Utility PV Inverter

Communication Protocol

Change History

Issue	Date	Change Content
1.0	2023-12-04	First release

Contents

1 Introduction

This manual introduces the Modbus-RTU protocol applied for the communication between Hopewind PV grid-connected string inverters and the high computer (PC) monitoring software. Through the protocol, inverter operating data and faults can be monitored in a real-time way.

2 Scheme

Interface	COM
Communication format	Modbus-RTU (RS485)
Communication rate	Default 9600bps (support 9600, 38400, 57600, 115200)
Device address	The default value is 1. The value ranges from 1-247
Starting bit	1
Data bit	8
Check bit	No check
Stop bit	1

3 Data Frame

Frame Format	Comply with Modbus Protocol
Device address	1
Function code	0x03: Read 1-N registers 0x06: Write single register 0x10: Write multiple registers
Maximum number of registers that can be read every time	100
CRC check algorithm	Reference link： http://www.modbus.org/docs/Modbus_over_serial_line_V1_02.pdf

4 Definition of Address

4.1 Data Type

U16

- Unsigned 16-bit integer data output transmission adopts: High byte first, low byte last

I16

- Signed 16-bit integer data output transmission adopts: High byte first, low byte last

U32

- Unsigned 32-bit integer data output transmission adopts: Low word first, high word last; High byte first, low byte last

I32

- Signed 32-bit integer data output transmission adopts: Low word first, high word last; High byte first, low byte last

4.2 Value Description

The meanings of some parameters in the protocol are as follows:

Gain: Actual value of related parameters = return value/gain;

For example: Name: MPPT1 input voltage, register address: 40500, return value: 5642, gain: 10, represents the calculated MPPT1 input voltage: 564.2 V

4.3 Error Code

0x01: Illegal function code

0x02: Illegal data address

0x03: Illegal data value

0x04: Slave node device failure

0x05: Master node receiving service invocation

0x06: Slave device busy

0x07: Data frame length error

0x08: Data frame check error

0x09: Data frame error

Example: Sample error code frame (first byte is device address, second byte is [function code + 0x80], third byte is error code, and last two bytes are CRC check code)

0x01: 01 83 01 80 F0 0X02: 01 86 02 C3 A1 0X03: 01 90 03 0C 01

5 Frame Example

Deliver the query command frame	01 03 00 00 00 32 C4 1F • 01: Slave ID • 03: Function code, read register value command • 00 00: Query register first address, 0x0000, high byte first, low byte last • 00 32: Query the number of registers, 0x0032, high byte first, low byte last • C4 1F: Check code
Query the response of a command frame	01 03 64 00 00 00 02 00 00 01 F4 01 0E 13 88 04 2C 00 00 00 00 00 00 27 10 00 00 02 26 03 9B FF 38 00 84 D6 EF FA 8D 0C 9F 0E CF 0E 47 07 E9 07 E8 07 E5 00 00 00 00 00 00 00 00 00 05 00 00 00 00 00 00 00 00 00 02 30 50 00 00 00 00 73 A0 02 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 98 A0 • 01: Save ID • 03: Function code, read register value command • 64: Response data length, the number of bytes is twice the number of registers • 00 00: The first register value, 0x0000, high byte first, low byte last • 00 02: Second register value, 0x0002, high byte first, low byte last • 98 A0: Check code
Set command frame delivery	01 06 00 0C 00 03 09 C8 • 01: Slave ID • 06: Function code, single register setting command • 00 0C: Register address, 0x000C, high byte first, low byte last • 00 03: Set value, 0x0003, high byte first, low byte last • 09 C8: Check code
Set the command frame reply	01 06 00 0C 00 03 09 C8 Detail of set command response frame: Consistent with set command frame

