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PEM3355 Three-phase Multi-function Meter
----Modbus Communication Protocol

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1. Modbus Communication Overview

PEM3355 uses the standard communication protocol - Modbus-RTU. The baud rate can be set to 1200, 2400, 4800, 9600, 19200, etc. through programming or manual operation.

2. Modbus Communication Settings

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

Parameter	Valid Value	Default Value
Baud rate	-1200 baud -2400 baud -4800 baud -9600 baud -19200 baud -38400 baud -57600 baud	9600 baud
Data bit	8	8
Parity bit	Odd parity Even parity No parity	No parity
Stop bit	1	1
Address	1–247	1

3. Command Request Format

Slave Address	Function Code	Command	CRC Check
8-Bits	8-Bits	N × 8-Bits	16-Bits Checking

3.1. Function Code

Function codes are used to instruct the device how to process the command. The following table lists the available function codes and their descriptions.

Function Code		Function Code Name	Functions
Decimal	Hexadecimal		
3	03H	Read holding register	Used to read the meter parameters
16	10H	Write multiple registers	Used to configure the meter parameters

3.2. Register List

The register list has the following headers:

Register Alias	Register Address	Operation Read/Write	Size	Type	Unit	Description

- **Register alias:** Used to refer to the meaning of the register
- **Register address:** The address of Modbus data. The data address in this manual is in decimal format.
- **Operation:** Indicate the operation that can be performed on the register
- **Size:** Indicate how many 16-bit data are occupied
- **Type:** The type of data encoding

- **Unit:** The unit of the register value
- **Description:** Introduce the function of this register

3.3. Data Type List

The following table lists the data types used in this manual:

Type	Description	Range
UInt16	Unsigned 16-bit integer	0–65535
Int16	Signed 16-bit integer	-32768–+32767
UInt32	Unsigned 32-bit integer	0–4 294 967 295
UInt64	Unsigned 64-bit integer	0–18 446 744 073 709 551 615
UTF8	8-bit UTF encoding	Multi-byte Unicode encoding
Float32	32-bit floating point	Standard IEEE floating point data (single precision)
Bitmap	–	–
Date Time	Time type	-

3.3.1. Date Time Details:

Byte	Bit															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1	Reserved(0)								Year (00–99, starting from 2000)							
2	Month (1–12)								Day (1–31)							
3	Hour (0–23)								Minute (0–59)							
4	Millisecond (0–59999)															

3.3.2. Configuring the Meter via Modbus-RTU

You can use function code 16 to write commands to the device and configure the meter parameters. Device parameter configuration can only be done by writing corresponding data to the "Configuration Command Register", that is, writing corresponding data to the address starting from 300 to configure the corresponding parameters.

3.3.3. Configuration Command Request

The following table lists the Modbus request format for configuration commands:

Slave Address (8 bits)	Function Code (8 bits)	Configuration Command Register Address (16 bits)		Configuration Command Register Number (16 bits)		Data length (8 bits)	Command (16 bits) X N				CRC Check Code (16 bits)	
							Command		Command parameters			
		High 8 bits	Low 8 bits	High 8 bits	Low 8 bits		High 8 bits	Low 8 bits	High 8 bits	Low 8 bits	Low 8 bits	High 8 bits
1-247	16					N × 2						

3.3.4. Configuration Results

The configuration results can be read through registers 424 and 425. The following table lists the configuration results:

Register Address	Content	Size (16 bits)	Data (Example)
424	Configuration command code	1	1001 (set time)
425	Result	1	0 = Valid operation 80 = Invalid command code 81 = Invalid command parameter 82 = Invalid number of command parameters 83 = Operation not performed

3.3.5. Configuration Command Example:

The following table lists the command format for configuring digital outputs:

Slave Address (8 bits)	Function Code (8 bits)	Configuration Command Register Address (16 bits)		Configuration Command Register Number (16 bits)		Data Length (8 bits)	Command (16 bits) X N				CRC Check （16bits）	
0x01	0x10	High 8 bits	Low 8 bits	High 8 bits	Low 8 bits	0x04	Command		Command Parameters		Low 8 bits	High 8 bits
							High 8 bits	Low 8 bits	High 8 bits	Low 8 bits		
		0x01	0x2C	0x00	0x02		0x03	0xED	0x00	0x01	0xAD	0xC3

4. Function Code (0x10=16) Operation Instructions

The function code (0x10=16) is used to configure the meter parameters. Its request and return data formats are as follows:

4.1. Request Data Format

NO.	Name	Type	Range (Decimal)	Description
1	Meter address	UInt8	1-247	
2	Function code	UInt8	16	
3	Register starting address	UInt16	-	High byte first (sending order)
4	Number of registers	UInt16	1-123	High byte first (sending order)
5	Number of register bytes	UInt8		Number of registers*2
6	Write value to register 1	UInt16	-	High byte first (sending order)
7	…	UInt16	-	High byte first (sending order)
8	Write value to register n	UInt16	-	High byte first (sending order)
9	CRC-16 check code	UInt16	-	Low byte first (sending order)

4.2. Return Data Format:

NO.	Name	Type	Range (Decimal)	Description
1	Meter address	UInt8	1-247	
2	Function code	UInt8	16	
3	Register starting address	UInt16	300	High byte first
4	Number of registers	UInt16	1-123	High byte first
5	CRC-16 check code	UInt16	-	Low byte first

Notice!

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

For example:

Configure relay output (command = 1005)

NO.	Name	Type	Range (Decimal)	Range (Hexadecimal)	Description
1	Meter address	UInt8	1	01	
2	Function code	UInt8	16	10	
3	Register starting address	UInt16	300	012C	High byte first (sending order)
4	Number of registers	UInt16	2	0002	High byte first (sending order)
5	Number of register bytes	UInt8	4	04	
6	Write value to register 300	UInt16	1005	03ED	High byte first (sending order), command
7	Write value to register 301	UInt16	1	0001	High byte first (sending order), command parameters
9	CRC-16 check code	UInt16	50093	C3AD	Low byte first (sending order)

The byte order is as follows:
01 10 01 2C 00 02 04 03 ED 00 01 AD C3
If the configuration data is correct, the following data will be returned:
01 10 01 2C 00 02 81 FD

NO.	Name	Type	Range (Hexadecimal)	Range (Decimal)
1	Meter address	UInt8	01	1
2	Function code	UInt8	10	16
3	Register starting address	UInt16	012C	300
4	Number of registers	UInt16	0002	2
7	CRC-16 check code	UInt16	81FD	

5. Function Code (0x03=3) Operation Instructions

Function code (0x03=3) is used to read the meter register parameters. Its request data and return data formats are as follows:

5.1. Request Data Format:

NO.	Name	Type	Range (Decimal)	Description
1	Meter address	UInt8	1-247	
2	Function code	UInt8	3	
3	Register starting address	UInt16	-	High byte first (sending order)
4	Number of registers	UInt16	1-125	High byte first (sending order)
5	CRC-16 check code	UInt16	-	Low byte first (sending order)

5.2. Return Data Format:

NO.	Name	Type	Range (Decimal)	Description
1	Meter address	UInt8	1-247	
2	Function code	UInt8	3	
3	Read register bytes	UInt8	-	Read register number*2
4	The value of register 1		-	High byte first
5	…		-	High byte first
6	The value of register n		-	High byte first
7	CRC-16 check code	UInt16	-	Low byte first

Example:

Read the voltage values of A, B, and C (the starting address of the voltage register is: 2147)

NO.	Name	Type	Range (Decimal)	Range (Hexadecimal)	Description
1	Meter address	UInt8	1	0x01	
2	Function code	UInt8	3	0x03	
3	Register starting address	UInt16	2147	0x0863	
4	Number of registers	UInt16	6	0x0006	
5	CRC-16 check code	UInt16	46647	0xB637	

The order of sent bytes is as follows:

01 03 08 63 00 06 37 B6

Return data:

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

NO.	Name	Type	Hexadecimal	Decimal
1	Meter address	UInt8	01	1
2	Function code	UInt8	03	3
3	Read register bytes	UInt8	0C	12
4	Phase A voltage	float32	435C0000	220V
5	Phase B voltage	float32	435D0000	221V
6	Phase C voltage	float32	435E0000	222V
7	CRC-16 check code	UInt16	14AC	

6. Error Response

6.1. Error Response Data Format

NO.	Name	Type	Decimal	Hexadecimal	Description
1	Meter 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 check code	UInt16			Low byte first

6.2. Modbus Error Code

Code (Hexadecimal)	Name	Description
0x01	Illegal function code	The function code used is not 3 or 16 supported by the meter.
0x02	Illegal data address	The register data written or read is not in the address range supported by the meter.
0x03	Illegal data value	The data value written to the register does not meet the requirements
0x04	Device error	An unknown error occurred

7. Configuration Command List

7.1. Set Meter Time

Command code	Operation	Size	Type	Unit	Range	Description
1001	W	1	UInt16	-	2000-2099	Year
	W	1	UInt16	-	1-12	Month
	W	1	UInt16	-	1-31	Day
	W	1	UInt16	-	0-23	Hour
	W	1	UInt16	-	0-59	Minute
	W	1	UInt16	-	0-59	Second

7.2. Set Communication Parameters

Command Code	Operation	Size	Type	Unit	Range	Description
1002	W	1	UInt16	-	1-247	Slave address
	W	1	UInt16	-	0,1,2,3,4,5,6	Baud rate 0=1200 1=2400 2=4800 3=9600 4=19200 5=38400 6=57600
	W	R/WC	UInt16	-	0,1,2	Parity bit 0 = Odd 1 = Even 2 = None

