standard IEEE floating point data (single precision)
Date Time	Time type	-
IPaddr	IP address	

Date Time format

Word	Bit															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1	Year(2000–2099)															
2	Month (1–12)								Date (1–31)							
3	Hour (0–23)								Minute (0–59)							
4	Millisecond (0–59999)															

IPaddr format

Byte	Position															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1	addr1(0–255)								addr2(0–255)							
2	addr3(0–255)								addr4(0–255)							

For instance: 192.168.1.5

Byte	Position															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1	192								168							

Byte	Position	
2	1	55

1.4 List of configuration instructions

1.4.1 System parameter setting

Instruction code	Operation	Size	Type	Unit	Range (Decimal)	Description
1001	W	1	UInt16	-	0,1,2,3,4,5	Wiring mode 0=3P4W_4CT 1=3P4W_3CT 2=3P3W_3CT 3=3P3W_2CT 4=1P3W 5=1P2W
	W	1	UInt16	Hz	50,60	Grid frequency
	W	2	UInt32	V	1-99999	Nominal voltage

1.4.2 Parameter setting of phase ABC current transformer

Instruction code	Operation	Size	Type	Unit	Range (Decimal)	Description
1002	W	1	UInt16	-	0,1	Phase ABC current access mode 0 = Rogowski coil access 1 = CT access
	W	2	UInt32	mV/kA@50Hz	1-99999	Phase ABC Rogowski coil sensitivity =Actual value*100
	W	2	UInt32	A	1-99999	Nominal current of phase ABC Rogowski coil
	W	2	UInt32	-	1-99999999	Current transformation ratio of phase ABC Rogowski coil =Actual transformation ratio *10000
	W	2	UInt32	mV/A	1-999999	CT sensitivity of phase ABC =Actual value *100
	W	2	UInt32	A	1-999999	CT nominal current of phase ABC
	W	2	UInt32	-	1-99999999	CT current transformation ratio of phase ABC = Actual transformation ratio *10000

1.4.3 Parameter setting of N-phase current transformer

Instruction code	Operation	Size	Type	Unit	Range (Decimal)	Description
1003	W	1	UInt16	-	0,1	N-phase current access mode 0 = Rogowski coil access 1 = CT access
	W	2	UInt32	mV/kA@50Hz	1-99999	N-phase Rogowski coil sensitivity =Actual value*100
	W	2	UInt32	A	1-99999	Nominal current of N-phase Rogowski coil
	W	2	UInt32	-	1-99999999	Current transformation ratio of N-phase Rogowski coil =Actual transformation ratio *10000
	W	2	UInt32	mV/A	1-999999	N-phase CT sensitivity =Actual value *100
	W	2	UInt32	A	1-999999	Nominal current of N-phase CT
	W	2	UInt32	-	1-99999999	N-phase CT current transformation ratio =Actual transformation ratio *10000

1.4.4 Voltage transformer parameter setting

Instruction code	Operation	Size	Type	Unit	Range (Decimal)	Description
1005	W	2	UInt32	-	1-99999999	Transformation ratio of phase ABC voltage transformer =Actual transformation ratio *10000
	W	2	UInt32	-	1-99999999	Transformation ratio of N-phase voltage transformer =Actual transformation ratio *10000

1.4.5 Voltage swell and dip, interruption event threshold setting

Instruction code	Operation	Size	Type	Unit	Range (Decimal)	Description
1050	W	1	UInt16	%	1050~1400	Voltage swell threshold Nominal voltage as reference Magnify in 10 times Default value:1100

Instruction code	Operation	Size	Type	Unit	Range (Decimal)	Description
	W	1	UInt16	%	10~60	Voltage swell hysteresis value Nominal voltage as reference Magnify in 10 times Default value:20
	W	1	UInt16	%	750~950	Voltage dip threshold Nominal voltage as reference Magnify in 10 times Default value:90
	W	1	UInt16	%	10~60	Voltage dip hysteresis value Nominal voltage as reference Magnify in 10 times Default value:20
	W	1	UInt16	%	10~100	Voltage interruption threshold Nominal voltage as reference Magnify in 10 times Default value:50
	W	1	UInt16	%	10~60	Voltage interruption hysteresis value Nominal voltage as reference Magnify in 10 times Default value:20

1.4.6 Over frequency low frequency event threshold setting

Instruction code	Operation	Size	Type	Unit	Range (Decimal)	Description
1051	W	1	UInt16	%	1001~1200	Overfrequency threshold Nominal frequency as reference Magnify in 10 times Default value:1010
	W	1	UInt16	%	500~999	Low frequency threshold Nominal frequency as reference Magnify in 10 times Default value:990

1.4.7 Overvoltage and low voltage event threshold setting

Instruction code	Operation	Size	Type	Unit	Range (Decimal)	Description

1052	W	1	UInt16	%	10100~20000	Overvoltage threshold Nominal voltage as reference Magnify in 100 times Default value:11000
	W	1	UInt16	%	100~9900	Low voltage threshold Nominal voltage as reference Magnify in 100 times Default value:9000

1.4.8 Overcurrent low current event threshold setting

Instruction code	Operation	Size	Type	Unit	Range (Decimal)	Description
1053	W	1	UInt16	%	10100~20000	Overcurrent threshold Nominal current as reference Magnify in 100 times Default value:11000
	W	1	UInt16	%	100~9900	Low current threshold Nominal current as reference Magnify in 100 times Default value:9000

1.4.9 Unbalance degree event threshold setting

Instruction code	Operation	Size	Type	Unit	Range (Decimal)	Description
1054	W	1	UInt16	%	1~9999	Voltage unbalance degree threshold Magnify in 100 times Default value:400
	W	1	UInt16	%	1~9999	Current unbalance degree threshold Magnify in 100 times Default value:1000

1.4.10 Voltage harmonic event threshold setting

Instruction code	Operation	Size	Type	Unit	Range (Decimal)	Description
1055	W	1	UInt16	%	1~9999	Voltage total harmonic threshold Magnify in 100 times Default value:500

Instruction code	Operation	Size	Type	Unit	Range (Decimal)	Description
	W	1	UInt16	%	1~9999	Voltage even harmonic threshold Magnify in 100 times Default value:500
	W	1	UInt16	%	1~9999	Voltage odd harmonic threshold Magnify in 100 times Default value:500

1.4.11 Current harmonic event threshold setting

Instruction code	Operation	Size	Type	Unit	Range (Decimal)	Description
1056	W	1	UInt16	%	1~9999	Current total harmonic threshold Magnify in 100 times Default value:500
	W	1	UInt16	%	1~9999	Current even harmonic threshold Magnify in 100 times Default value:500
	W	1	UInt16	%	1~9999	Current odd harmonic threshold Magnify in 100 times Default value:500

1.4.12 Demand parameter setting

Instruction code	Operation	Size	Type	Unit	Range (Decimal)	Description
1060	W	1	UInt16	-	0,1	Demand calculation method 0= fixed 1= sliding type
	W	1	UInt16	minute	1-60	Demand calculation interval