6 Inverter Modbus Protocol

6.1 Telemetry (Read Only)

No.	Name	Data Type	Unit	Gain	Address	Quantity	Note
1.	MPPT1 input voltage	I16	V	10	40300	1	
2.	MPPT2 input voltage	I16	V	10	40301	1	
3.	MPPT3 input voltage	I16	V	10	40302	1	
4.	MPPT4 input voltage	I16	V	10	40303	1	
5.	MPPT5 input voltage	I16	V	10	40304	1	
6.	MPPT6 input voltage	I16	V	10	40305	1	
7.	MPPT7 input voltage	I16	V	10	40306	1	
8.	MPPT8 input voltage	I16	V	10	40307	1	
9.	MPPT9 input voltage	I16	V	10	40308	1	350 kW string not involved
10.	MPPT10 input voltage	I16	V	10	40309	1	
11.	MPPT11 input voltage	I16	V	10	40310	1	
12.	MPPT12 input voltage	I16	V	10	40311	1	
13.	String 01 input current	I16	A	100	40316	1	
14.	String 02 input current	I16	A	100	40317	1	
15.	String 03 input current	I16	A	100	40318	1	
16.	String 04 input current	I16	A	100	40319	1	

No.	Name	Data Type	Unit	Gain	Address	Quantity	Note
17.	String 05 input current	I16	A	100	40320	1	
18.	String 06 input current	I16	A	100	40321	1	
19.	String 07 input current	I16	A	100	40322	1	
20.	String 08 input current	I16	A	100	40323	1	
21.	String 09 input current	I16	A	100	40324	1	
22.	String 10 input current	I16	A	100	40325	1	
23.	String 11 input current	I16	A	100	40326	1	
24.	String 12 input current	I16	A	100	40327	1	
25.	String 13 input current	I16	A	100	40328	1	
26.	String 14 input current	I16	A	100	40329	1	
27.	String 15 input current	I16	A	100	40330	1	
28.	String 16 input current	I16	A	100	40331	1	
29.	String 17 input current	I16	A	100	40332	1	
30.	String 18 input current	I16	A	100	40333	1	
31.	String 19 input current	I16	A	100	40334	1	
32.	String 20 input current	I16	A	100	40335	1	
33.	String 21 input current	I16	A	100	40336	1	
34.	String 22 input current	I16	A	100	40337	1	

No.	Name	Data Type	Unit	Gain	Address	Quantity	Note
35.	String 23 input current	I16	A	100	40338	1	
36.	String 24 input current	I16	A	100	40339	1	
37.	String 25 input current	I16	A	100	40340	1	250 kW string not involved
38.	String 26 input current	I16	A	100	40341	1	
39.	String 27 input current	I16	A	100	40342	1	
40.	String 28 input current	I16	A	100	40343	1	
41.	String 29 input current	I16	A	100	40344	1	
42.	String 30 input current	I16	A	100	40345	1	
43.	String 31 input current	I16	A	100	40346	1	
44.	String 32 input current	I16	A	100	40347	1	
45.	MPPT1 input power	U16	kW	100	40348	1	
46.	MPPT2 input power	U16	kW	100	40349	1	
47.	MPPT3 input power	U16	kW	100	40350	1	
48.	MPPT4 input power	U16	kW	100	40351	1	
49.	MPPT5 input power	U16	kW	100	40352	1	
50.	MPPT6 input power	U16	kW	100	40353	1	
51.	MPPT7 input power	U16	kW	100	40354	1	
52.	MPPT8 input power	U16	kW	100	40355	1	

No.	Name	Data Type	Unit	Gain	Address	Quantity	Note
53.	MPPT9 input power	U16	kW	100	40356	1	350 kW string not involved
54.	MPPT10 input power	U16	kW	100	40357	1	
55.	MPPT11 input power	U16	kW	100	40358	1	
56.	MPPT12 input power	U16	kW	100	40359	1	
57.	Grid AB line voltage	I16	V	10	40364	1	
58.	Grid BC line voltage	I16	V	10	40365	1	
59.	Grid CA line voltage	I16	V	10	40366	1	
60.	Grid A-phase current (Ia)	I16	A	10	40367	1	
61.	Grid B-phase current (Ib)	I16	A	10	40368	1	
62.	Grid C-phase current (Ic)	I16	A	10	40369	1	
63.	Grid frequency	I16	Hz	100	40370	1	
64.	AC active power	I16	kW	250 kW: 100 350 kW: 10	40371	1	Model dependent
65.	AC reactive power	I16	kVar		40372	1	
66.	DC input power	I16	kW		40373	1	
67.	Inverter efficiency	U16	%	100	40374	1	9800 means the efficiency is 98.00%
68.	Power factor	I16	N/A	1000	40375	1	
69.	Internal temperature	I16	℃	10	40376	1	
70.	Inverter on/off status	U16	N/A	1	40378	1	0: Shutdown 1: Grid-connected running

