



AHM1

Multifunction Power Meter

Modbus-RTU

Menu

1. OVERVIEW	- 3 -
2. COMMUNICATION	- 3 -
2.1 PHYSICAL LAYER	- 3 -
2.2 COMMUNICATION PROTOCOL	- 3 -
2.3 MODBUS-RTU COMMUNICATION PROTOCOL FORMAT	- 5 -
2.3.1 <i>Read coils (FC 0x01)</i>	- 5 -
2.3.2 <i>Read input discretes (FC 0x02)</i>	- 6 -
2.3.3 <i>Read data register value (FC 0x03/0x04)</i>	- 7 -
2.3.4 <i>Write Single Coil (FC 0x05)</i>	- 8 -
2.3.5 <i>Write Single Register (FC 0x06)</i>	- 9 -
2.3.6 <i>Write Multiple Coils (FC 0x0F)</i>	- 10 -
2.3.7 <i>Write Multiple Registers (FC 0x10)</i>	- 11 -
2.3.8 <i>Read File record (FC 0x14)</i>	- 12 -
2.3.9 <i>Reset data (FC 0x0E)</i>	- 16 -
2.4 DATA FORMAT	- 18 -
2.4.1 <i>32-bit float format</i>	- 18 -
2.4.2 <i>16-bit integer format</i>	- 18 -
2.4.3 <i>32-bit long integer format</i>	- 18 -
3. COMMUNICATION ADDRESS INFORMATION LIST	- 19 -
3.1 BASIC PARAMETERS	- 19 -

1. Overview

This user manual is the operation instruction for AHM1 multifunction power meter with Modbus-RTU protocol, which is used to help thirty party to operate and develop this meter.

2. Communication

2.1 Physical layer

Communication interface should be connected by shielded twisted-pair. Thirty-two meters are supposed to be connected to a same busbar at most. Terminal resistance should be connected to both ends of busbar. Communication speed is 1200~38400bps which can be set. Defaulted communication speed is 9600bps. Byte transmission format is composed of one start bit, eight data bits, no check bit or one odd bit or one even check bit, one or two stop bits.

2.2 Communication protocol

Message format

Address field	Function code field	Data field	Check field
one byte	one byte	N bytes	two bytes

◆ Address code

Address code is slave address with range of 1-247. Other addresses are reserved.

◆ Function code field

Function code field indicates the executive function of addressed terminal. Meaning and function of function codes supported by meter is shown in the following list.

Code	Meaning
0x01	Read coils
0x02	Read input discretes
0x03/0x04	Read data register value
0x05	Write Single Coil
0x06	Write Single Register
0x0F	Write Multiple Coils
0x10	Write Multiple Registers
0x14	Read File record
0x0E	Reset Data

◆ **Data code**

Data code includes the data which is needed by a terminal device when it performs a function or the data collected from a terminal device when it responds to an inquiry. These data may be numbers, referenced address or setting value. For example, when the function code tells a terminal device to read a register, the data field should indicate the terminal device that which register it should begin from and how much data it should read. The data code sent back from a terminal device includes data length and corresponding data. Data adopts BIG END mode which means low byte is after high byte.

◆ **Check code**

Cyclical Redundancy Check (CRC16) field occupies two bytes including a 16-bit binary value. CRC value will be calculated by transmission equipment and be added to a data frame. When the receiving equipment receives the data, it will calculate CRC value again, and then it compares the two CRC values. If the two values are not equal to each other, an error will be detected.

2.3 Modbus-RTU communication protocol format

2.3.1 Read coils (FC 0x01)

Request					
Frame structure	Address code	Function code	data code		CRC
			Start address	Number of relay	
Byte	1 byte	1 byte	2 bytes	2 bytes	2 bytes
Data range	1~247	0x01	0x0000 (fixed)	0x0001~0x0002	CRC
Message example	<u>0x01</u>	<u>0x01</u>	<u>0x00 0x00</u>	<u>0x00 0x02</u>	<u>0xBD</u> <u>0xCB</u>
Response					
frame structure	address code	function code	data code		CRC
			byte of register	register value	
Byte	1 byte	1 byte	1 byte	1 byte	2 bytes
Message example	<u>0x01</u>	<u>0x01</u>	<u>0x01</u>	<u>0x03</u>	<u>0x11 0x89</u>

Remark: The register value in the slave response indicates the status of the relay. Beginning from the lowest bit of the byte, each number corresponds to the status of a relay output. “1” indicates the relay is closed, while “0” indicates the relay is cut off. In the upper list, the register value “0x03” corresponds to “0000 0011” in binary system which means the first and second relays are closed.

2.3.2 Read input discretes (FC 0x02)

Request					
Frame structure	address	function code	data		CRC
			start address	number	
Byte	1 byte	1 byte	2 bytes	2 bytes	2 bytes
Data range	1~247	0x02	0x0000 (fixed)	0x0001~0x000C	CRC16
Message example	<u>0x01</u>	<u>0x02</u>	<u>0x00 0x00</u>	<u>0x00 0x01</u>	<u>0x79</u> <u>0xC9</u>
Response					
Data structure	address data	function code	data		CRC
			byte of register	register value	
Byte	1 byte	1 byte	1 byte	1 byte	2 bytes
Message example	<u>0x01</u>	<u>0x02</u>	<u>0x01</u>	<u>0x01</u>	<u>0x20 0x49</u>

Remark: The register value in the slave response indicates the status of digital input. Beginning from the lowest bit of the byte, each number corresponds to the status of a digital input. “1” indicates the switch is closed, while “0” indicates the switch is open. In the upper list the register value “0x01” is “0000 0001” in binary system which means first loop of digital input is closed.

2.3.3 Read data register value (FC 0x03/0x04)

Request					
Frame structure	address code	function code	data		CRC
			Start address	number of register	
Byte	1 byte	1 byte	2 bytes	2 bytes	2 bytes
data range	1~247	0x03/ 0x04		Max. 100	CRC16
message example	<u>0x01</u>	<u>0x03</u>	<u>0x00 0x06</u>	<u>0x00 0x06</u>	<u>0Xe4 0x36</u>
Response					
frame structure	address code	function code	data		CRC
			byte of register	register value	
byte	1 byte	1 byte	1 byte	12 bytes	2 bytes
message example	<u>0x01</u>	<u>0x03</u>	<u>0x0C</u>	<u>12-byte data</u>	<u>CRC16</u>

Remark: The initial register address in host inquiry is the initial address of the data collected from primary or secondary power grid. The number of register indicates the length of the data. In the upper list the register address “0x00 0x00” indicates the initial address of phase voltage float data of three phases, and the number of register “0x00 0x06” indicates the length of the data is 6 (three float data occupies six registers).

