



MODBUS

Communication Protocol V3.9



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1. MODBUS communication instructions

MODBUS is an application-layer messaging protocol, positioned at level 7 of the OSI model. It provides client/server communication between devices connected on different types of buses or networks.

MODBUS is a request/reply protocol and offers services specified by function codes. MODBUS function codes are elements of MODBUS request/reply PDUs. This protocol specification document describes the function codes used within the framework of MODBUS transactions.

As a master/slave protocol, there can only be one master station and one or more (up to 247) slaves on the bus at the same time. Modbus communication is always initiated by the master station. When the slave station does not receive a request from the master station, it does not send data. From the point where stations can not communicate with each other, the main station can only initiate a Modbus transaction.

2. Features

The communication protocol of Alpha solar charge controller has the following characteristics:

1. The communication protocol uses the Modbus-RTU standard association.
2. The default ID of the solar charge controller is 1, the ID can be modified by PC serial port software.
3. All communications are RTU mode, communication parameters are as follow:
 - a) 9600 baud
 - b) 8 data bits
 - c) 1 stop bit
 - d) No parity
 - e) No flow control
4. The register address is in hexadecimal format and the base address offset is 0x00.
5. All 32-bit data is represented by two 16-bit-length registers, namely L and H registers.
for example: The actual value of the input power of the charging is 3000, the data multiple is 100 times, the values of the variable L register (address 0x3002) are 0x93E0 and H register (address 0x3003) are 0x0004.

3. Modbus function codes

Function code	Designation
0x02	Read the switch input status
0x03	Read Holding Registers
0x04	Read Input Register
0x05	Write Single Coil
0x06	Write a single hold register
0x10	Write multiple hold registers

4.Real-time parameters

The real-time data and the real-time state of each parameter in the normal operation of the whole system, as well as the historical statistics of the power generation and the power consumption.

serial num.	variable name	Address	Function Code	description	units	multiplier
1	Equipment internal over temperature	2000	02(R)	1 The temperature in the machine exceeds the temperature protection value 0 The temperature in the machine is normal		
2	Day or night	200C	02(R)	1-night, 0-day		

serial num.	variable name	Address	Function Code	description	units	multiplier
1	Controller functional status 1	3011 (0d12305)	04(R)	D15~D12: (Maximum system voltage level for non - lithium electrical controller) 01H 12V 02H 24V 03H 36V 04H 48V D11~D8: (Minimum system voltage level of non - lithium - electric controller) 01H 12V 02H 24V 03H 36V 04H 48V D7~D4: (Controller series) 00H MT series 01H DC series 02H SMR series D3~D0: battery type 00H Lithium battery 01H Not Lithium battery		

2	Controller functional status 2	3012 (0d12306)	04(R)	Bit value meaning: 1H can set, 0H Do not set D15: Infrared function D14: Automatic power reduction-365 mode D13: 0°C Prohibit charging D12: grade of rated voltage D11: Overcharge recovery V of lithium battery D10: Overcharge protection V of lithium battery D9: floating charge voltage D8: equilibrium charge V D7: Strong charging V D6: Low V recovery voltage D5: Low voltage protection D4: Battery Type D3: Backlight Time D2: Device Time D1: Device ID D0: Device password		
3	Controller functional status 3	3013 (0d12307)	04(R)	Bit value meaning: 1H Exist This Mode 0H Don't Exist this mode D7: Six Time Frame Mode D6: Five Time Frame Mode D5: Timing Control D4: TOT Mode D3: Fixed Light Up Duration Mode; D2: D2D Mode D1: 24H Mode D0: Manual Operation Mode		
4	Controller functional status 4	3014 (0d12308)	04(R)	Reserved		
5	LVD Min Setting Value	3015 (0d12309)	04(R)	LVD: Low voltage detect. Eg: MPPT2075-DCLi controller is 9V, mean 900.	V	100
6	LVD Max Setting Value	3016 (0d12310)	04(R)	Eg: MPPT2075-DCLi controller is 30V, mean 3000.	V	100
7	LVD default setting value	3017 (0d12311)	04(R)	Eg: MPPT2075-DCLi controller is 9V, mean 900.	V	100