1.4.13 Zero drift suppression setting

Instruction code	Operation	Size	Type	Unit	Range (Decimal)	Description
1070	W	1	UInt16	%	0~1000	Voltage zero drift suppression of phase ABC Nominal voltage as reference Magnify in 100 times Default value:30
	W	1	UInt16	%	0~1000	Voltage zero drift suppression of N-phase

Instruction code	Operation	Size	Type	Unit	Range (Decimal)	Description
						Nominal voltage as reference Magnify in 100 times Default value:30
	W	1	UInt16	%	0~1000	Current zero drift suppression of phase ABC Nominal current as reference Magnify in 100 times Default value:50
	W	1	UInt16	%	0~1000	Current zero drift suppression of N-phase Take nominal current as reference Magnify in 100 times Default value:50

1.4.14 Harmonic calculation threshold setting

Instruction code	Operation	Size	Type	Unit	Range (Decimal)	Description
1080	W	1	UInt16	%	0~1000	Voltage harmonic calculation threshold of phase ABC Nominal voltage as reference Magnify in 100 times Default value:300
	W	1	UInt16	%	0~1000	Current harmonic calculation threshold of phase ABC Nominal current as reference Magnify in 100 times Default value:500

1.4.15 CO2 emission factor setting

Instruction code	Operation	Size	Type	Unit	Range (Decimal)	Description
1090	W	1	UInt32	kgCO2/MWh	0~999999	CO2 emission factor Magnify in 100 times Default value:60000

1.4.16 K-factor parameter setting

Instruction code	Operation	Size	Type	Unit	Range (Decimal)	Description
1091	W	1	UInt16	-	0,1	K-factor calculation method 0=US(United States)

Instruction code	Operation	Size	Type	Unit	Range (Decimal)	Description
						1=EU (Europe)
	W	1	UInt16	-	0~20	Parameter e of the EU calculation method Magnify in 100 times Default value: 10
	W	1	UInt16	-	100~200	Parameter q of the EU calculation method Magnify in 100 times Default value: 170

1.4.17 Analyzer time setting

Instruction code	Operation	Size	Type	Unit	Range (Decimal)	Description
1200	W	1	UInt16	-	2000-2099	Year
	W	1	UInt16	-	1-12	Month
	W	1	UInt16	-	1-31	Date
	W	1	UInt16	-	0-23	Hour
	W	1	UInt16	-	0-59	Minute
	W	1	UInt16	-	0-59	Second

1.4.18 Communication parameter setting

Instruction code	Operation	Size	Type	Unit	Range (Decimal)	Description
1210	W	1	UInt16	-	1-247	Slave address
	W	1	UInt16	-	0-6	Baud rate 0 = 2400 1 = 4800 2 = 9600 3 = 19200 4 = 38400 5 = 57600 6 = 115200
	W	1	UInt16	-	0,1,2	Parity check 0 = none check 1 = odd check 2 = even check
	W	1	UInt16	-	1,2	Stop bit 1 = 1bit 2 = 2bit

1.4.19 Relay output control

Instruction code	Operation	Size	Type	Unit	Range (Decimal system)	Description
1250	W	1	UInt16	-	0-2	Relay select 0= Relay1 & Relay2 1=Relay1 2=Relay2
	W	1	UInt16	-	0-1	Relay output control 0 = relay output open 1 = relay output closed

1.4.20 Restore factory settings

Instruction code	Operation	Size	Type	Unit	Range (Decimal)	Description
1300	W	1	UInt16	-	1	1:Restore factory settings

1.4.21 Energy reset

Instruction code	Operation	Size	Type	Unit	Range (decimal)	Description
1301	W	1	UInt16	-	1	1:Energy reset

1.4.22 Peak demand reset

Instruction code	Operation	Size	Type	Unit	Range (decimal)	Description
1302	W	1	UInt16	-	1	1:Peak demand reset

1.4.23 LAN setting

After parameter setting, the device needs to be restarted to take effect.

Instruction code	Operation	Size	Type	Unit	Range (decimal)	Description
2000	W	1	UInt16	-	0-1	DHCP 0=Enable 1=Disable Note: When DHCP is enabled, the analyzer automatically obtains IP, and the configured IP is invalid
	W	2	IPaddr	-	-	IP Address default:192.168.1.55
	W	2	IPaddr	-	-	Netmask default:255.255.255.0
	W	2	IPaddr	-	-	Gateway

Instruction code	Operation	Size	Type	Unit	Range (decimal)	Description
						defalut:192.168.1.1

1.4.24 Modbus-TCP/IP setting

After parameter setting, the device needs to be restarted to take effect.

Instruction code	Operation	Size	Type	Unit	Range (decimal)	Description
2001	W	1	UInt16	-	0-1	Status 0=Enable 1=Disable
	W	1	UInt16	-	-	Port default:502

1.4.25 Date format setting

Instruction code	Operation	Size	Type	Unit	Range (decimal)	Description
2010	W	1	UInt16	-	0-2	Date format 0= yyyy/mm/dd 1= mm/dd/yyyy 2= dd/mm/yyyy

1.4.26 Screen setting

Instruction code	Operation	Size	Type	Unit	Range (decimal)	Description
2020	W	1	UInt16	-	1-5	screen brightness
	W	1	UInt16	-	0-4	Screen off 0= Never 1= 1 minute 2= 5 minutes 3= 10 minutes 4= 30 minutes

1.4.27 Key setting

Instruction code	Operation	Size	Type	Unit	Range (decimal)	Description
2021	W	1	UInt16	-	0-1	Key tone 0=Enable 1=Disable
	W	1	UInt16	-	0-5	Key auto lock

Instruction code	Operation	Size	Type	Unit	Range (decimal)	Description
						0= Never 1= 1minute 2= 2 minutes 3= 3 minutes 4= 4 minutes 5= 5 minutes

1.4.28 Display language setting

Instruction code	Operation	Size	Type	Unit	Range (decimal)	Description
2030	W	1	UInt16	-	0-6	Display language 0=Chinese (Simplified) 1=English 2=Chinese (Traditional) 3=French 4=Russian 5=Spanish 6=Portuguese

1.4.29 User information setting

Instruction code	Operation	Size	Type	Unit	Range (decimal)	Description
2040	W	10	UTF8	-	-	user name Note: 20 ASCII characters, less than 20 are filled with blank characters (0x00) The settable characters are as follows: ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz0123456789-_
	W	10	UTF8	-	-	Location Note: 20 ASCII characters, less than 20 are filled with blank characters (0x00) The settable characters are as follows: ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz0123456789-_

1.4.30 Phase sequence name setting

Instruction code	Operation	Size	Type	Unit	Range (decimal)	Description
2050	W	1	UInt16	-	0-1	Phase sequence name

Instruction code	Operation	Size	Type	Unit	Range (decimal)	Description
						0= L1,L2,L3 1= A,B,C

1.4.31 Phase sequence color setting

Instruction code	Operation	Size	Type	Unit	Range (decimal)	Description
2051	W	1	UInt16	-	0-3	Standard selection 0=Chinese standard 1=American standard 2=IEC standard 3=Custom
	W	1	UInt16	-	0-8	Custom phase A color 0=black 1=red 2=blue 3=yellow 4=gray 5=orange 6=brown 7=green 8=white
	W	1	UInt16	-	0-8	Custom B phase color Color selection is the same as phase A
	W	1	UInt16	-	0-8	Custom C-phase color Color selection is the same as phase A
	W	1	UInt16	-	0-8	Custom N-phase color Color selection is the same as phase A
	W	1	UInt16	-	0-1	Custom GND color 0=green 1=yellow-green

