SAJ Modbus Communication Protocol

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1 Introduction

The hybrid inverter controller is composed of master controller, slave controller, and display board controller. The master controller is mainly responsible for the grid-connected algorithm voltage outer loop, Bus voltage stabilization control loop, MPPT, related grid interface algorithms, the statistics of power and electricity, and also system protection functions. The slave controller is mainly responsible for DC-DC conversion, DC boost, master-slave consistency detection, etc. The display board is mainly responsible for display working information of system. Therefore, it is necessary to define the communication protocol between the main controller and the display board.

2 Definition of Communication Interface

The master controller and the display board use UART communication, the communication setting is: default baud rate setting 115200bps, data bit 8 bits, stop bit 1 bit, no parity, no flow control. The communication mode adopts half-duplex communication mode. At the same time, only one of the master and slave can send data, and the other can receive data. The communication between the master controller and the display board is initiated by the display board, and the master controller responds (not actively initiates communication). The communication frame is a MODBUS protocol frame.

3 Definition of Communication Frame

Frame Structure

Frame Header	0xAA
Slave address field	0-247(decimal. 0 is broadcast address)
Function field	0x03: Read multiple parameters 0x06: Write single parameters 0x10: Write multiple parameters 0x17: Master and slave controller synchronize data 0x41: Firmware update
Data field	Data field includes address field and data load domain
CRC field	16bit CRC check value
End of Frame	0x55

Scale factor: The MCU doesn't possess the complete float point unit, so the calculation and transmission will adopt integer 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 below:

Address	SIZE(Word)	Register name	Data type	Scale factor	Unit	Property	Register description
001DH	1	PV1Volt	UInt16	0.1	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). The frame header does not need to compute the CRC check.

3.1.1 0x03 Read multiple registers

This function code (command) is used to read the contents of a continuous block in the register.

Request the protocol data unit to specify the starting register address and the number of registers.

In the response register data, each register data contains two bytes (the binary number is right-aligned in each byte). For each register, the first byte is the high bit and the second byte is the low bit.

For example, request to read register 0x0001-0x0002

Request	（Hex）	Response	（Hex）
Frame header	AA	Frame header	AA
	AA		AA
Slave address	0A	Slave address	0A
Command	03	Command	03
High bit of Register start address	00	Number of bytes	04
Low bit of Register start 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
CRE low bit	---	Low bit of Register value (02)	C2
CRC high bit	---	CRC low bit	---
End of frame	55	CRC high bit	---
	55	End of frame	55
			55

3.1.2 0x06 Write a single register

This function code (command) is used to write a holding register from the device. Request to specify the address of the register to be written.

The normal response is a reply to the request, and then the value written in the contents of the register is returned.

For example, it is required to write the address of register 0x0008 and write the value of 0xAAAA

Request	（Hex）	Response	（Hex）
Frame header	AA	Frame header	AA
	AA		AA
Slave address	0A	Slave address	0A
Command	06	Command	06
High bit of Register start address	00	High bit of Register start address	00
Low bit of Register start address	08	Low bit of Register start address	08
High bit of Register value	AA	High bit of Register value	AA
Low bit of Register value (01)	AA	Low bit of Register value (01)	AA
CRC low bit	---	CRC low bit	---
CRC high bit	---	CRC high bit	---
End of frame	55	End of frame	55
	55		55

3.1.3 0x17 Read/Write Multiple Registers (Master-slave synchronization data)

This function code (command) is used to perform a read operation and a write operation in a single transmission, and read and write multiple data.
For example:

Request	（Hex）	Response	（Hex）
Frame header	AA	Frame header	AA
	AA		AA
Slave address	11	Slave address	11
Command	17	Command	17
Read high bit of register starting address	00	Byte count	0C
Read low bit of register starting address	04	high bit of register value(04)	00
Read high bit of register number	00	low bit of register number(04)	FE
Read low bit of register number	06	high bit of register value(05)	0A
Write high bit of register starting address	00	low bit of register number(05)	CD
Write low bit of register starting address	0F	high bit of register value(06)	00
Write high bit of register number	00	low bit of register number(06)	01
Write low bit of register number	03	high bit of register value(07)	00
Byte count	06	low bit of register number(07)	03
Write high bit of register value(OF)	00	high bit of register value(08)	00
Write low bit of register value(OF)	FF	low bit of register number(08)	0D

Write high bit of register value(10)	00	high bit of register value(09)	00
Write low bit of register value(10)	FF	low bit of register value(09)	FF
Write high bit of register value(11)	00	CRC low bit	―――
Write low bit of register value(11)	FF	CRC high bit	―――
CRC low bit	―――	End of Frame	55
CRC high bit	―――		55
End of Frame	55		
	55		

3.1.4 0x17 Read/Write Multiple Registers (Master slave synchronizes data)

This function code (command) is used in a single transfer to perform a read operation and a write operation, multiple data read and write.

e.g.

Request	（Hex）	Response	（Hex）
Head of Frame	AA	Head of Frame	AA
	AA		AA
Slave address	11	Slave address	11
Command	17	Command	17
Read register starting address High bit	00	Number of Bit	0C
Write register starting address low bit	04	High bit of register value （04）	00
Read register number High bit	00	Low bit of register value （04）	FE
Read register number low bit	06	High bit of register value （05）	0A
Write register starting address high bit	00	low bit of register value（05）	CD
Write register starting address low bit	0F	High bit of register value （06）	00
Write register number High bit	00	Low bit of register value （06）	01
Write register number low bit	03	High bit of register value （07）	00
Number of bit	06	Low bit of register value （07）	03
Write register value high bit（OF ）	00	High bit of register value （08）	00
Write register value low bit（OF ）	FF	Low bit of register value （08）	0D
Write register value high bit（10 ）	00	High bit of register value （09）	00
Write register value high bit（10）	FF	Low bit of register value （09）	FF
Write register value high bit（11 ）	00	CRC low bit	―――
Write register value high bit（11）	FF	CRC high bit	―――
CRC low bit	―――	End of Frame	55
CRC high bit	―――		55
End of Frame	55		
	55		

3.1.5 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.
Return function code value +0x80 to exception code.

