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# SAJ Modbus Communication Protocol

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# SAJ Modbus Communication Protocol

## 1 Introduction

Communication protocol of Sununo Plus series (Single Phase) and Suntrio Plus series (Three Phase) On-grid Solar Inverters

## 2 Definition of Communication Interface

Communication frame refers to MODBUS protocol frame. It adopts UART communication and the setting is: data bit 8, stop bit 1, no parity check, no flow control. In terms of communication method, it adopts UART(Universal Asynchronous Receiver/Transmitter) half duplex communication mode. When the master and slave operate at the same time, only one can send the data and the other can receive data.

Baud Rate setting ways to SAJ Inverters:

1. Single Phase On-grid inverter (RS232 interface): 8 optional setting ways, default baud rate setting:115200bps
2. Three Phase On-grid inverter (RS232 interface): Baud Rate: 115200bps
3. Three Phase On-grid inverter(RS485 interface): Baud Rate: 9600bps

## 3 Definition of Communication Frame

Frame structure

Slave address field	0-247 (decimal) (0 is broadcast address)
Function field	0x03: Read multiple parameters 0x10: Write multiple parameters
Data field	Data field includes address field and data load domain
CRC field	16bit CRC check value

Scale factor: The MCU doesn't possess the complete float point unit, so the calculation and transmission will adopt intergar value instead of float point. In order to indicate the value that is less than 1, the digits after the decimal point will be illustrated by scale factor. The example of a register definition is shown as follows:

Address	SIZE(Word)	Register name	Data type	Scale factor	Unit	Property	Register description
0107H	1	PV1Volt	UInt16	-1	V	R	PV1 voltage

When Pv1 voltage is 300.5, the value of PV1Volt is 3005.

Property: R represents read-only; W represents write-only.

### 3.1 Communication Command and Frame Description

The checking range of CRC is **frame address~CRC field** (excluding CRC field)

#### 3.1.1 0x03 Read Multiple Registers

This function code(command) is used to read the contents of a contiguous block of registers.

The request protocol data unit specifies the register starting address and the number of registers.

The register data in the response message are packed as two bytes per register. (The binary contents are right justified within each byte) For each register, the first byte contains the high bits and the second contains the low bits.

Here is an example of a request to read registers 0x0001-0x0002:

Request	(Hex)	Response	(Hex)
Slave address	0A	Slave address	0A
Command	03	Command	03
High bit of register starting address	00	Byte count	04
Low bit of register starting address	01	High bit of register value(01)	0F
High bit of register number	00	Low bit of register value (01)	A0
Low bit of register number	02	High bit of register value (02)	01
CRC low bit	---	Low bit of register value (02)	C2
CRC high bit	---	CRC low bit	---
		CRC high bit	---

### 3.1.2 0x10 Write Multiple Registers

This function code (command) is used to write a series of contiguous address values in the registers.

The requested written values are specified in the request of data field. Data is packed as two bytes per register.

The normal response returns the function code, starting address, and quantity of registers written.

The following is an example that register 0x0001 is written to 0x1194 and register 0x0002 is written to 0x01CC.

Request	(Hex)	Response	(Hex)
Slave address	0A	Slave address	0A
Command	10	Command	10
High bit of register starting address	00	High bit of register starting address	00
Low bit of register starting address	01	Low bit of register starting address	01
High bit of register number	00	High bit of register number	00
Low bit of register number	02	Low bit of register number	02
Byte count	04	CRC low bit	---
High bit of register value (01)	11	CRC high bit	---
Low bit of register value (01)	94		
High bit of register value (02)	01		
Low bit of register value (02)	CC		
CRC low bit	---		
CRC high bit	---		

### 3.1.3 Definition of Exception Response

Once the slave receives the request, two types of response will be built according to the result of the processing:

- Positive response:

The response function code echoes the request function code

- Exception response

In an exception response, the server sets the MSB of the function code to 1.

In an exception response, the server returns the exception code in the data field.

Exception code:

Exception code (Hex)	Description
01	Illegal function code
02	Illegal requested address
03	Illegal requested data
04	Server fault
06	Server busy
10	Error password error
11	Error check error
12	Invalid parameters
13	System lock

For example: when the master reads the data, the slave responds exceptionally.

Request	(Hex)	Response	(Hex)
Slave address	0A	Slave address	0A
Command	03	Command	83
High bit of register starting address	00	Error code	02
Low bit of register starting address	01	CRC low bit	---
High bit of register number	00	CRC high bit	---
Low bit of register number	02		
CRC low bit	---		
CRC high bit	---		

## 4 Inverter Data & Register Information

### 4.1 Register Information

Addresses	SIZE (Word)	Name	Type	Scale factor	Unit	Property	Description	Notes
8F00H	1	Type	UInt16	0		R	Device Type	<b>0x0011:</b> Sununo Plus inverter one MPPT <b>0x0012:</b> Sununo Plus inverter dual MPPT <b>0x0021:</b> Suntrio Plus inverter
8F01H	1	Sub Type	UInt16			R	Subtype	
8F02H	1	Comm Pro Version	UInt16	-3		R	Comms Protocol Version	
8F03H	10	SN	String(20)			R	Serial Number	Invalid value: 0x00

8F0DH	10	PC	String(20)			R	Product Code	Invalid value: 0x00
8F17H	1	DV	UInt16	-3		R	Display Software Version	Invalid value: 0xFFFF
8F18H	1	MCV	UInt16	-3		R	Master Ctrl Software Version	Invalid value: 0xFFFF
8F19H	1	SCV	UInt16	-3		R	Slave Ctrl Software Version	Invalid value: 0xFFFF
8F1AH	1	Disp HW Version	UInt16	-3		R	Display Board Hardware Version	Invalid value: 0xFFFF
8F1BH	1	Ctrl HW Version	UInt16	-3		R	Cntrl Board Hardware Version	Invalid value: 0xFFFF
8F1CH	1	Power HW Version	UInt16	-3		R	Power BoardHardware Vesion	Invalid value: 0xFFFF

