Sofarsolar Hybrid Storage inverter

HYD 3K…6K-ES / ME 3000-SP

ModBus-RTU Protocol

2020-11-23

Version record table

Setting Time	Version	Modify contents	Operator

1. Summary of Agreement

1.1 Physical Layer

Physical Transmission: RS485/RS422
Address: 1 ～ 63
Baud rate: 9600bps
Maxi mun Distance: 1000M
Medium: Shielded twisted pair (STP)
Mode: MODBUS — RTU

1.2 Link Layer

First, The Master addressing the terminal device (Slave) , then on the opposite direction, Slave transmit the response to the Master. The protocol only used for data transmit between Master and Slave.Data Transmit through independent devices are prohibit. So that the data from independent device will not occupy the communication channel during the initialization, it is limit to send signal inquiry request to Master
Data Transmission Format: 1 starting byte; 8 data bytes; 1 stop byte; Parity: none
Data Transmission Format:

Slave Address	Function Code	Data	CRC

1-Byte	1-Byte	N-Byte	2byte

The Protocol defines CRC, DATA and other related parameters , these are necessary for specific data exchange. When data frame arrive at the slave, it will address its specific device, then problematic head will be remove , the data will be read by the device.If there are no errors, the slave will perform the tasks request by the data, the slave will have data back to the sender, by adding problematic head and sending the data back to the sender, the response data sent back from the slave contains the following contents: The terminal slave address (Address) , the executed commands (Function) , data generated after executed the requested command (Data) and a parity check code (Check) , The Salve can identify the wrong message from the Master, and make different responses.

1.3 (Address)

Address is the beginning of the frame, composed by one byte (value 1-63) . This address indicates the identity of the device that specified by user. This slave will get the data from the connected Master. For whole system, Address for each slaves must be unique. The slave will response when it is addressed, when slave back with response, the Slave address data will show which slave connect with Master.

1.4 (Function)

Function code shows the operation that slave will take after addressed. All Function code & meaning support by monitoring device list in Table 2

Function Code	Range of Register Address	Meaning
0x03	0x0000-0x00FF Read the register data from inverter input	Get one or more values from Register
	0x0100-0x01FF Read the register data from built- in combiner input	Get one or more values from Register
	Read Storage inverter's parameter, input register data 0x0200-0x02FF	Get one or more values from Register
0x04	0x1000-0x10FFRead the register data keep by inverter or storage inverter	Get one or more values from Register
	0x1100-0x11FF Read the register data keep by built-in combiner	Get one or more values from Register
	0x1000-0x10FF	Offer one or more values from

0x13	Write Setting or parameters to inverter or storage inverter	Registers to inverter
	0x1100-0x11FFWrite setting or parameter to built-in combiner	Offer one or more values from Registers to inverter
0x21	Ext Code 0x2000-0x20ff Inverter	
	Ext Code 0x2100-0x21ff Bulit-in combine	
0x07	Conceal Function 0x3000 Calibration (with password?)	
0x08	Conceal Function 0x4000 Maintaining information	
0x02	Auto Timing	
0x01	Remote on/off control, power limit ; power factor	
0x50	Read Storage data from EEPROM	
0x51	Write in EEPROM storage data	
0x61	Read the data from SD	
0x10	Read access time	
0x30	Factory Reset	
0x31	Clear today's energy	
0x32	Recovery the default setting of current country code	
0x33	Clear the total energy	
0x34	Clear the event list	
0x35	Read the control character of relay	
0x36	Write the control character to Relay	
0x37	Read the control character of relay, when we get alarm for controlling character (configable) , show the fault ID follow the setting	
0x38	Set the fault ID (alarm, can configable) as the control character to relay	
0x45	Read the testing Flag	
0x46	Write in the test Flag	

1.5 (Data)

Data consists two different hexadecimal number systems, ranging 00H～FFH. It made up of RTU character according to the network transmission mode. The data from Master to Slave need to contain the additional information: Slave must execute the behavior defined by function code. (in-consecutive register address included) ; number of the pending items need to be processed; actual number of data bytes in domain. For example: Function Code to Slave, read a register, data need indicate start and number of specific register, embedded address data types, different slave will have different results, because the features of slaves are different.

1.6 (CRC)

The verification allow the error to be existed during the transmission between Master and Slave. Sometimes because of the electrical noise and other interruptions, a set of data may change during the transmission from one device to another. The CRC verification ensure that Master or Slave not to respond to the incorrect data that has changed during the transmission. This verification improves the security and efficiency of whole system. We are using 16-bit circulation Redundary Check (CRC16) , CRC occupies two bytes, contains one 16-bit Binary value.CRC value calculated by transmitting device, then attach to the data frame, the receiving device recalculate the CRC value . Compared with the received CRC value, if two values are not equal, an error arises. Set all bytes to “1” for a 16-bit register, Then operated by 8 bit bytes in frame and current value of register continuity, only 8 data bits per byte participate in generation CRC value.start bits; stop bits and other possible parity bits will not affect CRC value generation. During the CRC value generation, each 8-bit byte XOR with the content in register, then shift the result to low-bit, high-bit supplement with “0”, the last significant bit (LSB) remove and test. If the LSB is “1”, the register XOR with a present fixed value, if the LSB shows”0”, not do any treatment. Repeat the above process until perform 8 times shift operation. The next 8-bit bytes XOR with current value of register, also perform another 8 shift XOR operation as above -mentioned, the final value we get is the CRC value.

The Process of generating a CRC value

Step1: Preset all bytes to “1” For 16-bit register, defined as CRC register (0FFFFH)

Step2: XOR the first 8-bit byte in data frame with the low byte in CRC register

Step3: Shift the CRC register one bit to the right, high-bit supplement with “0”, the LSB remove and test

Step4: If the LSB is “0”, repeat step3 (Next Shift) , if the LSB is “1”, the register XOR with a preset fixed value, (0A001H)

Step 5: Repeat step 3 &4, until perform 8 times shift operation.

Step 6: Repeat from step2 to 5 to deal with next 8-bit byte, until end of all bytes processing complete.

Step 7: Finally, the value of CRC register is the value of CRC

2. Instructions

2.1 Broadcast data frame information (address 0x88)

Broadcast data with no response

2.1.1. Auto Timing

(Slave Address)	0x88
(Function Code)	0x02
Register Address (Hi)	0x50
Register Address (Lo)	0x00
Number of Registers (Hi)	0x00
Number of Registers (Lo)	0x03
Data Field (Second)	
Data Field (Minute)	
Data Field (Hour)	
Data Field (Date)	
Data Field (Month)	
Data Field (Year)	
CRC Lo CRC checking code Lo	
CRC Hi CRC checking code Hi	

Address Table (Auto Timing)

Address	Definition	Variable Type	Length	Range	Default Value	Remarks
0x5000	Auto Timing	BCD				

2.1.2 On/Off Signal

1. Remote On/Off control

(Slave Address)	0x88
(Function Code)	0x01
Register Address (Hi)	0x01
Register Address (Lo)	0x42
Value of Registers (Hi)	0x00
Value of Registers (Lo)	0x55/0x66

CRC Lo CRC checking code Lo	0x82
CRC Hi CRC checking code Hi	0xBB

Remarks: Inverter ON Register Lo=0x55

Inverter Off Register Lo=0x66

2.1.3 Active power Derated Setting

1. Active power Derated

(Slave Address)	0x88
(Function Code)	0x01
Register Address (Hi)	0x01
Register Address (Lo)	0x41
Value of Register (Hi)	
Value of Register (Lo)	
CRC Lo CRC checking code Lo	
CRC Hi CRC checking code Hi	

2.1.4 Power factor Setting (Reactive power)

1. Power factor Setting (Reactive power)

(Slave Address)	0x88
(Function Code)	0x01
Register Address (Hi)	0x01
Register Address (Lo)	0x61
Value of Register (Hi)	
Valuer of Register (Lo)	
CRC Lo CRC checking code Lo	
CRC Hi CRC checking code Hi	

2.1.5 Reactive Power Setting

1. Reactive power setting

(Slave Address)	0x88

(Function Code)	0x01
Register Address (Hi)	0x10
Register Address (Lo)	0x62
Value of Register (Hi)	
Valuer of Register (Lo)	
CRC Lo CRC checking code Lo	
CRC Hi CRC checking code Hi	

2.2 Read Command 1 (function code 0x03)

Through the 0x03 function code, queries allow the register information, data format is as follows:

2.2.1 Read Data format

Master request message Format:

Slave Address	Function Code	Starting Address	Number of Registers	CRC checking code
1 Byte	1 Byte	2 Bytes	2 Bytes	2 Bytes
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Lo Byte Hi Byte

Slave response message Format:

Slave Address	Function Code	Byte Count	Register-1 value	。。。	Register-N value	CRC checking code
1 Byte	1 Byte	1 Byte	2 Bytes	N-2	2 Bytes	2 Bytes
Byte	Byte	Byte	Hi Byte Lo Byte	。。。	Hi Byte Lo Byte	Lo Byte Hi Byte

Example (query the state of the Inverter)

Request:

Slave Address	0x01
Function Code	0x03
Register Address Hi	0x00
Register Address Lo	0x00
Number of Registers Hi	0x00
Number of Registers Lo	0x01
CRC Lo CRC checking code Lo	0x84
CRC Hi	0x0A

CRC checking code Hi	

Response:

Slave Address	0x01
Function Code	0x03
Bytes Count	0x02
Value of Register Hi	0x00
Value of Register Lo	0x00
CRC Lo CRC checking code Lo	0xB8
CRC Hi CRC checking code Hi	0x44

2.2.2 Read the address list for storage inverter

Fault Information list

0x0201 low byte, Byte0

bit	Display	Remark &Fault code
Bit0	GridOVP	Grid Over voltage ID01
Bit1	GridUVP	Grid under voltage ID02
Bit2	GridOFP	Grid Over Frequency ID03
Bit3	GridUFP	Grid under frequency ID04
Bit4	BatOVP	Battery Over voltage ID05
Bit5	reserved	reserved ID06
Bit6	GridLVRT	LVRT fault ID07
Bit7	PV_OVP	PV over voltage ID08