7.3. Set System Wiring Parameters

Command Code	Operation	Size	Type	Unit	Range	Description
1003	W	1	UInt16	-	0,1.2,3,4	Wiring mode 1PH2W_LN=0, 1PH2W_LL=1, 3PH4W=2, 3PH3W=3, 1PH3W_LLN=4,
	W	1	UInt16	Hz	50,60	Grid frequency
	W	2	UInt32	V	＞0	VT primary voltage
	W	2	UInt32	V	＞0	VT secondary voltage = actual value*1000
	W	2	UInt32	A	＞0	CT primary voltage
	W	2	UInt32	mV	＞0	CT secondary voltage = actual value*1000
	W	2	UInt32	A	＞0	Rogowski coil primary current
	W	2	UInt32	mV	＞0	Rogowski coil secondary voltage = actual value * 1000
	W	1	UInt16	-	0,1	Voltage access method 0 = direct access 1 = access via VT
	W	1	UInt16	-	0,1	Current connection mode 0 = Rogowski coil connection 1 = CT connection

7.4. Set the Harmonic Order for Monitoring

Command Code	Operation	Size	Type	Unit	Range	Description
1004	W	1	UInt16	-	2-52	HX harmonic order
	W	1	UInt16	-	2-52	HY harmonic order
	W	1	UInt16	-	2-52	HZ harmonic order

7.5. Set Digital Output

Command Code	Operation	Size	Type	Unit	Range	Description
1005	W	1	UInt16	-	0,1	1 = Relay output enabled 0 = Relay output disabled

7.6. Set Tariffs

Command Code	Operation	Size	Type	Unit	Range	Description
1006	W	1	UInt16	-	1,2,3,4	1 = Tariff 1 2 = Tariff 2 3 = Tariff 3 4 = Tariff 4

7.7. Clear Energy

Command Code	Operation	Size	Type	Unit	Range	Description
2000	W	1	UInt16	-	100-103	100: Clear phase A energy 101: Clear phase B energy 102: Clear phase C energy 103: Clear all phases energy

7.8. Clear Tariff Energy

Command Code	Operation	Size	Type	Unit	Range	Description
2001	W	1	UInt16	-	200-204	200: Clear tariff 1 energy 201: Clear tariff 2 energy 202: Clear tariff 3 energy 203: Clear tariff 4 energy 204: Clear all tariff energy

7.9. Clear Maximum Demand

Command Code	Operation	Size	Type	Unit	Range	Description
2002	W	1	UInt16	-	1	1: Clear the maximum demand

8. Modbus Register List

8.1. Energy Meter

Register Alias	Register Address	R/W	Size	Type	Unit	Description
Meter model	50	R	20	UTF8	-	
Serial number	70	R	2	UInt32	-	
Firmware version number	72	R	1	UInt16	-	Format: X.Y.ZTT
Date and time	73	R/WC	4	Date time	-	Reg.73: Year 00-99 (from 2000 to 2099) Reg.74: Month (b15:b8), Day (b7:b0) Reg. 75: Hour (b15:b8), Minute (b7:b0) Reg. 76: Milliseconds

8.2. Communication

Register Alias	Register Address	R/W	Size	Type	Unit	Description
Address	80	R/WC	1	UInt16	-	1-247
Baud rate	81	R/WC	1	UInt16	-	0=1200 1=2400 2=4800 3=9600 4=19200 5=38400 6=57600
Parity bit	82	R/WC	1	UInt16	-	0 = odd parity 1 = even parity 2 = no parity

8.3. Power System

Register Alias	Register Address	R/W	Size	Type	Unit	Description
Wiring mode	90	R/WC	1	UInt16	-	0 = 1PH2W L - N 1 = 1PH2W L - L 2 = 3PH4W 3 = 3PH3W 4= 1PH3W_LLN
Grid frequency	91	R/WC	1	UInt16	Hz	
VT primary voltage value	92	R/WC	2	UInt32	V	
VT secondary voltage value	94	R/WC	2	UInt32	V	Actual value = read value / 1000
CT primary current value	96	R/WC	2	UInt32	A	
CT secondary voltage value	98	R/WC	2	UInt32	mV	Actual value = read value / 1000
Primary current value of Rogowski coil	100	R/WC	2	UInt32	A	
Rogowski coil secondary voltage value	102	R/WC	2	UInt32	mV	Actual value = read value / 1000
Voltage access mode	104	R/WC	1	UInt16	-	0 = Direct access 1 = Access via VT
Current access mode	105	R/WC	1	UInt16	-	0 = Rogowski coil 1 = CT

8.4. Digital Output Status

Register Alias	Register Address	R/W	Size	Type	Unit	Description
Digital output status	150	R/WC	1	-	-	1 = Relay output enabled 0 = Relay output disabled

8.5. Tariff Status

Register Alias	Register Address	R/W	Size	Type	Unit	Description
Tariff status	160	R/WC	1	-	-	1 = Tariff 1 2 = Tariff 2 3 = Tariff 3 4 = Tariff 4

8.6. Configuration Command Register

Register Alias	Register Address	R/W	Size	Type	Unit	Description
Command code	300	R/W	1	UInt16	-	
Command parameter 001	301	R/W	1	UInt16	-	
Command parameter 002	302	R/W	1	UInt16	-	
…	…	R/W	1	UInt16	-	
Command parameter 123	423	R/W	1	UInt16	-	
Configuration command code	424	R	1	UInt16	-	
Configuration results	425	R	1	UInt16	-	0 = Valid operation 80 = Invalid command code 81 = Invalid command parameter 82 = Invalid number of command parameters 83 = Operation not performed

9. Basic Data

9.1. Power Factor, Harmonics, Voltage, Current, Power

Register Alias	Register Address	R/W	Size	Type	Unit	Description
Power Factor						
PF1	2000	R	2	Float32	-	Phase A power factor
PF2	2002	R	2	Float32	-	Phase B power factor
PF3	2004	R	2	Float32	-	Phase C power factor
PF Avg	2006	R	2	Float32	-	Total power factor
DPF1	2008	R	2	Float32	-	Phase A fundamental power factor
DPF2	2010	R	2	Float32	-	Phase B fundamental power factor
DPF3	2012	R	2	Float32	-	Phase C fundamental power factor
DPF Avg	2014	R	2	Float32	-	Total fundamental power factor
Frequency						
Freq1	2016	R	2	Float32	Hz	Phase A frequency
Freq2	2018	R	2	Float32	Hz	Phase B frequency
Freq3	2020	R	2	Float32	Hz	Phase C frequency
FreqAvg	2022	R	2	Float32	Hz	Three-phase frequency average value
Measuring Harmonic Order						
HX harmonic order	2024	R/WC	1	UInt16	-	Range: 2-52
HY harmonic order	2025	R/WC	1	UInt16	-	Range: 2-52
HZ harmonic order	2026	R/WC	1	UInt16	-	Range: 2-52
Current Harmonics						
I1THDx	2027	R	2	Float32	%	Phase A current Xth harmonic percentage
I2THDx	2029	R	2	Float32	%	Phase B current Xth harmonic percentage
I3THDx	2031	R	2	Float32	%	Phase C current Xth harmonic percentage
ITHDx Avg	2033	R	2	Float32	%	Average value of three-phase current Xth harmonic percentage
I1THDy	2035	R	2	Float32	%	Phase A current Yth harmonic percentage
I2THDy	2037	R	2	Float32	%	Phase B current Yth harmonic percentage
I3THDy	2039	R	2	Float32	%	Phase C current Yth harmonic percentage
ITHDy Avg	2041	R	2	Float32	%	Average value of three-phase current Yth harmonic percentage
I1THDz	2043	R	2	Float32	%	Phase A current Zth harmonic percentage
I2THDz	2045	R	2	Float32	%	Phase B current Zth harmonic percentage
I3THDz	2047	R	2	Float32	%	Phase C current Zth harmonic percentage
ITHDz Avg	2049	R	2	Float32	%	Average value of three-phase current Zth harmonic percentage
I1THD	2051	R	2	Float32	%	Total harmonic percentage of phase A current
I2THD	2053	R	2	Float32	%	Total harmonic percentage of phase B current
I3THD	2055	R	2	Float32	%	Total harmonic percentage of phase C current
ITHD Avg	2057	R	2	Float32	%	The average value of total harmonics in three-phase current
I1THx	2059	R	2	Float32	V	Phase A current Xth harmonic current
I2THx	2061	R	2	Float32	V	Phase B current Xth harmonic current
I3THx	2063	R	2	Float32	V	Phase C current Xth harmonic current