1.4.32 Data logger Enable Configuration

Instruction code	Operation	Size	Type	Unit	Range (decimal)	Description
2060	W	1	UInt16	-	0-1	Datalogger Enable 0=Stop 1=Start

1.4.33 Data logger parameter configuration

Instruction code	Operation	Size	Type	Unit	Range (decimal)	Description
2061	W	10	UTF8	-	-	Record name Note: 20 ASCII characters, less than 20 are filled with blank characters (0x00) The settable characters are as follows: ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz0123456789-_
	W	1	UInt16	-	2000-2099	Record start time year
	W	1	UInt16	-	1-12	Record start time month
	W	1	UInt16	-	1-31	Record start time day
	W	1	UInt16	-	0-23	Record start time hour
	W	1	UInt16	-	0-59	Record start time minute
	W	1	UInt16	-	0-59	Record start time second
	W	1	UInt16	-	0-12	Record duration 0= 1 hour 1= 2 hours 2= 4 hours 3= 8 hours 4= 16 hours 5= 24 hours 6= 2 days 7= 7 days 8= 30 days 9= 3 mouths 10= 6 mouths 11= 12 mouths 12= Max time
	W	1	UInt16	Second	5-9999	Record interval

1.4.34 Waveform recorder enable configuration

Instruction code	Operation	Size	Type	Unit	Range (decimal)	Description
2070	W	1	UInt16	-	0-1	Waveform recorder enable 0= stop 1= start

1.4.35 Waveform recorder parameter configuration

Instruction code	Operation	Size	Type	Unit	Range (decimal)	Description
2071	W	10	UTF8	-	-	Record name Note: 20 ASCII characters, less than 20 are filled with blank characters (0x00) The settable characters are as follows: ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz0123456789-_
	W	1	UInt16	-	2000-2099	Record start time year
	W	1	UInt16	-	1-12	Record start time month
	W	1	UInt16	-	1-31	Record start time day
	W	1	UInt16	-	0-23	Record start time hour
	W	1	UInt16	-	0-59	Record start time minute
	W	1	UInt16	-	0-59	Record start time second
	W	1	UInt16	kHz	0-3	Sample rate 0= 1kHz 1= 2kHz 2= 4kHz 3= 8kHz
	W	1	UInt16	Second	-	Duration Different sampling rates can be set for different durations 1kHz: settable value 1-40 2kHz: settable value 1-20 4kHz: settable value 1-10 8kHz: settable values 1-5

1.4.36 Restart the analyzer

Instruction code	Operation	Size	Type	Unit	Range (decimal)	Description
6000	W	1	UInt16	-	6485	Restart analyzer command

1.5 Modbus Register list

1.5.1 Configure instruction register

Register alias	Register start address (decimal)	Operation	Size	Type	Unit	Description
Instruction code	300	R/W	1	UInt16	-	
Instruction parameters001	301	R/W	1	UInt16	-	
Instruction parameters002	302	R/W	1	UInt16	-	
…	…	R/W	1	UInt16	-	
Instruction parameters123	423	R/W	1	UInt16	-	
Configuration instruction code	424	R	1	UInt16	-	
Configuration results	425	R	1	UInt16	-	0 = valid operation 80 = invalid instruction code 81 = invalid instruction parameter 82 = number of invalid instruction parameters 83= operation not executed

1.5.2 Equipment parameters

Register alias	Register start address (decimal)	Operation	Size	Type	Unit	Description
Analyzer model	60	R	5	UTF8	-	
Serial No.	70	R	2	UInt32	-	
APP Version No.	72	R	1	UInt16	-	Format: X.Y.Z

Register alias	Register start address (decimal)	Operation	Size	Type	Unit	Description
IAP Version No.	73	R	1	UInt16	-	Format: X.Y.Z
Hardware version No.	74	R	1	UInt16	-	Format: ab.c :xy.z
Date and time	75	R/WC	4	Date time	-	Reg.75: Year 2000-2099 Reg.76: Month (b15:b8), Day (b7:b0) Reg. 77: Hour (b15:b8) ,Minute (b7:b0) Reg. 78: Millisecond
Date display format	79	R/WC	1	UInt16	-	Date display format 0= yyyy/mm/dd 1= mm/dd/yyyy 2= dd/mm/yyyy

1.5.3 Communication parameters

Register alias	Register start address (decimal)	Operation	Size	Type	Unit	Description
Slave address	80	R/WC	1	UInt16	-	1-247
Baud rate	81	R/WC	1	UInt16	-	0=2400 1=4800 2=9600 3=19200 4=38400 5=57600 6=115200
Parity	82	R/WC	1	UInt16	-	0 = None 1 = Odd 2 = Even
Stop bit	83	R/WC	1	UInt16	-	1 = 1 bit 2 = 2 bit

1.5.4 Digital Input/Output Status

Register alias	Register start address (decimal)	Operation	Size	Type	Unit	Description
Digital Input/Output Status	210	R	1	BitMap	-	Bit 0： (1=DI1 Close,0=DI1Open) Bit 1： (1=DI2 Close,0=DI2 Open) Bit 2： (1=Relay1 Close,0= Relay 1 Open) Bit 3：

Register alias	Register start address (decimal)	Operation	Size	Type	Unit	Description
						(1= Relay 2 Close,0= Relay 2 Open)

1.5.5 Power system

Register alias	Register start address (decimal)	Operation	Size	Type	Unit	Description
Wiring mode	500	R/WC	1	UInt16	-	0=3P4W_4CT 1=3P4W_3CT 2=3P3W_3CT 3=3P3W_2CT 4=1P3W 5=1P2W
Grid frequency	501	R/WC	1	UInt16	Hz	
Nominal voltage	502	R/WC	2	UInt32	V	
Phase ABC current transformer						
Phase ABC current access mode	504	R/WC	1	UInt16	-	0 = Rogowski coil 1 = CT
Phase ABC Rogowski coil sensitivity	505	R/WC	2	UInt32	mV/kA @50Hz	Actual value = read value /100
Nominal current of phase ABC Rogowski coil	507	R/WC	2	UInt32	A	
Current transformation ratio of phase ABC Rogowski coil	509	R/WC	2	UInt32	-	Actual value = read value/10000
CT sensitivity of phase ABC	511	R/WC	2	UInt32	mV/A	Actual value = read value/100
CT nominal current of phase ABC	513	R/WC	2	UInt32	A	
CT current transformation ratio of phase ABC	515	R/WC	2	UInt32	-	Actual value = read value/10000
N-phase current transformer						