0x0201 High Byte, Byte1

bit	Display	Remark
Bit0	HW_LLCBus_OVP	LLCBus over voltage hardware protection ID09
Bit1	HW_Boost_OVP	Busover voltage hardware protection ID10
Bit2	HwBuckBoostOCP	BuckBoost over current hardware protection ID11
Bit3	HwBatOCP	Battery over voltage hardware protection ID12
Bit4	GFCI_Fault	Residual current fault ID13
Bit5	HwPVOCP	PV hardware over current ID14
Bit6	HwAcOCP	AC output over current hardware protection ID15
Bit7	IpvUnbalance	PV current unbalance ID16

0x0202 low byte, Byte2

bit	Display	Remark
Bit0	HwADFaultIGrid	Grid current sampling error ID17
Bit1	HwADFaultDCI	Current DCI sampling error ID18
Bit2	HwADFaultVGrid	Grid voltage sampling errorID19
Bit3	GFCIDeviceFault	Residual current sampling error ID20

Bit4	MChip_Fault	Main DSP fault ID21
Bit5	HwAuxPowerFault	Auxiliary power fault ID22
Bit6	reserved	Reserved ID23
Bit7	reserved	reserved ID24

0x0202 High Byte, Byte3

bit	Display	Remark
Bit0	LLCBusOVP	LLCBus over voltage protection ID25
Bit1	SwBusOVP	BoostBus over voltage software protection ID26
Bit2	BatOCP	Battery over current protection ID27
Bit3	DciOCP	Dci over current protection ID28
Bit4	SwOCPInstant	Output instant current protection ID29
Bit5	BuckOCP	Buck over current protection ID30
Bit6	AcRmsOCP	Output Rms current protection ID31
Bit7	SwPvOCPInstant	Input over current software protectionID32

0x0203 low byte, Byte4

bit	Display	Remark
Bit0	PvConfigSetWrong	Input Mode Error ID33
Bit1	reserved	Reserved ID34
Bit2	reserved	Reserved ID35
Bit3	reserved	Reserved ID36
Bit4	reserved	Reserved ID37
Bit5	reserved	Reserved ID38
Bit6	reserved	Reserved ID39
Bit7	reserved	Reserved ID40

0x0203High Byte, Byte5

bit	Display	Remark
Bit0	reserved	Reserved ID41
Bit1	reserved	Reserved ID42
Bit2	reserved	Reserved ID43
Bit3	reserved	Reserved ID44
Bit4	reserved	Reserved ID45
Bit5	reserved	Reserved ID46
Bit6	reserved	Reserved ID47
Bit7	ConsistentFault_GFCI	Residual current consistence error ID48

0x0204 low byte, Byte6

bit	Display	Remark
Bit0	ConsistentFault_VGrid	Grid voltage consistence error ID49
Bit1	ConsistentFault_FGrid	Grid frequency consistence error ID50

Bit2	ConsistentFault_DCI	DCI current consistence error ID51
Bit3	BatCommunicatonFlag	battery communication fault ID52
Bit4	SpiCommLose	SPI communication error ID53
Bit5	SciCommLose	SCI communication error ID54
Bit6	RecoverRelayFail	Relay detecting error ID55
Bit7	PvIsoFault	Isolation resistance low ID56

0x0204 High Byte, Byte7

bit	Display	Remark
Bit0	OverTempFault_BAT	battery temperature protection ID57
Bit1	OverTempFault_HeatSink	Heat shrink over temperature protection ID58
Bit2	OverTempFault_Env	Ambient temperature protection ID59
Bit3	PEConnectFault	PE connection error ID60
Bit4	reserved	Reserved ID61
Bit5	reserved	Reserved ID62
Bit6	reserved	Reserved ID63
Bit7	reserved	Reserved ID64

0x0205 low byte, Byte8

bit	Display	Remark
Bit0	unrecoverHwAcOCP	Output hardware over current permanent faultID65
Bit1	unrecoverBusOVP	Bus over voltage permanent fault ID66
Bit2	BitEPSunrecoverBatOcP	EPS mode battery over current permanent fault ID67
Bit3	unrecoverIpvUnbalance	PV current unbalance permanent fault ID68
Bit4	reserved	Reserved ID69
Bit5	unrecoverOCPInstant	Output instant over current permanent fault ID70
Bit6	reserved	Reserved ID71
Bit7	reserved	Reserved ID72

0x0205 High Byte, Byte9

bit	Display	Remark
Bit0	unrecoverPvConfigSetWrong	Input mode Setting permanent fault ID73
Bit1	unrecoverIPVInstant	Input over current permanent fault ID74
Bit2	unrecoverEEPROM_W	Write EEPROM permanent fault ID 75
Bit3	unrecoverEEPROM_R	Read EEPROM permanent fault ID 76
Bit4	unrecoverRelayFail	Relay permanent fault ID77
Bit5	reserved	78
Bit6	reserved	79
Bit7	reserved	80

Inverter alarm information: 0x022B low byte, byte0

bit	Display	Remark

Bit0	OverTempAlarmLoadShedding	Over temperature derating ID81
Bit1	OverFreqAlarmLoadShedding	Over frequency derating ID82
Bit2	bitlongdistLoadShedding	Remote derating ID83
Bit3	bitlongdistOFF	Remote OFF ID84
Bit4	reserved	reserved
Bit5	reserved	reserved
Bit6	reserved	reserved
Bit7	batLowVoltageAlarm	Battery low voltage alarm ID85

Inverter alarm information: 0x022B High Byte, byte1

bit	Display	Remark
Bit0	BatVoltageLowShut	Battery low voltage turned off ID86
Bit1	reserved	reserved
Bit2	reserved	reserved
Bit3	reserved	reserved
Bit4	reserved	reserved
Bit5	reserved	reserved
Bit6	reserved	reserved
Bit7	reserved	reserved

Communication board internal information: 0x0242 low byte, byte0

bit	Display	Remark
Bit0	reserved	reserved ID91
Bit1	reserved	reserved ID92
Bit2	reserved	reserved ID93
Bit3	Software version is not consistent	Software version consistence error ID94
Bit4	CommEEPROM Fault	Communication board EEPROM errorID95
Bit5	RTCFault	RTC clock faultID96
Bit6	reserved	Reserved ID97
Bit7	SDfault	SD card fault ID98

Communication board internal information: 0x0242 High Byte, byte1

bit	Display	Remark
Bit0	reserved	reserved
Bit1	WifiFault	Wifi fault (ID reserved)
Bit2	reserved	reserved
Bit3	reserved	reserved
Bit4	reserved	reserved
Bit5	reserved	reserved
Bit6	reserved	reserved
Bit7	reserved	reserved

Lithium battery fault information list: 0x023D low byte, byte0

bit	Display	Remark
Bit0	BatOCD	Discharge over current protection ID100
Bit1	BatSCD	Discharge circuit protection ID101
Bit2	BatOV	over voltage protection ID102
Bit3	BatUV	Under voltage protection ID103
Bit4	BatOTD	discharge over temperature protection ID104
Bit5	BatOTC	Charge over temperature protection ID105
Bit6	BatUTD	Discharge low temperature protection ID106
Bit7	BatUTC	Charge low temperature protection ID107

Lithium battery fault list: byte1 –byte9

bit	Display	Remark
Bit0	reserved	reserved
Bit1	reserved	reserved
Bit2	reserved	reserved
Bit3	reserved	reserved
Bit4	reserved	reserved
Bit5	reserved	reserved
Bit6	reserved	reserved
Bit7	reserved	reserved

Country code list for storage inverter:

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

Operation Status:

0	WaitState	Wait status
1	CheckState	Check status
2	NormalState	On grid status
3	EPSState	EPS status
4	FaultState	Recoverable fault status
5	PermanentState	Permanent fault status

Hybrid inverter data address list

Address	Definition	Variable Type	len	Range	Default	Remark
0x0200	Operation status	int	16			See ”Operation status”
0x0201	fault list1	int	16			High Byte: byte1 Low byte: byte0
0x0202	fault list 2	int	16			High Byte: byte3 Low byte: byte2
0x0203	fault list 3	int	16			High Byte: byte5 Low byte: byte4
0x0204	fault list 4	int	16			High Byte: byte7 Low byte: byte6
0x0205	fault list 5	int	16			High Byte: byte9 Low byte: byte8
Address	Definition	Variable Type	len	Range	Default	Remark
0x0206	Grid R voltage	int	16	0-1000V		Unit: 0.1V
0x0207	Grid A current	int	16	0-100A		Unit: 0.01A Rms
0x0208	reserved					reserved
0x0209	reserved					reserved
0x020A	reserved					reserved
0x020B	reserved					reserved
0x020C	Grid frequency	int	16	0-100Hz		Unit: 0.01Hz
0x020D	Battery charge/discharge power	int	16	-10-10 KW		Unit: 0.01KW, positive means Charge, negative means discharge
0x020E	Battery Cell voltage	int	16	0-100V		Unit: 0.1V
0x020F	Battery Charge/discharge current	int	16	-100-100A		Unit: 0.01A , positive means Charge, negative means discharge

0x0210	Battery residual capacity (SOC)	int	16	0-100		Unit: 1%
0x0211	Battery temperature	int	16			Unit: 1 degree
0x0212	Grid point power	int	16	-10-10 KW		Unit: 0.01KW, Positive means export, negative means import.
0x0213	Load power	int	16	0-10 KW		Unit: 0.01KW
0x0214	Hybrid Inverter power	Int	16	-10-10KW		Unit: 0.01KW, Positive means export, negative means import.
0x0215	PV generation power	int	16	0-10 KW		Unit: 0.01KW
0x0216	EPS output voltage	int	16			Unit: 0.1V
0x0217	EPS output power	int	16			Unit: 0.01KW
0x0218	Today generation	int	16	0-65536		Unit: 0.01KWh
0x0219	Today export power	int	16	0-65536		Unit: 0.01KWh
0x021A	Today import power	int	16	0-65536		Unit: 0.01KWh
0x021B	Today load consuming	int	16	0-65536		Unit: 0.01KWh
0x021C	Total generation Hi	int	16	0-65536		Unit: 1KWh
0x021D	Total generation Lo	int	16	0-65536		Unit: 1KWh
0x021E	Total export power Hi	int	16	0-65536		Unit: 1KWh
0x021F	Total export power Lo	int	16	0-65536		Unit: 1KWh
0x0220	Total import power Hi	int	16	0-65536		Unit: 1KWh
0x0221	Total import power Lo	int	16	0-65536		Unit: 1KWh
0x0222	Load consuming power Hi	int	16	0-65536		Unit: 1KWh
0x0223	load consuming power Lo	int	16	0-65536		Unit: 1KWh
0x0224	Battery today	int	16	0-65536		Unit: 0.01KWh (V1.20 or