Exception code:

Exception code（Hex）	Description
01	Illegal function code
02	Illegal requested address
03	Illegal requested data
04	Server Error
06	Server busy
10	Wrong password
11	Wrong verification
12	Invalid parameters
13	System locked

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

Request	（Hex）	Response	（Hex）
Head of Frame	AA	Head of Frame	AA
	AA		AA
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	–––
Low bit of register starting address	00	CRC high bit	–––
Low bit of register number	02	End of Frame	55
CRC low bit	---		55
CRC high bit	---		
End of Frame	55		
	55		

4 Definitions of Solar inverter data Register

4.1 Definitions of Information Registers

Address	SIZE (Word)	Register Name	Data Type	Rate	Unit	Property	Description about Register	Note
8F00H	1	Type	UInt16	0		R	Device Type	0x0054: Single-phase hybrid storage inverter H1 series
8F01H	1	SubType	UInt16			R	Sub-type	
8F02H	1	CommProVersion	UInt16	-3		R	Communications 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 Control Software Version	Invalid Value: 0xFFFF
8F19H	1	SCV	UInt16	-3		R	Slave Control Software Version	Invalid Value: 0xFFFF
8F1AH	1	DispHW Version	UInt16	-3		R	Display Board Hardware Version	Invalid Value: 0xFFFF
8F1BH	1	CtrlHW Version	UInt16	-3		R	Control Board Hardware Version	Invalid Value: 0xFFFF

8F1CH	1	PowerHWVersion	UInt16	-3		R	Power Board Hardware Version	Invalid Value: 0xFFFF
8F1DH	1	BatNum	Uint16	0		R	Battery numbers	

4.2 Definitions of Realtime Data Registers（Optional）

Address	Size (Word)	Register Name	Data Type	Rate	Unit	Property
8E00H	1	BMS1 type	UInt16			R
8E01H	8	BMS1 SN	String(16)			R
8E09H	1	BMS1 software Version	UInt16	-3		R
8E0AH	1	BMS1 hardware Version	UInt16	-3		R
8E0BH	1	BAT1 type	UInt16			R
8E0CH	8	BAT1 SN	String(16)			R
8E14H	1	BMS2 type	UInt16			R
8E15H	8	BMS2 SN	String(16)			R
8E1DH	1	BMS2 software Version	UInt16	-3		R
8E1EH	1	BMS2 hardware Version	UInt16	-3		R
8E1FH	1	BAT2 type	UInt16			R
8E20H	8	BAT2 SN	String(16)			R
8E28H	1	BMS3 type	UInt16			R
8E29H	8	BMS3 SN	String(16)			R
8E31H	1	BMS3 software Version	UInt16	-3		R

8E32H	1	BMS3 hardware Version	UInt16	-3			R
8E33H	1	BAT3 type	UInt16				R
8E34H	8	BAT3 SN	String(16)				R
8E3CH	1	BMS4 type	UInt16				R
8E3DH	8	BMS4 SN	String(16)				R
8E45H	1	BMS4 software Version	UInt16	-3			R
8E46H	1	BMS4 hardware Version	UInt16	-3			R
8E47H	1	BAT4 type	UInt16				R
8E48H	8	BAT4 SN	String(16)				R

4.3 Definitions of Realtime Data Registers

Address	SIZE (Word)	Register Name	Data Type	Rate	Unit	Property	Register Description
4004H	1	MPVMode	Uint16			R	Inverter work mode
4005H	2	HFaultMSG	Uint32			R	Display board fault message
4007H	2	MFaultMSG	Uint32			R	Master Controller fault message
4009H	2	MFaultMSG2	Uint32			R	Master Controller fault message2
400BH	2	SFaultMSG	Uint32			R	Slave Controller fault message
400DH	2	SFaultMSG2	Uint32			R	Slave Controller fault message2
4010H	1	SinkTempC	Uint16	-1	℃	R	Heat Sink Temperature
4012H	1	GFCI	Int16	0	mA	R	Earth-leakage Current
4016H	1	ISO4	UInt16	0	kΩ	R	PV ISO
4019H	1	ConnTime	Uint16	0	s	R	Countdown to grid connection
4031H	1	RGridVolt	Uint16	-1	V	R	R Phase Grid Voltage

4032H	1	ROutCurr	Uint16	-2	A	R	R Phase Output Current
4033H	1	RGridFreq	Uint16	-2	Hz	R	R Phase Grid Frequency
4034H	1	RGridDCI	Int16	0	mA	R	R Phase Grid DC Component
4035H	1	ROutPowerWatt	Uint16	0	W	R	R Phase Output Active Power
4036H	1	RGridPowerVA	Uint16	0	W	R	R Phase Grid Apparent Power
4037H	1	RGridPowerPF	Int16	-3		R	R Phase Grid Power Factor
4046H	1	RInvVolt	Uint16	-1	V	R	R Phase Inverting Voltage
4047H	1	RInvCurr	Int16	-2	A	R	R Phase Inverting Current
4048H	1	RInvFreq	Uint16	-2	Hz	R	R Phase Inverting Frequency
4049H	1	RInvPowerWatt	Int16	0	W	R	R Phase Inverting Active Power
404AH	1	RInvPowerVA	Uint16	0	VA	R	R Phase Inverting Apparent Power
4055H	1	ROutVolt	Uint16	-1	V	R	R Phase Output Voltage
4056H	1	ROutCurr	Uint16	-2	A	R	R Phase Output Current
4057H	1	ROutFreq	Uint16	-2	Hz	R	R Phase Output Frequency
4058H	1	ROutDVI	Int16	0	mV	R	R Phase Output Voltage DC Component
4059H	1	ROutPowerWatt	Uint16	0	W	R	R Phase Output Active Power
405AH	1	ROutPowerVA	Uint16	0	VA	R	R Phase Output Apparent Power
4067H	1	BusVoltMaster	UInt16	-1	V	R	R Master BUS Voltage
4068H	1	BusVoltSlave	UInt16	-1	V	R	R Slave BUS Voltage
4069H	1	BatVolt	Uint16	-1	V	R	Battery Voltage
406AH	1	BatCurr	Int16	-2	A	R	Battery Current
406BH	1	BatCurr1	Int16	-2	A	R	Battery control1 Current
406CH	1	BatCurr2	Int16	-2	A	R	Battery control2 Current
406DH	1	BatPower	Int16	0	W	R	Battery Power
406EH	1	BatTempC	Int16	-1	℃	R	Battery Temperature
406FH	1	BatEnergyPercent	Uint16	-2	%	R	Battery energy percent
4071H	1	PV1Volt	UInt16	-1	V	R	PV1 Voltage
4072H	1	PV1Curr	UInt16	-2	A	R	PV1 Total current