8	LVR Min setting value	3018 (0d12312)	04(R)	LVR: Low voltage recovery. Eg: MPPT2075-DCLi controller is 9.6V, mean 960。	V	100
9	LVR Max Setting Value	3019 (0d12313)	04(R)	Eg: MPPT2075-DCLi controller is 31V, mean 3100。	V	100
10	LVR default setting value	301A (0d12314)	04(R)	Eg: MPPT2075-DCLi controller is 9.8V, mean 980。	V	100
11	CVT Min Setting Value for Li Series controller	301B (0d12315)	04(R)	CVT: Charge Target Voltage. Eg: MPPT2075-DCLi controller is 10V, mean 1000。	V	100
12	CVT Max Setting Value Li Series controller	301C (0d12316)	04(R)	Eg: MPPT2075-DCLi controller is 32V, mean 3200。	V	100
13	CVT default setting value Li Series controller	301D (0d12317)	04(R)	Eg: MPPT2075-DCLi controller is 12.6V, mean 1260。	V	100
14	CVR Min Setting Value Li Series controller	301E (0d12318)	04(R)	CVR: Charge recovery voltage. Eg: MPPT2075-DCLi controller is 9.2V, mean 920。	V	100
15	CVR Max Setting Value Li Series controller	301F (0d12319)	04(R)	Eg: MPPT2075-DCLi controller is 31.8V, mean 3180。	V	100
16	CVR default setting value Li Series controller	3020 (0d12320)	04(R)	Eg: MPPT2075-DCLi controller is 12.4V, mean 1240。	V	100
17	Day/Night Threshold voltage Min Setting Value	3021 (0d12321)	04(R)	Eg: MPPT2075-DCLi controller is 3.0V, mean 300。	V	100
18	Day/Night Threshold voltage Max Setting Value	3022 (0d12322)	04(R)	Eg: MPPT2075-DCLi controller is 20.0V, mean 2000。	V	100
19	Day/Night Threshold voltage default Setting Value	3023 (0d12323)	04(R)	Eg: MPPT2075-DCLi controller is 5.0V, mean 500。	V	100

20	Dimming Voltage Min Setting Value	3024 (0d12324)	04(R)	Eg: MPPT2075-DCLi controller is 10V, mean 1000。	V	100
21	Dimming Voltage Max Setting Value	3025 (0d12325)	04(R)	Eg: MPPT2075-DCLi controller is 32V, mean 3200。	V	100
22	Dimming Voltage default Setting Value	3026 (0d12326)	04(R)	Eg: MPPT2075-DCLi controller is 12.2V, mean 1220。	V	100
23	Load current Min Setting Value	3027 (0d12327)	04(R)	Eg: MPPT2075-DCLi controller is 0.15A, mean 15。	A	100
24	Load current Max Setting Value	3028 (0d12328)	04(R)	Eg: MPPT2075-DCLi controller is 6A, mean 600。	A	100
25	CVT and CVR max allow dropout voltage for Li-series controller	3029 (0d12329)	04(R)	Eg: MPPT2075-DCLi controller is 1.5V, mean 150。	V	100
26	CVT and CVR Min allow dropout voltage for Li-series controller	302A (0d12330)	04(R)	Eg: MPPT2075-DCLi controller is 0.2V, mean 20。	V	100
27	LVD and LVR Min allow dropout voltage	302B (0d12331)	04(R)	Eg: MPPT2075-DCLi controller is 0.6V, mean 60。	V	100
28	CVR and LVD & CVT and LVR Min allow dropout voltage	302C (0d12332)	04(R)	Eg: MPPT2075-DCLi controller is 0.2V, mean 20。	V	100
29	Slaver ID	3030 (0d12336)	04(R)			
30	The number of running days	3031 (0d12337)	04(R)	Every day 00: 00 add and 18hours add only once。		

31	Current battery voltage level	3032 (0d12338)	04(R)	Current battery voltage level connected to the system. 1200, 2400, 3600, 4800 respectively express 12V, 24V, 36V, 48V	V	100
32	Battery status	3033 (0d12339)	04(R)	D7~D4: 00H--Normal, 01H high temperature protection D3~D0: 00H Normal , 01H over voltage protection 02H Battery voltage is low 03H Low voltage protection		
33	Charge Status	3034 (0d12340)	04(R)	D5: 0H Day,1H Night D4: 0H Normal, 1H Charge over-temperature D3~2 Charging status: 00H Not charging, 01H Float charge 02H Boost charge 03H Equal charge D1: 0H Normal, 1H fault; D0: 1H Charging, 0H Not charging。		
34	Discharge Status	3035 (0d12341)	04(R)	D13~D12 Output Power: 00- Light Load 01- Moderate load 02- Rated load 03- Overload D11: 0H-Normal, 1H-Short circuit D4: 0H-Normal, 1H-Hardware Protection D3: 0H-Normal, 1H Open circuit protection; D2: 0H-Normal, 1H-discharge over temperature D1: 0H Normal, 1H fault; D0: 1H-Discharging 0H-Not discharge		
35	Environment Temperature	3036 (0d12342)	04(R)	Environment Temperature	°C	100
36	Device built-in temperature	3037 (0d12343)	04(R)	Internal temperature of the controller	°C	100

37	Over-discharge times	3038 (0d12344)	04(R)			
38	Fully-charged times	3039 (0d12345)	04(R)			
39	Over-voltage protection times	303A (0d12346)	04(R)			
40	Over-current protection times	303B (0d12347)	04(R)			
41	short-circuit protection times	303C (0d12348)	04(R)			
42	Open-circuit protection times	303D (0d12349)	04(R)			
43	Hardware protection times	303E (0d12350)	04(R)			
44	Charge over-temperature protection times	303F (0d12351)	04(R)			
45	Discharge over-temperature protection time	3040 (0d12352)	04(R)			
46	Battery remaining capacity	3045 (0d12357)	04(R)	Percentage of remaining battery capacity	%	1
47	Battery voltage	3046 (0d12358)	04(R)	Current battery voltage	V	100
48	Battery current	3047 (0d12359)	04(R)	Current battery current, Charging is positive, discharging is negative.	A	100
49	Battery power-L	3048 (0d12360)	04(R)	Battery power	W	100
50	Battery power-H	3049 (0d12361)	04(R)		W	100
51	Load Voltage	304A (0d12362)	04(R)	Load Voltage	V	100

