KPM75Power Quality Analyzer

MODBUS-RTU Communication Protocol_V1.0

KPM75 power quality analyzer power meter provides MODBUS-RTU communication protocol, 1 start bit, 8-bit data bits, 1/0 parity bit, 1/2 stop bits, each byte length is 11 bits.

Supported baud rates:：1200bps、2400bps、4800bps、9600bps、19200bps、38400bps。

Factory default communication parameters: ： 9600bps, no parity、1 stop bit.

1, Function code instruction

1.1 Read command function code 03H

The host reads the N-word data frame format from the slave (the data is hexadecimal)：

Slave add	Function code	Start add Hi	Start add Lo	reading quantity of data Hi	reading quantity of data Lo	CRC16 Hi	CRC16 Lo
00H	03H	xxH	xxH	00H	xxH	xxH	xxH

Slave add	Function code	Bytes counter	Data0	Data1	……	……	……
00H	03H	N			……	……	……

Slave response return frame format (data is in hexadecimal)：

DataN	CRC16 Hi	CRC16 Lo
	xxH	xxH

1.2 Write command Function code 10H

Query data frame：

Function code 16 (decimal) (10H in hexadecimal) allows the user to change the contents of multiple registers.

The host writes the N-word data frame format to the slave:

Slave add	Function code	Start add high	Start add low	Data counter Hi	Data counter Lo	Bytes counter
00H	10H	xxH	xxH	00H	N	2N

Data1	Data2	……	Data2N	CRC16 Hi	CRC16 Lo
40H	00H	……		xxH	xxH

Preset multi-register query data frames

Response data frame：

The normal response to a preset multiple register request is to respond to the machine address, function number, data start address, number of data, and CRC checksum after the register value is

changed. The following table.

Slave add	Function code	Start add Hi	Start add Lo	Data counter Hi	Data counter Lo	CRC16 Hi	CRC16 Lo
00H	10H	xxH	xxH	00H	N	xxH	xxH

Preset multi-register response data frames

1.3 Status of control and output of control relay

1.3.1 Relay control (function code 05H)

Request data frame:

Addr	Fun	DO addr hi	DO addr lo	Value hi	Value lo	CRC16 hi	CRC16 lo
01H	05H	xx	xx	AAH	55H	xxH	xxH

Response data frame:

Addr	Fun	DO addr hi	DO addr lo	Value hi	Value lo	CRC16 hi	CRC16 lo
01H	05H	xx	xx	AAH	55H	xxH	xxH

1.3.2Read relay output status (function code 01H)

Request data frame:

Read the status of Relay1.

Addr	Fun	Relay start reg hi	Relay start regs lo	Relay #of reg hi	Relay #of regs lo	CRC16 hi	CRC16 lo
01H	01H	00H	00H	00H	02H	xxH	xxH

Response data frame:

Response Data Frame: The slave responds to the host's data frame. Contains slave address, function code, number of data byte, relay status data, and CRC check. Each relay in the data packet occupies one bit (1 = ON, 0 = OFF). The first bit of the first byte is the lowest byte of the first byte. Address the relay state value, the rest of the order to the high order, useless bits filled with 0.

Read the contents of the digital output status response example.

Addr	Fun	Byte count	Data	CRC16 hi	CRC16 lo
01H	01H	01H	03H	11H	89H

Data byte content（Relay1 、Relay2 Closure）

7	6	5	4	3	2	1	0
0	0	0	0	0	0	1	1

1.4 Reading digital input status (function code 02H)

Request data frame:

Query data frame: This function allows the user to obtain the status of ON / OFF (1 = ON, 0 = OFF) of the switch input DI. In addition to the slave address and the function field, the data frame needs to included the initial address and the number of DIs to be read in the data field.The address

of DI starts at 0000H (DI1 = 0000H, DI2 = 0001H ... and so on).

The following example shows the state of the DI1 to DI6 read from the slave address 01

Addr	Fun	DI start reg hi	DI start regs lo	DI num hi	DI num lo	CRC16 hi	CRC16 lo
01H	02H	00H	00H	00H	04H	xx	xx

Response data frame:

The response contains the slave address, function code, number of data, packet and CRC check, each bit in the packet occupies one bit (1 = ON, 0 = OFF), the least significant bit of the first byte is the addressed DI1 value. The rest are arranged in order of high, and the unused bits are filled with 0.

The following table shows an example of reading the digital output status (DI1=ON, DI2=ON, DI3=OFF, DI4=OFF, DI5=OFF, DI6=OFF).

Addr	Fun	Byte count	Data	CRC16 hi	CRC16 lo
01H	02H	01H	03H	E1H	89H

Data

7	6	5	4	3	2	1	0
0	0	0	0	0	0	1	1

2, Status of digital input DI

This area is the current digital input DI state, the user can read the Modbus protocol 02H function code.

Address	Parameter	Numerical range	Data type	Attributes
0000H	DI1	1=ON，0=OFF	Bit	R
0001H	DI2	1=ON，0=OFF	Bit	R
0002H	DI3	1=ON，0=OFF	Bit	R
0003H	DI4	1=ON，0=OFF	Bit	R

3, **Relay output status**

This area stores relay status. Users can use the function code 01H of Modbus protocol to read the current status and use 05H function code to control the output. Note that control relay 0xAA00 is a relay, 0xAA55 relay.

Address	Parameter	Numerical range	Data type	Attributes
0000H	Relay1	1=ON，0=OFF	Bit	R/W
0001H	Relay2	1=ON，0=OFF	Bit	R/W
0002H	Relay3	1=ON，0=OFF	Bit	R/W
0003H	Relay4	1=ON，0=OFF	Bit	R/W

4, System parameter area

This area stores system parameters related to equipment operation, including communication parameters, wiring modes, I/O settings, etc., which can be read by using the Modbus protocol 03H function code or using the 10H function code setting.

Address	Parameter	Numerical range	Data type
0000H	Protection password	0~9999	Word
0001H	Modbus address	Modbus address：1~247	Word
0002H	Baud rate and check mode	Baud rate (BIT0~7)： 0：1200bps 1：2400bps 2：4800bps 3：9600bps 4：19200bps 5：38400bps Data Format (BIT8~15)： 0: 8,1,n （No check） 1: 8,1,even （Even parity） 2: 8,1,odd （Odd parity）	Word
0003H	Voltage transformation ratio	0~9999	Word
0004H	Current ratio	0~9999	Word
0005H	Wiring	0~2 0:3LN 3CT three-phase four-wire 1:2LL 2CT three-phase three-wire 2CT 2:2LL 3CT three-phase three-wire 3CT	Word
0006H	Transmission settings	0~25 (three-phase four-wire) are three-phase voltage, three-phase current, three-phase line voltage, active power, reactive power, apparent power, power factor and frequency. 0~10 (three-phase three-wire) are three-phase line pressure, three-phase current, total active power, total reactive power, total apparent power, power factor and frequency.	Word

