Storage and Hybrid

ModBus-RTU protocol

2018-5-04

Version History table

Time to develop	version number	Content	Modifier
04/05/2018	1.00	Initial Release	
11/07/2018	1.01	Increasing the input overcurrent fault code	
29/08/2018	1.02	Increase in primary and secondary DSP software version number	
26/03/2019	1.03	Increase ID34 overload protection	
25/05/2019	1.04	ID35 CT error	

A. Protocol Overview

1.1 Physical Layer

Physical layer transmission: RS485 / RS422
Address: 1 to 63
Communication baud rate: 9600bps
Communication distance: maximum 1000 meters
Communications Media: shielded twisted pair
Communication mode: MODBUS - RTU

1.2 Link Layer

Transmission type: Master-slave, half-duplex mode.

First, the host is addressed to a unique terminal device (slave), and then the response signal from the terminal device is transmitted to the host in the opposite direction. The protocol only allows data exchange between the host and the terminal device, and does not allow independent devices. This does not cause them to occupy the communication line during initialization, but only for the inquiry signal that arrives at the machine accordingly.
Data transmission format: 1 start bit, 8 data bits, 1 stop bit, no parity.
Data transmission format:

Device Address	function code	data	Check code
1-Byte	1-Byte	N-Byte	2byte

The protocol defines the checksum, data sequence, etc. in detail, which are all necessary for specific data exchange. When the data frame arrives at the terminal device, it enters the addressed device through a simple "port". The device removes the "envelope" (data header) of the data frame, reads the data, and if there is no error, executes the data request. The task, then, it adds the data it generates to the obtained "envelope" and returns the data frame to the sender. The returned response data includes the following: the terminal slave address (Address), the executed command (Function), the requested data generated by the execution command (Data), and a check code (Check). The terminal slave function recognizes the error communication from the host and makes a different error response.

1.3 Address code (Address)

The address is the beginning of the frame and consists of one byte (values 1 to 63). This address indicates the identity of the user-specified terminal device that will receive the host data from it. The terminal device address in a system network must be unique, and only the addressed terminal will respond. When the terminal sends back a response, the slave address data in the response tells the host which terminal is communicating with it.

1.4 Function code (Function)

The function code tells what the terminal to which the addressed terminal will perform. Table 2 lists the function codes supported by the monitoring device and their meanings are as follows.

function code	Register address space	significance
0x03	Read the inverter input register information 0x0000-0x00FF	Get the value of one or more registers
	Read the input register information of the built-in combiner box 0x0100-0x01FF	Get the value of one or more registers
	Reading inverter parameter accumulator input register information 0x0200-0x02FF	Get the value of one or more registers
0x04	Read inverters or inverter energy storage Holding register information 0x1000-0x10FF	Get the value of one or more registers
	Write the information of the built-in combiner box 0x1100-0x11FF	Get the value of one or more registers
0x13	Write inverters or inverter energy storageThe parameters or settings 0x1000-0x10FF	Write one or more values to the inverter registers
	Write a built-in combiner box information 0x1100-0x11FF	Write one or more values to the inverter registers
0x21	Spread code 0x2000-0x20ff Write inverter manufacturing-related information	
	Spread code 0x2100-0x21ff Write combiner box manufacturing-related information	
0x07	Hide function 0x3000 Calibration (plus password?)	
0x08	Hide function 0x4000 Maintenance information (encrypted?)	
0x02	Automatic timing	
0x01	Remote switch, power, power factor	
0x50	Read EEPROM data storage	
0x51	Write EEPROM data storage	
0x61	Read SD card data	
0x10	Reading Time	
0x30	reset	
0x31	Clear daily energy production	

0x32	Restores the current national safety parameter default values	
0x33	Clear power generation	
0x34	Clear Event Log	
0x35	Read control word relay	
0x36	Write control word relay	
0x37	Reading control word alarm relay ID number (function code 0x37) set when Alarm (configurable)	
0x38	Set alarm relay control word ID number (function code 0x38) when Alarm (configurable)	
0x45	Read test flag	
0x46	Write test flag	

1.5 Data field (Data)

The data field consists of two sets of hexadecimal numbers ranging from 00H to FFH, and consists of RTU characters according to the network transmission mode. The data field sent from the master to the slave message contains additional information: the slave must be used to perform the behavior defined by the function code, including, for example, discrete register addresses, the number of items to be processed, to be written Data information, the number of actual data bytes in the domain. For example, the function field code tells the terminal to read a register, and the data field needs to indicate which register to start and how many data to read. The embedded address and data differ according to the different capabilities between the type and the slave.

1.6 Error Check (CRC)

This check allows the host and terminal to check for errors during transmission. Sometimes, due to electrical noise and other disturbances, a set of data may change on the line while transferring from one device to another. Error checking ensures that the host or terminal does not respond to data that has changed during transmission. This improves the security and efficiency of the system, and the error check uses a 16-bit cyclic redundancy method. The Cyclic Redundancy Check (CRC) occupies two bytes and contains a 16-bit binary value. The CRC value is calculated by the transmitting device and then appended to the data frame. The receiving device recalculates the CRC value when receiving the data, and then compares it with the value in the received CRC field. If the two values are not equal, it occurs. error. In the CRC operation, a 16-bit register is first preset to all ones, and then the 8-bit byte in the data frame is continuously operated with the current value of the register, and only 8 data bits of each byte participate in the generation of the CRC. The start and stop bits and the possible parity bits do not affect the CRC. When generating the CRC, each 8-bit byte is XORed with the contents of the register, and then the result is shifted to the low-order bit. The high bit is complemented by “0”, and the least significant bit (LSB) is shifted out and detected. If it is 1, the The register is XORed with a preset fixed value. If the lowest bit is 0, no processing is performed.

The above processing is repeated until the shift operation is performed 8 times. When the last bit (bit 8) is

shifted, the next 8-bit byte is XORed with the current value of the register, and the other 8 is also performed. The sub-shift XOR operation, when all the bytes in the data frame are processed, the final value generated is the CRC value.

The process of generating a CRC is:

(1) Preset a 16-bit register to 0FFFFH (all 1), which is called CRC register;

(2) XOR the first octet in the data frame with the low byte in the CRC register and store the result in the CRC register.

(3) Move the CRC register one bit to the right, fill the highest bit with 0, and the lowest shift out and detect.

(4) If the lowest bit is 0: Repeat the third step (next shift).

If the least significant bit is 1: The CRC register is XORed with a preset fixed value (0A001H).

(5) Repeat steps 3 and 4 until 8 shifts. This completes a complete eight bit.

(6) Repeat steps 2 through 5 to process the next eight bits until all byte processing ends.

(7) The value of the final CRC register is the value of the CRC.

2. Detailed instructions

2.1 broadcast data frame information (address 0x88)

Features: non-response response data broadcast.

2.1.1. Automatic timing

Device Address	0x88
function code	0x02
Hi register address	0x50
Lo Register Address	0x00
Number of registers (high byte)	0x00
Number Register (Low Byte)	0x03
Data field (s)	
Data field (min)	
Data field (time)	
Data fields (date)	
Data Domain (month)	
Data Domain (year)	
CRC Check code Lo	
CRC Check code Hi	

Automatic timing address list

address	definition	Variable Types	length	range	Defaults	Remark
0x5000	Automatic timing	BCD				

2.1.2 OFF signals

remote On-OFF

Device Address	0x88
function code	0x01
Hi register address	0x01
Lo Register Address	0x42
Register value Hi	0x00
Register value Lo	0x55 / 0x66
CRC Check code Lo	0x82
CRC Check code Hi	0xBB

NOTE: boot registers Lo = 0x55, shutdown register Lo = 0X66.

2.1.3 Active power reduction setting

Active power reduction

Device Address	0x88
function code	0x01
Hi register address	0x01
Lo Register Address	0x41
Register value Hi	(0-1000)
Register value Lo	1000 corresponds to 100.0% active
CRC Check code Lo	
CRC Check code Hi	

2.1.4 Reactive Power factor setting

Reactive Power factor setting

Device Address	0x88
function code	0x01
Hi register address	0x01
Lo Register Address	0x61
Register value Hi	Int16, in the range -100 to 100
Register value Lo	
CRC Check code Lo	
CRC Check code Hi	

2.1.5 Reactive power setting

Reactive power setting

Device Address	0x88
function code	0x01
Hi register address	0x01
Lo Register Address	0x62

Register value Hi	Int16, in the range -100 to 100
Register value Lo	
CRC Check code Lo	
CRC Check code Hi	

2.2 Read command (Function Code 0x03)

Through the 03 function code, query the data information of the allowed registers. The command format is as follows:

2.2.1 read data format

Master Request packet format:

Device Address	function code	Start address register	The number of registers	CRC checksum
1 byte	1 byte	A word	A word	A word
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Lo Byte Hi Byte

Slave response message format:

Device Address	function code	Byte count	Register value 1	. . .	Register value (N)	CRC checksum
1 byte	1 byte	1 byte	A word	N-2	A word	A word
Byte	Byte	Byte	Hi Byte Lo Byte	. . .	Hi Byte Lo Byte	Lo Byte Hi Byte

Example request frame (running status):

request:

Device Address	0x01
function code	0x03
Hi register address	0x00
Lo Register Address	0x00
Hi number of registers	0x00
Lo number of registers	0x01
CRC Check code Lo	0x84
CRC Check code Hi	0x0A

response:

Device Address	0x01
function code	0x03
Byte count	0x02
Registervalue Hi	0x00
Registervalue Lo	0x00
CRC Check code Lo	0xB8
CRC Check code Hi	0x44

2.2.2 Storage inverter read address table

Error list:

0x0201 low byte, Byte0

bit	Logogram	Remarks	ID number
Bit0	GridOVP	Grid voltage is too high	ID01
Bit1	GridUVP	Grid voltage is too low	ID02
Bit2	GridOFP	Grid frequency is too high	ID03
Bit3	GridUFP	Grid frequency is too low	ID04
Bit4	BatOVP	Battery voltage is too high	ID05
Bit5	Reserved		ID06
Bit6	LVRT fault	LVRT function is faulty	ID07
Bit7	PVOVP	Input voltage is too high	ID08