4073H	1	PV1Power	UInt16	0	W	R	PV1 Power
4074H	1	PV2Volt	UInt16	-1	V	R	PV2 Voltage
4075H	1	PV2Curr	UInt16	-2	A	R	PV2 Total current
4076H	1	PV2Power	UInt16	0	W	R	PV2 Power
4095H	1	PV direction	Uint16	0		R	PV Energy Flow Direction
4096H	1	Battery direction	int16	0		R	Battery Energy Flow Direction
4097H	1	Grid direction	int16	0		R	Grid Power Flow Direction
4098H	1	OutPut direction	Uint16	0		R	Energy Flow Direction (Output to Load)
40A0H	1	SysTotalLoadWatt	Int16	0	W	R	Total Inverting Active Power
40A5H	1	TotalPVPower	Int16	0	W	R	Total Inverting Apparent Power
40A6H	1	TotalBatteryPower	Int16	0	W	R	Total Battery Power
40A7H	1	TotalGridPowerWatt	Int16	0	W	R	Total Grid Power Watt
40A8H	1	TotalGridPowerVA	Int16	0	VA	R	Total Grid Power VA
40A9H	1	TotalInvPowerWatt	Int16	0	W	R	Total Inverter Power Watt
40AAH	1	TotalInvPowerVA	Int16	0	VA	R	Total Inverter Power VA
40ABH	1	BackupTotalLoadPowerWatt	Uint16	0	W	R	Backup Total Load Power Watt
40ACH	1	BackupTotalLoadPowerVA	Uint16	0	VA	R	Backup Total Load Power VA
40BFH	2	Today PVEnergy	Uint32	-2	Kwh	R	Today's PV Generation
40C1H	2	Month PVEnergy	Uint32	-2	Kwh	R	PV Generation of the current month
40C3H	2	Year PVEnergy	Uint32	-2	Kwh	R	PV Generation of the current year
40C5H	2	Total PVEnergy	Uint32	-2	Kwh	R	Total PV Generation

40C7H	2	Today BatChgEnergy	Uint32	-2	Kwh	R	Today's Energy Used for Battery Charging
40C9H	2	Month BatChgEnergy	Uint32	-2	Kwh	R	Energy Used for Battery Charging in the current month
40CBH	2	Year BatChgEnergy	Uint32	-2	Kwh	R	Energy Used for Battery Charging in the current year
40CDH	2	Total BatChgEnergy	Uint32	-2	Kwh	R	Total Energy Used for Battery Charging
40CFH	2	Today BatDisEnergy	Uint32	-2	Kwh	R	Today's Energy Discharged by Battery
40D1H	2	Month BatDisEnergy	Uint32	-2	kwh	R	Energy Discharged by Battery in the current month
40D3H	2	Year BatDisEnergy	Uint32	-2	Kwh	R	Energy Discharged by Battery in the current year
40D5H	2	Total BatDisEnergy	Uint32	-2	Kwh	R	Total Energy Discharged by Battery
40DFH	2	Today TotalLoadEnergy	Uint32	-2	Kwh	R	Load Power Consumption of today
40E1H	2	Month TotalLoadEnergy	Uint32	-2	Kwh	R	Load Power Consumption of the month
40E3H	2	Year TotalLoadEnergy	Uint32	-2	Kwh	R	Load Power Consumption of the year
40E5H	2	Total TotalLoadEnergy	Uint32	-2	Kwh	R	Total Load Power Consumption
40E7H	2	Today BackupLoadEnergy	Uint32	-2	Kwh	R	Today's Backup Load Energy
40E9H	2	Month BackupLoadEnergy	Uint32	-2	Kwh	R	Backup Load Energy in the current month
40EBH	2	Year BackupLoadEnergy	Uint32	-2	Kwh	R	Backup Load Energy in the current year
40EDH	2	Total BackupLoadEnergy	Uint32	-2	Kwh	R	Total Backup Load Energy
40EFH	2	Today SellEnergy	Uint32	-2	kwh	R	Power Export to the Grid today

Address	SIZE (Word)	Register Name	Data Type	Rate	Unit	Property	Register Description
40F1H	2	Month SellEnergy	Uint32	-2	Kwh	R	Power Export to the Grid in the current month
40F3H	2	Year SellEnergy	Uint32	-2	Kwh	R	Power Export to the Grid in the current year
40F5H	2	Total SellEnergy	Uint32	-2	Kwh	R	Total Power Export to the Grid
40F7H	2	Today FeedInEnergy	Uint32	-2	Kwh	R	Power Imported from the Grid of today
40F9H	2	Month FeedInEnergy	Uint32	-2	Kwh	R	Power Imported from the Grid in the current month
40FBH	2	Year FeedInEnergy	Uint32	-2	Kwh	R	Power Imported from the Grid in the current year
40FDH	2	Total FeedInEnergy	Uint32	-2	Kwh	R	Total Power Imported from the Grid