#### 4.2 Real-time Data

Address	SIZE(Word)	Name	Type	Scale factor	Unit	Property	Description
0100H	1	MPVMode	UInt16			R	Inverter working mode WAIT 0x01 NORMAL 0x02 FAULT 0x03 UPDATE 0x04
0101H	6	FaultMSG	UInt16			R	Inverter error message
0107H	1	PV1Volt	UInt16	-1	V	R	PV1 voltage
0108H	1	PV1Curr	UInt16	-2	A	R	PV1 total current
0109H	1	PV1Power	UInt16	0	W	R	PV1 power
010AH	1	PV2Volt	UInt16	-1	V	R	PV2 voltage
010BH	1	PV2Curr	UInt16	-2	A	R	PV2 total current
010CH	1	PV2Power	UInt16	0	W	R	PV2 power
010DH	1	PV3Volt	UInt16	-1	V	R	PV3 voltage
010EH	1	PV3Curr	UInt16	-2	A	R	PV3 total current
010FH	1	PV3Power	UInt16	0	W	R	PV3 power
0110H	1	BusVolt	UInt16	-1	V	R	BUS voltage
0111H	1	InvTempC	Int16	-1	°C	R	Inverter temperature
0112H	1	GFCI	Int16	0	mA	R	GFCI
0113H	1	Power	UInt16	0	W	R	Active power of inverter total output
0114H	1	QPower	Int16	0	Var	R	Reactive power of inverter total output
0115H	1	PF	Int16	-3		R	Total power factor of inverter
0116H	1	L1Volt	UInt16	-1	V	R	L1 voltage
0117H	1	L1Curr	UInt16	-2	A	R	L1 current
0118H	1	L1Freq	UInt16	-2	Hz	R	L1 frequency

0119H	1	L1DCI	Int16	0	mA	R	L1direct current component
011AH	1	L1Power	UInt16	0	W	R	L1power
011BH	1	L1PF	Int16	-3		R	L1 power factor
011CH	1	L2Volt	UInt16	-1	V	R	L2 voltage
011DH	1	L2Curr	UInt16	-2	A	R	L2 current
011EH	1	L2Freq	UInt16	-2	Hz	R	L2 frequency
011FH	1	L2DCI	Int16	0	mA	R	L2 DC component
0120H	1	L2Power	UInt16	0	W	R	L2 power
0121H	1	L2PF	Int16	-3		R	L2 power factor
0122H	1	L3Volt	UInt16	-1	V	R	L3 voltage
0123H	1	L3Curr	UInt16	-2	A	R	L3 current
0124H	1	L3Freq	UInt16	-2	Hz	R	L3 frequency
0125H	1	L3DCI	Int16	0	mA	R	L3 DC componet
0126H	1	L3Power	UInt16	0	W	R	L3 power
0127H	1	L3PF	Int16	-3		R	L3 power factor
0128H	1	ISO1	UInt16	0	kΩ	R	PV1+_ISO
0129H	1	ISO2	UInt16	0	kΩ	R	PV2+_ISO
012AH	1	ISO3	UInt16	0	kΩ	R	PV3+_ISO
012BH	1	ISO4	UInt16	0	kΩ	R	PV__ISO
012CH	1	Today Energy	UInt16	-2	kWh	R	power generation on current day
012DH	2	Month Energy	UInt32	-2	kWh	R	power generation in the current month
012FH	2	Year Energy	UInt32	-2	kWh	R	power generation in current year
0131H	2	Total Energy	UInt32	-2	kWh	R	Total power generation
0133H	1	Today Hour	UInt16	-1	H	R	Daily working hours
0134H	2	Total Hour	UInt32	-1	H	R	Total working hours
0136H	1	Error Count	UInt16	0		R	Error count
0137H	4	Time	HEX	0		R	current time

### 4.3 Historical Power Generation

Address	SIZE(Word)	Name	Type	Scale factor	Unit	Property	Description
0A00H	1	EToday1	UInt16	-2	kwh	R	Power generation on the 1 <sup>st</sup> day of current month
0A01H	1	EToday2	UInt16	-2	kwh	R	Power generation on the 2 <sup>nd</sup> day of current month
0A02H	1	EToday3	UInt16	-2	kwh	R	Power generation on the 3 <sup>rd</sup> day of current month
0A03H	1	EToday4	UInt16	-2	kwh	R	Power generation on the 4 <sup>th</sup> day of current month
0A04H	1	EToday5	UInt16	-2	kwh	R	Power generation on the 5 <sup>th</sup> day of current month
0A05H	1	EToday6	UInt16	-2	kwh	R	Power generation on the 6 <sup>th</sup> day of

							current month
0A06H	1	EToday7	UInt16	-2	kwh	R	Power generation on the 7 <sup>th</sup> day of current month
0A07H	1	EToday8	UInt16	-2	kwh	R	Power generation on the 8 <sup>th</sup> day of current month
0A08H	1	EToday9	UInt16	-2	kwh	R	Power generation on the 9 <sup>th</sup> day of current month
0A09H	1	EToday10	UInt16	-2	kwh	R	Power generation on the 10 <sup>th</sup> day of current month
0A0AH	1	EToday11	UInt16	-2	kwh	R	Power generation on the 11 <sup>th</sup> day of current month
0A0BH	1	EToday12	UInt16	-2	kwh	R	Power generation on the 12 <sup>th</sup> day of current month
0A0CH	1	EToday13	UInt16	-2	kwh	R	Power generation on the 13 <sup>th</sup> day of current month
0A0DH	1	EToday14	UInt16	-2	kwh	R	Power generation on the 14 <sup>th</sup> day of current month
0A0EH	1	EToday15	UInt16	-2	kwh	R	Power generation on the 15 <sup>th</sup> day of current month
0A0FH	1	EToday16	UInt16	-2	kwh	R	Power generation on the 16 <sup>th</sup> day of current month
0A10H	1	EToday17	UInt16	-2	kwh	R	Power generation on the 17 <sup>th</sup> day of current month
0A11H	1	EToday18	UInt16	-2	kwh	R	Power generation on the 18 <sup>th</sup> day of current month
0A12H	1	EToday19	UInt16	-2	kwh	R	Power generation on the 19 <sup>th</sup> day of current month
0A13H	1	EToday20	UInt16	-2	kwh	R	Power generation on the 20 <sup>th</sup> day of current month
0A14H	1	EToday21	UInt16	-2	kwh	R	Power generation on the 21 <sup>st</sup> day of current month
0A15H	1	EToday22	UInt16	-2	kwh	R	Power generation on the 22 <sup>nd</sup> day of current month
0A16H	1	EToday23	UInt16	-2	kwh	R	Power generation on the 23 <sup>d</sup> day of current month
0A17H	1	EToday24	UInt16	-2	kwh	R	Power generation on the 24 <sup>th</sup> day of current month
0A18H	1	EToday25	UInt16	-2	kwh	R	Power generation on the 25 <sup>th</sup> day of current month
0A19H	1	EToday26	UInt16	-2	kwh	R	Power generation on the 26 <sup>th</sup> day of current month
0A1AH	1	EToday27	UInt16	-2	kwh	R	Power generation on the 27 <sup>th</sup> day of current month
0A1BH	1	EToday28	UInt16	-2	kwh	R	Power generation on the 28 <sup>th</sup> day of current month