0x0201 high byte, Byte1

bit	Logogram	Remark	ID number
Bit0	HW_LLCBus_OVP	Voltage on LLCBus is too high	ID09
Bit1	HW_Boost_OVP	Voltage on booster section is too high	ID10
Bit2	HWBuckBoostOCP	Current on Buck Boost section is too high	ID11
Bit3	HwBatOCP	Battery current is too high	ID12
Bit4	GFCI OCP	Ground Fault current is too high	ID13
Bit5	HWPVOCP	Input current is too high (hardware overcurrent)	ID14
Bit6	HwAcOCP	Grid current is too high (hardware overcurrent)	ID15
Bit7	IpvUnbalance	Input current is unbalanced	ID16

0x0202 low byte, Byte2

bit	Logogram	Remark	ID number
Bit0	HwADFaultIGrid	Grid current sampling error	ID17
Bit1	HwADFaultDCI	DCI sampling error	ID18
Bit2	HwADFaultVGrid	Grid voltage sampling error	ID19
Bit3	GFCIDeviceFault	GFCI sampling error	ID20
Bit4	MChip_Fault	Master chip fault	ID21
Bit5	HwAuxPowerFault	Auxiliary voltage error	ID22
Bit6	reserved		ID23
Bit7	reserved		ID24

0x0202 high byte, Byte3

bit	Logogram	Remark	ID number
Bit0	LLCBusOVP	Voltage on LLCBus is too high	ID25

Bit1	SwBusOVP	Voltage on LLCBus is too high	ID26
Bit2	BatOCP	Battery current is too high	ID27
Bit3	DciOCP	DCI is too high	ID28
Bit4	SwOCPInstant	Grid current is too high	ID29
Bit5	BuckOCP	Current on Buck section is too high	ID30
Bit6	AcRmsOCP	Output current is too high	ID31
Bit7	SwBOCPInstant	Input current is too high	ID32

0x0203 low byte, Byte4

bit	Logogram	Remark	ID number
Bit0	PvConfigSetWrong	Input mode is uncorrectly set	ID33
Bit1	Overload	Overload protection	ID34
Bit2	CTDisconnect	CT error	ID35
Bit3	reserved		ID36
Bit4	reserved		ID37
Bit5	reserved		ID38
Bit6	reserved		ID39
Bit7	reserved		ID40

0x0203 high byte, Byte5

bit	Logogram	Remark	ID number
Bit0	reserved		ID41
Bit1	reserved		ID42
Bit2	reserved		ID43
Bit3	reserved		ID44
Bit4	reserved		ID45
Bit5	reserved		ID46
Bit6	reserved		ID47
Bit7	ConsistenFault	GFCI Measured value by master and slave DSP is not matching	ID48

0x0204 low byte, Byte6

bit	Logogram	Remark	ID number
Bit0	ConsistentFault_Vgrid	Grid voltage value measured by master DSP and slave DSP is not consistent	ID49
Bit1	ConsistentFault_Fgrid	Grid frequency value measured by master DSP and slave DSP is not consistent	ID50
Bit2	ConsistentFault_DCI	DCI value measured by the master DSP and slave DSP is not consistent	ID51
Bit3	BatCommunicationFlag	Missing communication between inverter and batteries	ID52
Bit4	SpiCommLose	The SPI communication between master DSP and slave DSP is faulty	ID53
Bit5	SciCommLose	The SCI communication between control board and communication	ID54

		board is faulty	
Bit6	RecoverRelayFail	Relays fault	ID55
Bit7	PvIsoFault	Insulation resistance is too low	ID56

0x0204 high byte, Byte7

bit	Logogram	Remark	ID number
Bit0	OverTempFault_BAT	Battery temperature is too high	ID57
Bit1	OverTempFault_HeatSink	Heatsink temperature is too high	ID58
Bit2	OverTempFault_Env	Environment temperature is too high	ID59
Bit3	PE connectFault	Grounding not correct	ID60
Bit4	reserved		ID61
Bit5	reserved		ID62
Bit6	reserved		ID63
Bit7	reserved		ID64

0x0205 low byte, Byte8

bit	Logogram	Remark	ID number
Bit0	UnrecoverHwAcOCP	Grid current is too high this caused unrecoverable hardware fault	ID65
Bit1	UnrecoverBusOVP	Bus voltage is too high this caused unrecoverable hardware fault	ID66
Bit2	BitEPSunrecoverBatOCP	Permanent battery overcurrent in EPS mode	ID67
Bit3	UnrecoverIpvUnbalance	Input current is unbalanced this caused unrecoverable hardware fault	ID68
Bit4	reserved		ID69
Bit5	UnrecoverOCPInstant	Grid current is too high this caused unrecoverable hardware fault	ID70
Bit6	reserved		ID71
Bit7	reserved		ID72

0x0205 high byte, Byte9

bit	Logogram	Remark	ID number
Bit0	UnrecoverPVConfigSetWrong	Input mode is uncorrectly set	ID73
Bit1	UnrecoverIpvInstant	Input current is too high this caused unrecoverable hardware fault	ID74
Bit2	UnrecoverWRITEEEPROM	The EEPROM is unrecoverable	ID75
Bit3	UnrecoverREADEEPROM	The EEPROM is unrecoverable	ID76
Bit4	UnrecoverRelayFail	Relay is in permanent fault	ID77
Bit5	reserved		ID78
Bit6	reserved		ID79
Bit7	reserved		ID80

Inverter alarm: 0x022B low byte, byte0

bit	Logogram	Remark	ID number
Bit0	OverTempDerating	Inverter derated because the temperature is too high	ID81
Bit1	OverFreqDerating	Inverter derated because the grid frequency is too high	ID82
Bit2	RemoteDerating	Inverter derated on remote control	ID83
Bit3	RemoteOff	Inverter shut down by remote control	ID84
Bit4	reserved		
Bit5	reserved		
Bit6	reserved		ID87
Bit7	SOC <= 1 - DOD or battery undervoltage	Battery voltage below SOC	ID85

Inverter alarm: 0x022B high byte, byte1

bit	Logogram	Remark	ID number
Bit0	force charge failure	force charge failure	ID86
Bit1	reserved		
Bit2	reserved		
Bit3	reserved		
Bit4	reserved		
Bit5	reserved		
Bit6	reserved		
Bit7	reserved		

Communication inner plate information: 0x0242 low byte, byte0

bit	Logogram	Remark	ID number
Bit0	reserved		ID91
Bit1	reserved		ID92
Bit2	reserved		ID93
Bit3	Software version is not consistent	Software version between control board and communication board is not consistent	ID94
Bit4	Communication board EEPROM fault	Communication board EEPROM is faulty	ID95
Bit5	RTC clock chip anomaly	RTC clock chip is faulty	ID96
Bit6	Invalid Country	Selcted country is Invalid	ID97
Bit7	SD fault	The SD card is faulty	ID98

Communication board internal information: 0x0242 high byte, byte1

bit	Logogram	Remark	ID number
Bit0	reserved	Retention	
Bit1	WiFi Fault	Fault WIFI no ID	
Bit2	reserved	Retention	
Bit3	reserved	Retention	
Bit4	reserved	Retention	

Bit5	reserved	Retention	
Bit6	reserved	Retention	
Bit7	reserved	Retention	

Lithium battery error message list: 0x023D low byte, byte0

bit	Logogram	Remark	ID number
Bit0	BatOCD	Battery overcurrent	ID100
Bit1	BatSCD	Battery Short Circuit current protection	ID101
Bit2	BatOVP	Battery Overvoltage	ID102
Bit3	BatUV	Battery Undervoltage	ID103
Bit4	BatOTD	Battery Overtemperature during discharge	ID104
Bit5	BatOTC	Battery Overtemperature during charge	ID105
Bit6	BatUTD	Battery Undertemperature during discharge	ID106
Bit7	BatUTC	Battery Undertemperature during charge	ID107

Lithium battery error message list: byte1 -byte9

bit	Logogram	Remark	ID number
Bit0	reserved	Retention	
Bit1	reserved	Retention	
Bit2	reserved	Retention	
Bit3	reserved	Retention	
Bit4	reserved	Retention	
Bit5	reserved	Retention	
Bit6	reserved	Retention	
Bit7	reserved	Retention	

National Energy Storage Safety table number:

00	Germany VDE4105	01	CEI0-21 Internal
02	Australia	03	Spain RD1699
04	Turkey	05	Denmark
06	Greece Continent	07	Netherland
08	Belgium	09	UK-G59
10	China	11	France
12	Poland	13	Germany BDEW
14	Germany VDE0126	15	Italy CEI0-16
16	UK G83	17	Greece island
18	EU EN50438	19	EU EN61727
20	Korea	21	Sweden
22	Europe General	23	CEI0-21 External
24	Cyprus	25	India
26	Philippines	27	NewZealand
28	Reserve	29	Slovakia VSD

30	Slovakia SSE	31	Slovakia ZSD
32	CEI0-21 In Areti	33	Ukraine

Operating status:

0	WaitState	Wait state
1	CheckState	Detection state
2	NormalState	Presence and
3	EPSState	Emergency power supply status
4	FaultState	Recoverable fault condition
5	PermanentState	Permanent fault state