	Charge power					above)
0x0225	Battery today discharge power	int	16	0-65536		Unit: 0.01KWh (V1.20 or above)
0x0226	Battery total charge power Hi	int	16	0-65536		Unit: 1KWh (V1.20 or above)
0x0227	Battery total charge power Lo	int	16	0-65536		Unit: 1KWh (V1.20 or above)
0x0228	Battery total discharge power Hi	int	16	0-65536		Unit: 1KWh (V1.20 or above)
0x0229	Battery total discharge power Lo	int	16	0-65536		Unit: 1KWh (V1.20 or above)
0x022A	Count down time	int	16			Unit: 1s
0x022B	inverter alarm information	int	16			See“inverter alarm list ”
0x022C	Battery cycle time	int	16	0-65536		
0x022D	Inverter bus voltage	int	16			Unit: 0.1V
0x022E	LLC bus voltage	int	16			Unit: 0.1V
0x022F	Buckcurrent	int	16			Unit: 0.01A
0X0230	Grid R voltage	int	16			Unit: 0.1V
0X0231	Grid R voltage current	int	16			Unit: 0.01A
0X0232	reserved					
0X0233	reserved					
0X0234	reserved					
0X0235	reserved					
0X0236	reserved					
0X0237	Battery health (SOH)	int	16	0-100		Unit: 1%
0X0238	Hybrid internal temperature	int	16	-127-127		Unit: 1℃
0X0239	Heat shrink temperature	int	16	-127-127		Unit: 1℃
0X023A	Country Code	int	16			See “Country code list”
0X023B	DCI (current)	int	16			Unit: 1mA

0X023C	DCI (voltage)	int	16			Unit: 0.1V
0X023D	battery fault list 1	int	16			High Byte: byte1 Low byte: byte0
0X023E	Li battery fault list 2	int	16			High Byte: byte3 Low byte: byte2
0X023F	LI battery fault list 3	int	16			High Byte: byte5 Low byte: byte4
0X0240	Li battery fault list 4	int	16			High Byte: byte7 Low byte: byte6
0x0241	Li battery fault list 5	int	16			High Byte: byte9 Low byte: byte8
0x0242	Communication board internal info	int	16			High Byte: byte1 Low byte: byte0
0x0243	Today Generation time	int	16			Unit: 1 minute
0x0244	Total generation time Hi	int	16			Unit: 1 hour
0X0245	Total generation time low	int	16			Unit: 1hour
0x0246	Isolation resistance of PV1+ to ground					
0x0247	Isolation resistance of PV2+ to ground					
0x0248	Isolation resistance of PV- to ground					
0x0249						reserved
0x024A						reserved
0x024B						reserved
0x024C						reserved
0x024D						reserved
0x024E						reserved
0x024F						reserved
Panel string information						
Address	Definition	Variable Type	len	Range	Default	Remark
0x0250	PV1 voltage	int	16	0-1000V		Unit: 0.1V

0x0251	PV1 current	int	16	0-100A		Unit: 0.01A
0x0252	PV1 power	int	16	0-100kw		Unit: 0.01kw
0x0253	PV2 voltage	int	16	0-1000V		Unit: 0.1V
0x0254	PV2 current	int	16	0-100A		Unit: 0.01A
0x0255	PV2 power	int	16	0-100kw		Unit: 0.01kw

2.3 Read Command 2 (Function code 0x04)

2.3.1 Read the data format

By function code 0x04, query allow for all register, command format as below

Master request message format:

Slave Address	Function Code	Starting Address	Number of register	CRC checking code
1byte	1 byte	2 bytes	2 bytes	2 bytes
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Hi Byte Hi Byte

Slave Response Message Format

Slave Address	Function Code	Byte Count	1Register-1 Value	。。。	Register-N Value	CRC check code
1 byte	1byte	1byte	2bytes	N-2	2 bytes	2 bytes
Byte	Byte	Byte	Hi Byte Lo Byte	。。。	Hi Byte Lo Byte	Lo Byte Hi Byte

Request

Slave Address	0x01
Function Code	0x04
Register Address (Hi)	0x10
Register Address (Lo)	0x00
NO. of registers (Hi)	0x00
NO. Of register (Lo)	0x01
CRC Lo CRC checking code (Lo)	0x35
CRC Hi CRC checking code (Hi)	0x0A

Response:

Slave Address	0x01
Function Code	0x04
Count bytes	0x02

Value of Register (Hi)	0x00
Value of Register (Lo)	0x00
CRC Lo CRC check code (Lo)	0xB9
CRC Hi CRC checking code (Hi)	0x30

2.3.2 Address Table (Read the setting of inverter)

Address Table (Register Parameter hold by inverter)

Start-up parametert setting

Address	Definition	Variable Type	Length	Range	Default Value	Remarks
0x1000	Grid connection waiting time			0-1000		Unit second
0x1001	Grid power increasing Rate	Uint	16			Percentage of rated power / min
0x1002	Grid connection waiting time after grid fault recovery	Uint	16	0-1000		Unit second
0x1003	Grid power increasing after grid fault recovery	Uint	16			Percentage of rated power / min
0x1004	Over voltage protection value before grid connection	Uint	16			Unit 0.1V
0x1005	Under voltage protection value before grid connection	Uint	16			Unit 0.1V
0x1006	Over frequency protection value before grid connection	Uint	16			Unit 0.01Hz
0x1007	Under frequency protection value before grid	Uint	16			Unit 0.01Hz

	connection					
0x1008 to 0x100F	Reversed					
Parameter setting for grid voltage protection						
Address	Definition	Variable Type	Length	Range	Default Value	Remarks
0x1010	Enabled register for grid voltage protection	Uint	16			
0x1011	Class 1 over voltage protection value	Uint	16	10-300		Unit 0.1V
0x1012	Trigger time for class 1 over voltage protection	Uint	16	0-65536		Unit 10ms
0x1013	Class 2 over voltage protection value	Uint	16	10-300		Unit 0.01A
0x1014	Trigger time for class 1 over voltage protection	Uint	16	0-65536		Unit 10ms
0x1015	Class 1 under voltage protection value	Uint	16	10-300		Unit 0.01A
0x1016	Trigger time for class 1 under voltage protection	Uint	16	0-65536		Unit 10ms
0x1017	Class 2 under voltage protection value	Uint	16	10-300		Unit 0.01A
0x1018	Trigger time for class 2 under voltage protection	Uint	16	0-65536		Unit 10ms
0x1019	10-Min Over voltage protection value	Uint	16	10-300		Unit 0.01A
0x101A to 0x101F	Reversed					
Parameter setting for grid frequency protection						

Address	Definition	Variable Type	Length	Range	Default Value	Remarks
0x1020	Enabled register for grid frequency Protection	Uint	16			
0x1021	Class 1 over frequency protection value	Uint	16	50-55		Unit 0.01Hz
0x1022	Trigger Time For class 1 over frequency protection	Uint	16	0-65536		Unit 10ms
0x1023	Class 2 over frequency protection value	Uint	16	50-55		Unit 0.01Hz
0x1024	Trigger Time For class 2 over frequency protection	Uint	16	0-65536		Unit 10ms
0x1025	Class 1 under frequency protection value	Uint	16	45-55		Unit 0.01Hz
0x1026	Trigger Time For class1 under frequency protection	Uint	16	0-65536		Unit 10ms
0x1027	Class 2 under frequency protection value	Uint	16	45-55		Unit 0.01Hz
0x1028	Trigger Time For class 2 under frequency protection	Uint	16	0-65536		Unit 10ms
0x1029 to 0x102F	Reversed					
Parameter setting (Input current DCI protection)						
Address	Definition	Variable Type	Length	Range	Default Value	Remarks

0x1030	Enable register for DCI protection					
0x1031	Class 1 DCI protection value	Uint	16	0-2000		Unit 1mA
0x1032	Trigger Time For class 1 DCI protection	Uint	16	0-65536		Unit 10ms
0x1033	Class 2 DCI protection value	Uint	16	0-2000		Unit mA
0x1034	Trigger Time for class 2 DCI protection	Uint	16	0-65536		Unit 10ms
0x1035	DCI injection test value	Uint	16	0-65536		UNit 1mA
Active power & Remote on/off control						
0x1040	Active power &remote on/off control			0x01		Enable function remote on/off control only
0x1041	Percentage of active power output			0-1000		0.1%
0x1042	Remote on/off			0x10		55 ON/66 OFF
0x1045 to 0x104F	Reversed					
Parameter Setting (Active power derate by varying frequency)						
Address	Definition	Variable Type	Length	Range	Default Value	Remarks
0x1050	Enable & Working Mode Selection register					

0x1051	Staring rate for over/under frequency power derate			0-55		0.01Hz
0x1052	Over/under Frequency power derate rate					
0x1053	After over/under frequency power derate restore , maximum rate for power recovery					
0x1054	After over/under frequency power derate restore , minimum rate for power recovery					
0x1055	Waiting time After over/under frequency power derate restor					
0x1056	over/under frequency derate recovery rate					
Reactive Parameter Setting						
Address	Definition	Variable	Length	Range	Default	Remarks
0x1060	Enable & Working Mode register					
0x1061	Power Factor					Hi byte indicate the symbol and Lo byte indicate the power factor
0x1062	Regular reactive power percentage					Hi byte indicate the percentage
0x1063	P-cos Φ Curve mode first point power factor					