0007H	Backlighting time	0~120（minutes）	Word
0008H	Demand sliding window time	1~30（minutes）Sliding block method	Word
0009H	Max and min clearance	0: never clear 1: daily clear, 2: Clear month	Word
000AH	Set function display items	0：Display 1：Not display Bit0：Phase voltage Bit1：Phase current Bit2：Line voltage Bit3：Three-phase active power Bit4：Three-phase reactive power Bit5：Three-phase apparent power Bit6：Three-phase power factor Bit7：Multi-rate and historical electricity Bit8：Frequency Bit9：Demand Bit10：Temperature Bit11：Power Bit12：Harmonic Bit13：Max、Min Bit14：Switch input Bit15：Relay output	Word
000BH	Clear the max/min value	Enter the 0xAA78 command to immediately clear the maximum and minimum values。	
000CH	Clear all electrical energy	Enter 0x5578 command to clear the power immediately	Word
000DH	Device fault indication	0: No fault 1: Faulty Bit0: Clock failure Bit1: Ferroelectric data failure	Word

5, System Time Statistics Area

The statistics of the running time of the storage system in the region and the statistics of the system load time. These data can be read using the Modbus protocol 03H function code. The data format is unsigned 32-bit integer data.

Address	Parameter	Data type	Unit
0010H	System running time statistics.	unsigned int	min
0012H	System load time statistics	unsigned int	min

6, Clock parameter area

This area stores the calendar clock parameters that can be read using the Modbus protocol 03H function code, which can be set using the 16-function code.

Address	Parameter	Numerical range	Data type
0020H	year	2000~2099	Word
0021H	mon	1~12	Word
0022H	day	1~31	Word
0023H	hour	0~23	Word
0024H	min	0~59	Word
0025H	sec	0~59	Word

7, Basic Measurement Parameters Area

Basic measurement area, mainly measuring basic voltage, current, power, power factor, etc.; Sequential quantity and unbalance analysis, an important parameter to measure power quality when the voltage and current in the power grid are unbalanced, voltage and current unbalance degree is negative sequence / Positive sequence. The zero-sequence voltage and current can reflect the neutral current and the neutral voltage.

The calculation of demand is calculated using the sliding block method, which is to set a window time, that is, the calculation period of the demand. The window is slid every 1 minute, and the demand value is updated once.

All parameters in this area are real-time measurement parameters and are read using the Modbus protocol 03H function code. The data format is floating-point data, and the data in this area has been multiplied by the transformation ratio.

Address	Parameter	Data type	Unit
0030H	Phase voltage Ua	Floating point	V
0032H	Phase voltage Ub	Floating point	V
0034H	Phase voltage Uc	Floating point	V
0036H	Line voltage Uab	Floating point	V
0038H	Line voltage Ubc	Floating point	V
003AH	Line voltage Uca	Floating point	V
003CH	Phase current Ia	Floating point	A
003EH	Phase current Ib	Floating point	A
0040H	Phase current Ic	Floating point	A
0042H	Split-phase active power Pa	Floating point	W
0044H	Split-phase active power Pb	Floating point	W
0046H	Split-phase active power Pc	Floating point	W
0048H	System active power Psum	Floating point	W
004AH	Split-phase reactive power Qa	Floating point	var
004CH	Split-phase reactive power Qb	Floating point	var
004EH	Split-phase reactive power Qc	Floating point	var
0050H	System reactive power Qsum	Floating point	var
0052H	Split-phase apparent power Sa	Floating point	VA

0054H	Split-phase apparent power Sb	Floating point	VA
0056H	Split-phase apparent power Sc	Floating point	VA
0058H	System apparent power Ssum	Floating point	VA
005AH	Split-phase power factor PF1	Floating point	
005CH	Split-phase power factor PF2	Floating point	
005EH	Split-phase power factor PF3	Floating point	
0060H	System power factor PF	Floating point	
0062H	System frequency F	Floating point	HZ
0064H	Positive sequence voltage U1	Floating point	V
0066H	Negative sequence voltage U2	Floating point	V
0068H	Positive sequence current value I1	Floating point	A
006AH	Negative sequence current value I2	Floating point	A
006CH	Voltage unbalance Yv	Floating point	%
006EH	Current imbalance Yi	Floating point	%
0070H	Active demand	Floating point	W
0072H	Reactive demand	Floating point	var
0074H	Apparent demand	Floating point	VA
0076H	Temperature	Floating point	℃
0078H	Three-phase average phase voltage	Floating point	V
007AH	Three-phase average line voltage	Floating point	V
007EH	Zero-sequence voltage value U0	Floating point	V
0080H	Zero-sequence current value I0	Floating point	A

8, Power quality measurement parameter area

The device measurement includes total distortion rate, 2~51th harmonic content rate, odd number distortion rate, even number distortion rate, crest factor and K coefficient. This data is enlarged 1000 times. If it is data 185, the awareness is 18.5%.

The data can be read using the Modbus protocol 03H function code.

Address	Parameter	Numerical range	Instructions	Data type
0100H	UA or UAB Total Harmonic Distortion Rate THD_V1	0~1000	0~100.0%	Word
0101H	UB or UBC total harmonic content（THD_V2）	0~1000	0~100.0%	Word
0102H	UC or UCA total harmonic content（THD_V3）	0~1000	0~100.0%	Word
0103H	Ua or Uab odd harmonic distortion	0~1000	0~100.0%	Word
0104H	Ua or Uab even harmonic distortion	0~1000	0~100.0%	Word
0105H	Ub odd harmonic distortion rate	0~1000	0~100.0%	Word
0106H	Ub even harmonic distortion rate	0~1000	0~100.0%	Word
0107H	Uc or Ubc odd harmonic distortion rate	0~1000	0~100.0%	Word
0108H	Uc or Ubc even harmonic distortion rate	0~1000	0~100.0%	Word
0109H	I1 Total Harmonic Distortion Rate THD_I1	0~1000	0~100.0%	Word

010AH	I2 Total Harmonic Distortion Rate THD_I2	0~1000	0~100.0%	Word
010BH	I3 Total Harmonic Distortion Rate THD_I3	0~1000	0~100.0%	Word
010CH	I1 odd harmonic distortion rate	0~1000	0~100.0%	Word
010DH	I1 even harmonic distortion	0~1000	0~100.0%	Word
010EH	I2 odd harmonic distortion rate	0~1000	0~100.0%	Word
010FH	I2 even harmonic distortion	0~1000	0~100.0%	Word
0110H	I3 odd harmonic distortion rate	0~1000	0~100.0%	Word
0111H	I3 even harmonic distortion	0~1000	0~100.0%	Word
0112H	V1orV12 Crest factor	0~65535	65.535	Word
0113H	V2orV31 Crest factor	0~65535	65.535	Word
0114H	V3orV23 Crest factor	0~65535	65.535	Word
0115H	I1 K factor	0~65535	65.535	Word
0116H	I2 K factor	0~65535	65.535	Word
0117H	I3 K factor	0~65535	65.535	Word
0120H~0151H	Ua or Uab harmonic content ratio（2-51harmonics）	0~1000	0~100.0%	Word
015EH~018FH	Ub harmonic content ratio（2-51harmonics）	0~1000	0~100.0%	Word
019CH~01CDH	Uc or Ucb harmonic content ratio（2-51harmonics）	0~1000	0~100.0%	Word
01DAH~020BH	Ia harmonic content ratio（2-51harmonics））	0~1000	0~100.0%	Word
0218H~0249H	Ib harmonic content ratio（2-51harmonics）	0~1000	0~100.0%	Word
0256H~0287H	Ic harmonic content ratio（2-51harmonics））	0~1000	0~100.0%	Word

9, Angle measurement

The phase angle difference is Ub, Uc, and the phase relationship between current and Ua. The angle is from 0 to 360.0. This function can help the user to connect, prevent the user from connecting the wrong line, but also can directly reflect the angle relationship between the voltage and current of the grid. Because the three-phase three-wire and three-phase four-wire connection are different, the reference input voltage is not the same, so the protocol specifically separates the two connection mode data. Users can read different data ranges according to the connection mode.