4.4 Definition of Primary Controller Data Registers (optional)

Address	SIZE (Word)	Register Name	Data Type	Rate	Unit	Property	Register Description
A000H	1	BatNum	Uint16	0		R	Battery Number
A001H	1	BatCapcity	UInt16	0	AH	R	Battery Capacity
A002H	1	Bat1FaultMSG	Uint16	0		R	Battery1 Fault Message
A003H	1	Bat1warningMSG	Uint16	0		R	Battery1 warning Message
A004H	1	Bat2FaultMSG	Uint16	0		R	Battery2 Fault Message
A005H	1	Bat2warningMSG	Uint16	0		R	Battery2 warning Message
A006H	1	Bat3FaultMSG	Uint16	0		R	Battery3 Fault Message

A007H	1	Bat3warningMSG	Uint16	0		R	Battery3 warning Message
A008H	1	Bat4FaultMSG	Uint16	0		R	Battery4 Fault Message
A009H	1	Bat4warningMSG	Uint16	0		R	Battery4 warning Message
A00AH	2	Reserve	Uint16	0		R	Reserve
A00CH	1	Bat1SOC	Uint16	−2	%	R	Battery1 SOC
A00DH	1	Bat1SOH	Uint16	−2	%	R	Battery1 SOH
A00EH	1	Bat1Voltage	Uint16	−1	V	R	Battery1 Voltage
A00FH	1	Bat1Current	int16	−2	A	R	Battery1 Current
A010H	1	Bat1Temperature	int16	−1	°C	R	Battery1 Temperature
A011H	1	Bat1CycleNum	Uint16	0		R	Battery1 Cycle Number
A012H	1	Bat2SOC	Uint16	−2	%	R	Battery2 SOC
A013H	1	Bat2SOH	Uint16	−2	%	R	Battery2 SOH
A014H	1	Bat2Voltage	Uint16	−1	V	R	Battery2 Voltage
A015H	1	Bat2Current	int16	−2	A	R	Battery2 Current
A016H	1	Bat2Temperature	int16	−1	°C	R	Battery2 Temperature
A017H	1	Bat2CycleNum	Uint16	0		R	Battery2 Cycle Number
A018H	1	Bat3SOC	Uint16	−2	%	R	Battery3 SOC
A019H	1	Bat3SOH	Uint16	−2	%	R	Battery3 SOH
A01AH	1	Bat3Voltage	Uint16	−1	V	R	Battery3 Voltage
A01BH	1	Bat3Current	int16	−2	A	R	Battery3 Current
A01CH	1	Bat3Temperature	int16	−1	°C	R	Battery3 Temperature
A01DH	1	Bat3CycleNum	Uint16	0		R	Battery3 Cycle Number

Address	Size	Register Name	Data Type	Rate	Unit	Property	Description
A01EH	1	Bat4SOC	Uint16	-2	%	R	Battery4 SOC
A01FH	1	Bat4SOH	Uint16	-2	%	R	Battery4 SOH
A020H	1	Bat4Voltage	Uint16	-1	V	R	Battery4 Voltage
A021H	1	Bat4Current	int16	-2	A	R	Battery4 Current
A022H	1	Bat4Temperature	int16	-1	°C	R	Battery4 Temperature
A023H	1	Bat4CycleNum	Uint16	0		R	Battery4 Cycle Number

4.5 Definition of Special Registers

Address	SIZE (Word)	Register Name	Data Type	Rate	Unit	Property	Description about Register	Note	Defaults	Minimum Setting range	Maximum setting range
3208H	1	SafetyType	UInt16			R/W	Safety Type		0x2530		
3209H	1	FunMask	UInt16			R/W	Function Mask		0xFFFF		
321AH	1	ReConnTime	UInt16	0	S	R/W	ReConnect Time		60	5	600
321DH	1	ReactiveMode	UInt16			R/W	Reactive Mode	0 is capacitive regulation (kw), 1 is inductive regulation (kw), 2 is capacitive power factor regulation. 3 is inductive power factor regulation. 4 is curve mode	5	0	65535
321EH	1	ReactiveValue	UInt16	-3		R/W	Reactive Value	KW OR &	1000	0	65535
3224H	1	GridVolt10mHigh	UInt16	-1	V	R/W	GridVolt10mHigh		3000	2400	3000
3225H	1	GridVoltHigh	UInt16	-1	V	R/W	Grid Volt High		2800	2400	3000

3226H	1	GridVoltLow	UInt16	-1	V	R/W	Grid Volt Low		1600	1000	2200
3227H	1	GridFreqHigh	UInt16	-2	Hz	R/W	Grid Frequency High		5498	5000	6500
3228H	1	GridFreqLow	UInt16	-2	Hz	R/W	Grid FrequencyLow		4502	4500	6000
3229H	1	GridVoltHigh2	UInt16	-1	V	R/W	Grid Volt High2		2900	2400	3000
322AH	1	GridVoltLow2	UInt16	-1	V	R/W	Grid Volt Low2		1100	1000	2200
322BH	1	GridFreqHigh2	UInt16	-2	Hz	R/W	Grid Frequency High2		5500	5000	6500
322CH	1	GridFreqLow2	UInt16	-2	Hz	R/W	Grid Frequency Low2		4500	4500	6000
322DH	1	GridVoltHighTripTime	UInt16	0		R/W	Grid Voltage High Trip Time		90	0	65535
322EH	1	GridVoltLowTripTime	UInt16	0		R/W	Grid Voltage Low Trip Time		90	0	65535
322FH	1	GridVoltHighTripTime2	UInt16	0		R/W	Grid Voltage High Trip Time2		5	0	65535
3230H	1	GridVoltLowTripTime2	UInt16	0		R/W	Grid Volt Low Trip Time2		5	0	65535
3231H	1	GridFreqHighTripTime	UInt16	0		R/W	Grid Frequency High Trip Time		90	0	65535
3232H	1	GridFreqLowTripTime	UInt16	0		R/W	Grid Frequency Low Trip Time		90	0	65535
3233H	1	GridFreqHighTripTime2	UInt16	0		R/W	Grid Frequency High Trip Time2		90	0	65535
3234H	1	GridFreqLowTripTime2	UInt16	0		R/W	Grid Frequency Low Trip Time2		90	0	65535
3247H	1	AppMode	UInt16			R/W	Application Mode	0x00 Self-use 0x01 Time-Of-Use 0x02 Backup	0	0	65535