52	Load current	304B (0d12363)	04(R)	Load current	A	100
53	Load power-L	304C (0d12364)	04(R)	Load power	W	100
54	Load power-H	304D (0d12365)	04(R)		W	100
55	Solar voltage	304E (0d12366)	04(R)	The voltage of the solar panel.	V	100
56	Solar current	304F (0d12367)	04(R)	The current of the solar Panel.	A	100
57	Electricity generation power-L	3050 (0d12368)	04(R)	PV cell array current generated power	W	100
58	Electricity generation power-H	3051 (0d12369)	04(R)		W	100
59	The charging capacity of the day	3052 (0d12370)	04(R)	Everyday 00: 00 reset。	KWH	100
60	Total charging capacity-L	3053 (0d12371)	04(R)	Cleared after overflow	KWH	100
61	Total charging capacity-H	3054 (0d12372)	04(R)		KWH	100
62	The electricity consumption of the day	3055 (0d12373)	04(R)	everyday 00: 00 reset。	KWH	100
63	Total electricity consumption-L	3056 (0d12374)	04(R)	Cleared after overflow	KWH	100
64	Total electricity consumption-H	3057 (0d12375)	04(R)		KWH	100
65	Total light time during the day	3058 (0d12376)	04(R)	Every 00:00 reset。	Min	
66	Total charging capacity-L during the month	305D (0d12381)	04(R)	There is no such item for the time being.	KWH	100
67	Total charging	305E	04(R)		KWH	100

	capacity-H during the month	(0d12382)				
68	Total charging capacity-L during the year	305F (0d12383)	04(R)	There is no such item for the time being.	KWH	100
69	Total charging capacity-H during the year	3060 (0d12384)	04(R)		KWH	100
70	Charging capacity a day ago	3061 (0d12385)	04(R)	Every day 00: 00 reset.	KWH	100
71	Charging capacity two days ago	3062 (0d12386)	04(R)	Every day 00: 00 reset.	KWH	100
72	Charging capacity three days ago	3063 (0d12387)	04(R)	Every day 00: 00 reset.	KWH	100
73	Charging capacity four days ago	3064 (0d12388)	04(R)	Every day 00: 00 reset.	KWH	100
					
74	Charging capacity sixty days ago	309C (0d12444)	04(R)	Every day 00: 00 reset.	KWH	100
75	The number of running days	309D (0d12445)	04(R)	Every day 00: 00 add. Same as address 3031.		
76	Battery voltage	30A0 (0d12448)	04(R)	Current battery voltage	V	100
77	Battery current	30A1 (0d12449)	04(R)	Current battery current. Charging is positive, discharging is negative	A	100
78	Environment temperature	30A2 (0d12450)	04(R)	Environment temperature	°C	100
79	Battery status	30A3 (0d12451)	04(R)	Same as address 3033.		
80	Charge Status	30A4 (0d12452)	04(R)	Same as address 3034.		
81	Discharge Status	30A5 (0d12453)	04(R)	Same as address 3035.		
82	over discharge	30A6 (0d12454)	04(R)	Battery low voltage protection times.		

	times					
83	Fully charged times	30A7 (0d12455)	04(R)	The times of battery fully charged.		
84	The highest battery voltage on that day	30A8 (0d12456)	04(R)	Every day 00: 00 reset.	V	100
85	The lowest battery voltage on that day	30A9 (0d12457)	04(R)	Every day 00: 00 reset.	V	100
86	The highest battery voltage a day ago	30AA (0d12458)	04(R)	Every day 00: 00 reset.	V	100
87	The highest battery voltage two days ago	30AB (0d12459)	04(R)	Every day 00: 00 reset.	V	100
					
88	The highest battery voltage sixty days ago	30E5 (0d12517)	04(R)	Every day 00: 00 reset.	V	100
89	The lowest battery voltage a day ago	30E6 (0d12518)	04(R)	Every day 00: 00 reset.	V	100
90	The lowest battery voltage two days ago	30E7 (0d12519)	04(R)	Every day 00: 00 reset.	V	100
					
91	The lowest battery voltage sixty days ago	3121 (0d12577)	04(R)	Every day 00: 00 reset.	V	100
92	Load Voltage	3125 (0d12581)	04(R)	The voltage of the load terminal.	V	100
93	Load current	3126 (0d12582)	04(R)	The current of the load terminal.	A	100
94	Load power-L	3127 (0d12583)	04(R)	Load power	W	100
95	Load power-H	3128	04(R)		W	100