0x1064	P-cos ϕ Curve mode first point power percentage					
0x1065	P-cos ϕ Curve mode second point power factor					
0x1066	P-cos ϕ Curve mode second point power percentage					
0x1067	P-cos ϕ Curve mode third point power factor					
0x1068	P-cos ϕ Curve mode third point power percentage					
0x1069	P-cos ϕ Curve mode fourth point power factor					
0x106A	P-cos ϕ Curve mode fourth point power percentage					
0x106B	P-cos ϕ curve mode lockin voltage value					
0x106C	P-cos ϕ curve mode lockout voltage value					
0x106D	Starting voltage of Q-U curve mode 1 (high voltage)					
0x106E	Ending voltage of Q-U curve mode 1 (high voltage)					
0x106F	Starting voltage of Q-U curve mode 1 (low voltage)					
0x1070	Ending voltage of Q-U curve mode 1 (low voltage)					
0x1071	lockin power from Q-U curve mode1					
0x1072	lockout power from Q-U curve					

	mode1					
0x1073	Max reactive power of Q-U curve mode1					
0x1074	Response time for reactive power from Q-U curve mode1					
LVRT parameter setting						
Address	Definition	Variable Type	Length	Range	Default value	Remarks
0x1080	LVRT ENABLE REGISTER					
0x1081	Enter the value of LVRT voltage					
0x1082	Voltage for first point (LVRT curve)					
0x1083	Time for first point (LVRT Curve)					
0x1084	Voltage for second point (LVRT curve)					
0x1085	Time for second point (LVRT Curve)					
0x1086	Voltage for third point (LVRT curve)					
0x1087	Time for third point (LVRT Curve)					
0x1088	Voltage for fourth point (LVRT curve)					
0x1089	Time for fourth point (LVRT Curve)					
0x108A	Reactive current coefficient k					
0x108B	Waiting time for voltage recovery					
0x108C	Power recovery rate					

0x1090-0x109F	Reversed					
Other safety Parameter setting						
0x10A0	Is-landing enable register					
0x10A1	GFCI enable register					
0x10A2	Isolation Resistor enable register					
0x10A3	Insulation resistance protection value					
Register for Battery Parameter						
0x10B0	Battery Type	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	Power management Mode	Uint	16			reserved
0x10B3	Max Charge Voltage	Uint	16	50.0-58.0V		Unit: 0.1V
0x10B4	Max charge Current	Uint	16	0-65.00A		Unit: 0.01A, Mean the charging current from inverter can

						not exceed this value , not the real charging current
0x10B5	Over voltage protection value	Uint	16	50.0-58.5V		Unit: 0.1V
0x10B6	Min discharge voltage	Uint	16	42.0-52.0V		Unit : 0.1V
0x10B7	Max discharge voltage	Uint	16	0-70.00A		Unit: 0.01A Mean the discharging current from inverter can not exceed this value , not the real discharging current
0x10B8	Under voltage protection value	Uint	16	42.0-52.0V		Unit: 0.1V
0x10B9	DOD (depth of Discharge)	Uint	16	0-100%		Unit: 1% DOD indicated the maximum discharge power percentage , when SOC<1-D0D, inverter stop power discharge, inverter will also stop discharge according on other conditions
0x10BA	DOD of on grid mode (Shallow DOD)	Uint	16	0-100%		Unit : 1% Shallow DOD<=DOD Shallow DOD using for on-grid mode and shallow DOD<DOD
0x10BB	Empty battery voltage	Uint	16	42.50-47.00V		Unit: 0.01V Only for lead-acid battery , mean

						the open circuit voltage when lead -acid battery completely empty
0x10BC	Full battery voltage	Uint	16	47.01-55.00V		Unit : 0.01V Only for lead-acid battery , mean the open circuit voltage when lead -acid battery completely full

The definition of the enable register:

Grid voltage protection enable register:

Address: 0x1010

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Reversed	Reversed	Reversed	Reversed	Enable bit (class 2 under voltage protection)	Enable bit (class 1 under voltage protection)	Enable bit (class 2 over voltage protection)	Enable bit (class 1 over voltage protection)
Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Reversed	Reversed	Reversed	Reversed	Reversed	Reversed	Reversed	Reversed

Grid frequency protection enable register

Address: 0x1020

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Reversed	Reversed	Reversed	reversed	Enable bit (class 2 under frequency protection)	Enable bit (class 1 under frequency protection)	Enable bit (class 2 over frequency protection)	Enable bit (class 1 over frequency protection)
Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Reversed	Reversed	Reversed	Reversed	Reversed	Reversed	Reversed	Reversed

(Grid current DCI protection) enable register

Address: 0x1030

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Reversed	Reversed	Reversed	Reversed	Reversed	0: disable 1: enable DCI testing function	Enable Bit (class 2 grid DCI protection)	Enable Bit (class 1 grid DCI protection)
Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Reversed	Reversed	Reversed	Reversed	Reversed	Reversed	Reversed	Reversed

Active power & remote on/off control enable register

Address: 0x1040

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Reversed	Reversed	Reversed	Reversed	Reversed	Reversed	Enable bit (remote on/off control)	Enable bit (power derate by active power)
Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Reversed	Reversed	Reversed	Reversed	Reversed	Reversed	Reversed	Reversed

Parameter setting (Active power derate by varying frequency)

Address: 0x1050

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Reversed	Reversed	Reversed	Reversed	Reversed	Reversed		Enable Bit (Active power derate by varying frequency)
Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Reversed	Reversed	Reversed	Reversed	Reversed	Reversed	Reversed	Reversed

Enable register (Reactive parameter setting)

Address: 0x1060

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Reversed	Reversed	Reversed	Reversed	00: Enable Bit (Reactive mode1) 01: Enable Bit (Reactive mode2) 02: Enable Bit (Reactive mode3) 03: Enable Bit (Reactive mode4)			Enable Bit (Reactive Setting) d
Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Reversed	Reversed	Reversed	Reversed	Reversed	Reversed	Reversed	Reversed

Parameter Setting (LVRT Function)

Address: 0x1080

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Reversed	Reversed	Reversed	Reversed	Reversed	Reversed		0: disable

							1: Enable
Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Reversed	Reversed	Reversed	Reversed	Reversed	Reversed	Reversed	Reversed

Parameter Setting (islanding)

Address: 0x10A0

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

Parameter setting (GFCI function)

Address: 0x10A1

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

Parameter Setting (Insulation Resistance function)

Address: 0x10A2

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Reversed	Reversed	Reversed	Reversed	Reversed	Reversed	Enable PEE testing 0: disable 1: enable	Enable insulation Resistance 0: disabel 1: enable
Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Reversed	Reversed	Reversed	Reversed	Reversed	Reversed	Reversed	Reversed

Parameter Setting (PE testing)

Address: 0x10A4

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

2.3.4 Address table (Read production information)

Definition list for barcode :

ID	Number of digits	Value	Remarks

1	No.1	“S” or “Z” or ‘T’	“S” mean Sofar solar, Other OEM products using other letter to instead
2	No.2, 3	“A1” or “B1” or “C1” or “C2” or “C3” or “D1” or “E1” or “F1”	“A1”: 1-3KW single-phase one-way inverter, “B1”: 3-5KW single-phase two-way inverter, “C1”: 10-20KW three-phase inverter, “C2”: 10-20KW three-phase inverter +WIFI, “C3”: 10-20KW three-phase inverter +GPRS, “C4”: 10-20KW three-phase inverter external, “D1”: 30-40KW three-phase inverter, “D3”: 30-40KW three-phase inverter +GPRS, “D4”: 30-40KW three-phase inverter external, “E1”: 3KW, 5KW energy storage system inverter, “F1”: 4-12KW three-phase inverter, “F2”: 4-12KW three-phase inverter +WIFI, “F3”: 4-12KW three-phase inverter +GPRS, “F4”: 4-12KW three-phase inverter external, “G1”: 30-40KW three-phase inverter (YFL) , “G3”: 30-40KW three-phase inverter (YFL) +GPRS, “G4”: 30-40KW three-phase inverter (YFL) external, “H1”: 3-6KW G2 single-phase two-way inverter, “I1”: 50-70KW three-phase inverter (YFL) “J1”: 50-70KW three-phase inverter (WK) , “J2”: 50-70KW G2 three-phase inverter, “K1”: 7.5KW single-phase inverter, “L1”: 20-33KW G2 three-phase inverter, “M1”: 3-6KW single-phase hybrid inverter, “N1”: 10-15KW G2 three-phase inverter, “A3”: 1.1~3.3KW G3 single-phase one-way inverter,
3	No.4	C	C: internal
		E	E: Europe, Australia, India, South America…
		U	U: North America
1-6KW Barcode configuration table			
		Barcode	configuration
4	No.5, 6	S0	WiFi
		S1	WiFi + DC switch
		S2	DC switch
		S3	None
		S4	GPRS

		S5	DC switch + GPRS
		S6	DC switch + Ethernet
10-20K Barcode configuration table			
4	No.5, 6	S0	None
		S1	None
		S2	Standard equipment
		S3	None
		S4	Standard equipment + SPD (LEVEL2, DC)
		S5	Standard equipment + SPD (LEVEL2, DC) + SPD (LEVEL2, AC)
30-40K Barcode configuration table			
4	No.5, 6	S0	Standard
		S1	Standard + SPD (DC)
		S2	Standard + SPD (DC) + SPD (AC)
		S3	Standard + WiFi
		S4	Standard + SPD (DC) + WiFi
		S5	Standard + SPD (DC) + SPD (AC) + WiFi
50-70KW Barcode configuration table			
4	No.5, 6	S1	Standard
		S2	Standard + SPD (LEVEL2, AC)
4-12K Barcode configuration table			
4	No.5, 6	S0	Standard equipment
3KW, 5KW HYD Barcode configuration table			
4	No.5, 6	S2	Standard + GPRS
		S3	Standard + WIFI
3-6K			
4	No.5, 6	S0	Standard
		S1	Standard + DC switch
7.5K Single Phase Barcode configuration table			
4	No.5, 6	S0	Standard + DC switch
20-33K G2 Barcode configuration table			
4	No.5, 6	S0	Standard
3-6KW HYD Barcode configuration table			
4	No.5, 6	S0	Standard + DC switch
		S1	Standard + DC switch + WIFI
10-15K G2Barcode configuration table			
4	No.5, 6	S0	Standard
1.1~3.3K-G3Barcode configuration table			