No.	Name	Data Type	Unit	Gain	Address	Quantity	Note
71.	Inverter state	U16	N/A	1	40379	1	• Bit0: Standby • Bit1: Standby self-test • Bit2: Start grid connection • Bit3: Grid-connected running • Bit4: Alarm running • Bit5: Limite power running • Bit6: Scheduling running • Bit7: Fault shutdown • Bit8: Command shutdown
72.	Daily power generation	U32	kWh	100	40380	2	
73.	Cumulative power generation	U32	kWh	100	40382	2	
74.	CO_2 emission reduction	U32	kg	100	40384	2	
75.	Daily running time	U16	Hour	100	40386	1	Integer value, calculated by gain
76.	Cumulative running time	U32	Hour	100	40387	2	
77.	Inverter startup time	U32	N/A	1	40389	2	1. The time_ t format is converted to time. 2. The base time for inverter time calculation is 1970.1.1-00:00:00, and the time zone of the current region should be considered when the server sets time.
78.	Inverter shutdown time	U32	N/A	1	40391	2	

No.	Name	Data Type	Unit	Gain	Address	Quantity	Note
79.	Inverter fault word 1	U16	N/A	1	40393	1	• Bit0: RAM self-test failed • Bit1: EEPROM parameters back to default values • Bit2: EEPROM read / write failure • Bit3: FPGA version mismatch • Bit5: Internal communication fault
80.	Inverter fault word 2	U16	N/A	1	40394	1	• Bit0: A-phase hardware overcurrent • Bit1: B-phase hardware overcurrent • Bit2: C-phase hardware overcurrent • Bit3: A-phase CBC timeout • Bit4: B-phase CBC timeout • Bit5: C-phase CBC timeout • Bit6: Busbar hardware overvoltage • Bit7: Bus neutral point overvoltage
81.	Inverter fault word 3	U16	N/A	1	40395	1	• Bit0: Uab overvoltage • Bit1: Ubc overvoltage • Bit2: Uca overvoltage • Bit3: Uab undervoltage • Bit4: Ubc undervoltage • Bit5: Uca undervoltage • Bit8: Grid overfrequency • Bit9: Grid underfrequency • Bit11: Anti-islanding protection • Bit12: AC insulation abnormal • Bit14: LVRT protection

No.	Name	Data Type	Unit	Gain	Address	Quantity	Note
82.	Inverter fault word 4	U16	N/A	1	40396	1	• Bit0: Module A-phase software overcurrent • Bit1: Module B-phase software overcurrent • Bit2: Module C-phase software overcurrent • Bit3: Module current imbalance • Bit4: Filter capacitor undervoltage • Bit5: Module overtemperature • Bit6: Internal overtemperature • Bit7: DC injection threshold exceeded • Bit8: AD sampling zero drift abnormal • Bit9: Residual current threshold exceeded continuously • Bit10: Residual current self-test failed • Bit13: Abnormal low efficiency • Bit14: Residual current break-variable threshold exceeded
83.	Inverter fault word 5	U16	N/A	1	40397	1	• Bit0: Inverter synchronization overtime • Bit1: Bus short circuit • Bit5: Bus overvoltage • Bit6: Bus undervoltage • Bit7: Bus voltage imbalance

No.	Name	Data Type	Unit	Gain	Address	Quantity	Note
84.	Inverter fault word 6	U16	N/A	1	40398	1	• Bit0: AC relay open circuit • Bit1: AC relay short circuit
85.	Inverter fault word 7	U16	N/A	1	40399	1	• Bit0: Auxiliary power fault • Bit2: Bus hardware overvoltage • Bit3: Hardware overcurrent • Bit4: Unit hardware overcurrent • Bit12: CBC timeout
86.	Inverter fault word 8	U16	N/A	1	40400	1	• Bit0: AD sampling zero drift abnormal • Bit1: RAM self-test failed • Bit2: EEPROM parameters back to default values • Bit3: Historical fault storage failure • Bit4: CAN communication abnormal • Bit7: Bus software overvoltage • Bit8: Unit 1 software overcurrent • Bit9: Unit 2 software overcurrent • Bit10: Unit 3 software overcurrent • Bit11: Unit 4 software overcurrent • Bit12: Input polarity is reverse • Bit13: Abnormal insulation of positive busbar to ground • Bit14: Abnormal insulation of negative busbar to ground