		(0d12584)				
96	The electricity consumption of the day	3129 (0d12585)	04(R)	Every day 00: 00 reset. Same as address 3055.	KWH	100
97	Total electricity consumption-L	312E (0d12590)	04(R)	Cleared after accumulative overflow.	KWH	100
98	Total electricity consumption-H	312F (0d12591)	04(R)		KWH	100
99	Electricity consumption a day ago	3130 (0d12592)	04(R)	Every day 00: 00 reset.	KWH	100
100	Electricity consumption two days ago	3131 (0d12593)	04(R)		KWH	100
101	Electricity consumption three days ago	3132 (0d12594)	04(R)		KWH	100
102	Electricity consumption four days ago	3133 (0d12595)	04(R)		KWH	100
					
103	Electricity consumption sixty days ago	316B (0d12651)	04(R)	Every day 00: 00 reset.	KWH	100
104	The number of running days	316C (0d12652)	04(R)	Every day 00: 00 add. Same as address 3031 & 309D.		

4.1 For example

4.1.1 example-1

Read ID is 1, the data of address is 0X3011 (0d12305), read quantity is 28:

Send instructions: 01 04 30 11 00 1C AE C6

Analysis: 01 Equipment ID
 04 Function code
 30 11 To read the address starting bi

04 function code
 30 30 To read the address starting bit
 00 28 The number of addresses to read (start at 0x3030)
 FF 1B CRC Check

RCV: 01 04 50 00 01 00 00 09 60 00 00 00 20 00 01 09 C4
 0B 54 00 00 00 00 00 00 00 00 00 00 00 00 00 00
 00 00 00 00 00 00 00 00 00 00 00 00 00 1F 09 24 00 00
 00 00 00 00 09 24 00 00 00 00 00 00 02 44 00 00 00
 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 70 04

Analysis:

01 Equipment ID
 04 function code
 50 80 bytes
 00 01 Read data to address 0x3030 (0d12336) (slave ID)
 00 00
 09 60
 00 00
 00 20
 00 01
 09 C4
 0B 54

 00 00
 70 04 CRC Check

5. Rated parameters

Rated parameters of controller when leaving factory.

serial num.	variable name	Address	Function code	Describe	units	multiple
1	PV rated voltage	3000 (0d12288)	04(R)	PV rated voltage	V	100
2	PV rated current	3001 (0d12289)	04(R)	PV rated current	A	100
3	PV rated power-L	3002 (0d12290)	04(R)	PV rated power	W	100
4	PV rated power-H	3003 (0d12291)	04(R)		W	100
5	Battery rated voltage	3004 (0d12292)	04(R)	Battery rated voltage	V	100
6	Battery rated current	3005 (0d12293)	04(R)	Battery rated current	A	100

7	Battery rated power-L	3006 (0d12294)	04(R)	Battery rated power	W	100
8	Battery rated power-H	3007 (0d12295)	04(R)		W	100
9	Load rated voltage	3008 (0d12296)	04(R)	Load rated voltage	V	100
10	Load rated current	3009 (0d12297)	04(R)	Load rated current	A	100
11	Load rated power-L	300A (0d12298)	04(R)	Load rated power	W	100
12	Load rated power-H	300B (0d12299)	04(R)		W	100

5.1 For example

Read ID is 1, the data of address is 0X3000(0d12288), read quantity is 1.

Send instructions: 01 04 30 00 00 01 3E CA

Analysis: 01 Device ID
 04 Function code
 30 00 To read the address starting bit
 00 01 Number of addresses to read (start at 0x3000)
 3E CA CRC check

RCV: 01 04 02 17 70 B7 24

Analysis: 01 Device ID
 04 Function code
 02 Two bytes
 17 70 Read the data to address 0x3000 (0x1770 decimal 6000 with a multiple of 100 and an actual value of 60)
 B7 24 CRC check

6.Read only register

To facilitate Bluetooth and NB-IOT operation, the following read-only retention registers can be added to reduce the number of communication.

Serial num.	variable name	Address	Function code	Describe	units	multiple
1	Controller function status 1	8FF0 (0d36848)	03(R)	D15~D12: (Maximum voltage level of non lithium battery controller) 01H 12V, 02H 24V, 03H 36V 04H 48V. D11~D8: (Minimum voltage level of non lithium battery controller) 01H 12V, 02H 24V, 03H 36V 04H 48V. D7~D4: (Controller series) 00H MT series, 01H DC series, 02H SMR series. D3~D0: (battery type) 00H Li-Series 01H Non Lithium series		
2	Controller function status 2	8FF1 (0d36849)	03(R)	Bit value implication: 1H- This parameter can be set up. 0H-This parameter can not be set up. D15: Infrared Function. D14: Auto dimming-365 mode. D13: 0°C Charging. D12: grade of rated voltage. D11: Charge recovery voltage of lithium. D10: Charge target voltage of lithium D9: Float voltage D8: Equal voltage D7: Boost voltage		