								0x03 Passive			
3248H	1	GridChargPowerLimit	UInt16	0	W	R/W	Grid Charging Power Limit	Default 2500W	2500	100	5250
3249H	1	GridFeedPowerLimit	UInt16	0	W	R/W	Grid Feed Power Limit	Default 5000W	5000	100	5250
324AH	1	BatType	UInt16	0		R/W	Battery Type	Default:0，0= Lead-acid battery,1= lithium battery	0	0	1
324BH	1	BatCapcity	UInt16	0	AH	R/W	Battery Capacity	Default 100AH	100	50	1000
324CH	1	BatProtHigh	UInt16	-1	V	R/W	Battery Protection High	Default 60V，50~60V	600	500	600
324DH	1	BatProtLow	UInt16	-1	V	R/W	Battery Protection Low	Default 46V，40~52V	460	400	520
324EH	1	BatOpenVolt	UInt16	-1	V	R/W	Battery Open Volt	Default 38V，12~42V	360	120	420
324FH	1	BatLowVolt	UInt16	-1	V	R/W	Battery Low Volt	Default 42V，40~48V	420	400	480
3250H	1	BatDisDepth	UInt16	0	%	R/W	Battery Discharging Depth	Default80%，20~95%	80	20	95
3251H	1	BatFloatVolt	UInt16	-1	V	R/W	Battery Float Volt	Default 54V，48~58V	540	480	580
3252H	1	BatFloatTime	UInt16	0	min	R/W	Battery Float Time	Default 120，0~65535	120	0	65535
3253H	1	BatChgCurrLimit	UInt16	-1	A	R/W	Battery Charging Current Limit	Default 50A，5~50A	500	50	500
3254H	1	BatDisCurrLimit	UInt16	-1	A	R/W	Battery Discharging Current Limit	Default 100A,5~120A	1000	50	1200
3255H	1	BatAutoWakeEn	UInt16	0		R/W	Battery Auto Wake Enable	Default:0，0= OFF，1=ON，Allow setting only when the battery type is lithium battery	0	0	1
3256H	1	BatVoltAdjCoef	UInt16	0		R/W	Battery Volt Auto self check	Default 4096（IQ12）	4096	3277	4915
3271H	1	BackModSOCRetain	UInt16	0	%	R/W	Backup Mode SOC Retain	Default 80	80	1	100

3272H	1	EpsModeEn	UInt16	0		R/W	EpsModeEn	Default 1	1	0	1
3273H	1	BatSetSOC_H	UInt16	0	%	R/W	Battery Set SOC high	Default 80 In grid-connected mode	80	50	100
3274H	1	BatSetSOC_L	UInt16	0	%	R/W	Battery Set SOC Low	Default 40 In grid-connected mode	40	20	70
3275H	1	CommProtocolType	UInt16	0		R/W	Comment Protocol Type	0: Lead-acid battery 1：485 2:DYNESS-can 3：Saj-can 4：pylon-can	1	1	3
3276H	1	SafetyModeCtrl	UInt16	0		R/W	Safety Mode Control	Bit 10(DRM Enable bit): 0：OFF 1：ON	0	0	4096
3277H	1	DRMCertification	UInt16	0	%	R/W	DRM Certification	0:AS4777.2 1:AS4755.3	0	0	1
3278H	1	AgingModel	UInt16	0		R/W	Aging Model	0:Stand By 1：Charging 2：Discharging	0	0	2
3279H	1	FeedCtrlPowerLimit	UInt16	0	W	R/W	Feed Control Power Limitation	Default 5000W	5000	100	6000

Address	SIZE (Word)	Register Name	Data Type	Rate	Unit	Property	Description about Register	Note	Defaults	Minimum Setting range	Maximum setting range
3604H	1	Charge time enable control	Uint16	0		R/W	Charge time enable control	Each bit is 1 to indicate the number of enabling charging time, the 0th bit is the first one, the 1st bit is the second...	0	0	127
3605H	1	Discharge time enable control	Uint16	0		R/W	Discharge time enable control	Each bit is 1 to indicate the number of enabling charging time, the 0th bit	0	0	127

								is the first one, the 1st bit is the second...			
3606H	1	First charge start time	HEX	0		R/W	Battery first charging time (start)	High byte is hour, low byte is minute. hh : mm	0	0	0x173B(23:59)
3607H	1	First charge end time	HEX	0		R/W	Battery first charging time (end)	High byte is hour, low byte is minute. hh : mm	0		0x173B(23:59)
3608H	1	First charge power time	HEX	0		R/W	Battery first charging time (power)	The high byte indicates the day of the week, and each position is enabled. For example, 0b0100 indicates Wednesday; the low byte indicates power, such as 1 indicates 1% of the standard power of the model			
3609H	1	Second charge start time	HEX	0		R/W	Battery second charging time (start)	High byte is hour, low byte is minute. hh : mm	0	0	0x173B(23:59)
360AH	1	Second charge end time	HEX	0		R/W	Battery second charging time (end)	High byte is hour, low byte is minute. hh : mm	0		0x173B(23:59)
360BH	1	Second charge power time	HEX	0		R/W	Battery second charging time (power)	The high byte indicates the day of the week, and each position is enabled. For example, 0b0100 indicates Wednesday; the low byte indicates power, such as 1 indicates 1% of the standard power of the model			
360CH	1	Third charge start	HEX	0		R/W	Battery third	High byte is hour, low byte	0	0	0x173B(23:59)