The data can be read using the Modbus protocol 03H function code.

Address	Parameter	Numerical range	Instructions	Data type
0300H	Ub phase angle difference with respect to Ua	0~3600	Three-phase four-wire：0~360.0°	Word
0301H	Uc phase angle difference with respect to Ua	0~3600	Three-phase four-wire：0~360.0°	Word
0302H	Phase angle difference between Ia and Ua	0~3600	Three-phase four-wire：0~360.0°	Word
0303H	Phase angle difference between Ib and Ua	0~3600	Three-phase four-wire：0~360.0°	Word
0304H	Phase angle difference between Ic and Ua	0~3600	Three-phase four-wire：0~360.0°	Word
0305H	Ubc phase angle difference relative to Uab	0~3600	Three-phase three-wire：0~360.0°	Word
0306H	Phase angle difference between Ia and Uab	0~3600	Three-phase three-wire：0~360.0°	Word

0307H	Phase angle difference between Ib and Uab	0~3600	Three-phase three-wire：0~360.0°	Word
0308H	Phase angle difference between Ic and Uab	0~3600	Three-phase three-wire：0~360.0°	Word

10, Maximum and minimum statistics area

This area statistics the maximum and minimum voltage current, power, power factor, power demand, frequency, voltage and current imbalance. And the statistical period can be set to "Month Clear", "Day Clear", "Never Clear". Set to "Month Clear", which is the start time of the month, the maximum and minimum values are cleared and re-compared; "Daily Clear" is the zero hour of each day, the maximum and minimum values are cleared and re-compared; "Never Clear" is the highest value if not Manually clear, the value is always compared.

This area stores the maximum and minimum values of important parameters and their time stamps. The data can be read using the Modbus protocol 03H function code.

Address	Parameter	Numerical range	Instructions	Unit
0320H	Ua max		Floating point	V
0322H	Occurred moments of Ua max 2C66	Year：2000~2099	Word	
0323H		Month：1~12	Word	
0324H		Day：1~31	Word	
0325H		Hour：0~23	Word	
0326H		Minute：0~59	Word	
0327H		Second+millisecond：0~59999	Word	
0328H	Ub max		Floating point	V
032AH~032FH	Occurred moments of Ub max	Same as Ua time format	Word	
0330H	Uc max		Floating point	V
0332H~0337H	Occurred moments of Uc max	Same as Ua time format	Word	
0338H	Uab max		Floating point	V
033AH~033FH	Occurred moments of Uab max	Same as Ua time format		
0340H	Ubc max		Floating point	V
0342H~0347H	Occurred moments of Ubc max	Same as Ua time format		
0348H	Uca max		Floating point	V
034AH~034FH	Occurred moments of Uca max	Same as Ua time format		
0350H	Ia max		Floating point	A
0352H~0357H	Occurred moments of Ia max	Same as Ua time format		
0358H	Ib max Ib		Floating point	A
035AH~035FH	Occurred moments of Ib max	Same as Ua time format		
0360H	Ic max		Floating point	A
0362H~0367H	Occurred moments of Ic max	Same as Ua time format		
0368H	System active power maximum		Floating point	W
036AH~036FH	Occurred moments of P max	Same as Ua time format		
0370H	System reactive power maximum		Floating point	var
0372H~0377H	Occurred moments of Q max	Same as Ua time format		

0378H	System apparent power maximum		Floating point	VA
037AH~037FH	Occurred moments of S max	Same as Ua time format		
0380H	System power factor maximum		Floating point	
0382H~0387H	Occurred moments of PF max	Same as Ua time format		
0388H	Frequency maximum		Floating point	Hz
038AH~038FH	Occurred moments of F max	Same as Ua time format		
0390H	Maximum voltage imbalance			%
0392H~0397H	The moment of maximum voltage imbalance occurs	Same as Ua time format		
0398H	Current imbalance maximum			%
039AH~039FH	The moment of maximum current imbalance occurs	Same as Ua time format		
03A0H	System active power demand maximum		Floating point	W
03A2H~03A7H	Occurred moments of active power demand max	Same as Ua time format		
03A8H	System reactive power demand maximum		Floating point	var
03AAH~03AFH	Occurred moments of reactive power demand max	Same as Ua time format		
03B0H	System apparent power demand maximum		Floating point	VA
03B2H~03B7H	Occurred moments of apparent power demand max	Same as Ua time format		
03B8H	Temperature maximum		Floating point	℃
03BAH~03BFH	Occurred moments of temperature max	Same as Ua time format		
The following is the minimum record				
03C0H	Ua min		Floating point	V
03C2H~03C7H	Occurred moments of Ua min			
03C8H	Ub min		Floating point	V
03CAH~03CFH	Occurred moments of Ub min	Same as Ua time format	Word	
03D0H	Uc min		Floating point	V
03D2H~03D7H	Occurred moments of Uc min	Same as Ua time format	Word	
03D8H	Uab min		Floating point	V
03DAH~03DFH	Occurred moments of Uab min	Same as Ua time format		
03E0H	Ubc min		Floating point	V
03E2H~03E7H	Occurred moments of Ubc min	Same as Ua time format		
03E8H	Uca min		Floating point	V
03EAH~03EFH	Occurred moments of Uca min	Same as Ua time format		
03F0H	Ia min		Floating point	A
03F2H~03F7H	Occurred moments of Ia min	Same as Ua time format		
03F8H	Ib min Ib		Floating point	A
03FAH~03FFH	Occurred moments of Ib min	Same as Ua time format		