				D6: Low voltage recovery voltage D5: Low voltage protection D4: type of battery D3: Backlight Time D2: Device Time D1: Device ID D0: Device Password		
3	Controller function status 3	8FF2 (0d36850)	03(R)	Bit value implication: 1H-Exist this mode 0H-Don't Exist this mode D7: Six period mode D6: Five period mode D5: Time Control D4: T0T Mode D3: Fixed lighting time mode D2: D2D Mode; D1: 24H Mode; D0: Manual Operation Mode。		
4	Controller function status 4	8FF3 (0d36851)	03(R)	Reserved		
5	LVD Min setting value	8FF4 (0d36852)	03(R)	Suitable for lithium series controller.	V	100
6	LVD Max Setting Value	8FF5 (0d36853)	03(R)	Suitable for lithium series controller.	V	100
7	LVD Default Setting Value	8FF6 (0d36854)	03(R)	Suitable for lithium series controller.	V	100
8	LVR Min setting value	8FF7 (0d36855)	03(R)	Suitable for lithium series controller.	V	100
9	LVR Max Setting Value	8FF8 (0d36856)	03(R)	Suitable for lithium series controller.	V	100
10	LVR Default Setting Value	8FF9 (0d36857)	03(R)	Suitable for lithium series controller.	V	100
11	CVT Min Setting Value	8FFA (0d36858)	03(R)	Suitable for lithium series controller.	V	100
12	CVT Max Setting Value	8FFB (0d36859)	03(R)	Suitable for lithium series controller.	V	100
13	CVT default setting value	8FFC (0d36860)	03(R)	Suitable for lithium series controller.	V	100

14	CVR Min Setting Value	8FFD (0d36861)	03(R)	Suitable for lithium series controller.	V	100
15	CVR Max Setting Value	8FFE (0d36862)	03(R)	Suitable for lithium series controller.	V	100
16	CVR default setting value	8FFF (0d36863)	03(R)	Suitable for lithium series controller.	V	100
17	Day/Night Threshold voltage Min Setting Value	9000 (0d36864)	03(R)	Suitable for lithium series controller.	V	100
18	Day/Night Threshold voltage Max Setting Value	9001 (0d36865)	03(R)	Suitable for lithium series controller.	V	100
19	Day/Night Threshold voltage default Setting Value	9002 (0d36866)	03(R)	Suitable for lithium series controller.	V	100
20	Dimming Voltage Min Setting Value	9003 (0d36867)	03(R)		V	100
21	Dimming Voltage Max Setting Value	9004 (0d36868)	03(R)		V	100
22	Dimming Voltage default Setting Value	9005 (0d36869)	03(R)		V	100
23	Load current Min Setting Value	9006 (0d36870)	03(R)		A	100
24	Load current Max Setting Value	9007 (0d36871)	03(R)		A	100
25	Current battery voltage level	9008 (0d36872)	03(R)	Current System Battery Voltage Level. 1200, 2400, 3600, 4800 respectively 12V, 24V,36V,48V	V	100
26	CVT and CVR max allow dropout voltage for Li-series controller	9009 (0d36873)	03(R)		V	100

27	CVT and CVR Min allow dropout voltage for Li-series controller	900A (0d36874)	03(R)		V	100
28	LVD and LVR Min allow dropout voltage	900B (0d36875)	03(R)		V	100
29	CVR and LVD & CVT and LVR Min allow dropout voltage	900C (0d36876)	03(R)		V	100

6.1 For example

Read ID is 1, the data of address is 0X8FF0(0d36848), read quantity is 29.

Send instructions: 01 03 8F F0 00 1D AF 24

Analysis: 01 Device ID
 03 Function Code
 8F F0 To read the address starting bit
 00 1D The number of addresses to read (start at 0x8FF0)
 AF 24 CRC Check

RCV: 01 03 3A 41 01 13 F7 00 0F 00 00 04 38 04 B0 04 60 04 74
 05 00 04 B0 00 00 00 00 00 00 00 00 00 00 00 00 01 2C 03 20
 03 20 00 00 00 00 00 00 00 00 00 00 00 09 60 00 00 00 00 00 3C
 00 00 7B B4

Analysis: 01 Device ID
 03 Function Code
 3A 58 Byte
 41 01 Read data to address 0x8FF0 (controller functional state 1)
 7B B4 CRC Check

7. Device Parameter

The controller has the default ID number of "1". The ID can be modified by PC serial port software with a range of 1~247.

serial num.	variable name	Address	Function code	Describe	units	multiple				
1	Real-time Clock	9017 (0d36887)	03(R) 06(W) 10(W)	Second。						
2	Real-time Clock	9018 (0d36888)	03(R) 06(W) 10(W)	Minute。						
3	Real-time Clock	9019 (0d36889)	03(R) 06(W) 10(W)	Time。						
4	Real-time Clock	901A (0d36890)	03(R) 06(W) 10(W)	Day。						
5	Real-time Clock	901B (0d36891)	03(R) 06(W) 10(W)	Month。						
6	Real-time Clock	901C (0d36892)	03(R) 06(W) 10(W)	Year(Years' Lower Two Digits, Range 0~99)。						
7	Baud rate	901D (0d36893)	03(R) 06(W) 10(W)	D3~D0: 00H 4800 01H 9600(Currently fixed 9600, can not be changed) 02H 19200 03H 57600 04H 115200						
8	Backlight Time	901E (0d36894)	03(R) 06(W) 10(W)	LCD backlight delay after the number of seconds of this setting be off, range 0~600.	S					
9	Device Password	901F (0d36895)	03(R) 06(W) 10(W)	Four Password Value: <table><tr><td>Top Digit</td><td>Third</td><td>second</td><td>lowest order</td></tr></table> D15~12, Password highest D11~8, Password Third D5~4, Password Second D3~0, Password lowest	Top Digit	Third	second	lowest order		
Top Digit	Third	second	lowest order							