Register alias	Register start address (decimal)	Operation	Size	Type	Unit	Description
N-phase current access mode	517	R/WC	1	UInt16	-	0 = Rogowski coil 1 = CT
N-phase Rogowski coil sensitivity	518	R/WC	2	UInt32	mV/kA @50Hz	Actual value = read value/100
Nominal current of N-phase Rogowski coil	520	R/WC	2	UInt32	A	
Current transformation ratio of N-phase Rogowski coil	522	R/WC	2	UInt32	-	Actual value = read value/10000
CT sensitivity of N-phase	524	R/WC	2	UInt32	mV/A	Actual value = read value/100
CT nominal current of N-phase	526	R/WC	2	UInt32	A	
CT current transformation ratio of N-phase	528	R/WC	2	UInt32	-	Actual value = read value/10000
Voltage transformer						
Transformation ratio of phase ABC voltage transformer	530	R/WC	2	UInt32	-	Actual value = read value/10000
Transformation ratio of N-phase voltage transformer	532	R/WC	2	UInt32	-	Actual value = read value/10000

1.5.6 Voltage, current, power, power factor

Register alias	Register start address (decimal)	Operation	Size	Type	Unit	Description
Current						
IA	1000	R	2	Float32	A	Phase A current
IB	1002	R	2	Float32	A	Phase B current

Register alias	Register start address (decimal)	Operation	Size	Type	Unit	Description
IC	1004	R	2	Float32	A	Phase C current
IN	1006	R	2	Float32	A	Phase N current
Current Avg	1008	R	2	Float32	A	Average value of ABC three-phase current
Phase voltage						
UA	1010	R	2	Float32	V	UA-UN voltage
UB	1012	R	2	Float32	V	UB-UN voltage
UC	1014	R	2	Float32	V	UC-UN voltage
UN-G	1016	R	2	Float32	V	UN-GND voltage
Phase Voltage Avg	1018	R	2	Float32	V	Average value of ABC three-phase phase voltage
Line voltage						
UAB	1020	R	2	Float32	V	UA-UB voltage
UBC	1022	R	2	Float32	V	UB-UC voltage
UCA	1024	R	2	Float32	V	UC-UA voltage
Line Voltage Avg	1026	R	2	Float32	V	Average value of three-phase line voltage
Active power						
PA	1028	R	2	Float32	kW	Phase A Active power
PB	1030	R	2	Float32	kW	Phase B Active power
PC	1032	R	2	Float32	kW	Phase C Active power
PTotal	1034	R	2	Float32	kW	Total Active power
Reactive power						
QA	1036	R	2	Float32	kVAR	Phase A Reactive power
QB	1038	R	2	Float32	kVAR	Phase B Reactive power
QC	1040	R	2	Float32	kVAR	Phase C Reactive power
QTotal	1042	R	2	Float32	kVAR	Total Reactive power
Apparent power						
SA	1044	R	2	Float32	kVA	Phase A Apparent power
SB	1046	R	2	Float32	kVA	Phase B Apparent power
SC	1048	R	2	Float32	kVA	Phase C Apparent power
STotal	1050	R	2	Float32	kVA	Total Apparent power
Power factor						
PFA	1052	R	2	Float32	-	Phase A Power factor
PFB	1054	R	2	Float32	-	Phase B Power factor
PFC	1056	R	2	Float32	-	Phase C Power factor
PFTotal	1058	R	2	Float32	-	Total Power factor
Fundamental harmonic power factor						

Register alias	Register start address (decimal)	Operation	Size	Type	Unit	Description
DPFA	1060	R	2	Float32	-	Phase A Fundamental harmonic power factor
DPFB	1062	R	2	Float32	-	Phase B Fundamental harmonic power factor
DPFC	1064	R	2	Float32	-	Phase C Fundamental harmonic power factor
DPFTotal	1066	R	2	Float32	-	Total Fundamental harmonic power factor
Frequency						
FreqA	1068	R	2	Float32	Hz	Phase A Frequency
FreqB	1070	R	2	Float32	Hz	Phase B Frequency
FreqC	1072	R	2	Float32	Hz	Phase C Frequency
FreqTotal	1074	R	2	Float32	Hz	Three phase comprehensive frequency

1.5.7 Energy

There are two types of energy, possive energy and reverse energy.

When the total electric energy reaches 1.0 x 10^9 kwh, 1.0 x 10^9 kvarh, or 1.0 x 10^9 KVAh, the electric energy of each phase will be cleared automatically.

Register alias	Register start address (decimal)	Operation	Size	Type	Unit	Description
Active Energy-Int64						
EPAImp	2500	R	4	Int64	Wh	Phase A Positive active energy
EPBImp	2504	R	4	Int64	Wh	Phase B Positive active energy
EPCImp	2508	R	4	Int64	Wh	Phase C Positive active energy
EPImp	2512	R	4	Int64	Wh	Total Positive active energy
EPAExp	2516	R	4	Int64	Wh	Phase A Reverse active energy
EPBExp	2520	R	4	Int64	Wh	Phase B Reverse active energy
EPCExp	2524	R	4	Int64	Wh	Phase C Reverse active energy
EPExp	2528	R	4	Int64	Wh	Total Reverse active energy
Reactive energy-Int64						
EQAImp	2532	R	4	Int64	Wh	Phase A Positive reactive energy
EQBImp	2536	R	4	Int64	Wh	Phase B Positive reactive energy
EQCImp	2540	R	4	Int64	Wh	Phase C Positive reactive energy
EQImp	2544	R	4	Int64	Wh	Total Positive reactive energy
EQAExp	2548	R	4	Int64	Wh	Phase A Reverse reactive

Register alias	Register start address (decimal)	Operation	Size	Type	Unit	Description
						energy
EQBExp	2552	R	4	Int64	Wh	Phase B Reverse reactive energy
EQCExp	2556	R	4	Int64	Wh	Phase C Reverse reactive energy
EQExp	2560	R	4	Int64	Wh	Total Reverse reactive energy
Apparent Energy-Int64						
ESA	2564	R	4	Int64	VAh	Phase A Apparent Energy
ESB	2568	R	4	Int64	VAh	Phase B Apparent Energy
ESC	2572	R	4	Int64	VAh	Phase C Apparent Energy
ES	2576	R	4	Int64	VAh	Total Apparent Energy
UInt32 Energy						
Active Energy- UInt32						
EPAImp	2600	R	2	UInt32	kWh	Phase A Positive active energy
EPBImp	2602	R	2	UInt32	kWh	Phase B Positive active energy
EPCImp	2604	R	2	UInt32	kWh	Phase C Positive active energy
EPImp	2606	R	2	UInt32	kWh	Total Positive active energy
EPAExp	2608	R	2	UInt32	kWh	Phase A Reverse active energy
EPBExp	2610	R	2	UInt32	kWh	Phase B Reverse active energy
EPCExp	2612	R	2	UInt32	kWh	Phase C Reverse active energy
EPExp	2614	R	2	UInt32	kWh	Total Reverse active energy
Reactive energy- UInt32						
EQAImp	2616	R	2	UInt32	kVARh	Phase A Positive reactive energy
EQBImp	2618	R	2	UInt32	kVARh	Phase B Positive reactive energy
EQCImp	2620	R	2	UInt32	kVARh	Phase C Positive reactive energy
EQImp	2622	R	2	UInt32	kVARh	Total Positive reactive energy
EQAExp	2624	R	2	UInt32	kVARh	Phase A Reverse reactive energy
EQBExp	2626	R	2	UInt32	kVARh	Phase B Reverse reactive energy
EQCExp	2628	R	2	UInt32	kVARh	Phase C Reverse reactive energy
EQExp	2630	R	2	UInt32	kVARh	Total Reverse reactive energy
Apparent Energy-UInt32						
ESA	2632	R	2	UInt32	kVAh	Phase A Apparent Energy
ESB	2634	R	2	UInt32	kVAh	Phase B Apparent Energy
ESC	2636	R	2	UInt32	kVAh	Phase C Apparent Energy
ES	2638	R	2	UInt32	kVAh	Total Apparent Energy

1.5.8 Tariff Energy

Tariff Energy types are Int64 and UInt32, whose unit size is different.

