Data center power supply monitoring solution

1 General

With the development of data center, the problem of energy consumption is also prominent. Energy management and design of power supply and distribution for data center has been a hot issue. High efficient and reliable power distribution solution for data center is an effective way for improving efficiency of power usage for data center and lowering energy consumption. To realize the energy saving for data center, it is necessary to monitor every load accurately. However, as there are too many load circuits in data center, it is hard for traditional meters to meet the requirements of cost, dimension, installation, construction, etc. Therefore, multi-circuit monitoring device is needed for centralized monitoring for data center.

Acrel AMC16 series multi-circuit monitoring device is specially designed for the power management of center data server in data center. This device is small and exquisite, which can monitor electric parameters and switching state from as many as dozens of circuits besides input circuit and output circuit in a centralized way. It realizes high centralization of monitoring circuits in the dimension of traditional meter.

2 Technical features

<table>
<tr><th colspan="2">Model
Technical parameters</th><th>AMC16-MA</th><th>AMC16-MAH</th><th>AMC16-Z</th><th>AMC16-ZH</th><th>AMC16-MH</th><th>AMC16-MD</th><th>AMC16-K</th><th>AMC16-E3（4）</th><th>AMC16-E3（4）/S</th><th>AMC16-E3（4）/A</th></tr>
<tr><td rowspan="3">Bus voltage</td><td>Rated input</td><td colspan="4">AC220V</td><td colspan="2">DC 48V</td><td rowspan="4">/</td><td colspan="3">AC220V</td></tr>
<tr><td>Measurement range</td><td colspan="4">AC 40 ~ 400V</td><td colspan="2">DC 48V±20%</td><td colspan="3">AC 40 ~ 400V</td></tr>
<tr><td>Over load</td><td colspan="6">Double transient voltage/30s</td><td colspan="3">Double transient voltage/30s</td></tr>
<tr><td>Current circuit</td><td>Rated input</td><td colspan="5">Input:5A, Output:20mA</td><td>5V</td><td>5A</td><td>10mA or 5A</td></tr>
</table>

	Measurement range	Input:5-10000A,Output:0.25 ~ 120A	Input5-10000A；Output：0.25 ~ 60A	Self-set		5-10000A	Rated input 5-10000A；Rated input 20mA：0-200A
	Overload	Double continuously and 10times/5s transiently				Double continuously and 10times/5s transiently	
Input frequency		45 ~ 60Hz		/	45-60Hz	45-65Hz	
Power supply		AC85-265V or DC100V-350V		DC 48V±20%	AC85-265V or DC100V-350V	AC85-265V	DC48V
accuracy	Input	For input circuit: 1.0 For output circuit:2.0			/	For current and voltage: 0.5 For power and Kwh: 1.0	For 5A input current and 10mA input current: 1.0 For voltage:0.5 For power and Kwh:1.0
Relay output		5A/250VAC or 5A/30VDC					
Switching state		No	21 active contacts 1 passive contact	4 passive contacts	No	38 active contacts 4 passive contacts	2 passive contacts
Communication		RS485 Modbus-RTU protocol					
Power consumption		5VA					

Insulation resistance		100MΩ
Industrial frequency withstand voltage		Power/input/output AC 2kV/1min 50Hz
Environment	Temperature	Operation-15℃ ~ +55℃ storage：-25℃ ~ +70℃
	Humidity	Relative humidity≤93%
	Altitude	≤2500m

3 Specifications

Function \ Model		AMC16 MA	AMC16 MAH	AMC16Z	AMC16 ZH	AMC16 MH	AMC16 MD		AMC16 K	AMC16-E3（4）	AMC16-E3（4）/S	AMC16-E3（4）/A
Measurement system		AC	■	■	■	■	■		■	■	■	■
		DC						■	■			
measurement parameters	Input circuit	No. of circuits	2	2	1	1	2	1		1	1	1
		Voltage	■	■	■	■	■	■		■	■	■

		Active and reactive power	■	■	■	■	■			■	■	■
	Output circuit	NO. of Circuits	12(three phase)/36 single phase	12(three phase)/ 36 single phase	7(three phase)/ 21 single phase	7(three phase)/21 single phase	28(three phase) /84 single phase	42 single phase				
		Current	■	■	■	■	■	■				
		Active and reactive power	■	■	■	■	■					
		Power factor	■	■	■	■	■					
		Active and reactive Kwh	■	■	■	■	■	■ (Only active Kwh)				
		Max demand					■					

		zero-sequence voltage、zero-sequence current					■					
		Leak current					□					
		Temperature testing					□ 2 circuits					
Power Quality analysis	Input circuit	Total harmonic of voltage and current		■		■						
		2^{nd}~15^{th} sub harmonic of current and voltage		■		■						
	Output circuit	Total harmonic of voltage and current		■ Only for current		■ Only for current	■					

		2^{nd}~15^{th} sub harmonic of current and voltage		■ Only for current		■ Only for current	■					
Switching input		Passive			■ 1 circuit	■ 1 circuit	■ 4 circuits		■circuits	■ 2 circuits	■ 2 circuits	■ 2 circuits
		Active			■ 21 circuits	■ 21 circuits			■ 38 circuits			
Relay output		■ 1 circuit		■ 1 circuit	■ 1 circuit	■ 1 circuit	■ 2 circuits	■ 1 circuit	■ 1 circuit	■ 1 circuit	■ 1 circuit	■ 1 circuit
Communication (Modbus-RTU)	1 circuit		■	■	■	■	■	■	■	■		■
	2 circuits						□					

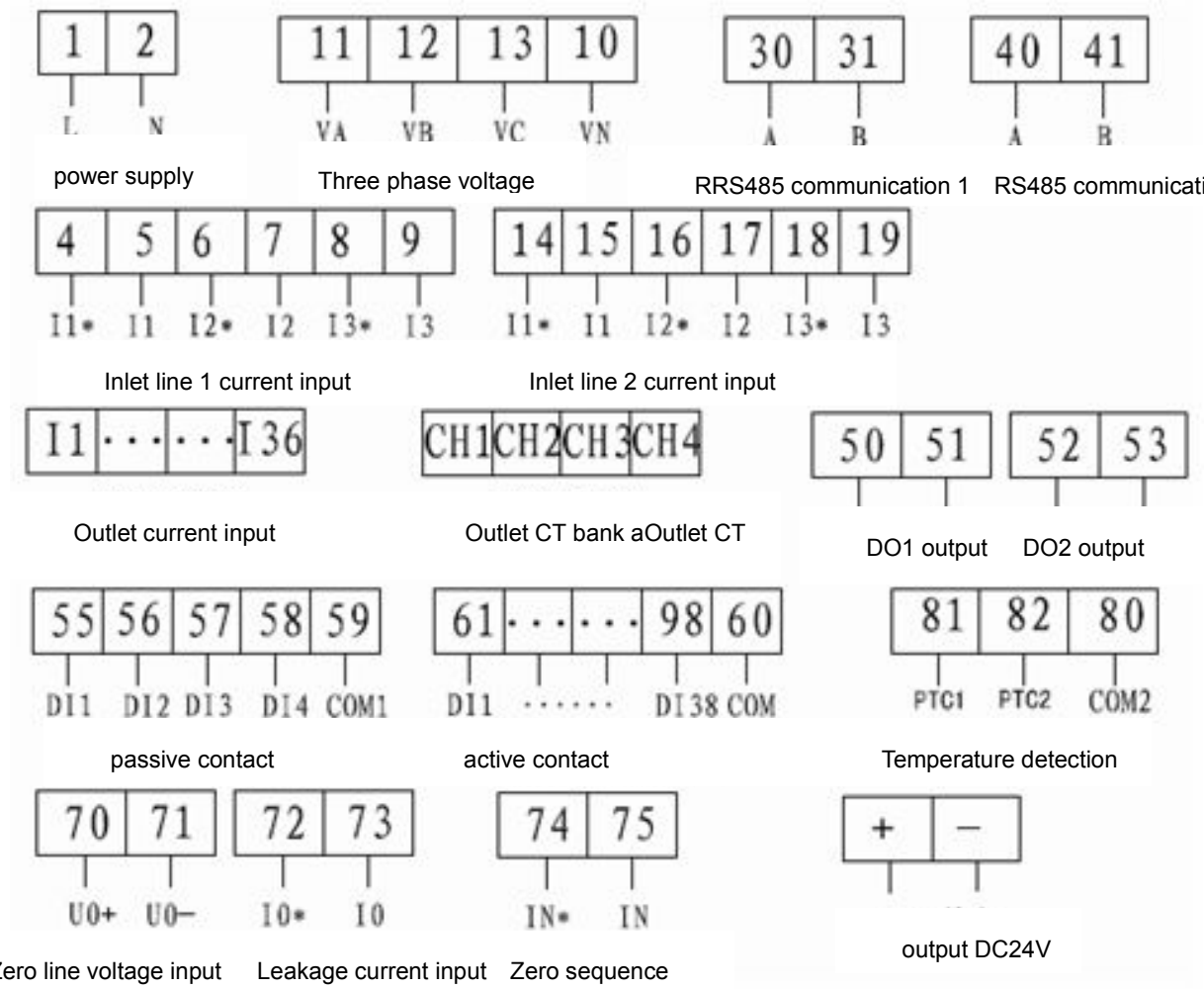
Notes:AMC16-E3(4)/S measures grid power and gas generator power separately. AMC16-E3(4)/A has specially designed thunder protecting circuits applicable for outdoor telecommunication station.