0A1CH	1	EToday29	UInt16	-2	kwh	R	Power generation on the 29 <sup>th</sup> day of current month
0A1DH	1	EToday30	UInt16	-2	kwh	R	Power generation on the 30 <sup>th</sup> day of current month
0A1EH	1	EToday31	UInt16	-2	kwh	R	Power generation on the 31 <sup>st</sup> day of current month
0A1FH	1	LEToday1	UInt16	-2	kwh	R	Power generation on the 1 <sup>st</sup> day of last month
0A20H	1	LEToday2	UInt16	-2	kwh	R	Power generation on the 2 <sup>nd</sup> day of last month
0A21H	1	LEToday3	UInt16	-2	kwh	R	Power generation on the 3 <sup>rd</sup> day of last month
0A22H	1	LEToday4	UInt16	-2	kwh	R	Power generation on the 4 <sup>th</sup> day of last month
0A23H	1	LEToday5	UInt16	-2	kwh	R	Power generation on the 5 <sup>th</sup> day of last month
0A24H	1	LEToday6	UInt16	-2	kwh	R	Power generation on the 6 <sup>th</sup> day of last month
0A25H	1	LEToday7	UInt16	-2	kwh	R	Power generation on the 7 <sup>th</sup> day of last month
0A26H	1	LEToday8	UInt16	-2	kwh	R	Power generation on the 8 <sup>th</sup> day of last month
0A27H	1	LEToday9	UInt16	-2	kwh	R	Power generation on the 9 <sup>th</sup> day of last month
0A28H	1	LEToday10	UInt16	-2	kwh	R	Power generation on the 10 <sup>th</sup> day of last month
0A29H	1	LEToday11	UInt16	-2	kwh	R	Power generation on the 11 <sup>th</sup> day of last month
0A2AH	1	LEToday12	UInt16	-2	kwh	R	Power generation on the 12 <sup>th</sup> day of last month
0A2BH	1	LEToday13	UInt16	-2	kwh	R	Power generation on the 13 <sup>th</sup> day of last month
0A2CH	1	LEToday14	UInt16	-2	kwh	R	Power generation on the 14 <sup>th</sup> day of last month
0A2DH	1	LEToday15	UInt16	-2	kwh	R	Power generation on the 15 <sup>th</sup> day of last month
0A2EH	1	LEToday16	UInt16	-2	kwh	R	Power generation on the 16 <sup>th</sup> day of last month
0A2FH	1	LEToday17	UInt16	-2	kwh	R	Power generation on the 17 <sup>th</sup> day of last month
0A30H	1	LEToday18	UInt16	-2	kwh	R	Power generation on the 18 <sup>th</sup> day of last month
0A31H	1	LEToday19	UInt16	-2	kwh	R	Power generation on the 19 <sup>th</sup> day of last month



0A32H	1	LEToday20	UInt16	-2	kwh	R	Power generation on the 20 <sup>th</sup> day of last month
0A33H	1	LEToday21	UInt16	-2	kwh	R	Power generation on the 21 <sup>st</sup> day of last month
0A34H	1	LEToday22	UInt16	-2	kwh	R	Power generation on the 22 <sup>nd</sup> day of last month
0A35H	1	LEToday23	UInt16	-2	kwh	R	Power generation on the 23 <sup>rd</sup> day of last month
0A36H	1	LEToday24	UInt16	-2	kwh	R	Power generation on the 24 <sup>th</sup> day of last month
0A37H	1	LEToday25	UInt16	-2	kwh	R	Power generation on the 25 <sup>th</sup> day of last month
0A38H	1	LEToday26	UInt16	-2	kwh	R	Power generation on the 26 <sup>th</sup> day of last month
0A39H	1	LEToday27	UInt16	-2	kwh	R	Power generation on the 27 <sup>th</sup> day of last month
0A3AH	1	LEToday28	UInt16	-2	kwh	R	Power generation on the 28 <sup>th</sup> day of last month
0A3BH	1	LEToday29	UInt16	-2	kwh	R	Power generation on the 29 <sup>th</sup> day of last month
0A3CH	1	LEToday30	UInt16	-2	kwh	R	Power generation on the 30 <sup>th</sup> day of last month
0A3DH	1	LEToday31	UInt16	-2	kwh	R	Power generation on the 31 <sup>st</sup> day of last month
0A3EH	1	LLEToday1	UInt16	-2	kwh	R	Power generation on the 1 <sup>st</sup> of the month before last
0A3FH	1	LLEToday2	UInt16	-2	kwh	R	Power generation on the 2 <sup>nd</sup> day of the month before last
0A40H	1	LLEToday3	UInt16	-2	kwh	R	Power generation on the 3 <sup>rd</sup> day of the month before last
0A41H	1	LLEToday4	UInt16	-2	kwh	R	Power generation on the 4 <sup>th</sup> day of the month before last
0A42H	1	LLEToday5	UInt16	-2	kwh	R	Power generation on the 5 <sup>th</sup> day of the month before last
0A43H	1	LLEToday6	UInt16	-2	kwh	R	Power generation on the 6 <sup>th</sup> day of the month before last
0A44H	1	LLEToday7	UInt16	-2	kwh	R	Power generation on the 7 <sup>th</sup> day of the month before last
0A45H	1	LLEToday8	UInt16	-2	kwh	R	Power generation on the 8 <sup>th</sup> day of the month before last
0A46H	1	LLEToday9	UInt16	-2	kwh	R	Power generation on the 9 <sup>th</sup> day of the month before last
0A47H	1	LLEToday10	UInt16	-2	kwh	R	Power generation on the 10 <sup>th</sup> day of