When the rate of electricity reaches 1.0 x 10^7 kWh, 1.0 x 10^7 kVarh, or v1.0 x 10^7 kVah, each Tariff Energy will be automatically cleared to zero.

Register alias	Register start address (decimal)	Operation read / write	Size	Type	Unit	Description
Tariff Energy-Int64						
ET1	2700	R	4	Int64	Wh	Tariff 1 Active Energy
ET2	2704	R	4	Int64	Wh	Tariff 2 Active Energy
ET3	2708	R	4	Int64	Wh	Tariff 3 Active Energy
ET4	2712	R	4	Int64	Wh	Tariff 4 Active Energy
ET5	2716	R	4	Int64	Wh	Tariff 5 Active Energy
ET6	2720	R	4	Int64	Wh	Tariff 6 Active Energy
Tariff Energy-UInt32						
ET1	2750	R	2	UInt32	kWh	Tariff 1 Active Energy
ET2	2752	R	2	UInt32	kWh	Tariff 2 Active Energy
ET3	2754	R	2	UInt32	kWh	Tariff 3 Active Energy
ET4	2756	R	2	UInt32	kWh	Tariff 4 Active Energy
ET5	2758	R	2	UInt32	kWh	Tariff 5 Active Energy
ET6	2760	R	2	UInt32	kWh	Tariff 6 Active Energy

1.5.9 Demand register

Register alias	Register start address (decimal)	Operation	Size	Type	Unit	Description
Basic parameters of demand						
DMDMethod	3000	R/WC	1	UInt16	-	Demand calculation method: 0= sliding type 1= fixed
DMD block	3001	R/RC	1	UInt16	Minute	Demand interval
PDMD Reset Time	3002	R	4	Date time	-	Peak demand reset date and time
Power demand						
PADemand	3020	R	2	Float32	kW	Current active power demand of phase A
PAPeakDemand	3022	R	2	Float32	kW	Peak demand of phase A active power

Register alias	Register start address (decimal)	Operation	Size	Type	Unit	Description
PAPeakDemandDate	3024	R	4	Date time	-	Occurrence time of peak demand of phase A active power
PBDemand	3028	R	2	Float32	kW	Current active power demand of phase B
PBPeakDemand	3030	R	2	Float32	kW	Peak demand of phase B active power
PBPeakDemandDate	3032	R	4	Date time	-	Occurrence time of peak demand of phase B active power
PCDemand	3036	R	2	Float32	kW	Current active power demand of phase C
PCPeakDemand	3038	R	2	Float32	kW	Peak demand of phase C active power
PCPeakDemandDate	3040	R	4	Date time	-	Occurrence time of peak demand of phase C active power
PSUMDemand	3044	R	2	Float32	kW	Current total active power demand
PSUMPeakDemand	3046	R	2	Float32	kW	Peak demand of total active power
PSUMPeakDemandDate	3048	R	4	Date time	-	Occurrence time of peak demand of total active power
QADemand	3052	R	2	Float32	kVar	Current reactive power demand of phase A
QAPeakDemand	3054	R	2	Float32	kVar	Peak demand of phase A reactive power
QAPeakDemandDate	3056	R	4	Date time	-	Occurrence time of peak demand of phase A reactive power
QBDemand	3060	R	2	Float32	kVar	Current reactive power demand of phase B
QBPeakDemand	3062	R	2	Float32	kVar	Peak demand of phase B reactive power
QBPeakDemandDate	3064	R	4	Date time	-	Occurrence time of peak demand of phase B reactive power
QCDemand	3068	R	2	Float32	kVar	Current reactive power demand of phase C
QCPeakDemand	3070	R	2	Float32	kVar	Peak demand of phase C reactive power
QCPeakDemandDate	3072	R	4	Date time	-	Occurrence time of peak demand of phase C reactive power
QSUMDemand	3076	R	2	Float32	kVar	Current total reactive power demand

Register alias	Register start address (decimal)	Operation	Size	Type	Unit	Description
QSUMPeakDemand	3078	R	2	Float32	kVar	Peak demand of total reactive power
QSUMPeakDemandDate	3080	R	4	Date time	-	Occurrence time of peak demand of total reactive power
SADemand	3084	R	2	Float32	kVa	Current apparent power demand of phase A
SAPeakDemand	3086	R	2	Float32	kVa	Peak demand of phase A apparent power
SAPeakDemandDate	3088	R	4	Date time	-	Occurrence time of peak demand of phase A apparent power
SBDemand	3092	R	2	Float32	kVa	Current apparent power demand of phase B
SBPeakDemand	3094	R	2	Float32	kVa	Peak demand of phase B apparent power
SBPeakDemandDate	3096	R	4	Date time	-	Occurrence time of peak demand of phase B apparent power
SCDemand	3100	R	2	Float32	kVa	Current apparent power demand of phase C
SCPeakDemand	3102	R	2	Float32	kVa	Peak demand of phase C apparent power
SCPeakDemandDate	3104	R	4	Date time	-	Occurrence time of peak demand of phase C apparent power
SSUMDemand	3108	R	2	Float32	kVa	Current total apparent power demand
SSUMPeakDemand	3110	R	2	Float32	kVa	Peak demand of total apparent power
SSUMPeakDemandDate	3112	R	4	Date time	-	Occurrence time of peak demand of total apparent power
Current demand						
IADemand	3116	R	2	Float32	A	Phase A current demand
IAPeakDemand	3118	R	2	Float32	A	Peak demand of phase A current
IAPeakDemandDate	3120	R	4	Date time	-	Occurrence time of peak demand of phase A current
IBDemand	3124	R	2	Float32	A	Phase B current demand
IBPeakDemand	3126	R	2	Float32	A	Peak demand of phase B current
IBPeakDemandDate	3128	R	4	Date time	-	Occurrence time of peak demand of phase B current
ICDemand	3132	R	2	Float32	A	Phase C current demand
ICPeakDemand	3134	R	2	Float32	A	Peak demand of phase C current

Register alias	Register start address (decimal)	Operation	Size	Type	Unit	Description
ICPeakDemandDate	3136	R	4	Date time	-	Occurrence time of peak demand of phase C current
IAvgDemand	3140	R	2	Float32	A	Three phase average current demand
IAvgPeakDemand	3142	R	2	Float32	A	Peak demand of three-phase average current
IAvgPeakDemand Date	3144	R	4	Date time	-	Occurrence time of peak demand of three-phase average current