Appendix

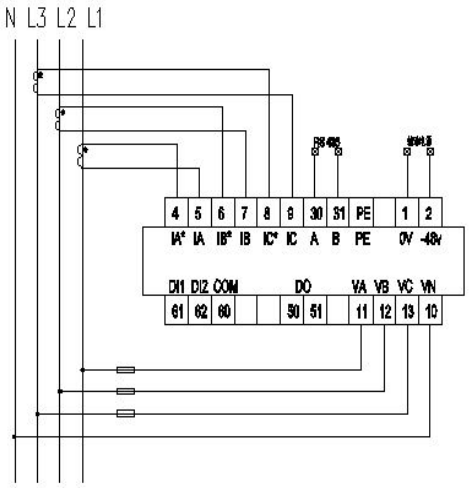
Name of Product	Model	Input	Output	Notes
Current transformer	AKH-0.66-W-12（B）	100A	20mA	Inner diameter Φ12mm
Current transformer bank	AMC16MH-CT	50A		Current transformer bank with 21 as a group and connected by bank line
Hall current sensor	AHBC-LTA	100A	50mA	Inner diameter Φ20mm
Switch Power supply	D-20	220V	±15V	With Hall current transformer
	SBD-30	±48V	±15V	
Residual current transformer	AKH-0.66L	5A	5mA	
Temperature sensor	NTC	/	/	0~120℃ temperature monitoring criterion

4 Connection

- AMC16-M/Z



- AMC16-E4



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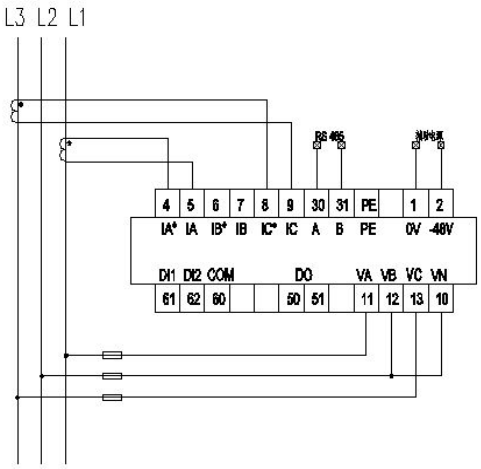


AMC16M

Terminal NO.	Definition	Illustration	Notes
1	L	AC input	AC220V
2	N		
4	IA1*	Inlet line 1, A phase current	
5	IA1		For AC, connected with ground, For DC, connected with the ground of power supply.
6	IB1*	Inlet line 1, B phase current	
7	IB1		For AC, connected with ground, For DC, connected with the ground of power supply.
8	IC1*	Inlet line 1, C phase current	
9	IC1		For AC, connected with ground, For DC, connected with the ground of power supply.
10	UN	AC voltage null line	
11	UA	AC voltage A phase	
12	UB	AC voltage B phase	Parallelly Connected with 11 for single phase or DC
13	UC	AC voltage C phase	Parallelly Connected with 11 for single phase or DC
14	IA2*	Inlet line 2, A phase current	
15	IA2		For AC, connected with ground, For DC, connected with the ground of power supply.
16	IB2*	Inlet line 2, B phase current	
17	IB2		For AC, connected with ground, For DC, connected with the ground of power supply.
18	IC2*	Inlet line 2, C phase current	

19	IC2		For AC, connected with ground, For DC, connected with the ground of power supply.
21	L	DC input	DC48V
22	N		
30	A1	RS485 communication 1	
31	B1		
40	A2	RS485 communication 2	
41	B2		
50		Switching output	
51			
I1 ~ I36	+	Outlet current	For AC signal,"-" is connected with negative terminal of transformer and can't be connected with the ground. For DC signal,"-" is connected with the ground of the power supply.
	-		
Addr1	Address 1	Address setting for Communication 1	Please refer to device panel for setting method
Addr2	Address 2	Address setting for Communication 2	
Baud1	Baud rate 1	Baud rate setting for Communication 1	
Baud2	Baud rate 2	Baud rate setting for Communication 2	
Clr.e		Kwh Zero clearance	Please refer to "Part 6 parameter setting" for setting method

AMC16Z

Terminal No.	Definition	Illustration	Notes
1	L	AC power input	AC220V
2	N		
4	IA*	Inlet current A phase	
5	IA		Directly connected with the ground
6	IB*	Inlet current B phase	
7	IB		Directly connected with the ground
8	IC*	Inlet current C phase	
9	IC		Directly connected with the ground
10	UN	AC voltage null line	Active switching input common port
11	UA	AC voltage A phase	
12	UB	AC voltage B phase	Parallelly Connected with 11 for single phase
13	UC	AC voltage C phase	Parallelly Connected with 11 for single phase
30	A1	RS485 communication 1	
31	B1		
50		Switching output	
51			
55	Switching input	Dry contact	Passive bus
59			
I1 ~ I7	+	Outlet current	For AC signal,"-" is connected with negative

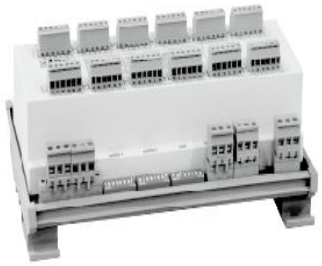
	-		terminal of transformer.
61 ~ 81	Switching input	Wet contact	A AC220V input
Add	Address	Address setting for communication	Please refer to device panel for setting method
Baud	Baud rate	Baud rate setting for communication	
Clr.e		Kwh Zero clearance	Please refer to “Part 6 parameter setting” for setting method

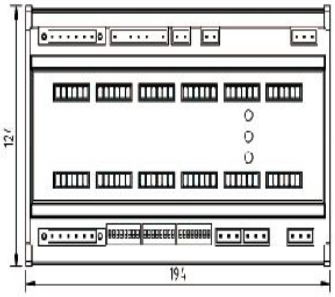
AMC16K

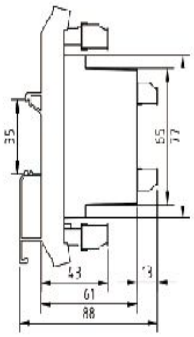
Terminal No.	Definition	Illustration	Notes
1	L	AC input	AC220V
2	N		
30	A	RS485 communication	
31	B		
50		Switching output	
51			
55 ~ 58	Switching input	Dry contact	Passive contact
59		Common port	
61 ~ 98	Switching input	Wet contact	AC220V input
Add	Address	Address setting for communication	Please refer to device panel for setting method
Baud	Baud	Baud rate setting for communication	

1 Outline and installation cutout size

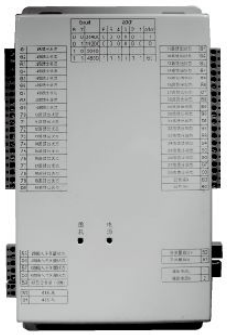
- AMC16M

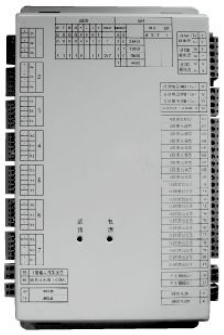


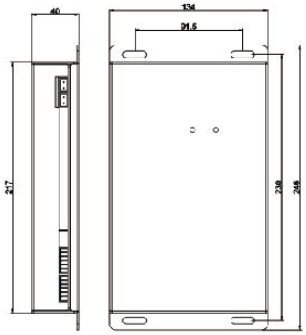




- AMC16Z、AMC16K







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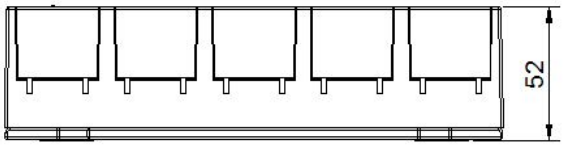
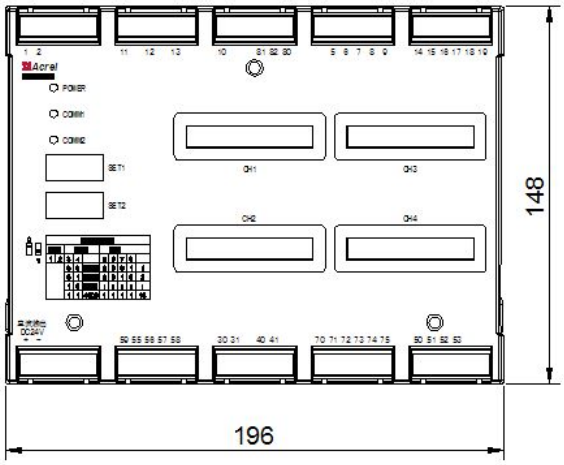
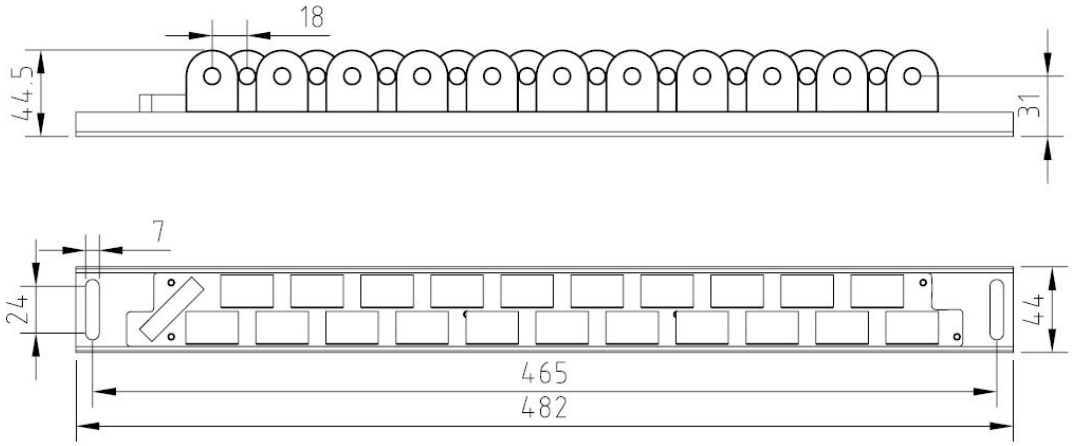
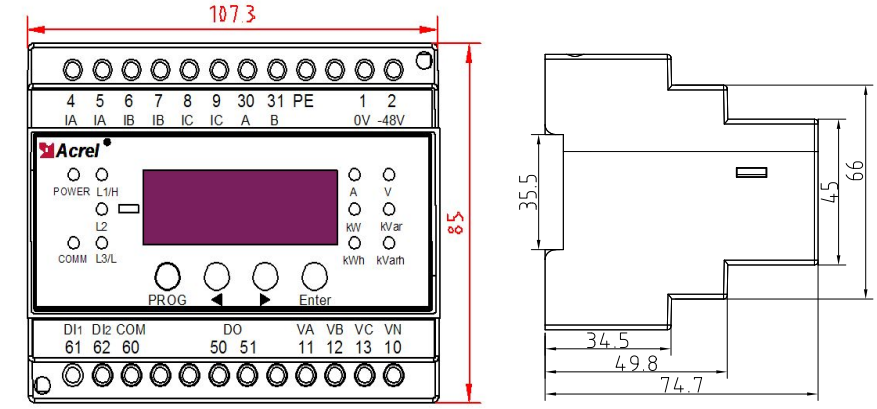