							the month before last
0A48H	1	LLEToday11	UInt16	-2	kwh	R	Power generation on the 11 <sup>th</sup> day of the month before last
0A49H	1	LLEToday12	UInt16	-2	kwh	R	Power generation on the 12 <sup>th</sup> day of the month before last
0A4AH	1	LLEToday13	UInt16	-2	kwh	R	Power generation on the 13 <sup>th</sup> day of the month before last
0A4BH	1	LLEToday14	UInt16	-2	kwh	R	Power generation on the 14 <sup>th</sup> day of the month before last
0A4CH	1	LLEToday15	UInt16	-2	kwh	R	Power generation on the 15 <sup>th</sup> day of the month before last
0A4DH	1	LLEToday16	UInt16	-2	kwh	R	Power generation on the 16 <sup>th</sup> day of the month before last
0A4EH	1	LLEToday17	UInt16	-2	kwh	R	Power generation on the 17 <sup>th</sup> day of the month before last
0A4FH	1	LLEToday18	UInt16	-2	kwh	R	Power generation on the 18 <sup>th</sup> day of the month before last
0A50H	1	LLEToday19	UInt16	-2	kwh	R	Power generation on the 19 <sup>th</sup> day of the month before last
0A51H	1	LLEToday20	UInt16	-2	kwh	R	Power generation on the 20 <sup>th</sup> day of the month before last
0A52H	1	LLEToday21	UInt16	-2	kwh	R	Power generation on the 21 <sup>st</sup> day of the month before last
0A53H	1	LLEToday22	UInt16	-2	kwh	R	Power generation on the 22 <sup>nd</sup> day of the month before last
0A54H	1	LLEToday23	UInt16	-2	kwh	R	Power generation on the 23 <sup>rd</sup> day of the month before last
0A55H	1	LLEToday24	UInt16	-2	kwh	R	Power generation on the 24 <sup>th</sup> day of the month before last
0A56H	1	LLEToday25	UInt16	-2	kwh	R	Power generation on the 25 <sup>th</sup> day of the month before last
0A57H	1	LLEToday26	UInt16	-2	kwh	R	Power generation on the 26 <sup>th</sup> day of the month before last
0A58H	1	LLEToday27	UInt16	-2	kwh	R	Power generation on the 27 <sup>th</sup> day of the month before last
0A59H	1	LLEToday28	UInt16	-2	kwh	R	Power generation on the 28 <sup>th</sup> day of the month before last
0A5AH	1	LLEToday29	UInt16	-2	kwh	R	Power generation on the 29 <sup>th</sup> day of the month before last
0A5BH	1	LLEToday30	UInt16	-2	kwh	R	Power generation on the 30 <sup>th</sup> day of the month before last
0A5CH	1	LLEToday31	UInt16	-2	kwh	R	Power generation on the 31 <sup>st</sup> day of the month before last
0A5DH	2	EMonth1	UInt32	-2	kwh	R	Power generation in the 1 <sup>st</sup> month of current year
0A5FH	2	EMonth2	UInt32	-2	kwh	R	Power generation in the 2 <sup>nd</sup> month

							of current year
0A61H	2	EMonth3	UInt32	-2	kwh	R	Power generation in the 3 <sup>rd</sup> month of current year
0A63H	2	EMonth4	UInt32	-2	kwh	R	Power generation in the 4 <sup>th</sup> month of current year
0A65H	2	EMonth5	UInt32	-2	kwh	R	Power generation in the 5 <sup>th</sup> month of current year
0A67H	2	EMonth6	UInt32	-2	kwh	R	Power generation in the 6 <sup>th</sup> month of current year
0A69H	2	EMonth7	UInt32	-2	kwh	R	Power generation in the 7 <sup>th</sup> month of current year
0A6BH	2	EMonth8	UInt32	-2	kwh	R	Power generation in the 8 <sup>th</sup> month of current year
0A6DH	2	EMonth9	UInt32	-2	kwh	R	Power generation in the 9 <sup>th</sup> month of current year
0A6FH	2	EMonth10	UInt32	-2	kwh	R	Power generation in the 10 <sup>th</sup> month of current year
0A71H	2	EMonth11	UInt32	-2	kwh	R	Power generation in the 11 <sup>th</sup> month of current year
0A73H	2	EMonth12	UInt32	-2	kwh	R	Power generation in the 12 <sup>th</sup> month of current year
0A75H	2	LEMonth1	UInt32	-2	kwh	R	Power generation in the 1 <sup>st</sup> month of last year
0A77H	2	LEMonth2	UInt32	-2	kwh	R	Power generation in the 2 <sup>nd</sup> month of last year
0A79H	2	LEMonth3	UInt32	-2	kwh	R	Power generation in the 3 <sup>th</sup> month of last year
0A7BH	2	LEMonth4	UInt32	-2	kwh	R	Power generation in the 4 <sup>th</sup> month of last year
0A7DH	2	LEMonth5	UInt32	-2	kwh	R	Power generation in the 5 <sup>th</sup> month of last year
0A7FH	2	LEMonth6	UInt32	-2	kwh	R	Power generation in the 6 <sup>th</sup> month of last year
0A81H	2	LEMonth7	UInt32	-2	kwh	R	Power generation in the 7 <sup>th</sup> month of last year
0A83H	2	LEMonth8	UInt32	-2	kwh	R	Power generation in the 8 <sup>th</sup> month of last year
0A85H	2	LEMonth9	UInt32	-2	kwh	R	Power generation in the 9 <sup>th</sup> month of last year
0A87H	2	LEMonth10	UInt32	-2	kwh	R	Power generation in the 10 <sup>th</sup> month of last year
0A89H	2	LEMonth11	UInt32	-2	kwh	R	Power generation in the 11 <sup>th</sup> month of last year
0A8BH	2	LEMonth12	UInt32	-2	kwh	R	Power generation in the 12 <sup>th</sup> month of last year
0A8DH	2	Eyear	UInt32	-2	kwh	R	Power generation in the current