0400H	Ic min		Floating point	A
0402H~0407H	Occurred moments of Ic min	Same as Ua time format		
0408H	System active power minimum		Floating point	W
040AH~040FH	Occurred moments of P min	Same as Ua time format		
0410H	System reactive power minimum		Floating point	var
0412H~0417H	Occurred moments of Q min	Same as Ua time format		
0418H	System apparent power minimum		Floating point	VA
041AH~041FH	Occurred moments of S min	Same as Ua time format		
0420H	System power factor minimum		Floating point	
0422H~0427H	Occurred moments of PE min	Same as Ua time format		
0428H	Frequency minimum		Floating point	Hz
042AH~042FH	Occurred moments of F min	Same as Ua time format		
0430H	Voltage imbalance minimum			%
0432H~0437H	The moment of voltage imbalance occurs	Same as Ua time format		
0438H	Current imbalance minimum			%
043AH~043FH	Occurred moments of current imbalance minimum	Same as Ua time format		
0440H	System active power demand minimum		Floating point	W
0442H~0447H	Occurred moments of active power demand minimum	Same as Ua time format		
0448H	System reactive power demand minimum		Floating point	var
044AH~044FH	Occurred moments of reactive power demand minimum	Same as Ua time format		
0450H	System apparent power demand minimum		Floating point	VA
0452H~0457H	Occurred moments of apparent power demand minimum	Same as Ua time format		
0458H	Temperature minimum		Floating point	℃
045AH~045FH	Occurred moments of temperature min	Same as Ua time format		

11, Relay settings

When DI is turned on, the software can design the anti-shake time and the relay pulse output width can be set. Only when the relay is set to remote control mode and the output type is pulse output, other modes are invalid.

Can use Modbus protocol 03H function code reading, or use 10H function code settings.

Address	Parameter	Explanation of meaning	Defaults	Data type
0460H	Switch input 1	0~9999 mS(system default 20ms)	20	Word

	anti-shake time			
0461H	Switch input 2 anti-shake time	0~9999 mS(system default 20ms)	20	Word
0462H	Switch input 3 anti-shake time	0~9999 mS(system default 20ms)	20	Word
0463H	Switch input 4 anti-shake time	0~9999 mS(system default 20ms)	20	Word
0464H	Relay 1 pulse output width	50~9999，(additional 1 number is 1mS)	200	Word
0465H	Relay 2 pulse output width	50~9999，(Each additional number is 1mS,)	200	Word
0466H	Relay 3 pulse output width	50~9999，(additional 1 number is 1mS)	200	Word
0467H	Relay 4 pulse output width	50~9999，(Each additional number is 1mS,)	200	Word
0468H	Relay remote control method	Bit0~3 Corresponds to the 1st to 4th relay output patterns 0-Remote control method。 1-Alarm method	0	Word
0469H	Relay Switch output method	Bit0~3Corresponds to the 1st to 4th relay output patterns 0 — Pulse output 1 — Level output	0	Word

12, Alarm event function

The device has 8 sets of alarm records. Each alarm set can be output to the relay. Note that the relay must be set to the alarm mode to be effective. If the relay is set to pulse mode, the relay will operate relays and relays in a pulse mode after the alarm occurs. If this alarm condition is established, only one pulse is output. If the alarm condition is not established, the alarm will be resumed. . If the relay is opened in a level output mode, the alarm condition is established and the relay is always output. Once the alarm condition is not established, the relay returns to the open state.

The corresponding parameters of the alarm measured parameters are as follows：

No.	Corresponding parameters
0~35	The basic measurement parameter data corresponding to this group of coefficients

Can use Modbus protocol 03H function code reading, or use 10H function code settings.

Address	Parameter	**Explanation of meaning**	**Numerical range**	**Defaults**	**Data type**
0470H	Whether the alarm group is closed	Bit0~bit8 One alarm group per bit 0：Close 1：Open		0	
0471H	Alarm group and DO1 relay (this relay must be set to alarm is valid)	Bit0~bit8 One alarm group per bit 0：Close 1：Open		0	
0472H	Alarm group and DO2 relay (this relay must be set to alarm is valid)	Bit0~bit8 One alarm group per bit 0：Close 1：Open		0	

0473H	Alarm group and DO3 relay (this relay must be set to alarm is valid)	Bit0~bit8 One alarm group per bit 0：Close 1：Open		0	
0474H	Alarm group and DO4 relay (this relay must be set to alarm is valid)	Bit0~bit8 One alarm group per bit 0：Close 1：Open		0	
0475H	Alarm group delay	0~999S	0~999S	0	Word
0476H	Group 1：Parameter no.	Check record table meaning (increase temperature alarm)	0~36	0	Word
0477H	Group 1：Setting value	Related to specific parameters			Floating point
0479H	Group 1：Comparison method	0：Less than，Lower limit of judgment 1: More than，Upper limit of judgment	0~1	1	Word
047AH	Group 2：Parameter no.	Check record table meaning	0~36	0	Word
047BH	Group 2：Setting value	Related to specific parameters			Floating point
047DH	Group 2：Comparison method	0：Less than，Lower limit of judgment 1: More than，Upper limit of judgment	0~1	1	Word
047EH	Group 3：Parameter no.	Check record table meaning	0~36	0	Word
047FH	Group 3：Setting value	Related to specific parameters			Floating point
0481H	Group 3：Comparison method	0：Less than，Lower limit of judgment 1: More than，Upper limit of judgment	0~1	1	Word
0482H	Group 4：Parameter no.	Check record table meaning	0~36	0	Word
0483H	Group 4：Setting value	Related to specific parameters			Floating point
0485H	Group 4：Comparison method	0：Less than，Lower limit of judgment 1: More than，Upper limit of judgment	0~1	1	Word
0486H	Group 5：Parameter no.	Check record table meaning	0~36	0	Word
0487H	Group 5：Setting value	Related to specific parameters			Floating point
0489H	Group 5：Comparison method	0：Less than，Lower limit of judgment 1: More than，Upper limit of judgment	0~1	1	Word
048AH	Group 6：Parameter no.	Check record table meaning	0~36	0	Word
048BH	Group 6：Setting value	Related to specific parameters			Floating point
048DH	Group 6：Comparison method	0：Less than，Lower limit of judgment 1: More than，Upper limit of judgment	0~1	1	Word
048EH	Group 7：Parameter no.	Check record table meaning	0~36	0	Word
048FH	Group 7：Setting value	Related to specific parameters			Floating point
0491H	Group 7：Comparison method	0：Less than，Lower limit of judgment 1: More than，Upper limit of judgment	0~1	1	Word

0492H	Group 8：Parameter no.	Check record table meaning	0~36	0	Word
0493H	Group 8：Setting value	Related to specific parameters			Floating point
0495H	Group 8： Comparison method	0：Less than，Lower limit of judgment 1: More than，Upper limit of judgment	0~1	1	Word

13、Multi-rate energy split time and rate setting area

This area is divided into 4 time zones and 8 time periods

Time-division hour setting: Up to 4 time zones (or seasonal) can be set. Each time zone can be set up to 8 time periods. Each time period can be assigned to four rates (tip, peak, valley, and flat). Any of them.

Time zone and time period are no longer set "seconds", seconds are default 0 seconds.

Time zone setting format: The starting time of the first time zone starts at 0:00 on January 1 and the starting time zone of the remaining segments is the ending time of the previous session. The last period must be set to 24:00 on December 31st. If you do not need multiple time zones, you only need to set the last time zone to 24:00:00 on December 31st. If you set a time zone error, the last time zone defaults to 24:00:00 on December 31st.