2.3.4 Write Single Coil (FC 0x05)

Request					
frame structure	address code	function code	data code		CRC
			Start address	relay action value	
byte	1byte	1byte	2 bytes	2 bytes	2 bytes
data range	1~247	0x05	0x0000~0x0000 3	0xFF00/0x0000	CRC16
message example	<u>0x01</u>	<u>0x05</u>	<u>0x00 0x00</u>	<u>0xFF 0x00</u>	<u>0x8C 0x3A</u>
Response					
frame structure	address code	function code	data code		CRC
			initial relay address	relay action value	
byte	1 byte	1 byte	2 bytes	2 bytes	2 bytes
message example	<u>0x01</u>	<u>0x05</u>	<u>0x00 0x00</u>	<u>0xFF 0x00</u>	<u>0x8C 0x3A</u>

Remark: In host request, the relay action value “0xFF00” indicates the relay is closed, while “0x0000” indicates the relay is open. If user wants to perform remotely control operation, please make sure the relay is working in “remotely control” mode.

2.3.5 Write Single Register (FC 0x06)

Request					
frame structure	address code	function code	data code		CRC
			Register Address	preset data	
byte	1 byte	1 byte	2 bytes	2 bytes	2 bytes
data range	1~247	0x06	0x0000~0xFFFF F	0x0000~0xFFFF	CRC16
message example	<u>0x01</u>	<u>0x06</u>	<u>0x00 0x00</u>	<u>0xAA 0x55</u>	<u>0x37 0x55</u>
Response					
frame structure	address code	function code	data code		CRC
			Register Address	preset data	
byte	1 byte	1 byte	2 bytes	2 bytes	2 bytes
message example	<u>0x01</u>	<u>0x06</u>	<u>0x00 0x00</u>	<u>0xAA 0x55</u>	<u>0x37 0x55</u>

Remark: Not all registers can be modified. As for specific information, please refer to communication address list.

2.3.6 Write Multiple Coils (FC 0x0F)

Request							
frame structure	address code	function code	data code				CRC
			initial relay address	number of relay	number of data byte	relay action value	
byte	1 byte	1 byte	2 bytes	2 bytes	1 byte	1 byte	2 bytes
data range	1~247	0x0F	0x0000 (fixed)	0x0001~0x0004	0x01		CRC16
message example	<u>0x01</u>	<u>0x0F</u>	<u>0x00 0x00</u>	<u>0x00 0x02</u>	<u>0x01</u>	<u>0x03</u>	<u>0x9E</u> <u>0x96</u>
Response							
frame structure	address code	function code	data code		CRC check code		
			initial relay address	number of relay			
byte	1 byte	1byte	2bytes	2bytes	2 bytes		
message example	<u>0x01</u>	<u>0x0F</u>	<u>0x00 0x00</u>	<u>0x00 0x02</u>	<u>0Xd4</u> <u>0x0A</u>		

Remark: In the host inquiry, beginning from the lowest bit of relay action value, each bit corresponds to a relay output. “1” indicates the relay is closed, while “0” indicates the relay is open. In the upper list, relay action value “0x03”is “0000 0111”in binary system, which means the first and second relays are closed.

2.3.7 Write Multiple Registers (FC 0x10)

Request							
frame structure	address code	function code	data code				CRC
			initial relay address	relay length	relay byte	written value	
byte	1 byte	1 byte	2 bytes	2 bytes	1 byte	2N bytes	2 byte
data range	1~247	0x10	0x080A	0x0001	N		CRC16
message example	<u>0x01</u>	<u>0x10</u>	<u>0x08 0x0A</u>	<u>0x00</u> <u>0x01</u>	<u>0x02</u>	<u>0x0064</u>	<u>0x2ED1</u>
Request							
frame structure	address code	function code	data code		CRC		
			initial relay address	relay length			
byte	1 byte	1 byte	2 bytes	2 bytes	2 bytes		
message example	<u>0x01</u>	<u>0x10</u>	<u>0x08 0x0A</u>	<u>0x00 0x01</u>	<u>0x2ED1</u>		

Remark: Please strictly follow the Meter setting information address list in appendix when writing setting register. Do not change the reserved data. Written data should not exceed set range. Wrong operation may cause meter damaged.

2.3.8 Read File record (FC 0x14)

Request

Function	1 byte	0x14
Byte counting	1 byte	0x07
Sub-request x, parameter type	1 byte	0x06
Sub-request x, file number	2 bytes	0x0000-0x0007
Sub-request x, event log number	2 bytes	0x0000-0xFDE7
Sub-request x, event log length	2 bytes	N

Response

Function code	1 byte	0x14
Response data length	1 byte	0x07~0xF5
Sub-request x, file length	1 byte	0x07~0xF5
Sub-request x, parameter type	1 byte	6
Sub-request x, event log data	Nx2 bytes	...

Send sub-request file number, event log number and event log length description of message

Event log	File number	Event log number	Event log length
Data log	0x0004	0x0000~0x000F: 0: latest piece of data log 1: second piece of data log from the latest piece of data log ... 32000: 32001th piece of data log from the latest piece of data log	1~32

Example for reading file

Request								
frame structure	address code	function code	data code					CRC
			byte counting	parameter type	file number	event log number	event log length	
byte	1 byte	1 byte	1 byte	1 byte	2 bytes	2 bytes	2 bytes	2 bytes
data range	1~247	0x14	0x07	0x06	0x0004	0~6500 0	1~32	CRC
message	<u>0x01</u>	<u>0x14</u>	0x07	<u>0x06</u>	<u>0x0004</u>	<u>0x0000</u>	<u>0x002</u> <u>0</u>	<u>0x093C</u>
Response								
frame structure	address code	function code	data code				CRC	
			response data length	response file length	parameter type	log data		
byte	1 byte	1 byte	1 byte	1 byte	1 byte	64 bytes	2 bytes	
message	<u>0x01</u>	<u>0x14</u>	<u>0x42</u>	<u>0x41</u>	<u>0x06</u>	log data	CRC	

Read electric data log format

Meter supports 32000 pieces of data log at most. Each data log contains eight electric parameter data. The interval of data log is set by pressing buttons on meter or through communication. Please refer to communication address list.