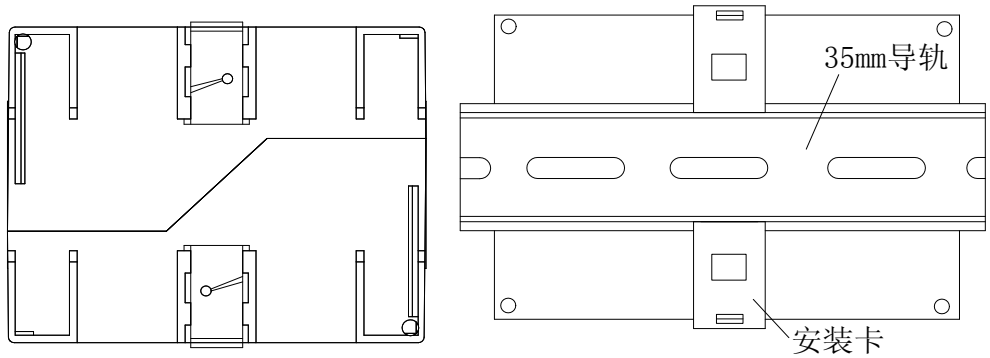


- AMC16MH-CT



- AMC16-E3(4)





2 *Ordering example*

2.1 Model: AMC16MA

Technical requirements: Input voltage AC220V, input current AC 5A,self-setting transformer ratio, outlet current transformer ratio AC100A/20mA, 2 inlet testing and 36 single phase(or 12 3-phase) outlet testing, 1 switching output.

Communication protocol: RS485 port Modbus/RTU protocol

Power supply:AC220V

(2)Model:AMC16MD

Technical requirements: input voltage DC 48V, input current DC50mA with self-setting. 42 DC testing, 1 switching output.

Communication protocol:RS485 port Modbus/RTU protocol

Power supply:DC48V

2.2 Model:AMC16-E4/A

Technical requirements: Input phase voltage AC220V, input current transformer ratio 2000A/5A(or 200A/10mA), 2 switching input and 1 relay output. Lightening protection 5kA.

Communication protocol: RS485 port Modbus/RTU protocol

Power supply: DC48V

2.3 Model: AMC16-E3

Technical requirements: input line voltage AC 380V, current transformer ratio 2000A/5A, 2 switching input and 1 relay output.

Communication protocol: RS485 port Modbus/RTU protocol

Power supply:AC/DC220V

2.4 Model:AMC16-E4/S

Technical requirements: input phase voltage AC 220V, current transformer ratio 2000A/5A, 2 switching input and 1 relay output.Measuring grid power and gas generator power separately.

Communication protocol:RS485 port Modbus/RTU protocol

Power supply:AC/DC220V

3 Communication protocol

This protocol stipulates protocols for the physical connections and communications between AMC16 Series multi-circuit monitoring device and data terminal equipments. The method of communication in this protocol is similar to Modbus-RTU.

3.1 General Description of this Protocol

The protocol used in AMC Series device defines data sequence for address code, function code and check code in a detailed way. These are necessary for specific data exchange. This protocol adopts master-slave for network communication in one communication wire (half duplex communication). This means that in a single communication wire signal will be transmitted in two opposite ways. First, the master computer signal addresses the only terminal equipment (slave computer), and then the response signal from the terminal

equipment returns to the master computer in the opposite direction.

This protocol allowed only in the host (PC, PLC) and the communication between terminal equipment between the terminal equipment, and does not allow the independent data exchange, so that each terminal device does not occupy the communication line in their initialization, and only reached the query response signal of the machine.7.2

Transmission Mode

Data are transmitted in an asynchronous way and measured by bytes. The communication between master computer and slave computer is 11-byte format, including 1 start bit, 8 data bits(the least significance bit will be sent first), parity bit and 2 stop bits.

3.2.1 Data Frame Format

Address Code	Function Code	Data Field	CRC Check Code
1 byte	1 byte	n byte	2 bytes

3.2.2 Address Field

Address field is located at the beginning of frame, made up of 1 byte(8-bit binary code), 0 ~ 255 in decimal system, only 1 ~ 247 used in our system, retaining other addresses. These bits set addresses for the terminal equipment designated by users. The equipment will receive data from master computer connected to it. The address for the terminal equipment must be unique. Only the addressed terminal will respond to the query with this address. When the terminal responds a message, the address data in response will tell the master computer which terminal is communicating with it.

3.2.3 Function Field

Function field code tells the addressed terminal to carry out what function. The following table shows the function codes used in this series device, their definition and functions.

Code	Definition	Operation
03	Read Register	Acquire current binary system value in one or more register.
16	Multi-register	Set binary system value into a series multi-register.

3.2.4 Data field

Data field contains the data terminal needs to carry out specific functions or the data terminal collects when responding to a query. The data can be values, addresses or set parameters. For example, when function field code tells a terminal to read a register, data field needs to tell from which register and how many data to read. The embedded data and addresses vary with types and the contents in slave computers.

3.2.5Check Field

This field allows master computer and terminals to check the errors in data transmission. Sometimes, due to electric noise and other interference, data can be changed when transmitted from one equipment to

another. Error check can ensure that master computer or terminals will not respond to the changed data in transmission. This enhance the safety a

3.2.6 Error Checking Method

Error check field takes 2 bytes including a 16-bit binary value. CRC value is calculated by transmission equipment and then is added to data frame. Data receiving equipment will recalculate the CRC value when receiving the data and then compare them with the value in CRC field. If there is difference between the two values, then errors occur.

When CRC is in operation, it presets a 16-bit register all as 1 first and then calculate 8 bits of each byte in data frame and the current value in the register consecutively. Only the 8 bits in each byte engender CRC. Start bit, stop bit and parity bit won't affect CRC. When engendering CRC, the 8 bits in each byte will do XOR calculation with the values in the register and the result will shift towards low bit and high bit will be supplemented by 0. LSB will shift out and check. If LSB is 1, this register will do XOR calculation with a preset fixed value(0A001H) and if LSB is 0, then there is no related operation.

The above operation repeats until 8 bit-shifting is completed. When the last bit shift(the 8^{th} bit) is completed, the next 8-bit byte will do XOR calculation with the current value in register and in the same way do 8 bit shifts. After all the bytes in the data frame finish the above-mentioned operation, the final value is CRC value.

3.3 Description of Function Code

3.3.1 Function Code 02H: Read discrete magnitude input

This function code reads the consecutive state of discrete input from 1 to 2000.The requesting PDU designating the detailed starting address, which is the first designated input address and input no. Addressing input starts from 0. Therefore, addressing input 1-16 will be 0-15. According to every bit in the data field, the discrete input in the responding message shall be taken as an input. Indication status will be 1=ON and 0=OFF. The LSB (lowest bit) of the first data byte is included in the addressing input in query. Repeat the operation to other input until the high bit end in this byte and in the following bytes the order will be from low bit to high bit. If the returned input quantity is not the

The example below is from the 01 number from the machine readable DI7 ~ 10 consecutive switch state DI16

The HOST Sends		Send Information	From the machine returns	Returns Information
Address code		01H	Address code	01H
Function code		02H	Function code	02H
The starting address	high byte	00H	The number of bytes	02H
	Low byte	06H	Input of state14-7	3FH
Number of bytes output	High byte	00H	Input of state16-15	02H

	Low byte	0AH	CRC check code	Low byte	29H
CRC check code	low byte	18H		High byte	89H
	High byte	0CH			

The discrete input state 14-7 said sixteen hexadecimal byte value 3F or binary 00111111. The 14 is the input Bytes of MSB, 7 input is the byte LSB

The discrete input state 16-15 said sixteen hexadecimal byte values 02, or binary 00000010. Input 15 is LSB, zero fill the remaining bits in the last data byte

3.3.2 Function Code 03H: Read Register

This function allows users to obtain the data collected and recorded by equipment and system parameters. There is no limit to the number of data for master to query in one time. But it can't exceed the defined address range.

The following example is the data collected from No. 01 slave computer(each address takes 2 bytes in the data frame) UA, UB, UC. The address for UA is 0011H, for UB, 0012H and for UC, 0013H.

Master Sending		Message	Return from Slave		Returned message
Address Code		01H	Address Code		01H
Function Code		03H	Function Code		03H
Start Address	High Byte	00H	Number of bytes		06H
	Low Byte	03H	Register Data	High Byte	0EH
Num of Registers	High Byte	00H		Low Byte	EEH
	Low Byte	03H	Register Data	High Byte	0EH
CRC Check Code	Low Byte	F5H		Low Byte	E8H
	High Byte	CBH	Register Data	High Byte	0EH

				Low Byte	E9H
			CRC checking code	Low Byte	8FH
				High Byte	7EH

3.3.3The function code 06H: write a single register

The content of the function code 06H allows the user to change a single register, the instrument system parameters, the switch output state can use this function number written

The following example is preset address is 01 meters and switch quantity output DO. Switch output state register address 0045H, the corresponding DO closed data for 0x01.