4	No.5, 6	S0	Standard
		S1	Standard + DC switch
5	No.7, 8	Inverter related power	Please read the related power description below
6	No.9	Year (2000-2035)	2000 (0) , 2001 (1) , 2002 (2) , 2003 (3) , 2004 (4) , 2005 (5) , 2006 (6) , 2007 (7) , 2008 (8) , 2009 (9) , 2010 (A) , 2011 (B) , 2012 (C) , 2013 (D) , 2014 (E) , 2015 (F) , 2016 (G) , 2017 (H) , 2018 (J) , 2019 (K) , 2020 (L) , 2021 (M) , 2022 (N) , 2023 (P) , 2024 (Q) , 2025 (R) , 2026 (S) , 2027 (T) , 2028 (U) , 2029 (V) , 2030 (W) , 2031 (X) , 2032 (Y) , 2033 (Z)
7	No.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)
8	No.11	Day	1st (1) , 2nd (2) , 3rd (3) , 4th (4)
			5th (5) , 6th (6) , 7th (7) , 8th (8)
			9th (9) , 10th (A) , 11th (B) , 12th (C)
			13th (D) , 14th (E) , 15th (F) , 16th (G)
			17th (H) , 18th (J) , 19th (K) , 20th (L)
			21st (M) , 22nd (N) , 23rd (P) , 24th (Q)
			25th (R) , 26th (S) , 27th (T) , 28th (U)
			29th (V) , 30th (W) , 31st (X)
9	No.12, 13, 14	xxx	Number of unit produce that day

Related power description (NO. 7&8 digits of barcode)

1. 1-3KW Single phase single MPPT inverter (“A”)

11: 1100W Model: SOFAR 1100TL 16: 1600W Model: SOFAR 1600TL

22: 2200W Model: SOFAR 2200TL 27: 2700W Model: SOFAR2700TL

30: 3000W Model: SOFAR 3000TL

2. 3-6KW Single phase Dual MPPTS inverter (“B”)

30: 3000W Model: SOFAR3000TLM 36: 3680W Model: SOFAR3680TLM

40: 4000W Model: SOFAR4000TLM 46: 4600W Model: SOFAR4600TLM

50: 5000W Model: SOFAR5000TLM

3, 10-20KW Three Phase Inverter Dual MPPTS (“C”)

10: 10000W Model: SOFAR 10000TL 15: 15000W Model: SOFAR 15000TL
17: 17000W Model: SOFAR 17000TL 20: 20000W Model: SOFAR 20000TL
4, 30-40KW Three Phase Inverter Dual MPPTS (“D”)
30: 30000W Model: SOFAR 30000TL 33: 33000W Model: SOFAR 33000TL
36: 36000W Model: SOFAR 36000TL 40: 40000W Model: SOFAR 40000TL
5, 3-6KW Single Phase Battery charge& Discharge control inverter (“E”)
30: 3000W Model: ME3000 SP
50: 5000W Model: ME5000 SP
6, 4-12KW Three Phase Inverter Dual MPPTS (“F”)
04: 4000W Model: SOFAR 4KTL-X 05: 5000W Model: SOFAR 5KTL-X
06: 6000W Model: SOFAR 6KTL-X 08: 8000W Model: SOFAR 8KTL-X
10: 10000W Model: SOFAR 10KTL-X 12: 12000W Model: SOFAR 12KTL-X

7, 30-40KW Three Phase Inverter Dual MPPTS IGBT: infineon (“G”)

30: 30000W Model: SOFAR 30000TL 33: 33000W Model: SOFAR 33000TL
36: 36000W Model: SOFAR 36000TL 40: 40000W Model: SOFAR 40000TL
8, 3-6KW Single phase Dual MPPTS -G2 (“H”)
30: 3000W Model: SOFAR 3KTLM-G2 36: 3680W Model: SOFAR 3.6KTLM-G2
40: 4000W Model: SOFAR 4KTLM-G2 46: 4600W Model: SOFAR 4.6KTLM-G2
50: 5000W Model: SOFAR 5KTLM-G2 60: 6000W Model: SOFAR 6KTLM-G2
9, 50-70KW Three Phase Inverter Three MPPTS IGBT: infineon (“G”) (Reversed, no produce yet)
50: 50000W Model: SOFAR 50000TL 60: 60000W Model: SOFAR 60000TL
70: 70000W Model: SOFAR 70000TL
10, 50-70KW Three Phase Inverter Three MPPTS (“J”)
50: 50000W Model: SOFAR 50000TL 60: 60000W Model: SOFAR 60000TL
70: 70000W Model: SOFAR 70000TL
11, 7.5KW Single Phase Dual MPPTS (“K”)
75: 7500W Model: SOFAR 7.5KTLM-G2
12, 20-33KW Three Phase Dual MPPTS (“L”)
20: 20000W Model: SOFAR 20000TL-G2 25: 25000W Model: SOFAR 25000TL-G2
30: 30000W Model: SOFAR 30000TL-G2 33: 33000W Model: SOFAR 33000TL-G2

Related Information about inverter’s production (Independent space 16 bytes)						
Address	Definition	Variable Type)	Length (byte)	Range	Default Value	Remarks
0x2000	Product code name					
0x2001 To	Serial number					

0x2007						
0x2008 To 0x2009	ARM software version					ASCII character, high byte at first, example Ver 1.00 is“V100”
0x200A To 0x200B	Hardware version					ASCII character, high byte at first, example Ver 1.00 is“V100”
0x200C To 0x200D	DSPS software version					
0x200E To 0x200F	DSPM software version					

Address Table (Read calibration data measure by inverter)

Measurement Calibration for inverter						
Address	Definition	Variable Value	length	Range	Default Value	Remarks
0x3000	Ratio correction factor for Vbat			0.95-1.05		
0x3001	Deviation value for Vbat			+-15V		
0x3002	Ratio correction factor for Ibat			0.95-1.05		
0x3003				-1-1A		
0x3004	Ratio Correction factor for R phase voltage			0.95-1.05		
0x3005				+-15V		
0x3006	Ratio Correction factor for CT’S current			0.95-1.05		
0x3007				-1-1A		

0x3008	Ratio correction factor for PV1 power					
0x3009	Deviation value for PV1 voltage					
0x300A	Scale Factor for PV1 current					
0x300B	Deviation value for PV1 current					
0x300C	Calibration coefficient for CT current located in R-Phase					
0x300D						
0x300E						
0x300F						
0x3010	Calibration coefficient for CT current located in S-Phase					
0x3011						
0x3012						
0x3013						
0x3014	Calibration coefficient for CT current located in T-Phase					
0x3015						
0x3016	Ratio correction factor for Vbus			0.95-1.05		
0x3017	Deviation value for Vbus			+-15V		
0x3018	Ratio correction factor for EPS current			0.95-1.05		
0x3019				+-15V		

0x301A	Ratio correction factor for PV2 power			0.95-1.05		
0x301B	Deviation value for PV2 voltage			+-15V		
0x301C	Ratio correction factor for inverter voltage					
0x301D	Deviation value forinverter voltage					
0x301E	Scale Factor for PV2 current					
0x301F	Deviation value for PV2 current					
0x3020 To 0x302F	Reversed					
Parameter Setting for factory Mode						
0x3100	Register for factory Mode					low byte: Factory mode Byte7: 1 enable 0 disable Byte6: Clear calibration factor 1 Enable 0 Disable Bit5, 4, 3Reversed Bit2: 1 discharge, 0 Charge Bit1: PV2 Bit0: PV1

						High byte: percentage of PV output current , 128 mean 100%
0x3101	Storage power in factory Mode					Percentage of storage current , 128 mean 100%

2.4 Writing Parameter (Function Code0x13)

2.4.1 Write the Data Frame

Master Request message format

Slave Address	Function Code	Starting Address	Numbers of the register	Register-1 value	。 。 。	Register-N value	CRC16
1 byte	1 byte	2 bytes	2byte	2bytes	N-2	2bytes	2 bytes
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

Slave Address	Function Code	Starting Address	Numbers of the register	Register-1 value	。 。 。	Register-N value	CRC16
1 byte	1 byte	2 bytes	2byte	2bytes	N-2	2bytes	2 bytes
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	。 。 。	Hi Byte Lo Byte	Hi Byte Lo Byte

Request frame example (query running status) :
Request:

Slave Address	0x01
Function Code	0x13
Register Address Hi	0x10
Register Address Lo	0x00
Hi NO. Of register Hi	0x00
Lo No. Of register Lo	0x01
Register Value (Hi)	0x00

Register value (Lo)	0x01
CRC check code (Lo)	0x31
CRC checking code (Hi)	0x96

Response:

Slave Address	0x01
Function Code	0x13
Register Address Hi	0x10
Register Address Lo	0x00
Hi NO. Of register Hi	0x00
Lo No. Of register Lo	0x01
Register-1 Value (Hi)	0x00
Register-1 value (Lo)	0x01
CRC check code (Lo)	0x31
CRC checking code (Hi)	0x96