Historical data frame contains thirty-two words. First three words are time data. The other twenty-nine words are electric parameter data. Electric parameter data is secondary value. Description of data frame is shown in following list.

Parameter	Format	Unit
Recording time	Int	High byte:year low byte:month

Recording time	Int	High byte: day low byte:hour
Recording time	Int	High byte: minute low byte:second
V1	Int	0.1V
V2	Int	0.1V
V3	Int	0.1V
V12	Int	0.1V
V23	Int	0.1V
V31	Int	0.1V
I1	Int	0.001A
I2	Int	0.001A
I3	Int	0.001A
P	Int	1W
Q	Int	1var
S	Int	1VA
F	Int	0.01Hz
THDv1	Int	0.01%
THDv2	Int	0.01%
THDv3	Int	0.01%
THDI1	Int	0.01%
THDI2	Int	0.01%
THDI3	Int	0.01%
kWh+	Long	1Wh
kWh-	Long	1Wh
kvarh+	Long	1varh
kvarh-	Long	1varh
kVAh	Long	1VAh
User set1	Int	
User set2	Int	
User set3	Int	

User set4	Int	
User set5	Int	
User set6	Int	

Take reading the latest piece of log as example. Data type is hexadecimal.

Host request: 01 14 07 06 00 04 00 00 00 20 09 3C

Slave response: 01 14 42 41 06
0E 0A 17 0D 04 09 00 00 00 00 00 00 00 00 00 00

y:m d:h m:s V1 V2 V3 V12

V23

00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
V31 I1 I2 I3 P Q S F
00 00 00 00 00 00 00 00 00 00 00 00 00 00 0F 20
THDv1 THDv2 THDv3 THDI1 THDI2 THDI3 kWh+
00 00 00 00 00 00 1A 28 00 00 00 00 00 00 1E 37 74 89
kWh- kvarh+ kvarh- kVAh CRC

2.3.9 Reset data (FC 0x0E)

Request							
frame structure	address code	function code	data code				CRC
			initial relay address	Password	ID Reset	ID value	
byte	1 byte	1 byte	2 bytes	2 bytes	1 byte	1 bytes	2 byte
data range	1~247	0x0E	0xAACC	0x0001	N	0xFF	CRC16
message example	<u>0x01</u>	<u>0x0E</u>	<u>0xAA0xCC</u>	<u>0x00 x01</u>	<u>0x01</u>	<u>0xFF</u>	<u>0x760D</u>
Request							
frame structure	address code	function code	data code				CRC
			initial relay address	Password	ID Reset	ID value	
byte	1 byte	1 byte	2 bytes	2 bytes	1 byte	1 bytes	2 byte
data range	1~247	0x0E	0xAACC	0x0001	N	0xFF	CRC16
message example	<u>0x01</u>	<u>0x0E</u>	<u>0xAACC</u>	<u>0x00 x01</u>	<u>0x01</u>	<u>0xFF</u>	<u>0x760D</u>

Remark: This code can reset date of energy, Demand, MaxMin, Event , Pulses, and so on.

Password: This value should equal User's Password;

Id Reset:

0x01: Clear Energy 0x02: Clear Demand 0x03: Clear MaxMin
0x04: Clear Event 0x05: Clear Pulses 0x06: Clear Counters
0x07: Clear Record

Id value:

The value must be 0xff.

2.4 Data format

2.4.1 32-bit float format

32-bit float type data follows IEEE-754 format. Byte sequence of data adopts big-end mode which means low byte is after high byte.

Float type data of three phase voltages are shown in the following list.

Address(Hex)	Data(Hex)	Description
0006-0007	435C-8000	V1 = 0x435C8000 = 220.5V
0008-0009	4360-4CCD	V2 = 0x43604CCD = 224.3V
000A-000B	435E-B333	V3 = 0x435EB333 = 222.7V

2.4.2 16-bit integer format

16-bit integer type data adopts two's complement storage mode. Byte sequence of data adopts big-endian mode which means low byte is after high byte.

Int data of three phase voltages harmonic are shown in the following list.

Address(Hex)	Data(Hex)	Description
0210	0230	THDv1 = 0x0230 = 5.6%
0211	0172	THDv2 = 0x0172 = 3.7%
0212	0096	THDv3 = 0x0096 = 1.5%

2.4.3 32-bit long integer format

32-bit integer type data adopts two's complement storage mode. Byte sequence of data adopts big-end mode which means low byte is after high byte.

Long data of energy accumulation time are shown in the following list.

Address(Hex)	Data(Hex)	Description
0054-0055	0020-152A	Hour meter-EP+ = 2102570s
0056-0057	0000-37CD	Hour meter-EP- = 14285s

3. Communication address information list

3.1 Basic parameters

Address	Format	Description	Unit	R/W
0006-0007	Float	V1	V	R
0008-0009	Float	V2	V	R
000A-000 B	Float	V3	V	R
000C-000 D	Float	V12	V	R
000E-000F	Float	V23	V	R
0010-0011	Float	V31	V	R
0012-0013	Float	I1	A	R
0014-0015	Float	I2	A	R
0016-0017	Float	I3	A	R
0018-0019	Float	In(3P4W)	A	R
001A-001 B	Float	P1	kW	R
001C-001 D	Float	P2	kW	R
001E-001F	Float	P3	kW	R
0020-0021	Float	P	kW	R
0022-0023	Float	Q1	kvar	R
0024-0025	Float	Q2	kvar	R
0026-0027	Float	Q3	kvar	R
0028-0029	Float	Q	kvar	R
002A-002 B	Float	S1	kVA	R
002C-002 D	Float	S2	kVA	R