HOST SENDS		SEND INFORMATION	From the machine returns		RETURNS INFORMATION
Address code		01H	Address code		01H
FUNCATION CODE		06H	FUNCATION CODE		06H
The starting address	HIGH BYTE	00H	The starting address	HIGH BYTE	00H
	LOW BYTE	45H		LOW BYTE	45H
0045H to write data	HIGH BYTE	00H	read-in data	HIGH BYTE	00H
	LOW BYTE	01H		LOW BYTE	01H
CRC Check Code	LOW BYTE	59H	CRC Check Code	LOW BYTE	59H
	HIGH BYTE	DFH		HIGH BYTE	DFH

3.3.4 Function Code 10H: Write multi-register

Function code 10H allows users to alter the contents in several registers. System parameters and switch output state can be written in by this function. At most, 16 (32-bit) data can be written in at a time.

The following example shows the switch signal DO from the meter with preset address 01. The address

for switch output state indicator register is 0045H. The 1st bit is for DO.

Master Sending		Message sent	Return From Slave		Message returned
Address Code		01H	Address Code		01H
Function Code		10H	Function Code		10H
Start Address	High Byte	00H	Start Address	High Byte	00H
	Low Byte	45H		Low Byte	45H
Num. of Registers	High Byte	00H	Num. of Registers	High Byte	00H
	Low Byte	01H		Low Byte	01H
Num. of bytes		02H	CRC checking code	Low Byte	10H
0045H Data to be written in	High Byte	00H		High Byte	1CH
	Low Byte	01H			
CCRC check code	Low Byte	69H			
	High Byte	05H			

3.4 Communication Address

Address		Parameters	Value range	R/W	Data Type
0	00H	Phase voltage 1	AC unsigned xxx.x V DC signed xx.xV	R	Word
1	01H	Phase voltage 2			
2	02H	Phase voltage 3			
3	03H	Line voltage 1			
4	04H	Line voltage 2			

5	05H	Line voltage 3			
6	06H	Frequency	Unsigned 0 ~ 99.99Hz	R	Word
7	07H	Inlet line 1: A phase(DC1) current	AC: unsigned secondary x.xxx A current multiplied by CT ratio to get primary current DC: signed primary side current xx.x A	R	Word
8	08H	Inlet line 1: B phase(DC2) current			
9	09H	Inlet line 1 :C phase(DC1) current			
10	0AH	Inlet line 1 :total active power	Signed secondary xx.xxx kW multiplied by CT ratio to get primary side value	R	Word
11	0BH	Inlet line 1 : total reactive power	Signed secondary xx.xxx kvar multiplied by CT ratio to get primary side value	R	Word
12	0CH	Inlet line 1 : total power factor	Signed-1.000 ~ 1.000	R	Word
13	0DH	Inlet line 1 : total active kWh high	Unsigned primary side value xx.xx kWh	R	DWord
14	0EH	Inlet line 1 : total active kWh low			
15	0FH	Inlet line 1 :total reactive kWh high	Unsigned primary side value xx.xx kvarh	R	DWord
16	10H	Inlet line 1 :total reactive kWh low			
17	11H	Inlet line 1 :A phase(DC 1) active power	AC: signed secondary xx.xx kW multiplied by CT ratio to get primary value DC: signed primary side xx.xx kW	R	Word
18	12H	Inlet line 1 : B phase(DC 2) active power			
19	13H	Inlet line 1 : B phase(DC 3) active power			
20	14H	Inlet line 1 :A phase reactive power	signed secondary xx.xx kvar multiplied by CT ratio to get primary value	R	Word
21	15H	Inlet line 1 :B phase reactive power			
22	16H	Inlet line 1 :C phase reactive power			
23	17H	Inlet line 1 :A phase power factor	Signed -1.000 ~ 1.000	R	Word
24	18H	Inlet line 1 :B phase power factor			
25	19H	Inlet line 1 :C phase power factor			
26	1AH	Inlet line 1 :A phase(DC 1) active kWh high	Unsigned primary value xx.xxkWh	R	DWord
27	1BH	Inlet line 1 :A phase(DC 1) active power low			
28	1CH	Inlet line 1 :B phase(DC 2) active kWh high			
29	1DH	Inlet line 1 :B phase(DC 2) active kWh low			
30	1EH	Inlet line 1 :C phase(DC 3) active kWh high			
31	1FH	Inlet line 1 :C phase(DC 3) active kWh low			
32	20H	Inlet line 1 :A phase reactive kWh high	Unsigned primary value xx.xx kvarh	R	DWord
33	21H	Inlet line 1 :A phase reactive kWh low			

34	22H	Inlet line 1 :B phase reactive kWh high			
35	23H	Inlet line 1 :B phase reactive kWh low			
36	24H	Inlet line 1 :C phase reactive kWh high			
37	25H	Inlet line 1 :C phase reactive kWh low			
38	26H	Inlet line 2:A phase(DC 4) current	AC: unsigned secondary x.xxx A current multiplied by CT ratio to get primary current DC: signed primary side current xx.x A	R	Word
39	27H	Inlet line 2:B phase(DC 5) current			
40	28H	Inlet line 2:C phase(DC 6) current			
41	29H	Inlet line 2 : total active power	Signed secondary xx.xxx kW multiplied by CT ratio to get primary side value	R	Word
42	2AH	Inlet line 2 : total reactive power	Signed secondary xx.xxx kvar multiplied by CT ratio to get primary side value	R	Word
43	2BH	Inlet line 2 : total power factor	Signed -1.000 ~ 1.000	R	Word
44	2CH	Inlet line 2 : total kWh high	Unsigned primary side value xx.xx kWh	R	DWord
45	2DH	Inlet line 2 : total kWh low			
46	2EH	Inlet line 2 : total reactive kWh high	Unsigned primary side value xx.xx kvarh	R	DWord
47	2FH	Inlet line 2 : total reactive kWh low			
48	30H	Inlet line 2: A phase(DC 4) active power	AC: signed secondary xx.xx kW multiplied by CT ratio to get primary value DC: signed primary side xx.xx kW	R	Word
49	31H	Inlet line 2: B phase(DC 5) active power			
50	32H	Inlet line 2: C phase(DC 6) active power			
51	33H	Inlet line 2: A phase reactive power	signed secondary xx.xxx kvar multiplied by CT ratio to get primary value	R	Word
52	34H	Inlet line 2: B phase reactive power			
53	35H	Inlet line 2: C phase reactive power			
54	36H	Inlet line 2: A phase power factor	Signed -1.000 ~ 1.000	R	Word
55	37H	Inlet line 2: B phase power factor			
56	38H	Inlet line 2: C phase power factor			
57	39H	Inlet line 2: A phase(DC 4) active kWh high	Unsigned primary value xx.xx kWh	R	DWord
58	3AH	Inlet line 2: A phase(DC 4) active kWh low			
59	3BH	Inlet line 2: B phase(DC 5) active kWh high			
60	3CH	Inlet line 2: B phase(DC 5) active kWh low			

61	3DH	Inlet line 2: C phase(DC 6) active kWh high			
62	3EH	Inlet line 2: C phase(DC 6) active kWh low			
63	3FH	Inlet line 2: A phase reactive kWh high	Unsigned primary value xx.xx kvarh	R	DWord
64	40H	Inlet line 2: A phase reactive kWh low			
65	41H	Inlet line 2: B phase reactive kWh high			
66	42H	Inlet line 2: B phase reactive kWh low			
67	43H	Inlet line 2: C phase reactive kWh high			
68	44H	Inlet line 2: C phase reactive kWh low			
69	45H	DO state (switching state output)	Bit0	R/W	Word
70	46H	Inlet line 1: A phase CT ratio	1 ~ 2000	R/W	Word
71	47H	Inlet line 1: B phase CT ratio			
72	48H	Inlet line 1: B phase CT ratio			
73	49H	Inlet line 2: A phase CT ratio			
74	4AH	Inlet line 2: B phase CT ratio			
75	4BH	Inlet line 2: B phase CT ratio			
76	4CH	Active switching state input state 1 ~ 16	bit15 ~ bit0：16th ~ 1st circuit input	R	
77	4DH	Active switching input state 17 ~ 32	bit15 ~ bit0：32th ~ 17th circuit input		
78	4EH	Active switching input state 33 ~ 40 Reactive switching input state	bit1、bit0：38th and 37th circuit input bit11 ~ bit8：4th ~ 1st input		
79	4FH	Standby			
80	50H	Outlet line L1A(1)/DC 7 current	AC:unsigned primary side xxx.xx A DC:signed primary side xxx.x A	R	Word
81	51H	Outlet line L1B(2) /DC8 current			
82	52H	Outlet line L1C(3) /DC9 current			
83	53H	Outlet line L2A(4) /DC10 current			
84	54H	Outlet line L2B(5) /DC11 current			
85	55H	Outlet line L2C(6) /DC12 current			
86	56H	Outlet line L3A(7) /DC13 current			
87	57H	Outlet line L3B(8) /DC14 current			
88	58H	Outlet line L3C(9) /DC15 current			
89	59H	Outlet line L4A(10) /DC16 current			
90	5AH	Outlet line L4B(11) /DC17 current			
91	5BH	Outlet line L4C(12) /DC18 current			
92	5CH	Outlet line L5A(13) /DC19 current			
93	5DH	Outlet line L5B(14) /DC20 current			
94	5EH	Outlet line L5C(15) /DC21 current			
95	5FH	Outlet line L6A(16) /DC22 current			

