KPM37 Three-phase DIN rail smart energy meter

MODBUS-RTU Communication protocol _V1.0

Content

KPM37 provides the MODBUS-RTU communication protocol, a start, 8-bit data bits, 1/0 parity, 1/2 stop bits, each with a length of 11 bits.
Supported baud rates: 1200bps, 2400bps, 4800bps, 9600bps, 19200bps.
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	CRC 16 Hi	CRC16 Lo
00H	03H	xxH	xxH	00H	xxH	xxH	xxH

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

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

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 check code 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 Control and output status 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	FFH	00H	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	FFH	00H	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:

The slave responds to the host's data frame. Contains slave address, function code, number of data byte, relay status data, and CRC error check. Each relay in the data packet occupies one bit (1 = ON, 0 = OFF). Least significant bit of the first byte is the addressed relay state value, the rest are arranged in order of high position, and the useless bits are 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 DI status ON / OFF (1 = ON, 0 = OFF). In addition to the slave address and the function field, the data frame

needs to include the initial address and the DI number 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 DI2 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	02H	xx	xx

Response data frame:

The response contains the slave address, function code, number of data, packet and CRC error 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).

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

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 0x0000 is a relay open, 0xFF55 is relay close.

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

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 ratio	0~9999	Word
0004H	Current ratio	0~9999	Word
0005H	Wiring	0~2 3LN 3CT three-phase four-wire 3CT 2LL 2CT three-phase three-wire 2CT 2LL 3CT three-phase three-wire 3CT	Word
0006H	Reserved		
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	Reserved		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 electricity immediately	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
0012H	System running time statistics.	unsigned int	min
0014H	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 10H 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		
0066H	Negative sequence voltage U1		
0068H	Positive sequence current I1		
006AH	Negative sequence current I1		
006CH	Voltage unbalance Yv	Floating point	%
006EH	Current imbalance Yi	Floating point	%
0070H	Active demand		
0072H	Reactive demand		
0074H	Apparent demand		
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, 2~31th 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 ratio	0~1000	0~100.0%	Word
0104H	Ua or Uab even harmonic distortion ratio	0~1000	0~100.0%	Word
0105H	Ub odd harmonic distortion ratio	0~1000	0~100.0%	Word
0106H	Ub even harmonic distortion ratio	0~1000	0~100.0%	Word
0107H	Uc or Ubc odd harmonic distortion ratio	0~1000	0~100.0%	Word
0108H	Uc or Ubc even harmonic distortion ratio	0~1000	0~100.0%	Word
0109H	Ia Total Harmonic Distortion ratio THD_I1	0~1000	0~100.0%	Word
010AH	Ib Total Harmonic Distortion ratio THD_I2	0~1000	0~100.0%	Word
010BH	Ic Total Harmonic Distortion ratio THD_I3	0~1000	0~100.0%	Word
010CH	Ia odd harmonic distortion ratio	0~1000	0~100.0%	Word
010DH	Ia even harmonic distortion ratio	0~1000	0~100.0%	Word
010EH	Ib odd harmonic distortion ratio	0~1000	0~100.0%	Word
010FH	Ib even harmonic distortion ratio	0~1000	0~100.0%	Word
0110H	Ic odd harmonic distortion ratio	0~1000	0~100.0%	Word
0111H	Ic even harmonic distortion ratio	0~1000	0~100.0%	Word
0112H	Va or Vab Crest factor	0~65535	65.535	Word
0113H	Vb or Vbc Crest factor	0~65535	65.535	Word
0114H	Vc or Vca Crest factor	0~65535	65.535	Word
0115H	Ia K factor	0~65535	65.535	Word
0116H	Ib K factor	0~65535	65.535	Word
0117H	Ic K factor	0~65535	65.535	Word
0120H~013DH	Ua or Uab harmonic content ratio （2-31harmonics）	0~1000	0~100.0%	Word
015EH~017BH	Ub harmonic content ratio（2-31harmonics）	0~1000	0~100.0%	Word
019CH~01B9H	Uc or Ucb harmonic content ratio （2-31harmonics）	0~1000	0~100.0%	Word
01DAH~01F7H	Ia harmonic content ratio（2-31harmonics））	0~1000	0~100.0%	Word
0218H~0	Ib harmonic content ratio（2-31harmonics）	0~1000	0~100.0%	Word