Period setting format: The default start time of the first segment is 00:00, the start time of the remaining segments is the end time of the previous segment, and the last segment must be set to 24:00. If there is no need for eight sessions, then only The last segment needed to set the segmentation time is 24:00.

Users can choose different time zones and different time periods to meet individual needs. However, in order to ensure that the time setting is reasonable and effective, the instrument will perform strict time setting checks. If the setting is correct and the time-sharing measurement function is enabled, the hourly metering will be performed; otherwise, the electricity metering timer will not be performed.

The parameters in this area are the segmentation time and rate setting area, which can be read using the Modbus protocol 03H function code or using the 10H function code setting. Write up to 12 registers at a time

According to the set time zone number The default last time zone end time is December 31st 24:00

At least one time zone must be enabled for the time zone setting. The time zone begins at the end of the first time slot of the time zone to which it belongs, and the first one that is less than the end time is accumulated.

1、 Multi-rate setting parameter requirements:

2、 The ending time of the last enabled time zone must be 24:00 on December 31, otherwise it defaults to 24:00 on December 31st.

3. The ending time of the previous period in the period must be less than the ending period of the later period

4. If the user's settings are unreasonable, time-sharing measurement errors will occur.

Address	Parameter	Numerical range	Data type
0500H	The number of time zones that	1~4	Word

	can be enabled 1		
0501H~0504H	1st time zone end time：4 Month, Day, Hour, Minute	Month：1~12 Day：1:31 Hour：0~24 Minute：0~59	Word
0505H~0508H	2nd time zone end time：4 Month, Day, Hour, Minute	Month：1~12 Day：1:31 Hour：0~24 Minute：0~59	Word
0509H~050CH	3rd time zone end time：4 Month, Day, Hour, Minute	Month：1~12 Day：1:31 Hour：0~24 Minute：0~59	Word
050DH~0510H	4th time zone end time：4 Month, Day, Hour, Minute	Month：1~12 Day：1:31 Hour：0~24 Minute：0~59	Word
0511H~ 0512H	The end time of the 1st segment of 1st time zone	Hour：0~24 分：0~59	Word
0513H~ 0514H	The end time of the 2nd segment of 1st time zone	Hour：0~24 分：0~59	Word
0515H~ 0516H	The end time of the 3rd segment of 1st time zone	Hour：0~24 分：0~59	Word
0517H~ 0518H	The end time of the 4th segment of 1st time zone	Hour：0~24 分：0~59	Word
0519H~ 051AH	The end time of the 5th segment of 1st time zone	Hour：0~24 分：0~59	Word
051BH~ 051CH	The end time of the 6th segment of 1st time zone	Hour：0~24 分：0~59	Word
051DH~ 051EH	The end time of the 7th segment of 1st time zone	Hour：0~24 分：0~59	Word
051FH~ 0520H	The end time of the 8th segment of 1st time zone	Hour：0~24 分：0~59	Word
0521H	The rate of 1st segment of 1st time zone	0~3(Corresponds to spikes, peaks, flats, and valleys)	Word
0522H	The rate of 2ndsegment of 1st time zone	0~3(Corresponds to spikes, peaks, flats, and valleys)	Word
0523H	The rate of 3rd segment of 1st time zone	0~3(Corresponds to spikes, peaks, flats, and valleys)	Word
0524H	The rate of 4th segment of 1st time zone	0~3(Corresponds to spikes, peaks, flats, and valleys)	Word
0525H	The rate of 5th segment of 1st time zone	0~3(Corresponds to spikes, peaks, flats, and valleys)	Word
0526H	The rate of 6th segment of 1st time zone	0~3(Corresponds to spikes, peaks, flats, and valleys)	Word
0527H	The rate of 7th segment of 1st time zone	0~3(Corresponds to spikes, peaks, flats, and valleys)	Word
0528H	The rate of 8st segment of 1st time zone	0~3(Corresponds to spikes, peaks, flats, and valleys)	Word
0529H~0540H	Second time zone setting	Same as first time zone	Word

0541H~0558H	Third time zone setting	Same as first time zone	Word
0559H~0570H	Fourth time zone setting	Same as first time zone	Word

14, Multi-rate electric metrics parameter area

Parametes in this area are the cumulative energy, which can be read using the Modbus protocol 03H function code.

Address	**Parameter**	**Numerical range**	**Data type**	**Unit**	
Four-quadrant electrical energy					
0580H	Total positive active energy		Floating point	kWh	
0582H	Total negative active energy		Floating point	kWh	
0584H	Total inductive reactive energy		Floating point	kvarh	
0586H	Total capacitive reactive energy		Floating point	kvarh	
Total Time Period Energy					
0588H	Total active energy		Floating point	kWh	
058AH	Total reactive energy		Floating point	kvarh	
058CH	Total active energy this month		Floating point	kWh	
058EH	Total reactive energy this month		Floating point	kvarh	
0590H	Total active energy last month		Floating point	kWh	
0592H	Total reactive energy last month		Floating point	kvarh	
0594H	Total active energy two months ago		Floating point	kWh	
0596H	Total reactive energy two months ago		Floating point	kvarh	
Sharp Time Period Energy					
0598H	Total sharp active energy		Floating point	kWh	
059AH	Total sharp reactive energy		Floating point	kvarh	
059CH	Total sharp active energy this month		Floating point	kWh	

059EH	Total sharp reactive energy this month		Floating point	kvarh	
05A0H	Total sharp active energy last month		Floating point	kWh	
05A2H	Total sharp reactive energy last month		Floating point	kvarh	
05A4H	Total sharp active energy two months ago		Floating point	kWh	
05A6H	Total sharp reactive energy two months ago		Floating point	kvarh	
Peak Time Period Energy					
05A8H	Total peak active energy		Floating point	kWh	
05AAH	Total peak reactive energy		Floating point	kvarh	
05ACH	Total peak active energy this month		Floating point	kWh	
05AEH	Total peak reactive energy this month		Floating point	kvarh	
05B0H	Total peak active energy last month		Floating point	kWh	
05B2H	Total peak reactive energy last month		Floating point	kvarh	
05B4H	Total peak active energy this month two months ago		Floating point	kWh	
05B6H	Total peak reactive energy this month two months ago		Floating point	kvarh	
Shoulder Time Period Energy					
05B8H	Total shoulder time period active energy		Floating point	kWh	
05BAH	Total shoulder time period reactive energy		Floating point	kvarh	
05BCH	Total shoulder time period active energy this month		Floating point	kWh	
05BEH	Total shoulder time period reactive energy this month		Floating point	kvarh	
05C0H	Total shoulder time period active energy last month		Floating point	kWh	
05C2H	Total shoulder time period reactive energy last month		Floating point	kvarh	
05C4H	Total shoulder time period active energy two month ago		Floating point	kWh	
05C6H	Total shoulder time period reactive energy two		Floating	kvarh	

	month ago		point		
Off-peak Time Period Energy					
05C8H	Total off-peak time period active energy		Floating point	kWh	
05CAH	Total off-peak time period reactive energy		Floating point	kvarh	
05CCH	Total off-peak time period active energy this month		Floating point	kWh	
05CEH	Total off-peak time period reactive energy this month		Floating point	kvarh	
05D0H	Total off-peak time period active energy last month		Floating point	kWh	
05D2H	Total off-peak time period reactive energy last month		Floating point	kvarh	
05D4H	Total off-peak time period active energy two month ago		Floating point	kWh	
05D6H	Total off-peak time period reactive energy two month ago		Floating point	kvarh	
Average Power Factor					
05DAH	Average power factor this month		Floating point		
05DCH	Average power factor last month		Floating point		
05DEH	Average power factor two month ago		Floating point		