1.5.10 Voltage and current harmonic register

Register alias	Register start address (decimal)	Operation	Size	Type	Unit	Description
Current harmonic percentage						
IATHD	4000	R	2	Float32	%	Phase A current total harmonic percentage
IBTHD	4002	R	2	Float32	%	Phase B current total harmonic percentage
ICTHD	4004	R	2	Float32	%	Phase C current total harmonic percentage
IATOHD	4006	R	2	Float32	%	Phase A current odd total harmonic percentage
IBTOHD	4008	R	2	Float32	%	Phaese B current odd total harmonic percentage
ICTOHD	4010	R	2	Float32	%	Phase C current odd total harmonic percentage
IATEHD	4012	R	2	Float32	%	Phase A current even total harmonic percentage
IBTEHD	4014	R	2	Float32	%	Phase B current even total harmonic percentage
ICTEHD	4016	R	2	Float32	%	Phsee C curremt even total harmonic percentage
IAHD1	4018	R	2	Float32	%	1st harmonic percentage of phase A current
IBHD1	4020	R	2	Float32	%	1st harmonic percentage of phase B current
ICHD1	4022	R	2	Float32	%	1st harmonic percentage of phase C current
…	4024-4311	…	…	…	…	The 2nd-49th harmonic percentage of ABC phase current
IAHD50	4312	R	2	Float32	%	The 50th harmonic percentage of phase A current

Register alias	Register start address (decimal)	Operation	Size	Type	Unit	Description
IBHD50	4314	R	2	Float32	%	The 50th harmonic percentage of phase B current
ICHD50	4316	R	2	Float32	%	The 50th harmonic percentage of phase C current
Current harmonic value						
IAHDV1	4400	R	2	Float32	A	Fundamental current value of phase A current
IBHDV1	4402	R	2	Float32	A	Fundamental current value of phase B current
ICHDV1	4404	R	2	Float32	A	Fundamental current value of phase C current
…	4406-4693	…	…	…	…	The 2nd-49th harmonic current value of ABC phase current
IAHDV50	4694	R	2	Float32	A	The 50th harmonic current value of phase A current
IBHDV50	4696	R	2	Float32	A	The 50th harmonic current value of phase B current
ICHDV50	4698	R	2	Float32	A	The 50th harmonic current value of phase C current
Voltage harmonic percentage						
UATHD	5000	R	2	Float32	%	Phase A volage total harmonic percentage
UBTHD	5002	R	2	Float32	%	Phase B voltage total harmonic percentage
UCTHD	5004	R	2	Float32	%	Phase C voltage vota harmonic percentage
UATOHD	5006	R	2	Float32	%	Phase A voltage odd total harmonic percentage
UBTOHD	5008	R	2	Float32	%	Phase B voltage odd total harmonic percentage
UCTOHD	5010	R	2	Float32	%	Phase C voltage odd total harmonic percentage
UATEHD	5012	R	2	Float32	%	Phase A voltage even total harmonic percentage
UBTEHD	5014	R	2	Float32	%	Phase B voltage even total harmonic percentage
UCTEHD	5016	R	2	Float32	%	Phase C voltage even total harmonic percentage
UAHD1	5018	R	2	Float32	%	The 1st harmonic percentage of phase A voltage
UBHD1	5020	R	2	Float32	%	The 1st harmonic percentage of phase B voltage

Register alias	Register start address (decimal)	Operation	Size	Type	Unit	Description
UCHD1	5022	R	2	Float32	%	The 1st harmonic percentage of phase C voltage
…	5024-5311	…	…	…	…	The 2nd-49th harmonic percentage of ABC phase voltage
UAHD50	5312	R	2	Float32	%	The 50th harmonic percentage of phase A voltage
UBHD50	5314	R	2	Float32	%	The 50th harmonic percentage of phase B voltage
UCHD50	5316	R	2	Float32	%	The 50th harmonic percentage of phase C voltage
Voltage harmonic value						
UAHDV1	5400	R	2	Float32	V	The 1st harmonic voltage value of phase A voltage
UBHDV1	5402	R	2	Float32	V	The 1st harmonic voltage value of phase B voltage
UCHDV1	5404	R	2	Float32	V	The 1st harmonic voltage value of phase C voltage
…	5406-5693	…	…	…	…	The 2nd-49th harmonic voltage value of ABC phase voltage
UAHDV50	5694	R	2	Float32	V	The 50th harmonic voltage value of phase A voltage
UBHDV50	5696	R	2	Float32	V	The 50th harmonic voltage value of phase B voltage
UCHDV50	5698	R	2	Float32	V	The 50th harmonic voltage value of phase C voltage

1.5.11 Max./Min.

Register alias	Register start address (decimal)	Operation	Size	Type	Unit	Description
Current Max./Min.						
IA Max	6000	R	2	Float32	A	Phase A current max.
IB Max	6002	R	2	Float32	A	Phase B current max.
IC Max	6004	R	2	Float32	A	Phase C current max.
IAVG Max	6006	R	2	Float32	A	Avg current max.
IN Max	6008	R	2	Float32	A	Phase N current max.
IA Min	6010	R	2	Float32	A	Phase A current min.
IB Min	6012	R	2	Float32	A	Phase B current min.
IC Min	6014	R	2	Float32	A	Phase C current min.

IAVG Min	6016	R	2	Float32	A	Avg current min.
IN Min	6018	R	2	Float32	A	Phase N current min.
Voltage Max./Min.						
UA Max	6020	R	2	Float32	V	Phase A voltage max.
UB Max	6022	R	2	Float32	V	Phase B voltage max.
UC Max	6024	R	2	Float32	V	Phase C voltage max.
Phase UAVGMax	6026	R	2	Float32	V	Avg voltage max.
UN Max	6028	R	2	Float32	V	Phase N voltage max.
UA Min	6030	R	2	Float32	V	Phase A voltage min.
UB Min	6032	R	2	Float32	V	Phase B voltage min.
UC Min	6034	R	2	Float32	V	Phase C voltage min.
UAVGMin	6036	R	2	Float32	V	Avg voltage min.
UN Min	6038	R	2	Float32	V	Phase N voltage min.
UAB Max	6040	R	2	Float32	V	UAB voltage max.
UBC Max	6042	R	2	Float32	V	UBC voltage max.
UCA Max	6044	R	2	Float32	V	UCA voltage max.
LineUAVGMax	6046	R	2	Float32	V	Avg voltage max.
UAB Min	6050	R	2	Float32	V	UAB voltage min.
UBC Min	6052	R	2	Float32	V	UBC voltage min.
UCA Min	6054	R	2	Float32	V	UCA voltage min.
LineUAVGMin	6056	R	2	Float32	V	Avg voltage min.
Active Power Max./Min.						
PA Max	6060	R	2	Float32	kW	Phase A active power max.
PB Max	6062	R	2	Float32	kW	Phase B active power max.
PC Max	6064	R	2	Float32	kW	Phase C active power max.
PSUMMax	6066	R	2	Float32	kW	Total active power max.
PA Min	6070	R	2	Float32	kW	Phase A active power min.
PB Min	6072	R	2	Float32	kW	Phase B active power min.
PC Min	6074	R	2	Float32	kW	Phase C active power min.
PSUMMin	6076	R	2	Float32	kW	Total active power min.
Reactive Power Max./Min.						
QA Max	6080	R	2	Float32	kVar	Phase A reactive power max.
QB Max	6082	R	2	Float32	kVar	Phase B reactive power max.
QC Max	6084	R	2	Float32	kVar	Phase C reactive power max.
QSUMMax	6086	R	2	Float32	kVar	Total reactive power max.
QA Min	6090	R	2	Float32	kVar	Phase A reactive power min.
QB Min	6092	R	2	Float32	kVar	Phase B reactive power min.
QC Min	6094	R	2	Float32	kVar	Phase C reactive power min.
QSUMMin	6096	R	2	Float32	kVar	Total reactive power min.

