

Modbus communication protocol_Ver 1.38_C

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一、 Introduction

1.1、 Protocol Introduction

Modbus Protocol is a common language used in UPS controller. MODBUS Serial Line protocol is a Master-Slave protocol; the master send request to an individual slave. After receiving and processing the request, the slave returns a message (a 'reply') to the master. Each slave must have an unique address (from 0x01~0xFF), so that it can be addressed independently from other nodes.

1.2、 Interface

Baud rate: 1200bps、 2400 bps、 4800 bps、 9600 bps、 14400 bps、 19200 bps

Data length: RTU mode 8bit、 ASCII mode 7bit

Parity: None

Stop bit: 1bit

1.2.1 RS_485 port definition

The RS_485 definition is shown in Fig 1.



Fig1. RS_485 port definition

pin2--- 485+/A
pin3--- 485-/B
pin5 --- GND

1.2.2 RS_232 port definition

Male type pins definition of RS_232 Port is shown in Fig 2.



Fig2. Male type pins definition of RS_232 Port

pin2--- RXD
pin3--- TXD
pin5--- GND

Female type holes definition of RS_232 Port is shown in Fig 3.

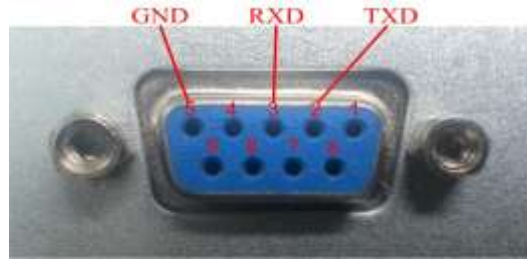


Fig3. Female type holes definition of RS_232 Port

pin2--- TXD
pin3--- RXD
pin5--- GND

1.3、 Protocol format

This protocol supports RTU mode and ASCII mode.

1.3.1 Format of the RTU mode

When devices communicate on a MODBUS serial line using the RTU (Remote Terminal Unit) mode, each 8-bit byte in a message contains two 4-bit hexadecimal characters. Each message must be transmitted in a continuous stream of characters.

The format for each byte in the RTU mode is:

Coding system: 8-bit binary;
Bits per Byte: 1 start bit
8 data bits, least significant bit sent first
1 bit for parity completion, if not, this is stop bit
1 stop bit

Error check area: Cyclic Redundancy Check (CRC)

Remark: the use of no parity requires 2 stop bits.

RTU Mode Request frame format:

Start	Address	Function	Register Starting address	Register number	CRC Low bit	CRC High bit	End
≥3.5 character times	8 bits	8 bits	16 bits	16 bits	8 bits	8 bits	≥3.5 character times

Bit Sequence in RTU mode:

Start	1	2	3	4	5	6	7	8	Stop/Par	Stop
-------	---	---	---	---	---	---	---	---	----------	------

RTU Mode Response frame format:

Start	Address	Function	Date	CRC Low bit	CRC High bit	End
≥3.5 character times	8 bits	8 bits	N*8 bits	8 bits	8 bits	≥3.5 character times

A MODBUS message is placed by the transmitting device into a frame that has a known beginning and ending point. This allows devices that receive a new frame to begin at the start of the message, and to know when the message is completed. Partial messages must be detected and errors must be set as a result. In RTU mode, message frames are separated by a silent interval of at least 3.5 character times.

The entire message frame must be transmitted as a continuous stream of characters. If a silent interval of more than 1.5 character times occurs between two characters, the message frame is declared incomplete and should be discarded by the receiver. 1.5 character times and 3.5 character times are relative to the baud rate, for example, baud rate is 9600:

$$1.5 \text{ character times} = (1/9600) \times 11 \times 1.5 \times 1000 = 1.72 \text{ ms}$$

$$3.5 \text{ character times} = (1/9600) \times 11 \times 3.5 \times 1000 = 4.01 \text{ ms}$$

For a complete example:

Request frame format: request date of unit 1, register start address: 0002, only 1 register.

	Address	Function	Register Starting address		Register number		CRC	
Date	0x01	0x03	0x00	0x02	0x00	0x01	0x25	0xCA
Bit	1	1	2		2		2	

Response frame format: unit 1 Response frame.

	Address	Function	Return data bytes	Date		CRC	
Date	0x01	0x03	0x02	0x12	0x22	0xE9	0x5C
Bit	1	1	1	2		2	

1.3.2 Format of the ASCII mode

When devices are setup to communicate on a MODBUS serial line using ASCII (American Standard Code for Information Interchange) mode, each 8-bit byte in a message is sent as two ASCII characters.

The format for each byte in ASCII mode is:

Coding System: Hexadecimal, ASCII characters 0-9, A-F

Bits per Byte: 1 start bit

7 data bits, least significant bit sent first

1 bit for parity completion, if not, this is stop bit

1 stop bit

Error check area: Longitudinal Redundancy Checking (LRC)

Remark: the use of no parity requires 2 stop bits.

ASCII Mode Request frame format:

Start	Address	Function	Register Starting address	Register number	LRC	End
: (0x3A)	16 bits	16 bits	32 bits	32 bits	16 bits	CRLF (0x0D0A)

Bit Sequence in ASCII mode:

Start	1	2	3	4	5	6	7	Stop/Par	Stop
-------	---	---	---	---	---	---	---	----------	------

ASCII Response frame format:

Start	Address	Function	Return data number	Date	LRC	End
: (0x3A)	16 bits	16 bits	16 bits	N*32bits	16 bits	CRLF (0x0D0A)

In ASCII mode, a message is delimited by specific characters as Start-of-frames (0x3A) and End-of-frames (0x0D). The maximum interval between the characters is 1s, if more than 1s, the receiving device considers an error has occurred. The allowable characters transmitted for all other fields are hexadecimal 0–9, A–F (ASCII coded), **highest 4-bit sent first, then least 4-bit**. For example, the byte 0x01 is encoded as two characters: 0x30 and 0x31.

Request frame format: request date of unit 1, register start address: 0002, only 1 register.

	Start	Address	Function	Register Starting address		Register number		LRC	End
Byte	:	0x01	0x03	0x00	0x02	0x00	0x01	F9	CRLF
ASCII	0x3A	0x3031	0x3033	0x3030	0x3032	0x3030	0x3031	0x4639	0x0D0A

Response frame format: write 4000 (0x0FA0) to register 0002 of slave unit 1:

	Start	Address	Function	Return Date number	Date		LRC	End
Byte	:	0x01	0x06	0x02	0x0F	0xA0	0x48	CRLF
ASCII	0x3A	0x3031	0x3036	0x3032	0x3046	0x4130	0x3438	0x0D0A

2. Communication content

2.1、Telemetry (Function code: 0x03)

No. (Register)	Name	Data type (Hi-Lo)	Coefficient	Unit	Remark
0	Bypass voltage Phase A	Unsigned int	0.1	V	Used for compatibility
1	Bypass voltage Phase A	Unsigned int	0.1	V	HT11、HT31 series just have phase A, the registers of phase B and C be reserved.
2	Bypass voltage Phase B	Unsigned int	0.1	V	
3	Bypass voltage Phase C	Unsigned int	0.1	V	
4	Bypass current Phase A	Unsigned int	0.1	A	
5	Bypass current Phase B	Unsigned int	0.1	A	
6	Bypass current Phase C	Unsigned int	0.1	A	
7	Bypass frequency Phase A	Unsigned int	0.01	Hz	
8	Bypass frequency Phase B	Unsigned int	0.01	Hz	
9	Bypass frequency Phase C	Unsigned int	0.01	Hz	
10	Bypass PF_A	Unsigned int	0.01		
11	Bypass PF_B	Unsigned int	0.01		
12	Bypass PF_C	Unsigned int	0.01		
13	Input voltage Phase A	Unsigned int	0.1	V	HT11、HT31 series just have phase A, the registers of phase B and C be reserved.
14	Input voltage Phase B	Unsigned int	0.1	V	
15	Input voltage Phase C	Unsigned int	0.1	V	
16	Input current Phase A	Unsigned int	0.1	A	
17	Input current Phase B	Unsigned int	0.1	A	