2.4.2 Address Table (Write the setting for inverter)

Start-up parameter setting						
Address	Defintion	Variable Type	Length	Range	Default Vale	Remarks
0x1000	Grid connection waiting time			0-1000		Unit second
0x1001	Grid power increasing Rate	Uint	16			Percentage of rated power / min
0x1002	Grid connection waiting time after grid fault recovery	Uint	16	0-1000		Unit second
0x1003	Grid power increasing after grid fault recovery	Uint	16			Percentage of rated power / min
0x1004	Over voltage protection value before grid connection	Uint	16			Unit 0.1V
0x1005	Under voltage	Uint	16			Unit 0.1V

	protection value before grid connection					
0x1006	Over frequency protection value before grid connection	Uint	16			Unit 0.01Hz
0x1007	Under frequency protection value before grid connection	Uint	16			Unit 0.01Hz
0x1008 To 0x100F	Reversed					
Parameter setting for grid voltage protection						
Address	Definition	Variable type	Length	Range	Default Value	Remarks
0x1010	Enabled register for grid voltage protection	Uint	16			
0x1011	Class 1 over voltage protection value	Uint	16	10-300		Unit 0.1V
0x1012	Trigger time for class 1 over voltage protection	Uint	16	0-65536		Unit 10ms
0x1013	Class 2 over voltage protection value	Uint	16	10-300		Unit 0.01A
0x1014	Trigger time for class 1 over voltage protection	Uint	16	0-65536		Unit 10ms
0x1015	Class 1 under voltage protection value	Uint	16	10-300		Unit 0.01A
0x1016	Trigger time for	Uint	16	0-65536		Unit 10ms

	class 1 under voltage protection					
0x1017	Class 2 under voltage protection value	Uint	16	10-300		Unit 0.01A
0x1019	Trigger time for class 2 under voltage protection	Uint	16	0-65536		Unit 10ms
0x1019	10-Min Over voltage protection value	Uint	16	10-300		Unit 0.01A
0x101A To 0x101F	Reversed					
Parameter setting for grid frequency protection						
Address	Definition	Variable Type	Length	Range	Default Value	Remarks
0x1020	Enabled register for grid frequency Protection	Uint	16			
0x1021	Class 1 over frequency protection value	Uint	16	50-55		Unit 0.01Hz
0x1022	Trigger Time For class 1over frequency protection	Uint	16	0-65536		Unit 10ms
0x1023	Class 2 over frequency protection value	Uint	16	50-55		Unit 0.01Hz
0x1024	Trigger Time For class 2 over frequency protection	Uint	16	0-65536		Unit 10ms
0x1025	Class 1 under frequency	Uint	16	45-55		Unit 0.01Hz

	protection value					
0x1026	Trigger Time For class1 under frequency protection	Uint	16	0-65536		Unit 10ms
0x1027	Class 2 under frequency protection value	Uint	16	45-55		Unit 0.01Hz
0x1028	Trigger Time For class 2 under frequency protection	Uint	16	0-65536		Unit 10ms
0x1029 To 0x102F	Reversed					

Parameter Setting (input current DCI protection)						
Address	Definition	Variable type	Length	Range	Default Value	Remarks
0x1030	Enable register for DCI protection					
0x1031	Class 1 DCI protection value	Uint	16	0-2000		Unit mA
0x1032	Trigger Time For class 1 DCI protection	Uint	16	0-65536		Unit 10ms
0x1033	Class 2 DCI protection value	Uint	16	0-2000		Unit 1mA
0x1034	Trigger Time for class 2 DCI protection	Uint	16	0-65536		Unit 10ms

Active power & Remote on/off control						
Address	Definition	Variable Type	Length	Range	Default Value	Remarks

0x1040	Enabled register for active& remote on/off control					Enable function Remote on/off control only
0x1041	Percentage of active power output			0-1000		0.1%
0x1042	Remote on/off					
0x1043 To 0x104F	Reversed					
Parameter Setting (Active power derate by varying frequency)						
Address	Definition	Variable type	Length	Range	Default Value	Remarks
0x1050	Enable & Working Mode register					
0x1051	Staring rate for varying frequency power derate			0-55		0.01Hz
0x1052	Varyubf Frequency power derate rate					
0x1053	After varying frequency power derate restore , maximum rate for power recovery					
0x1054	After varying frequency power derate restore , minimum rate for power recover					
0x1055	Waiting time After varying frequency					

	power derate restore					
0x1056	Varying frequency recovery rate					
Reactive Parameter Setting						
Address	Definition	Variable	Length	Range	Default Value	Remarks
0x1060	Enable & Working Mode register					
0x1061	Power Factor					Hi Byte indicates the symbol and Lo byte indicates the power factor
0x1062	Regular reactive power percentage					Hi byte indicate the percentage
0x1063	P-cos Φ Curve mode first point power factor					
0x1064	P-cos Φ Curve mode first point power percentage					
0x1065	P-cos Φ Curve mode second point power factor					
0x1066	P-cos Φ Curve mode second point power percentage					
0x1067	P-cos Φ Curve mode third point power factor					
0x1068	P-cos Φ Curve mode third					

	point power percentage					
0x1069	P-cos Φ Curve mode fourth point power factor					
0x106A	P-cos Φ Curve mode fourth point power percentage					
0x106B	P-cos Φ curve mode lockin voltage value					
0x106C	P-cos Φ curve mode lockout voltage value					
0x106D	Starting voltage of Q-U curve mode 1 (high voltage)					
0x106E	Ending voltage of Q-U curve mode 1 (high voltage)					
0x106F	Starting voltage of Q-U curve mode 1 (low voltage)					
0x1070	Ending voltage of Q-U curve mode 1 (low voltage)					
0x1071	Lockin power from Q-U curve mode1					
0x1072	Lockout power from Q-U curve mode1					
0x1073	Max reactive power of Q-U curve mode1					
0x1074	Response time for reactive					

	power from Q-U curve mode1					
LVRT Parameter setting						
Address	Definition	Variable Type	Length	Range	Default Value	Remarks
0x1080	LVRT ENABLE REGISTER					
0x1081	Enter the value of LVRT voltage					
0x1082	Voltage for first point (LVRT curve)					
0x1083	Time for first point (LVRT Curve)					
0x1084	Voltage for second point (LVRT curve)					
0x1085	Time for second point (LVRT Curve)					
0x1086	Voltage for third point (LVRT curve)					
0x1087	Time for third point (LVRT Curve)					
0x1088	Voltage for fourth point (LVRT curve)					
0x1089	Time for fourth point (LVRT Curve)					
0x108A	Reactive current coefficient k					
0x108B	Waiting time for voltage recovery					
0x108C	Power recovery					

	rate					
Other safety Parameter setting						
0x0190	Is-landing enable to register					
0x0191	GFCI enable register					
0x0192	Isolation Resistor enable register					
0x0193	Insulation resistance protection value					
Parameter Setting (Factory Mode)						
0x3100	Register for factory Mode					low byte: Factory mode Byte7: 1 enable 0 disable Byte6: Clear calibration factor 1 Enable 0 Disable Bit5, 4, 3Reversed Bit2: 1 discharge, 0 Charge Bit1: PV2 Bit0: PV1 High byte: percentage of PV output current , 128 mean 100%
0x3101	Storage power in factory Mode					Low byte : high byte: Percentage of storage current , 128 mean 100%

Battery Parameter Setting						
0x10B0	Battery Type					
0x10B1	Battery Capacity					
0x10B2	Power management Mode					
0x10B3	DOD			0-100		
0x10B4	Discharge Time Period			0-24		
0x10B5	Max charge voltage			58.0V		
0x10B6	Max Charge Current			65.0A		
0x10B7	Over voltage protection Value			58.0V		
0x10B8	Min discharge voltage			40.0V		
0x10B9	Max discharge current			65.0A		
0x10BA	Under voltage protection value			40.0V		
0x10BB	Empty battery Voltage					
0x10BC	Full battery voltage					
Other	Reversed					

2.4.3 Address Table (write setting for Built-in combiner)

Parameter Setting (Built-in combiner)						
Address	Definition	Variable Type	Length	Range	Default Value	Remarks
0x1100	Number of					

	current loops					
0x1101	Value of under voltage Protection	Uint	16			Hi byte byte1; Lo byte, byte0
0x1102	Value of Over Voltage protection	Uint	16			Hi byte byte3; Lo byte, byte2
0x1103	Value of reflux power	Uint	16			Hi byte byte5; Lo byte, byte4
0x1104	Value of over current protection	Uint	16		0x04B0	Unit 0.01A
0x1104						
0x1105						
0x1106						
0x1107						
0x1108 To 0x110F	Reversed					

2.5 Write related production information to inverter (Function Code 0x21)

2.5.1 Format of write-in data

Master request message Format:

Slave Address	Function Code	Starting Address	Numbers Of registers	Register-1 Value	。。。	Register (N) value	CRC checking code
1byte	1byte	2 bytes	2 bytes	2 bytes	N-2	2 bytes	2 bytes
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:

Slave Address	Function Code	Starting Address	Numbers Of registers	Register-1 Value	。。。	Register (N) value	CRC checking code
1byte	1byte	2 bytes	2 bytes	2 bytes	N-2	2 bytes	2 bytes
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	。。。	Hi Byte Lo Byte	Hi Byte Lo Byte

Request frame example (query running status) :

Request:

Slave Address	0x01
Function Code	0x21
Register Address Hi	0x20
Register Address Lo	0x00
Hi NO. Of register Hi	0x00
Lo No. Of register Lo	0x01
Register Value (Hi)	0x00
Register value (Lo)	0x00
CRC check code (Lo)	0XE6
CRC checking code (Hi)	0x65

Response:

Slave Address	0x01
Function Code	0x21
Register Address Hi	0x20
Register Address Lo	0x00
Hi NO. Of register Hi	0x00
Lo No. Of register Lo	0x01
Register Value (Hi)	0x00
Register value (Lo)	0x00
CRC check code (Lo)	0XE6
CRC checking code (Hi)	0x65

2.5.2 Write Related production information to inverter address Table

Related Information about built in combiner's production (Independent space 16 bytes)						
Address	Definition	Variable Type	Length	Range	Default Value	Remarks
0x2000	Production Code					(Read-only)
0x2001	Series Number					

To 0x2006						
0x2007 To 0x2008	Software version					(Read-only)
0x2009 To 0x200A	Hardware version					
0x200B To 0x200F	Reversed					

2.6 Measurement calibration wrote-in (Only for SOFAR use)

2.7 Maintenance related information (Only for SOFAR use)

2.8 Read (EEPROM) History power and Event list (function code 0x50)

Through function code to search the Data information of allowed registers. The command format show as follows:

2.8.1Read foramt

Master request message format:

Slave Address	Function code	Starting address	Register information	CRC checking code
1 Byte	1 Byte	2 Bytes	2 Bytes	2 Bytes
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Lo Byte Hi Byte

Slave response message format:

Slave Address	Function code	Number of Byte	Valid Data	CRC checking code

1 Byte	1 Byte	2 Bytes	N Bytes	2 Bytes
Byte	Byte	Byte	N Bytes	Lo Byte Hi Byte

2.8.2 Read History energy and Address list of events

Address	Definition	Variable type	Length (bytes)	Range	Default	Remarks
0x6000	Today's generation	Hex	2*24			Register Information Bar have no practical meaning. It is 0.
0x6001	Daily generation of this month	Hex	2*31			Register Information Bar have no practical meaning. It is 0.
0x6002	Daily generation of this month	Hex	4*12			Register Information Bar have no practical meaning. It is 0.
0x6003	Total generation those year	Hex	4			
0x6004	Power Generation of specific Year N	Hex	4 or 4*20			The value of Register is N, for example, N=2 means it is the energy of recent specific Year 2. If N=0xFFFF, read all energy of recent 20 years.
06005	Recent Nth event record	Hex	8			The value of register is N, for example, N=2 means it is the Recent Second Event Record. Total record recent 100 event lists
0x6006	Recent Nth Timing Record	Hex	12			The value of register is N, for example, N=2 means it is the Recent Second Timing Record. Total record recent 10 Timing records.
0x6007	Recent clear Power to Zero Records	HEX	6			The value of register is N, for example, N=2 means it is the Recent Second Timing Record. Totally records recent 10 Timing records.
0x6008	Recent clear Events to Zero Records	HEX	6			The value of register is N, for example, N=2 means it is the Second Clear events Record. Totally records recent 10 Clear events records.