ITHx Avg	2065	R	2	Float32	V	Three-phase current average value of Xth harmonic current
I1THy	2067	R	2	Float32	V	Phase A current Yth harmonic current
I2THy	2069	R	2	Float32	V	Phase B current Yth harmonic current
I3THy	2071	R	2	Float32	V	Phase C current Yth harmonic current
ITHy Avg	2073	R	2	Float32	V	Three-phase current average value of Yth harmonic current
I1THz	2075	R	2	Float32	V	Phase A current Zth harmonic current
I2THz	2077	R	2	Float32	V	Phase B current Zth harmonic current
I3THz	2079	R	2	Float32	V	Phase C current Zth harmonic current
ITHz Avg	2081	R	2	Float32	V	Three-phase current average value of Zth harmonic current
Voltage Harmonics						
U1THDx	2083	R	2	Float32	%	Phase A voltage Xth harmonic percentage
U2THDx	2085	R	2	Float32	%	Phase B voltage Xth harmonic percentage
U3THDx	2087	R	2	Float32	%	Phase C voltage Xth harmonic percentage
UTHDx Avg	2089	R	2	Float32	%	Three-phase voltage Xth harmonic percentage average value
U1THDy	2091	R	2	Float32	%	Phase A voltage Yth harmonic percentage
U2THDy	2093	R	2	Float32	%	Phase B voltage Yth harmonic percentage
U3THDy	2095	R	2	Float32	%	Phase C voltage Yth harmonic percentage
UTHDy Avg	2097	R	2	Float32	%	Three-phase voltage Yth harmonic percentage average value
U1THDz	2099	R	2	Float32	%	Phase A voltage Zth harmonic percentage
U2THDz	2101	R	2	Float32	%	Phase B voltage Zth harmonic percentage
U3THDz	2103	R	2	Float32	%	Phase C voltage Zth harmonic percentage
UTHDz Avg	2105	R	2	Float32	%	Three-phase voltage Zth harmonic percentage average value
U1THD	2107	R	2	Float32	%	Phase A voltage total harmonic percentage
U2THD	2109	R	2	Float32	%	Phase B voltage total harmonic percentage
U3THD	2111	R	2	Float32	%	Phase C voltage total harmonic percentage
UTHD Avg	2113	R	2	Float32	%	The average value of total harmonics of three-phase voltage
U1THx	2115	R	2	Float32	V	Phase A voltage Xth harmonic voltage
U2THx	2117	R	2	Float32	V	Phase B voltage Xth harmonic voltage
U3THx	2119	R	2	Float32	V	Phase C voltage Xth harmonic voltage
UTHx Avg	2121	R	2	Float32	V	Three-phase voltage Xth harmonic voltage average value
U1THy	2123	R	2	Float32	V	Phase A voltage Yth harmonic voltage
U2THy	2125	R	2	Float32	V	Phase B voltage Yth harmonic voltage
U3THy	2127	R	2	Float32	V	Phase C voltage Yth harmonic voltage
UTHy Avg	2129	R	2	Float32	V	Three-phase voltage Yth harmonic voltage average value
U1THz	2131	R	2	Float32	V	Phase A voltage Zth harmonic voltage
U2THz	2133	R	2	Float32	V	Phase B voltage Zth harmonic voltage
U3THz	2135	R	2	Float32	V	Phase C voltage Zth harmonic voltage
UTHz Avg	2137	R	2	Float32	V	Three-phase voltage Z harmonic voltage average value
Current						
I1	2139	R	2	Float32	A	Phase A current
I2	2141	R	2	Float32	A	Phase B current
I3	2143	R	2	Float32	A	Phase C current
Current Avg	2145	R	2	Float32	A	Three-phase current average value
Voltage						

U1	2147	R	2	Float32	V	Phase A voltage
U2	2149	R	2	Float32	V	Phase B voltage
U3	2151	R	2	Float32	V	Phase C voltage
Voltage Avg	2153	R	2	Float32	V	Three-phase voltage average value
Power						
P1	2155	R	2	Float32	kW	Phase A active power
P2	2157	R	2	Float32	kW	Phase B active power
P3	2159	R	2	Float32	kW	Phase C active power
PTotal	2161	R	2	Float32	kW	Total active power
Q1	2163	R	2	Float32	kVAR	Phase A reactive power
Q2	2165	R	2	Float32	kVAR	Phase B reactive power
Q3	2167	R	2	Float32	kVAR	Phase C reactive power
QTotal	2169	R	2	Float32	kVAR	Total reactive power
S1	2171	R	2	Float32	kVA	Phase A apparent power
S2	2173	R	2	Float32	kVA	Phase B apparent power
S3	2175	R	2	Float32	kVA	Phase C apparent power
STotal	2177	R	2	Float32	kVA	Total apparent power

9.2. Energy

When the total energy reaches 1.0 x 10^9 kWh, 1.0 x 10^9 kVarh, or 1.0 x 10^9 kVah, the energy of each phase will be automatically reset.

Register Alias	Register Address	R/W	Size	Type	Unit	Description
Active Energy						
EP1Imp	4000	R	2	UInt32	kWh	Phase A active input energy
EP2Imp	4002	R	2	UInt32	kWh	Phase B active input energy
EP3Imp	4004	R	2	UInt32	kWh	Phase C active input energy
EPImp	4006	R	2	UInt32	kWh	Total active input energy
EP1Exp	4008	R	2	UInt32	kWh	Phase A active output energy
EP2Exp	4010	R	2	UInt32	kWh	Phase B active output energy
EP3Exp	4012	R	2	UInt32	kWh	Phase C active output energy
EPExp	4014	R	2	UInt32	kWh	Total active output energy
Reactive Energy						
EQ1Imp	4024	R	2	UInt32	kVARh	Phase A reactive input energy
EQ2Imp	4026	R	2	UInt32	kVARh	Phase B reactive input energy
EQ3Imp	4028	R	2	UInt32	kVARh	Phase C reactive input energy
EQImp	4030	R	2	UInt32	kVARh	Total reactive input energy
EQ1Exp	4032	R	2	UInt32	kVARh	Phase A reactive output energy
EQ2Exp	4034	R	2	UInt32	kVARh	Phase B reactive output energy
EQ3Exp	4036	R	2	UInt32	kVARh	Phase C reactive output energy
EQExp	4038	R	2	UInt32	kVARh	Total reactive output energy
Apparent Energy						
ES1Imp	4048	R	2	UInt32	kVAh	Phase A apparent input energy
ES2Imp	4050	R	2	UInt32	kVAh	Phase B apparent input energy

ES3Imp	4052	R	2	UInt32	kVAh	Phase C apparent input energy
ESImp	4054	R	2	UInt32	kVAh	Total apparent input energy
ES1Exp	4056	R	2	UInt32	kVAh	Phase A apparent output energy
ES2Exp	4058	R	2	UInt32	kVAh	Phase B apparent output energy
ES3Exp	4060	R	2	UInt32	kVAh	Phase C apparent output energy
ESExp	4062	R	2	UInt32	kVAh	Total apparent output energy
Tariff Energy						
ETF1	4072	R	2	UInt32	kWh	Tariff 1 Energy
ETF2	4074	R	2	UInt32	kWh	Tariff 2 Energy
ETF3	4076	R	2	UInt32	kWh	Tariff 3 Energy
ETF4	4078	R	2	UInt32	kWh	Tariff 4 Energy
Power/Current Demand						
PDemand	5000	R	2	Float32	kW	Active power demand
PPeakDemand	5002	R	2	Float32	kW	Maximum active power demand
PPeakDemandDate	5004	R	4	Date time	-	Maximum active power demand occurrence time
QDemand	5008	R	2	Float32	kVar	Reactive power demand
QPeakDemand	5010	R	2	Float32	kVar	Maximum reactive power demand
QPeakDemandDate	5012	R	4	Date time	-	Maximum reactive power demand occurrence time
SDemand	5016	R	2	Float32	kVa	Apparent power demand
SPeakDemand	5018	R	2	Float32	kVa	Maximum apparent power demand
SPeakDemandDate	5020	R	4	Date time	-	Maximum apparent power demand occurrence time
I1Demand	5024	R	2	Float32	kW	Phase A current demand
I1PeakDemand	5026	R	2	Float32	kW	Maximum demand for Phase A current
I1PeakDemandDate	5028	R	4	Date time	-	The occurrence time of the maximum demand for phase A current
I2Demand	5032	R	2	Float32	kW	Phase B current demand
I2PeakDemand	5034	R	2	Float32	kW	Maximum demand for Phase B current
I2PeakDemandDate	5036	R	4	Date time	-	The occurrence time of the maximum demand for phase B current
I3Demand	5040	R	2	Float32	kW	Phase C current demand
I3PeakDemand	5042	R	2	Float32	kW	Maximum demand for Phase C current
I3PeakDemandDate	5044	R	4	Date time	-	The occurrence time of the maximum demand for phase C current
IAvgDemand	5048	R	2	Float32	kW	Average current demand
IAvgPeakDemand	5050	R	2	Float32	kW	Average current maximum demand
IAvgPeakDemand Date	5052	R	4	Date time	-	Average current maximum demand occurrence time

10. Revision History:

Version	Description	Date	Revised by
V3.4	1. Modified the data format of the energy register: from float32 to UInt32 2. Modified the data unit of the energy register: from Wh to kWh 3. Modified the tariff to 4 tariffs 4. Deleted the address of the UInt64 energy register 5. Added the operation instructions for function codes 3 and 16	20181101	Walter
V3.3	1. Modified the default communication to: 9600 8N1 2. Modified the size of the "VT secondary voltage value", "CT secondary voltage value", and "Rogowski coil secondary voltage value" registers to 2 registers of 32 bits and modified the definition of their write values 3. Modified the definition and read address of the "power system" parameter configuration register	20180825	Walter

Three-phase Multi-function Meter

PEM3553

Communication Protocol

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1 Modbus Communication Overview

1.1 Function Overview

PEM3553 meter adopts the standard communication protocol - Modbus-RTU. The baud rate can be set to 1200, 2400, 4800, 9600, 19200, etc. through programming or manual operation.

1.2 Modbus Communication Settings

Before communicating with a device using the Modbus protocol, use the display screen to configure the following settings:

Parameter	Valid Value	Default Value
Baud rate	1200	9600
	2400	
	4800	
	9600	
	19200	
	38600	
	57600	
	115200	
Data bit	8	8
Parity	Odd parity	No parity
	Even parity	
	No parity	
Stop bit	1	1
Address	1–247	1

1.3 Command Request Format

Slave Address	Function Code	Command	CRC Check
8-Bits	8-Bits	N × 8-Bits	16-Bits Checking

1.4 Function Code

Function codes are used to instruct the device how to process the command. The following table shows the available function codes and their descriptions.