235H				
0256H~0273H	Ic harmonic content ratio（2-31harmonics）)	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, 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	Phase angle difference between Ub and Ua	0~3600	Three-phase four-wire: 0~360.0°	Word
0301H	Phase angle difference between Uc and 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	Phase angle difference between Ubc and 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. Relay settings

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

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 anti-shake time	0~9999 mS(system default 20ms)	20	Word
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 — Electrical level output	0	Word

11. 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 and the relays will be output in a pulse mode after the alarm occurs. If this alarm condition is continually 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 continually 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

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

Address	Parameter	Explanation of meaning	Numerical range	Defaults	Data type
0470H	Alarm group open/close	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

12. The multi-rate electricity tariff setting region and segment time

Region, divided into four time zones, eight time slots.
Section setting for time-sharing: Up to 4 time zones (or seasonal) can be set. Each time zone can be set up to 8 time slots. Each time zone can be assigned to four rates (point, peak, valley, flat).
Time zones and time slots are not set to "seconds", and seconds are defaulted to 0 seconds.

Time zone setting format: The first time zone start time is 0:0 on January 1st, and the start time zones of the remaining segments are the end time of the previous segment. The last time period must be set to 24:00 on December 31. If you do not need multiple time zones, you only need to set the last time zone to 24:00 on December 31. If there is an error in the time zone, the last time zone defaults to 24:00 on December 31st.
Time slots setting format: The default starting time of the first segment is 00:00, the starting time of the remaining segments is the ending time of the previous segment, and the last segment must be set to 24:00. If no time slot is required, then the last paragraph required is set to a time of 24:00.

Users can choose different time zones and different time slots to meet individual needs. However, in order to ensure that the time setting is reasonable and effective, the

meter will perform a strict time setting check. If the setting is correct and the time-sharing function is turned on, the time-division metering will be performed, otherwise the time-sharing meter will not be performed.

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

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

The time zone setting must be enabled at least one time zone, the time slot is checked from the end time of the first time zone of the present time zone, to find the rates less than the end time of the first accumulation period.

Multi-rate setting parameters required:

1. The end time of the last enabled time zone must be December 31st, 24:00., otherwise it defaults to December 31st, 24:00.
2. The end time of the previous period in the time period must be less than the end time of the next period
3. If the user setting is unreasonable, an error will occur in time-division measurement.

Address	Parameters	Data range	Data type
0500H	Enabled time zone 1	1~4	Word
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	1st time zone 1st segment end time	Hour： 0~24 Minute： 0~59	Word
0513H~ 0514H	1st time zone 2nd segment end time	Hour： 0~24 Minute： 0~59	Word
0515H~ 0516H	1st time zone 3rd segment end time	Hour： 0~24 Minute： 0~59	Word
0517H~ 0518H	1st time zone 4th segment end time	Hour： 0~24 Minute： 0~59	Word
0519H~ 051AH	1st time zone 5th segment end	Hour： 0~24 Minute：	Word

	time	0~59	
051BH~ 051CH	1st time zone 6th segment end time	Hour：0~24 Minute：0~59	Word
051DH~ 051EH	1st time zone 7th segment end time	Hour：0~24 Minute：0~59	Word
051FH~ 0520H	1st time zone 8th segment end time	Hour：0~24 Minute：0~59	Word
0521H	1st time zone 1st segment tariff	0~3(Corresponds sharp, peak, flat, valley)	Word
0522H	1st time zone 2nd segment tariff	0~3(Corresponds sharp, peak, flat, valley)	Word
0523H	1st time zone 3rd segment tariff	0~3(Corresponds sharp, peak, flat, valley)	Word
0524H	1st time zone 4th segment tariff	0~3(Corresponds sharp, peak, flat, valley)	Word
0525H	1st time zone 5th segment tariff	0~3(Corresponds sharp, peak, flat, valley)	Word
0526H	1st time zone 6th segment tariff	0~3(Corresponds sharp, peak, flat, valley)	Word
0527H	1st time zone 7th segment tariff	0~3(Corresponds sharp, peak, flat, valley)	Word
0528H	1st time zone 8th segment tariff	0~3(Corresponds sharp, peak, flat, valley)	Word
0529H~0540H	2nd time zone setting	Same as 1st time zone	Word
0541H~0558H	3rd time zone setting	Same as 1st time zone	Word
0559H~0570H	3rd time zone setting	Same as 1st time zone	Word

13. Multi-rate electric energy parameters

The parameters of this area are the cumulative amount of energy, which can be read by Modbus protocol 03H function code.