							year
0A8FH	2	Eyear1	UInt32	-2	kwh	R	Power generation in last year
0A91H	2	Eyear2	UInt32	-2	kwh	R	Power generation in last 2 years
0A93H	2	Eyear3	UInt32	-2	kwh	R	Power generation in last 3 years
0A95H	2	Eyear4	UInt32	-2	kwh	R	Power generation in last 4 years
0A97H	2	Eyear5	UInt32	-2	kwh	R	Power generation in last 5 years
0A99H	2	Eyear6	UInt32	-2	kwh	R	Power generation in last 6 years
0A9BH	2	Eyear7	UInt32	-2	kwh	R	Power generation in last 7 years
0A9DH	2	Eyear8	UInt32	-2	kwh	R	Power generation in last 8 years
0A9FH	2	Eyear9	UInt32	-2	kwh	R	Power generation in last 9 years
0AA1H	2	Eyear10	UInt32	-2	kwh	R	Power generation in last 10 years
0AA3H	2	Eyear11	UInt32	-2	kwh	R	Power generation in last 11 years
0AA5H	2	Eyear12	UInt32	-2	kwh	R	Power generation in last 12 years
0AA7H	2	Eyear13	UInt32	-2	kwh	R	Power generation in last 13 years
0AA9H	2	Eyear14	UInt32	-2	kwh	R	Power generation in last 14 years
0AABH	2	Eyear15	UInt32	-2	kwh	R	Power generation in last 15 years
0AADH	2	Eyear16	UInt32	-2	kwh	R	Power generation in last 16 years
0AAFH	2	Eyear17	UInt32	-2	kwh	R	Power generation in last 17 years
0AB1H	2	Eyear18	UInt32	-2	kwh	R	Power generation in last 18 years
0AB3H	2	Eyear19	UInt32	-2	kwh	R	Power generation in last 19 years
0AB5H	2	Eyear20	UInt32	-2	kwh	R	Power generation in last 20 years
0AB7H	2	Eyear21	UInt32	-2	kwh	R	Power generation in last 21 years
0AB9H	2	Eyear22	UInt32	-2	kwh	R	Power generation in last 22 years
0ABBH	2	Eyear23	UInt32	-2	kwh	R	Power generation in last 23 years
0ABDH	2	Eyear24	UInt32	-2	kwh	R	Power generation in last 24 years

#### 4.4 Historical Fault Record

Address	SIZE(Word)	Name	Type	Scale factor	Unit	Property	Description
0B00H	4	hErrorTime1	BCD			R	Error1Time
0B04H	6	hError1				R	Error1
0B0AH	4	hErrorTime2	BCD			R	Error2Time
0B0EH	6	hError2				R	Error2
0B14H	4	hErrorTime3	BCD			R	Error3Time
0B18H	6	hError3				R	Error3
0B1EH	4	hErrorTime4	BCD			R	Error4Time
0B22H	6	hError4				R	Error4
0B28H	4	hErrorTime5	BCD			R	Error5Time
0B2CH	6	hError5				R	Error5
0B32H	4	hErrorTime6	BCD			R	Error6Time
0B36H	6	hError6				R	Error6
0B3CH	4	hErrorTime7	BCD			R	Error7Time

0B40H	6	hError7			R	Error7
0B46H	4	hErrorTime8	BCD		R	Error8Time
0B4AH	6	hError8			R	Error8
0B50H	4	hErrorTime9	BCD		R	Error9Time
0B54H	6	hError9			R	Error9
0B5AH	4	hErrorTime10	BCD		R	Error10Time
0B5EH	6	hError10			R	Error10
0B64H	4	hErrorTime11	BCD		R	Error11Time
0B68H	6	hError11			R	Error11
0B6EH	4	hErrorTime12	BCD		R	Error12Time
0B72H	6	hError12			R	Error12
0B78H	4	hErrorTime13	BCD		R	Error13Time
0B7CH	6	hError13			R	Error13
0B82H	4	hErrorTime14	BCD		R	Error14Time
0B86H	6	hError14			R	Error14
0B8CH	4	hErrorTime15	BCD		R	Error15Time
0B90H	6	hError15			R	Error15
0B96H	4	hErrorTime16	BCD		R	Error16Time
0B9AH	6	hError16			R	Error16
0BA0H	4	hErrorTime17	BCD		R	Error17Time
0BA4H	6	hError17			R	Error17
0BAAH	4	hErrorTime18	BCD		R	Error18Time
0BAEH	6	hError18			R	Error18
0BB4H	4	hErrorTime19	BCD		R	Error19Time
0BB8H	6	hError19			R	Error19
0BBEH	4	hErrorTime20	BCD		R	Error20Time
0BC2H	6	hError20			R	Error20
0BC8H	4	hErrorTime21	BCD		R	Error21Time
0BCCH	6	hError21			R	Error21
0BD2H	4	hErrorTime22	BCD		R	Error22Time
0BD6H	6	hError22			R	Error22
0BDCH	4	hErrorTime23	BCD		R	Error23Time
0BE0H	6	hError23			R	Error23
0BE6H	4	hErrorTime24	BCD		R	Error24Time
0BEAH	6	hError24			R	Error24
0BF0H	4	hErrorTime25	BCD		R	Error25Time
0BF4H	6	hError25			R	Error25
0BFAH	4	hErrorTime26	BCD		R	Error26Time
0BFEH	6	hError26			R	Error26
0C04H	4	hErrorTime27	BCD		R	Error27Time
0C08H	6	hError27			R	Error27
0C0EH	4	hErrorTime28	BCD		R	Error28Time
0C12H	6	hError28			R	Error28
0C18H	4	hErrorTime29	BCD		R	Error29Time
0C1CH	6	hError29			R	Error29