15, Switch input SOE（Specific quantity，Tentative 100 groups）

The device has 4 DI inputs and can record status change information (status, occurrence time) with a time resolution of 1 millisecond. The first group of data defaults to the most recent SOE event. The last group defaults to the earliest occurrence of a SOE event. The SOE record is stored using a first-in, first-out model, and the most recently sent SOE event replaces the earliest occurring SOE.

This function is to always detect the dislocation of the DI terminal, have the function of SOE, and record the time and mode of the dislocation..

Can read by function code 03H using Modbus protocol.

Address	Parameter	Numerical range	Data type
0600H	The most recent 1st SOE description	Bit0~bit7： 1：From low to high (open)； 2：From high to low (closed)； Bit8~ Bit15： DI address（1~8）	Word
0601H	The most recent 1st SOE time	year：2000~2099	Word
0602H		month：1~12	Word

0603H		day：1~31	Word
0604H		hour：0~23	Word
0605H		minute：0~59	Word
0606H		sec+millisecond：0~59999	Word
0607H~060DH	The most recent 2nd SOE description and time	Same format as the first group	Word
060EH~0614H	The most recent 3rd SOE description and time	Same format as the first group	Word
0615H~061BH	The most recent 4th SOE description and time	Same format as the first group	Word
061CH~0622H	The most recent 3th SOE description and time	Same format as the first group	Word
0623H~0629H	The most recent 6th SOE description and time	Same format as the first group	Word
062AH~0630H	The most recent 7th SOE description and time	Same format as the first group	Word
0631H~0637H	The most recent 8th SOE description and time	Same format as the first group	Word
0638H~063EH	The most recent 9th SOE description and time	Same format as the first group	Word
063FH~0645H	The most recent 10th SOE description and time	Same format as the first group	Word
0646H~064CH	The most recent 11th SOE description and time	Same format as the first group	Word
064DH~0653H	The most recent 12th SOE description and time	Same format as the first group	Word
065DH~065AH	The most recent 13th SOE description and time	Same format as the first group	Word
065BH~0661H	The most recent 14th SOE description and time	Same format as the first group	Word
0662H~0668H	The most recent 15th SOE description and time	Same format as the first group	Word
0669H~066FH	The most recent 16th SOE description and time	Same format as the first group	Word
0670H~0676H	The most recent 17th SOE description and time	Same format as the first group	Word
0677H~067DH	The most recent 18th SOE description and time	Same format as the first group	Word
067EH~0684H	The most recent 19th SOE description and time	Same format as the first group	Word
0685H~068BH	The most recent 20th SOE description and time	Same format as the first group	Word
068CH~0692H	The most recent 21th SOE description and time	Same format as the first group	Word
0693H~0699H	The most recent 22th SOE description and time	Same format as the first group	Word
069AH~06A0H	The most recent 23th SOE description and time	Same format as the first group	Word
06A1H~06A7H	The most recent 24th SOE description and time	Same format as the first group	Word
06A8H~06AEH	The most recent 25th SOE description and time	Same format as the first group	Word
06AFH~06B5H	The most recent 26th SOE description and time	Same format as the first group	Word
06B6H~06BCH	The most recent 27th SOE description and time	Same format as the first group	Word
06BDH~06C3H	The most recent 28th SOE description and time	Same format as the first group	Word
06C4H~06CAH	The most recent 29th SOE description and time	Same format as the first group	Word
06CBH~06D1H	The most recent 30th SOE description and time	Same format as the first group	Word
06D2H~08BBH	31~100th SOE description and time	Same format as the first group	Word

16, Switch output SOE (Tentative 100 groups，it is related to ferroelectric space)

Record relay operation events and record relay action patterns and times.

Can read by function code 03H using Modbus protocol

Address	Parameter	Numerical range	Data type
0900H	The most recent 1st SOE description	Bit0~bit7： 1：From low to high (open)； 2：From high to low (closed)； Bit8~ Bit15： DO address（1~8）	Word
0901H	The most recent 1st SOE time	year：2000~2099	Word
0902H		month：1~12	Word
0903H		day：1~31	Word
0904H		hour：0~23	Word
0905H		minute：0~59	Word
0906H		sec+millisecond：0~59999	Word
0907H~090DH	The most recent 2nd SOE description and time	Same format as the first group	Word
090EH~0914H	The most recent 3rd SOE description and time	Same format as the first group	Word
0915H~091BH	The most recent 4th SOE description and time	Same format as the first group	Word
091CH~0922H	The most recent 5th SOE description and time	Same format as the first group	Word
0923H~0929H	The most recent 6th SOE description and time	Same format as the first group	Word
092AH~0930H	The most recent 7th SOE description and time	Same format as the first group	Word
0931H~0937H	The most recent 8th SOE description and time	Same format as the first group	Word
0938H~093EH	The most recent 9th SOE description and time	Same format as the first group	Word
093FH~0945H	The most recent 10th SOE description and time	Same format as the first group	Word
0946H~094CH	The most recent 11th SOE description and time	Same format as the first group	Word
094DH~0953H	The most recent 12th SOE description and time	Same format as the first group	Word
095DH~095AH	The most recent 13th SOE description and time	Same format as the first group	Word
095BH~0961H	The most recent 14th SOE description and time	Same format as the first group	Word
0962H~0968H	The most recent 15th SOE description and time	Same format as the first group	Word
0969H~096FH	The most recent 16th SOE description and time	Same format as the first group	Word
0970H~0976H	The most recent 17th SOE description and time	Same format as the first group	Word
0977H~097DH	The most recent 18th SOE description and time	Same format as the first group	Word
097EH~0984H	The most recent 19th SOE description and time	Same format as the first group	Word
0985H~098BH	The most recent 20th SOE description and time	Same format as the first group	Word
098CH~0BBBH	The most recent 21th SOE description and time	Same format as the first group	Word

17, Fault alarm record（Tentative 100 groups）

The system has 8 groups of alarms. If an alarm occurs, the area records the alarm event and records the most recent fault.

Can read by function code 03H using Modbus protocol.