No.	Name	Data Type	Unit	Gain	Address	Quantity	Note
86.	Inverter fault word 8	U16	N/A	1	40400	1	• Bit15: Booster-side short circuit
87.	Inverter alarm word 3	U16	N/A	1	40403	1	• Bit6: Grid abnormal • Bit7: Grid voltage imbalance threshold exceeded • Bit10: Grid phase sequence reverse • Bit13: Grid voltage abnormal
88.	Inverter alarm word 4	U16	N/A	1	40404	1	• Bit12: Abnormal high efficiency
89.	Inverter alarm word 5	U16	N/A	1	40405	1	• Bit2: DC voltage detection abnormal • Bit8: DC input voltage high
90.	Inverter alarm word 6	U16	N/A	1	40406	1	• Bit4: AC SPD abnormal
90.	Inverter alarm word 6	U16	N/A	1	40406	1	• Bit5: Internal fan abnormal • Bit6: External fan abnormal
91.	Inverter alarm word 7	U16	N/A	1	40407	1	• Bit0: DC SPD abnormal • Bit6: Booster side open circuit • Bit8: PV string abnormal
92.	PID status	U16	N/A	1	40409	1	0: Not running 1: Normal running

No.	Name	Data Type	Unit	Gain	Address	Quantity	Note
93.	Inverter state	U16	N/A	1	40410	1	0: Standby 1: Power generation 2: Self-derating power generation 3: Power rationing and derating power generation 4: Planned shutdown 5: Power cuts-caused shutdown 6: Fault shutdown Note: Applicable to Xinjiang power grid
94.	Inverter state	U16	N/A	1	40411	1	0: Shutdown / Standby 1: Normal running 2: Maintenance Note: Applicable to Heilongjiang power grid
95.	Inverter state	U16	N/A	1	40412	1	1: Normal running 2: Shutdown 3: Maintenance 4: Standby Note: Applicable to Ningxia power grid
96.	Inverter state	U16	N/A	1	40413	1	0: Fault 1: Normal running 2: Standby 3: Controlled running Note: Applicable to Sichuan power grid
97.	Inverter state	U16	N/A	1	40414	1	1: Normal running 2: Standby 3: Out of service (faulty, maintenance, limited) Note: Applicable to Xibei power grid

No.	Name	Data Type	Unit	Gain	Address	Quantity	Note
98.	Inverter state	U16	N/A	1	40415	1	0: Grid-connected running 1: Standby 2: Limited power 3: Shutdown Note: Applicable to Tianjin power grid
99.	Inverter state	U16	N/A	1	40416	1	• Bit0: Standby • Bit1: Power generation • Bit2: Self-derating power generation • Bit3: Power rationing and derating generation • Bit4: Planned shutdown • Bit5: Power cuts-caused shutdown • Bit6: Fault shutdown Note: Applicable to Xinjiang power grid
100.	Inverter state	U16	N/A	1	40417	1	• Bit0: Standby Bit1: Power generation • Bit2: Self-derating generation • Bit3: Power rationing and derating generation • Bit4: Planned shutdown at the station • Bit5: Planned shutdown off the station • Bit6: Power cuts-caused shutdown

No.	Name	Data Type	Unit	Gain	Address	Quantity	Note
100.	Inverter state	U16	N/A	1	40417	1	• Bit7: Fault shutdown Note: Applicable to Jibei power grid

6.2 Remote Control (Writable, Readable)

No.	Name	Data Type	Unit	Gain	Address	Quantity	Note
1.	Start command	U16	N/A	1	40200	1	0: Invalid 1: Start
2.	Shutdown command	U16	N/A	1	40201	1	0: Invalid 1: Shutdown
3.	Reset command	U16	N/A	1	40202	1	0: Invalid 1: Reset
4.	SVG startup	U16	N/A	1	40203	1	0: Invalid 1: Valid