0C22H	4	hErrorTime30	BCD			R	Error30Time
0C26H	6	hError30				R	Error30
0C2CH	4	hErrorTime31	BCD			R	Error31Time
0C30H	6	hError31				R	Error31
0C36H	4	hErrorTime32	BCD			R	Error32Time
0C3AH	6	hError32				R	Error32
0C40H	4	hErrorTime33	BCD			R	Error33Time
0C44H	6	hError33				R	Error33
0C4AH	4	hErrorTime34	BCD			R	Error34Time
0C4EH	6	hError34				R	Error34
0C54H	4	hErrorTime35	BCD			R	Error35Time
0C58H	6	hError35				R	Error35
0C5EH	4	hErrorTime36	BCD			R	Error36Time
0C62H	6	hError36				R	Error36
0C68H	4	hErrorTime37	BCD			R	Error37Time
0C6CH	6	hError37				R	Error37
0C72H	4	hErrorTime38	BCD			R	Error38Time
0C76H	6	hError38				R	Error38
0C7CH	4	hErrorTime39	BCD			R	Error39Time
0C80H	6	hError39				R	Error39
0C86H	4	hErrorTime40	BCD			R	Error40Time
0C8AH	6	hError40				R	Error40
0C90H	4	hErrorTime41	BCD			R	Error41Time
0C94H	6	hError41				R	Error41
0C9AH	4	hErrorTime42	BCD			R	Error42Time
0C9EH	6	hError42				R	Error42
0CA4H	4	hErrorTime43	BCD			R	Error43Time
0CA8H	6	hError43				R	Error43
0CAEH	4	hErrorTime44	BCD			R	Error44Time
0CB2H	6	hError44				R	Error44
0CB8H	4	hErrorTime45	BCD			R	Error45Time
0CBCH	6	hError45				R	Error45
0CC2H	4	hErrorTime46	BCD			R	Error46Time
0CC6H	6	hError46				R	Error46
0CCCH	4	hErrorTime47	BCD			R	Error47Time
0CD0H	6	hError47				R	Error47
0CD6H	4	hErrorTime48	BCD			R	Error48Time
0CDAH	6	hError48				R	Error48
0CE0H	4	hErrorTime49	BCD			R	Error49Time
0CE4H	6	hError49				R	Error49
0CEAH	4	hErrorTime50	BCD			R	Error50Time
0CEEH	6	hError50				R	Error50
0CF4H	4	hErrorTime51	BCD			R	Error51Time
0CF8H	6	hError51				R	Error51
0CFEH	4	hErrorTime52	BCD			R	Error52Time

0D02H	6	hError52			R	Error52
0D08H	4	hErrorTime53	BCD		R	Error53Time
0D0CH	6	hError53			R	Error53
0D12H	4	hErrorTime54	BCD		R	Error54Time
0D16H	6	hError54			R	Error54
0D1CH	4	hErrorTime55	BCD		R	Error55Time
0D20H	6	hError55			R	Error55
0D26H	4	hErrorTime56	BCD		R	Error56Time
0D2AH	6	hError56			R	Error56
0D30H	4	hErrorTime57	BCD		R	Error57Time
0D34H	6	hError57			R	Error57
0D3AH	4	hErrorTime58	BCD		R	Error58Time
0D3EH	6	hError58			R	Error58
0D44H	4	hErrorTime59	BCD		R	Error59Time
0D48H	6	hError59			R	Error59
0D4EH	4	hErrorTime60	BCD		R	Error60Time
0D52H	6	hError60			R	Error60
0D58H	4	hErrorTime61	BCD		R	Error61Time
0D5CH	6	hError61			R	Error61
0D62H	4	hErrorTime62	BCD		R	Error62Time
0D66H	6	hError62			R	Error62
0D6CH	4	hErrorTime63	BCD		R	Error63Time
0D70H	6	hError63			R	Error63
0D76H	4	hErrorTime64	BCD		R	Error64Time
0D7AH	6	hError64			R	Error64
0D80H	4	hErrorTime65	BCD		R	Error65Time
0D84H	6	hError65			R	Error65
0D8AH	4	hErrorTime66	BCD		R	Error66Time
0D8EH	6	hError66			R	Error66
0D94H	4	hErrorTime67	BCD		R	Error67Time
0D98H	6	hError67			R	Error67
0D9EH	4	hErrorTime68	BCD		R	Error68Time
0DA2H	6	hError68			R	Error68
0DA8H	4	hErrorTime69	BCD		R	Error69Time
0DACH	6	hError69			R	Error69
0DB2H	4	hErrorTime70	BCD		R	Error70Time
0DB6H	6	hError70			R	Error70
0DBCH	4	hErrorTime71	BCD		R	Error71Time
0DC0H	6	hError71			R	Error71
0DC6H	4	hErrorTime72	BCD		R	Error72Time
0DCAH	6	hError72			R	Error72
0DD0H	4	hErrorTime73	BCD		R	Error73Time
0DD4H	6	hError73			R	Error73
0DDAH	4	hErrorTime74	BCD		R	Error74Time
0DDEH	6	hError74			R	Error74

0DE4H	4	hErrorTime75	BCD			R	Error75Time
0DE8H	6	hError75				R	Error75
0DEEH	4	hErrorTime76	BCD			R	Error76Time
0DF2H	6	hError76				R	Error76
0DF8H	4	hErrorTime77	BCD			R	Error77Time
0DFCH	6	hError77				R	Error77
0E02H	4	hErrorTime78	BCD			R	Error78Time
0E06H	6	hError78				R	Error78
0E0CH	4	hErrorTime79	BCD			R	Error79Time
0E10H	6	hError79				R	Error79
0E16H	4	hErrorTime80	BCD			R	Error80Time
0E1AH	6	hError80				R	Error80
0E20H	4	hErrorTime81	BCD			R	Error81Time
0E24H	6	hError81				R	Error81
0E2AH	4	hErrorTime82	BCD			R	Error82Time
0E2EH	6	hError82				R	Error82
0E34H	4	hErrorTime83	BCD			R	Error83Time
0E38H	6	hError83				R	Error83
0E3EH	4	hErrorTime84	BCD			R	Error84Time
0E42H	6	hError84				R	Error84
0E48H	4	hErrorTime85	BCD			R	Error85Time
0E4CH	6	hError85				R	Error85
0E52H	4	hErrorTime86	BCD			R	Error86Time
0E56H	6	hError86				R	Error86
0E5CH	4	hErrorTime87	BCD			R	Error87Time
0E60H	6	hError87				R	Error87
0E66H	4	hErrorTime88	BCD			R	Error88Time
0E6AH	6	hError88				R	Error88
0E70H	4	hErrorTime89	BCD			R	Error89Time
0E74H	6	hError89				R	Error89
0E7AH	4	hErrorTime90	BCD			R	Error90Time
0E7EH	6	hError90				R	Error90
0E84H	4	hErrorTime91	BCD			R	Error91Time
0E88H	6	hError91				R	Error91
0E8EH	4	hErrorTime92	BCD			R	Error92Time
0E92H	6	hError92				R	Error92
0E98H	4	hErrorTime93	BCD			R	Error93Time
0E9CH	6	hError93				R	Error93
0EA2H	4	hErrorTime94	BCD			R	Error94Time
0EA6H	6	hError94				R	Error94
0EACH	4	hErrorTime95	BCD			R	Error95Time
0EBOH	6	hError95				R	Error95
0EB6H	4	hErrorTime96	BCD			R	Error96Time
0EBAH	6	hError96				R	Error96
0ECOH	4	hErrorTime97	BCD			R	Error97Time