18	Input current Phase C	Unsigned int	0.1	A	
19	Input frequency Phase A	Unsigned int	0.01	Hz	
20	Input frequency Phase B	Unsigned int	0.01	Hz	
21	Input frequency Phase C	Unsigned int	0.01	Hz	
22	Input PF_A	Unsigned int	0.01		
23	Input PF_B	Unsigned int	0.01		
24	Input PF_C	Unsigned int	0.01		
25	Output voltage Phase A	Unsigned int	0.1	V	HT11、HT31 series just have phase A, the registers of phase B and C be reserved.
26	Output voltage Phase B	Unsigned int	0.1	V	
27	Output voltage Phase C	Unsigned int	0.1	V	
28	Output current Phase A	Unsigned int	0.1	A	
29	Output current Phase B	Unsigned int	0.1	A	
30	Output current Phase C	Unsigned int	0.1	A	
31	Output frequency Phase A	Unsigned int	0.01	Hz	
32	Output frequency Phase B	Unsigned int	0.01	Hz	
33	Output frequency Phase C	Unsigned int	0.01	Hz	
34	Output PF_A	Unsigned int	0.01		
35	Output PF_B	Unsigned int	0.01		
36	Output PF_C	Unsigned int	0.01		
37	Output kVA Phase A	Unsigned int	0.1/1	kVA/VA	HT11、HT31 series just have phase A, the registers of phase B and C be reserved.
38	Output kVA Phase B	Unsigned int	0.1	kVA	
39	Output kVA Phase C	Unsigned int	0.1	kVA	
40	Output kW Phase A	Unsigned int	0.1/1	kW/W	
41	Output kW Phase B	Unsigned int	0.1	kW	
42	Output kW Phase C	Unsigned int	0.1	kW	
43	Output kVar Phase A	Unsigned int	0.1/1	kVar/Var	
44	Output kVar Phase B	Unsigned int	0.1	kVar	
45	Output kVar Phase C	Unsigned int	0.1	kVar	
46	Load percent Phase A	Unsigned int	0.1	%	
47	Load percent Phase B	Unsigned int	0.1	%	
48	Load percent Phase C	Unsigned int	0.1	%	
49	Environment temperature	Unsigned int	0.1	°C	
50	Battery voltage positive	Unsigned int	0.1	V	HT11、HT31 series just have phase A, the registers of phase B and C be reserved. Battery current: Charge>0,Discharge<0
51	Battery voltage negative	Unsigned int	0.1	V	
52	Battery current positive	int	0.1	A	
53	Battery current negative	int	0.1	A	
54	Battery temperature	Unsigned int	0.1	°C	

55	Battery remain time	Unsigned int	0.1	min	
56	Battery capacity	Unsigned int	0.1	%	
57	Reserved				
58	Reserved				
59	Reserved				
60	Reserved				
61	Reserved				
62	Reserved				
63	Reserved				
64	Reserved				
65	Reserved				
66	Reserved				
67	Reserved				
68	Monitor series number	Unsigned int	1		
69	First monitor version number	Unsigned int	1		
70	Second monitor version number	Unsigned int	1		
71	No. of currently available unit	Unsigned int	1		<p>RMX、HTX series: Bit0-Bit3: Adjustment enable bits (0: disable, 1: enable) Bit0: Invertor Adjust Bit1: Bypass Adjust Bit2: Input Adjust Bit3: Battery Adjust</p> <p>Other series(except HT11(1-3KVA), it no this function): Bit0-Bit3: The number of currently online module(1-10). If it is 0, it means adjustment conditions is not OK. Bit4-Bit15: Reserved</p>
72	Unit N Inv voltage A	Unsigned int	0.1	V	<p>HT11、HT31 series just have phase A, the registers of phase B and C be reserved. HT11(1-3KVA) no this function (Internal use only)</p>
73	Unit N Inv voltage B	Unsigned int	0.1	V	
74	Unit N Inv voltage C	Unsigned int	0.1	V	
75	Unit N bypass voltage A	Unsigned int	0.1	V	
76	Unit N bypass voltage B	Unsigned int	0.1	V	
77	Unit N bypass voltage C	Unsigned int	0.1	V	
78	UPS series number	Unsigned int	1		Bit0-Bit5: UPS series 1:RMX(20-600KVA) 2:RM(10-200 KVA) 3:HT33(40-200 KVA)

					4:HTX33(10-40 KVA) 5:HT33(10-30 KVA) 6:HT31(10-20 KVA) 7:HT11(6-20 KVA) 8:HT11(1-3 KVA) Bit6-Bit15:Reserved
79	Reserved				
80	MTR_IP_PORT	Unsigned int	1		(Used by tooling test) Monitoring board input port state defined as follows: Bit0:MaintCb Bit1:LcdPenIrq Bit2:DryBCBClosed Bit3:DryBCBOnline Bit4:BCBGenOnline Bit5:KeyMute Bit6:KeyTxByp Bit7:KeyTxInv Bit8:Epo Bit9:ByFanFail Bit10: ServiceMod Bit11: ModConnectOk Bit12: CabConnectOk Bit13: AsRemoteSd Bit14: RemoteEpo Bit15: Reserved
The follows are module data, currently only supported by RMX(20-600KVA) and RM(10-200KVA) series.					
2000	Current Module Number	Unsigned int	1		Record the module data from which module
2001	Main Input Voltage Phase A	Unsigned int	0.1	V	
2002	Main Input Voltage Phase B	Unsigned int	0.1	V	
2003	Main Input Voltage Phase C	Unsigned int	0.1	V	
2004	Main Input Current Phase A	Unsigned int	0.1	A	
2005	Main Input Current Phase B	Unsigned int	0.1	A	
2006	Main Input Current Phase C	Unsigned int	0.1	A	
2007	Main Input Frequency Phase A	Unsigned int	0.01	Hz	
2008	Main Input Frequency Phase B	Unsigned int	0.01	Hz	
2009	Main Input Frequency Phase C	Unsigned int	0.01	Hz	
2010	Input PF Phase A	Unsigned int	0.01		

2011	Input PF Phase B	Unsigned int	0.01		
2012	Input PF Phase C	Unsigned int	0.01		
2013	Postive DC Bus Voltage	Unsigned int	0.1	V	
2014	Negative DC Bus Voltage	Unsigned int	0.1	V	
2015	Postive Battery String Voltage	Unsigned int	0.1	V	
2016	Negative Battery String Voltage	Unsigned int	0.1	V	
2017	Postive Charger Voltage	Unsigned int	0.1	V	
2018	Negative Charger Voltage	Unsigned int	0.1	V	
2019	Postive Charger Current	Unsigned int	0.1	A	
2020	Negative Charger Current	Unsigned int	0.1	A	
2021	Postive Discharge Current	Unsigned int	0.1	A	
2022	Negative Discharge Current	Unsigned int	0.1	A	
2023	Invertor Voltage Phase A	Unsigned int	0.1	V	
2024	Invertor Voltage Phase B	Unsigned int	0.1	V	
2025	Invertor Voltage Phase C	Unsigned int	0.1	V	
2026	Output Current Phase A	Unsigned int	0.1	V	
2027	Output Current Phase B	Unsigned int	0.1	V	
2028	Output Current Phase C	Unsigned int	0.1	V	
2029	Output Frequency Phase A	Unsigned int	0.01	A	
2030	Output Frequency Phase B	Unsigned int	0.01	A	
2031	Output Frequency Phase C	Unsigned int	0.01	A	
2032	Output PF Phase A	Unsigned int	0.01		
2033	Output PF Phase B	Unsigned int	0.01		
2034	Output PF Phase C	Unsigned int	0.01		
2035	Output Voltage Phase A	Unsigned int	0.1	V	
2036	Output Voltage Phase B	Unsigned int	0.1	V	
2037	Output Voltage Phase C	Unsigned int	0.1	V	
2038	Bypass Voltage Phase A	Unsigned int	0.1	V	
2039	Bypass Voltage Phase B	Unsigned int	0.1	V	
2040	Bypass Voltage Phase C	Unsigned int	0.1	V	
2041	Output Apparent Power Phase A	Unsigned int	0.1	kVA/VA	
2042	Output Apparent Power Phase B	Unsigned int	0.1	kVA	
2043	Output Apparent Power Phase C	Unsigned int	0.1	kVA	
2044	Output Active Power Phase A	Unsigned int	0.1	kW/W	
2045	Output Active Power Phase B	Unsigned int	0.1	kW	
2046	Output Active Power Phase C	Unsigned int	0.1	kW	