002E-002F	Float	S3	kVA	R
0030-0031	Float	S	kVA	R
0032-0033	Float	PF1		R
0034-0035	Float	PF2		R
0036-0037	Float	PF3		R
0038-0039	Float	PF		R
003A-003 B	Float	F	Hz	R
003C-003 D	Float	Average value of Vph-n	V	R
003E-003F	Float	Average value of Vph-ph	V	R
0040-0041	Float	Average current	A	R
0042-0043	Float	Import Active Energy	kWh	R
0044-0045	Float	Export Active Energy	kWh	R
0046-0047	Float	Import Reactive Energy	kvarh	R
0048-0049	Float	Export Reactive Energy	kvarh	R
004A-004 B	Float	Apparent Energy	kVAh	R
004C-004 D	Float	1 st Quadrant Reactive Energy - EQL+	kvarh	R
004E-004F	Float	2 nd Quadrant Reactive Energy - EQC+	kvarh	R
0050-0051	Float	3 rd Quadrant Reactive Energy - EQL-	kvarh	R
0052-0053	Float	4 th Quadrant Reactive Energy - EQC-	kvarh	R
0054-0055	Float	Hour meter - EP+	s	R
0056-0057	Float	Hour meter - EP-	s	R
0058-0059	Float	Alternative Import Active Energy	kWh	R
005A-005 B	Float	Alternative Export Active Energy	kWh	R

005C-005 D	Float	Alternative Import Reactive Energy	kvarh	R
005E-005F	Float	Alternative Export Reactive Energy	kvarh	R
0060-0061	Float	Alternative Apparent Energy	kVAh	R
0062-0063	Float	Alternative Energy - EQL+	kvarh	R
0064-0065	Float	Alternative Energy - EQC+	kvarh	R
0066-0067	Float	Alternative Energy - EQL-	kvarh	R
0068-0069	Float	Alternative Energy - EQC-	kvarh	R
006A-006 B	Float	Hour meter - Alternative EP+	s	R
006C-006 D	Float	Hour meter - Alternative EP-	s	R
006E-006F	Float	Total tariff import energy	kWh	R
0070-0071	Float	Tariff #1 import energy	kWh	R
0072-0073	Float	Tariff #2 import energy	kWh	R
0074-0075	Float	Tariff #3 import energy	kWh	R
0076-0077	Float	Tariff #4 import energy	kWh	R
0078-0079	Float	Total tariff export energy	kWh	R
007A-007 B	Float	Tariff #1 export energy	kWh	R
007C-007 D	Float	Tariff #2 export energy	kWh	R
007E-007F	Float	Tariff #3 export energy	kWh	R
0080-0081	Float	Tariff #4 export energy	kWh	R
0082-0083	Float	Max. value-V1	V	R
0084-0085	Float	Max. value-V2	V	R
0086-0087	Float	Max. value-V3	V	R
0088-0089	Float	Max. value-V12	V	R
008A-008 B	Float	Max. value-V23	V	R

008C-008 D	Float	Max. value-V31	V	R
008E-008F	Float	Max. value-I1	A	R
0090-0091	Float	Max. value-I2	A	R
0092-0093	Float	Max. value-I3	A	R
0094-0095	Float	Max. value-In	A	R
0096-0097	Float	Max. value-P1	kW	R
0098-0099	Float	Max. value-P2	kW	R
009A-009 B	Float	Max. value-P3	kW	R
009C-009 D	Float	Max. value-P	kW	R
009E-009F	Float	Max. value-Q1	kvar	R
00A-00A1	Float	Max. value-Q2	kvar	R
00A2-00A 3	Float	Max. value-Q3	kvar	R
00A4-00A 5	Float	Max. value-Q	kvar	R
00A6-00A 7	Float	Max. value-S1	kVA	R
00A8-00A 9	Float	Max. value-S2	kVA	R
00AA-00A B	Float	Max. value-S3	kVA	R
00AC-00A D	Float	Max. value-S	kVA	R
00AE-00A F	Float	Max. value-PF		R
00B0-00B 1	Float	Max. value-F	Hz	R

00B2-00B 3	Float	Max. value-Average Vph-n	V	R
00B4-00B 5	Float	Max. value-Average Vph-ph	V	R
00B6-00B 7	Float	Max. value-Average I	A	R
00B8-00B 9	Float	Min. value-V1	A	R
00BA-00B B	Float	Min. value-V2	A	R
00BC-00B D	Float	Min. value-V3	A	R
00BE-00B F	Float	Min. value-V12	V	R
00C0-00C 1	Float	Min. value-V23	V	R
00C2-00C 3	Float	Min. value-V31	V	R
00C4-00C 5	Float	Min. value-I1	A	R
00C6-00C 7	Float	Min. value-I2	A	R
00C8-00C 9	Float	Min. value-I3	A	R
00CA-00C B	Float	Min. value-In	A	R
00CC-00C D	Float	Min. value-P1	kW	R
00CE-00C F	Float	Min. value-P2	kW	R

00D0-00D 1	Float	Min. value-P3	kW	R
00D2-00D 3	Float	Min. value-P	kW	R
00D4-00D 5	Float	Min. value-Q1	kvar	R
00D6-00D 7	Float	Min. value-Q2	kvar	R
00D8-00D 9	Float	Min. value-Q3	kvar	R
00DA-00D B	Float	Min. value-Q	kvar	R
00DC-00D D	Float	Min. value-S1	kVA	R
00DE-00D F	Float	Min. value-S2	kVA	R
00E0-00E 1	Float	Min. value-S3	kVA	R
00E2-00E 3	Float	Min. value-S	kVA	R
00E4-00E 5	Float	Min. value-PF		R
00E6-00E 7	Float	Min. value-F	Hz	R
00E8-00E 9	Float	Min. value-Average Vph-n	V	R
00EA-00E B	Float	Min. value-Average Vph-ph	V	R
00EC-00E D	Float	Min. value-Average I	A	R

00EE-00E F	Float	Max. demand value -I1	A	R
00F0-00F1	Float	Max. demand value -I2	A	R
00F2-00F3	Float	Max. demand value -I3	A	R
00F4-00F5	Float	Max. demand value -P	W	R
00F6-00F7	Float	Max. demand value -Q	var	R
00F8-00F9	Float	Max. demand value -S	VA	R
00FA-00F D	--	--		
00FE-00F F	Float	Present demand value -I1	A	R
0100-0101	Float	Present demand value -I2	A	R
0102-0103	Float	Present demand value -I3	A	R
0104-0105	Float	Present demand value -P	kW	R
0106-0107	Float	Present demand value -Q	kvar	R
0108-0109	Float	Present demand value -S	kVA	R
010A-010 D	--	--	--	
010E-010F	Float	Previous demand value -I1	A	R
0110-0111	Float	Previous demand value -I2	A	R
0112-0113	Float	Previous demand value -I3	A	R
0114-0115	Float	Previous demand value -P	kW	R
0116-0117	Float	Previous demand value -Q	kvar	R
0118-0119	Float	Previous demand value -S	kVA	R
011A-011D	--	--	--	
011E-011F	Float	Load percentage	%	R
0120	Int	High byte-year,Low byte-month		R
0121	Int	High byte-day,Low byte-hour		R
0122	Int	High byte-minute,Low byte-second		R
0123	Int	High byte-week		R