Storage inverter data table address

address	definition	Variable Types	length	range	Defaults	Remark
0x0200	Operating status	Uint	16			See "Operating states"
0x0201	Failure information Table 1	Uint	16			High byte byte1, low byte byte0
0x0202	Failure information table 2	Uint	16			High byte byte3, low byte byte2
0x0203	Failure information table 3	Uint	16			High byte byte5, low byte byte4
0x0204	Failure information table 4	Uint	16			High byte byte7, low byte byte6
0x0205	Failure information table 5	Uint	16			High byte byte9, low byte byte8
address	definition	Variable Types	length	range	Defaults	Remark
0x0206	A phase voltage	Uint	16	0-1000V		Unit 0.1V
0x0207	A phase current	int	16	0-100A		Unit 0.01A, rms
0x0208	reserved					reserved
0x0209	reserved					reserved
0x020A	reserved					reserved
0x020B	reserved					reserved
0x020C	Grid frequency	Uint	16	0-100Hz		Unit 0.01Hz
0x020D	Battery charge-discharge power	int	16	-10-10 KW		Unit 0.01kW, positive charge, negative discharge
0x020E	Battery cell	Uint	16	0-100V		Unit 0.1V

	voltage					
0x020F	Bbattery charge-discharge current	int	16	-100-100A		0.01A units, positive charge, negative discharge
0x0210	SoC (status of charge)	Uint	16	0-100		Units 1%
0x0211	Battery temperature	int	16			Unit 1 ℃
0x0212	Grid Power	int	16	-10-10 KW		0.01kW unit, power output is positive, power input is negative
0x0213	Load power	Uint	16	0-10 KW		Unit 0.01KW
0x0214	Energy storage power inverter	Int	16	-10-10KW		0.01kW unit, power output is positive, power input is negative
0x0215	PV power generation	Uint	16	0-10 KW		Unit 0.01KW
0x0216	EPS output voltage	Uint	16			Unit 0.1V
0x0217	EPS power output	Uint	16			Unit 0.01KW
0x0218	Daily energy	Uint	16	0-65536		Unit 0.01KWh
0x0219	Daily energy injected into the grid	Uint	16	0-65536		Unit 0.01KWh
0x021A	Daily energy taken from the grid	Uint	16	0-65536		Unit 0.01KWh
0x021B	Load daily energy	Uint	16	0-65536		Unit 0.01KWh
0x021C	Total energy High	Uint	16	0-65536		Unit 1KWh
0x021D	Total energy Low	Uint	16	0-65536		Unit 1KWh
0x021E	Total energy injected into the grid High	Uint	16	0-65536		Unit 1KWh
0x021F	Total energy injected into the grid Low	Uint	16	0-65536		Unit 1KWh
0x0220	Total energy taken from the grid High	Uint	16	0-65536		Unit 1KWh
0x0221	Total energy taken from the	Uint	16	0-65536		Unit 1KWh

	grid Low					
0x0222	Load total energy High	Uint	16	0-65536		Unit 1KWh
0x0223	Load total energy Low	Uint	16	0-65536		Unit 1KWh
0x0224	Daily energy charging battery	Uint	16	0-65536		Unit 0.01KWh (V1.20 and subsequent editions)
0x0225	Daily energy discharging battery	Uint	16	0-65536		Unit 0.01KWh (V1.20 and subsequent editions)
0x0226	Total energy charging battery High	Uint	16	0-65536		Unit 1KWh (V1.20 and subsequent editions)
0x0227	Total energy charging battery Low	Uint	16	0-65536		Unit 1KWh (V1.20 and subsequent editions)
0x0228	Total energy discharging battery High	Uint	16	0-65536		Unit 1KWh (V1.20 and subsequent editions)
0x0229	Total energy discharging battery Low	Uint	16	0-65536		Unit 1KWh (V1.20 and subsequent editions)
0x022A	Countdown time	Uint	16			Unit: 1s
0x022B	Inverter Alarm	Uint	16			See "inverter alarm information table"
0x022C	Battery cycles	Uint	16	0-65536		
0x022D	Bus voltage	Uint	16			Unit: 0.1V
0x022E	LLC Bus voltage	Uint	16			Unit: 0.1V
0x022F	Buck Current	Uint	16			Unit: 0.01A
0X0230	R-phase voltage	Uint	16			Unit: 0.1V
0X0231	R-phase current	Uint	16			Unit: 0.01A
0X0232	reserved					
0X0233	reserved					
0X0234	reserved					
0X0235	reserved					
0X0236	reserved					
0X0237	Battery health degree	Uint	16	0-100		Unit: 1%
0X0238	Inverter internal temperature	int	16	-127-127		Unit: 1 ℃
0X0239	Heat sink temperature	int	16	-127-127		Unit: 1 ℃
0X023A	Country Standard	Uint	16			See "Safety National Form"

0X023B	Current DC component	int	16			Unit 1mA
0X023C	Voltage DC component	int	16			Unit 0.1V
0X023D	Lithium battery failure information 1	Uint	16			High byte byte1, low byte byte0
0X023E	Lithium battery failure information 2	Uint	16			High byte byte3, low byte byte2
0X023F	Lithium battery failure information 3	Uint	16			High byte byte5, low byte byte4
0X0240	Lithium battery failure information 4	Uint	16			High byte byte7, low byte byte6
0x0241	Lithium battery failure information 5	Uint	16			High byte byte9, low byte byte8
0x0242	Communication board inner message	Uint	16			High byte byte1, low byte byte0
0x0243	Day generation time	Uint	16			Unit 1 minutes
0x0244	Total generating time high byte	Uint	16			Unit 1 hour
0X0245	Total generating time low byte	Uint	16			Unit 1 hour
0x0246	PV1+ insulation resistance to ground					
0x0247	PV2+ insulation resistance to ground					
0x0248	PV- insulation resistance to ground					
0x0249	Input Mode					0-- parallel mode 1-- independent mode
0x024A						reserved
0x024B						reserved
0x024C						reserved
0x024D						reserved
0x024E						reserved
0x024F						reserved
Input information panels						

address	definition	Variable Types	length	range	Defaults	Remark
0x0250	PV1 voltage	Uint	16	0-1000V		Unit 0.1V
0x0251	PV1 current	int	16	0-100A		Unit 0.01A
0x0252	PV1 power	Uint	16	0-100kw		Unit 0.01kw
0x0253	PV2 voltage	Uint	16	0-1000V		Unit 0.1V
0x0254	PV2 current	int	16	0-100A		Unit 0.01A
0x0255	PV2 power	Uint	16	0-100kw		Unit 0.01kw

2.3 Read command (Function Code 0x04)

2.3.1 read data format

Through the 04 function code, query the data information of the allowed registers. The command format is as follows:

Master Request packet format:

Device Address	function code	Start address register	The number of registers	CRC checksum
1 byte	1 byte	A word	A word	A word
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Lo Byte Hi Byte

Slave response message format:

Device Address	function code	Byte count	Register value 1	. . .	Register value (N)	CRC checksum
1 byte	1 byte	1 byte	A word	N-2	A word	A word
Byte	Byte	Byte	Hi Byte Lo Byte	. . .	Hi Byte Lo Byte	Lo Byte Hi Byte

Example request frame (running status):

request:

Device Address	0x01
function code	0x04
Hi register address	0x10
Register Address Lo	0x00
Hi number of registers	0x00
Lo number of registers	0x01
CRC Check code Lo	0x35
CRC Check code Hi	0x0A

response:

Device Address	0x01
function code	0x04
Byte count	0x02

Registervalue Hi	0x00
Registervalue Lo	0x00
CRC Check code Lo	0xB9
CRC Check code Hi	0x30

2.3.2 Read inverter setting parameter address table

Inverter parameter address table holding register

Power Inverter parameter setting						
address	definition	Variable Types	length	range	Defaults	Remark
0x1000	Waiting for grid connection time			0-1000		In seconds
0x1001	Grid power rate rise	Uint	16			Corresponds to the percentage of rated power / min
0x1002	Waiting for grid connection time after grid fault recovery	Uint	16	0-1000		In seconds
0x1003	Power rise rate after grid fault recovery	Uint	16			Corresponds to the percentage of rated power / min
0x1004	Grid overvoltage value before connection	Uint	16			Unit 0.1V
0x1005	Grid undervoltage value before connection	Uint	16			Unit 0.1V
0x1006	Grid overfrequency value before connection	Uint	16			Unit 0.01Hz
0x1007	Grid underfrequency value before connection	Uint	16			Unit 0.01Hz
0x1008 to 0x100F	Retention					
Grid voltage protection parameter settings						
address	definition	Variable Types	length	range	Defaults	Remark

0x1010	Grid voltage protections enable register	Uint	16			
0x1011	First Overvoltage protection grid value	Uint	16	10-300		Unit 0.1V
0x1012	First Overvoltage intervention time	Uint	16	0-65536		10ms units
0x1013	Second Overvoltage protection grid value	Uint	16	10-300		Unit 0.01A
0x1014	Second Overvoltage intervention time	Uint	16	0-65536		10ms units
0x1015	First Undervoltage protection grid value	Uint	16	10-300		Unit 0.01A
0x1016	First Undervoltage intervention time	Uint	16	0-65536		10ms units
0x1017	Second Undervoltage protection grid value	Uint	16	10-300		Unit 0.01A
0x1018	Second Undervoltage intervention time	Uint	16	0-65536		10ms units
0x1019	10 minutes (Average) overvoltage protection grid value	Uint	16	10-300		Unit 0.01A
0x101A to 0x101F	Retention					
Grid frequency protection parameter settings						
address	definition	Variable Types	length	range	Defaults	Remark

0x1020	Grid frequency protections enable register	Uint	16			
0x1021	First Overfrequency protection grid value	Uint	16	50-55		Unit 0.01Hz
0x1022	First Overfrequency intervention time	Uint	16	0-65536		10ms units
0x1023	Second Overfrequency protection grid value	Uint	16	50-55		Unit 0.01Hz
0x1024	Second Overfrequency intervention time	Uint	16	0-65536		10ms units
0x1025	First Underfrequenc yprotection grid value	Uint	16	45-55		Unit 0.01Hz
0x1026	First Underfrequenc y intervention time	Uint	16	0-65536		10ms units
0x1027	Second Underfrequenc yprotection grid value	Uint	16	45-55		Unit 0.01Hz
0x1028	Second Underfrequenc y intervention time	Uint	16	0-65536		10ms units
0x1029 to 0x102F	Retention					

DCI output current protection parameter set						
address	definition	Variable Types	length	range	Defaults	Remark
0x1030	DCI protection enable register					
0x1031	First DCI protection value	Uint	16	0-2000		Unit mA
0x1032	First DCI protection	Uint	16	0-65536		10ms units

	intervention time					
0x1033	Second DCI protection value	Uint	16	0-2000		Unit mA
0x1034	Second DCI protection intervention time	Uint	16	0-65536		10ms units
0x1035	DCI injection test value	Uint	16	0-65536		Unit 1mA

Active and remote control switch						
address	definition	Variable Types	length	range	Defaults	Remark
0x1040	Active and remote power on/off enable register					Here only the setting-opening power-off function
0x1041	Active output percentage			0-1000		0.1%
0x1042	Remote switch					55 Power On / Off 66
0x1045 to 0x104F	Retention					

