HPM6-DG
POWER MANAGEMENT CONTROLLER
COMMUNICATION PROTOCOL

SMARTGEN (ZHENGZHOU) TECHNOLOGY CO., LTD.

Chinese trademark

English trademark

SmartGen ─ make your generator *smart*

SmartGen Technology Co., Ltd.

No.28 Jinsuo Road

Zhengzhou

Henan Province

P. R. China

Tel: +86-371-67988888/67981888/67992951

+86-371-67981000(overseas)

Fax: +86-371-67992952

Email: sales@smartgen.cn

Web: www.smartgen.com.cn / www.smartgen.cn

Table 1 Version History

Date	Version	Content
2021-09-30	V1.0	Original release.

CONTENT

1 COMMUNICATION PROTOCOL

1.1 OVERVIEW

This protocol describes read and write command format of communication and definition of internal information data for the third-party to develop and use.

1.2 PHYSICAL LAYER

HPM6 power management controller provides external communication based on RS485 and RJ45 ports. RS485 follows Modbus-RTU communication format, RJ45 follows Modbus-TCP/UDP communication format.

1.2.1 RS485 PORT

Controller is used as RS485's slave, adopts Modbus-RTU protocol, not support other protocols like Modbus-ASCII.

Communication address: 1~254 (default: 1)

Baud rate: 2400/4800/9600/19200bps (default: 9600bps)

Start bit: 1-bit

Data bit: 8-bit

Parity bit: None, Odd Parity, Even Parity (default: None)

Stop bit: 1-bit or 2-bit (default: 2-bit)

Timeout period: over 100ms.

Communication distance: 9600 baud rate, the longest distance can reach 1,000m when using 120Ω shielding twisted pair.

Once maximum 120 data of word register can be read.

Up to 32 controllers can be connected together for network communication.

When RS485 is connected, 120Ω twisted pair with shielding layer shall be used, and the shielding layer shall be grounded at one end.
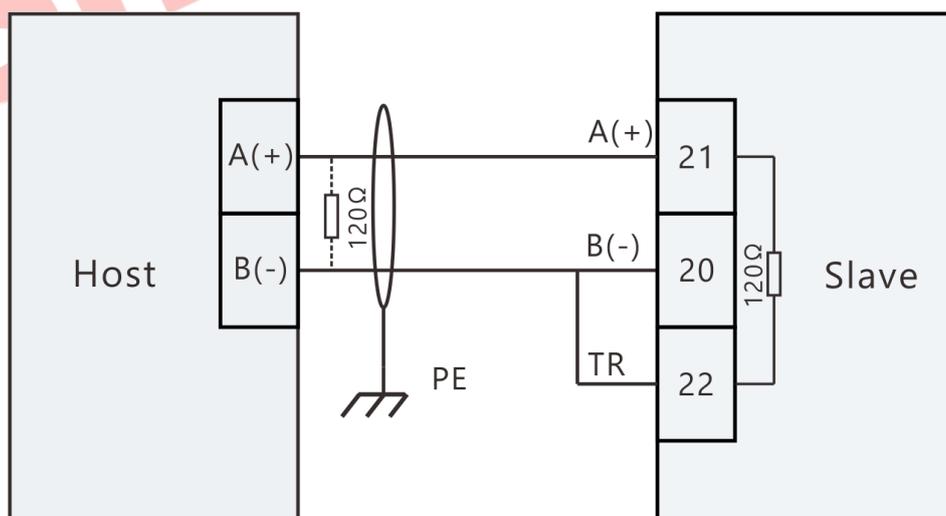
Fig.1 Single Unit RS485 Communication Wiring Diagram

NOTE: 120Ω impedance resistor can be connected automatically according to site situation, controller side has TR terminal, internal integrated 120Ω resistor, simply shorting terminal 20 and 22 represents access to 120Ω resistor, details