360DH	1	Third charge end time	HEX	0		R/W	Battery third charging time (end)	High byte is hour, low byte is minute. hh : mm	0		0x173B(23:59)
		time					charging time (start)	is minute. hh : mm			
360EH	1	Third charge power time	HEX	0		R/W	Battery third charging time (power)	The high byte indicates the day of the week, and each position is enabled. For example, 0b0100 indicates Wednesday; the low byte indicates power, such as 1 indicates 1% of the standard power of the model			
360FH	1	Fourth charge start time	HEX	0		R/W	Battery fourth charging time (start)	High byte is hour, low byte is minute. hh : mm	0	0	0x173B(23:59)
3610H	1	Fourth charge end time	HEX	0		R/W	Battery fourth charging time (end)	High byte is hour, low byte is minute. hh : mm	0		0x173B(23:59)
3611H	1	Fourth charge power time	HEX	0		R/W	Battery fourth charging time (power)	The high byte indicates the day of the week, and each position is enabled. For example, 0b0100 indicates Wednesday; the low byte indicates power, such as 1 indicates 1% of the standard power of the model			
3612H	1	Fifth charge start time	HEX	0		R/W	Battery fifth charging time (start)	High byte is hour, low byte is minute. hh : mm	0	0	0x173B(23:59)
3613H	1	Fifth charge end time	HEX	0		R/W	Battery fifth	High byte is hour, low byte	0		0x173B(23:59)

							charging time (end)	is minute. hh : mm		
3614H	1	Fifth charge power time	HEX		0	R/W	Battery fifth charging time (power)	The high byte indicates the day of the week, and each position is enabled. For example, 0b0100 indicates Wednesday; the low byte indicates power, such as 1 indicates 1% of the standard power of the model		
3615H	1	Sixth charge start time	HEX		0	R/W	Battery sixth charging time (start)	High byte is hour, low byte is minute. hh : mm	0	0	0x173B(23:59)
3616H	1	Sixth charge end time	HEX		0	R/W	Battery sixth charging time (end)	High byte is hour, low byte is minute. hh : mm	0		0x173B(23:59)
3617H	1	Sixth charge power time	HEX		0	R/W	Battery sixth charging time (power)	The high byte indicates the day of the week, and each position is enabled. For example, 0b0100 indicates Wednesday; the low byte indicates power, such as 1 indicates 1% of the standard power of the model		
3618H	1	Seventh charge start time	HEX		0	R/W	Battery seventh charging time (start)	High byte is hour, low byte is minute. hh : mm	0	0	0x173B(23:59)
3619H	1	Seventh charge end time	HEX		0	R/W	Battery seventh charging time (end)	High byte is hour, low byte is minute. hh : mm	0		0x173B(23:59)

361AH	1	Seventh charge power time	HEX			0	R/W	Battery seventh charging time (power)	The high byte indicates the day of the week, and each position is enabled. For example, 0b0100 indicates Wednesday; the low byte indicates power, such as 1 indicates 1% of the standard power of the model			
361BH	1	First discharge start time	HEX			0	R/W	Battery first discharging time (start)	High byte is hour, low byte is minute. hh : mm	0	0	0x173B(23:59)
361CH	1	First discharge end time	HEX			0	R/W	Battery first discharging time (end)	High byte is hour, low byte is minute. hh : mm	0		0x173B(23:59)
361DH	1	First discharge power time	HEX			0	R/W	Battery first discharging time (power)	The high byte indicates the day of the week, and each position is enabled. For example, 0b0100 indicates Wednesday; the low byte indicates power, such as 1 indicates 1% of the standard power of the model			
361EH	1	Second discharge start time	HEX			0	R/W	Battery second discharging time (start)	High byte is hour, low byte is minute. hh : mm	0	0	0x173B(23:59)
361FH	1	Second discharge end time	HEX			0	R/W	Battery second discharging time (end)	High byte is hour, low byte is minute. hh : mm	0		0x173B(23:59)
3620H	1	Second discharge power time	HEX			0	R/W	Battery second discharging time (power)	The high byte indicates the day of the week, and each position is enabled. For			

								example, 0b0100 indicates Wednesday; the low byte indicates power, such as 1 indicates 1% of the standard power of the model			
3621H	1	Third discharge start time	HEX	0		R/W	Battery third discharging time (start)	High byte is hour, low byte is minute. hh : mm	0	0	0x173B(23:59)
3622H	1	Third discharge end time	HEX	0		R/W	Battery third discharging time (end)	High byte is hour, low byte is minute. hh : mm	0		0x173B(23:59)
3623H	1	Third discharge power time	HEX	0		R/W	Battery third discharging time (power)	The high byte indicates the day of the week, and each position is enabled. For example, 0b0100 indicates Wednesday; the low byte indicates power, such as 1 indicates 1% of the standard power of the model			
3624H	1	Fourth discharge start time	HEX	0		R/W	Battery fourth discharging time (start)	High byte is hour, low byte is minute. hh : mm	0	0	0x173B(23:59)
3625H	1	Fourth discharge end time	HEX	0		R/W	Battery fourth discharging time (end)	High byte is hour, low byte is minute. hh : mm	0		0x173B(23:59)
3626H	1	Fourth discharge power time	HEX	0		R/W	Battery fourth discharging time (power)	The high byte indicates the day of the week, and each position is enabled. For example, 0b0100 indicates Wednesday; the low byte indicates power, such as 1			