6.3 Remote Control (Writable, Readable)

No.	Name	Data Type	Unit	Gain	Address	Quantity	Note
1.	Date settings	U32	N/A	1	40000	2	0-3155759999 Note see below
	Note: The time calculation reference time of the inverter is 1970.1.1-00:00:00 When the server sets the time, it should consider the time zone of the current region. Example: 1. Write address 40000 Write value: 1546516800 = 1546488000 (time_t format seconds) + 28800 (time zone seconds), switch to Beijing (time zone:1970.1.1-08:00:00) date time is 2019/1/3 12:00:00. 2. Read address 40000 Read value: 1546516800, subtract the time zone seconds 28800, 1546516800 (read value 2880) = 1546488000 (time_t format seconds) is what you really need. Switch to Beijing (time zone: 1970.1.1-08:00:00) date time is 2019/1/3 12:00:00.						
2.	Reactive power regulation mode	U16	N/A	1	40002	1	0-5 0: No reactive power output 1: Power factor regulation 2: Reactive kVar regulation 3: Reactive power ratio regulation ratio regulation
3.	Power factor regulation	I16	N/A	1000	40003	1	[-1, -0.8], [0.8, 1] For example, the register value is 10000, the power factor is 1.0000
4.	Reactive power kVar regulation	I16	kVar	10	40004	1	-60% to +60% Pn Pn indicates the rated power (unit: kW) For example, if the rated power is 100 kW, the Pn is 100. The range is -60 to +60 kVar.
5.	Reactive power ratio regulation	I16	%	100	40005	1	-60% to + 60% For example: The register value is 5000, the ratio is 50.00%.

No.	Name	Data Type	Unit	Gain	Address	Quantity	Note
6.	Active power regulation mode	U16	N/A	1	40011	1	Pn Indicates the rated power (unit: kW). For example, if the rated power is 100 kW, the Pn is 100. The range of Pn is from -60 to +60 kVar.
7.	Active power value regulation	I16	kW	250 kW: 100 350 kW: 10	40012	1	0-110% Pn 250 kW PV string: Pn is 250 kW; Range: 0-247.5 kW; Gain: 100, a register value of 10000, indicates a power of 100 kW; 350 kW PV string: Pn is 350 kW; Range: 0—385 kW; Gain: 10, register value 1000, indicates power 100 kW

6.4 Device Characteristic Information (Read Only)

No.	Name	Data Type	Unit	Gain	Address	Quantity	Note
1.	Device electronic serial number	U16	N/A	1	40601	30	
2.	Software version_DC_AC	U32	N/A	1	40631	2	
3.	Software version_DC_DC	U32	N/A	1	40633	2	
4.	Software version_FPGA	U32	N/A	1	40635	2	
5.	Parameter version_DC_AC	U32	N/A	1	40637	2	
6.	Software version_bootloader	U32	N/A	1	40639	2	

No.	Name	Data Type	Unit	Gain	Address	Quantity	Note
7.	Communication protocol version	U32	N/A	1	40641	2	V000.000.000: Version 1 protocol V001.000.000: Version 2 protocol V002.000.000: Version 3 protocol V003.000.000: Version 4 protocol V004.000.000: Version 5 protocol V005.000.000: Version 6 Protocol V006.000.000: Version 7 protocol V007.000.000: Version 8 protocol V008.000.000: Version 9 protocol V009.000.000: Version 10 protocol
8.	Parameter version_DC_DC	U32	N/A	1	40643	2	
9.	Rated power	U16	kW	1	40646	1	
10.	Rated voltage	U16	V	1	40647	1	

7 Examples

7.1 Read Single Register

Start address of the register: 40500 and 40001

Register Start Address	Host Sending Frame	Slave Answering Frame
40500	01 03 9E 34 00 01 EA 2C • 01: Slave ID • 03: Function code 0x03 for reading single register value command • 9E 34: Read the first address of the register. 0x9E34 with high byte first and low byte last • 00 01: Read the number of registers, the number of 0x0001 with high byte first and low byte last • EA 2C: CRC check code	Under normal conditions: 01 03 02 00 00 B8 44 • 01: Slave ID • 03: Function code 0x03 for reading single register value command • 02: Read the number of registers with a total number of 0x0002 • 00 00: Read the register contents of 0x0000 with high byte first and low byte last • B8 44: CRC check code Note: Read one value of the register whose address is 40500
40001	01 03 9C 41 00 01 FA 4E • 01: Slave ID • 03: Function code 0x03 for reading single register value command • 9C 41: Read the first address of the register. 0x9C41 with high byte first and low byte last • 00 01: Read the number of registers, a total number of 0x0001 with high byte first and low byte last • FA 4E: CRC check code	Under abnormal conditions: 01 83 02 C0 F1 • 01: Slave ID; • 83: Function code 0x03 + 0x80 for reading reply function code for register value abnormality; • 02: Error code indicating illegal data address (refer to the Error Code table in the Basic Definition sheet) • C0 F1: CRC check code Note: Test non-existent register address