refer to the later description.
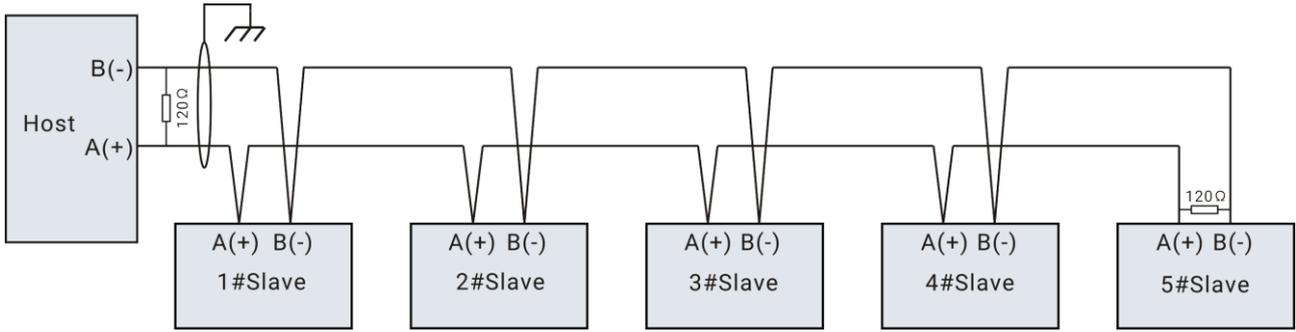
Fig.2 Multi-unit RS485 Communication Wiring Diagram

NOTE1: Please set each controller's communication module address before networking. Same module address is inhibited in the same network.

NOTE2: The shielding layer of communication line is single-end grounded on the host side.

1.2.2 ETHERNET PORT

As the web server, controller adopts Modbus_TCP/UDP network communication protocol, internal integrated switch function, supports device-level ring redundancy.

Communication baud rate: 10M/100M self-adaption

Port: 502

Communication distance: point-to-point Ethernet cables must not exceed 100m.

Cable specification: It must meet or above SF/UTP CAT5e, RJ45 cross and through wiring (T568A, T568B) can be used.

Wiring way is as following:
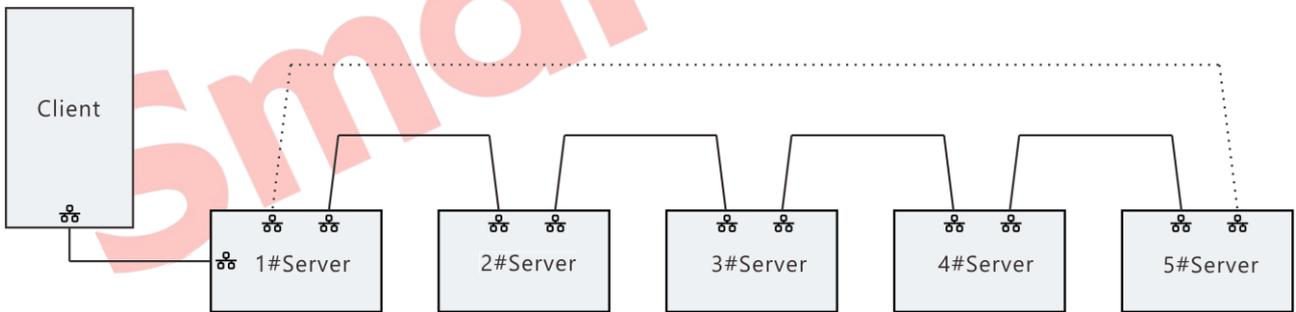
Fig.3 Multi-unit Network Communication Wiring Diagram 1
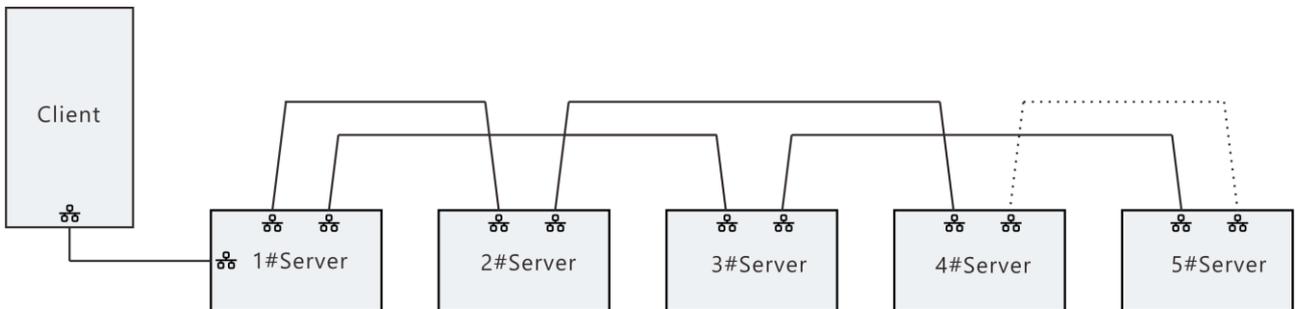
Fig.3 Multi-unit Network Communication Wiring Diagram 2