2047	Output Reactive Power Phase A	Unsigned int	0.1	kVar/Var	
2048	Output Reactive Power Phase B	Unsigned int	0.1	kVar	
2049	Output Reactive Power Phase C	Unsigned int	0.1	kVar	
2050	Output Load Percentage Phase A	Unsigned int	0.1	%	
2051	Output Load Percentage Phase B	Unsigned int	0.1	%	
2052	Output Load Percentage Phase C	Unsigned int	0.1	%	
2053	Reserved	Unsigned int			
2054	Reserved	Unsigned int			
2055	Reserved	Unsigned int			
2056	Reserved	Unsigned int			
2057	Reserved	Unsigned int			
2058	Reserved	Unsigned int			
2059	Reserved	Unsigned int			
2060	Reserved	Unsigned int			
2061	Reserved	Unsigned int			
2062	Reserved	Unsigned int			
2063	Reserved	Unsigned int			
2064	Reserved	Unsigned int			
2065	Reserved	Unsigned int			
2066	Reserved	Unsigned int			
2067	Reserved	Unsigned int			
2068	Reserved	Unsigned int			
2069	Reserved	Unsigned int			
2070	Reserved	Unsigned int			
2071	Reserved	Unsigned int			
2072	Reserved	Unsigned int			
The follows are module expanding data, currently only supported by RMX(20-600KVA) series.					
2073	Fan Running Time (hour)	Unsigned int	1	h	
2074	DC Bus Capacitor Running Time (hour)	Unsigned int	1	h	
2075	Reserved	Unsigned int			
2076	Reserved	Unsigned int			
2077	Forbid Rectifier Power On Sign Integration	Unsigned int	1		
2078	Utility Power And Battery Sign Integration	Unsigned int	1		
2079	Reserved	Unsigned int			
2080	Reserved	Unsigned int			

2081	Rectifier DSP Input Port	Unsigned int	1		
2082	Rectifier DSP Output Port	Unsigned int	1		
2083	Invertor DSP Input Port	Unsigned int	1		
2084	Invertor DSP Output	Unsigned int	1		
2085	Allow Invertor On Sign Integration	Unsigned int	1		
2086	Allow Transfer to Invert Sign Integration	Unsigned int	1		
2087	Transfer to Bypass Locked Sign Integration	Unsigned int	1		
2088	Invertor Power Off Locked Sign Integration	Unsigned int	1		
2089	Reserved	Unsigned int			
2090	Invertor IO CAN	Unsigned int	1		
2091	Invertor DATA CAN	Unsigned int	1		
2092	Parallel Signal	Unsigned int	1		
2093	Read Rectifier Variate	Unsigned int	1		
2094	Write Rectifier Variate	Unsigned int	1		
2095	Read Invertor Variate	Unsigned int	1		
2096	Write Invertor Variate	Unsigned int	1		
2097	Inlet Temperature	Unsigned int	0.1	°C	
2098	Outlet Temperature	Unsigned int	0.1	°C	
2099	Rectifier IGBT Temperature Phase A	Unsigned int	0.1	°C	
2100	Rectifier IGBT Temperature Phase B	Unsigned int	0.1	°C	
2101	Rectifier IGBT Temperature Phase C	Unsigned int	0.1	°C	
2102	Invertor IGBT Temperature Phase A	Unsigned int	0.1	°C	
2103	Invertor IGBT Temperature Phase B	Unsigned int	0.1	°C	
2104	Invertor IGBT Temperature Phase C	Unsigned int	0.1	°C	
2105	Reserved	Unsigned int			
2106	Reserved	Unsigned int			
2107	Reserved	Unsigned int			
2108	Reserved	Unsigned int			
2109	Reserved	Unsigned int			
2110	Reserved	Unsigned int			
2111	Reserved	Unsigned int			
2112	Reserved	Unsigned int			
2113	Reserved	Unsigned int			
2114	Reserved	Unsigned int			

2115	Reserved	Unsigned int			
2116	Reserved	Unsigned int			
2117	Reserved	Unsigned int			
2118	Reserved	Unsigned int			
2119	Reserved	Unsigned int			
2120	Reserved	Unsigned int			
2121	Reserved	Unsigned int			
2122	Reserved	Unsigned int			
2123	Reserved	Unsigned int			
2124	Reserved	Unsigned int			
2125	Reserved	Unsigned int			
2126	Reserved	Unsigned int			
2127	Reserved	Unsigned int			
2128	Reserved	Unsigned int			
2129	Reserved	Unsigned int			
2130	Reserved	Unsigned int			
2131	Reserved	Unsigned int			
2132	Reserved	Unsigned int			
2133	Reserved	Unsigned int			
2134	Reserved	Unsigned int			
2135	Reserved	Unsigned int			
2136	Reserved	Unsigned int			
2137	Reserved	Unsigned int			
2138	Reserved	Unsigned int			
2139	Reserved	Unsigned int			
2140	Reserved	Unsigned int			
2141	Reserved	Unsigned int			
2142	Reserved	Unsigned int			
2143	Reserved	Unsigned int			
2144	Reserved	Unsigned int			

The follows are module version informations, currently only supported by RMX(20-600KVA) and RM(10-200KVA) series.

2145	Rectifier Identifier	Unsigned int	1		
2146	Rectifier Series Number	Unsigned int	1		
2147	Rectifier First Version Number	Unsigned int	1		
2148	Rectifier Second Version Number	Unsigned int	1		
2149	Invertor Identifier	Unsigned int	1		
2150	Invertor Series Number	Unsigned int	1		
2151	Invertor First Version Number	Unsigned int	1		
2152	Invertor Second Version Number	Unsigned int	1		

For example:

Assuming UPS device address is 0x12, start address of the register is 0x0005, No. of the register is 2, to inquiry “Bypass current ph_B” and “Bypass current ph_C”, if “Bypass current ph_B” is 50.2A, “Bypass current ph_C” is 50.2A, coefficient is 0.1, so:

Register 0x0005 value is: (502)D = (01F6)H

Register 0x0006 value is: (502)D = (01F6)H

Return number of the register is: 4

RTU mode, request and response frame information as follow:

Request frame:

	Device address	Function code	Start address of register	Register number	CRC
data	0x12	0x03	0x0005	0x0002	0xAD96

Response frame:

	Device address	Function code	Data Length(byte)	Data content		CRC
data	0x12	0x03	0x04	0x01F6	0x01F6	0xEAB8

ASCII mode, request and response frame information as follow:

Request frame:

	start	Device address	Function code	Start address of register		Register number		LRC	Stop
	:	0x12	0x03	0x0005		0x0002		0xE4	CRLF
ASCII	0x3A	0x3132	0x3033	0x3030	0x3035	0x3030	0x3032	0x4534	0x0D0A

Response frame: :

	Start	Device address	Function code	Data Length (byte)	Data content				LRC	Stop
	:	0x12	0x03	0x04	01F6		01F6		0xF3	CRLF
ASCII	0x3A	0x3132	0x3033	0x3034	0x3031	0x4636	0x3031	0x4636	0x4633	0x0D0A

2.2、Telesignalization (Function code: 0x04)

No. (Register)	Name	Data type (Hi-Lo)	Remark
81	Load On Source	Unsigned int	0: None 1: UPS Supply 2: Bypass Supply
82	Battery Status	Unsigned int	0: Not Work 1: Float Charge 2: Boost Charge 3: Discharge
83	Battery Connect Status	Unsigned int	0: Not Connect 1: Connect
84	Maintain Cb Status	Unsigned int	0: Open 1: Close
85	EPO	Unsigned int	0: None 1: EPO
86	Invertor Ready Capacity	Unsigned int	0: Enough 1: Not Enough
87	Generator Input	Unsigned int	0: Disconnect 1: Connect
88	Input Fail	Unsigned int	0: Normal 1: Abnormal
89	Bypass Sequence Fail	Unsigned int	0: Normal 1: Abnormal
90	Bypass Voltage Fail	Unsigned int	0: Normal 1: Abnormal
91	Bypass Fail	Unsigned int	0: Normal 1: Abnormal
92	Bypass Over Load	Unsigned int	0: No 1: Yes
93	Bypass Over Load Timeout	Unsigned int	0: No 1: Yes
94	Bypass Untrack	Unsigned int	0: No 1: Yes
95	Tx Time Limit	Unsigned int	0: No 1: Yes
96	Output Shorted	Unsigned int	0: No 1: Yes
97	Battery EOD	Unsigned int	0: No 1: Yes
98	Battery Test Begin (Reserved)	Unsigned int	0: No 1: Yes
99	Battery Test Result	Unsigned int	0: No Test