7.2 Read Multiple Registers

Start address of the register: 40000 and 40500

Register Start Address	Host Sending Frame	Slave Answering Frame
40000	01 03 9C 40 00 03 2A 4F • 01: Slave ID • 03: Function code 0x03 for reading multiple register value commands • 9C 40: Read the first address of the register. 0x9C40 with high byte first and low byte last • 00 03: Read the number of registers, a total number of 0x0003 with high byte first and low byte last • 2A 4F: CRC check code	Under normal conditions: 01 03 06 00 00 00 00 00 00 21 75 • 01: Slave ID • 03: Function code 0x03 for reading single register value command • 06: Read the total number of bytes of the register contents of 0x06 • 00 00 00 00 00 00: Read the register contents with high byte first and low byte last • 21 75: CRC check code Read the value of 2 registers with register addresses 40000–40003 (address is continuously) Note: The address 40000 contains 2 register units, and the address 40002 contains 1 register unit, so an actual length of 3 register units is read.
40500	01 03 9E 34 00 45 EA 1F • 01: Slave ID • 03: Function code 0x03 for reading multiple register value commands • 9E 34: Read the first address of the register. 0x9E34 with high byte first and low byte last • 00 45: Read the number of registers, a total number of 0x0045 with high byte first and low byte last • EA 1F: CRC check code	Under normal conditions: 01 03 8A 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 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 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 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 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 00 00 00 00 00 00 00 00 00 00 00 00 0000 00 00

Register Start Address	Host Sending Frame	Slave Answering Frame
40500	01 03 9E 34 00 45 EA 1F • 01: Slave ID • 03: Function code 0x03 for reading multiple register value commands • 9E 34: Read the first address of the register. 0x9E34 with high byte first and low byte last • 00 45: Read the number of registers, a total number of 0x0045 with high byte first and low byte last • EA 1F: CRC check code	00 00 00 00 00 00 00 00 00 00 00 00 00 2C EC • 01: Slave ID • 03: Function code 0x03 for reading single register value command • 8A: Read the total number bytes of the register contents of 0x008A • All 00: Read all register contents as 0 with high byte first and low byte last • 2C EC: CRC check code Read the values of 69 registers with register addresses 40500–40564 (continuous addresses).
40000	01 03 9C 40 00 0F 2A 4A • 01: Slave ID • 03: Function code 0x03, read multiple register values command • 9C 40: Register first address, 0x9C40, the high byte first and the low byte last • 00 0F: Number of registers, 0x000F, the high byte first and the low byte last • 2A 4A: CRC check code	Under abnormal conditions: • 01: Slave ID • 83: Function code 0x03+0x80, read register value abnormal reply function code • 09: Error code, indicates a data frame error (refer to the "basic definition" error code table) • 81 36: CRC check code Test to read the error length of multiple registers.

7.3 Write Single Register

Start address of the register: 40002 and 60000.

Register Start Address	Host Sending Frame	Slave Answering Frame
40002	01 06 9C 42 00 03 47 8F • 01: Slave ID • 06: Function code 0x06 for setting single register value command • 9C 42: Set the first address of the register. 0x9C42 with high byte first and low byte last • 00 03: Set the register contents, the value of 0x0003 with high byte first and low byte last • 47 8F: CRC check code	Under normal conditions: 01 06 9C 42 00 03 47 8F • 01: Slave ID • 06: Function code 0x06 for setting single register value command • 9C 42: Set the first address of the register. 0x9C42 with high byte first and low byte last • 00 03: Set the register contents, the value of 0x0003 with high byte first and low byte last • 47 8F: CRC check code Write the value of 1 register to register address 40002
60000	01 06 EA 60 00 01 7C 0C • 01: Slave ID • 06: Function code 0x06 for setting single register value command • EA 60: Set the first address of the register. 0xEA60 with high byte first and low byte last • 00 01: Set the register contents, the value of 0x0001 with high byte first and low byte last • 7C 0C: CRC check code	Under normal conditions: 01 06 EA 60 00 01 7C 0C • 01: Slave ID • 06: Function code 0x06 for setting single register value command • EA 60: Set the first address of the register. 0xEA60 with high byte first and low byte last • 00 01: Set the register contents, the value of 0x0001 with high byte first and low byte last • 7C 0C: CRC check code Under abnormal conditions: 01 86 02 C3 A1 • 01: Slave ID; • 86: Function code 0x06+0x80 for setting reply function code for single register value abnormality • 02: Error code indicating illegal