Apparent Power Max./Min.						
SA Max	6100	R	2	Float32	kVa	Phase A apparent power max.
SB Max	6102	R	2	Float32	kVa	Phase B apparent power max.
SC Max	6104	R	2	Float32	kVa	Phase C apparent power max.
SSUMMax	6106	R	2	Float32	kVa	Total apparent power max.
SA Min	6110	R	2	Float32	kVa	Phase A apparent power min.
SB Min	6112	R	2	Float32	kVa	Phase B apparent power min.
SC Min	6114	R	2	Float32	kVa	Phase C apparent power min.
SSUMMin	6116	R	2	Float32	kVa	Total apparent power min.
Power Factor Max./Min.						
PFA Max	6120	R	2	Float32	-	Phase A active power max.
PFB Max	6122	R	2	Float32	-	Phase B active power max.
PFC Max	6124	R	2	Float32	-	Phase C active power max.
PF Total Max	6126	R	2	Float32	-	Total active power max.
PFA Min	6130	R	2	Float32	-	Phase A active power min.
PFB Min	6132	R	2	Float32	-	Phase B active power min.
PFC Min	6134	R	2	Float32	-	Phase C active power min.
PF Total Min	6136	R	2	Float32	-	Total active power min.
Power Factor Max./Min.						
DPFA Max	6140	R	2	Float32	-	Phase A active power max.
DPFB Max	6142	R	2	Float32	-	Phase B active power max.
DPFC Max	6144	R	2	Float32	-	Phase C active power max.
DPF Total Max	6146	R	2	Float32	-	Total active power max.
DPFA Min	6150	R	2	Float32	-	Phase A active power min.
DPFB Min	6152	R	2	Float32	-	Phase B active power min.
DPFC Min	6154	R	2	Float32	-	Phase C active power min.
DPF Total Min	6156	R	2	Float32	-	Total active power min.
Frequency Max./Min.						
FA Max	6160	R	2	Float32	Hz	Phase A active power max.
FB Max	6162	R	2	Float32	Hz	Phase B active power max.
FC Max	6164	R	2	Float32	Hz	Phase C active power max.
F Total Max	6166	R	2	Float32	Hz	Total active power max.
FA Min	6170	R	2	Float32	Hz	Phase A active power min.
FB Min	6172	R	2	Float32	Hz	Phase B active power min.
FC Min	6174	R	2	Float32	Hz	Phase C active power min.
F Total Min	6176	R	2	Float32	Hz	Total active power min.

1.5.12 Unbalance degree

Register alias	Register start address (decimal)	Operation	Size	Type	Unit	Description
Voltage negative sequence unbalance degree	7000	R	2	Float32	%	Voltage negative sequence unbalance degree
Voltage zero sequence unbalance degree	7002	R	2	Float32	%	Voltage zero sequence unbalance degree
Current negative sequence unbalance degree	7004	R	2	Float32	%	Current negative sequence unbalance degree
Current zero sequence unbalance degree	7006	R	2	Float32	%	Current zero sequence unbalance degree

1.5.13 Current K-factor and crest factor register

Register alias	Register start address (decimal)	Operation	Size	Type	Unit	Description
Current K factor parameters						
K-factor calculation method	7990	R/WC	1	UInt16	-	K-factor calculation method 0=US(United States) 1=EU (Europe)
Parameter e of the EU calculation method	7991	R/WC	1	UInt16	-	Parameter e of the EU calculation method Actual value = read value / 100
Parameter q of the EU calculation method	7992	R/WC	1	UInt16	-	Parameter q of the EU calculation method Actual value = read value / 100
Current K factor						
KFIA	8000	R	2	Float32	-	Current K factor of phase A
KFIB	8002	R	2	Float32	-	Current K factor of phase B
KFIC	8004	R	2	Float32	-	Current K factor of phase C
Current crest factor						

Register alias	Register start address (decimal)	Operation	Size	Type	Unit	Description
CFIA	8010	R	2	Float32	-	Current crest factor of phase A
CFIB	8012	R	2	Float32	-	Current crest factor of phase B
CFIC	8014	R	2	Float32	-	Current crest factor of phase C
Voltage crest factor						
CFUA	8020	R	2	Float32	-	Voltage crest factor of phase A
CFUB	8022	R	2	Float32	-	Voltage crest factor of phase B
CFUC	8024	R	2	Float32	-	Voltage crest factor of phase C

1.5.14 Voltage and current angle register

Register alias	Register start address (decimal)	Operation	Size	Type	Unit	Description
Angle between voltages:						
UAB	8100	R	2	Float32	°	Angle between phase A and phase B voltage
UBC	8102	R	2	Float32	°	Angle between phase B and phase C voltage
UCA	8104	R	2	Float32	°	Angle between phase C and phase A voltage
Angle between currents:						
IAB	8106	R	2	Float32	°	Angle between phase A and phase B current
IBC	8108	R	2	Float32	°	Angle between phase B and phase C current
ICA	8110	R	2	Float32	°	Angle between phase C and phase A current
Angle between voltage and current:						
UIA	8112	R	2	Float32	°	Angle between voltage and current of phase A
UIB	8114	R	2	Float32	°	Angle between voltage and current of phase B
UIC	8116	R	2	Float32	°	Angle between voltage and current of phase C

1.5.15 Event parameters

Register alias	Register start address (decimal)	Operation	Size	Type	Unit	Description
Swell,Dip,Interrupt event threshold						
Voltage swell threshold	9000	R/WC	1	UInt16	%	Nominal voltage as reference Magnify in 10 times Default value: 1100
Voltage swell hysteresis	9001	R/WC	1	UInt16	%	Nominal voltage as reference Magnify in 10 times Default value: 20
Voltage dip threshold	9002	R/WC	1	UInt16	%	Nominal voltage as reference Magnify in 10 times Default value:90
Voltage dip hysteresis	9003	R/WC	1	UInt16	%	Nominal voltage as reference Magnify in 10 times Default value: 20
Voltage interrupt threshold	9004	R/WC	1	UInt16	%	Nominal voltage as reference Magnify in 10 times Default value: 50
Voltage interrupt hysteresis	9005	R/WC	1	UInt16	%	Nominal voltage as reference Magnify in 10 times Default value: 20
Frequency over and under event threshold						
Over frequency threshold	9006	R/WC	1	UInt16	%	Nominal frequency as reference Magnify in 10 times Default value: 1010
Under frequency threshold	9007	R/WC	1	UInt16	%	Nominal frequency as reference Magnify in 10 times Default value: 990
Voltage over and under event threshold						
Over voltage threshold	9008	R/WC	1	UInt16	%	Nominal voltage as reference Magnify in 100 times Default value: 11000
Under voltage threshold	9009	R/WC	1	UInt16	%	Nominal voltage as reference Magnify in 100 times Default value: 9000
Current over and under event threshold						
Over current threshold	9010	R/WC	1	UInt16	%	Nominal current as reference Magnify in 100 times Default value: 11000
Under current threshold	9011	R/WC	1	UInt16	%	Nominal current as reference Magnify in 100 times