Active versus frequency derating function parameter setting						
address	definition	Variable Types	length	range	Defaults	Remark
0x1050	Enable and mode select register					
0x1051	Over frequency load start frequency			0-55		0.01Hz
0x1052	Over-frequency load shedding rate					
0x1053	Maximum frequency of power recovery after overfrequency frequency					

	derating occurs frequency					
0x1054	Minimum frequency of power recovery after overfrequency frequency derating occurs					
0x1055	Waiting time before reloading after overclocking frequency recovery					
0x1056	Overfrequency return rate					
Reactive parameter settings						
address	definition	Variable Types	length	range	Defaults	Remark
0x1060	Enable and mode select register					
0x1061	Power Factor					Symbol indicates a high, low power factor values expressed
0x1062	fixed percentage of the reactive power					Expressed as a percentage symbol indicating high low
0x1063	P-cosϕ curve mode first point power factor value					
0x1064	P-cosϕ curve mode first point power percentage					
0x1065	P-cosϕ curve mode second point power factor value					

0x1066	P-cosϕ curve mode second point power percentage					
0x1067	P-cosϕ curve mode third point power factor value					
0x1068	P-cosϕ curve mode third point power percentage					
0x1069	P-cosϕ curve mode fourth point power factor value					
0x106A	P-cosϕ curve mode fourth point power percentage					
0x106B	P-cosϕ curve mode lockin voltage value					
0x106C	P-cosϕ curve mode lockout voltage value					
0x106D	Q-U curve mode 1 high voltage starting voltage s					
0x106E	Q-U curve mode 1 high voltage termination voltage s					
0x106F	Q-U curve mode 1 low voltage starting voltage s					
0x1070	Q-U curve mode 1 low voltage termination voltage s					
0x1071	Q-U curve mode 1 lockin power					

0x1072	Q-U curve mode 1 lockout power					
0x1073	Q-U curve mode 1 maximum reactive power					
0x1074	Q-U curve mode 1 reactive response time					
LVRT parameter settings						
address	definition	Variable Types	length	range	Defaults	Remark
0x1080	LVRT enable register					
0x1081	Enter LVRT voltage value					
0x1082	LVRT curve first point voltage					
0x1083	LVRT curve first time					
0x1084	LVRT curve second point voltage					
0x1085	LVRT curve second time					
0x1086	LVRT curve third point voltage					
0x1087	LVRT curve third time					
0x1088	LVRT curve fourth point voltage					
0x1089	LVRT curve fourth time					
0x108A	Reactive current coefficient k					
0x108B	Waiting time after voltage recovery					
0x108C	Power return					

	rate					
0x1090-0x109F	Retention					
Other safety parameters set						
0x10A0	Islanding enable register					
0x10A1	GFCI enable register					
0x10A2	Insulation resistance enable register					
0x10A3	Insulation resistance value protection					
Battery parameter register						
0x10B0	type of battery	Uint	16			0x0000-DARFON 0x0001-PYLON 0x0002-SOLTARO 0x0003-ALPHA.ESS 0x0004-GENERAL 0x0100-DEFAULT
0x10B1	battery capacity	Uint	16	0-999Ah		Unit: 1Ah
0x10B2	Energy management	Uint	16			reserved
0x10B3	Maximum charge voltage	Uint	16	50.0-58.0 V		Unit: 0.1V
0x10B4	Maximum charge current	Uint	16	0-65.00A		Unit: 0.01A, indicating that the inverter charging current cannot exceed this value, non-actual charging current
0x10B5	Over-Voltage Protection	Uint	16	50.0-58.5 V		Unit: 0.1V
0x10B6	Minimum discharge voltage	Uint	16	42.0-52.0 V		Unit: 0.1V
0x10B7	Maximum	Uint	16	0-70.00A		Unit: 0.01A,

	discharge current					indicating that the inverter discharging current cannot exceed this value, non-actual charging current
0x10B8	Undervoltage protection voltage	Uint	16	42.0-52.0 V		Unit: 0.1V
0x10B9	Depth of discharge	Uint	16	0-100%		Unit: 1%, DOD indicates the maximum discharge amount. When the SOC<1-DOD, the inverter stops discharging, the inverter stops discharging according also to other conditions.
0x10BA	Grid depth of discharge	Uint	16	0-100%		Unit: 1%, Shallow DOD is used for grid connection status. And Shallow DOD<=DOD
0x10BB	Empty battery voltage	Uint	16	42.50-47.00V		Unit: 0.01V, only for lead-acid batteries, indicating the open circuit voltage when the lead-acid battery is completely emptied
0x10BC	Fully charged battery voltage	Uint	16	47.01-55.00V		Unit: 0.01V, only for lead-acid batteries, indicating the open circuit voltage when the lead-acid battery is fully charged

Can be defined so that the register:

Grid Voltage Protection Enable Register:

Address: 0x1010

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Retention	Retention	Retention	Retention	second grid undervoltage protection	first grid undervoltage protection	second grid overvoltage protection	first grid overvoltage protection

				enable bit (<<)	enable bit (<)	enable bit (>>)	enable bit (>)
Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Retention	Retention	Retention	Retention	Retention	Retention	Retention	Retention

Grid frequency protection enable register:

Address: 0x1020

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Retention	Retention	Retention	Retention	second grid under-frequency protection enable bit (<<)	first grid under frequency protection enable bit (<)	second grid overfrequency protection enable bit (>>)	first grid overfrequency protection enable bit (>)
Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Retention	Retention	Retention	Retention	Retention	Retention	Retention	Retention

Grid current DCI protection enable register:

Address: 0x1030

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Retention	Retention	Retention	Retention	Retention	0: Disabled 1: Enable DCI test function	Grid DCI secondary protection enable bit (>>)	DCI network level to protect enable bit (>)
Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Retention	Retention	Retention	Retention	Retention	Retention	Retention	Retention

Active control and remote switch enable register:

Address: 0x1040

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Retention	Retention	Retention	Retention	Retention	Retention	Remote switch enable bit	Active Load shedding enable bit
Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Retention	Retention	Retention	Retention	Retention	Retention	Retention	Retention

Active versus frequency derating function parameter setting

Address: 0x1050

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Retention	Retention	Retention	Retention	Retention	Retention		Active derating with

							frequency enable bit
Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Retention	Retention	Retention	Retention	Retention	Retention	Retention	Retention

Reactive parameter setting Enable Register

Address: 0x1060

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Retention	Retention	Retention	Retention	Retention	00; mode enable bit 01; mode enable bit 02; mode enable bit 03; mode enable bit	1 reactive 2 reactive 3 reactive 4 reactive	Reactive setting enable bit
Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Retention	Retention	Retention	Retention	Retention	Retention	Retention	Retention

LVRT function parameter settings

Address: 0x1080

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Retention	Retention	Retention	Retention	Retention	Retention		0: Disabled 1: Enable
Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Retention	Retention	Retention	Retention	Retention	Retention	Retention	Retention

Islanding function parameter settings

Address: 0x10A0

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Retention	Retention	Retention	Retention	Retention	Retention		0: Disabled 1: Enable
Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Retention	Retention	Retention	Retention	Retention	Retention	Retention	Retention

GFCI function parameter settings

Address: 0x10A1

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Retention	Retention	Retention	Retention	Retention	Retention		0: Disabled 1: Enable
Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Retention	Retention	Retention	Retention	Retention	Retention	Retention	Retention

Insulation Resistance function parameter settings

Address: 0x10A2

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0

Retention	Retention	Retention	Retention	Retention	Retention	PE ground fault detection enable 0: Disabled 1: Enable	Insulation resistance detection enable 0: Disabled 1: Enable
Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Retention	Retention	Retention	Retention	Retention	Retention	Retention	Retention

PE ground fault detection enable function parameter settings

Address: 0x10A4

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Retention	Retention	Retention	Retention	Retention	Retention		0: Disabled 1: Enable
Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Retention	Retention	Retention	Retention	Retention	Retention	Retention	Retention

2.3.4 inverter manufacture related information read address table

The serial number of a definition list:

ID	Value	Remark
1	'S'	sofar, instead of OEM products to other letters
2-3	"A1" or "M1" or "C1"	A1 low-power single-phase inverter M1 micro reverse C1 power10-20kW D1 power 30-40kW E1 storage inverter
4	E / U	E (Europe, Australia, China), U (USA)
5-6	"S0 "or" S1 "or" S2 "or""S3 "or" S4 "or" S5 "or" S6 "	Configuration list in the table below

7-8	05/06/08/10/12/15/17/20/25/30/50	Power
		// If the power bit is A1 or C1 20 represents a 20kW
		// If the power bit is M1 25 represents a 250W

9	Year	2000 (0) 2001 (1) 2002 (2) 2003 (3) 2004 (4) 2005 (5) 2006 (6) 2007 (7) 2008 (8) 2009 (9) 10 years (A) 11 in (B) 12 years (C) 13 years (D) 14 years (E) 15 years (F) 16 years (G) 17 years (H) 18 years (I)

		19 years (J) 20 years (K) 21 years (L) 22 years (M) 23 in (N) 24 years (O) 25 years (P) 26 years (Q) 27 in (R) 28 years (S) 29 years (T) 30 years (U) 31 years (V) 32 years (W) 33 years (X) 34 years (Y) 35 years (Z)
10	month	January (1) February (2) March (3), April (4) May (5) June (6) July (7) August (8) September (9) October (A), November (B) December (C)
11	day	1 (1) 2 (2) 3 (3) 4 (4) 5 (5) 6 (6) 7 (7) 8 (8) 9 (9) 10 (A) 11 (B) 12 (C) 13 (D) 14 (E) 15 (F) 16 (G) 17 (H) 18 (I) 19 (J) 20 (K) 21 (L) 22 (M) 23 (N) 24 (O) 25 (P) 26 (Q) 27 (R) 28 (S) 29 (T) 30 (U) 31(V)
12-14	xxx	001 (progressive production numer)

Sofar 20000TL-Sx, Sofar 17000TL-Sx, Sofar 15000TL-Sx, Sofar 10000TL-Sx (x=0-6, representing different combinations of accessories, the differences are shown in the table below)

	DCCable Gland	PV connector	DC Terminal Blocks	Fuse board+Detection board	DC Anti Lightning	DC switch	AC switch	AC SPD
Sofar 17000TL-S0 Sofar 10000TL-S0	√		√					
Sofar 17000TL-S1 Sofar 10000TL-S1	√		√			√		
Sofar 17000TL-S2 Sofar 10000TL-S2		√	√			√		
Sofar		√		√		√		

17000TL-S3 Sofar 10000TL-S3								
Sofar 17000TL-S4 Sofar 10000TL-S4		√		√	√	√		
Sofar 17000TL-S5 Sofar 10000TL-S5		√		√	√	√		√
Sofar 17000TL-S6 Sofar 10000TL-S6		√		√	√	√	√	√