Address	Parameters	Value range	Unit	Data type
Four quadrant energy				
0580H	Total positive active energy		kWh	Floating point
0582H	Total negative active energy		kWh	Floating point
0584H	Total inductive reactive energy		kvarh	Floating point
0586H	Total capacitive reactive energy		kvarh	Floating point
Total time slot energy				
0588H	Total active energy		kWh	Floating point
058AH	Total reactive energy		kvarh	Floating point
058CH	Current month total active energy		kWh	Floating point
058EH	Current month total reactive		kvarh	Floating point

	energy			
0590H	Last month total active energy		kWh	Floating point
0592H	Last month total reactive energy		kvarh	Floating point
0594H	Before last month total active energy		kWh	Floating point
0596H	Before last month total reactive energy		kvarh	Floating point
Peak time slot energy				
0598H	Total peak active energy		kWh	Floating point
059AH	Total peak reactive energy		kvarh	Floating point
059CH	Current month total peak active energy		kWh	Floating point
059EH	Current month total peak reactive energy		kvarh	Floating point
05A0H	Last month total peak active energy		kWh	Floating point
05A2H	Last month total peak reactive energy		kvarh	Floating point
05A4H	Before last month total peak active energy		kWh	Floating point
05A6H	Before last month total peak reactive energy		kvarh	Floating point
Sharp time slot energy				
05A8H	Total sharp active energy		kWh	Floating point
05AAH	Total sharp reactive energy		kvarh	Floating point
05ACH	Current month total sharp active energy		kWh	Floating point
05AEH	Current month total sharp reactive energy		kvarh	Floating point
05B0H	Last month total sharp active energy		kWh	Floating point
05B2H	Last month total sharp reactive energy		kvarh	Floating point
05B4H	Before last month total sharp active energy		kWh	Floating point
05B6H	Before last month total sharp reactive energy		kvarh	Floating point
Flat time slot energy				
05B8H	Total flat active energy		kWh	Floating point
05BAH	Total flat reactive energy		kvarh	Floating point
05BCH	Current month total flat active energy		kWh	Floating point
05BEH	Current month total flat reactive		kvarh	Floating point

	energy			
05C0H	Last month total flat active energy		kWh	Floating point
05C2H	Last month total flat reactive energy		kvarh	Floating point
05C4H	Before last month total flat active energy		kWh	Floating point
05C6H	Before last month total flat reactive energy		kvarh	Floating point
Valley time slot energy				
05C8H	Total valley active energy		kWh	Floating point
05CAH	Total valley reactive energy		kvarh	Floating point
05CCH	Current month total valley active energy		kWh	Floating point
05CEH	Current month total valley reactive energy		kvarh	Floating point
05D0H	Last month total valley active energy		kWh	Floating point
05D2H	Last month total valley reactive energy		kvarh	Floating point
05D4H	Before last month total valley active energy		kWh	Floating point
05D6H	Before last month total valley reactive energy		kvarh	Floating point
Average power factor				
05DAH	Current month average power factor			Floating point
05DCH	Last month average power factor			Floating point
05DEH	Before last month average power factor			Floating point
Split phase energy metering				
05E0H	Phase A positive active energy		kWh	Floating point
05E2H	Phase A negative active energy		kWh	Floating point
05E4H	Phase A positive reactive energy		kvarh	Floating point
05E6H	Phase A negative reactive energy		kvarh	Floating point
05E8H	Phase B positive active energy		kWh	Floating point
05EAH	Phase B negative active energy		kWh	Floating point
05ECH	Phase B positive reactive energy		kvarh	Floating point
05EEH	Phase B negative reactive energy		kvarh	Floating point
05F0H	Phase C positive active energy		kWh	Floating point
05F2H	Phase C negative active energy		kWh	Floating point
05F4H	Phase C positive reactive energy		kvarh	Floating point
05F6H	Phase C negative reactive energy		kvarh	Floating point