Address	Parameter	Numerical range	Data type
0C00H	The most recent 1st fault event description	Specific fault events（0~36） Write alarm group best	Word
0C01H	The most recent 1st fault event time	year：2000~2099	Word
0C02H		month：1~12	Word
0C03H		day：1~31	Word
0C04H		hour：0~23	Word
0C05H		minute：0~59	Word
0C06H		sec+millisecond：0~59999	Word
0C07H~0C0DH	The most recent 2nd fault event description and time	Same format as the first group	Word
0C0EH~0C14H	The most recent 3th fault event description and time	Same format as the first group	Word
0C15H~0C1BH	The most recent 3th fault event description and time	Same format as the first group	Word
0C1CH~0C22H	The most recent 3th fault event description and time	Same format as the first group	Word
0C23H~0C29H	The most recent 3th fault event description and time	Same format as the first group	Word
0C2AH~0C30H	The most recent 3th fault event description and time	Same format as the first group	Word
0C31H~0C37H	The most recent 3th fault event description and time	Same format as the first group	Word
0C38H~0C3EH	The most recent 3th fault event description and time	Same format as the first group	Word
0C3FH~0C45H	The most recent 3th fault event description and time	Same format as the first group	Word
0C46H~0C4CH	The most recent 3th fault event description and time	Same format as the first group	Word
0C4DH~0C53H	The most recent 3th fault event description and time	Same format as the first group	Word
0C5DH~0C5AH	The most recent 3th fault event description and time	Same format as the first group	Word
0C5BH~0C61H	The most recent 3th fault event description and time	Same format as the first group	Word
0C62H~0C68H	The most recent 3th fault event description and time	Same format as the first group	Word
0C69H~0C6FH	The most recent 3th fault event description and time	Same format as the first group	Word
0C70H~0C76H	The most recent 3th fault event description and time	Same format as the first group	Word
0C77H~0C7DH	The most recent 3th fault event description and time	Same format as the first group	Word
0C7EH~0C84H	The most recent 3th fault event description and time	Same format as the first group	Word
0C85H~0C8BH	The most recent 3th fault event description and time	Same format as the first group	Word
0C8CH~0C92H	The most recent 3th fault event description and time	Same format as the first group	Word
0C93H~0C99H	The most recent 3th fault event description and time	Same format as the first group	Word
0C9AH~0CA0H	The most recent 3th fault event description and time	Same format as the first group	Word
0CA1H~0CA7H	The most recent 3th fault event description and time	Same format as the first group	Word
0CA8H~0CAEH	The most recent 3th fault event description and time	Same format as the first group	Word
0CAFH~0CB5H	The most recent 3th fault event description and time	Same format as the first group	Word
0CB6H~0CBCH	The most recent 3th fault event description and time	Same format as the first group	Word
0CBDH~0CC3H	The most recent 3th fault event description and time	Same format as the first group	Word
0CC4H~0CCAH	The most recent 3th fault event description and time	Same format as the first group	Word
0CCBH~0CD1H	The most recent 3th fault event description and time	Same format as the first group	Word
0CD2H~0EBBH	30~100th fault event description and time	Same format as the first group	Word

18, Waveform recording data

18.1 Fault record setting area

Can use Modbus protocol 03H function code reading, or use 10H function code settings.

Address	Parameter	Numerical range	Instruction	Data type
1000H	Start recording manually	0~1	0：Manually start 3 voltages 1：Manually start 3 items of current	Word
1001H	Rated current	1or 5	Transformer： 1A or 5A	Word
1002H	Rated voltage	10~660	Fault record Un	Word
1003H	fault record on or off	0x00~0x1FF	Bit0:A phase A over-current Bit1:B phase B over-current Bit2:C phase C over-current Bit3:Phase A over-voltage Bit4:Phase B over-voltage Bit5:Phase C over-voltage Bit6:Phase A under-voltage Bit7:Phase B under-voltage Bit8:Phase C under-voltage	Word
1004H	Over-current alarm threshold (3-phase current threshold is the same)	20～200	0.2In~2.0 0In	Word
1005H	Over-current alarm delay time (3-phase current threshold is the same)	0～9999	0.01~99.99S	Word
1006H	Over-voltage alarm threshold (3-phase voltage threshold is the same)	20～200	0.2In~2.0 0In	Word
1007H	Over-voltage alarm delay time(3-phase voltage threshold is the same)	0～9999	0.01~99.99S	Word
1008H	Under-voltage lower limit alarm threshold (3-phase voltage threshold is the same)	20～200	0.2In~2.0 0In	Word
1009H	Under-voltage alarm delay time (3-phase voltage threshold is the same)	0～9999	0.01~99.99S	Word

18.2 Fault record waveform record

This area records the cause of the fault. By the cause of the fault, it can be distinguished that the recorded data is a 3-phase voltage or a 3-phase current, recording a total of 10 cycles and 64 cycles per cycle; the recorded wave data has been converted into a standard data format, current data, Expanding 1000 times, for example, data is 5000 for 5.000A; voltage data is increased by

100 times, for example, 2200 for data, which is 220.0V. Note that the data inside is not a quadratic value, and the user multiplies it by the ratio to obtain the corresponding data.

Can use Modbus protocol 03H function code reading

Address	Parameter	Numerical range	Data type
0x1100	Fault Causes of Group 1 Fault Record	0= Manual voltage recording 1= Manual current recording 2=Phase A current exceeds the limit record； 3= Phase B current exceeds the limit record； 4= Phase C current exceeds the limit record； 5= Phase A voltage exceeds the limit record； 6= Phase B voltage exceeds the limit record 7= Phase C voltage exceeds the limit record 8= Phase A voltage lower limit alarm 9= Phase B voltage lower 10= Phase C voltage lower	word
0x1101	Group 1 Fault Record Recorded wave current（voltage）	0——65535 Current :（0~65.535） Voltage : (0~6553.5)	word
0x1102	Group 1 Fault Record year	2000~2999	word
0x1103	Group 1 Fault Record month	1~12	word
0x1104	Group 1 Fault Record day	1~31	word
0x1105	Group 1 Fault Record hour	0~23	word
0x1106	Group 1 Fault Record minute	0~59	word
0x1107	Group 1 Fault Record millisecond	0~59999	word
0x1108~0x1387	Group 1 Fault Record A phase voltage（current）1~10 cycles data (64 points per cycle)		word
0x1388~0x1607	Group 1 Fault Record B phase voltage（current）1~10 cycles data (64 points per cycle)		word
0x1608~0x1887	Group 1 Fault Record C phase voltage（current1~10 cycles data (64 points per cycle)		word
0x1888~0x200F	All parameters of the second group fault record	Same as the first group	word

0x2010~0x2797	All parameters of the third group fault record	Same as the first group	word
0x279E~0x2F26	All parameters of the 4th group fault record	Same as the first group	word
0x2F27~0x36B0	All parameters of the 5th group fault record	Same as the first group	word

Note：Common ferroelectric space data of fault record：（0x269C-0x1000+1）*2 = 11578bytes/1024 = 11.3K,

100 groups SOE(DI) +100groups SOE(DO)+100groups alarm record = 300*9 = 2700bytes /1024 = 2.63

Other space settings, Reserved 2K space is enough

The above statistics use a total of ferroelectric：11578+2700+2048 = 15.943k。

16k of ferroelectricity is used almost entirely according to the calculation.