10	Slave ID	9020 (0d36896)	03(R) 06(W) 10(W)	Range1~247. If you forget ID, you can use address 254 to get device ID.		
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7.1 For example

7.1.1 Example-1

Read ID is 1, Data with address 0x9017, the number of reads is 10

Send instructions: 01 03 90 17 00 0A 58 C9

Analysis: 01 Device ID
 03 Function Code
 90 17 To read the address starting bit
 00 0A The number of addresses to read (starting at 0x9017)
 58 C9 CRC Check

RCV: 01 03 14 00 34 00 24 00 00 00 01 00 01 00 12
 00 01 00 00 00 00 00 01 45 85

Analysis: 01 Device ID
 03 Function Code
 14 20 ↑ Byte
 00 34 Read data to address 0x9017 (Real time clock-second)

 45 85 CRC Check

7.1.2 Example-2(Forget ID)

If you forget the ID, you can use the following instruction to read the ID of the controller:

Send instructions: FE 03 90 20 00 01 BC CF

Analysis: FE Query ID Instruction
 03 Function Code
 90 20 To read the address starting bit
 00 01 The number of addresses to read (Starting from 0 x3000)
 BC CF CRC Check

RCV: 01 03 02 00 01 79 84

Analysis: 01 Device ID
 03 Function Code
 02 Two Byte
 00 01 Read the data to address 0x9020 (Device ID)
 79 84 CRC Check

8. Battery and Load Parameter

The Battery type is selected to set the corresponding parameters, mainly for some special voltage points reasonable Settings.

Set the corresponding Load control mode for the actual situation to achieve the best use effect of Load.

serial num	variable name	Address	Function code	Describe	units	multiple
1	Battery Type	9021 (0d36897)	03(R) 06(W) 10(W)	0000H-Lithium Series 0001H-Liquid 0002H-GEL 0003H-AGM		
2	Low voltage Protection	9022 (0d36898)	03(R) 06(W) 10(W)	Set Range: Non lithium battery: Voltage Range 1080-1180 (According to 12V system settings); Lithium series: 800-6000(It depends on the controller, eg: MPPT2075-DCLi is 900-3000。) 。	V	100
				Non lithium battery: Capacity range 1-5, corresponding to Soc1~Soc5		
3	Low voltage recovery	9023 (0d36899)	03(R) 06(W) 10(W)	Set Range: Non lithium battery: Voltage control range:1140-1280 (According to 12V system settings) Lithium series: 860-6100(It depends on the controller, eg: MPPT2075-DCLi is 960-3100)	V	100
4	Boost voltage	9024 (0d36900)	03(R) 06(W) 10(W)	Boost voltage set range:1400-1480 (suitable for Liquid, Gel and AGM battery. According to 12V system settings)	V	100
5	Equalizing voltage	9025 (0d36901)	03(R) 06(W) 10(W)	Equalizing voltage setting range: 1400-1500(suitable for Liquid and AGM battery. According to 12V system settings)	V	100
6	Float voltage	9026 (0d36902)	03(R) 06(W) 10(W)	Float voltage set range:1300-1450 (suitable for Liquid, Gel and AGM battery. According to 12V system settings)	V	100

7	System Rated Voltage Level	9027 (0d36903)	03(R) 06(W) 10(W)	0- Automatic Identification 1-9 representative 12V/24V/36V/48V/60V/ 110V/120V/220V/240V. When the system voltage is specified, the controller will no longer automatically recognize it.		
8	Charge target voltage for Lithium	9028 (0d36904)	03(R) 06(W) 10(W)	Set Range: 1000-6200(It depends on the controller, eg: MPPT2075-DCLi is 1000-3200)	V	100
9	Charge recovery voltage for Lithium	9029 (0d36905)	03(R) 06(W) 10(W)	Set Range: 850-6180 (It depends on the controller, eg: MPPT2075-DCLi is 920-3180)	V	100
10	0°C Charging	902A (0d36906)	03(R) 06(W) 10(W)	D3~D0: 00H-Normal Charging 01H-No Charging 02H-Slow Charging Suitable for Lithium series controller.		
11	Load Mode for MT series controller	902B (0d36907)	03(R) 06(W) 10(W)	Suitable for MT series Controller. 0-12 representative: 0---Always on mode. 1--- Dusk to dawn Mode(D2D) 2~9--- Night Light on time 2~9 hours 10--- Manual Mode(Default: Load On) 11---T0T mode 12--- Timing Switch		
12	MT Series Manual Control mode, Default Setting On/Off	902C (0d36908)	03(R) 06(W) 10(W)	0-On, 1-Off		
13	MT Series Timing Opening Period 1	902D (0d36909)	03(R) 06(W) 10(W)	The length of the first period of load output, D15~D8: Hour D7 ~ D0: Minute, Suitable for light threshold and timing		