96	60H	Outlet line L6B(17) /DC23 current			
97	61H	Outlet line L6C(18) /DC24 current			
98	62H	Outlet line L7A(19) /DC25 current			
99	63H	Outlet line L7B(20) /DC26 current			
100	64H	Outlet line L7C(21) /DC27 current			
101	65H	Outlet line L8A(22) /DC28 current			
102	66H	Outlet line L8B(23) /DC29 current			
103	67H	Outlet line L8C(24) /DC30 current			
104	68H	Outlet line L9A(25) /DC31 current			
105	69H	Outlet line L9B(26) /DC32 current			
106	6AH	Outlet line L9C(27) /DC33 current			
107	6BH	Outlet line L10A(28) /DC34 current			
108	6CH	Outlet line L10B(29) /DC35 current			
109	6DH	Outlet line L10C(30) /DC36 current			
110	6EH	Outlet line L11A(31) /DC37 current			
111	6FH	Outlet line L11B(32) /DC38 current			
112	70H	Outlet line L11C(33) /DC39 current			
113	71H	Outlet line L12A(34) /DC40 current			
114	72H	Outlet line L12B(35) /DC41 current			
115	73H	Outlet line L12C(36) /DC42 current			
116	74H	Standby			
117	75H	Standby			
118	76H	Standby			
119	77H	Standby			
120	78H	Outlet line L1A(1) /DC7active power			
121	79H	Outlet line L1B(2) /DC8 active power			
122	7AH	Outlet line L1C(3) /DC9 active power			
123	7BH	Outlet line L2A(4) /DC10 active power			
124	7CH	Outlet line L2B(5) /DC11 active power			
125	7DH	Outlet line L2C(6) /DC12 active power			
126	7EH	Outlet line L3A(7) /DC13 active power			
127	7FH	Outlet line L3B(8) /DC14 active power			
128	80H	Outlet line L3C(9) /DC15 active power			
129	81H	Outlet line L4A(10) /DC16 active power	Signed primary side xx.xx kW	R	Word
130	82H	Outlet line L4B(11) /DC17 active power			
131	83H	Outlet line L4C(12) /DC18 active power			
132	84H	Outlet line L5A(13) /DC19 active power			
133	85H	Outlet line L5B(14) /DC20 active power			
134	86H	Outlet line L5C(15) /DC21 active power			
135	87H	Outlet line L6A(16) /DC22 active power			
136	88H	Outlet line L6B(17) /DC23 active power			
137	89H	Outlet line L6C(18) /DC24 active power			
138	8AH	Outlet line L7A(19) /DC25 active power			

139	8BH	Outlet line L7B(20) /DC26 active power			
140	8CH	Outlet line L7C(21) /DC27 active power			
141	8DH	Outlet line L8A(22) /DC28 active power			
142	8EH	Outlet line L8B(23) /DC29 active power			
143	8FH	Outlet line L8C(24) /DC30 active power			
144	90H	Outlet line L9A(25) /DC31 active power			
145	91H	Outlet line L9B(26) /DC32 active power			
146	92H	Outlet line L9C(27) /DC33 active power			
147	93H	Outlet line L10A(28) /DC34 active power			
148	94H	Outlet line L10B(29) /DC35 active power			
149	95H	Outlet line L10C(30) /DC36 active power			
150	96H	Outlet line L11A(31) /DC37 active power			
151	97H	Outlet line L11B(32) /DC38 active power			
152	98H	Outlet line L11C(33) /DC39 active power			
153	99H	Outlet line L12A(34) /DC40 active power			
154	9AH	Outlet line L12B(35) /DC41 active power			
155	9BH	Outlet line L12C(36) /DC42 active power			
156	9CH	Standby			
157	9DH	DC1 rated current			
158	9EH	DC2 rated current			
159	9FH	DC3 rated current			
160	A0H	Outlet line L1A(1)reactive power/DC4 rated current	AC reactive power: Signed primary side xx.xx kvar DC rated current：unsigned Xxx A	R R/W	Word
161	A 1H	Outlet line L1B(2) reactive power/DC5 rated current			
162	A 2H	Outlet line L1C(3) reactive power/DC6 rated current			
163	A 3H	Outlet line L2A(4) reactive power/DC7 rated current			
164	A 4H	Outlet line L2B(5) reactive power/DC8 rated current			
165	A 5H	Outlet line L2C(6) reactive power/DC9 rated current			
166	A 6H	Outlet line L3A(7) reactive power/DC10 rated current			
167	A 7H	Outlet line L3B(8) reactive power/DC11 rated current			
168	A 8H	Outlet line L3C(9) reactive power/DC12 rated current			
169	A 9H	Outlet line L4A(10) reactive power/DC13 rated current			
170	A AH	Outlet line L4B(11) reactive power/DC14 rated current			

171	A BH	Outlet line L4C(12) reactive power/DC15 rated current			
172	A CH	Outlet line L5A(13) reactive power/DC16 rated current			
173	A DH	Outlet line L5B(14) reactive power/DC17 rated current			
174	A EH	Outlet line L5C(15) reactive power/DC18 rated current			
175	A FH	Outlet line L6A(16) reactive power/DC19 rated current			
176	B0H	Outlet line L6B(17) reactive power/DC20 rated current			
177	B1H	Outlet line L6C(18) reactive power/DC21 rated current			
178	B2H	Outlet line L7A(19) reactive power/DC22 rated current			
179	B3H	Outlet line L7B(20) reactive power/DC23 rated current			
180	B4H	Outlet line L7C(21) reactive power/DC24 rated current			
181	B5H	Outlet line L8A(22) reactive power/DC25 rated current			
182	B6H	Outlet line L8B(23) reactive power/DC26 rated current			
183	B7H	Outlet line L8C(24) reactive power/DC27 rated current			
184	B8H	Outlet line L9A(25) reactive power/DC28 rated current			
185	B9H	Outlet line L9B(26) reactive power/DC29 rated current			
186	BAH	Outlet line L9C(27) reactive power/DC30 rated current			
187	BBH	Outlet line L10A(28) reactive power/DC31 rated current			
188	BCH	Outlet line L10B(29) reactive power/DC32 rated current			
189	BDH	Outlet line L10C(30) reactive power/DC33 rated current			
190	BEH	Outlet line L11A(31) reactive power/DC34 rated current			
191	BFH	Outlet line L11B(32) reactive power/DC35 rated current			
192	C0H	Outlet line L11C(33) reactive power/DC36 rated current			

193	C1H	Outlet line L12A(34) reactive power/DC37 rated current			
194	C2H	Outlet line L12B(35) reactive power/DC38 rated current			
195	C3H	Outlet line L12C(36) reactive power/DC39 rated current			
196	C4H	DC40 rated current			
197	C5H	DC41 rated current			
198	C6H	DC42 rated current			
199	C7H	Standby			
200	C8H	Outlet line L1A(1) power factor	-1.000 ~ 1.000	R	Word
201	C9H	Outlet line L1B(2) power factor			
202	CAH	Outlet line L1C(3) power factor			
203	CBH	Outlet line L2A(4) power factor			
204	CCH	Outlet line L2B(5) power factor			
205	CDH	Outlet line L2C(6) power factor			
206	CEH	Outlet line L3A(7) power factor			
207	CFH	Outlet line L3B(8) power factor			
208	D0H	Outlet line L3C(9) power factor			
209	D1H	Outlet line L4A(10) power factor			
210	D2H	Outlet line L4B(11) power factor			
211	D3H	Outlet line L4C(12) power factor			
212	D4H	Outlet line L5A(13) power factor			
213	D5H	Outlet line L5B(14) power factor			
214	D6H	Outlet line L5C(15) power factor			
215	D7H	Outlet line L6A(16) power factor			
216	D8H	Outlet line L6B(17) power factor			
217	D9H	Outlet line L6C(18) power factor			
218	DAH	Outlet line L7A(19) power factor			
219	DBH	Outlet line L7B(20) power factor			
220	DCH	Outlet line L7C(21) power factor			
221	DDH	Outlet line L8A(22) power factor			
222	DEH	Outlet line L8B(23) power factor			
223	DFH	Outlet line L8C(24) power factor			
224	E0H	Outlet line L9A(25) power factor			
225	E1H	Outlet line L9B(26) power factor			
226	E2H	Outlet line L9C(27) power factor			
227	E3H	Outlet line L10A(28) power factor			
228	E4H	Outlet line L10B(29) power factor			
229	E5H	Outlet line L10C(30) power factor			
230	E6H	Outlet line L11A(31) power factor			
231	E7H	Outlet line L11B(32) power factor			
232	E8H	Outlet line L11C(33) power factor			

233	E9H	Outlet line L12A(34) power factor			
234	EAH	Outlet line L12B(35) power factor			
235	EBH	Outlet line L12C(36) power factor			
236	ECH	Standby			
237	EDH	Standby			
238	EEH	Standby			
239	EFH	Standby			
240	F0H	Outlet line L1A(1)active kWh high	Unsigned primary side xx.xx kWh	R	DWord
241	F1H	Outlet line L1A(1)active kWh low			
242	F2H	Outlet line L1B(2)active kWh high			
243	F3H	Outlet line L1B(2)active kWh low			
244	F4H	Outlet line L1C(3)active kWh high			
245	F5H	Outlet line L1C(3)active kWh low			
246	F6H	Outlet line L2A(4)active kWh high			
247	F7H	Outlet line L2A(4)active kWh low			
248	F8H	Outlet line L2B(5)active kWh high			
249	F9H	Outlet line L2B(5)active kWh low			
250	FAH	Outlet line L2C(6)active kWh high			
251	FBH	Outlet line L2C(6)active kWh low			
252	FCH	Outlet line L3A(7)active kWh high			
253	FDH	Outlet line L3A(7)active kWh low			
254	FEH	Outlet line L3B(8)active kWh high			
255	FFH	Outlet line L3B(8)active kWh low			
256	100H	Outlet line L3C(9)active kWh high			
257	101H	Outlet line L3C(9)active kWh low			
258	102H	Outlet line L4A(10)active kWh high			
259	103H	Outlet line L4A(10)active kWh low			
260	104H	Outlet line L4B(11)active kWh high			
261	105H	Outlet line L4B(11)active kWh low			
262	106H	Outlet line L4C(12)active kWh high			
263	107H	Outlet line L4C(12)active kWh low			
264	108H	Outlet line L5A(13)active kWh high			
265	109H	Outlet line L5A(13)active kWh low			
266	10AH	Outlet line L5B(14)active kWh high			
267	10BH	Outlet line L5B(14)active kWh low			
268	10CH	Outlet line L5C(15)active kWh high			
269	10DH	Outlet line L5C(15)active kWh low			
270	10EH	Outlet line L6A(16)active kWh high			
271	10FH	Outlet line L6A(16)active kWh low			
272	110H	Outlet line L6B(17)active kWh high			
273	111H	Outlet line L6B(17)active kWh low			
274	112H	Outlet line L6C(18)active kWh high			
275	113H	Outlet line L6C(18)active kWh low			