			1:Test Success 2:Test Fail 3:Testing
100	Battery Manual Test (Reserved)	Unsigned int	0: No 1: Yes
101	Battery Maintain Result	Unsigned int	0:No Maintain 1:Maintain success 2: Maintain Fail 3:Maintaining
102	Stop Test (Reserved)	Unsigned int	
103	Fault Clear (Reserved)	Unsigned int	
104	Hislog Clear (Reserved)	Unsigned int	
105	On Ups Inhibited	Unsigned int	0: Invertor On Enable 1: Invertor On Disable
106	Manual Tx Bypass	Unsigned int	0: No 1: Yes
107	Battery Volt Low	Unsigned int	0: No 1: Yes
108	Battery Reverse	Unsigned int	0: No 1: Yes
109	REC Status	Unsigned int	0:OFF 1:Soft Start 2:Normal Work
110	Input Neutral Lost	Unsigned int	0: No Lost 1: Lost
111	Bypass Fan Fail	Unsigned int	0: Normal 1: Fail
112	Lost N+X Redundant	Unsigned int	0: No Lost 1: Lost
113	EOD System Inhibited	Unsigned int	0: No 1: Inhibited
114	CT Weld Reverse	Unsigned int	0: Normal 1: Reverse Just HT11(1-3k) have this function
115	Reserved		
116	Reserved		
117	Reserved		
118	Reserved		
119	First Module Online Flag Bit	Unsigned int	Bit15: Module 32 Bit14: Module 31 ... Bit0: Module 17 Corresponding bit is 1 means the module on, 0 means the module off Just RMX(20-600KVA)and

			RM(10-200KVA) have this function
120	Second Module Online Flag Bit	Unsigned int	Bit15: Module 16 Bit14: Module 15 ... Bit0: Module 1 Corresponding bit is 1 means the module on, 0 means the module off Just RMX(20-600KVA)and RM(10-200KVA) have this function
121	Unit 1 Pull	Unsigned int	0: Pull Out 1: Join In
122	Unit 1 REC Fail	Unsigned int	0: Normal 1: Abnormal
123	Unit 1 INV Fail	Unsigned int	0: Normal 1: Abnormal
124	Unit 1 REC Over Temperature	Unsigned int	0: Normal 1: Abnormal
125	Unit 1 Fan Fail	Unsigned int	0: Normal 1: Abnormal
126	Unit 1 INV Over Load	Unsigned int	0: Normal 1: Abnormal
127	Unit 1 INV Over Load Timeout	Unsigned int	0: Normal 1: Abnormal
128	Unit 1 INV Over Temperature	Unsigned int	0: Normal 1: Abnormal
129	Unit 1 INV Protect	Unsigned int	0: Normal 1: Abnormal
130	Unit 1 Manual Shutdown	Unsigned int	0: Normal 1: Shutdown
131	Reserved		
132	Reserved		
133	Unit 2 Pull	Unsigned int	0: Pull Out 1: Join In
134	Unit 2 REC Fail	Unsigned int	0: Normal 1: Abnormal
135	Unit 2 INV Fail	Unsigned int	0: Normal 1: Abnormal
136	Unit 2 REC Over Temperature	Unsigned int	0: Normal 1: Abnormal
137	Unit 2 Fan Fail	Unsigned int	0: Normal 1: Abnormal
138	Unit 2 INV Over Load	Unsigned int	0: Normal 1: Abnormal
139	Unit 2 INV Over Load Timeout	Unsigned int	0: Normal 1: Abnormal
140	Unit 2 INV Over Temperature	Unsigned int	0: Normal 1: Abnormal
141	Unit 2 INV Protect	Unsigned int	0: Normal 1: Abnormal
142	Unit 2 Manual Shutdown	Unsigned int	0: Normal 1: Shutdown
143	Reserved		
144	Reserved		
145	Unit 3 Pull	Unsigned int	0: Pull Out 1: Join In
146	Unit 3 REC Fail	Unsigned int	0: Normal 1: Abnormal
147	Unit 3 INV Fail	Unsigned int	0: Normal 1: Abnormal
148	Unit 3 REC Over Temperature	Unsigned int	0: Normal 1: Abnormal
149	Unit 3 Fan Fail	Unsigned int	0: Normal 1: Abnormal
150	Unit 3 INV Over Load	Unsigned int	0: Normal 1: Abnormal
151	Unit 3 INV Over Load Timeout	Unsigned int	0: Normal 1: Abnormal
152	Unit 3 INV Over Temperature	Unsigned int	0: Normal 1: Abnormal
153	Unit 3 INV Protect	Unsigned int	0: Normal 1: Abnormal
154	Unit 3 Manual Shutdown	Unsigned int	0: Normal 1: Shutdown
155	Reserved		

156	Reserved		
157	Unit 4 Pull	Unsigned int	0: Pull Out 1: Join In
158	Unit 4 REC Fail	Unsigned int	0: Normal 1: Abnormal
159	Unit 4 INV Fail	Unsigned int	0: Normal 1: Abnormal
160	Unit 4 REC Over Temperature	Unsigned int	0: Normal 1: Abnormal
161	Unit 4 Fan Fail	Unsigned int	0: Normal 1: Abnormal
162	Unit 4 INV Over Load	Unsigned int	0: Normal 1: Abnormal
163	Unit 4 INV Over Load Timeout	Unsigned int	0: Normal 1: Abnormal
164	Unit 4 INV Over Temperature	Unsigned int	0: Normal 1: Abnormal
165	Unit 4 INV Protect	Unsigned int	0: Normal 1: Abnormal
166	Unit 4 Manual Shutdown	Unsigned int	0: Normal 1: Shutdown
167	Reserved		
168	Reserved		
169	Unit 5 Pull	Unsigned int	0: Pull Out 1: Join In
170	Unit 5 REC Fail	Unsigned int	0: Normal 1: Abnormal
171	Unit 5 INV Fail	Unsigned int	0: Normal 1: Abnormal
172	Unit 5 REC Over Temperature	Unsigned int	0: Normal 1: Abnormal
173	Unit 5 Fan Fail	Unsigned int	0: Normal 1: Abnormal
174	Unit 5 INV Over Load	Unsigned int	0: Normal 1: Abnormal
175	Unit 5 INV Over Load Timeout	Unsigned int	0: Normal 1: Abnormal
176	Unit 5 INV Over Temperature	Unsigned int	0: Normal 1: Abnormal
177	Unit 5 INV Protect	Unsigned int	0: Normal 1: Abnormal
178	Unit 5 Manual Shutdown	Unsigned int	0: Normal 1: Shutdown
179	Reserved		
180	Reserved		
181	Unit 6 Pull	Unsigned int	0: Pull Out 1: Join In
182	Unit 6 REC Fail	Unsigned int	0: Normal 1: Abnormal
183	Unit 6 INV Fail	Unsigned int	0: Normal 1: Abnormal
184	Unit 6 REC Over Temperature	Unsigned int	0: Normal 1: Abnormal
185	Unit 6 Fan Fail	Unsigned int	0: Normal 1: Abnormal
186	Unit 6 INV Over Load	Unsigned int	0: Normal 1: Abnormal
187	Unit 6 INV Over Load Timeout	Unsigned int	0: Normal 1: Abnormal
188	Unit 6 INV Over Temperature	Unsigned int	0: Normal 1: Abnormal
189	Unit 6 INV Protect	Unsigned int	0: Normal 1: Abnormal
190	Unit 6 Manual Shutdown	Unsigned int	0: Normal 1: Shutdown
191	Reserved		
192	Reserved		
193	Unit 7 Pull	Unsigned int	0: Pull Out 1: Join In
194	Unit 7 REC Fail	Unsigned int	0: Normal 1: Abnormal
195	Unit 7 INV Fail	Unsigned int	0: Normal 1: Abnormal
196	Unit 7 REC Over Temperature	Unsigned int	0: Normal 1: Abnormal
197	Unit 7 Fan Fail	Unsigned int	0: Normal 1: Abnormal
198	Unit 7 INV Over Load	Unsigned int	0: Normal 1: Abnormal