14	MT Series Timing Opening Period 2	902E (0d36910)	03(R) 06(W) 10(W)	The length of the second period of load output, D15~D8: Hour D7 ~ D0: Minute, Suitable for light threshold and timing		
15	Timed start time 1- seconds	902F (0d36911)	03(R) 06(W) 10(W)	Timing start time of load output. Suitable for controller with timing function.	sec	
16	Timed start time 1- minute	9030 (0d36912)	03(R) 06(W) 10(W)	Timing start time of load output. Suitable for controller with timing function.	Min	
17	Timed start time 1-hour	9031 (0d36913)	03(R) 06(W) 10(W)	Timing start time of load output. Suitable for controller with timing function.	hour	
18	Timed off time 1- seconds	9032 (0d36914)	03(R) 06(W) 10(W)	Timing off time of load output. Suitable for controller with timing function.	sec	
19	Timed off time 1- minute	9033 (0d36915)	03(R) 06(W) 10(W)	Timing off time of load output. Suitable for controller with timing function.	Min	
20	Timed off time 1-hour	9034 (0d36916)	03(R) 06(W) 10(W)	Timing off time of load output. Suitable for controller with timing function.	hour	
21	Timed start time 2- seconds	9035 (0d36917)	03(R) 06(W) 10(W)	Timing start time of load output. Suitable for controller with timing function.	sec	
22	Timed start time 2- minute	9036 (0d36918)	03(R) 06(W) 10(W)	Timing start time of load output. Suitable for controller with timing function.	Min	
23	Timed start time 2-hour	9037 (0d36919)	03(R) 06(W) 10(W)	Timing start time of load output. Suitable for controller with timing function.	hour	
24	Timed off time 2- seconds	9038 (0d36920)	03(R) 06(W) 10(W)	Timing off time of load output. Suitable for controller with timing function.	sec	
25	Timed off time 2- minute	9039 (0d36921)	03(R) 06(W) 10(W)	Timing off time of load output. Suitable for controller with timing function.	Min	
26	Timed off time 2-hour	903A (0d36922)	03(R) 06(W) 10(W)	Timing off time of load output. Suitable for controller with timing function.	hour	

27	Time control period selection	903B (0d36923)	03(R) 06(W) 10(W)	Record the time period selected by the load. 0 - use 1 period, 1 - use 2 periods. Suitable for controller with timing function.		
28	Light controlled dark voltage	903C (0d36924)	03(R) 06(W) 10(W)	Solar panel voltage below this value is considered close to night. Non lithium battery set range is 300-1000 (According to 12V system settings) Lithium series set range: 300-2000 (It depends on the controller. eg: MPPT2075-DCLi is 300-2000)	V	100
29	Day/Night Delay time	903D (0d36925)	03(R) 06(W) 10(W)	Set Range: 0-30。	Min	
30	DC series timing control time 1 dimming	903E (0d36926)	03(R) 06(W) 10(W)	0-10 representative 0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100	%	
31	DC series timing control time 2 dimming	903F (0d36927)	03(R) 06(W) 10(W)	0-10 representative 0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100	%	
32	DC Series Time1	9040 (0d36928)	03(R) 06(W) 10(W)	Time1 setting range: 0-15 representative 0, 30,60,90,120, 150, 180,210,240,270,300,330,360,390,420 (In the case of SMR series, it is 24H mode),450(D2D mode)	Min	
33	DC Series the Time1 dimming	9041 (0d36929)	03(R) 06(W) 10(W)	Time1 dimming setting range: 0-10 representative 0,10,20,30,40,50,60, 70,80,90,100	%	
34	DC Series Time2	9042 (0d36930)	03(R) 06(W) 10(W)	Time2 setting range: 0-15 representative 0, 30,60,90,120, 150, 180,210,240,270,300,330,360,390,420,450	Min	
35	DC Series the Time2 dimming	9043 (0d36931)	03(R) 06(W) 10(W)	Time2 dimming setting range: 0-10 representative 0,10,20,30,40,50,60, 70,80,90,100	%	