Function Code		Function Code Name	Function
Decimal	Hexadecimal		
3	03H	Read holding registers	Used to read parameters
16	10H	Writing multiple registers	Used to configure parameters

1.5 Register List Format

The register list contains the following columns:

Category	Address	REG Address	Data Type	REG Length (U16)	Attribute	Unit	RW	Description

- Category: Used to refer to the meaning of registers
- Address: Modbus data address. The data address in this manual is in decimal.
- REG address: Modbus data address, the data address in this document is in hexadecimal
- Type: Encoded data type.
- REG length: Indicate the size of the 16-bit data.
- Attribute: Register parameter specification
- Unit: The unit of the register value
- RW: Read and Write
- Description: Introduce the function of this register

1.6 Data Type List

The following table lists the data types used in this manual.

Type	Description	Range
UInt16	Signed 16-bit integer	0–65535
Int16	Signed 16-bit integer	-32768–+32767
UInt32	Signed 32-bit integer	0–4 294 967 295
UInt64	Signed 64-bit integer	0–18 446 744 073 709 551 615
UTF8	8-bit UTF encoding	Multi-byte Unicode encoding

Float32	32-bit floating point	Standard IEEE floating point data (single precision)
Bitmap	–	–
Date Time	Time type	-

Date Time Details:

Byte	Bit															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1	Years (2000–2099)															
2	Month (1–12)								Day (1–31)							
3	Hour (0–23)								Minute (0–59)							
4	Second (0–59)															

Time Type Details:

Byte	Bit															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1	Hour (0–23)															
2	Minute (0–59)															
3	Second (0–59)															

1.7 Configuration via Modbus-RTU

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

Device parameter configuration can only be done by writing corresponding data to the "configuration command register", that is, writing corresponding data to the address starting from 300 to configure the corresponding parameters.

1.8 Configuration Command Request

The following table lists the Modbus request format for configuration commands.

Slave address 8 bits	Function code 8 bits	Configuration command register address 16 bits		Configuration command register number 16 bits		Data 8 bits	Command (16 bits) X N				CRC check (16 bits)	
1-247	16	High 8bits	Low 8bits	High 8bits	Low 8 bits	N × 2	Command		Command parameters		Low 8 bits	High 8 bits
							High 8 bits	Low 8 bits	High 8 bits	Low 8 bits		

1.9 Configuration Result

The configuration results can be read through registers 424 and 425. The following table lists the configuration results:

Register Address	Content	Size (16 bits)	Data (Example)
424	Configuration command code	1	1001 (set time)
425	Result	1	0 = Valid operation 80 = Invalid command code 81 = Invalid command parameter 82 = Invalid number of command parameters 83 = Operation not performed

1.10 Function Code (0x3=3) Operation Instructions

Function code (0x03=3) is used to read register parameters. The request and return data formats are as follows:

1.10.1 Request Data Format

No.	Name	Type	Range (Decimal)	Description
1	Address	UInt8	1-247	
2	Function code	UInt8	3	
3	Starting register address	UInt16	-	High byte first (sending order)
4	Number of registers	UInt16	1-125	High byte first (sending order)
5	CRC-16 check	UInt16	-	Low byte first (sending order)

1.10.2 Return Data Format

No.	Name	Type	Range (Decimal)	Description
1	Address	UInt8	1-247	
2	Function code	UInt8	3	
3	Read register bytes	UInt8	-	Read register number*2
4	The value of register 1	UInt16	-	High byte first
5	…	UInt16	-	High byte first
6	The value of register n	UInt16	-	High byte first

7	CRC-16 Check	UInt16	-	Low byte first

Example:

Read the voltage values of A, B, and C (the starting address of the voltage register is: 2147)

No.	Name	Type	Range (Decimal)	Range (Hexadecimal)	Description
1	Meter address	UInt8	1	0x01	
2	Function code	UInt8	3	0x03	
3	Starting register address	UInt16	2147	0x0863	
4	Number of registers	UInt16	6	0x0006	
5	CRC-16 check	UInt16	46647	0xB637	

The order of sent bytes is as follows:

01 03 08 63 00 06 37 B6

Returned data:

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

NO.	Name	Type	Hexadecimal	Decimal
1	Meter address	UInt8	01	1
2	Function code	UInt8	03	3
3	Read register bytes	UInt8	0C	12
4	Phase A voltage	float32	435C0000	220V
5	Phase B voltage	float32	435D0000	221V
6	Phase C voltage	float32	435E0000	222V
7	CRC-16 check	UInt16	14AC	

1.11 Function Code (0x10=16) Operation Instructions

The function code (0x10=16) is used to configure the meter parameters. Its request and return data formats are as follows:

1.11.1 Request Data Format

NO.	Name	Type	Range (Decimal)	Description
1	Address	UInt8	1-247	

2	Function code	UInt8	16	
3	Register starting address	UInt16	-	High byte first (sending order)
4	Number of registers	UInt16	1-123	High byte first (sending order)
5	Number of register bytes	UInt8		Number of registers*2
6	Write value to register 1	UInt16	-	High byte first (sending order)
7	…	UInt16	-	High byte first (sending order)
8	Write value to register n	UInt16	-	High byte first (sending order)
9	CRC-16 check code	UInt16	-	Low byte first (sending order)

1.11.2 Return Data Format

NO.	Name	Type	Range (Decimal)	Description
1	Address	UInt8	1-247	
2	Function code	UInt8	16	
3	Register starting address	UInt16	300	High byte first
4	Number of registers	UInt16	1-123	High byte first
5	CRC-16 check code	UInt16	-	Low byte first

Notice!

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

For example:

Configure relay output (command = 1005)

NO.	Name	Type	Range (Decimal)	Range (Hexadecimal)	Description
1	Meter address	UInt8	1	01	
2	Function code	UInt8	16	10	
3	Register starting address	UInt16	300	012C	High byte first (sending order)
4	Number of registers	UInt16	2	0002	High byte first (sending order)
5	Number of register bytes	UInt8	4	04	
6	Register 300 write value	UInt16	1005	03ED	High byte first (sending order), command

7	Register 301 write value	UInt16	1	0001	High byte first (sending order), command parameters
9	CRC-16 check code	UInt16	50093	C3AD	Low byte first (sending order)

The byte order is as follows:

01 10 01 2C 00 02 04 03 ED 00 01 AD C3

If the configuration data is correct, the following data will be returned:

01 10 01 2C 00 02 81 FD

NO.	Name	Type	Range (Hexadecimal)	Range (Decimal)
1	Meter address	UInt8	01	1
2	Function code	UInt8	10	16
3	Register starting address	UInt16	012C	300
4	Number of registers	UInt16	0002	2
7	CRC-16 check code	UInt16	81FD	

1.12 Configuration Command List

1.12.1 System Parameter Settings

Command 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	1	UInt16	V	1-65535	Nominal voltage (excluding VT ratio)
	W	2	UInt32	-	1-99999999	VT ratio, magnified 10000 times
	W	2	UInt32	-	1-99999999	CT ratio, magnified 10000 times

1.12.2 ABC Phase CT Parameter Setting

Command Code	Operation	Size	Type	Unit	Range (Decimal)	Description

1002	W	1	UInt16	-	0,1	ABC phase current access mode 0 = Rogowski coil access 1 = VCT access
	W	2	UInt32	A mV@50	1-999999	ABC phase Rogowski coil input value ABC phase Rogowski coil output value
	W	2	UInt32	Hz mV@60 Hz	1-99999	=actual value*100 (Note: the output needs to be set according to the grid frequency)
	W	2	UInt32	A	1-999999	ABC phase Rogowski coil nominal current
	W	2	UInt32	A	1-999999	ABC phase VCT input value
	W	2	UInt32	mV	1-99999	ABC phase VCT output value = actual value * 100

1.12.3 N-phase CT Parameter Setting

Command Code	Operation	Size	Type	Unit	Range (Decimal)	Description
1003	W	1	UInt16	-	0,1	N-phase current access mode 0 = Rogowski coil access 1 = VCT access
	W	2	UInt32	A	1-999999	N-phase Rogowski coil input value
	W	2	UInt32	mV@50 Hz mV@60 Hz	1-99999	N-phase Rogowski coil output value = actual value * 100 (Note: the output needs to be set according to the grid frequency)
	W	2	UInt32	A	1-999999	N-phase Rogowski coil nominal current
	W	2	UInt32	A	1-999999	N-phase VCT input value
	W	2	UInt32	mV	1-99999	N-phase VCT output value = actual value * 100
	W	2	UInt32	A	1-999999	N-phase VCT nominal current

1.12.4 ABC Phase Current Direction Setting

When the coil direction is inconsistent with the actual direction, it can be modified according to the following configuration:

Command Code	Operation	Size	Type	Unit	Range (Decimal)	Description
1010	W	1	UInt16	-	0,1	Phase A current direction 0 = forward (default) 1 = reverse
	W	1	UInt16	-	0,1	Phase B current direction 0 = forward (default) 1 = reverse
	W	1	UInt16	-	0,1	Phase C current direction 0 = forward (default) 1 = reverse

1.12.5 ABC Phase Current Channel Setting

Command Code	Operation	Size	Type	Unit	Range (Decimal)	Description
1011	W	1	UInt16	-	0，1，2	Phase A current channel selection 0 = Current channel 1 (default) 1 = Current channel 2 2 = Current channel 3
	W	1	UInt16	-	0，1，2	Phase B current channel selection 0 = Current channel 1 1 = Current channel 2 (default) 2 = Current channel 3
	W	1	UInt16	-	0，1，2	Phase C current channel selection 0 = Current channel 1 1 = Current channel 2 2 = Current channel 3 (default)

1.12.6 Zero Drift Suppression Setting

Command Code	Operation	Size	Type	Unit	Range (Decimal)	Description
1020	W	1	UInt16	%	0~1000	Voltage zero drift suppression Take (nominal voltage*VT ratio) as reference =actual value*100 Default value: 10