276	114H	Outlet line L7A(19)active kWh high			
277	115H	Outlet line L7A(19)active kWh low			
278	116H	Outlet line L7B(20)active kWh high			
279	117H	Outlet line L7B(20)active kWh low			
280	118H	Outlet line L7C(21)active kWh high			
281	119H	Outlet line L7C(21)active kWh low			
282	11AH	Outlet line L8A(22)active kWh high			
283	11BH	Outlet line L8A(22)active kWh low			
284	11CH	Outlet line L8B(23)active kWh high			
285	11DH	Outlet line L8B(23)active kWh low			
286	11EH	Outlet line L8C(24)active kWh high			
287	11FH	Outlet line L8C(24)active kWh low			
288	120H	Outlet line L9A(25)active kWh high			
289	121H	Outlet line L9A(25)active kWh low			
290	122H	Outlet line L9B(26)active kWh high			
291	123H	Outlet line L9B(26)active kWh low			
292	124H	Outlet line L9C(27)active kWh high			
293	125H	Outlet line L9C(27)active kWh low			
294	126H	Outlet line L10A(28)active kWh high			
295	127H	Outlet line L10A(28)active kWh low			
296	128H	Outlet line L10B(29)active kWh high			
297	129H	Outlet line L10B(29)active kWh low			
298	12AH	Outlet line L10C(30)active kWh high			
299	12BH	Outlet line L10C(30)active kWh low			
300	12CH	Outlet line L11A(31)active kWh high			
301	12DH	Outlet line L11A(31)active kWh low			
302	12EH	Outlet line L11B(32)active kWh high			
303	12FH	Outlet line L11B(32)active kWh low			
304	130H	Outlet line L11C(33)active kWh high			
305	131H	Outlet line L11C(33)active kWh low			
306	132H	Outlet line L12A(34)active kWh high			
307	133H	Outlet line L12A(34)active kWh low			
308	134H	Outlet line L12B(35)active kWh high			
309	135H	Outlet line L12B(35)active kWh low			
310	136H	Outlet line L12C(36)active kWh high			
311	137H	Outlet line L12C(36)active kWh low			
312	138H	Standby			
313	139H	Standby			
314	13AH	Standby			
315	13BH	Standby			
316	13CH	Standby			
317	13DH	Standby			
318	13EH	Standby			

319	13FH	Standby			
320	140H	Outlet line L1A(1)reactive kWh high	Unsigned primary side xx.xx kvarh	R	DWord
321	141H	Outlet line L1A(1)reactive kWh low			
322	142H	Outlet line L1B(2)reactive kWh high			
323	143H	Outlet line L1B(2)reactive kWh low			
324	144H	Outlet line L1C(3)reactive kWh high			
325	145H	Outlet line L1C(3)reactive kWh low			
326	146H	Outlet line L2A(4)reactive kWh high			
327	147H	Outlet line L2A(4)reactive kWh low			
328	148H	Outlet line L2B(5)reactive kWh high			
329	149H	Outlet line L2B(5)reactive kWh low			
330	14AH	Outlet line L2C(6)reactive kWh high			
331	14BH	Outlet line L2C(6)reactive kWh low			
332	14CH	Outlet line L3A(7)reactive kWh high			
333	14DH	Outlet line L3A(7)reactive kWh low			
334	14EH	Outlet line L3B(8)reactive kWh high			
335	14FH	Outlet line L3B(8)reactive kWh low			
336	150H	Outlet line L3C(9)reactive kWh high			
337	151H	Outlet line L3C(9)reactive kWh low			
338	152H	Outlet line L4A(10)reactive kWh high			
339	153H	Outlet line L4A(10)reactive kWh low			
340	154H	Outlet line L4B(11)reactive kWh high			
341	155H	Outlet line L4B(11)reactive kWh low			
342	156H	Outlet line L4C(12)reactive kWh high			
343	157H	Outlet line L4C(12)reactive kWh low			
344	158H	Outlet line L5A(13)reactive kWh high			
345	159H	Outlet line L5A(13)reactive kWh low			
346	15AH	Outlet line L5B(14)reactive kWh high			
347	15BH	Outlet line L5B(14)reactive kWh low			
348	15CH	Outlet line L5C(15)reactive kWh high			
349	15DH	Outlet line L5C(15)reactive kWh low			
350	15EH	Outlet line L6A(16)reactive kWh high			
351	15FH	Outlet line L6A(16)reactive kWh low			
352	160H	Outlet line L6B(17)reactive kWh high			
353	161H	Outlet line L6B(17)reactive kWh low			
354	162H	Outlet line L6C(18)reactive kWh high			
355	163H	Outlet line L6C(18)reactive kWh low			
356	164H	Outlet line L7A(19)reactive kWh high			
357	165H	Outlet line L7A(19)reactive kWh low			
358	166H	Outlet line L7B(20)reactive kWh high			
359	167H	Outlet line L7B(20)reactive kWh low			
360	168H	Outlet line L7C(21)reactive kWh high			
361	169H	Outlet line L7C(21)reactive kWh low			

362	16AH	Outlet line L8A(22)reactive kWh high			
363	16BH	Outlet line L8A(22)reactive kWh low			
364	16CH	Outlet line L8B(23)reactive kWh high			
365	16DH	Outlet line L8B(23)reactive kWh low			
366	16EH	Outlet line L8C(24)reactive kWh high			
367	16FH	Outlet line L8C(24)reactive kWh low			
368	170H	Outlet line L9A(25)reactive kWh high			
369	171H	Outlet line L9A(25)reactive kWh low			
370	172H	Outlet line L9B(26)reactive kWh high			
371	173H	Outlet line L9B(26)reactive kWh low			
372	174H	Outlet line L9C(27)reactive kWh high			
373	175H	Outlet line L9C(27)reactive kWh low			
374	176H	Outlet line L10A(28)reactive kWh high			
375	177H	Outlet line L10A(28)reactive kWh low			
376	178H	Outlet line L10B(29)reactive kWh high			
377	179H	Outlet line L10B(29)reactive kWh low			
378	17AH	Outlet line L10C(30)reactive kWh high			
379	17BH	Outlet line L10C(30)reactive kWh low			
380	17CH	Outlet line L11A(31)reactive kWh high			
381	17DH	Outlet line L11A(31)reactive kWh low			
382	17EH	Outlet line L11B(32)reactive kWh high			
383	17FH	Outlet line L11B(32)reactive kWh low			
384	180H	Outlet line L11C(33)reactive kWh high			
385	181H	Outlet line L11C(33)reactive kWh low			
386	182H	Outlet line L12A(34)reactive kWh high			
387	183H	Outlet line L12A(34)reactive kWh low			
388	184H	Outlet line L12B(35)reactive kWh high			
389	185H	Outlet line L12B(35)reactive kWh low			
390	186H	Outlet line L12C(36)reactive kWh high			
391	187H	Outlet line L12C(36)reactive kWh low			
392	188H	Standby			
393	189H	Standby			
394	18AH	Standby			
395	18BH	Standby			
396	18CH	software version			
397	18DH	Standby			
398	18EH	Standby			
399	18FH	Standby			
400	190H	Outlet line current L1A(1)、L1B(2)phase	Notes:4) high 8th bit L1B, low 8th bit I1A Default: 0x0201H	R/W	Word
401	191H	Outlet line current L1C(3)、L2A(4) phase	High 8th bitL2A、low 8th bitL1C default：0x0103H		
402	192H	Outlet line current L2B(5)、L2C(6) phase	High 8th bitL2C、low 8th bitL2B		