Inverter manufacture related information (individual 16 byte space)						
address	definition	Variable Types	length	range	Defaults	Remark
0x2000	product code					
0x2001 to 0x2007	Production serial number					
0x2008 to 0x2009	ARM software version number					ASCII characters, high front Ver1.00 embodiment as "V100"
0x200A to 0x200B	Hardware version number					ASCII characters, high front embodiment "V100"
0x200C 0x200D to	DSPS software version					
0x200E to 0x200F	DSPM software version					

2.3.5 inverter measured calibration data read address table

Inverter measurement calibration						
address	definition	Variable Types	length	range	Defaults	Remark
0x3000	Vbat calibration coefficient			0.95-1.05		
0x3001	Offset Vbat			+ -15V		
0x3002	Ibat calibration coefficient			0.95-1.05		
0x3003	Offset Ibat			-1-1A		
0x3004	R-phase voltage calibration coefficient			0.95-1.05		
0x3005	R-phase voltage offset			+ -15V		
0x3006	Inductor current calibration coefficient			0.95-1.05		
0x3007	Inductor current offset			-1-1A		
0x3008	PV1 voltage calibration coefficient					
0x3009	Offset PV1 voltage					
0x300A	PV1 current calibration coefficient					
0x300B	Offset PV1 current					
0x300C	R-Phase current from CT calibration factor					
0x300D	R-Phase current from CT offset					
0x300E	S-phase voltage calibration coefficient					
0x300F	S-phase voltage offset					
0x3010	S-Phase current from CT calibration					

	factor					
0x3011	S-Phase current from CT offset					
0x3012	T-phase voltage calibration coefficient					
0x3013	T-phase voltage offset					
0x3014	T-Phase current from CT calibration factor					
0x3015	T-Phase current from CT offset					
0x3016	Vbus calibration coefficient			0.95-1.05		
0x3017	Vbus Offset			+ -15V		
0x3018	EPS current calibration coefficient			0.95-1.05		
0x3019	EPS current offset			-1-1A		
0x301A	Voltage PV2 scale calibration coefficient			0.95-1.05		
0x301B	PV2 voltage calibration coefficient			+ -15V		
0x301C	Offset PV2 voltage					
0x301D	Offset voltage inverter					
0x301E	PV2 current calibration coefficient					
0x301F	Offset PV2 current					
0x3020 to 0x302F	Retention					
Factory parameter setting mode						

0x3100	Factory mode register					Low Byte: factory mode Bit7: 1 to enable the factory model, 0 disabled Bit6: 1 Clear calibration coefficient enabled, disabled 0 Bit5,4,3 reserved Bit2: 1 discharging, charging 0 Bit1: PV2 Bit0: PV1 High Byte: PV current percentage of 128 represents 100%
0x3101	Energy storage power plant model					Low byte: High Byte: current percentage tank, 128 represents 100%

2.4 writing parameters (function code 0x13)

2.4.1 write data format

Master Request packet format:

Device Address	function code	Start address register	The number of registers	Register value 1	. . .	Register value (N)	CRCCheck code
1 byte	1 byte	A word	A word	A word	N-2	A word	1 Words
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	. . .	Hi Byte Lo Byte	Hi Byte Lo Byte

Slave response message format:

Device Address	function code	Start address register	The number of registers	Register value 1	. . .	Register value (N)	CRCCheck code
1 byte	1 byte	A word	A word	A word	N-2	A word	1 Words
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	. . .	Hi Byte Lo Byte	Hi Byte Lo Byte

Example request frame (running status):

request:

Device Address	0x01
function code	0x13

Hi register address	0x10
Lo Register Address	0x00
Hi number of registers	0x00
Lo number of registers	0x01
Register value Hi	0x00
Register value Lo	0x01
CRC Check code Lo	0x31
CRC Check code Hi	0x96

response:

Device Address	0x01
function code	0x13
Hi register address	0x10
Lo Register Address	0x00
Hi number of registers	0x00
Lo number of registers	0x01
Register value Hi	0x00
Register value Lo	0x01
CRC Check code Lo	0x31
CRC Check code Hi	0x96

2.4.2 write address parameter table inverter

Power Inverter parameter setting						
address	definition	Variable Types	length	range	Defaults	Remark
0x1000	Waiting for grid connection time			0-1000		In seconds
0x1001	Grid power rate rise	Uint	16			Corresponds to the percentage of rated power / min
0x1002	Waiting for grid connection time after grid fault recovery	Uint	16	0-1000		In seconds
0x1003	Power rise rate after grid fault recovery	Uint	16			Corresponds to the percentage of rated power / min
0x1004	Grid overvoltage protection value before grid connection	Uint	16			Unit 0.1V
0x1005	Grid	Uint	16			Unit 0.1V

	undervoltage protection value before grid connection					
0x1006	Grid over-frequency protection value before grid connection	Uint	16			Unit 0.01Hz
0x1007	Grid underfrequency protection value before grid connection	Uint	16			Unit 0.01Hz
0x1008 to 0x100F	Retention					
Grid voltage protection parameter settings						
address	definition	Variable Types	length	range	Defaults	Remark
0x1010	Grid voltage protections enable register	Uint	16			
0x1011	First Overvoltage protection grid value	Uint	16	10-300		Unit 0.1V
0x1012	First Overvoltage intervention time	Uint	16	0-65536		10ms units
0x1013	Second Overvoltage protection grid value	Uint	16	10-300		Unit 0.01A
0x1014	Second Overvoltage intervention time	Uint	16	0-65536		10ms units
0x1015	First Undervoltage protection grid value	Uint	16	10-300		Unit 0.01A
0x1016	First Undervoltage intervention time	Uint	16	0-65536		10ms units
0x1017	Second	Uint	16	10-300		Unit 0.01A

	Undervoltage protection grid value					
0x1019	Second Undervoltage intervention time	Uint	16	0-65536		10ms units
0x1019	10 minutes (Average) overvoltage protection grid value	Uint	16	10-300		Unit 0.01A
0x101A to 0x101F	Retention					
Grid frequency protection parameter settings						
address	definition	Variable Types	length	range	Defaults	Remark
0x1020	Grid frequency protections enable register	Uint	16			
0x1021	First Overfrequency protection grid value	Uint	16	50-55		Unit 0.01Hz
0x1022	First Overfrequency intervention time	Uint	16	0-65536		10ms units
0x1023	Second Overfrequency protection grid value	Uint	16	50-55		Unit 0.01Hz
0x1024	Second Overfrequency intervention time	Uint	16	0-65536		10ms units
0x1025	First Underfrequencyprotection grid value	Uint	16	45-55		Unit 0.01Hz
0x1026	First Underfrequency intervention time	Uint	16	0-65536		10ms units
0x1027	Second Underfrequencyprotection grid	Uint	16	45-55		Unit 0.01Hz

	value					
0x1028	Second Underfrequency intervention time	Uint	16	0-65536		10ms units
0x1029 to 0x102F	Retention					

DCI output current protection parameter set

address	definition	Variable Types	length	range	Defaults	Remark
0x1030	DCI protection enable register					
0x1031	First DCI protection value	Uint	16	0-2000		Unit mA
0x1032	First DCI protection intervention time	Uint	16	0-65536		10ms units
0x1033	Second DCI protection value	Uint	16	0-2000		Unit mA
0x1034	Second DCI protection intervention time	Uint	16	0-65536		10ms units

Active and remote control switch

address	definition	Variable Types	length	range	Defaults	Remark
0x1040	Active and remote power on/off enable register					Here only the setting-opening power-off function
0x1041	Active output percentage			0-1000		0.1%
0x1042	Remote switch					
0x1043 to 0x104F	Retention					

Active versus frequency derating function parameter setting

address	definition	Variable Types	length	range	Defaults	Remark

0x1050	Enable and mode select register					
0x1051	Over frequency load start frequency			0-55		0.01Hz
0x1052	Over-frequency load shedding rate					
0x1053	Maximum frequency of power recovery after overfrequency frequency derating occurs frequency					
0x1054	Minimum frequency of power recovery after overfrequency frequency derating occurs					
0x1055	Waiting time before reloading after overclocking frequency recovery					
0x1056	Overfrequency return rate					
Reactive parameter settings						
address	definition	Variable Types	length	range	Defaults	Remark
0x1060	And enable mode select register					
0x1061	Power Factor					Symbol indicates a high, low power factor values expressed
0x1062	fixed percentage of					Expressed as a percentage symbol

	the reactive power					indicating high low
0x1063	P-cosϕ curve mode first point power factor value					
0x1064	P-cosϕ curve mode first point power percentage					
0x1065	P-cosϕ curve mode second point power factor value					
0x1066	P-cosϕ curve mode second point power percentage					
0x1067	P-cosϕ curve mode third point power factor value					
0x1068	P-cosϕ curve mode third point power percentage					
0x1069	P-cosϕ curve mode fourth point power factor value					
0x106A	P-cosϕ curve mode fourth point power percentage					
0x106B	P-cosϕ curve mode lockin voltage value					
0x106C	P-cosϕ curve mode lockout voltage value					
0x106D	Q-U curve mode 1 high voltage starting voltage s					
0x106E	Q-U curve mode 1 high voltage					

	termination voltage s					
0x106F	Q-U curve mode 1 low voltage starting voltage s					
0x1070	Q-U curve mode 1 low voltage termination voltage s					
0x1071	Q-U curve mode 1 lockin power					
0x1072	Q-U curve mode 1 lockout power					
0x1073	Q-U curve mode 1 maximum reactive power					
0x1074	Q-U curve mode 1 reactive response time					
LVRT parameter settings						
address	definition	Variable Types	length	range	Defaults	Remark
0x1080	LVRT enable register					
0x1081	Enter LVRT voltage value					
0x1082	LVRT curve first point voltage					
0x1083	LVRT curve first time					
0x1084	LVRT curve second point voltage					
0x1085	LVRT curve second time					
0x1086	LVRT curve third point voltage					