	W	1	UInt16	%	0~1000	Current zero drift suppression Take (nominal current*CT ratio) as reference =actual value*100 Default value: 10

1.12.7 Demand Parameter Setting

Command Code	Operation	Size	Type	Unit	Range (Decimal)	Description
1060	W	1	UInt16	-	0,1	Demand calculation mode 0 = Fixed 1 = Sliding
	W	1	UInt16	Minute	1-60	Demand calculation interval

1.12.8 Tariff Mode Setting

Command Code	Operation	Size	Type	Unit	Range	Description
1070	W	1	UInt16	-	0,1	Tariff switching mode 0 = manual switching 1 = RTC switching

1.12.9 Manual Tariff Setting

Command Code	Operation	Size	Type	Unit	Range	Description
1071	W	1	UInt16	-	0-5	Manual tariff setting 0 = Tariff 1 1 = Tariff 2 … 5 = Tariff 6 (Note: This setting is only valid when the tariff mode is set to manual switching)

1.12.10 RTC Tariff Time Period Setting

Command Code	Operation	Size	Type	Unit	Range (Decimal)	Description
1072	W	3	Time	-	-	Ta start time
	W	3	Time	-	-	Tb start time
	W	3	Time	-	-	Tc start time
	W	3	Time	-	-	Td start time
	W	3	Time	-	-	Te start time
	W	3	Time	-	-	Tf start time

1.12.11 RTC Tariff Selection Setting

Command Code	Operation	Size	Type	Unit	Range (Decimal)	Description
1073	W	1	UInt16	–	0-5	Ta tariff setting 0 = tariff 1 1 = tariff 2 … 5 = tariff 6
	W	1	UInt16	–	0-5	Tb tariff setting
	W	1	UInt16	–	0-5	Tc tariff setting
	W	1	UInt16	–	0-5	Td tariff setting
	W	1	UInt16	–	0-5	Te tariff setting
	W	1	UInt16	–	0-5	Tf tariff setting

1.12.12 Device Time Setting

Command 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	Day
	W	1	UInt16	–	0-23	Hour
	W	1	UInt16	–	0-59	Minute

	W	1	UInt16	–	0-59	Second

1.12.13 Communication Parameter Setting

Command 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 0 = None 1 = Odd 2 = Even
	W	1	UInt16	–	1，2	Stop bit 1 = 1bit 2 = 2bit

1.12.14 Clear

Command Code	Operation	Size	Type	Unit	Range (Decimal)	Description
1301	W	1	UInt16	–	1-5	1: Clear the maximum and minimum values 2: Clear the maximum demand 3: Clear the tariff energy 4: Clear the energy 5: Clear all the above values

1.12.15 Relay Output Control Mode

Command Code	Operation	Size	Type	Unit	Range (Decimal)	Description
2000	W	1	UInt16	–	0-1	Relay output control mode 0 = Manual control mode 1 = Alarm output control mode

1.12.16 Relay Output Manual Control

Command Code	Operation	Size	Type	Unit	Range (Decimal)	Description
2001	W	1	UInt16	–	0-1	Relay output control 0 = Relay output open 1 = Relay output closed (Note: This setting is only valid when the relay output control mode is manual control mode)

1.12.17 1.12.17 Alarm Setting

Command Code	Operation	Size	Type	Unit	Range (Decimal)	Description
3000	W	1	UInt16	-	-	Alarm ID
	W	1	UInt16	-	0,1	Alarm function 0=disable 1=enable
	-	1	UInt16	-	-	Reserved
	W	2	Float32	-	0-1000000	Alarm activation threshold

	W	2	Float32	%	–	Alarm release point Error percentage relative to alarm activation threshold Example: Overcurrent alarm activation threshold = 100A, alarm release point = 5% Then the alarm is released when the current value is less than 100-100*5%=95A
	W	1	UInt16	–	0,1	Buzzer output association 0=not associated 1=associated
	W	1	UInt16	–	0,1	Relay output association 0=not associated 1=associated

2 Register List: Device System Information

2.1 Device Parameter

Register Alias	Register Starting Address (Decimal)	R/W	Size	Type	Unit	Description
Device model	60	R	10	UTF8	–	
Serial number	70	R	2	UInt32	–	
APP version number	72	R	1	UInt16	–	Format: X.Y
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: Second

2.2 Communication Parameters

Register Alias	Register Starting Address (Decimal)	R/W	Size	Type	Unit	Description
Slave device address	80	R/W C	1	UInt16	–	1-247
Baud rate	81	R/W C	1	UIn t16	-	0=2400 1=4800 2=9600 3=19200 4=38400 5=57600 6=115200
Check mode	82	R/W C	1	UInt16	-	0 = No parity 1 = Odd parity 2 = Even parity
Stop bit	83	R/W C	1	UInt16	-	1 = 1 bit 2 = 2 bit

2.3 Relay

Register Alias	Register Starting Address (Decimal)	R/W	Size	Type	Unit	Description
Output control mode	200	R/WC	1	UInt16	-	Relay output control mode 0 = Manual control mode 1 = Alarm output control mode
Relay output control	201	R/WC	1	UInt16	-	Relay output control 0 = Relay output open 1 = Relay output closed (Note: This setting is only valid when the relay output control mode is manual control mode)
Relay output status	202	R	1	UInt16	-	Relay output status 0 = open 1 = closed

2.4 Digital Input Status

Register Alias	Register Starting Address (Decimal)	R/W	Size	Type	Unit	Description
Digital input status	210	R	1	UInt16	-	0 = Digital input open 1 = Digital input closed

2.5 Voltage and Current Phase Sequence

Register Alias	Register Starting Address (Decimal)	R/W	Size	Type	Unit	Description
Voltage and current phase sequence	220	R	1	UInt16	–	0 = voltage phase sequence is correct, current phase sequence is correct 1 = voltage phase sequence is incorrect, current phase sequence is correct 2 = voltage phase sequence is correct, current phase sequence is incorrect 3 = voltage phase sequence is incorrect, current phase sequence is incorrect

2.6 Relay

Register Alias	Register Starting Address (Decimal)	R/W	Size	Type	Unit	Description
Command code	300	R/W	1	UInt16	-	
Command parameter 001	301	R/W	1	UInt16	-	
Command parameter 002	302	R/W	1	UInt16	-	
…	…	R/W	1	UInt16	-	
Command parameter 123	423	R/W	1	UInt16	-	
Configuration command code	424	R	1	UInt16	-	
Configuration result	425	R	1	UInt16	-	0 = Valid operation 80 = Invalid command code 81 = Invalid command parameter 82 = Invalid number of command parameters 83 = Operation not performed

2.7 Power System Parameters

Register Alias	Register Starting Address (Decimal)	R/W	Size	Type	Unit	Description
Wiring mode	500	R/WC	1	UInt16	-	0=three-phase four-wire 4CT 1=three-phase four-wire 3CT 2=three-phase three-wire 3CT 3=three-phase three-wire 2CT 4=one-phase three-wire 5=one-phase two-wire
Grid frequency	501	R/WC	1	UInt16	Hz	
Nominal voltage	502	R/WC	1	UInt16	V	Not include VT ratio

VT ratio	503	R/WC	2	UInt32	-	Actual value = read value/10000
CT ratio	505	R/WC	2	UInt32	-	Actual value = read value/10000
ABC Phase CT						
ABC phase current access mode	510	R/WC	1	UInt16	-	0 = Rogowski coil 1 = VCT
ABC phase Rogowski coil Pri	511	R/WC	2	UInt32	A	
ABC phase Rogowski coil Sec	513	R/WC	2	UInt32	mV@50 Hz mV@60 Hz	Actual value = read value / 100
Nominal current of Rogowski coil of ABC phase	515	R/WC	2	UInt32	A	
ABC phase VCT Pri	517	R/WC	2	UInt32	A	
ABC phase VCT Sec	519	R/WC	2	UInt32	mV	Actual value = read value / 100
ABC phase VCT nominal current	521	R/WC	2	UInt32	A	
N-phase CT						
N phase current access mode	530	R/WC	1	UInt16	-	0 = Rogowski coil 1 = CT
N phase Rogowski coil Pri	531	R/WC	2	UInt32	A	
N phase Rogowski coil Sec	533	R/WC	2	UInt32	mV@50 Hz mV@60 Hz	Actual value = read value / 100
Nominal current of Rogowski coil of N phase	535	R/WC	2	UInt32	A	
N phase VCT Pri	537	R/WC	2	UInt32	A	
N phase VCT Sec	539	R/WC	2	UInt32	mV	Actual value = read value / 100

N phase VCT nominal current	541	R/WC	2	UInt32	A	

2.8 Current Direction Setting

Register Alias	Register Starting Address (Decimal)	R/W	Size	Type	Unit	Description
Phase A current direction	550	R/WC	1	UInt16	-	Phase A current direction 0=forward (default) 1=reverse
Phase B current direction	551	R/WC	1	UInt16	-	Phase B current direction 0=forward (default) 1=reverse
Phase C current direction	552	R/WC	1	UInt16	-	Phase C current direction 0=forward (default) 1=reverse

2.9 Current Channel Selection

Register Alias	Register Starting Address (Decimal)	R/W	Size	Type	Unit	Description
Phase A current channel	553	R/WC	1	UInt16	-	Phase A current channel 0 = Channel 1 (default) 1 = Channel 2 2 = Channel 3
Phase B current channel	554	R/WC	1	UInt16	-	Phase B current channel 0 = Channel 1 1 = Channel 2 (default) 2 = Channel 3
Phase C current channel	555	R/WC	1	UInt16	-	Phase C current channel 0 = Channel 1 1 = Channel 2 2 = Channel 3 (default)