199	Unit 7 INV Over Load Timeout	Unsigned int	0: Normal 1: Abnormal
200	Unit 7 INV Over Temperature	Unsigned int	0: Normal 1: Abnormal
201	Unit 7 INV Protect	Unsigned int	0: Normal 1: Abnormal
202	Unit 7 Manual Shutdown	Unsigned int	0: Normal 1: Shutdown
203	Reserved		
204	Reserved		
205	Unit 8 Pull	Unsigned int	0: Pull Out 1: Join In
206	Unit 8 REC Fail	Unsigned int	0: Normal 1: Abnormal
207	Unit 8 INV Fail	Unsigned int	0: Normal 1: Abnormal
208	Unit 8 REC Over Temperature	Unsigned int	0: Normal 1: Abnormal
209	Unit 8 Fan Fail	Unsigned int	0: Normal 1: Abnormal
210	Unit 8 INV Over Load	Unsigned int	0: Normal 1: Abnormal
211	Unit 8 INV Over Load Timeout	Unsigned int	0: Normal 1: Abnormal
212	Unit 8 INV Over Temperature	Unsigned int	0: Normal 1: Abnormal
213	Unit 8 INV Protect	Unsigned int	0: Normal 1: Abnormal
214	Unit 8 Manual Shutdown	Unsigned int	0: Normal 1: Shutdown
215	Reserved		
216	Reserved		
217	Unit 9 Pull	Unsigned int	0: Pull Out 1: Join In
218	Unit 9 REC Fail	Unsigned int	0: Normal 1: Abnormal
219	Unit 9 INV Fail	Unsigned int	0: Normal 1: Abnormal
220	Unit 9 REC Over Temperature	Unsigned int	0: Normal 1: Abnormal
221	Unit 9 Fan Fail	Unsigned int	0: Normal 1: Abnormal
222	Unit 9 INV Over Load	Unsigned int	0: Normal 1: Abnormal
223	Unit 9 INV Over Load Timeout	Unsigned int	0: Normal 1: Abnormal
224	Unit 9 INV Over Temperature	Unsigned int	0: Normal 1: Abnormal
225	Unit 9 INV Protect	Unsigned int	0: Normal 1: Abnormal
226	Unit 9 Manual Shutdown	Unsigned int	0: Normal 1: Shutdown
227	Reserved		
228	Reserved		
229	Unit 10 Pull	Unsigned int	0: Pull Out 1: Join In
230	Unit 10 REC Fail	Unsigned int	0: Normal 1: Abnormal
231	Unit 10 INV Fail	Unsigned int	0: Normal 1: Abnormal
232	Unit 10 REC Over Temperature	Unsigned int	0: Normal 1: Abnormal
233	Unit 10 Fan Fail	Unsigned int	0: Normal 1: Abnormal
234	Unit 10 INV Over Load	Unsigned int	0: Normal 1: Abnormal
235	Unit 10 INV Over Load Timeout	Unsigned int	0: Normal 1: Abnormal
236	Unit 10 INV Over Temperature	Unsigned int	0: Normal 1: Abnormal
237	Unit 10 INV Protect	Unsigned int	0: Normal 1: Abnormal
238	Unit 10 Manual Shutdown	Unsigned int	0: Normal 1: Shutdown
239	Reserved		
240	Reserved		

The follows are module status data, currently only supported by RMX(20-600KVA) and RM(10-200KVA) series.

3000	Current Module Number	Unsigned int	Record the module data from which module, you can set this register by function code 0x06.
3001	Load On Source	Unsigned int	Bit12-Bit15: 0000 : None 0001 : UPS 0010 : Bypass 0100 : Other Unit
	Rectifier Status	Unsigned int	Bit8-Bit11: 0000 : OFF 0001 : Soft Start 0010 : Normal Work
	Invertor Status	Unsigned int	Bit4-Bit7: 0000 : OFF 0001 : Soft Start 0010 : Normal Work
	Bypass Status	Unsigned int	Bit0-Bit3: 0000 : Abnormal 0001 : Normal
3002	Battery Status	Unsigned int	Bit12-Bit15: 0000 : Disconnect 0001 : Boost Charging 0010 : Float Charging 0100 : Discharging 1000 : Not Working
	Input CB Status	Unsigned int	Bit8-Bit11: 0000 : Open 0001 : Close
	Bypass CB Status	Unsigned int	Bit4-Bit7: 0000 : Open 0001 : Close
	Output CB Status	Unsigned int	Bit0-Bit3: 0000 : Open 0001 : Close
3003	Maintenance CB Status	Unsigned int	Bit12-Bit15: 0000 : Open 0001 : Close
	Postive Battery String CB Status	Unsigned int	Bit8-Bit11: 0000 : Open 0001 : Close
	Negative Battery String CB Status	Unsigned int	Bit4-Bit7: 0000 : Open 0001 : Close
	Postive Battery String Connect Status	Unsigned int	Bit0-Bit3: 0000 : Disconnect

			0001 : Connect
3004	Negative Battery String Connect Status	Unsigned int	Bit12-Bit15: 0000 : Disconnect 0001 : Connect
	Invertor On Allow Status	Unsigned int	Bit8-Bit11: 0000 : Disable 0001 : Enable
	Invertor Working Status	Unsigned int	Bit4-Bit7: 0000 : Not Ready 0001 : Ready 0010 : Supplying
	Generator Connect Status	Unsigned int	Bit0-Bit3: 0000 : Disconnect 0001 : Connect
3005	Service Mode	Unsigned int	Bit12-Bit15: 0000 : No 0001 : Yes
	Invertor Ready Capacity	Unsigned int	Bit8-Bit11: 0000 : Enough 0001 : Less
	Load Capacity VS Invertor Capacity	Unsigned int	Bit4-Bit7: 0000 : Invertor Capacity More 0001 : Load Capacity More
	BCB Shunt Trip Status	Unsigned int	Bit0-Bit3: 0000 : No Action 0001 : Trip
3006	BCB Connect Status	Unsigned int	Bit12-Bit15: 0000 : Disconnect 0001 : Connect
	BCB Status	Unsigned int	Bit8-Bit11: 0000 : Open 0001 : Close
	EPO Status	Unsigned int	Bit4-Bit7: 0000 : No Action 0001 : EPO
	Module Pull Status	Unsigned int	Bit0-Bit3: 0000 : Inset 0001 : Pull Out
3007	Invertor Available Status	Unsigned int	Bit12-Bit15: 0000 : Unavailable 0001 : Available
	Power On End Flag	Unsigned int	Bit8-Bit11: 0000 : Not End 0001 : End
	LBS Available Status	Unsigned int	Bit4-Bit7:

			0000 : Unavailable 0001 : Available
	Synchronization Source	Unsigned int	Bit0-Bit3: 0000 : Reserved 0001 : Local Oscillator 0010 : Synchronize Bypass 0100 : Reserved 1000 : Synchronize LBS
3008	Interrupt Transfer to Inverter	Unsigned int	Bit12-Bit15: 0000 : Disable 0001 : Enable
	Dormancy Status	Unsigned int	Bit8-Bit11: 0000 : No 0001 : Yes
	Small LCD Function Key Status	Unsigned int	Bit4-Bit7: 0000 : OFF 0001 : ON
	Small LCD Current Page	Unsigned int	Bit0-Bit3: 0~7 means the number of page index after turn page
3009	If wave exist in XROM	Unsigned int	Bit12-Bit15: 0000 : No 0001 : Yes
	If the wave is triggering	Unsigned int	Bit8-Bit11: 0000 : No 0001 : Yes
	Reserved	Unsigned int	
	Reserved	Unsigned int	
3010	Reserved	Unsigned int	
3011	Reserved	Unsigned int	
3012	Reserved	Unsigned int	
3013	Reserved	Unsigned int	
3014	Reserved	Unsigned int	
3015	Reserved	Unsigned int	
3016	Reserved	Unsigned int	
The follows are module alarm data, currently only supported by RMX(20-600KVA) and RM(10-200KVA) series.			
3017	Synchronization Status	Unsigned int	Bit12-Bit15: 0000 : Asynchronize 0001 : Synchronized
	Utility Power	Unsigned int	Bit8-Bit11: 0000 : Normal 0001 : Fault
	Rectifier	Unsigned int	Bit4-Bit7: 0000 : Normal 0001 : Fault