01244	Int	State of digital input,0:off,1:on Bit0:DI1 Bit1:DI2		R
0125	Int	State of relay output,0:off,1:on Bit0:DO1 Bit1:DO2		R
0126-0127	Long	Pulse counter: #1 Digital input		R
0128-0129	Long	Pulse counter: #2 Digital input		R

3.2 Harmonic data

Address	Format	Description	Unit	R/W
0200	Int	Phase angle of V1(default 0°)	0.1°	R
0201	Int	Phase angle of V2	0.1°	R
0202	Int	Phase angle of V3	0.1°	R
0203	Int	Phase angle of I1	0.1°	R
0204	Int	Phase angle of I2	0.1°	R
0205	Int	Phase angle of I3	0.1°	R
0206	Int	Positive-sequence component of voltage	0.1V	R
0207	Int	Negative-sequence component of voltage	0.1V	R
0208	Int	Zero-sequence component of voltage	0.1V	R
0209	Int	Unbalance factor of voltage		R
020A	--	--	--	
020B	Int	Positive-sequence component of current	0.001A	R
020C	Int	Negative-sequence component of current	0.001A	R
020D	Int	Zero-sequence component of current	0.001A	R
020E	Int	Unbalance factor of current		R
020F	--	--	--	
0210	Int	THD-V1	0.01%	R
0211	Int	THD-V2	0.01%	R

0212	Int	THD-V3	0.01%	R
0213	Int	THD-I1	0.01%	R
0214	Int	THD-I1	0.01%	R
0215	Int	THD-I1	0.01%	R
0216	Int	Fundamental value -V1	0.1V	R
0217	Int	Fundamental value -V2	0.1V	R
0218	Int	Fundamental value -V3	0.1V	R
0219	Int	Fundamental value -I1	0.001A	R
021A	Int	Fundamental value -I2	0.001A	R
021B	Int	Fundamental value -I3	0.001A	R
021C	Int	Harmonic content -V1	0.1V	R
021D	Int	Harmonic content -V2	0.1V	R
021E	Int	Harmonic content -V3	0.1V	R
021F	Int	Harmonic content -I1	0.001A	R
0220	Int	Harmonic content -I2	0.001A	R
0221	Int	Harmonic content -I3	0.001A	R
0222	Int	2 ND harmonic ratio-V1	0.01%	R
0223	Int	3 rd harmonic ratio-V1	0.01%	R
0224	Int	4 th harmonic ratio-V1	0.01%	R
0225	Int	5 th harmonic ratio-V1	0.01%	R
0226	Int	6 th harmonic ratio-V1	0.01%	R
0227	Int	7 th harmonic ratio-V1	0.01%	R
0228	Int	8 th harmonic ratio-V1	0.01%	R
0229	Int	9 th harmonic ratio-V1	0.01%	R
022A	Int	10 th harmonic ratio-V1	0.01%	R
022B	Int	11 th harmonic ratio-V1	0.01%	R
022C	Int	12 th harmonic ratio-V1	0.01%	R
022D	Int	13 th harmonic ratio-V1	0.01%	R
022E	Int	14 th harmonic ratio-V1	0.01%	R

022F	Int	15 th harmonic ratio-V1	0.01%	R
0230	Int	16 th harmonic ratio-V1	0.01%	R
0231	Int	17 th harmonic ratio-V1	0.01%	R
0232	Int	18 th harmonic ratio-V1	0.01%	R
0233	Int	19 th harmonic ratio-V1	0.01%	R
0234	Int	20 th harmonic ratio-V1	0.01%	R
0235	Int	21 th harmonic ratio-V1	0.01%	R
0236	Int	22 th harmonic ratio-V1	0.01%	R
0237	Int	23 th harmonic ratio-V1	0.01%	R
0238	Int	24 th harmonic ratio-V1	0.01%	R
0239	Int	25 th harmonic ratio-V1	0.01%	R
023A	Int	26 th harmonic ratio-V1	0.01%	R
023B	Int	27 th harmonic ratio-V1	0.01%	R
023C	Int	28 th harmonic ratio-V1	0.01%	R
023D	Int	29 th harmonic ratio-V1	0.01%	R
023E	Int	30 th harmonic ratio-V1	0.01%	R
023F	Int	31 th harmonic ratio-V1	0.01%	R
0240	Int	2 nd harmonic ratio-V2	0.01%	R
0241	Int	3 rd harmonic ratio-V2	0.01%	R
0242	Int	4 th harmonic ratio-V2	0.01%	R
0243	Int	5 th harmonic ratio-V2	0.01%	R
0244	Int	6 th harmonic ratio-V2	0.01%	R
0245	Int	7 th harmonic ratio-V2	0.01%	R
0246	Int	8 th harmonic ratio-V2	0.01%	R
0247	Int	9 th harmonic ratio-V2	0.01%	R
0248	Int	10 th harmonic ratio-V2	0.01%	R
0249	Int	11 th harmonic ratio-V2	0.01%	R
024A	Int	12 th harmonic ratio-V2	0.01%	R
024B	Int	13 th harmonic ratio-V2	0.01%	R