2.10 Zero Drift Suppression Parameter

Register Alias	Register Starting Address (Decimal)	R/W	Size	Type	Unit	Description
Voltage zero drift suppression	600	R/WC	1	UInt16	%	Voltage zero drift suppression Using (nominal voltage*VT ratio) as reference Actual value = read value/100
Current zero drift suppression	601	R/WC	1	UInt16	%	Current zero drift suppression Use (nominal current*CT ratio) as reference Actual value = read value/100

2.11 Tariff Parameter

Register Alias	Register Starting Address (Decimal)	R/W	Size	Type	Unit	Description
Current tariff	800	R	1	UInt16	-	Current tariff 0-5=tariff 1-tariff 6
Tariff switching mode	801	R/WC	1	UInt16	-	Tariff switching mode 0=manual switching 1=RTC switching
Manual tariff selection	802	R/WC	1	UInt16	-	Manual tariff selection 0-5=tariff 1-tariff 6
RTC Ta start time	803	R/WC	3	Time	-	RTC Ta start time
RTC Tb start time	806	R/WC	3	Time	-	RTC Tb start time
RTC Tc start time	809	R/WC	3	Time	-	RTC Tc start time
RTC Td start time	812	R/WC	3	Time	-	RTC Td start time
RTC Te start time	815	R/WC	3	Time		RTC Te start time
RTC Tf start time	818	R/WC	3	Time	-	RTC Tf start time
RTC Ta tariff selection	821	R/WC	1	UInt16	-	Ta tariff selection 0-5=tariff 1-tariff 6
RTC Tb tariff selection	822	R/WC	1	UInt16	-	Tb tariff selection 0-5=tariff 1-tariff 6
RTC Tc tariff selection	823	R/WC	1	UInt16	-	Tc tariff selection 0-5=tariff 1-tariff 6
RTC Td tariff selection	824	R/WC	1	UInt16	-	Td tariff selection 0-5=tariff 1-tariff 6
RTC Te tariff selection	825	R/WC	1	UInt16	-	Te tariff selection 0-5=tariff 1-tariff 6
RTC Tf tariff selection	826	R/WC	1	UInt16	-	Tf tariff selection 0-5=tariff 1-tariff 6

2.12 Electrical Parameter

Register Alias	Register Starting Address (Decimal)	R/W	Size	Type	Unit	Description
Current						

IA	1000	R	2	Float32	A	Phase A current
IB	1002	R	2	Float32	A	Phase B current
IC	1004	R	2	Float32	A	Phase C current
Current Avg	1006	R	2	Float32	A	Average value of ABC phase current
IN	1008	R	2	Float32	A	Phase N 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
Phase Voltage Avg	1016	R	2	Float32	V	Average value of phase voltage of phase ABC
U0	1018	R	2	Float32	V	Zero sequence 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 Power Factor						
DPFA	1060	R	2	Float32	-	Phase A fundamental power factor

DPFB	1062	R	2	Float32	-	Phase B fundamental power factor
DPFC	1064	R	2	Float32	-	Phase C fundamental power factor
DPFTotal	1066	R	2	Float32	-	Total fundamental 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

2.13 Energy

There are two types of energy data: Int64 and UInt32, and the unit and size of the two are different.

When the total energy reaches 1.0×10^9 kWh, 1.0×10^9 kVarh, or 1.0×10^9 kVah, the energy of each phase will be automatically reset to zero.

Register Alias	Register Starting Address (Decimal)	R/W	Size	Type	Unit	Description
Active Energy - Int64						
EPAImp	2500	R	4	Int64	Wh	Phase A forward active energy
EPBImp	2504	R	4	Int64	Wh	Phase B forward active energy
EPCImp	2508	R	4	Int64	Wh	Phase C forward active energy
EPImp	2512	R	4	Int64	Wh	Total forward 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	VARh	Phase A forward reactive energy
EQBImp	2536	R	4	Int64	VARh	Phase B forward reactive energy
EQCImp	2540	R	4	Int64	VARh	Phase C forward reactive energy
EQImp	2544	R	4	Int64	VARh	Total forward reactive energy
EQAExp	2548	R	4	Int64	VARh	Phase A reverse reactive energy
EQBExp	2552	R	4	Int64	VARh	Phase B reverse reactive energy
EQCExp	2556	R	4	Int64	VARh	Phase C reverse reactive energy
EQExp	2560	R	4	Int64	VARh	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 forward active energy
EPBImp	2602	R	2	UInt32	kWh	Phase B forward active energy
EPCImp	2604	R	2	UInt32	kWh	Phase C forward active energy
EPImp	2606	R	2	UInt32	kWh	Total forward 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 forward reactive energy
EQBImp	2618	R	2	UInt32	kVARh	Phase B forward reactive energy
EQCImp	2620	R	2	UInt32	kVARh	Phase C forward reactive energy
EQImp	2622	R	2	UInt32	kVARh	Total forward 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

2.14 Tariff Energy

There are two types of tariff energy data: Int64 and UInt32, and the unit and size of the two are different. When the tariff energy reaches 1.0 x 10^9 kWh, it will be automatically cleared.

Register Alias	Register Starting Address (Decimal)	R/W	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

2.15 Demand Parameter

Register Alias	Register Starting Address (Decimal)	R/W	Size	Type	Unit	Description
Basic Parameters of Demand						
DMDMethod	3000	R/WC	1	UInt16	-	Demand calculation mode: 0=sliding type 1=fixed type

DMD block	3001	R/RC	1	UInt16	Min	Demand interval
PDMD Reset Time	3002	R	4	Date time	-	Maximum demand reset date and time
Power Demand						
PADemand	3020	R	2	Float32	kW	Phase A active power demand
PAPeakDemand	3022	R	2	Float32	kW	Maximum demand of active power of phase A
PAPeakDemandDate	3024	R	4	Date time	-	The occurrence time of the maximum demand of active power of phase A
PBDemand	3028	R	2	Float32	kW	Phase B active power demand
PBPeakDemand	3030	R	2	Float32	kW	Maximum demand of active power of phase B
PBPeakDemandDate	3032	R	4	Date time	-	The occurrence time of the maximum demand of active power of phase B
PCDemand	3036	R	2	Float32	kW	Phase C active power demand
PCPeakDemand	3038	R	2	Float32	kW	Maximum demand of active power of phase C
PCPeakDemandDate	3040	R	4	Date time	-	The occurrence time of the maximum demand of active power of phase C
PSUMDemand	3044	R	2	Float32	kW	Total active power demand
PSUMPeakDemand	3046	R	2	Float32	kW	Maximum total active power demand
PSUMPeakDemandDate	3048	R	4	Date time	-	Total active power maximum demand occurrence time
QADemand	3052	R	2	Float32	kVar	Phase A reactive power demand
QAPeakDemand	3054	R	2	Float32	kVar	Maximum demand of reactive power of phase A
QAPeakDemandDate	3056	R	4	Date time	-	The occurrence time of the maximum demand of reactive power of phase A
QBDemand	3060	R	2	Float32	kVar	Phase B reactive power demand
QBPeakDemand	3062	R	2	Float32	kVar	Maximum demand of reactive power of phase B
QBPeakDemandDate	3064	R	4	Date time	-	The occurrence time of the maximum demand of reactive power of phase B
QCDemand	3068	R	2	Float32	kVar	Phase C reactive power demand
QCPeakDemand	3070	R	2	Float32	kVar	Maximum demand of reactive power of phase C
QCPeakDemandDate	3072	R	4	Date time	-	The occurrence time of the maximum demand of reactive power of phase C
QSUMDemand	3076	R	2	Float32	kVar	Total reactive power demand
QSUMPeakDemand	3078	R	2	Float32	kVar	Maximum total reactive power demand
QSUMPeakDemandDate	3080	R	4	Date time	-	Total reactive power maximum demand occurrence time
SADemand	3084	R	2	Float32	kVa	Phase A apparent power demand
SAPeakDemand	3086	R	2	Float32	kVa	Phase A apparent power maximum demand
SAPeakDemandDate	3088	R	4	Date time	-	The occurrence time of the maximum demand of apparent power of phase A
SBDemand	3092	R	2	Float32	kVa	Phase B apparent power demand

SBPeakDemand	3094	R	2	Float32	kVa	Phase B apparent power maximum demand
SBPeakDemandDate	3096	R	4	Date time	-	The occurrence time of the maximum demand of apparent power of phase B
SCDemand	3100	R	2	Float32	kVa	Phase C apparent power demand
SCPeakDemand	3102	R	2	Float32	kVa	Phase C apparent power maximum demand
SCPeakDemandDate	3104	R	4	Date time	-	The occurrence time of the maximum demand of apparent power of phase C
SSUMDemand	3108	R	2	Float32	kVa	Total apparent power demand
SSUMPeakDemand	3110	R	2	Float32	kVa	Total apparent power maximum demand
SSUMPeakDemandDate	3112	R	4	Date time	-	Total apparent power maximum demand occurrence time