0x1087	LVRT curve third time					
0x1088	LVRT curve fourth point voltage					
0x1089	LVRT curve fourth time					
0x108A	Reactive current coefficient k					
0x108B	Waiting time after voltage recovery					
0x108C	Power return rate					
Other safety parameters set						
0x0190	Islanding enable register					
0x0191	GFCI enable register					
0x0192	Insulation resistance enable register					
0x0193	Insulation resistance value protection					
Factory parameter setting mode						
0x3100	Factory mode register					Low Byte: factory mode Bit7: 1 to enable the factory model, 0 disabled Bit6: 1 Clear calibration coefficient enabled, disabled 0 Bit5,4,3 reserved Bit2: 1 discharging, charging 0 Bit1: PV2 Bit0: PV1 High Byte: PV current

						percentage of 128 represents 100%
0x3101	Energy storage power plant model					Low byte: High Byte: current percentage tank, 128 represents 100%
Battery parameter setting						
0x10B0	type of battery	Uint	16			0x0000-DARFON 0x0001-PYLON 0x0002-SOLTARO 0x0003-ALPHA.ESS 0x0004-GENERAL 0x0100-DEFAULT
0x10B1	battery capacity	Uint	16	0-999Ah		Unit: 1Ah
0x10B2	Energy management	Uint	16			reserved
0x10B3	Maximum charge voltage	Uint	16	50.0-58.0 V		Unit: 0.1V
0x10B4	Maximum charge current	Uint	16	0-65.00A		Unit: 0.01A, indicating that the inverter charging current cannot exceed this value, non-actual charging current
0x10B5	Over-Voltage Protection	Uint	16	50.0-58.5 V		Unit: 0.1V
0x10B6	Minimum discharge voltage	Uint	16	42.0-52.0 V		Unit: 0.1V
0x10B7	Maximum discharge current	Uint	16	0-70.00A		Unit: 0.01A, indicating that the inverter discharging current cannot exceed this value, non-actual charging current
0x10B8	Undervoltage protection voltage	Uint	16	42.0-52.0 V		Unit: 0.1V
0x10B9	Depth of discharge	Uint	16	0-100%		Unit: 1%, DOD indicates the maximum discharge amount. When the SOC<1-DOD, the inverter stops discharging, the

						inverter stops discharging according also to other conditions.
0x10BA	Grid depth of discharge	Uint	16	0-100%		Unit: 1%, Shallow DOD is used for grid connection status. And Shallow DOD<=DOD
0x10BB	Empty battery voltage	Uint	16	42.50-47.00V		Unit: 0.01V, only for lead-acid batteries, indicating the open circuit voltage when the lead-acid battery is completely emptied
0x10BC	Fully charged battery voltage	Uint	16	47.01-55.00V		Unit: 0.01V, only for lead-acid batteries, indicating the open circuit voltage when the lead-acid battery is fully charged

2.4.3 write address parameter combiner box

Combiner box parameter settings						
address	definition	Variable Types	length	range	Defaults	Remark
0x1100	Hardware loop number					
0x1101	Undervoltage protection value	Uint	16			High byte byte1, low byte byte0
0x1102	Overvoltage protection value	Uint	16			High byte byte3, low byte byte2
0x1103	Reverse current protection value	Uint	16			High byte byte5, low byte byte4
0x1104	Overcurrent protection	Uint	16		0x04B0	Unit 0.01A

	value					
0x1104						
0x1105						
0x1106						
0x1107						
0x1108 to 0x110F	Retention					

2.5 write inverter or storage system manufacturer related information (spread code 0x21)

2.5.1 write data format

Master Request packet format:

Device Address	function code	Start address register	The number of registers	Register value 1	. . .	Register value (N)	CRCCheck code
1 byte	1 byte	A word	A word	A word	N-2	A word	1 Words
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	. . .	Hi Byte Lo Byte	Hi Byte Lo Byte

Slave response message format:

Device Address	function code	Start address register	The number of registers	Register value 1	. . .	Register value (N)	CRCCheck code
1 byte	1 byte	A word	A word	A word	N-2	A word	1 Words
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	. . .	Hi Byte Lo Byte	Hi Byte Lo Byte

Example request frame (running status):

request:

Device Address	0x01
function code	0x21
Hi register address	0x20
Lo Register Address	0x00
Hi number of registers	0x00
Lo number of registers	0x01
Register value Hi	0x00
Register value Lo	0x00
CRC Check code Lo	0XE6
CRC Check code Hi	0x65

response:

Device Address	0x01
function code	0x21
Hi register address	0x20

Lo Register Address	0x00
Hi number of registers	0x00
Lo number of registers	0x01
Register value Hi	0x00
Register value Lo	0x00
CRC Check code Lo	0XE6
CRC Check code Hi	0x65

2.5.2 inverter manufacture related information write address table

Inverter manufacture related information (individual 16 byte space)						
address	definition	Variable Types	length	range	Defaults	Remark
0x2000	product code					Read-only
0x2001 to 0x2006	Production serial number					
0x2007 to 0x2008	Software version number					Read-only
0x2009 to 0x200A	Hardware version number					
0x200B to 0x200F	Retention					

2.6 Calibration Measurement write (function code 0x07, hidden from the user)

2.6.1 write data format

Master Request packet format:

Device Address	function code	Start address register	The number of registers	Register value 1	. . .	Register value (N)	CRCCheck code
1 byte	1 byte	A word	A word	A word	N-2	A word	1 Words
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	. . .	Hi Byte Lo Byte	Hi Byte Lo Byte

Slave response message format:

Device Address	function code	Start address register	The number of registers	Register value 1	. . .	Register value (N)	CRCCheck code
1 byte	1 byte	A word	A word	A word	N-2	A word	1 Words
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	. . .	Hi Byte Lo Byte	Hi Byte Lo Byte

Example request frame (running status):

request:

Device Address	0x01
function code	0x07
Hi register address	0x30
Lo Register Address	0x00
Hi number of registers	0x00
Lo number of registers	0x01
Register value Hi	0x00
Register value Lo	0x00
CRC Check code Lo	0XA3
CRC Check code Hi	0x37

response:

Device Address	0x01
function code	0x07
Hi register address	0x30
Lo Register Address	0x00
Hi number of registers	0x00
Lo number of registers	0x01
Register value Hi	0x00
Register value Lo	0x00
CRC Check code Lo	0XA3
CRC Check code Hi	0x37

2.7 Maintenance-related information (function code 0x08, hidden from the user) (reserved interface)

2.7.1 Data Format

Master Request packet format:

Device Address	function code	Start address register	The number of registers	CRC checksum
1 byte	1 byte	A word	A word	A word
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Hi Byte Hi Byte

Slave response message format:

Device Address	functio n code	Byte count	Register value 1	. . .	Register value (N)	CRC checksum
1 byte	1 byte	1 byte	A word	N-2	A word	A word
Byte	Byte	Byte	Hi Byte Lo Byte	. . .	Hi Byte Lo Byte	Lo Byte Hi Byte

Example request frame (running status):

request:

Device Address	0x01
function code	0x08
Hi register address	0x40
Lo Register Address	0x00
Hi number of registers	0x00
Lo number of registers	0x01
CRC Check code Lo	0x34
CRC Check code Hi	0x0B

response:

Device Address	0x01
function code	0x08
Byte count	0x02
Register value Hi	0x00
Register value Lo	0x00
CRC Check code Lo	0xBA
CRC Check code Hi	0x60

2.7.2 Maintenance read the address information table

Maintenance-related information(Function Code listed separately)						
0x4000						High bit Byte0.1 error occurrence, low bit Byte0.0 error occurrence
0x40A1						High bit Byte0.3 error occurrence, low bit Byte0.2 error occurrence
0x40A2	Byte0.2 number of errors occur					High bit Byte0.5 error occurrence, low bit Byte0.4 error occurrence
0x40A3	Byte0.3 error occurrences					High bit Byte0.7 error occurrence, low bit

						Byte0.6 error occurrence
0x40A4						High bit Byte1.1 error occurrence, low bit Byte1.0 error occurrence
0x40A5						High bit Byte1.3 error occurrence, low bit Byte1.2 error occurrence
0x40A6						High bit Byte1.5 error occurrence, low bit Byte1.4 error occurrence
0x40A7						High bit Byte1.7 error occurrence, low bit Byte1.6 error occurrence
0x40A8						High bit Byte2.1 error occurrence, low bit Byte2.0 error occurrence
0x40A9						High bit Byte2.3 error occurrence, low bit Byte2.2 error occurrence
0x40AA						High bit Byte2.5 error occurrence, low bit Byte2.4 error occurrence
0x40AB						High bit Byte2.7 error occurrence, low bit Byte2.6 error occurrence
0x40AC						High bit Byte3.1 error occurrence, low bit Byte3.0 error occurrence
0x40AD						High bit Byte3.3 error occurrence, low bit Byte3.2 error occurrence
0x40AE						High bit Byte3.5 error occurrence, low bit Byte3.4 error occurrence
0x40AF						High bit Byte3.7 error occurrence, low bit

						Byte3.6 error occurrence
0x40B0						High bit Byte4.1 error occurrence, low bit Byte4.0 error occurrence
0x40B1						High bit Byte4.3 error occurrence, low bit Byte4.2 error occurrence
0x40B2	Byte0.2 number of errors occur					High bit Byte4.5 error occurrence, low bit Byte4.4 error occurrence
0x40B3	Byte0.3 error occurrences					High bit Byte4.7 error occurrence, low bit Byte4.6 error occurrence
0x40B4						High bit Byte5.1 error occurrence, low bit Byte5.0 error occurrence
0x40B5						High bit Byte5.3 error occurrence, low bit Byte5.2 error occurrence
0x40B6						High bit Byte5.5 error occurrence, low bit Byte5.4 error occurrence
0x40B7						High bit Byte5.7 error occurrence, low bit Byte5.6 error occurrence
0x40B8						High bit Byte6.1 error occurrence, low bit Byte6.0 error occurrence
0x40B9						High bit Byte6.3 error occurrence, low bit Byte6.2 error occurrence
0x40BA						High bit Byte6.5 error occurrence, low bit Byte6.4 error occurrence
0x40BB						High bit Byte6.7 error occurrence, low bit

						Byte6.6 error occurrence
0x40BC						High bit Byte7.1 error occurrence, low bit Byte7.0 error occurrence
0x40BD						High bit Byte7.3 error occurrence, low bit Byte7.2 error occurrence
0x40BE						High bit Byte7.5 error occurrence, low bit Byte7.4 error occurrence
0x40BF						High bit Byte7.7 error occurrence, low bit Byte7.6 error occurrence

2.8 reading (EEPROM) and historical power events (function code 0x50)