According to above calculation：100groups SOE(DI) +100groups SOE(DO)+100groups alarm record+3 fault record（Each group is 3-phase voltage, or 3-phase current）

19, Power quality data

19.1 Voltage flicker, fluctuation data

Can use Modbus protocol 03H function code reading

Address	Parameter	Numerical range	Instruction	Data type
4000H	Phase that occurred short-term flicker	0	0：Phase A	Word
4001H	Short-term flicker value Pst			Floating point
4003H	The date when the last flicker occurred		0x20160629	BCD code
4005H	The time of the last flicker occurred		0x00162452	BCD code
4007H	ms value of the last flicker occurred time		0x00000300	BCD code
4009H	Phase that occurred short-term flicker	1	1：Phase B	Word
400AH	Short-term flicker value Pst			Floating point
400CH	The date when the last flicker occurred		0x20160629	BCD code
400EH	The time of the last flicker occurred		0x00162452	BCD code
4010H	ms value of the last flicker occurred time		0x00000300	BCD code
4012H	Phase that occurred short-term flicker	2	2： Phase C	Word
4013H	Short-term flicker value Pst			Floating point
4015H	The date when the last flicker occurred		0x20160629	BCD code
4017H	The time of the last flicker occurred		0x00162452	BCD code
4019H	ms value of the last flicker occurred time		0x00000300	BCD code
401BH	Phase that occurred long-term flicker	0	0： Phase A	Word
401CH	Long-term flicker value Pst			Floating point
401EH	The date when the last flicker occurred		0x20160629	BCD code
4020H	The time of the last flicker occurred		0x00162452	BCD code
4022H	ms value of the last flicker occurred time		0x00000300	BCD code
4024H	Phase that occurred long-term flicker	1	1： Phase B	Word
4025H	Long-term flicker value Pst			Floating point
4027H	The date when the last flicker occurred		0x20160629	BCD code

4029H	The time of the last flicker occurred		0x00162452	BCD code
402BH	ms value of the last flicker occurred time		0x00000300	BCD code
402DH	Phase that occurred long-term flicker	2	2：Phase C	Word
402EH	Long-term flicker value Pst			Floating point
4030H	The date when the last flicker occurred		0x20160629	BCD code
4032H	The time of the last flicker occurred		0x00162452	BCD code
4034H	ms value of the last flicker occurred time		0x00000300	BCD code
4036H	Phase that extreme value of fluctuation	0	0： Phase A	Word
4037H	Extreme value of fluctuation			Floating point
4039H	The date when the last fluctuation occurred		0x20160629	BCD code
403BH	The time of the last fluctuation occurred		0x00162452	BCD code
403DH	ms value of the last fluctuation occurred		0x00000300	BCD code
403FH	Phase that extreme value of fluctuation	1	1： Phase A	Word
4040H	Extreme value of fluctuation			Floating point
4042H	The date when the last fluctuation occurred		0x20160629	BCD code
4044H	The time of the last fluctuation occurred		0x00162452	BCD code
4046H	ms value of the last fluctuation occurred		0x00000300	BCD code
4048H	Phase that extreme value of fluctuation	0	0：Phase A	Word
4049H	Extreme value of fluctuation			Floating point
404BH	The date when the last fluctuation occurred		0x20160629	BCD code
404DH	The time of the last fluctuation occurred		0x00162452	BCD code
404FH	ms value of the last fluctuation occurred		0x00000300	BCD code

19.2 Record of voltage dip

A total of 50 voltage dip event records， can be read using the Modbus protocol 03H function code.

Address	Parameter	Numerical range	Instruction	Data type
4060H	The phase that the voltage dips occurs	0	0：Phase A 1：Phase B 2：Phase C	Word
4061H	Extreme of voltage dips		164.5V	Floating point
4063H	The date when the voltage dips occurred		0x20160629	BCD code
4065H	The time of voltage dips occurred		0x00162452	BCD code
4067H	ms value of the time of voltage dips occurred		0x00000300	Long Word
4069H	Voltage dip duration		0x00000500 Equivalent to 500ms	BCD code

406BH ~ 4286H	2~50 voltage dips events recorded with the same data format as above			

19.3 Voltage swell event record

A total of 50 voltage swell event records， can be read using the Modbus protocol 03H function code.

Address	Parameter	Numerical range	Instruction	Data type
4290H	The phase that the voltage dip occurs	0	0：Phase A 1：Phase B 2：Phase C	Word
4291H	Extreme of voltage swell		284V	Floating point
4293H	The date when the voltage swell occurred		0x20160629	BCD code
4295H	The time of voltage swell occurred		0x00162452	BCD code
4297H	ms value of the time of voltage swell occurred		0x00000300	Long Word
4299H	Voltage swell duration		0x00000500 Equivalent to 500ms	BCD code
429BH ~ 44B6H	2~50 voltage swell events recorded with the same data format as above			

19.4 Voltage interruption event record

A total of 50 voltage interruption event records， can be read using the Modbus protocol 03H function code.

Address	Parameter	Numerical range	Instruction	Data type
44C0H	The phase that the voltage interruption occurs	0	0：Phase A 1：Phase B 2：Phase C	Word
44C1H	Extreme of voltage interruption		0V	Floating point
44C3H	The date when the voltage interruption occurred		0x20160629	BCD code
44C5H	The time of voltage interruption occurred		0x00162452	BCD code

44C7H	ms value of the time of voltage interruption occurred		0x00000300	Long Word
44C9H	Voltage interruption duration		0x00000500 Equivalent to 500ms	BCD code
44CBH ~ 46E6H	2~50 voltage interruption events recorded with the same data format as above			

Annex

Transfer project：

3 phase 4 wire			**3 phase 3 wire**	
0	**Ua**		**0**	**Uab**
1	**Ub**		**1**	**Ubc**
2	**Uc**		**2**	**Uca**
3	**Ia**		**3**	**Ia**
4	**Ib**		**4**	**Ib**
5	**Ic**		**5**	**Ic**
6	**Uab**		**6**	**PS**
7	**Ubc**		**7**	**QS**
8	**Uca**		**8**	**SS**
9	**Pa**		**9**	**PFs**
10	**Pb**		**10**	**F**
11	**Pc**			
12	**Ps**			
13	**Qa**			
14	**Qb**			
15	**Qc**			
16	**Qs**			
17	**Sa**			
18	**Sb**			
19	**Sc**			
20	**Ss**			
21	**PFa**			
22	**Pfb**			
23	**PFc**			
24	**PFs**			
25	**F**			

Instruction：***P=(Px-12)×Pe×CT×PT／8***

Px is the measured value of analog， Unit: ***mA***;

Pe is the corresponding rated power value， Unit: ***W***

Different voltage levels correspond to different PE values, as follows:

200V/5A：*Pe*=3000W

200V/1A：*Pe*=600W

100V/5A：*Pe*=1500W

100V/1A：*Pe*=300W

Active power and reactive power follow the power curve