1.3 DATA LINK LAYER

1.3.1 MODBUS
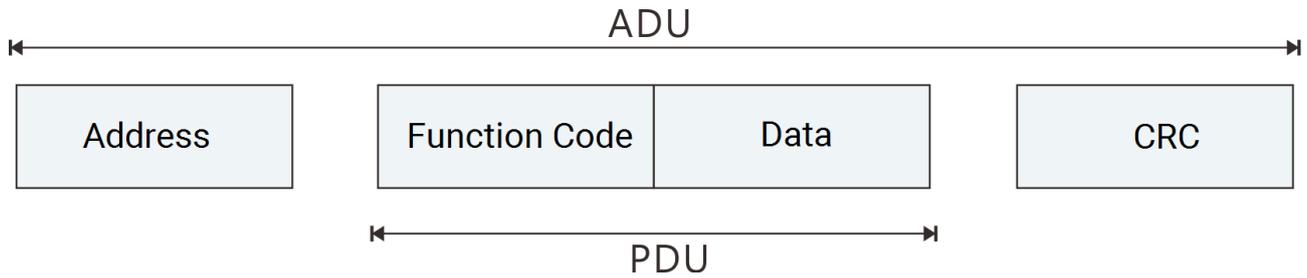
Fig.5 Modbus General Protocol Frame Format

1.3.2 MODBUS-RTU
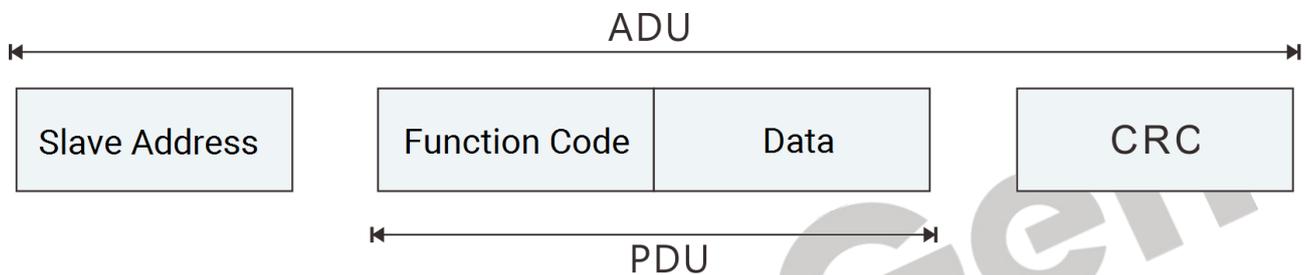
Fig.6 Modbus-RTU General Protocol Frame Format

ADU length: Based on serial bus, ADU is designed according to 256 bytes, among that:

Slave address: 1 byte

PDU: 253 bytes

CRC: 2 bytes

Modbus-RTU communication is commonly used under the serial communication, slave address range allocation is as follows:

Table 2 Communication Address Allocation

Broadcast Address	Sub-node Address	Reserve
0	1~254	255

Reserve address for backup.

CRC calculation is as follows:

The master or slave can detect whether the received information is right or not via CRC. Sometimes, due to electronic noise or other interference, the information may change in the transmission process. CRC code ensures that master or slave does not work for the error information in the transmission process. It increases the system's safety and efficiency. CRC code adopts CRC-16 calibration method.

2-byte CRC code, low byte is in the front and high byte is at last.

NOTE: All information frame formats are the same: address code, function code, data field and CRC code.

Cyclic Redundancy Check (CRC) contains two bytes, i.e. 16-bit binary. The CRC code is calculated by the sender, and placed at the end of the transmitted information. The receiver recalculates whether the CRC code of the received information is the same as the received one. If they are different, it means something goes wrong.

CRC code calculation method: first put the 16-bit register all to "1"; and then handle the each 8-bit data information gradually. In the process of CRC code calculation, only 8-bit data bit is used and start bit and stop bit are not included in it.