2.16 Voltage and Current Harmonics

Register Alias	Register Starting Address (Decimal)	R/W	Size	Type	Unit	Description
Current Harmonic Percentage						
IATHD	4000	R	2	Float32	%	Total harmonic percentage of phase A current
IBTHD	4002	R	2	Float32	%	Total harmonic percentage of phase B current
ICTHD	4004	R	2	Float32	%	Total harmonic percentage of phase C current
IATOHD	4006	R	2	Float32	%	Percentage of odd total harmonics of Phase A current
IBTOHD	4008	R	2	Float32	%	Percentage of odd total harmonics of Phase B current
ICTOHD	4010	R	2	Float32	%	Percentage of odd total harmonics of Phase C current
IATEHD	4012	R	2	Float32	%	Percentage of even total harmonics of Phase A current
IBTEHD	4014	R	2	Float32	%	Percentage of even total harmonics of Phase B current
ICTEHD	4016	R	2	Float32	%	Percentage of even total harmonic of Phase C current
IAHD1	4018	R	2	Float32	%	Phase A current 1st harmonic percentage
IBHD1	4020	R	2	Float32	%	Phase B current 1st harmonic percentage
ICHD1	4022	R	2	Float32	%	Phase C current 1st harmonic percentage
…	4024-4311	…	…	…	…	Phase ABC current 2rd-49th harmonic percentage
IAHD50	4312	R	2	Float32	%	Phase A current 50th harmonic percentage
IBHD50	4314	R	2	Float32	%	Phase B current 50th harmonic percentage
ICHD50	4316	R	2	Float32	%	Phase C current 50th harmonic percentage
Current Harmonic Value						
IAHDV1	4400	R	2	Float32	A	Phase A current fundamental current value
IBHDV1	4402	R	2	Float32	A	Phase B current fundamental current value
ICHDV1	4404	R	2	Float32	A	Phase C current fundamental current value

…	4406-4693	…	…	…	…	Phase ABC current 2-49th harmonic current value
IAHDV50	4694	R	2	Float32	A	Phase A current 50th harmonic current value
IBHDV50	4696	R	2	Float32	A	Phase B current 50th harmonic current value
ICHDV50	4698	R	2	Float32	A	Phase C current 50th harmonic current value
Voltage Harmonic Percentage						
UATHD	5000	R	2	Float32	%	Total harmonic percentage of phase A voltage
UBTHD	5002	R	2	Float32	%	Total harmonic percentage of phase B voltage
UCTHD	5004	R	2	Float32	%	Total harmonic percentage of phase C voltage
UATOHD	5006	R	2	Float32	%	Percentage of odd total harmonics of Phase A voltage
UBTOHD	5008	R	2	Float32	%	Percentage of odd total harmonics of Phase B voltage
UCTOHD	5010	R	2	Float32	%	Percentage of odd total harmonics of Phase C voltage
UATEHD	5012	R	2	Float32	%	Percentage of even total harmonics of Phase A voltage
UBTEHD	5014	R	2	Float32	%	Percentage of even total harmonics of Phase B voltage
UCTEHD	5016	R	2	Float32	%	Percentage of even total harmonics of Phase C voltage
UAHD1	5018	R	2	Float32	%	Phase A voltage 1st harmonic percentage
UBHD1	5020	R	2	Float32	%	Phase B voltage 1st harmonic percentage
UCHD1	5022	R	2	Float32	%	Phase C voltage 1st harmonic percentage
…	5024-5311	…	…	…	…	Phase ABC voltage 2-49th harmonic voltage value
UAHD50	5312	R	2	Float32	%	Phase A voltage 50th harmonic percentage
UBHD50	5314	R	2	Float32	%	Phase B voltage 50th harmonic percentage
UCHD50	5316	R	2	Float32	%	Phase C voltage 50th harmonic percentage
Voltage Harmonic Value						
UAHDV1	5400	R	2	Float32	V	Phase A voltage 1st harmonic voltage value
UBHDV1	5402	R	2	Float32	V	Phase B voltage 1st harmonic voltage value
UCHDV1	5404	R	2	Float32	V	Phase C voltage 1st harmonic voltage value
…	5406-5693	…	…	…	…	Phase ABC voltage 2-49th harmonic voltage value
UAHDV50	5694	R	2	Float32	V	Phase A voltage 50th harmonic voltage value
UBHDV50	5696	R	2	Float32	V	Phase B voltage 50th harmonic voltage value
UCHDV50	5698	R	2	Float32	V	Phase C voltage 50th harmonic voltage value

2.17 Max. & Min. Value

Register Alias	Register Starting Address (Decimal)	R/W	Size	Type	Unit	Description
Max./Min. Current						

IA Max	6000	R	2	Float32	A	Maximum current of phase A
IB Max	6002	R	2	Float32	A	Maximum current of phase B
IC Max	6004	R	2	Float32	A	Maximum current of phase C
IAVG Max	6006	R	2	Float32	A	Maximum three-phase average current
IN Max	6008	R	2	Float32	A	Maximum current of phase N
IA Min	6010	R	2	Float32	A	Minimum current of phase A
IB Min	6012	R	2	Float32	A	Minimum current of phase B
IC Min	6014	R	2	Float32	A	Minimum current of phase C
IAVGMin	6016	R	2	Float32	A	Minimum three-phase average current
IN Min	6018	R	2	Float32	A	Minimum current of phase N
Max./Min. Voltage						
UA Max	6020	R	2	Float32	V	Maximum UA-UN phase voltage
UB Max	6022	R	2	Float32	V	Maximum UB-UN phase voltage
UC Max	6024	R	2	Float32	V	Maximum UC-UN phase voltage
Phase UAVGMax	6026	R	2	Float32	V	The maximum value of the average value of the three-phase voltage
UA Min	6030	R	2	Float32	V	Minimum UA-UN phase voltage
UB Min	6032	R	2	Float32	V	Minimum UB-UN phase voltage
UC Min	6034	R	2	Float32	V	Minimum UC-UN phase voltage
UAVGMin	6036	R	2	Float32	V	The minimum value of the average value of the three-phase voltage
UAB Max	6040	R	2	Float32	V	Maximum UA-UB line voltage
UBC Max	6042	R	2	Float32	V	Maximum UB-UC line voltage
UCA Max	6044	R	2	Float32	V	Maximum UC-UA line voltage
LineUAVGMax	6046	R	2	Float32	V	The maximum value of the average value of the three-phase line voltage
UAB Min	6050	R	2	Float32	V	Minimum UA-UB line voltage
UBC Min	6052	R	2	Float32	V	Minimum UB-UC line voltage
UCA Min	6054	R	2	Float32	V	Minimum UC-UA line voltage
LineUAVGMin	6056	R	2	Float32	V	The minimum value of the average value of the three-phase line voltage
Max./Min. Active Power						
PA Max	6060	R	2	Float32	kW	Maximum active power of phase A
PB Max	6062	R	2	Float32	kW	Maximum active power of phase B
PC Max	6064	R	2	Float32	kW	Maximum active power of phase C
PSUMMax	6066	R	2	Float32	kW	Maximum three-phase total active power
PA Min	6070	R	2	Float32	kW	Minimum active power of phase A
PB Min	6072	R	2	Float32	kW	Minimum active power of phase B
PC Min	6074	R	2	Float32	kW	Minimum active power of phase C
PSUMMin	6076	R	2	Float32	kW	Minimum three-phase total active power

Max./Min. Reactive Power						
QA Max	6080	R	2	Float32	kVar	Maximum reactive power of phase A
QB Max	6082	R	2	Float32	kVar	Maximum reactive power of phase B
QC Max	6084	R	2	Float32	kVar	Maximum reactive power of phase C
QSUMMax	6086	R	2	Float32	kVar	Maximum three-phase total reactive power
QA Min	6090	R	2	Float32	kVar	Minimum reactive power of phase A
QB Min	6092	R	2	Float32	kVar	Minimum reactive power of phase B
QC Min	6094	R	2	Float32	kVar	Minimum reactive power of phase C
QSUMMin	6096	R	2	Float32	kVar	Minimum three-phase total reactive power
Max./Min. Apparent Power						
SA Max	6100	R	2	Float32	kVa	Maximum apparent power of phase A
SB Max	6102	R	2	Float32	kVa	Maximum apparent power of phase B
SC Max	6104	R	2	Float32	kVa	Maximum apparent power of phase C
SSUMMax	6106	R	2	Float32	kVa	Maximum three-phase total apparent power
SA Min	6110	R	2	Float32	kVa	Minimum apparent power of phase A
SB Min	6112	R	2	Float32	kVa	Minimum apparent power of phase B
SC Min	6114	R	2	Float32	kVa	Minimum apparent power of phase C
SSUMMin	6116	R	2	Float32	kVa	Minimum three-phase total apparent power

2.18 Imbalance

Register Alias	Register Starting Address (Decimal)	R/W	Size	Type	Unit	Description
Current negative sequence imbalance	7000	R	2	Float32	%	Current negative sequence imbalance
Current zero sequence imbalance	7002	R	2	Float32	%	Current zero sequence imbalance
Voltage negative sequence imbalance	7004	R	2	Float32	%	Voltage negative sequence imbalance
Voltage zero sequence imbalance	7006	R	2	Float32	%	Voltage zero sequence imbalance

2.19 Current K Factor

Register Alias	Register Starting Address (Decimal)	R/W	Size	Type	Unit	Description
Current K Factor						
KFIA	8000	R	2	Float32	-	Phase A current K factor
KFIB	8002	R	2	Float32	-	Phase B current K factor
KFIC	8004	R	2	Float32	-	Phase C current K factor

2.20 Voltage Current Angle

Register Alias	Register Starting Address (Decimal)	R/W	Size	Type	Unit	Description
Voltage Angle:						
UA	8100	R	2	Float32	°	Phase A voltage angle
UB	8102	R	2	Float32	°	Phase B voltage angle
UC	8104	R	2	Float32	°	Phase C voltage angle
Current Angle:						
IA	8106	R	2	Float32	°	Phase A current angle
IB	8108	R	2	Float32	°	Phase B current angle
IC	8110	R	2	Float32	°	Phase C current angle
Angle between Voltage and Current:						
UIA	8112	R	2	Float32	°	Angle between phase A voltage and current
UIB	8114	R	2	Float32	°	Angle between phase B voltage and current
UIC	8116	R	2	Float32	°	Angle between phase C voltage and current