14. 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	Ua max occurred moments	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	Ub max Occurred moments	Same as Ua time format	Word	
0330H	Uc max		Floating point	V
0332H~0337H	Uc max Occurred moments	Same as Ua time format	Word	
0338H	Uab max		Floating point	V
033AH~033FH	Uab max Occurred moments	Same as Ua time format		
0340H	Ubc max		Floating point	V
0342H~0347H	Ubc max Occurred moments	Same as Ua time format		
0348H	Uca max		Floating point	V
034AH~034FH	Uca max Occurred moments	Same as Ua time format		
0350H	Ia max		Floating point	A
0352H~0357H	Ia max Occurred moments	Same as Ua time format		
0358H	Ib max Ib		Floating point	A
035AH~035FH	Ib max Occurred moments	Same as Ua time format		
0360H	Ic max		Floating point	A
0362H~0367H	Ic max Occurred moments	Same as Ua time format		
0368H	System active power maximum		Floating point	W
036AH~036FH	P max Occurred moments	Same as Ua time format		

0370H	System reactive power maximum		Floating point	var
0372H~0377H	Q max Occurred moments	Same as Ua time format		
0378H	System apparent power maximum		Floating point	VA
037AH~037FH	S max Occurred moments	Same as Ua time format		
0380H	System power factor maximum		Floating point	
0382H~0387H	PF max Occurred moments	Same as Ua time format		
0388H	Frequency maximum		Floating point	Hz
038AH~038FH	F max Occurred moments	Same as Ua time format		
0390H	Maximum voltage imbalance			%
0392H~0397H	Maximum voltage imbalance occurs moments	Same as Ua time format		
0398H	Current imbalance maximum			%
039AH~039FH	Maximum current imbalance occurs moment	Same as Ua time format		
03A0H	System active power demand maximum		Floating point	
03A2H~03A7H	System active power demand maximum occurs moment	Same as Ua time format		
03A8H	System reactive power demand maximum		Floating point	
03AAH~03AFH	System reactive power demand maximum occurs moment	Same as Ua time format		
03B0H	System apparent power demand maximum		Floating point	
03B2H~03B7H	System apparent power demand maximum occurs moment	Same as Ua time format		
03B8H	Temperature maximum		Floating point	℃
03BAH~03BFH	Temperature max occurred moments	Same as Ua time format		
Minimum record				
03C0H	Ua min		Floating point	V
03C2H~03C7H	Ua min Occurred moments			
03C8H	Ub min		Floating point	V
03CAH~03CFH	Ub min Occurred moments	Same as Ua time format	Word	
03D0H	Uc min		Floating point	V
03D2H~03D7H	Uc min Occurred moments	Same as Ua time format	Word	
03D8H	Uab min		Floating point	V
03DAH~03DFH	Uab min Occurred moments	Same as Ua time format		

03E0H	Ubc min		Floating point	V
03E2H~03E7H	Ubc min Occurred moments	Same as Ua time format		
03E8H	Uca min		Floating point	V
03EAH~03EFH	Uca min Occurred moments	Same as Ua time format		
03F0H	Ia min		Floating point	A
03F2H~03F7H	Ia min Occurred moments	Same as Ua time format		
03F8H	Ib min Ib		Floating point	A
03FAH~03FFH	Ib min Occurred moments	Same as Ua time format		
0400H	Ic min		Floating point	A
0402H~0407H	Ic min Occurred moments	Same as Ua time format		
0408H	System active power minimum		Floating point	W
040AH~040FH	P min Occurred moments	Same as Ua time format		
0410H	System reactive power minimum		Floating point	var
0412H~0417H	Q min Occurred moments	Same as Ua time format		
0418H	System apparent power minimum		Floating point	VA
041AH~041FH	S min Occurred moments	Same as Ua time format		
0420H	System power factor minimum		Floating point	
0422H~0427H	PF min Occurred moments	Same as Ua time format		
0428H	Frequency minimum		Floating point	Hz
042AH~042FH	F min Occurred moments	Same as Ua time format		
0430H	Voltage imbalance minimum			%
0432H~0437H	Voltage imbalance Occurred moments	Same as Ua time format		
0438H	Current imbalance minimum		Floating point	%
043AH~043FH	Current imbalance minimum Occurred moments	Same as Ua time format		
0440H	System active power demand minimum		Floating point	
0442H~0447H	System active power demand minimum occurs moment	Same as Ua time format		
0448H	System reactive power demand minimum		Floating point	
044AH~044FH	System reactive power demand minimum occurs moment	Same as Ua time format		
0450H	System apparent power demand minimum		Floating point	
0452H~0457H	System apparent power demand minimum occurs moment	Same as Ua time format		

0458H	Temperature minimum		Floating point	℃
045AH~045FH	Occurred moments of temperature min	Same as Ua time format		