Through the 0x50 function code, query the data information of the allowed registers. The command format is as follows:

2.8.1 read data format

Master Request packet format:

Device Address	function code	Start address register	Register information	CRC checksum
1 byte	1 byte	A word	A word	A word
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Lo Byte Hi Byte

Slave response message format:

Device Address	function code	Byte count	valid data	CRC checksum
1 byte	1 byte	1 byte	Nbyte	A word
Byte	Byte	Byte	N Bytes	Lo Byte Hi Byte

2.8.2 power and read the history of the event address table

address	definition	Variable Types	Length (bytes)	range	Defaults	Remark
0x6000	Today's energy	Hex	2 * 24			Register Information Bar no real meaning, 0
0x6001	every day energy this month	Hex	2 * 31			Register Information Bar no real meaning, 0
0x6002	every month energy this year	Hex	4 * 12			Register Information Bar no real meaning, 0
0x6003	Historical total energy generation	Hex	4			
0x6004	Power generation in the N-th year	Hex	4 * 4 or 20			The value in the register information is N. For example, 2 is the power generation amount of the latest 2nd year. If N=0xFFFF, the power generation amount of the last 20 years needs to be read.
06005	Recently N-th event record	Hex	8			The value in the register information is N, such as 2 is the last 2nd event record, and the last 100 event records are recorded in total.
0x6006	Recent record when the N-th school	Hex	12			The value in the register information is N, such as 2 is the last 2nd school time record. (A total of 10 recent school hours records were recorded)
0x6007	Recent record how many times the power was cleared	HEX	6			The value in the register information is N, such as 2 is the last 2nd power clear record. (A total of the last 10 power-clearing records were recorded)
0x6008	Recent events clear records	HEX	6			The value in the register information is N, such as 2 is the last 2nd event clear record (A total of the last 10 event clear records were recorded)

Event Log effective response data format data frames as follows:

Time event ID number and send event							
event ID No.	year YY	month MM	day DD	week	Time HH	Minute MM	second SS

Recording valid data format of the response data frame is correction:

Before the time at school						Time after school hours					
second ss	Minute mm	Time hh	day DD	MM month	year YY	second ss	Minute mm	Time hh	day DD	MM month	year YY

Power cleared the logged data format response data frame is:

Power cleared time					
Seconds ss	Min mm	When hh	DD Day	MM month	In YY

Event Clearing effective response data record format of the data frame is:

Event Clearing Time					
Seconds ss	Min mm	When hh	DD Day	MM month	In YY

2.9 write (EEPROM) hystorical data (function code 0x51)

2.9.1 write data format

Master Request packet format:

Device Address	function code	Start address register	Register information	Number of bytes written	To be written The data	CRCCheck code
1 byte	1 byte	A word	1 byte	1 byte	N words	1 Words
Byte	Byte	Hi Byte Lo Byte	Byte	Byte	N Bytes	Hi Byte Lo Byte

Slave response message format:

Device Address	function code	Start address register	Register information	Number of bytes written	To be written The data	CRCCheck code
1 byte	1 byte	A word	1 byte	1 byte	N words	1 Words
Byte	Byte	Hi Byte Lo Byte	Byte	Byte	N Bytes	Hi Byte Lo Byte

2.9.2 write the hystorical energy data

address	definition	Variable Types	Length (bytes)	range	Defaults	Remark
0x6000	Today's energy	Hex	2 * 24			
0x6001	every day energy this month	Hex	2 * 31			

0x6002	every month energy this year	Hex	4 * 12			
0x6003	Historical total energy generation	Hex	4			
0x6004	Power generation in the N-th year	Hex	4 * 4 or 20			The value in the register information is N. For example, 2 is the power generation amount of the latest 2nd year. If N=0xFFFF, the power generation amount of the last 20 years needs to be read.

2.10 read SD card storage historical energy (function code 0x60)

Through the 0x60 function code, query the data information of the allowed registers. The command format is as follows:

2.10.1 read data format

Master Request packet format:

Device Address	function code	Start address register	Register information	CRC checksum
1 byte	1 byte	A word	3bytes	A word
Byte	Byte	Hi Byte Lo Byte	3 Byte	Lo Byte Hi Byte

Slave response message format:

Device Address	function code	Byte count	valid data	CRC checksum
1 byte	1 byte	1 byte	Nbyte	A word
Byte	Byte	Byte	N Bytes	Lo Byte Hi Byte

2.10.2 read the history of electricity

address	definition	Variable Types	Length (bytes)	range	Defaults	Remark
0x7000	Today's energy	Hex	2 * 24			
0x7001	every day energy this month	Hex	2 * 31			
0x7002	every month energy this year	Hex	4 * 12			

Read one day generating capacity of SD card information request frame column data format:

In YY	MM month	DD Day
BCD code	BCD code	BCD code

Read SD card generating capacity a month of columns of information request frame data format:

In YY	MM month	Retention
BCD code	BCD code	00

Read a given year generating capacity SD card information request frame column data format:

In YY	Retention	Retention
BCD code	00	00

2.11 Read Time (function code 0x10)

The current time is queried through the 0x10 function code. The command format is as follows:

2.11.1 read data format

Master Request packet format:

Device Address	function code	Start address register	The number of registers	CRC checksum
1 byte	1 byte	A word	A word	A word
Byte	Byte	Hi Byte Lo Byte	0x00 0x00	Lo Byte Hi Byte

Slave response message format:

Device Address	function code	Byte count	valid data	CRC checksum
1 byte	1 byte	1 byte	N bytes	A word
Byte	Byte	Byte	N Bytes	Lo Byte Hi Byte

2.11.2 read time address table

address	definition	Variable Types	Length (bytes)	range	Defaults	Remark
0x8000	Current time	Hex	7			
0x8001	Control board today's power-on time	Hex	7			

Valid data acknowledgment frame format is as follows:

Seconds ss	Min mm	When hh	DD Day	MM month	In YY

2.12 Restore Factory Settings command (function code 0x30)

2.12.1 read data format

Restore factory settings with 0x30 function code.

Master Request packet format:

Device Address	function code	Start address register	The number of registers	CRC checksum
1 byte	1 byte	A word	A word	A word
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Lo Byte Hi Byte

Slave response message format:

Device Address	function code	Start address register	The number of registers	CRC checksum
1 byte	1 byte	A word	A word	A word
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Lo Byte Hi Byte

2.13 Clear daily energy (function code 0x31)

2.13.1 read data format

Clear daily energy with 0x31 function code.

Master Request packet format:

Device Address	function code	Start address register	The number of registers	CRC checksum
1 byte	1 byte	A word	A word	A word
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Lo Byte Hi Byte

Slave response message format:

Device Address	function code	Start address register	The number of registers	CRC checksum
1 byte	1 byte	A word	A word	A word
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Lo Byte Hi Byte

2.14 restore the current national safety parameter default values (function code 0x32)

2.14.1 Data Format

Restore the default values for national safety parameters with 0x32 function code

Master Request packet format:

Device Address	function code	Start address register	The number of registers	CRC checksum
1 byte	1 byte	A word	A word	A word
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Lo Byte Hi Byte

Slave response message format:

Device Address	function code	Start address register	The number of registers	CRC checksum
1 byte	1 byte	A word	A word	A word
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Lo Byte Hi Byte

2.15 Clear total energy (function code 0x33)

2.15.1 Data Format

Clear total energy production with 0x33 function code

Master Request packet format:

Device Address	function code	Start address register	The number of registers	CRC checksum
1 byte	1 byte	A word	A word	A word
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Lo Byte Hi Byte

Slave response message format:

Device Address	function code	Start address register	The number of registers	CRC checksum
1 byte	1 byte	A word	A word	A word
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Lo Byte Hi Byte

2.16 Clear event log (function code 0x34)

2.16.1 Data Format

Clear event log with 0x34 function code

Master Request packet format:

Device Address	function code	Start address register	The number of registers	CRC checksum
1 byte	1 byte	A word	A word	A word
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Lo Byte Hi Byte

Slave response message format:

Device Address	function code	Start address register	The number of registers	CRC checksum
1 byte	1 byte	A word	A word	A word
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Lo Byte Hi Byte

2.16 Read Alarm relay control word(function code 0x35)

2.16.1 Data Format

Read alarm relay control word with 0x35 function code

Master Request packet format:

Device Address	function code	Start address register	The number of registers	CRC checksum
1 byte	1 byte	A word	A word	A word
Byte	Byte	0x00 0x00	0x00 0x00	Lo Byte Hi Byte

Slave response message format:

Device Address	function code	Byte count	Control word	CRC checksum
1 byte	1 byte	1 byte	1 byte	A word
Byte	Byte	Byte	Byte	Lo Byte Hi Byte

NOTE: relay control word is defined as follows

0x00	Production
0x01	Alarm
0x02	Alarm (configurable)

2.17 Set Alarm relay control word (function code 0x36)

2.17.1 Data Format

Set alarm relay control word with 0x36 function code

Master Request packet format:

Device Address	function code	Start address register	Reserved words	Control word	CRC checksum
1 byte	1 byte	A word	1 byte	1 byte	A word
Byte	Byte	0x00 0x00	0x00	Byte	Lo Byte Hi Byte

NOTE: relay control word is defined as follows

0x00	Production
0x01	Alarm
0x02	Alarm (configurable)

0XAA	Relay disable (disable the relay control function)

Slave response message format:

Device Address	function code	Start address register	Control word	CRC checksum
1 byte	1 byte	A word	A word	A word
Byte	Byte	0x00 0x00	Hi Byte Lo Byte	Lo Byte Hi Byte

2.18 Read the alarm ID number (function code 0x37) when the control word of the relay is set as Alarm(configurable)

2.18.1 Data Format

The alarm ID number set when the control word of the relay is Alarm (configable) is read by the 0x37 function code.

Master Request packet format:

Device Address	function code	Start address register	The number of registers	CRC checksum
1 byte	1 byte	A word	A word	A word
Byte	Byte	0x00 0x00	0x00 0x00	Lo Byte Hi Byte

Slave response message format:

Device Address	function code	Byte count	Control word	CRC checksum
1 byte	1 byte	1 byte	N bytes	A word
Byte	Byte	Byte	N Bytes	Lo Byte Hi Byte

2.19 Set the alarm ID number (function code 0x38) when the control word of the relay is set as Alarm(configurable)

2.19.1 Data Format

The alarm ID number set when the control word of the relay is Alarm (configable) is set by the 0x38 function code.