2.21 Alarm

Register Alias	Register Starting Address (Decimal)	R/W	Size	Type	Unit	Description
Alarm Bitmap						
Enabled Alarm Bitmap						
Enable alarm bitmap 1	10000	R	1	Bitmap	-	0 = Alarm disabled 1 = Alarm enabled Bit N (0-15) = Alarm ID N (1-16)
Enable alarm bitmap 2	10001	R	1	Bitmap	-	0 = Alarm disabled 1 = Alarm enabled Bit N (0-15) = Alarm ID N (17-32)
Active Alarm Bitmap						
Activate alarm bitmap 1	10010	R	1	Bitmap	-	0 = Alarm inactive 1 = Alarm active Bit N (0-15) = Alarm ID N (1-16)
Activate alarm bitmap 2	10011	R	1	Bitmap	-	0 = Alarm inactive 1 = Alarm active Bit N (0-15) = Alarm ID N (17-32)
Current Alarm Output Bit **(Note: There is at most 1 alarm output at the same time)**						
Current alarm output bitmap 1	10020	R	1	Bitmap	-	0 = Alarm not output 1 = Alarm output Bit N (0-15) = Alarm ID N (1-16)
Current alarm output bitmap 2	10021	R	1	Bitmap	-	0 = Alarm not output 1 = Alarm output Bit N (0-15) = Alarm ID N (17-32)
Alarm Parameters						
Overcurrent, each phase **(Note: if one phase exceeds the activation threshold, an alarm will be generated, and if all phases are below the alarm release point, the alarm will be released)**						**Alarm ID=1**
Enabled status	10100	R/WC	1	UInt16	-	Enabled status 0=disable 1=enable
Activation threshold	10102	R/WC	2	Float32	A	Alarm activation threshold
Alarm release point	10104	R/WC	2	Float32	%	Alarm release point Percent error relative to the alarm activation threshold Example: Alarm activation threshold = 100A Alarm release point = 5% When the current value is less than 100-100*5%=95A, the alarm is released

Buzzer output association	10106	R/WC	1	UInt16	-	Buzzer output association 0=not associated 1=associated
Relay output association	10107	R/WC	1	UInt16	-	Relay output association 0=not associated 1=associated (Note: The control is only effective when the relay output mode is alarm output mode)
Undercurrent, each phase						**Alarm ID=2**
Enabled status	10120	R/WC	1	UInt16	-	Enable status 0=disable 1=enable
Activation threshold	10122	R/WC	2	Float32	A	Alarm activation threshold
Alarm release point	10124	R/WC	2	Float32	%	Alarm release point Percent error relative to the alarm activation threshold
Buzzer output association	10126	R/WC	1	UInt16	-	Buzzer output association 0=not associated 1=associated
Relay output association	10127	R/WC	1	UInt16	-	Relay output association 0=not associated 1=associated
Over-phase voltage, L-N						**Alarm ID=3**
Enabled status	10140	R/WC	1	UInt16	-	Enable status 0=disable 1=enable
Activation threshold	10142	R/WC	2	Float32	V	Alarm activation threshold
Alarm release point	10144	R/WC	2	Float32	%	Alarm release point Percent error relative to the alarm activation threshold
Buzzer output association	10146	R/WC	1	UInt16	-	Buzzer output association 0=not associated 1=associated
Relay output association	10147	R/WC	1	UInt16	-	Relay output association 0=not associated 1=associated
Phase loss voltage, L-N						**Alarm ID=4**
Enabled status	10160	R/WC	1	UInt16	-	Enable status 0=disable 1=enable
Activation threshold	10162	R/WC	2	Float32	V	Alarm activation threshold
Alarm release point	10164	R/WC	2	Float32	%	Alarm release point Percent error relative to the alarm activation threshold
Buzzer output association	10166	R/WC	1	UInt16	-	Buzzer output association 0=not associated 1=associated

Relay output association	10167	R/WC	1	UInt16	-	Relay output association 0=not associated 1=associated
Overline voltage, L-L						**Alarm ID=5**
Enabled status	10180	R/WC	1	UInt16	-	Enable status 0=disable 1=enable
Activation threshold	10182	R/WC	2	Float32	V	Alarm activation threshold
Alarm release point	10184	R/WC	2	Float32	%	Alarm release point Percent error relative to the alarm activation threshold
Buzzer output association	10186	R/WC	1	UInt16	-	Buzzer output association 0=not associated 1=associated
Relay output association	10187	R/WC	1	UInt16	-	Relay output association 0=not associated 1=associated
Underline voltage, L-L						**Alarm ID=6**
Enabled status	10200	R/WC	1	UInt16	-	Enable status 0=disable 1=enable
Activation threshold	10202	R/WC	2	Float32	V	Alarm activation threshold
Alarm release point	10204	R/WC	2	Float32	%	Alarm release point Percent error relative to the alarm activation threshold
Buzzer output association	10206	R/WC	1	UInt16	-	Buzzer output association 0=not associated 1=associated
Relay output association	10207	R/WC	1	UInt16	-	Relay output association 0=not associated 1=associated
Overpower, total active power (absolute value)						**Alarm ID=10**
Enabled status	10220	R/WC	1	UInt16	-	Enable status 0=disable 1=enable
Activation threshold	10222	R/WC	2	Float32	kW	Alarm activation threshold
Alarm release point	10224	R/WC	2	Float32	%	Alarm release point Percent error relative to the alarm activation threshold
Buzzer output association	10226	R/WC	1	UInt16	-	Buzzer output association 0=not associated 1=associated
Relay output association	10227	R/WC	1	UInt16	-	Relay output association 0=not associated 1=associated
Overpower, total reactive power (absolute value)						**Alarm ID=14**

Enabled status	10240	R/WC	1	UInt16	-	Enable status 0=disable 1=enable
Activation threshold	10242	R/WC	2	Float32	kVar	Alarm activation threshold
Alarm release point	10244	R/WC	2	Float32	%	Alarm release point Percent error relative to the alarm activation threshold
Buzzer output association	10246	R/WC	1	UInt16	-	Buzzer output association 0=not associated 1=associated
Relay output association	10247	R/WC	1	UInt16	-	Relay output association 0=not associated 1=associated
Overpower, total apparent power						**Alarm ID=18**
Enabled status	10260	R/WC	1	UInt16	-	Enable status 0=disable 1=enable
Activation threshold	10262	R/WC	2	Float32	kVA	Alarm activation threshold
Alarm release point	10264	R/WC	2	Float32	%	Alarm release point Percent error relative to the alarm activation threshold
Buzzer output association	10266	R/WC	1	UInt16	-	Buzzer output association 0=not associated 1=associated
Relay output association	10267	R/WC	1	UInt16	-	Relay output association 0=not associated 1=associated
Over demand, total active power (absolute value), current						**Alarm ID=20**
Enabled status	10280	R/WC	1	UInt16	-	Enable status 0=disable 1=enable
Activation threshold	10282	R/WC	2	Float32	kW	Alarm activation threshold
Alarm release point	10284	R/WC	2	Float32	%	Alarm release point Percent error relative to the alarm activation threshold
Buzzer output association	10286	R/WC	1	UInt16	-	Buzzer output association 0=not associated 1=associated
Relay output association	10287	R/WC	1	UInt16	-	Relay output association 0=not associated 1=associated
Over demand, total reactive power (absolute value), current						**Alarm ID=21**
Enabled status	10300	R/WC	1	UInt16	-	Enable status 0=disable 1=enable
Activation threshold	10302	R/WC	2	Float32	kVar	Alarm activation threshold

Alarm release point	10304	R/WC	2	Float32	%	Alarm release point Percent error relative to the alarm activation threshold
Buzzer output association	10306	R/WC	1	UInt16	-	Buzzer output association 0=not associated 1=associated
Relay output association	10307	R/WC	1	UInt16	-	Relay output association 0=not associated 1=associated
Over demand, total apparent power, current						**Alarm ID=22**
Enabled status	10320	R/WC	1	UInt16	-	Enable status 0=disable 1=enable
Activation threshold	10322	R/WC	2	Float32	kVA	Alarm activation threshold
Alarm release point	10324	R/WC	2	Float32	%	Alarm release point Percent error relative to the alarm activation threshold
Buzzer output association	10326	R/WC	1	UInt16	-	Buzzer output association 0=not associated 1=associated
Relay output association	10327	R/WC	1	UInt16	-	Relay output association 0=not associated 1=associated
Over THD-U (voltage total harmonics), each phase						**Alarm ID=30**
Enabled status	10340	R/WC	1	UInt16	-	Enable status 0=disable 1=enable
Activation threshold	10342	R/WC	2	Float32	%	Alarm activation threshold
Alarm release point	10344	R/WC	2	Float32	%	Alarm release point Percent error relative to the alarm activation threshold
Buzzer output association	10346	R/WC	1	UInt16	-	Buzzer output association 0=not associated 1=associated
Relay output association	10347	R/WC	1	UInt16	-	Relay output association 0=not associated 1=associated
Over THD-I (total current harmonics), each phase						**Alarm ID=31**
Enabled status	10360	R/WC	1	UInt16	-	Enable status 0=disable 1=enable
Activation threshold	10362	R/WC	2	Float32	%	Alarm activation threshold
Alarm release point	10364	R/WC	2	Float32	%	Alarm release point Percent error relative to the alarm activation threshold

Buzzer output association	10366	R/WC	1	UInt16	-	Buzzer output association 0=not associated 1=associated
Relay output association	10367	R/WC	1	UInt16	-	Relay output association 0=not associated 1=associated

3 Version Revision History

Version	Description	Date	Revised by
v1.0	First edition	2024/8/19	Alan