In the process of CRC code calculation, 8-bit data is XORed with the register data; and the result obtained moves 1 bit to the least significant bit (LSB), then use 0 to fill up the most significant bit (MSB). Then the LSB is examined. If the LSB is 1, the register content is XORed with a preset value. If the LSB is 0, there is no XOR operation.

This process is repeated for many times. After eighth shift, the next 8-bit is XORed with the current register content, and this process repeats for eight times as last. After all data information have been processed, final contents of the register are the CRC value.

CRC-16 code calculation procedure:

——Make 16-bit CRC register as hex FFFF;

——Make one 8-bit data XORed with the lower 8-bit of the CRC register, and put the result in the CRC register;

——Shift the contents of CRC register one bit to the right, with 0 filled into the MSB. Then check the moved-out bit;

——If the LSB is 0: Repeat Step 3 (another shift);

——If the LSB is 1: XOR CRC register with the hex A001;

——Repeat Step 3 and 4 until 8 shifts have been performed. In this way, all 8-bit data have been processed;

——Repeat Step 2 to 5 and perform the next data handling process;

——The final CRC register value is CRC code. When transmission, the lower 8-bit will be sent first, the higher 8-bit is at last.

NOTE: The calculation of CRC code starts from <slave address>, exclusive of all bytes of <CRC code>.

1.3.3 MODBUS-TCP/UDP
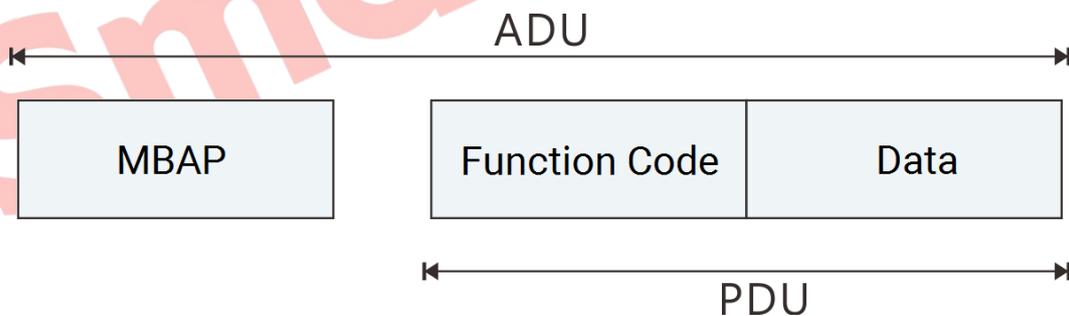
Fig.7 Modbus-TCP/UDP General Protocol Frame Format

The frame length is recommended as 260 bytes based on the standard. When applied for some expanded function, data server can expand ADU to proper length according to self resources for improving network transmission efficiency. The actual ADU length is reflected in the MBAP length field.

When Modbus is applied to TCP/IP, a special MBAP (Modbus application protocol MBAP) will be used to identify Modbus application data unit (ADU), MBAP has 4 fields, total 7 bytes, whose definition is as following:

Table 3 MBAP Definition

Data Field	Length (Byte)	Description	Client	Server
Transmission Identifier	2	Request frame and response frame match identification	Client allocation, it is recommended that the data request transmission identifier be different for each frame.	This identifier in the response frame of server side must be consistent with request frame.
Protocol Type	2	0=MODBUS protocol	Client allocation, default 0	This identifier in the response frame of server side must be consistent with request frame.
Data Length	2	Follow-up data length	Client allocates according to actual frame	Server allocates according to actual frame length.
Logic Device ID	1	0	Client allocates according to actual frame request	This identifier in the response frame of server side must be consistent with request frame.
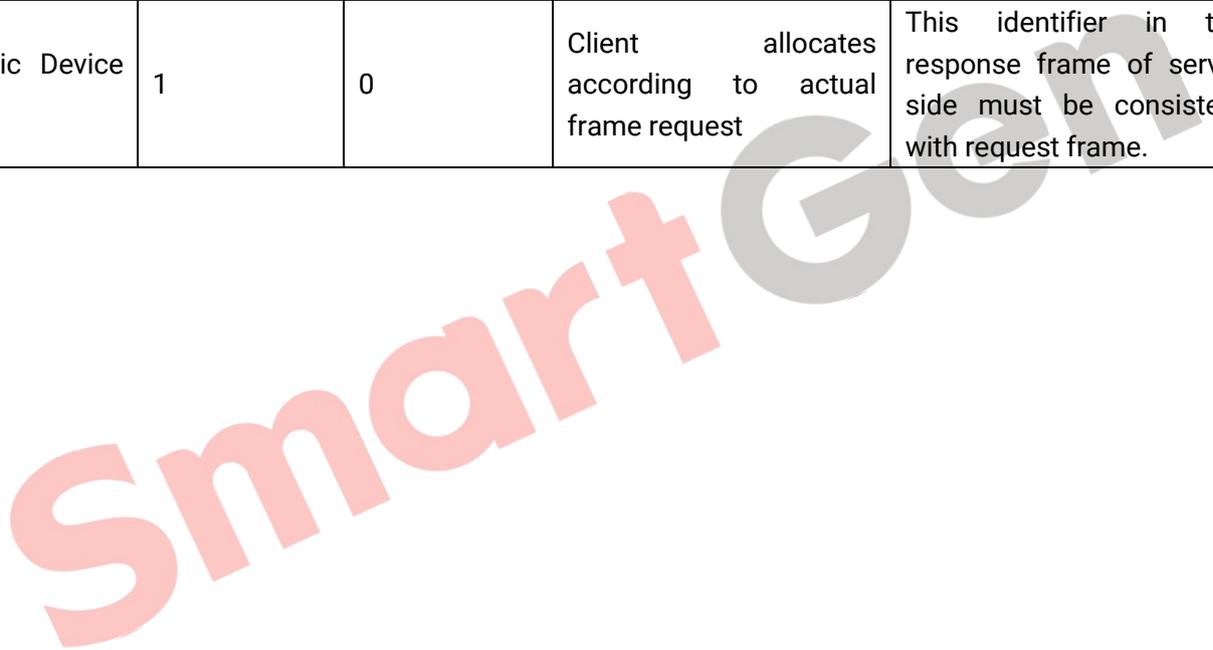
1.4 APPLICATION LAYER

1.4.1 FUNCTION CODE

Table 4 Function Code List

Broadcast Address	Sub-node Address	Reserve
03H	Read Registers	Read one or multiple registers data
05H	Place Single Coil	Place single coil

Supported function code: 03H, 05H. Function code 03H is used for reading controller alarm, status information and various electricity data; function code 05H is used for sending remote command.

Data calibration method: CRC16.

Internal registers of controller are in the unit of "word (double bytes)".

1.4.2 ERROR HANDLING

When device detects other errors except the CRC code, the slave must send information to the master. The function code MSB is 1, which means the response function code by slave should add 128 based on the function code. The following codes show that unexpected errors have occurred.

CRC error received from the master will be ignored by the device.

Table 5 Error Code Responsed by Slave (CRC Excluded)

Item	Description
Address Code	1 byte
Function Code	1 byte (MSB is 1)
Error Code	1 byte
CRC Code	2 bytes

Wrong Function Code:

01   Illegal function code

The function code received in the query is not an allowable action for the slave.

02   Illegal data address

The data address received in the query is not an allowable address for the slave.

03   Illegal data value

A value contained in the query data field is not an allowable value for the slave.