								indicates 1% of the standard power of the model			
3627H	1	Fifth discharge start time	HEX	0		R/W	Battery fifth discharging time (start)	High byte is hour, low byte is minute. hh : mm	0	0	0x173B(23:59)
3628H	1	Fifth discharge end time	HEX	0		R/W	Battery fifth discharging time (end)	High byte is hour, low byte is minute. hh : mm	0		0x173B(23:59)
3629H	1	Fifth discharge power time	HEX	0		R/W	Battery fifth discharging time (power)	The high byte indicates the day of the week, and each position is enabled. For example, 0b0100 indicates Wednesday; the low byte indicates power, such as 1 indicates 1% of the standard power of the model			
362AH	1	Sixth discharge start time	HEX	0		R/W	Battery sixth discharging time (start)	High byte is hour, low byte is minute. hh : mm	0	0	0x173B(23:59)
362BH	1	Sixth discharge end time	HEX	0		R/W	Battery sixth discharging time (end)	High byte is hour, low byte is minute. hh : mm	0		0x173B(23:59)
362CH	1	Sixth discharge power time	HEX	0		R/W	Battery sixth discharging time (power)	The high byte indicates the day of the week, and each position is enabled. For example, 0b0100 indicates Wednesday; the low byte indicates power, such as 1 indicates 1% of the standard power of the model			

362DH	1	Seventh discharge start time	HEX	0		R/W	Battery seventh discharging time (start)	High byte is hour, low byte is minute. hh：mm	0	0	0x173B(23:59)
362EH	1	Seventh discharge end time	HEX	0		R/W	Battery seventh discharging time (end)	High byte is hour, low byte is minute. hh：mm	0		0x173B(23:59)
362FH	1	Seventh discharge power time	HEX	0		R/W	Battery seventh discharging time (power)	The high byte indicates the day of the week, and each position is enabled. For example, 0b0100 indicates Wednesday; the low byte indicates power, such as 1 indicates 1% of the standard power of the model			
3630H	1	Meter enable	Uint16	0		R/W	Meter enable	0：Off，1：Single meter 2：double meters	0	0	2
3631H	1	Meter addr	Uint16	0		R/W	Meter address	1 - 255	1	1	255
3632H	1	Buzzer on-off	Uint16	0		R/W	Buzzer on-off	0：On，1：Off	0	0	1
3633H	1	RS485 Addr	Uint16			R/W	RS485 Address	1~127	1	1	127
3634H	1	RS485 BaudRate	Uint16			R/W	RS485 Baud Rate	0:9600,1:4800,2:2400,3:1200	0	0	3
3635H	1	PreventReverseFlow enable	Uint16			R/W	Prevent Reverse Flow enable	0:Off，1:On			
3636H	1	Passive charge enable	Uint16			R/W	Passive charge enable	1：charge；2：discharge			
3637H	1	Passive GridChargePower	Uint16	0	w	R/W	The power of grid passive charging				

3638H	1	Passive GridDisChargePower	Uint16	0	w	R/W	The power of grid passive discharging				
363BH	1	Battery protocol	Uint16	0		R/W	Battery protocol	0：pylon RS485-1 1:chint RS485-1 2：Lead acid-0 3:kegon can-3 4:dyness can-2 5：RS485-1 6：pylon can-4	0	0	5

4.6 Definition of Error Code

Code	Error Code	Definition of Error Code	Code	Error Code	Definition of Error Code
1	Relay Err	Relay Error	33	Bat Input Short Err	Battery Input Short Error
2	GFCI Device Err	GFCI Device Error	34	Bat Volt.High Err	Battery Voltage High Error
3	Fan Err	Fan Error	35	Fan Err	Fan Error
4	EEPROM Err	EEPROM Error	36	BusSoftTimeOut Err	Bus Soft Time Out Error
5	Lost Com.M<->S Err	Lost Communication Between Master and Slave Error	37	Lost Com.M<->S Err	Lost Communication Between Master and Slave Error
6	ISO Err	ISO Error	38	BMS Lost.Conn Warn	Lost BMS Connection

				warning
7	Temp.High Err	Temperature High Error	39	Bus Volt.High Err	Bus Voltage High Error
8	Temp.Low Err	Temperature Low Error	40	Discharge Err	Discharge Error
9	Bus Volt.High Err	Bus Voltage High Error	41	BUS Volt.Consis Err	BUS Voltage Constant Error
10	Bus Volt.Low Err	Bus Voltage Low Error	42	Out Insert Err	Output Insert Error
11	GFCI Err	GFCI Error	43	Inv Wave Err	Inverter Wave Error
12	DCI Err	DCI Error	44	GFCI Consis Err	GFCI Constant Error
13	HWBus Volt.High Err	HW Bus Voltage High Error	45	Reserved(bit 45)	Reserved(bit 45)
14	HWPV1 Curr.High Err	HW PV1 Current High Error	46	DVI Consis Err	DVI Constant Error
15	HWPV2 Curr.High Err	HW PV2 Current High Error	47	CHG1 Curr Err	CHG1 Current Error
16	HWInv Curr.High Err	HW Inverter Current High Error	48	CHG2 Curr Err	CHG2 Current Error
17	Inv Short Err	Inverter Short Error	49	Grid Volt.Consis Warn	Grid Voltage Constant warning
18	Over Load Err	Over Load Error	50	Grid Freq.Consis Warn	Grid Frequency Constant