The valid data format (event record response data frame)

ID number of event and the time when event was sent							
ID number of Event	Year YY	Month MM	Day DD	Weak	Hour HH	Minute MM	Second SS

The valid data format (timing record response data frame)

Time before auto adjustment						Time after auto adjustment					
Second ss	Minute mm	Hour Hh	Day DD	Month MM	Year YY	Second ss	Minute mm	Hour Hh	Day DD	Month MM	Year YY

The valid data format (Energy clearing record response data frame)

Energy clearing time					
Second ss	Minute mm	Hour hh	Day DD	Month MM	Year YY

The valid data format (Event list clearing record response data frame)

Events clearing time					
Second ss	Minute mm	Hour hh	Day DD	Month MM	Year YY

2.9 Write (EEPROM) history energy (function code 0x51)

2.9.1 Write Data Foramt

Master request message format:

Slave Address	Function code	Starting address	Register information	Number of bytes written	Data to be written	CRC checking code
					N bytes	2 bytes
Byte	Byte	Hi Byte Lo Byte	Byte	Byte	N Bytes	Hi Byte Lo Byte

Slave response message format:

Slave Addres	Function code	Starting address	Register information	Number of bytes written	Data to be written	CRC checking code

s						
					N bytes	2 bytes
Byte	Byte	Hi Byte Lo Byte	Byte	Byte	N Bytes	Hi Byte Lo Byte

2.9.2 Write history energy

Address	Definition	Variable type	Length (bytes)	Range	Defaults	Remarks
0x6000	Today's Generation	Hex	2*24			
0x6001	Daily generation of this month	Hex	2*31			
0x6002	Daily generation of this month	Hex	4*12			
0x6003	Total generation those year	Hex	4			
0x6004	Genearation of recent specific Year N	Hex	4 or 4*20			The value of register is N, for example, N=2 means it is the energy of recent specific Year 2. If N=0xFFFF, read all energy of recent 20 years.

2.10 Read History power stored by SD card (function code 0x60)

Through function code 0x60 to search data information of allowed registers, the command format show as follows:

2.10.1 Read Data Format

Master request message format:

Slave Address	Function code	Starting address	Information of register	CRC checking code
1 Byte	1 Byte	2 Bytes	3bytes	2 Bytes
Byte	Byte	Hi Byte Lo Byte	3 Byte	Lo Byte Hi Byte

Slave response message format:

Slave Address	Function code	Number of Bytes	Valid Data	CRC CRC checking code
1 Byte	1 Byte	1 Byte	N Bytes	2 Bytes
Byte	Byte	Byte	N Bytes	Lo Byte Hi Byte

2.10.2 Read history energy

Address	Definition	Variable type	Length (bytes)	Range	Defaults	Remarks
0x7000	One day's energy	Hex	2*24			
0x7001	Daily energy of this month	Hex	2*31			
0x7002	Monthly energy of this year	Hex	4*12			

The data format for the information bar (reading one day's total energy from SD card)

Year YY	Month MM	Day DD
BCD code	BCD code	BCD code

The data format for the information bar (reading one month's total energy from SD card):

Year YY	Month MM	Reserved
BCD code	BCD code	00

The data format for the information bar (reading one year's total energy from SD card):

Year YY	Reserved	Reserved
BCD code	00	00

2.11 Read time (function code 0x10)

Through function code 0x10 to read time, the command format is as follows:

2.11.1 Read Data Format

Master request message format:

Slave Address	Function code	Starting address	Number of Registers	CRC checking code
1 Byte	1 Byte	2 Bytes	2 Bytes	2 Bytes
Byte	Byte	Hi Byte Lo Byte	0x00 0x00	Lo Byte Hi Byte

Slave response message format:

Slave Address	Function code	Number of Byte	Valid parameters	CRC checking code
1 Byte	1 Byte	2 Bytes	N Bytes	2 Bytes
Byte	Byte	Byte	N Bytes	Lo Byte Hi Byte

2.11.2 The Address of reading time

Address	Definition	Variable type	Length (bytes)	Range	Defaults	Remarks
0x8000	System time	BCD	7			
0x8001	Power-on time on control board today	BCD	7			

The valid data format of the response frame is as follows:

Second ss	Minute mm	Hour hh	Weak D	Day DD	Month MM	Year YY

2.12 Return to factory setting (function code 0x30)

2.12.1 Read Data Format

Through function code 0x30 to return to factory setting
Master request message format:

Slave Address	Function code	Starting address	Number of Registers	CRC checking code
1 Byte	1 Byte	2 Bytes	2 Bytes	2 Bytes
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Lo Byte Hi Byte

Slave response message format:

Slave Address	Function code	Starting address	Number of Registers	CRC checking code
1 Byte	1 Byte	2 Bytes	2 Bytes	2 Bytes
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Lo Byte Hi Byte

2.13 Clear today's energy (function code 0x31)

2.13.1 Read Data Format

Through function code 0x31 to clear today's energy
Master request message format:

Slave Address	Function code	Starting address	Number of Registers	CRC checking code
1 Byte	1 Byte	2 Bytes	2 Bytes	2 Bytes
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Lo Byte Hi Byte

Slave response message format:

Slave Address	Function code	Starting address	Number of Registers	CRC checking code
1 Byte	1 Byte	2 Bytes	2 Bytes	2 Bytes
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Lo Byte Hi Byte

2.14 Return to default values of current Country code setting (function code 0x32)

2.14.1 Data Format

Through function code 0x32 to return to default values of current Country code setting
Master request message format:

Slave Address	Function code	Starting address	Number of Registers	CRC checking code
1 Byte	1 Byte	2 Bytes	2 Bytes	2 Bytes
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Lo Byte Hi Byte

Slave response message format:

Slave Address	Function code	Starting address	Number of Registers	CRC checking code
1 Byte	1 Byte	2 Bytes	2 Bytes	2 Bytes
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Lo Byte Hi Byte

2.15 Clear energy (function code 0x33)

2.15.1 Data Format

Through function code 0x33 to clear energy

Master request message format:

Slave Address	Function code	Starting address	Number of Registers	CRC checking code
1 Byte	1 Byte	2 Bytes	2 Bytes	2 Bytes
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Lo Byte Hi Byte

Slave response message format:

Slave Address	Function code	Starting address	Number of Registers	CRC checking code
1 Byte	1 Byte	2 Bytes	2 Bytes	2 Bytes
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Lo Byte Hi Byte

2.16 Clear Eventlist (function code 0x34)

2.16.1 Data Format

Through function code to clear eventlist
Master request message format:

Slave Address	Function code	Starting address	Number of Registers	CRC checking code
1 Byte	1 Byte	2 Bytes	2 Bytes	2 Bytes
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Lo Byte Hi Byte

Slave response message format:

Slave Address	Function code	Starting address	Number of Registers	CRC checking code
1 Byte	1 Byte	2 Bytes	2 Bytes	2 Bytes
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Lo Byte Hi Byte

2.16 Read control Byte of relay (function code 0x35)

2.16.1 Data Format

Through function code 0x35 to read control Byte of relay
Master request message format:

Slave Address	Function code	Starting address	Number of Registers	CRC checking code
1 Byte	1 Byte	2 Bytes	2 Bytes	2 Bytes
Byte	Byte	0x00 0x00	0x00 0x00	Lo Byte Hi Byte

Slave response message format:

Slave Address	Function code	Number of Bytes	Control Byte	CRC checking code
1 Byte	1 Byte	1 Byte	1 Byte	2 Bytes
Byte	Byte	Byte	Byte	Lo Byte Hi Byte

Note: The control Byte of relay is defined as follows

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

2.17 Set control Byte of this relay (function code 0x36)

2.17.1 Data Format

Through function code 0x36 to set control Byte of this relay
Post request message format:

Slave Address	Function code	Starting address	Reserved Byte	Control Byte	CRC checking code
1 Byte	1 Byte	2 Bytes	1 Byte	1 Byte	2 Bytes
Byte	Byte	0x00 0x00	0x00	Byte	Lo Byte Hi Byte

Note: The control Byte of relay define as follows

0x00	Production
0x01	Alarm
0x02	Alarm (configable)
0XAA	Relay disable (Disable the control function of this relay)

Slave response message format:

Slave Address	Function code	Starting address	Control Byte	CRC checking code
1 Byte	1 Byte	2 Bytes	2 Bytes	2 Bytes
Byte	Byte	0x00 0x00	Hi Byte Lo Byte	Lo Byte Hi Byte

2.18 Read the Alarm ID number when control Byte is Alarm (configable) (function code 0x37)

2.18.1 Data Format

Through function code 0x37 to read the Alarm ID number when control Byte is Alarm (configable)
Master request message format:

Slave Address	Function code	Starting address	Number of Registers	CRC checking code
1 Byte	1 Byte	2 Bytes	2 Bytes	2 Bytes
Byte	Byte	0x00 0x00	0x00 0x00	Lo Byte Hi Byte