0EC4H	6	hError97			R	Error97
0ECAH	4	hErrorTime98	BCD		R	Error98Time
0ECEH	6	hError98			R	Error98
0ED4H	4	hErrorTime99	BCD		R	Error99Time
0ED8H	6	hError99			R	Error99
0EDEH	4	hErrorTime100	BCD		R	Error100Time
0EE2H	6	hError100			R	Error100

#### 4.5 Inverter Fault

0101H FaultMSG Inverter Fault message											
ErrorData0				ErrorData1				ErrorData2			
High bit											Low bit
11	10	9	8	7	6	5	4	3	2	1	0

Error code	Description	Error analysis
Err81	Lost Communication Between Display board & Control board Master	ErrorData0[0x80000000] = "Code 81:Lost Communication D<->C";
	reserve	ErrorData0[0x40000000]
	reserve	ErrorData0[0x20000000]
	reserve	ErrorData0[0x10000000]
	reserve	ErrorData0[0x08000000]
	reserve	ErrorData0[0x04000000]
	reserve	ErrorData0[0x02000000]
	reserve	ErrorData0[0x01000000]
	reserve	ErrorData0[0x00800000]
	reserve	ErrorData0[0x00400000]
	reserve	ErrorData0[0x00200000]
	reserve	ErrorData0[0x00100000]
Err48	Fan error 4 Master	ErrorData0[0x00080000] = "Code 48:Master Fan4 Error";
Err47	Fan error 3 Master	ErrorData0[0x00040000] = "Code 47:Master Fan3 Error";
Err46	Fan error 2 Master	ErrorData0[0x00020000] = "Code 46:Master Fan2 Error";
Err45	Fan error 1 Master	ErrorData0[0x00010000] = "Code 45:Master Fan1 Error";
	reserve	ErrorData0[0x00008000]
	reserve	ErrorData0[0x00004000]
Err43	L3 Current High of Hardware of Grid Master	ErrorData0[0x00002000] = "Code 43:Master HW Phase3 Current High";
Err42	L2 Current High of Hardware of Grid Master	ErrorData0[0x00001000] = "Code 42:Master HW Phase2 Current High";
Err41	L1 Current High of Hardware of Grid Master	ErrorData0[0x00000800] = "Code 41:Master HW Phase1 Current High";
Err40	PV2 Current High of Hardware Master	ErrorData0[0x00000400] = "Code 40:Master HWPV2 Current High";
Err39	PV1 Current High of Hardware	ErrorData0[0x00000200] = "Code 39:Master HWPV1 Current High";

	Master	
Err38	Bus Voltage High Of Hardware Master	ErrorData0[0x00000100] = "Code 38:Master HWBus Voltage High";
	reserve	ErrorData0[0x00000080]
	reserve	ErrorData0[0x00000040]
	reserve	ErrorData0[0x00000020]
Err37	L3 Current High Master	ErrorData0[0x00000010] = "Code 37:Master Phase3 Current High";
Err36	L2 Current High Master	ErrorData0[0x00000008] = "Code 36:Master Phase2 Current High";
Err35	L1 Current High Master	ErrorData0[0x00000004] = "Code 35:Master Phase1 Current High";
Err34	Bus Voltage Low Master	ErrorData0[0x00000002] = "Code 34:Master Bus Voltage Low";
Err33	Bus Voltage High Master	ErrorData0[0x00000001] = "Code 33:Master Bus Voltage High";
Err32	Bus Voltage Unbalance Master	ErrorData1[0x80000000] = "Code 32:Master Bus Voltage Balance Error";
Err31	Insulation Error Master	ErrorData1[0x40000000] = "Code 31:Master ISO Error";
Err30	L3 DCI Error Master	ErrorData1[0x20000000] = "Code 30:Master Phase3 DCI Error";
Err29	L2 DCI Error Master	ErrorData1[0x10000000] = "Code 29:Master Phase2 DCI Error";
Err28	L1 DCI Error Master	ErrorData1[0x08000000] = "Code 28:Master Phase1 DCI Error";
Err27	GFCI Error Master	ErrorData1[0x04000000] = "Code 27:Master GFCI Error";
Err26	L3 Grid Lost Error Master	ErrorData1[0x02000000] = "Code 26:Master Phase3 No Grid Error";
Err25	L2 Grid Lost Error Master	ErrorData1[0x01000000] = "Code 25:Master Phase2 No Grid Error";
Err24	L1 Grid Lost Error Master	ErrorData1[0x00800000] = "Code 24:Master Phase1 No Grid Error";
Err23	L3 Frequency Low Master	ErrorData1[0x00400000] = "Code 23:Master Phase3 Frequency Low";
Err22	L3 Frequency High Master	ErrorData1[0x00200000] = "Code 22:Master Phase3 Frequency High";
Err21	L2 Frequency Low Master	ErrorData1[0x00100000] = "Code 21:Master Phase2 Frequency Low";
Err20	L2 Frequency High Master	ErrorData1[0x00080000] = "Code 20:Master Phase2 Frequency High";
Err19	L1 Frequency Low Master	ErrorData1[0x00040000] = "Code 19:Master Phase1 Frequency Low";
Err18	L1 Frequency High Master	ErrorData1[0x00020000] = "Code 18:Master Phase1 Frequency High";
Err17	L3 Average Voltage of 10 minutes High Master	ErrorData1[0x00010000] = "Code 17:Master Phase3 Voltage 10Min High";
Err16	L2 Average Voltage of 10 minutes High Master	ErrorData1[0x00008000] = "Code 16:Master Phase2 Voltage 10Min High";
Err15	L1 Average Voltage of 10 minutes High Master	ErrorData1[0x00004000] = "Code 15:Master Phase1 Voltage 10Min High";
Err14	L3 Voltage Low Master	ErrorData1[0x00002000] = "Code 14:Master Phase3 Voltage Low";
Err13	L3 Voltage High Master	ErrorData1[0x00001000] = "Code 13:Master Phase3 Voltage High";
Err12	L2 Voltage Low Master	ErrorData1[0x00000800] = "Code 12:Master Phase2 Voltage Low";
Err11	L2 Voltage High Master	ErrorData1[0x00000400] = "Code 11:Master Phase2 Voltage High";
Err10	L1 Voltage Low Master	ErrorData1[0x00000200] = "Code 10:Master Phase1 Voltage Low";
Err09	L1 Voltage High Master	ErrorData1[0x00000100] = "Code 09:Master Phase1 Voltage High";
Err08	Current Sensor Master	ErrorData1[0x00000080] = "Code 08:Master Current Sensor Error";
Err07	DCI Devices Error Master	ErrorData1[0x00000040] = "Code 07:Master DCI Device Error";
Err06	GFCI Devices Error Master	ErrorData1[0x00000020] = "Code 06:Master GFCI Device Error";
Err05	Lost Interior Communication Master	ErrorData1[0x00000010] = "Code 05:Master Lost Communication M<->S";