					warning
19	PV1 Volt.High Err	PV1 Voltage High Error	51	DCI Consis Warn	DCI Constant warning
20	PV2 Volt.High Err	PV2 Voltage High Error	52	GND Loss Warn	GND Loss warning
21	PV1 Curr.High Err	PV1 Current High Error	53	LN Wrong Warn	LN Wrong warning
22	PV2 Curr.High Err	PV2 Current High Error	54	ForbidChargeWarn	Forbid Charge warning
23	Inv Curr.High Err	Inverter Current High Error	55	ForbidDisChargeWarn	Forbid Discharge warning
24	Ext Com Lost Err	Ext Communication Lost Error	56	ForceChargeWarn	Force Charge warning
25	Grid Volt.High Warn	Grid Voltage High warning	57	Grid Volt.High Warn	Grid Voltage High warning
26	Grid Volt.Low Warn	Grid Voltage Low warning	58	Grid Volt.Low Warn	Grid Voltage Low warning
27	Grid Freq.High Warn	Grid Frequency High warning	59	Grid Freq.High Warn	Grid Frequency High warning
28	Grid Freq.Low Warn	Grid Frequency Low warning	60	Grid Freq.Low Warn	Grid Frequency Low warning
29	Grid Loss Warn	Grid Loss warning	61	Grid Loss Warn	Grid Loss warning
30	Grid Volt.10min Warn	Grid Voltage10min warning	62	Battery Open Warn	Battery Open warning
31	Over Load Warn	Over Load warning	63	Battery High Warn	Battery High warning

32	Out Volt.Low Warn	Output Voltage Low warning	64	Battery Low Warn	Battery Low warning

Code	Error Code	Definition of Error Code
65	Lost Com.H<->M Err	Inner Connection Lost
66	HMI EEPROM Err	HMI EEPROM Error
67	HMI RTC Err	HMI RTC Error
68	BMS Device Err	BMS Device Error
69	Reserved(bit 69)	Reserved(bit 69)
70	Reserved(bit 70)	Reserved(bit 70)
71	Reserved(bit 71)	Reserved(bit 71)
72	Reserved(bit 72)	Reserved(bit 72)
73	Reserved(bit 73)	Reserved(bit 73)
74	Reserved(bit 74)	Reserved(bit 74)
75	Reserved(bit 75)	Reserved(bit 75)

76	Reserved(bit 76)	Reserved(bit 76)
77	Reserved(bit 77)	Reserved(bit 77)
78	Reserved(bit 78)	Reserved(bit 78)
79	Reserved(bit 79)	Reserved(bit 79)
80	Reserved(bit 80)	Reserved(bit 80)
81	BMS Cell Volt.H Warn	BMS Cell Voltage High warning
82	BMS Cell Volt.L Warn	BMS Cell Voltage Low warning
83	BMS CHG Curr.H Warn	BMS CHG Current High warning
84	Reserved(bit 84)	Reserved(bit 84)
85	BMS DCHG Curr.H Warn	BMS DCHG Current High warning
86	BMS DCHG Temp Warn	BMS DCHG Temperature warning
87	BMS CHG Temp Warn	BMS CHG Temperature warning
88	BMS Voltage Low Warn	BMS Voltage Low warning
89	BMS Lost.Conn Warn	BMS Lost Connection warning

90	Reserved(bit 90)	Reserved(bit 90)
91	Meter Lost Com Warn	Meter Lost Communication warning
92	DRM0 Warn	DRM0 warning
93	Reserved(bit 93)	Reserved(bit 93)
94	Reserved(bit 94)	Reserved(bit 94)
95	Reserved(bit 95)	Reserved(bit 95)
96	Reserved(bit 96)	Reserved(bit 96)

4.7 Definition of BMS Error Code

	Fault MSG	Warning MSG
Bit 0	Reserved	Reserved

Bit 1	Over voltage	High voltage
Bit 2	Under voltage	Low voltage
Bit 3	Over temp.	High temp.
Bit 4	Under temp.	Low temp.
Bit 5	Over MOSFET temp.	Over MOSFET temp.
Bit 6	Over environment temp.	Over environment temp.
Bit 7	Over current discharge	High current discharge
Bit 8	Over current charge	High current charge
Bit 9	Short circuit	Short circuit
Bit 10	Reserved	Reserved
Bit 11	BMS internal	BMS internal
Bit 12	Voltage detection failure	Reserved
Bit 13	Current detection failure	Reserved
Bit 14	Temp. detection failure	Reserved
Bit 15	MOSFET detection failure	Reserved

4.8 Definition of 0x3309

Address	BIT	Register Name	Rate	Description about Register	Note
0x3209	bit0	RelayCheck	0	Relay detection enable bit	0=OFF、1=ON
	bit1	ISOCheck	0	ISO detection enable bit	0=OFF、1=ON
	bit2	GFCIDevCheck	0	GFCI equipment Self-check enable bit	0=OFF、1=ON

	bit3	GFCICheck	0	GFCI Self-check enable bit	0=OFF、1=ON
	bit4	DciCheck	0	Grid DCI detection enable bit	0=OFF、1=ON
	bit5	DciAdjust	0	Grid DCI control enable bit	0=OFF、1=ON
	bit6	AntiIsland	0	Anti-island detection enable bit	0=OFF、1=ON
	bit7	FANCheck	0	Fan detection enable bit	0=OFF、1=ON
	bit8	Rsvd8	0	Reserved 8	0=OFF、1=ON
	bit9	Rsvd9	0	Reserved 9	0=OFF、1=ON
	bit10	Rsvd10	0	Reserved 10	0=OFF、1=ON
	bit11	LNPECheck	0	Grid wiring detection enable bit	0=OFF、1=ON
	bit12	DviAdjust	0	Output voltage DCI enable bit	0=OFF、1=ON
	bit13	OutInsertCheck	0	Output terminal abnormal access detection enable bit	0=OFF、1=ON
	bit14	InvWaveCheck	0	Inverter wave detection enable bit	0=OFF、1=ON
	bit15	PvLoadFuncEn	0	PV Independent load function enable bit	0=OFF、1=ON