	Inverter	Unsigned int	Bit0-Bit3: 0000 : Normal 0001 : Fault
3018	Bypass Power	Unsigned int	Bit12-Bit15: 0000 : Normal 0001 : Fault
	Postive Battery String Voltage	Unsigned int	Bit8-Bit11: 0000 : Normal 0001 : Low 0010 : High
	Negative Battery String Voltage	Unsigned int	Bit4-Bit7: 0000 : Normal 0001 : Low 0010 : High
	Postive Battery String Temperature	Unsigned int	Bit0-Bit3: 0000 : Normal 0001 : Fault
3019	Negative Battery String Temperature	Unsigned int	Bit12-Bit15: 0000 : Normal 0001 : Fault
	Input Voltage Phase A	Unsigned int	Bit8-Bit11: 0000 : Normal 0001 : Low 0010 : High
	Input Voltage Phase B	Unsigned int	Bit4-Bit7: 0000 : Normal 0001 : Low 0010 : High
	Input Voltage Phase C	Unsigned int	Bit0-Bit3: 0000 : Normal 0001 : Low 0010 : High
3020	Input Current Phase A	Unsigned int	Bit12-Bit15: 0000 : Normal 0001 : Fault
	Input Current Phase B	Unsigned int	Bit8-Bit11: 0000 : Normal 0001 : Fault
	Input Current Phase C	Unsigned int	Bit4-Bit7: 0000 : Normal 0001 : Fault
	Output Voltage Phase A	Unsigned int	Bit0-Bit3: 0000 : Normal 0001 : Low 0010 : High

3021	Output Voltage Phase B	Unsigned int	Bit12-Bit15: 0000 : Normal 0001 : Low 0010 : High
	Output Voltage Phase C	Unsigned int	Bit8-Bit11: 0000 : Normal 0001 : Low 0010 : High
	Output Current Phase A	Unsigned int	Bit4-Bit7: 0000 : Normal 0001 : Fault
	Output Current Phase B	Unsigned int	Bit0-Bit3: 0000 : Normal 0001 : Fault
3022	Output Current Phase C	Unsigned int	Bit12-Bit15: 0000 : Normal 0001 : Fault
	(Not use in 20K module) Line Synchronization Signal	Unsigned int	Bit8-Bit11: 0000 : Normal 0001 : Fault
	(Not use in 20K module) PWM Synchronization Signal	Unsigned int	Bit4-Bit7: 0000 : Normal 0001 : Fault
	(Not use in 20K module) Input Current Unbalance	Unsigned int	Bit0-Bit3: 0000 : Normal 0001 : Fault
3023	Utility Voltage Status	Unsigned int	Bit12-Bit15: 0000 : Normal 0001 : Fault
	Utility Frequency Status	Unsigned int	Bit8-Bit11: 0000 : Normal 0001 : Fault
	Main Input Sequence Status	Unsigned int	Bit4-Bit7: 0000 : Normal 0001 : Fault
	REC Soft Start Status	Unsigned int	Bit0-Bit3: 0000 : Normal 0001 : Fault
3024	REC IGBT Over Current	Unsigned int	Bit12-Bit15: 0000 : Normal 0001 : Fault
	Input Inductance Over Temperature	Unsigned int	Bit8-Bit11: 0000 : Normal 0001 : Fault
	Rectifier Over Temperature	Unsigned int	Bit4-Bit7:

			0000 : Normal 0001 : Fault
	Postive DC Bus Over Voltage	Unsigned int	Bit0-Bit3: 0000 : Normal 0001 : Fault
3025	Negative DC Bus Over Voltage	Unsigned int	Bit12-Bit15: 0000 : Normal 0001 : Fault
	Fan Fail(All)	Unsigned int	Bit8-Bit11: 0000 : Normal 0001 : Fault
	Main BackFeed Protect	Unsigned int	Bit4-Bit7: 0000 : Normal 0001 : Fault
	DC Bus Unbalance	Unsigned int	Bit0-Bit3: 0000 : Normal 0001 : Fault
3026	Postive DC Bus Low Voltage	Unsigned int	Bit12-Bit15: 0000 : Normal 0001 : Fault
	Negative DC Bus Low Voltage	Unsigned int	Bit8-Bit11: 0000 : Normal 0001 : Fault
	Postive Battery String Reverse	Unsigned int	Bit4-Bit7: 0000 : Normal 0001 : Fault
	Negative Battery String Reverse	Unsigned int	Bit0-Bit3: 0000 : Normal 0001 : Fault
3027	Battery Leakage	Unsigned int	Bit12-Bit15: 0000 : Normal 0001 : Fault
	Battery Cool Start	Unsigned int	Bit8-Bit11: 0000 : Normal 0001 : Fault
	Postive Charger Over Voltage	Unsigned int	Bit4-Bit7: 0000 : Normal 0001 : Low 0010 : High
	Negative Charger Over Voltage	Unsigned int	Bit0-Bit3: 0000 : Normal 0001 : Low 0010 : High
3028	Postive Charger Over Temperature	Unsigned int	Bit12-Bit15: 0000 : Normal

			0001 : Fault
	Negative Charger Over Temperature	Unsigned int	Bit8-Bit11: 0000 : Normal 0001 : Fault
	Postive Charger Status	Unsigned int	Bit4-Bit7: 0000 : Normal 0001 : Fault
	Negative Charger Status	Unsigned int	Bit0-Bit3: 0000 : Normal 0001 : Fault
3029	Postive Battery String Low Voltage	Unsigned int	Bit12-Bit15: 0000 : Normal 0001 : Fault
	Negative Battery String Low Voltage	Unsigned int	Bit8-Bit11: 0000 : Normal 0001 : Fault
	Postive Battery String EOD	Unsigned int	Bit4-Bit7: 0000 : Normal 0001 : Fault
	Negative Battery String EOD	Unsigned int	Bit0-Bit3: 0000 : Normal 0001 : Fault
3030	Input Neutral Lost	Unsigned int	Bit12-Bit15: 0000 : Normal 0001 : Fault
	Bypass Sequence Status	Unsigned int	Bit8-Bit11: 0000 : Normal 0001 : Fault
	Bypass Voltage Status	Unsigned int	Bit4-Bit7: 0000 : Normal 0001 : Fault
	Bypass SCR Status	Unsigned int	Bit0-Bit3: 0000 : Normal 0001 : Fault
3031	Bypass Overload	Unsigned int	Bit12-Bit15: 0000 : Normal 0001 : Fault
	Bypass Overload Time Out	Unsigned int	Bit8-Bit11: 0000 : Normal 0001 : Fault
	Bypass Freqence Over Track	Unsigned int	Bit4-Bit7: 0000 : Normal 0001 : Fault
	Bypass BackFeed Protect	Unsigned int	Bit0-Bit3: 0000 : Normal

			0001 : Fault
3032	Pulse Load to Bypass	Unsigned int	Bit12-Bit15: 0000 : Normal 0001 : Fault
	Overload Time Out	Unsigned int	Bit8-Bit11: 0000 : Normal 0001 : Fault
	Bypass Fail and Shutdown	Unsigned int	Bit4-Bit7: 0000 : Normal 0001 : Fault
	Auxiliary Power Lost	Unsigned int	Bit0-Bit3: 0000 : Normal 0001 : Fault
3033	Manual Shutdown	Unsigned int	Bit12-Bit15: 0000 : Normal 0001 : Fault
	Invertor Protect	Unsigned int	Bit8-Bit11: 0000 : Normal 0001 : Fault
	Exceed Tx Times Limit(Per hour)	Unsigned int	Bit4-Bit7: 0000 : Normal 0001 : Fault
	Output Power BackFeed	Unsigned int	Bit0-Bit3: 0000 : Normal 0001 : Fault
3034	Input Fuse Breakdown	Unsigned int	Bit12-Bit15: 0000 : Normal 0001 : Fault
	Bypass Over Current Lock	Unsigned int	Bit8-Bit11: 0000 : Normal 0001 : Fault
	Invertor Inductance Over Temperature	Unsigned int	Bit4-Bit7: 0000 : Normal 0001 : Fault
	Invertor Over Temperature	Unsigned int	Bit0-Bit3: 0000 : Normal 0001 : Fault
3035	Invertor IGBT Over Current	Unsigned int	Bit12-Bit15: 0000 : Normal 0001 : Fault
	Output Fuse Breakdown	Unsigned int	Bit8-Bit11: 0000 : Normal 0001 : Fault
	Output Overload	Unsigned int	Bit4-Bit7: 0000 : Normal