024C	Int	14 th harmonic ratio-V2	0.01%	R
024D	Int	15 th harmonic ratio-V2	0.01%	R
024E	Int	16 th harmonic ratio-V2	0.01%	R
024F	Int	17 th harmonic ratio-V2	0.01%	R
0250	Int	18 th harmonic ratio-V2	0.01%	R
0251	Int	19 th harmonic ratio-V2	0.01%	R
0252	Int	20 th harmonic ratio-V2	0.01%	R
0253	Int	21 th harmonic ratio-V2	0.01%	R
0254	Int	22 th harmonic ratio-V2	0.01%	R
0255	Int	23 th harmonic ratio-V2	0.01%	R
0256	Int	24 th harmonic ratio-V2	0.01%	R
0257	Int	25 th harmonic ratio-V2	0.01%	R
0258	Int	26 th harmonic ratio-V2	0.01%	R
0259	Int	27 th harmonic ratio-V2	0.01%	R
025A	Int	28 th harmonic ratio-V2	0.01%	R
025B	Int	29 th harmonic ratio-V2	0.01%	R
025C	Int	30 th harmonic ratio-V2	0.01%	R
025D	Int	31 th harmonic ratio-V2	0.01%	R
025E	Int	2 nd harmonic ratio-V3	0.01%	R
025F	Int	3 rd harmonic ratio-V3	0.01%	R
0260	Int	4 th harmonic ratio-V3	0.01%	R
0261	Int	5 th harmonic ratio-V3	0.01%	R
0262	Int	6 th harmonic ratio-V3	0.01%	R
0263	Int	7 th harmonic ratio-V3	0.01%	R
0264	Int	8 th harmonic ratio-V3	0.01%	R
0265	Int	9 th harmonic ratio-V3	0.01%	R
0266	Int	10 th harmonic ratio-V3	0.01%	R
0267	Int	11 th harmonic ratio-V3	0.01%	R
0268	Int	12 th harmonic ratio-V3	0.01%	R

0269	Int	13 th harmonic ratio-V3	0.01%	R
026A	Int	14 th harmonic ratio-V3	0.01%	R
026B	Int	15 th harmonic ratio-V3	0.01%	R
026C	Int	16 th harmonic ratio-V3	0.01%	R
026D	Int	17 th harmonic ratio-V3	0.01%	R
026E	Int	18 th harmonic ratio-V3	0.01%	R
026F	Int	19 th harmonic ratio-V3	0.01%	R
0270	Int	20 th harmonic ratio-V3	0.01%	R
0271	Int	21 th harmonic ratio-V3	0.01%	R
0272	Int	22 th harmonic ratio-V3	0.01%	R
0273	Int	23 th harmonic ratio-V3	0.01%	R
0274	Int	24 th harmonic ratio-V3	0.01%	R
0275	Int	25 th harmonic ratio-V3	0.01%	R
0276	Int	26 th harmonic ratio-V3	0.01%	R
0277	Int	27 th harmonic ratio-V3	0.01%	R
0278	Int	28 th harmonic ratio-V3	0.01%	R
0279	Int	29 th harmonic ratio-V3	0.01%	R
027A	Int	30 th harmonic ratio-V3	0.01%	R
027B	Int	31 th harmonic ratio-V3	0.01%	R
027C	Int	2 ND harmonic ratio-I1	0.01%	R
027D	Int	3 rd harmonic ratio-I1	0.01%	R
027E	Int	4 th harmonic ratio-I1	0.01%	R
027F	Int	5 th harmonic ratio-I1	0.01%	R
0280	Int	6 th harmonic ratio-I1	0.01%	R
0281	Int	7 th harmonic ratio-I1	0.01%	R
0282	Int	8 th harmonic ratio-I1	0.01%	R
0283	Int	9 th harmonic ratio-I1	0.01%	R
0284	Int	10 th harmonic ratio-I1	0.01%	R
0285	Int	11 th harmonic ratio-I1	0.01%	R

0286	Int	12 th harmonic ratio-I1	0.01%	R
0287	Int	13 th harmonic ratio-I1	0.01%	R
0288	Int	14 th harmonic ratio-I1	0.01%	R
0289	Int	15 th harmonic ratio-I1	0.01%	R
028A	Int	16 th harmonic ratio-I1	0.01%	R
028B	Int	17 th harmonic ratio-I1	0.01%	R
028C	Int	18 th harmonic ratio-I1	0.01%	R
028D	Int	19 th harmonic ratio-I1	0.01%	R
028E	Int	20 th harmonic ratio-I1	0.01%	R
028F	Int	21 th harmonic ratio-I1	0.01%	R
0290	Int	22 th harmonic ratio-I1	0.01%	R
0291	Int	23 th harmonic ratio-I1	0.01%	R
0292	Int	24 th harmonic ratio-I1	0.01%	R
0293	Int	25 th harmonic ratio-I1	0.01%	R
0294	Int	26 th harmonic ratio-I1	0.01%	R
0295	Int	27 th harmonic ratio-I1	0.01%	R
0296	Int	28 th harmonic ratio-I1	0.01%	R
0297	Int	29 th harmonic ratio-I1	0.01%	R
0298	Int	30 th harmonic ratio-I1	0.01%	R
0299	Int	31 th harmonic ratio-I1	0.01%	R
029A	Int	2 nd harmonic ratio-I2	0.01%	R
029B	Int	3 rd harmonic ratio-I2	0.01%	R
029C	Int	4 th harmonic ratio-I2	0.01%	R
029D	Int	5 th harmonic ratio-I2	0.01%	R
029E	Int	6 th harmonic ratio-I2	0.01%	R
029F	Int	7 th harmonic ratio-I2	0.01%	R
02A0	Int	8 th harmonic ratio-I2	0.01%	R
02A1	Int	9 th harmonic ratio-I2	0.01%	R
02A2	Int	10 th harmonic ratio-I2	0.01%	R

02A3	Int	11 th harmonic ratio-I2	0.01%	R
02A4	Int	12 th harmonic ratio-I2	0.01%	R
02A5	Int	13 th harmonic ratio-I2	0.01%	R
02A6	Int	14 th harmonic ratio-I2	0.01%	R
02A7	Int	15 th harmonic ratio-I2	0.01%	R
02A8	Int	16 th harmonic ratio-I2	0.01%	R
02A9	Int	17 th harmonic ratio-I2	0.01%	R
02AA	Int	18 th harmonic ratio-I2	0.01%	R
02AB	Int	19 th harmonic ratio-I2	0.01%	R
02AC	Int	20 th harmonic ratio-I2	0.01%	R
02AD	Int	21 th harmonic ratio-I2	0.01%	R
02AE	Int	22 th harmonic ratio-I2	0.01%	R
02AF	Int	23 th harmonic ratio-I2	0.01%	R
02B0	Int	24 th harmonic ratio-I2	0.01%	R
02B1	Int	25 th harmonic ratio-I2	0.01%	R
02B2	Int	26 th harmonic ratio-I2	0.01%	R
02B3	Int	27 th harmonic ratio-I2	0.01%	R
02B4	Int	28 th harmonic ratio-I2	0.01%	R
02B5	Int	29 th harmonic ratio-I2	0.01%	R
02B6	Int	30 th harmonic ratio-I2	0.01%	R
02B7	Int	31 th harmonic ratio-I2	0.01%	R
02B8	Int	2 nd harmonic ratio-I3	0.01%	R
02B9	Int	3 rd harmonic ratio-I3	0.01%	R
02BA	Int	4 th harmonic ratio-I3	0.01%	R
02BB	Int	5 th harmonic ratio-I3	0.01%	R
02BC	Int	6 th harmonic ratio-I3	0.01%	R
02BD	Int	7 th harmonic ratio-I3	0.01%	R
02BE	Int	8 th harmonic ratio-I3	0.01%	R
02BF	Int	9 th harmonic ratio-I3	0.01%	R