Slave response message format:

Slave Address	Function code	Number of Byte	Control Byte	CRC checking code
1 Byte	1 Byte	1 Byte	N Bytes	2 Bytes
Byte	Byte	Byte	N Bytes	Lo Byte Hi Byte

2.19 Set the Alarm ID number when control Byte is Alarm (configable) (function code 0x38)

2.19.1 Data Format

Through function code 0x38 to set the Alarm ID number when control Byte is Alarm (configable)
Master request message format:

Slave Address	Function code	Starting address	Number of bytes written	ID number to be written	CRC checking code
1 Byte	1 Byte	2 Bytes	1 Byte	N Bytes	2 Bytes
Byte	Byte	Hi Byte Lo Byte	Byte	N Bytes	Hi Byte Lo Byte

Slave response message format:

Slave Address	Function code	Starting address	Number of bytes written	ID number to be written	CRC checking code
1 Byte	1 Byte	2 Bytes	1 Byte	N Bytes	2 Bytes
Byte	Byte	Hi Byte Lo Byte	Byte	N Bytes	Hi Byte Lo Byte

2.20 Read test Flags (function code 0x45)

2.20.1 Data Format

Through function code 0x45 to read test Flags
Master request message format:

Slave Address	Function code	Starting address	Number of Registers	CRC checking code
1 Byte	2 Bytes	2 Bytes	2 Bytes	2 Bytes
Byte	0x45	0x00 0x00	0x00 0x00	Lo Byte Hi Byte

Slave response message format:

Slave Address	Function code	Number of Byte	Control Byte	CRC checking code
1 Byte	1 Byte	1 Byte	1 Byte	2 Bytes

Byte	Byte	Byte	1 Bytes	Lo Byte Hi Byte

Flag Definition:

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Reserved	Reserved	Reserved	Reserved	Reserved	T2 Test Completion Flag	Aging Test Completion Flag	T1 Test Completion Flag

2.21 Set test flags (function code 0x46)

2.21.1 Data Format

Through function code 0x46 to set test flags

Master request message format:

Slave Address	Function code	Starting address	Parameters to be written	CRC checking code
1 Byte	1 Byte	2 Bytes	2 Bytes	2 Bytes
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Hi Byte Lo Byte

Slave response message format:

Slave Address	Function code	Starting address	Parameters to be written	CRC checking code
1 Byte	1 Byte	2 Bytes	2 Bytes	2 Bytes
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Hi Byte Lo Byte

2.22 Set the EPS enable bit (Function Code 0x41)

2.22.1 Data Format

Through the function Code 0x41, set the EPS Enable bit

Master request message format:

:

Slave Address	Function Code	Starting Address	Numbers of the registers	Parameters to be written	CRC Checking Code
1 byte	1 byte	2bytes	2 bytes	2 bytes	2 bytes
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Hi Byte Lo Byte

Slave response message format:

Slave Address	Function Code	Starting Address	Numbers of the registers	Parameters to be written	CRC Checking Code
1 byte	1 byte	2bytes	2 bytes	2 bytes	2 bytes
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 the passive Mode (function code 0x42 & 0x49)

Before we using the passive control , make sure the working mode as “Passive Mode”, and double check the communication address conflict with other machine

Confirm by Heartbeat signal, making sure the communication work normal, inverter will enter standby mode if the alave machine lose the heartbeat signal for 1 minutes.It is recommended to send a heartbeat signal every 1~10 seconds.

The Status word indicates whether the current commands accepted and the reject reasons. Notes that , when master broadcast address (0x88) as passive mode command or heartbeats, the slave recieve the message normally, but it will not make any response. When Slave from Syandby state to working state, power climb rate will limit due to the safety regulations, and it will recount down when working state change to standby. Therefore, when you need to respond quickly from the machine, you need to be careful to go to the "standby" state.

2.23.1 Data Format

Function code 0x42, Setting to Passive mode (charge or discharge)
Master request message format (Request) :

Slave Address	Function Code	Starting Address	Number of Registers	CRC16
1 Byte	1Byte	2bytes	2 bytes	2 bytes
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Hi Byte Lo Byte

Slave response message format (response) :

Slave Address	function code	Byte count	Register1-N Value	CRC16
1 1byte	1 byte	1 byte	2bytes	2 bytes
Byte	Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte

Battery Charging & discharging Parameter Register (Function Code 0x42)

Address	Define	Variable Types	Length	Range	Default value	Remarks
0x0100	Stand by	Uint	16	0x5555		In stand by mode
0x0101	Discharge	Uint	16	0~3000		To discharge mode, discharge power was

						the value follow the register unit 1W
0x0102	Charge	Uint	16	0~3000		To charge mode, discharge power was the value follow the register unit 1W
0x0103	Auto	Uint	16	0x5555		Auto Mode

Passive Mode Heartbeats Register (Function Code 0x49)

Address	Define	Variable Types	Length	Range	Default value	Remarks
0x2201	Heartbeat	Uint	16	0x2202		1beat/second quickest and 1beat /min at least

Heartbeat Package (Address is 01) :

01 49 22 01 22 02 1E DD

Status&Error Code

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 working Mode

2.24.1 Data Format

Master request message format:

Slave Address	Function Code	Starting Address	Bumber of the register to be write in	Number of the write in bytes	Value to be write in	CRC checking code
1byte	1byte	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:

Slave Address	Function Code	Starting Address	Number of the registers	CRC Checking Code
1 byte	1byte	2 bytes	2 bytes	2 bytes
Byte	0x10	Hi Byte Lo Byte	Hi Byte Lo Byte	Hi Byte Lo Byte

Master request message format:

Slave Address	Function Code	Starting address	Nunber of the registers to be write in	CRC Checking 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:

Slave Address	Functio n Code	Number of the Data Bytes	Response Register Data	CRC Checking Code
1 byte	1 byte	1 byte	…	2 2 bytes
Byte	0x03	Byte	Register 1 Low bit, register 1 low bit	Hi Byte Lo Byte

Slave response message (Incorrect Data) format:

Slave Address	Function Code	Fault ID	CRC CRC Checking Code
1 byte	1 byte	1 byte	2 bytes
Byte	0x90	Byte	Hi Byte Lo Byte

2.24.2 Register Address

Address	Definotion	Variabl	Leng	Range	R/W	Remarks

		e Type	th			
0x1200	Working Mode	Uint	16	0-3	R/W	0— Auto Mode 1— Time of Use Mode 2— Timing Mode 3— Passive Mode Use: Save and verify the parameters of the corresponding mode and change the working mode
0x1201	Timing Mode/Charging Start time	Uint	16		R/W	Hi Byte—hour, range 0-23 Lo Byte—minute, range 0-59
0x1202	Timing Mode/Charging End time	Uint	16		R/W	Hi Byte—hour, range0-23 Lo Byte—minute, range0-59
0x1203	Timing Mode/discharging Start time	Uint	16		R/W	Hi Byte—hour, range0-23 Lo Byte—minute, range0-59
0x1204	Timing Mode/discharging End time	Uint	16		R/W	Hi Byte—hour, range0-23 Lo Byte—minute, range0-59
0x1205	Timing Mode/charging power	Uint	16	0-3000	R/W	Unit: Watt
0x1206	Timing Mode/ Discharge power	Uint	16	0-3000	R/W	Unit: Watt
0x1207	Time of use Mode/Rules number	Uint	16	0-3	R/W	The smaller the serial number, the higher the priority. Be sure to set the rule number before setting other parameters.
0x1208	Time of use Mode/Forced Charging Start time	Uint	16		R/W	Hi Byte—hour, Range0-23 Lo Byte—minute, Range0-59
0x1209	Time of use Mode/Forced Charging End time	Uint	16		R/W	Hi Byte—hour, 0-23 Lo Byte—minute, 0-59
0x120A	SOC Time of use mode/Force Charging SOC deadline	Uint	16	30-100	R/W	Percentage of remaining battery, when the current SOC of the battery reaches the value of the change register, the forced charging ends, and the machine is charged according to the power of the grid.

0x120B	Time of use mode/Force Charging Power	Uint	16	0-3000	R/W	If set to 0, it will charge battery based on the grid power. Unit Watt
0x120C	Time of use Mode/Rule Starting date	Uint	16		R/W	Hi Byte—month, Range1-12 Lo Byte—date , Range1-31
0x120D	Time of use Mode/Rule Ending date	Uint	16		R/W	Hi Byte—month, Range1-12 Lo Byte—Date, Range1-31
0x120E	Time of use Mode/Rules function Weekdays	Uint16	16		R/W	This register show by different bits, if value 0 for this bit, mean disable, 1 for enable. b0—Monday b1—Tuesday b2—Wednesday b3—Thursday b4—Friday b5—Saturday b6—Sunday
0x120F	Time of use Mode/Rules enable	Uint16	16	0/1	R/W	If the value of this Register show 1, it is mean enable this rule, if show 0 , disable this rule
0x1211	Passive Mode/Heartbeat Signal	Uint16	16	0x5555	W	Forward 0x5555 to this register to keep passive mode, more than 60s, no command forward to this register, inverter will enter standby mode, through the address (0x88) can broadcast heartbeats to all inverters.
0x1212	Passive Mode/Standby	Uint16	16	0x5555	W	Write in 0x5555, change it to standby mode.
0x1213	Passive Mode/Discharging	Uint16	16	0-3000	W	Unit : Watt
0x1214	Passive Mode/Charging	Uint16	16	0-3000	W	Unit : Watt
0x1215	Passive mode/auto	Uint16	16	-10000~10000	W	Stable grid power, make the grid power close to the value of the register, positive value mean”from system to grid, negative value means take power from grid to system.

Example

Request	Send command	Remarks
Set the parameter for timing Mode	0x 01 10 12 01 00 06 0C 00 00 0B 37 0C 00 17 38 09 C4 09 C4 83 23	Timing Mode, Charging time period 00: 00-11: 55, Power 2500W, Discharging Time period 12: 00-23: 56, power2500W.
Change the working Mode to Timing Mode	0x 01 10 12 00 00 01 02 00 02 15 90	Parameter checking and change the working mode to Timing Mode.