			0001 : Fault
	Inverter Relay Status	Unsigned int	Bit0-Bit3: 0000 : Normal 0001 : Fault
3036	Inverter Communication Status	Unsigned int	Bit12-Bit15: 0000 : Normal 0001 : Fault
	Manual Starting Action	Unsigned int	Bit8-Bit11: 0000 : Normal 0001 : Fault
	Parallel Cable Status	Unsigned int	Bit4-Bit7: 0000 : Normal 0001 : Fault
	Parallel Share Status	Unsigned int	Bit0-Bit3: 0000 : Normal 0001 : Fault
3037	User Operation Error	Unsigned int	Bit12-Bit15: 0000 : Normal 0001 : Fault
	Output Shorted Circuit	Unsigned int	Bit8-Bit11: 0000 : Normal 0001 : Fault
	Battery Test	Unsigned int	Bit4-Bit7: 0000 : Not Define 0001 : Test OK 0010 : Test Fail 0100 : Testing
	Battery Maintenance	Unsigned int	Bit0-Bit3: 0000 : Not Define 0001 : Test OK 0010 : Test Fail 0100 : Testing
3038	System Test	Unsigned int	Bit12-Bit15: 0000 : Not Define 0001 : Test OK 0010 : Test Fail
	Inverter Bridge Open	Unsigned int	Bit8-Bit11: 0000 : Normal 0001 : Fault
	Inverter Relay Open	Unsigned int	Bit4-Bit7: 0000 : Normal 0001 : Fault
	Inverter Relay Shorted	Unsigned int	Bit0-Bit3: 0000 : Normal 0001 : Fault

3039	Outlet Temperature Abnormal	Unsigned int	Bit12-Bit15: 0000 : Normal 0001 : Fault
	Input Over Current Time Out	Unsigned int	Bit8-Bit11: 0000 : Normal 0001 : Fault
	Inlet Time Sensor Connect Status	Unsigned int	Bit4-Bit7: 0000 : Normal 0001 : Fault
	Outlet Time Sensor Connect Status	Unsigned int	Bit0-Bit3: 0000 : Normal 0001 : Fault
3040	Fan Fail Over Temperature	Unsigned int	Bit12-Bit15: 0000 : Normal 0001 : Fault
	Reserved		
	Reserved		
	Reserved		
3041-3070 reserved for module alarm			
3071-3190 are comprehensive module alarm, set by bits, corresponding bit is 1 means alarm occurred, 0 means alarm not happen. Every module possess 4 registers, total of 120. Currently, only RMX(20-600KVA) and RM(10-200KVA) have this function.			
3071	Module 1 Comprehensive Alarm	Unsigned int	Bit0: Rectifier Fail Bit1: Invertor Fail Bit2: Rectifier Over Temperature Bit3: Fan Fail Bit4: Over Load Bit5: Over Load Timeout Bit6: Invertor Over Temperature Bit7: Invertor Protect Bit8: Manual Shutdown The follows comprehensive alarm only supported by RMX(20-600KVA) Bit9: Battery or Charger Fail Bit10: Power Share Fail Bit11: Synchron Pulse Fail Bit12: Input Voltage Detect Fail Bit13: Battery Voltage Detect Fail Bit14: Output Voltage Fail Bit15: Bypass Voltage Detect Fail
3072	Module 1 Comprehensive Alarm	Unsigned int	Bit0: Invertor Bridge Fail Bit1: Outlet Temperature Error Bit2: Input Current Unbalance

			Bit3: DC Bus Over Voltage Bit4: Rectifier Soft Start Fail Bit5: Invertor Relay Connect Fail Bit6: Invertor Relay Short Circuit Bit7: PWM Synchron Fail Bit8: Intelligent Sleep Bit9: Input Over Current Timeout Bit10: No Inlet Temperature Sensor Bit11: No Outlet Temperature Sensor Bit12: Capacitor Expired Bit13: Fan Expired Bit14: Module Connector Error Bit15: Firmware Error
3073	Module 1 Comprehensive Alarm	Unsigned int	Reserved
3074	Module 1 Comprehensive Alarm	Unsigned int	Reserved
3075-3078	Module 2 Comprehensive Alarm	Unsigned int	Refer to 3071-3074
3079-3082	Module 3 Comprehensive Alarm	Unsigned int	Refer to 3071-3074
3083-3086	Module 4 Comprehensive Alarm	Unsigned int	Refer to 3071-3074
3087-3090	Module 5 Comprehensive Alarm	Unsigned int	Refer to 3071-3074
3091-3094	Module 6 Comprehensive Alarm	Unsigned int	Refer to 3071-3074
3095-3098	Module 7 Comprehensive Alarm	Unsigned int	Refer to 3071-3074
3099-3102	Module 8 Comprehensive Alarm	Unsigned int	Refer to 3071-3074
3103-3106	Module 9 Comprehensive Alarm	Unsigned int	Refer to 3071-3074
3107-3110	Module 10 Comprehensive Alarm	Unsigned int	Refer to 3071-3074
RMX(20-600KVA) most have 30 modules, RM(10-200KVA) most have 10 modules, the follows only be supported by RMX(20-600KVA).			
3111-3114	Module 11 Comprehensive Alarm	Unsigned int	Refer to 3071-3074
3115-3118	Module 12 Comprehensive Alarm	Unsigned int	Refer to 3071-3074
3119-3122	Module 13 Comprehensive Alarm	Unsigned int	Refer to 3071-3074
3123-3126	Module 14 Comprehensive Alarm	Unsigned int	Refer to 3071-3074
3127-3130	Module 15 Comprehensive Alarm	Unsigned int	Refer to 3071-3074
3131-3134	Module 16 Comprehensive Alarm	Unsigned int	Refer to 3071-3074
3135-3138	Module 17 Comprehensive Alarm	Unsigned int	Refer to 3071-3074
3139-3142	Module 18 Comprehensive Alarm	Unsigned int	Refer to 3071-3074
3143-3146	Module 19 Comprehensive Alarm	Unsigned int	Refer to 3071-3074
3147-3150	Module 20 Comprehensive Alarm	Unsigned int	Refer to 3071-3074
3151-3154	Module 21 Comprehensive Alarm	Unsigned int	Refer to 3071-3074
3155-3158	Module 22 Comprehensive Alarm	Unsigned int	Refer to 3071-3074
3159-3162	Module 23 Comprehensive Alarm	Unsigned int	Refer to 3071-3074
3163-3166	Module 24 Comprehensive Alarm	Unsigned int	Refer to 3071-3074
3167-3170	Module 25 Comprehensive Alarm	Unsigned int	Refer to 3071-3074
3171-3174	Module 26 Comprehensive Alarm	Unsigned int	Refer to 3071-3074
3175-3178	Module 27 Comprehensive Alarm	Unsigned int	Refer to 3071-3074
3179-3172	Module 28 Comprehensive Alarm	Unsigned int	Refer to 3071-3074

3183-3186	Module 29 Comprehensive Alarm	Unsigned int	Refer to 3071-3074
3187-3190	Module 30 Comprehensive Alarm	Unsigned int	Refer to 3071-3074

Note:

HT serial below 30K treat as one module

For example:

Assuming UPS device address is 0x12, start address of the register is 0x006C, No. of the register is 1, to inquiry “Battery Reverse”, if “Battery Reverse” is 0x0000.

RTU mode, request and response frame information as follow:

Request frame:

	Device address	Function code	Start address of register	Register number	CRC
data	0x12	0x04	0x006C	0x0001	0x74F3

Response frame:

	Device address	Function code	Data Length(byte)	Data content	CRC
data	0x12	0x04	0x02	0x0000	0xF33C

ASCII mode, request and response frame information as follow:

Request frame:

	Start	Device address	Function code	Start address of register		Register number		LRC	Stop
	:	0x12	0x04	0x006C		0x0001		0x7D	CRLF
ASCII	0x3A	0x3132	0x3034	0x3030	0x3643	0x3030	0x3031	0x3744	0x0D0A

Response frame:

	Start	Device address	Function code	Data Length (byte)	Data content		LRC	Stop
	:	0x12	0x04	0x02	0x0000		0xE8	CRLF
ASCII	0x3A	0x3132	0x3034	0x3032	0x3030	0x3030	0x4538	0x0D0A

2.3、 Write Single Register(Function 0x06)

Only used by insider

No. (Register)	Name	Data type (Hi-Lo)	Coefficient	Remark
391	Reserved	Unsigned int		
392	Reserved	Unsigned int		
393	Reserved	Unsigned int		
394	Reserved	Unsigned int		
395	Reserved	Unsigned int		
396	Reserved	Unsigned int		
397	Reserved	Unsigned int		
398	Reserved	Unsigned int		
399	Reserved	Unsigned int		
400	Set module ID	Unsigned int		Used by query module data RMX(20-600KVA): 1-30 RM(10-200KVA): 1-10 Other series reserved.