			default：0x0302H		
403	193H	Outlet line current L3A(7)、L3B(8) phase	High 8th bitL3B、low 8th bitL3A default：0x0201H		
404	194H	Outlet line current L3C(9)、L4A(10) phase	High 8th bitL4A、low 8th bitL3C default：0x0103H		
405	195H	Outlet line current L4B(11)、L4C(12) phase	High 8th bitL4C、low 8th bitL4B default：0x0302H		
406	196H	Outlet line current L5A(13)、L5B(14) phase	High 8th bitL5B、low 8th bitL5A default：0x0201H		
407	197H	Outlet line current L5C(15)、L6A(16) phase	High 8th bitL6A、low 8th bitL5C default：0x0103H		
408	198H	Outlet line current L6B(17)、L6C(18) phase	High 8th bitL6C、low 8th bitL6B default：0x0302H		
409	199H	Outlet line current L7A(19)、L7B(20) phase	High 8th bitL7B、low 8th bitL7A default：0x0201H		
410	19AH	Outlet line current L7C(21)、L8A(22) phase	High 8th bitL8A、low 8th bitL7C default：0x0103H		
411	19BH	Outlet line current L8B(23)、L8C(24) phase	High 8th bitL8C、low 8th bitL8B default：0x0302H		
412	19CH	Outlet line current L9A(25)、L9B(26) phase	High 8th bitL9B、low 8th bitL9A default：0x0201H		
413	19DH	Outlet line current L9C(27)、L10A(28) phase	High 8th bitL10A、low 8th bitL9C default：0x0103H		
414	19EH	Outlet line current L10B(29)、L10C(30) phase	High 8th bitL10C、low 8th bitL10B default：0x0302H		
415	19FH	Outlet line current L11A(31)、L11B(32) phase	High 8th bitL11B、low 8th bitL11A default：0x0201H		
416	1A0H	Outlet line current L11C(33)、L12A(34) phase	High 8th bitL12A、low 8th bitL11C default：0x0103H		
417	1A1H	Outlet line current L12B(35)、L12C(36) phase	High 8th bitL12C、low 8th bitL12B default：0x0302H		
418	1A2H	standby			
419	1A3H	standby			
420	1A4H	Inlet line 1:A phase apparent power DC 1 current zero	AC apparent power: unsigned primary side xx.xx kW DC current zero：signed	R R/W	Word
421	1A5H	Inlet line 1:B phase apparent power /DC2 current zero			
422	1A6H	Inlet line 1:C phase apparent power /DC3 current zero			
423	1A7H	Inlet line 2:A phase apparent power /DC4			

		current zero			
424	1A8H	Inlet line 2:B phase apparent power /DC5 current zero			
425	1A9H	Inlet line 2:C phase apparent power /DC6 current zero			
426	1AAH	Outlet line L1A(1)apparent power /DC7 current zero			
427	1ABH	Outlet line L1B(2) apparent power /DC8 current zero			
428	1ACH	Outlet line L1C(3) apparent power /DC9 current zero			
429	1ADH	Outlet line L2A(4) apparent power /DC10 current zero			
430	1AEH	Outlet line L2B(5) apparent power /DC11 current zero			
431	1AFH	Outlet line L2C(6) apparent power /DC12 current zero			
432	1B0H	Outlet line L3A(7) apparent power /DC13 current zero			
433	1B1H	Outlet line L3B(8) apparent power /DC14 current zero			
434	1B2H	Outlet line L3C(9) apparent power /DC15 current zero			
435	1B3H	Outlet line L4A(10) apparent power /DC16 current zero			
436	1B4H	Outlet line L4B(11) apparent power /DC17 current zero			
437	1B5H	Outlet line L4C(12) apparent power /DC18 current zero			
438	1B6H	Outlet line L5A(13) apparent power /DC19 current zero			
439	1B7H	Outlet line L5B(14) apparent power /DC20 current zero			
440	1B8H	Outlet line L5C(15) apparent power /DC21 current zero			
441	1B9H	Outlet line L6A(16) apparent power /DC22 current zero			
442	1BAH	Outlet line L6B(17) apparent power /DC23 current zero			
443	1BBH	Outlet line L6C(18) apparent power /DC24 current zero			
444	1BCH	Outlet line L7A(19) apparent power /DC25 current zero			
445	1BDH	Outlet line L7B(20) apparent power /DC26			

		current zero			
446	1BEH	Outlet line L7C(21) apparent power /DC27 current zero			
447	1BFH	Outlet line L8A(22) apparent power /DC28 current zero			
448	1C0H	Outlet line L8B(23) apparent power /DC29 current zero			
449	1C1H	Outlet line L8C(24) apparent power /DC30 current zero			
450	1C2H	Outlet line L9A(25) apparent power /DC31 current zero			
451	1C3H	Outlet line L9B(26) apparent power /DC32 current zero			
452	1C4H	Outlet line L9C(27) apparent power /DC33 current zero			
453	1C5H	Outlet line L10A(28) apparent power /DC34 current zero			
454	1C6H	Outlet line L10B(29) apparent power /DC35 current zero			
455	1C7H	Outlet line L10C(30) apparent power /DC36 current zero			
456	1C8H	Outlet line L11A(31) apparent power /DC37 current zero			
457	1C9H	Outlet line L11B(32) apparent power /DC38 current zero			
458	1CAH	Outlet line L11C(33) apparent power /DC39 current zero			
459	1CBH	Outlet line L12A(34) apparent power /DC40 current zero			
460	1CCH	Outlet line L12B(35) apparent power /DC41 current zero			
461	1CDH	Outlet line L12C(36) apparent power /DC42 current zero			
462	1CEH	standby			
463	1CFH	standby			
464	1D0H	standby			
465 ~ 476	1D1H ~ 1DCH	3 phase Outlet line 1 ~ 12 total active power	Signed primary side xx.xx kW	R	Word
477	1DDH	standby			
478	1DEH	standby			
479	1DFH	standby			
480 ~ 491	1E0H ~	3 phase Outlet line 1 ~ 1 total reactive power	Signed primary side xx.xx kVar	R	Word

	1EBH				
492	1ECH	standby			
493	1EDH	standby			
494	1EEH	3 phase inlet line 1: total apparent power			
495	1EFH	3 phase inlet line 2: total apparent power			
496	1F0H	standby			
497	1F1H	standby			
498	1F2H	standby			
499 ~ 510	1F3H ~ 1FEH	3 phase outlet line 1 ~ 12 total apparent power	Unsigned primary side xx.xx kW	R	Word
511	1FFH	standby			
512	200H	standby			
513	201H	standby			
514	202H	3 phase Outlet line 1 total active kWh high	Unsigned primary side xx.xx kWh	R	Word
515	203H	3 phase Outlet line 1 total active kWh low			
516	204H	3 phase Outlet line 2 total active kWh high			
517	205H	3 phase Outlet line 3 total active kWh low			
518	206H	3 phase Outlet line 3 total active kWh high			
519	207H	3 phase outlet line 3 total active kWh low			
520	208H	3 phase outlet line 4 total active kWh high			
521	209H	3 phase outlet line 4 total active kWh low			
522	20AH	3 phase outlet line 5 total active kWh high			
523	20BH	3 phase outlet line 5 total active kWh low			
524	20CH	3 phase outlet line 6 total active kWh high			
525	20DH	3 phase outlet line 6 total active kWh low			
526	20EH	3 phase outlet line 7 total active kWh high			
527	20FH	3 phase outlet line 7 total active kWh low			
528	210H	3 phase outlet line 8 total active kWh high			
529	211H	3 phase outlet line 8 total active kWh low			
530	212H	3 phase outlet line 9 total active kWh high			
531	213H	3 phase outlet line 9 total active kWh low			
532	214H	3 phase outlet line 10 total active kWh high			
533	215H	3 phase outlet line 10 total active kWh low			
534	216H	3 phase outlet line 11 total active kWh high			
535	217H	3 phase outlet line 11 total active kWh low			
536	218H	3 phase outlet line 12 total active kWh high			
537	219H	3 phase outlet line 12 total active kWh low			
538	21AH	standby			
539	21BH	standby			
540	21CH	3 phase outlet line 1 total reactive kWh high	Unsigned primary side xx.xx kVarh	R	Word
541	21DH	3 phase outlet line 1 total reactive kWh low			
542	21EH	3 phase outlet line 2 total reactive kWh high			
543	21FH	3 phase outlet line 2 total reactive kWh low			
544	220H	3 phase outlet line 3 total reactive kWh high			

545	221H	3 phase outlet line 3 total reactive kWh low			
546	222H	3 phase outlet line 4 total reactive kWh high			
547	223H	3 phase outlet line 4 total reactive kWh low			
548	224H	3 phase outlet line 5 total reactive kWh high			
549	225H	3 phase outlet line 5 total reactive kWh low			
550	226H	3 phase outlet line 6 total reactive kWh high			
551	227H	3 phase outlet line 6 total reactive kWh low			
552	228H	3 phase outlet line 7 total reactive kWh high			
553	229H	3 phase outlet line 7 total reactive kWh low			
554	22AH	3 phase outlet line 8 total reactive kWh high			
555	22BH	3 phase outlet line 8 total reactive kWh low			
556	22CH	3 phase outlet line 9 total reactive kWh high			
557	22DH	3 phase outlet line 9 total reactive kWh low			
558	22EH	3 phase outlet line 10 total reactive kWh high			
559	22FH	3 phase outlet line 10 total reactive kWh low			
560	230H	3 phase outlet line 11 total reactive kWh high			
561	231H	3 phase outlet line 11 total reactive kWh low			
562	232H	3 phase outlet line 12 total reactive kWh high			
563	233H	3 phase outlet line 12 total reactive kWh low			
564	234H	standby			
565 ~ 576	235H ~ 240H	3 phase outlet line 1 ~ 12total power factor	-1.000 ~ 1.000	R	Word
577	241H	standby			
578	242H	standby			
579	243H	standby			
580	244H	A phase voltage total harmonic content	xx%		
581 ~ 594	245H ~ 252H	A phase voltage 2nd to 15th sub harmonic content			
595	253H	B phase voltage total harmonic content			
596 ~ 609	254H ~ 261H	B phase voltage 2nd to 15th sub harmonic content			
610	262H	C phase voltage total harmonic content			
611 ~ 624	263H ~ 270H	C phase voltage 2nd to 15th sub harmonic content			
625	271H	Inlet line 1: A phase current total harmonic content			
626 ~ 639	272H ~ 27FH	Inlet line 1: A phase current 2nd to 15th sub harmonic content			
640	280H	Inlet line 1: B phase current total harmonic			

		content			
641 ~ 654	281H ~ 28EH	Inlet line 1: B phase current 2nd to 15th sub harmonic content			
655	28FH	Inlet line 1: C phase current total harmonic content			
656 ~ 669	290H ~ 29DH	Inlet line 1: C phase current 2nd to 15th sub harmonic content			
670	29EH	Inlet line 2: A phase current total harmonic content			
671 ~ 684	29FH ~ 2ACH	Inlet line 2: A phase current 2nd to 15th sub harmonic content			
685	2AEH	Inlet line 2: B phase current total harmonic content			
686 ~ 699	2AFH ~ 2BBH	Inlet line 2: B phase current 2nd to 15th sub harmonic content			
700	2BCH	Inlet line 2: C phase current total harmonic content			
701 ~ 714	2BDH ~ 2CAH	Inlet line 2: C phase current 2nd to 15th sub harmonic content			
715	2CBH	Inlet line 1: A phase current total harmonic content			
716 ~ 729	2CCH ~ 2D9H	Inlet line 1: A phase current 2nd to 15th sub harmonic content			
730	2DAH	Inlet line 1: B phase current total harmonic content			
731 ~ 744	2DBH ~ 2E8H	Inlet line 1: B phase current 2nd to 15th sub harmonic content			
745	2E9H	Inlet line 1: C phase current total harmonic content			
746 ~ 759	2EAH ~ 2F7H	Inlet line 1: C phase current 2nd to 15th sub harmonic content			
760	2F8H	Inlet line 2: A phase current total harmonic content			