Register Start Address	Host Sending Frame	Slave Answering Frame
60000		data address (refer to the Error Code table in the Basic Definition sheet) • C3 A1: CRC check code Note: Write the value of 1 register to register address 60000 (illegal register address)

7.4 Write Multiple Registers

Start address of the register: 40200 and 40000

Register Start Address	Host Sending Frame	Slave Answering Frame
40000	01 10 9C 40 00 03 06 33 44 55 66 00 04 23 DA • 01: Slave ID • 10: Function code 0x10 for setting multiple register value commands • 9C 40: Set the first address of the register. 0x9C40 with high byte first and low byte last • 00 03: Set the number of registers, a total number of 0x0003 with high byte first and low byte last • 06: Set the total number of bytes of the register contents • 33 44 55 66 00 04: Set the value of the register • 23 DA: CRC check code	Under normal conditions: 01 10 9C 40 00 03 AF 8C • 01: Slave ID • 10: Function code 0x10 for setting multiple register value commands • 9C 40: Set the first address of the register. 0x9C40 with high byte first and low byte last • 00 03: Set the number of registers, a total number of 0x0003 with high byte first and low byte last • AF 8C: CRC check code Write the value of 2 registers to register address 40000–40002 (continuous addresses) Note: The address 40000 contains 2 register units and the address 40002 contains 1 register unit, so an actual length of 3 register units is written.
40200	01 10 9D 08 00 03 06 00 01 00 01 00 01 0C 04	Under normal conditions: 01 10 9D 08 00 03 2E 66

Register Start Address	Host Sending Frame	Slave Answering Frame
40200	• 01: Slave ID • 10: Function code 0x10 for setting multiple register value commands • 9D 08: Set the first address of the register. 0x9D08 with high byte first and low byte last • 00 03: Set the number of registers, a total number of 0x0003 with high byte first and low byte last • 06: Set the total number of bytes of the register contents of 0x06 • 00 01 00 01 00 01: Set the value of the register • 0C 04: CRC check code	• 01: Slave ID • 10: Function code 0x10 for setting multiple register value commands • 9D 08: Set the first address of the register. 0x9D08 with high byte first and low byte last • 00 03: Set the number of registers, a total number of 0x0003 with high byte first and low byte last • 2E 66: CRC check code
40000	01 10 9C 40 00 0F 1E 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 00 00 00 00 00 7F 03 • 01: Slave ID • 10: Function code 0x10 for setting multiple register value commands • 9C 40: Set the first address of the register. 0x9C40 with high byte first and low byte last • 00 0F: Set the number of registers, a total number of 0x000F with high byte first and low byte last • 1E: Set the total number of bytes of the register contents of 0x1E; a total number of 30 bytes • 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 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00: Set the	Under abnormal conditions: 01 90 09 8C 06 • 01: Slave ID • 90: Function code 0x10+0x80 for setting reply function code for multiple register value abnormality • 09: Error code indicating data frame error (refer to the Error Code table in the Basic Definition sheet) • 8C 06: CRC check code Test to write the error length of multiple registers. The address of the current setting frame is discontinuous.

Register Start Address	Host Sending Frame	Slave Answering Frame
40000	value of the register with a total number of 30 bytes • 7F 03: CRC check code	

Note:

1. Please refer to the related description in the Basic Definition sheet.

2. Please calculate the real frame data length based on the fact that 1 register unit contains 2 bytes, 32 Bit integer contains 2 register units, and 16 Bit integer contains 1 register unit.