02C0	Int	10 th harmonic ratio-I3	0.01%	R
02C1	Int	11 th harmonic ratio-I3	0.01%	R
02C2	Int	12 th harmonic ratio-I3	0.01%	R
02C3	Int	13 th harmonic ratio-I3	0.01%	R
02C4	Int	14 th harmonic ratio-I3	0.01%	R
02C5	Int	15 th harmonic ratio-I3	0.01%	R
02C6	Int	16 th harmonic ratio-I3	0.01%	R
02C7	Int	17 th harmonic ratio-I3	0.01%	R
02C8	Int	18 th harmonic ratio-I3	0.01%	R
02C9	Int	19 th harmonic ratio-I3	0.01%	R
02CA	Int	20 th harmonic ratio-I3	0.01%	R
02CB	Int	21 th harmonic ratio-I3	0.01%	R
02CC	Int	22 th harmonic ratio-I3	0.01%	R
02CD	Int	23 th harmonic ratio-I3	0.01%	R
02CE	Int	24 th harmonic ratio-I3	0.01%	R
02CF	Int	25 th harmonic ratio-I3	0.01%	R
02D0	Int	26 th harmonic ratio-I3	0.01%	R
02D1	Int	27 th harmonic ratio-I3	0.01%	R
02D2	Int	28 th harmonic ratio-I3	0.01%	R
02D3	Int	29 th harmonic ratio-I3	0.01%	R
02D4	Int	30 th harmonic ratio-I3	0.01%	R
02D5	Int	31 th harmonic ratio-I3	0.01%	R

3.3 Records

Address	Format	Description 1	Description 2	R/W
06B8	Int	High byte-year, Low byte-month	Record of power on	R
06B9	Int	High byte-day, Low byte-hour		R
06BA	Int	High byte-minute, Low byte-second		R

06BB	Int	Numbers of power on		R
06BC	Int	High byte-year, Low byte-month	Record of power off	R
06BD	Int	High byte-day, Low byte-hour		R
06BE	Int	High byte-minute, Low byte-second		R
06BF	Int	Numbers of power off		R
06C0	Int	High byte-year, Low byte-month	Record of setting	R
06C1	Int	High byte-day, Low byte-hour		R
06C2	Int	High byte-minute, Low byte-second		R
06C3	Int	Numbers of setting		R
06C4	Int	High byte-year, Low byte-month	Record of reset max/min	R
06C5	Int	High byte-day, Low byte-hour		R
06C6	Int	High byte-minute, Low byte-second		R
06C7	Int	Numbers of reset max/min		R
06C8	Int	High byte-year, Low byte-month	Record of reset demand	R
06C9	Int	High byte-day, Low byte-hour		R
06CA	Int	High byte-minute, Low byte-second		R
06CB	Int	Numbers of reset demand		R
06CC	Int	High byte-year, Low byte-month	Record of reset energy	R
06CD	Int	High byte-day, Low byte-hour		R
06CE	Int	High byte-minute, Low byte-second		R
06CF	Int	Numbers of reset energy		R
06D0-06D5	--	--	--	
06D6	Int	High byte-Numbers of SOE		R
06D7-06DB	--	--	--	

06DC	Int	Numbers of data record		R
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3.4 Setup Parameters

Address	Format	Description 1	Description 2	R/W
0802	Int	Password	0-9999	R
0803	--	--	--	--
0804	Int	High byte	Langue 0: English 1: Spanish	R/W
		Low byte	Contrast:0-5	R/W
0805	Int	High byte	Back light delay time:0-255s 0:usually ON	R/W
		Low byte	Data recording interval 1-255min	
0806	Int	High byte	Address: 1-247	R/W
		Low byte	Baud rate 0: 1200bps 1: 2400bps 2: 4800bps 3: 9600bps 4: 19200bps 5: 38400bps	
0807	Int	High byte	Parity 0: N,8,1 1: O,8,1 2: E,8,1 3: N,8,2	R/W
0808-0809	--	--	--	
080A	Int	High byte	Wiring 0: 3P4W	R/W

			1: 3P3W 2:1P2W 3:1P3W	
080B	--	--	--	
080C-080D	Long	PT primary	1~999999V	R/W
080E-080F	Long	CT primary	1~999999A	R/W
0810	Int	PT secondary	1~999V	R/W
0811	Int	CT secondary	1~6A	R/W
0812	Int	Item of Record 1#	0: V1 1: V2 2: V3 3: V12 4: V23 5: V31 6: I1 7: I2 8: I3 9: In 10: P1 11: P2 12: P3 13: P 14: Q1 15: Q2 16: Q3 17: Q 18: S1 19: S2 20: S3 21: S	R

			<p>22: PF1</p> <p>23: PF2</p> <p>24: PF3</p> <p>25: PF</p> <p>26: F</p> <p>27: Unavg</p> <p>28: Uavg</p> <p>29: Iavg</p> <p>30: Phase angle of V1</p> <p>31: Phase angle of V2</p> <p>32: Phase angle of V3</p> <p>33: Phase angle of I1</p> <p>34: Phase angle of I2</p> <p>35: Phase angle of I3</p> <p>36: Positive-sequence component of voltage</p> <p>37: Negative-sequence component of voltage</p> <p>38: Zero-sequence component of voltage</p> <p>39: Unbalance factor of voltage</p> <p>40: Reserved</p> <p>41: Positive-sequence component of current</p> <p>42: Negative-sequence component of current</p> <p>43: Zero-sequence component of current</p> <p>44: Unbalance factor of</p>	
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			current 45: Reserved 46: THD-V1 47: THD-V2 48: THD-V3 49: THD-I1 50: THD-I2 51: THD-I3	
0813	Int	Item of Record 2#	the same as above	R
0814	Int	Item of Record 3#	the same as above	R
0815	Int	Item of Record 4#	the same as above	R
0816	Int	Item of Record5#	the same as above	R
0817	Int	Item of Record 6#	the same as above	R
0818	Int	Item of Demand	0: Default(I1/I2/I3/P/Q/S)	R/W
0819	Int	Mode of demand	0: slip block mode 1: fixed block mode	R/W
081A	Int	Slip time(t)	1-9999s	R/W
081B	Int	Demand period(T)	1-30t	R/W
081C	Int	High byte-DI1 Low byte-DI2	0: state monitor 1: pulse counter 2: Alternative energy 3: tariff energy 4: synchronous demand	R/W
081D	Int	Relay output-DO1 mode	0: OFF 1: remote control 2: alarm 3: energy pulse	R/W
081E	Int	Relay output -DO1 Pulse width	0.1~99.9ms 0.0: no pulse	R/W