Register alias	Register start address (decimal)	Operation	Size	Type	Unit	Description
						Default value: 9000
Unbalance event threshold						
Voltage unbalance threshold	9012	R/WC	1	UInt16	%	Magnify in 100 times Default value: 400
Current unbalance threshold	9013	R/WC	1	UInt16	%	Magnify in 100 times Default value: 1000
Voltage harmonic event threshold						
Voltage THD threshold	9014	R/WC	1	UInt16	%	Magnify in 100 times Default value: 500
Voltage even haemonic distortion threshold	9015	R/WC	1	UInt16	%	Magnify in 100 times Default value: 500
Voltage odd haemonic distortion threshold	9016	R/WC	1	UInt16	%	Magnify in 100 times Default value: 500
Current harmonic event threshold						
Current THD threshold	9017	R/WC	1	UInt16	%	Magnify in 100 times Default value: 500
Current even haemonic distortion threshold	9018	R/WC	1	UInt16	%	Magnify in 100 times Default value: 500
Current odd haemonic distortion threshold	9019	R/WC	1	UInt16	%	Magnify in 100 times Default value: 500

1.5.16 Communication parameters

Register alias	Register start address (decimal)	Operation	Size	Type	Unit	Description
LAN						
DHCP status	10000	R/WC	1	UInt16	-	DHCP 0=Enable 1=Disable Default:Disable
IP Address	10001	R/WC	2	IPaddr	-	IP Address

Register alias	Register start address (decimal)	Operation	Size	Type	Unit	Description
						default:192.168.1.55
Netmask	10003	R/WC	2	IPaddr	-	Netmask default:255.255.255.0
Gateway	10005	R/WC	2	IPaddr	-	Gateway default:192.168.1.1
Modbus-TCP						
Status	10010	R/WC	1	UInt16	-	Status 0=Enable 1=Disable
Port	10011	R/WC	1	UInt16	-	Port default:502

1.5.17 Screen display parameters

Register alias	Register start address (decimal)	Operation	Size	Type	Unit	Description
Screen display brightness	10020	R/WC	1	UInt16	-	Screen display brightness
Screen off	10021	R/WC	1	UInt16	-	Screen off 0= Never 1= 1 minute 2= 5 minutes 3= 10 minutes 4= 30 minutes

1.5.18 Key parameters

Register alias	Register start address (decimal)	Operation	Size	Type	Unit	Description
Key tone	10030	R/WC	1	UInt16	-	Key tone 0=Enable 1=Disable
Key auto lock	10031	R/WC	1	UInt16	-	Key auto lock 0= Never 1= 1minute 2= 2 minutes

Register alias	Register start address (decimal)	Operation	Size	Type	Unit	Description
						3= 3 minutes 4= 4 minutes 5= 5 minutes

1.5.19 Display language parameters

Register alias	Register start address (decimal)	Operation	Size	Type	Unit	Description
Display language	10040	R/WC	1	UInt16	-	Display language 0=Chinese (Simplified) 1=English 2=Chinese (Traditional) 3=French 4=Russian 5=Spanish 6=Portuguese

1.5.20 User information

Register alias	Register start address (decimal)	Operation	Size	Type	Unit	Description
user name	10050	R/WC	10	UTF8	-	user name Note: 20 ASCII characters, less than 20 are filled with blank characters (0x00) The settable characters are as follows: ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz0123456789-_
Location	10060	R/WC	10	UTF8	-	Location Note: 20 ASCII characters, less than 20 are filled with blank characters (0x00) The settable characters are as follows: ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz0123456789-_

1.5.21 Phase sequence display parameters

Register alias	Register start address (decimal)	Operation	Size	Type	Unit	Description
Phase sequence name						
Phase sequence name	10080	R/WC	1	UInt16	-	Phase sequence name 0= L1,L2,L3 1= A,B,C
Phase sequence color						
Standard selection	10081	R/WC	1	UInt16	-	Standard selection 0=Chinese standard 1=American standard 2=IEC standard 3=Custom
Phase A color	10082	R/WC	1	UInt16	-	Phase A color 0=black 1=red 2=blue 3=yellow 4=gray 5=orange 6=brown 7=green 8=white
Phase B color	10083	R/WC	1	UInt16	-	Phase B color Color selection is the same as phase A
Phase C color	10084	R/WC	1	UInt16	-	Phase C color Color selection is the same as phase A
Phase N color	10085	R/WC	1	UInt16	-	Phase N color Color selection is the same as phase A
GND color	10086	R/WC	1	UInt16	-	GND color 0=green 1=yellow-green

1.5.22 Data logger parameters

Register alias	Register start address (decimal)	Operation	Size	Type	Unit	Description
Status	10100	R/WC	1	UInt16	-	Status 0=Stop

Register alias	Register start address (decimal)	Operation	Size	Type	Unit	Description
						1=Recording
Record name	10101	R/WC	10	UTF8	-	Record name Note: 20 ASCII characters, less than 20 are filled with blank characters (0x00) The settable characters are as follows: ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz0123456789-_
Record start time	10111	R/WC	4	Date time	-	Record start time Reg.75: Year 2000-2099 Reg.76: Month (b15:b8), Day (b7:b0) Reg.77: Hour (b15:b8) ,Minute (b7:b0) Reg.78: Milisecond
Record duration	10115	R/WC	1	UInt16	-	Record duration 0= 1 hour 1= 2 hours 2= 4 hours 3= 8 hours 4= 16 hours 5= 24 hours 6= 2 days 7= 7 days 8= 30 days 9= 3 mouths 10= 6 mouths 11= 12 mouths 12= Max time
Record interval	10116	R/WC	1	UInt16	s	Record interval

1.5.23 Waveform recorder parameters

Register alias	Register start address (decimal)	Operation	Size	Type	Unit	Description
Status	10120	R/WC	1	UInt16	-	Status 0=Stop

Register alias	Register start address (decimal)	Operation	Size	Type	Unit	Description
						1=Recording
Record name	10121	R/WC	10	UTF8	-	Record name Note: 20 ASCII characters, less than 20 are filled with blank characters (0x00) The settable characters are as follows: ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz0123456789-_
Record start time	10131	R/WC	4	Date time	-	Record start time Reg.75: Year 2000-2099 Reg.76: Month (b15:b8), Day (b7:b0) Reg.77: Hour (b15:b8) ,Minute (b7:b0) Reg.78: Milisecond
Sample rate	10135	R/WC	1	UInt16	-	Sample rate 0= 1kHz 1= 2kHz 2= 4kHz 3= 8kHz
Duration	10136	R/WC	1	UInt16	s	Duration Different sampling rates can be set for different durations 1kHz: settable value 1-40 2kHz: settable value 1-20 4kHz: settable value 1-10 8kHz: settable values 1-5