Err04	Low Temperature Master	ErrorData1[0x00000008] = "Code 04:Master Temperature Low Error";
Err03	High Temperature Master	ErrorData1[0x00000004] = "Code 03:Master Temperature High Error";
Err02	Storer Error Master	ErrorData1[0x00000002] = "Code 02:Master EEPROM Error";
Err01	Relay Error Master	ErrorData1[0x00000001] = "Code 01:Master Relay Error";
	reserve	ErrorData2[0x80000000]
Err80	PV3 Voltage High Slave	ErrorData2[0x40000000] = "Code 80:Slave PV Voltage High Error";
Err79	PV2 Current High Slave	ErrorData2[0x20000000] = "Code 79:Slave PV2 Current High Error";
Err78	PV1 Current High Slave	ErrorData2[0x10000000] = "Code 78:Slave PV1 Current High Error";
Err77	PV2 Voltage High Slave	ErrorData2[0x08000000] = "Code 77:Slave PV2 Voltage High Error";
Err76	PV1 Voltage High Slave	ErrorData2[0x04000000] = "Code 76:Slave PV1 Voltage High Error";
Err75	L3 No Grid Error Slave	ErrorData2[0x02000000] = "Code 75:Slave Phase3 No Grid Error";
Err74	L2 No Grid Error Slave	ErrorData2[0x01000000] = "Code 74:Slave Phase2 No Grid Error";
Err73	L1 No Grid Error Slave	ErrorData2[0x00800000] = "Code 73:Slave Phase1 No Grid Error";
Err72	L3 Frequency Low Slave	ErrorData2[0x00400000] = "Code 72:Slave Phase3 Frequency Low";
Err71	L3 Frequency High Slave	ErrorData2[0x00200000] = "Code 71:Slave Phase3 Frequency High";
Err70	L2 Frequency Low Slave	ErrorData2[0x00100000] = "Code 70:Slave Phase2 Frequency Low";
Err69	L2 Frequency High Slave	ErrorData2[0x00080000] = "Code 69:Slave Phase2 Frequency High";
Err68	L1 Frequency Low Slave	ErrorData2[0x00040000] = "Code 68:Slave Phase1 Frequency Low";
Err67	L1 Frequency High Slave	ErrorData2[0x00020000] = "Code 67:Slave Phase1 Frequency High";
Err66	L3 Grid Voltage Low Slave	ErrorData2[0x00010000] = "Code 66:Slave Phase3 Voltage Low";
Err65	L3 Grid Voltage High Slave	ErrorData2[0x00008000] = "Code 65:Slave Phase3 Voltage High";
Err64	L2 Grid Voltage Low Slave	ErrorData2[0x00004000] = "Code 64:Slave Phase2 Voltage Low";
Err63	L2 Grid Voltage High Slave	ErrorData2[0x00002000] = "Code 63:Slave Phase2 Voltage High";
Err62	L1 Grid Voltage Low Slave	ErrorData2[0x00001000] = "Code 62:Slave Phase1 Voltage Low";
Err61	L1 Grid Voltage High Slave	ErrorData2[0x00000800] = "Code 61:Slave Phase1 Voltage High";
Err60	L3 Data Consistency of DCI Slave	ErrorData2[0x00000400] = "Code 60:Slave Phase3 DCI Consis Error";
Err59	L2 Data Consistency of DCI Slave	ErrorData2[0x00000200] = "Code 59:Slave Phase2 DCI Consis Error";
Err58	L1 Data Consistency of DCI Slave	ErrorData2[0x00000100] = "Code 58:Slave Phase1 DCI Consis Error";
Err57	Data Consistency of GFCI Slave	ErrorData2[0x00000080] = "Code 57:Slave GFCI Consis Error";
Err56	L3 Data Consistency of Frequency Error Slave	ErrorData2[0x00000040] = "Code 56:Slave Phase3 Frequency Consis Error";
Err55	L2 Consistency of Frequency Error Slave	ErrorData2[0x00000020] = "Code 55:Slave Phase2 Frequency Consis Error";
Err54	L1 Data Consistency of Frequency Error Slave	ErrorData2[0x00000010] = "Code 54:Slave Phase1 Frequency Consis Error";
Err53	L3 Data Consistency of Voltage Error Slave	ErrorData2[0x00000008] = "Code 53:Slave Phase3 Voltage Consis Error";
Err52	L2 Data Consistency of Voltage Error Slave	ErrorData2[0x00000004] = "Code 52:Slave Phase2 Voltage Consis Error";
Err51	L1 Data Consistency of Voltage Error Slave	ErrorData2[0x00000002] = "Code 51:Slave Phase1 Voltage Consis Error";

Err50	Lost interior communication Slave	ErrorData2[0x00000001] = "Code 50:Slave Lost Communication between M<->S";
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For example:

Read 0x0101~0x0106 total 6 registers:

Return corresponding error code as below:

00 08 00 00 83 80 00 04 00 00 00 00

A total of 12 bytes of error code from left to right respectively from the highest to the lowest

Error analysis is as below:

code 48:Master Fan4 Error,

code 32:Master Bus Voltage Balance Error,

code 26:Master Phase3 No Grid Error,

code 25:Master Phase2 No Grid Error,

code 24:Master Phase1 No Grid Error,

code 03:Master Temperature High Error

#### 4.6 Special Registers

Address	SIZE (Word)	Name	Type	Scale factor	Unit	Property	Description	Remarks
801FH	1	LimitPower	UInt16			W	Limit Power	percentage
8020H	4	Time	HEX	0		W	Machine time	Form: yyyyMMddHHmmsszz <b>yyyy</b> :year <b>MM</b> : month <b>dd</b> : date <b>HH</b> : hour (24) <b>mm</b> : minut <b>ss</b> : second <b>zz</b> : reserved 2015-1-2 10:11:12 is marked as 07DF 01 02 0A 0B 0C 00