081F	Int	Relay output-DO1 Alarm item select	0: V1 > 1: V1 < 2: V2 > 3: V2 < 4: V3 > 5: V3 < 6: Vn > 7: Vn < 8: V12 > 9: V12 < 10: V23 > 11: V23 < 12: V31 > 13: V31 < 14: V1 > 15: V1 < 16: Uavg> 17: Uavg< 18: Vavg> 19: Vavg< 20: I1 > 21: I1 < 22: I2 > 23: I2 < 24: I3 > 25: I3 < 26: I > 27: I < 28: Iavg >	R/W
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			29: Iavg < 30: In > 31: In< 32: P > 33: P < 34: Q > 35: Q < 26: S > 37: S < 38: PF> 39: PF< 40: F > 41: F < 42: Uunb > 43: Uunb < 44: Iunb > 45: Iunb < 46: THDu > 47: THDu < 48: THDi > 49: THDi < 50: Dlx	
			Energy pulse select: 0: kWh+ 1: kWh- 2: kvarh+ 3: kvarh-	

0820-0821	Long	Relay output-DO1 limit value	<p>primary grid data:</p> <p>0-9999*10ⁿ (n=0,3,6)</p> <p>ratio: voltage: 0.1V</p> <p>current: 0.001A</p> <p>power: 1W/var/VA,</p> <p>PF: 0.001</p> <p>F: 0.01Hz</p> <p>Uunb /lunb :0.1%</p> <p>THDu /THDi : 0.01%</p> <p>If it is switch linkage, this value corresponds to the No. of digital input.</p> <p>0:D1 1:DI2</p>	R/W
0822-0823	Long	Relay output -DO1 hysteresis	<p>primary grid data</p> <p>0-9999*10ⁿ (n=0,3,6)</p> <p>ratio: voltage: 0.1V</p> <p>current: 0.001A</p> <p>power: 1W/var/VA,</p> <p>PF: 0.001</p> <p>F: 0.01Hz</p> <p>Uunb /lunb :0.1%</p> <p>THDu /THDi : 0.01%</p> <p>Setting parameter value should be smaller than two times of rated value.</p>	R/W
0824	Int	Relay output -DO1 Alarm delay time	0~99.99s	R/W

0825	Int	Relay output Main body-DO1 Alarm interlock	0:OFF 1:ON	R/W
0826		Relay output-DO2 mode	0: OFF 1: remote control 2: alarm 3: energy pulse	R/W
0827		Relay output -DO2 Pulse width	0.1~99.9ms 0.0: no pulse	R/W
0828	Int	Relay output-DO2 Alarm item select	0: V1 > 1: V1 < 2: V2 > 3: V2 < 4: V3 > 5: V3 < 6: Vn > 7: Vn < 8: V12 > 9: V12 < 10: V23 > 11: V23 < 12: V31 > 13: V31 < 14: V1 > 15: V1 < 16:Uavg> 17:Uavg< 18:Vavg> 19:Vavg< 20: I1 >	R/W

			21: I1 <	
			22: I2 >	
			23: I2 <	
			24: I3 >	
			25: I3 <	
			26: I >	
			27: I <	
			28: Iavg >	
			29: Iavg <	
			30: In >	
			31: In<	
			32: P >	
			33: P <	
			34: Q >	
			35: Q <	
			26: S >	
			37: S <	
			38: PF>	
			39: PF<	
			40: F >	
			41: F <	
			42: Uunb >	
			43: Uunb <	
			44: Iunb >	
			45: Iunb <	
			46: THDu >	
			47: THDu <	
			48: THDi >	
			49: THDi <	
			50: Dlx	

			<p>Energy pulse select:</p> <p>0: kWh+</p> <p>1: kWh-</p> <p>2: kvarh+</p> <p>3: kvarh-</p>	
0829-082A	Long	Relay output-DO2 limit value	<p>primary grid data:</p> <p>0-9999*10ⁿ (n=0,3,6)</p> <p>ratio: voltage: 0.1V</p> <p>current: 0.001A</p> <p>power: 1W/var/VA,</p> <p>PF: 0.001</p> <p>F: 0.01Hz</p> <p>Uunb /lunb :0.1%</p> <p>THDu /THDi : 0.01%</p> <p>If it is switch linkage, this value corresponds to the No. of digital input.</p> <p>0:D1 1:DI2</p>	R/W
			<p>Energy pulse constant:</p> <p>0-9999, secondary grid data.(Wh/imp)/(varh/imp)</p>	
082B-082C	Long	Relay output -DO2 hysteresis	<p>primary grid data</p> <p>0-9999*10ⁿ (n=0,3,6)</p> <p>ratio: voltage: 0.1V</p> <p>current: 0.001A</p> <p>power: 1W/var/VA,</p> <p>PF: 0.001</p> <p>F: 0.01Hz</p> <p>Uunb /lunb :0.1%</p> <p>THDu /THDi : 0.01%</p>	R/W

			Setting parameter value should be smaller than two times of rated value.	
082D	Int	Relay output -DO2 Alarm delay time	0~99.99s	R/W
082E	Int	Relay output Main body-DO2 Alarm interlock	0:OFF 1:ON	R/W
082F-0830	Char	Ethernet	Local IP	R/W
0831-0832	Char		Subnet mask	R/W
0833-0834	Char		Gateway address	R/W
0835-0837	Char		MAC Address	R/W
0838	Int		DHCP	0:OFF 1:ON