RTU mode, request and response frame information as follow:

Request frame:

	Device address	Function code	Address of register	Register value	CRC
data	0x**	0x06	0x0*** (2 Bytes)	0x0*** (2 Bytes)	0x****

Response frame:

	Device address	Function code	Data Length(byte)	Register value	CRC
data	0x**	0x06	0x0*** (2 Bytes)	0x0*** (2 Bytes)	0x****

ASCII mode, request and response frame information as follow:

Request frame:

	start	Device address	Function code	Address of register	Register value	LRC	Stop
	:	0x**	0x06	0x0*** (2 Bytes)	0x0*** (2 Bytes)	0x**	CRLF
ASCII	0x3A	0x****	0x3036	0x30**,0x****	0x30**,0x****	0x****	0x0D0A

Response frame: :

	Start	Device address	Function code	Data Length (byte)	Data content	LRC	Stop
	:	0x**	0x06	0x0*** (2 Bytes)	0x0*** (2 Bytes)	0xF3	CRLF
ASCII	0x3A	0x****	0x3036	0x30**,0x****	0x30**,0x****	0x4633	0x0D0A

2.4、Query Module Analog Data(Function 0x6D)

Only used by insider

Note: This function be used for getting module telemetry, address range 2000-2152, other address is illegal.

Only RMX(20-600KVA) and RM(10-200KVA) series have this function.

RTU mode, request and response frame information as follow:

Request frame:

	Device address	Function code	Start address of register	Register number	Bytes number	Module ID	CRC
data	0x**	0x6D	0x**** (2 Bytes)	N(2 Bytes)	N*2 (1 Byte)	1-30 (2 Bytes)	0x****

Response frame:

	Device address	Function code	Data bytes number	Data content	CRC
data	0x**	0x6D	N*2 (1 Byte)	0x****, ..., 0x****	0x****

ASCII mode, request and response frame information as follow:

Request frame:

	start	Device address	Function code	Start address of register	Register number	Bytes Number	Module ID	LRC	Stop
data	:	0x**	0x6D	0x**** (2 Bytes)	N (2 Bytes)	N*2 (1)	1-30 (2 Bytes)	0x**	CRLF
ASCII	0x3A	0x****	0x3644	0x****, 0x****	0x****, 0x****	0x****	0x****, 0x****	0x****	0x0D0A

Response frame: :

	Start	Device address	Function code	Data bytes number	Data content	LRC	Stop
data	:	0x**	0x6D	0x** (1 Byte)	0x****, ..., 0x****	0x**	CRLF
ASCII	0x3A	0x****	0x3644	0x****	0x****, 0x****, ..., 0x****, 0x****	0x****	0x0D0A

2.5、Query Module Signal Data(Function 0x6E)

Only used by insider

Note: This function be used for getting module telesignalization, address range 3000-3070, other address is illegal.

Only RMX(20-600KVA) and RM(10-200KVA) series have this function.

RTU mode, request and response frame information as follow:

Request frame:

	Device address	Function code	Start address of register	Register number	Bytes number	Module ID	CRC
data	0x**	0x6E	0x**** (2 Bytes)	N(2 Bytes)	N*2 (1 Byte)	1-30 (2 Bytes)	0x****

Response frame:

	Device address	Function code	Data bytes number	Data content	CRC
data	0x**	0x6E	N*2 (1 Byte)	0x****, ..., 0x****	0x****

ASCII mode, request and response frame information as follow:

Request frame:

	start	Device address	Function code	Start address of register	Register number	Bytes Number	Module ID	LRC	Stop
data	:	0x**	0x6E	0x**** (2 Bytes)	N (2 Bytes)	N*2 (1)	1-30 (2 Bytes)	0x**	CRLF
ASCII	0x3A	0x****	0x3645	0x****, 0x****	0x****, 0x****	0x****	0x****, 0x****	0x****	0x0D0A

Response frame: :

	Start	Device address	Function code	Data bytes number	Data content	LRC	Stop
data	:	0x**	0x6E	0x** (1 Byte)	0x****, ..., 0x****	0x**	CRLF
ASCII	0x3A	0x****	0x3645	0x****	0x****, 0x****, ..., 0x****, 0x****	0x****	0x0D0A

Appendix B CRC table

High_ byte table

/ Table of CRC values for high-order byte */*

```
static unsigned int auchCRCHI[] = {
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81,
0x40, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0,
0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01,
0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81,
0x40, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0,
0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01,
0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81,
0x40, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0,
0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x01,
0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81,
0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0,
0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01,
0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81,
0x40 } ;
```

Low_ byte table

/ Table of CRC values for low-order byte */*

```
static unsigned int auchCRCLo[] = {
0x00, 0xC0, 0xC1, 0x01, 0xC3, 0x03, 0x02, 0xC2, 0xC6, 0x06, 0x07, 0xC7, 0x05, 0xC5, 0xC4,
0x04, 0xCC, 0x0C, 0x0D, 0xCD, 0x0F, 0xCF, 0xCE, 0x0E, 0x0A, 0xCA, 0xCB, 0x0B, 0xC9, 0x09,
0x08, 0xC8, 0xD8, 0x18, 0x19, 0xD9, 0x1B, 0xDB, 0xDA, 0x1A, 0x1E, 0xDE, 0xDF, 0x1F, 0xDD,
0x1D, 0x1C, 0xDC, 0x14, 0xD4, 0xD5, 0x15, 0xD7, 0x17, 0x16, 0xD6, 0xD2, 0x12, 0x13, 0xD3,
0x11, 0xD1, 0xD0, 0x10, 0xF0, 0x30, 0x31, 0xF1, 0x33, 0xF3, 0xF2, 0x32, 0x36, 0xF6, 0xF7,
0x37, 0xF5, 0x35, 0x34, 0xF4, 0x3C, 0xFC, 0xFD, 0x3D, 0xFF, 0x3F, 0x3E, 0xFE, 0xFA, 0x3A,
0x3B, 0xFB, 0x39, 0xF9, 0xF8, 0x38, 0x28, 0xE8, 0xE9, 0x29, 0xEB, 0x2B, 0x2A, 0xEA, 0xEE,
0x2E, 0x2F, 0xEF, 0x2D, 0xED, 0xEC, 0x2C, 0xE4, 0x24, 0x25, 0xE5, 0x27, 0xE7, 0xE6, 0x26,
0x22, 0xE2, 0xE3, 0x23, 0xE1, 0x21, 0x20, 0xE0, 0xA0, 0x60, 0x61, 0xA1, 0x63, 0xA3, 0xA2,
0x62, 0x66, 0xA6, 0xA7, 0x67, 0xA5, 0x65, 0x64, 0xA4, 0x6C, 0xAC, 0xAD, 0x6D, 0xAF, 0x6F,
0x6E, 0xAE, 0xAA, 0x6A, 0x6B, 0xAB, 0x69, 0xA9, 0xA8, 0x68, 0x78, 0xB8, 0xB9, 0x79, 0xBB,
0x7B, 0x7A, 0xBA, 0xBE, 0x7E, 0x7F, 0xBF, 0x7D, 0xBD, 0xBC, 0x7C, 0xB4, 0x74, 0x75, 0xB5,
0x77, 0xB7, 0xB6, 0x76, 0x72, 0xB2, 0xB3, 0x73, 0xB1, 0x71, 0x70, 0xB0, 0x50, 0x90, 0x91,
0x51, 0x93, 0x53, 0x52, 0x92, 0x96, 0x56, 0x57, 0x97, 0x55, 0x95, 0x94, 0x54, 0x9C, 0x5C,
0x5D, 0x9D, 0x5F, 0x9F, 0x9E, 0x5E, 0x5A, 0x9A, 0x9B, 0x5B, 0x99, 0x59, 0x58, 0x98, 0x88,
0x48, 0x49, 0x89, 0x4B, 0x8B, 0x8A, 0x4A, 0x4E, 0x8E, 0x8F, 0x4F, 0x8D, 0x4D, 0x4C, 0x8C,
0x44, 0x84, 0x85, 0x45, 0x87, 0x47, 0x46, 0x86, 0x82, 0x42, 0x43, 0x83, 0x41, 0x81, 0x80, 0x40 };
```