Master Request packet format:

Device Address	function code	Start address register	Number of bytes written	ID number to be written	CRCCheck code
1 byte	1 byte	A word	1 byte	N words	1 Words
Byte	Byte	Hi Byte Lo Byte	Byte	N Bytes	Hi Byte Lo Byte

Slave response message format:

Device Address	function code	Start address register	Number of bytes written	ID number to be written	CRCCheck code
1 byte	1 byte	A word	1 byte	N words	1 Words
Byte	Byte	Hi Byte Lo Byte	Byte	N Bytes	Hi Byte Lo Byte

2.20 Read test flag (function code 0x45)

2.20.1 Data Format

Read test flag by function 0x45.

Master Request packet format:

Device Address	function code	Start address register	The number of registers	CRC checksum
1 byte	1 byte	A word	A word	A word
Byte	0x45	0x00 0x00	0x00 0x00	Lo Byte Hi Byte

Slave response message format:

Device Address	function code	Byte count	Control word	CRC checksum
1 byte	1 byte	1 byte	1 byte	A word
Byte	Byte	Byte	1Bytes	Lo Byte Hi Byte

Flag definition:

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Retention	Retention	Retention	Retention	Retention	T2 test completion flag	Burn Complete Flag	T1 test completion flag

2.21 Set test flag (function code 0x46)

2.21.1 Data Format

Read test flag by function 0x46.

Master Request packet format:

Device Address	function code	Start address register	Value to be written	CRCCheck code
1 byte	1 byte	A word	A word	1 Words

Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Hi Byt Lo Byte

Slave response message format:

Device Address	function code	Start address register	Value to be written	CRCCheck code
1 byte	1 byte	A word	A word	1 Words
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Hi Byte Lo Byte

2.22 Set EPS enable bit (function code 0x49)

2.22.1 Data Format

Set EPS function enable bit by 0x49 function code

Master Request packet format:

Device Address	function code	Start address register	The number of registers	Value to be written	CRCCheck code
1 byte	1 byte	A word	A word	1 Words	1 Words
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Hi Byte Lo Byte

Slave response message format:

Device Address	function code	Start address register	The number of registers	Value to be written	CRCCheck code
1 byte	1 byte	A word	A word	1 Words	1 Words
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Hi Byte Lo Byte

Enable: 0x00 0x55
Disable: 0x00 0xAA

2.23 Set passive mode (function code 0x42 & 0x49)

Before using passive mode, you need to set "Working Mode" to "Passive Mode" on the machine, and then check if the machine addresses in the same network conflict.
The function of the heartbeat signal is to confirm that both sides of the communication (master and slave) are working normally, and the slave loses the heartbeat signal for 1 minute and then goes into standby mode. It is recommended to send a heartbeat signal every 1 to 10 seconds.
The status word indicates whether the current instruction is accepted and the possible reason for rejection. Note that when the host sends a passive mode command or heartbeat using the broadcast address (0x88), the slave will normally receive the message but will not respond. When the slave goes from the "standby" state to the working state, the power climb speed is limited due to safety regulations, and it needs to be counted down again after the work state is switched to "standby". Therefore, when the slave needs to respond quickly, it needs to be carefully transferred to " standby mode.

2.23.1 Data Format

Set passive mode function by 0x49 function code

Master Request message format:

Device Address	function code	Register Address	Register data	CRCCheck code
1 byte	1 byte	A word	A word	1 Words
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Hi Byte Lo Byte

Slave reply text:

Device Address	function code	Data length	Status Word	CRCCheck code
1 byte	1 byte	1 byte	A word	1 Words
Byte	Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte

Discharge parameter setting register (function code 0x42)

address	definition	Variable Types	length	range	Defaults	Remark
0x0100	Standby	Uint	16	0x5555		Enters the standby state
0x0101	Discharge	Uint	16	0 ~ 3000		Enters the discharging state, the discharging power register value Unit 1W
0x0102	Charging	Uint	16	0 ~ 3000		Enters the charging state, the charging power for the register value Unit 1W
0x0103	automatic	Uint	16	0x5555		Automatic mode

Heartbeat passive mode register (function code 0x49)

address	definition	Variable Types	length	range	Defaults	Remark
0x2201	Heartbeat	Uint	16	0x2202		The fastest sent once per second, sent at least once per minute

Example heartbeat packet (address 01):

01 49 22 01 22 02 1E DD

Status & Error Code (status word)

Byte	Bit	Description
Lo Byte	[7: 0]	0— Accept; 1— Invalid Mode, check work-mode on the screen;

		2— CRC Failed, refer to CRC16 / Modbus protocol; 3— Busy, inverter is busy, check the status below; 4— Invalid Data, make sure register value is correct;
Hi Byte	0	1— Battery is ready to charge;
	1	1— Battery is ready to discharge;
	2	1— battery is full, charge prohibited;
	3	1— battery is empty, discharge prohibited;

2.24 Set the operating mode

2.24.1 Data Format

Master write packet format:

Device Address	function code	Start address register	Write register number	Write Bytes	Value to be written	CRCCheck code
1 byte	1 byte	2 bytes	2 bytes	1 byte	...	2 bytes
Byte	0x10	Hi Byte Lo Byte	Hi Byte Lo Byte	Byte	...	Hi Byte Lo Byte

Slave response message format:

Device Address	function code	Start address register	Register number	CRCCheck code
1 byte	1 byte	2 bytes	2 bytes	2 bytes
Byte	0x10	Hi Byte Lo Byte	Hi Byte Lo Byte	Hi Byte Lo Byte

The master reads packet format:

Device Address	function code	Start address register	Write register number	CRCCheck code
1 byte	1 byte	2 bytes	2 bytes	2 bytes
Byte	0x03	Hi Byte Lo Byte	Hi Byte Lo Byte	Hi Byte Lo Byte

Slave response message format:

Device Address	function code	Data bytes	Response data register	CRCCheck code
1 byte	1 byte	1 byte	...	2 bytes
Byte	0x03	Byte	1 High Low Register 1 Register...	Hi Byte Lo Byte

Slave response message (error data) format:

Device Address	function code	error code	CRCCheck code
1 byte	1 byte	1 byte	2 bytes
Byte	0x90	Byte	Hi Byte Lo Byte

2.24.2 Register address

address	definition	Variable Types	length	range	R / W	Remark
0x1200	Operating mode	Uint	16	0-3	R / W	0— Automatic mode 1— TOU mode (time of usage) 2— The timing of charge and discharge mode 3— Passive mode Uses: saving mode and the corresponding check parameter and change the operating mode
0x1201	Timing of charge and discharge / charge starting time	Uint	16		R / W	Hi Byte- hours, range 0-23 Lo Byte- minutes, range 0-59
0x1202	Timing of charge and discharge / charge end time	Uint	16		R / W	Hi Byte- hours, range 0-23 Lo Byte- minutes, range 0-59
0x1203	Timing of charge and discharge / discharge starting time	Uint	16		R / W	Hi Byte- hours, range 0-23 Lo Byte- minutes, range 0-59
0x1204	Timing of charge and discharge / time of discharge end	Uint	16		R / W	Hi Byte- hours, range 0-23 Lo Byte- minutes, range 0-59
0x1205	Timing of charge and discharge / charge power	Uint	16	0-3000	R / W	Unit: watt (W)
0x1206	Timing of charge and discharge / discharge power	Uint	16	0-3000	R / W	Unit: watt (W)
0x1207	TOU / rule number	Uint	16	0-3	R / W	The smaller the number, the higher the priority. Before setting other parameters sure to set the rule number
0x1208	TOU price /	Uint	16		R / W	Hi Byte- hours, range 0-23

	forced charging start time					Lo Byte- minutes, range 0-59
0x1209	TOU price / forced charging end time	Uint	16		R / W	Hi Byte- hours, range 0-23 Lo Byte- minutes, range 0-59
0x120A	TOU price / off forcibly charge SOC	Uint	16	30-100	R / W	Percentage of charge remaining, when the battery SOC reaches change the current register value, the forced charging end, the machine according to the charging power grid
0x120B	TOU price / forced charging power	Uint	16	0-3000	R / W	If set to 0, the machine according to the charging power grid Unit: watt (W)
0x120C	TOU / Rules start date	Uint	16		R / W	Hi Byte- months, range 1-12 Lo Byte- date, range 1-31
0x120D	TOU / end date of entry into force of the rules	Uint	16		R / W	Hi Byte- months, range 1-12 Lo Byte- date, range 1-31
0x120E	TOU / week rules take effect	Uint16	16		R / W	This register represents the bit-field, indicates invalid weeks 0, bit 1 represents an effective week b0- Monday b1- Tuesday b2- Wednesday b3- Thursday b4- Friday b5- Saturday b6- Sunday
0x120F	TOU / rules to enable	Uint16	16	0/1	R / W	Write 1 to register the current rule will take effect; Failure to register will write 0 current rule.
0x1211	Passive mode / heartbeat	Uint16	16	0x5555	W	0x5555 write to this register in order to maintain the passive mode to work properly; if the register is more than 60 seconds is not written correctly, the machine will be transferred to the standby state; May send a heartbeat signal through a broadcast address to all machines (0x88)
0x1212	Passive mode / standby	Uint16	16	0x5555	W	0x5555 Write to this register to enable the machine to standby state;
0x1213	Passive mode / discharge	Uint16	16	0-3000	W	Unit: watt (W)
0x1214	Passive mode / charge	Uint16	16	0-3000	W	Unit: watt (W)
0x1215	Passive mode / Auto	Uint16	16	-10,000 to	W	Stable power grid, the grid power approaches such as the register value;

				10,000		A positive value indicates the direction of power "from the system to the power grid"; A negative value indicates the direction of transmission power "Power to the system from the" complement form Unit: watt (W)

Examples

Claim	Send instructions	Remark
Charging and discharging a timing parameter set	0x 01 10 12 01 00 06 0C 00 00 0B 37 0C 00 17 38 09 C4 09 C4 83 23	Timing discharge mode, charging time 00: 00-11: 55, 2500W power, discharge time is 12: 00-23: 56, power 2500W
Change the operating mode is timed charge and discharge mode	0x 01 10 12 00 00 01 02 00 02 15 90	Calibration parameters and change the operating mode to the charge-discharge mode timer