761 ~ 774	2F9H ~ 306H	Inlet line 2: A phase current 2nd to 15th sub harmonic content			
775	307H	Inlet line 2: B phase current total harmonic content			
776 ~ 789	308H ~ 315H	Inlet line 2: B phase current 2nd to 15th sub harmonic content			
790	316H	Inlet line 2: C phase current total harmonic content			
791 ~ 804	317H ~ 324H	Inlet line 2: C phase current 2nd to 15th sub harmonic content			
805	325H	Inlet line 3: A phase current total harmonic content			
806 ~ 819	326H ~ 333H	Inlet line 3: A phase current 2nd to 15th sub harmonic content			
820	334H	Inlet line 3: B phase current total harmonic content			
821 ~ 834	335H ~ 342H	Inlet line 3: B phase current 2nd to 15th sub harmonic content			
835	343H	Inlet line 3: C phase current total harmonic content			
836 ~ 849	345H ~ 351H	Inlet line 3: C phase current 2nd to 15th sub harmonic content			
850	352H	Inlet line 4: A phase current total harmonic content			
851 ~ 864	353H ~ 360H	Inlet line 4: A phase current 2nd to 15th sub harmonic content			
865	361H	Inlet line 4: B phase current total harmonic content			
866 ~ 879	362H ~ 36FH	Inlet line 4: B phase current 2nd to 15th sub harmonic content			
880	370H	Inlet line 4: C phase current total harmonic content			
881 ~ 894	371H ~ 37EH	Inlet line 4: C phase current 2nd to 15th sub harmonic content			
895	37FH	Inlet line 5: A phase current total harmonic content			
896 ~ 909	380H ~ 38DH	Inlet line 5: A phase current 2nd to 15th sub harmonic content			
910	38EH				

		Inlet line 5: B phase current total harmonic content			
911 ~ 924	38FH ~ 39CH	Inlet line 5: B phase current 2nd to 15th sub harmonic content			
925	39DH	Inlet line 5: C phase current total harmonic content			
926 ~ 939	39EH ~ 3ABH	Inlet line 5: C phase current 2nd to 15th sub harmonic content			
940	3ACH	Inlet line 6: A phase current total harmonic content			
941 ~ 954	3ADH ~ 3BAH	Inlet line 6: A phase current 2nd to 15th sub harmonic content			
955	3BBH	Inlet line 6: B phase current total harmonic content			
956 ~ 969	3BCH ~ 3C9H	Inlet line 6: B phase current 2nd to 15th sub harmonic content			
970	3CAH	Inlet line 6: C phase current total harmonic content			
971 ~ 984	3CBH ~ 3D8H	Inlet line 6: C phase current 2nd to 15th sub harmonic content			
985	3D9H	Inlet line 7: A phase current total harmonic content			
986 ~ 999	3DAH ~ 3E7H	Inlet line 7: A phase current 2nd to 15th sub harmonic content			
1000	3E8H	Inlet line 7: B phase current total harmonic content			
1001 ~ 1014	3E9H ~ 3F6H	Inlet line 7: B phase current 2nd to 15th sub harmonic content			
1015	3F7H	Inlet line 7: C phase current total harmonic content			
1016 ~ 1029	3F8H ~ 405H	Inlet line 7: C phase current 2nd to 15th sub harmonic content			
1030	406H	Inlet line 8: A phase current total harmonic content			

1031 ~ 1044	407H ~ 414H	Inlet line 8: A phase current 2nd to 15th sub harmonic content			
1045	415H	Inlet line 8: B phase current total harmonic content			
1046 ~ 1059	416H ~ 423H	Inlet line 8: B phase current 2nd to 15th sub harmonic content			
1060	424H	Inlet line 8: C phase current total harmonic content			
1061 ~ 1074	425H ~ 432H	Inlet line 8: C phase current 2nd to 15th sub harmonic content			
1075	433H	Inlet line 9: A phase current total harmonic content			
1076 ~ 1089	434H ~ 441H	Inlet line 9: A phase current 2nd to 15th sub harmonic content			
1090	442H	Inlet line 9: B phase current total harmonic content			
1091 ~ 1104	443H ~ 450H	Inlet line 9: B phase current 2nd to 15th sub harmonic content			
1105	451H	Inlet line 9: C phase current total harmonic content			
1106 ~ 1119	452H ~ 45FH	Inlet line 9: C phase current 2nd to 15th sub harmonic content			
1121 ~ 1134	461H ~ 46EH	Inlet line 10: A phase current 2nd to 15th sub harmonic content			
1135	46FH	Inlet line 10: B phase current total harmonic content			
1136 ~ 1149	470H ~ 47DH	Inlet line 10: B phase current 2nd to 15th sub harmonic content			
1150	47EH	Inlet line 10: C phase current total harmonic content			
1151 ~ 1164	47FH ~ 48CH	Inlet line 10: C phase current 2nd to 15th sub harmonic content			
1165	48DH	Inlet line 11: A phase current total harmonic content			
1166 ~ 1179	48EH ~ 49BH	Inlet line 11: A phase current 2nd to 15th sub harmonic content			
1180	49AH	Inlet line 11: B phase current total harmonic content			

1181 ~ 1194	49BH ~ 4AAH	Inlet line 11: B phase current 2nd to 15th sub harmonic content			
1195	4ABH	Inlet line 11: C phase current total harmonic content			
1196 ~ 1209	4ACH ~ 4B9H	Inlet line 11: C phase current 2nd to 15th sub harmonic content			
1210	4BAH	Inlet line 12: A phase current total harmonic content			
1211 ~ 1224	4BBH ~ 4C8H	Inlet line 12: A phase current 2nd to 15th sub harmonic content			
1225	4C9H	Inlet line 12: B phase current total harmonic content			
1226 ~ 1239	4CAH ~ 4D7H	Inlet line 12: B phase current 2nd to 15th sub harmonic content			
1240	4D8H	Inlet line 12: C phase current total harmonic content			
1241 ~ 1254	4D9H ~ 4E6H	Inlet line 12: C phase current 2nd to 15th sub harmonic content			

Note：1The above address table is applicable to all devices. Harmonic data apply with H model

2、Electric power communication data is 1 times side data, unit 0.01kWh

EX:Read the address of the 0x0DH value is 0x1234H, the read address of the 0x0EH value is 0x5678H, the actual primary side power value is 0x12345678H (3054198.96kWh).

3、The above address table register address value by 16 hexadecimal

4、Loop phase according to the actual current connected phase setting, corresponding relation between A, B, C for the corresponding to 1, 2

3, Beyond the scope of the recovery for the default parameters. Example: Outlet line 1, the 2 current respectively is A, B phase load, 0x190H address parameters should be set to 0x0201H, power and electric energy or will be unable to accurately measure 1, 2Outlet line circuit.

5、In actual use, the user must according to the actual use of device models, parameters to read the corresponding address. Users in the read a register parameters, attention should be paid to the parameters of the number of bytes of address the low or high, and pay attention to the numerical representation of (some numerical reading with binary representation, with some numerical notation, some data for signed operands)

6、Because AMC16MD with external Holzer transformer, there may be deviation, zero the Holzer transformer is therefore, in actual use, the completion of the Holzer sensor and AMC16MD sensor wiring, Holzer after the power load is not put in front, need to adjust the zero point AMC16MD (0x1A4H ~ 0x1CDH), until 1 to zero 42 Road DC current to zero so far.

7、AMC16MD only allows the input signal for the 0-5V current signal, a primary side current value according to the actual communications through the write command set. (0x9DH ~ 0xC6H)

Belt device switch input function, can also support the function code 01H, 02H

Address		parameter	Read-write attribute	Number range	Data types
0	00H	DI1	R	0-OFF;1-ON	Bit
1	01H	DI2			
2	02H	DI3			
3	03H	DI4			
4	04H	DI5			
5	05H	DI6			
6	06H	DI7			
7	07H	DI8			
8	08H	DI9			
9	09H	DI10			
10	0AH	DI11			
11	0BH	DI12			
12	0CH	DI13			
13	0DH	DI14			
14	0EH	DI15			
15	0FH	DI16			
16	10H	DI17			
17	11H	DI18			
18	12H	DI19			
19	13H	DI20			
20	14H	DI21			
21	15H	DI22			
22	16H	DI23			
23	17H	DI24			
24	18H	DI25			
25	19H	DI26			
26	1AH	DI27			
27	1BH	DI28			
28	1CH	DI29			
29	1DH	DI30			

30	1EH	DI31			
31	1FH	DI32			
32	20H	DI33			
33	21H	DI34			
34	22H	DI35			
35	23H	DI36			
36	24H	DI37			
37	25H	DI38			
38	26H	DI39			
39	27H	DI40			
40	28H	DI41			
41	29H	DI42			

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