36	DC Series Time3	9044 (0d36932)	03(R) 06(W) 10(W)	Time3 setting range: 0-15 representative 0, 30,60,90,120, 150, 180,210,240,270,300,330,360,390,4 20,450	Sec	
37	DC Series the Time3 dimming	9045 (0d36933)	03(R) 06(W) 10(W)	Time3 dimming setting range: 0-10 representative 0,10,20,30,40,50,60, 70,80,90,100	%	
38	DC Series Time4	9046 (0d36934)	03(R) 06(W) 10(W)	Time4 setting range: 0-15 representative 0,30,60,90,120,150, 180,210,240,270,300,330,360,390,4 20, T0T	Sec	
39	DC Series the Time4 dimming	9047 (0d36935)	03(R) 06(W) 10(W)	Time4 dimming setting range: 0-10 representative 0,10,20,30,40,50,60, 70,80,90,100	%	
40	DC Series Time5	9048 (0d36936)	03(R) 06(W) 10(W)	Time3 setting range: 0-15 representative 0, 30,60,90,120, 150, 180,210,240,270,300,330,360,390,4 20,450	Sec	
41	DC Series the Time5 dimming	9049 (0d36937)	03(R) 06(W) 10(W)	Time5 dimming setting range: 0-10 representative 0,10,20,30,40,50,60, 70,80,90,100	%	
42	DC Series Load current	904A (0d36938)	03(R) 06(W) 10(W)	Setting Range: 10-1000 (It depends on the controller)	A	100
43	DC Series Auto Dimming	904B (0d36939)	03(R) 06(W) 10(W)	D3~D0: 00H Auto Dimming , 01H 365 mode, 02H/03H Don't Dimming.		
44	DC Series Dimming Voltage	904C (0d36940)	03(R) 06(W) 10(W)	Setting Range: Non lithium:1180-1250(According to 12V system settings) Lithium:1000- Over-charged target Voltage(It depends on the controller)	V	100
45	DC Series Dimming percentage	904D (0d36941)	03(R) 06(W) 10(W)	Setting Range: 1-20	%	

46	Sensing delay off time	904E (0d36942)	03(R) 06(W) 10(W)	Intelligent Induction Controller has no time delay to turn off the lights. Scope can be set: 1-15 corresponding, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100,110,120,130,140,150.	Sec	
47	Dimming of Infrared Series controller when no people	904F (0d36943)	03(R) 06(W) 10(W)	Dimming when no people, can be set range: 0-10 corresponds to 0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100.	%	
48	Light controlled switch	9052 (0d36946)	03(R) 06(W) 10(W)	0-off, 1-on.		
49	Light-control led daybreak voltage	9053 (0d36947)	03(R) 06(W) 10(W)	Solar panel voltage above this voltage is considered close to daytime. Lead-acid series are set in accordance with 12V system, and can be set in 310-1100. Lithium series can be set range: 310-2100(The specific scope depends on the controller.)	V	100
50	Dimming percentage	9054 (0d36948)	03(R) 06(W) 10(W)	Dimming ratio for load test, ranging from 0 to 100.	%	

8.1 Limiting conditions of voltage parameters

- 1 The low voltage recovery voltage should be at least 0.6V higher than the low voltage protection voltage.
- 2 Dimming voltage Should not be higher than the charge target voltage;
- 3 The recovery voltage should be at least 0.2V higher than the low voltage protection voltage.
- 4 The charging target voltage should be at least 0.2V higher than the low voltage recovery voltage.

9 Other switches value

serial num	variable name	Address	Function code	Describe
1	Manual control switch	0	05(W)	1-Manual turn on output state 0-Manual turn off output state The Magic series takes effect only in manual mode.
2	test key on/off	1	05(W)	1 Trigger once test key 0 Normal work
3	DC Series Timing Control Mode Switch	2	05(W)	1 Open Timing Control 0 Close Timing Control
4	Manual control charging switch	3	05(W)	1 Manual turn on charging 0 Manual shutdown charging
5	Restore system default value	8	05(W)	1 yes, Restore system is factory default setting (The ID is also restored as the default value, Password reset); 0 no
6	Clear running days, Power generation or consumption WH, historical minimum maximum voltage	9	05(W)	1-Clear Device statistic.
7	Clear all protection and fully charged times	10	05(W)	1-Clear.
8	Clear charge /Discharge AH	11	05(W)	1-Clear.
9	Clear all of the above historical data	12	05(W)	1-Clear.

For example(Restore system default value)

Send instructions: 01 05 00 08 FF 00 0D F8

Analysis:

01	Device ID
05	Function Code
00 08	send address
FF 00	Send data (enable to restore default)
0D F8	CRC Check

RCV: 01 05 00 08 FF 00 0D F8

Analysis: 01 Device ID

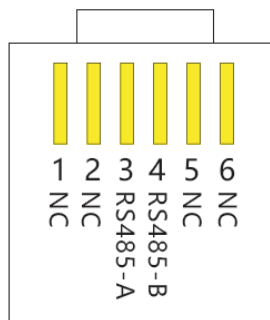
05	Function Code
00 08	Receiving address
FF 00	RXD
0D F8	CRC Check

10 Communication interface definition

10.1 Magic Series Controller RJ11 PIN Connection

Interface pin definition:

Pin No	Definition
1	NC
2	NC
3	RS-485-A
4	RS-485-B
5	NC
6	NC



10.2 MPPT-DC series and SMR-MPPT series RS485 interface

The controller RS485 interface is drawn through the four core waterproof terminal, and the interface pin is defined:

Wire	Defined
Brown	NC
Black	NC
Blue	RS485-A
Green	RS485-B