2 CONTROLLER INTERNAL REGISTER ADDRESS AND DATA

2.1 ALARM, STATUS COIL DATA FIELD CORRESPONDING TO FUNCTION CODE 03H

Table 6 Alarm, Status Coil Data Field

Modbus Address	PLC Address	Bit Address	Name	Description
0.0	40001.0	bit0	Common Alarm	0 means no common alarm;
0.1	40001.1	bit1	Common Trip and Stop Alarm	1 means there is common alarm occurs; and so on.
0.2	40001.2	bit2	Common Trip Alarm	Common xx alarm here is common real-time xx alarm, that is 1 means active alarm, 0 means inactive alarm.
0.3	40001.3	bit3	Common Safety Trip and Stop	
0.4	40001.4	bit4	Common Safety Trip	
0.5	40001.5	bit5	Common Block Alarm	
0.6	40001.6	bit6	Common Warning Alarm	
0.7	40001.7	bit7	Common Indication Alarm	
0.8	40001.8	bit8	Common Alarm Self-locked Alarm	
0.9	40001.9	bit9	Common Trip and Stop Self-locked Alarm	Common xx self-locked alarm here is common slef-lock xx alarm, that is 1 means active alarm, zeroing after alarm is inactive and response is unlocked. It is recommended to use this self-lock alarm when being monitoring.
0.10	40001.10	bit10	Common Trip Self-locked Alarm	
0.11	40001.11	bit11	Common Safety Trip and Stop Self-locked Alarm	
0.12	40001.12	bit12	Common Safety Trip Self-locked Alarm	
0.13	40001.13	bit13	Common Block Self-locked Alarm	
0.14	40001.14	bit14	Common Warning Self-locked Alarm	
0.15	40001.15	bit15	Common Indication Self-locked Alarm	
1.0	40002.0	bit0	Start Inhibited	
1.1	40002.1	bit1	Override Mode	
1.2	40002.2	bit2	Light Consumer Mode	
1.3	40002.3	bit3	Fixed Power Mode	
1.4	40002.4	bit4	Safe Mode	
1.5	40002.5	bit5	DG Inactive	
1.6	40002.6	bit6	Shore Supply	
1.7	40002.7	bit7	Reserved	
1.8	40002.8	bit8	Reserved	
1.9	40002.9	bit9	Reserved	
1.1	40002.10	bit10	Reserved	

Modbus Address	PLC Address	Bit Address	Name	Description
1.11	40002.11	bit11	Reserved	
1.12	40002.12	bit12	Reserved	
1.13	40002.13	bit13	Auto Mode	
1.14	40002.14	bit14	Semi-auto Mode	
1.15	40002.15	bit15	Manual Mode	
2.0-21.15	4003.0-40022.15		Trip and Stop Alarm Filed	7 alarm fields have same alarm bit. Each alarm area has 20*16=320 alarm bits, each alarm bit refers to alarm bit description of alarm field.
22.0-41.15	4023.0-40042.15		Trip Alarm Filed	
42.0-61.15	4043.0-40062.15		Safety Trip and Stop Alarm Filed	
62.0-81.15	4063.0-40082.15		Safety Trip Alarm Filed	
82.0-101.15	4083.0-40102.15		Block Alarm Filed	
102.0-121.15	4103.0-40122.15		Warning Alarm Filed	
122.0-141.15	4123.0-40142.15		Indication Alarm Filed	
142.0	40143.0	bit0	Input Port 1 Status	
142.1	40143.1	bit1	Input Port 2 Status	
142.2	40143.2	bit2	Input Port 3 Status	
142.3	40143.3	bit3	Input Port 4 Status	
142.4	40143.4	bit4	Input Port 5 Status	
142.5	40143.5	bit5	Input Port 6 Status	
142.6	40143.6	bit6	Input Port 7 Status	
142.7	40143.7	bit7	Input Port 8 Status	
142.8	40143.8	bit8	Input Port 9 Status	
142.9	40143.9	bit9	Input Port 10 Status	
142.10	40143.10	bit10	Input Port 11 Status	
142.11	40143.11	bit11	Input Port 12 Status	
142.12	40143.12	bit12	Input Port 13 Status	
142.13	40143.13	bit13	Input Port 14 Status	
142.14	40143.14	bit14	Input Port 15 Status	
142.15	40143.15	bit15	Input Port 16 Status	
143	40144	bit0	Input Port 17 Status	
		bit1	Input Port 18 Status	
		bit2	Input Port 19 Status	
		bit3	Input Port 20 Status	
		bit4	Reserved	
		bit5	Reserved	
		bit6	Reserved	
		bit7	Reserved	
		bit8	Reserved	
		bit9	Reserved	
		bit10	Reserved	
		bit11	Reserved	
		bit12	Reserved	

Modbus Address	PLC Address	Bit Address	Name	Description
		bit13	Reserved	
		bit14	Reserved	
		bit15	Reserved	
144	40145	bit0	Output Port 1 Status	
		bit1	Output Port 2 Status	
		bit2	Output Port 3 Status	
		bit3	Output Port 4 Status	
		bit4	Output Port 5 Status	
		bit5	Output Port 6 Status	
		bit6	Output Port 7 Status	
		bit7	Output Port 8 Status	
		bit8	Output Port 9 Status	
		bit9	Output Port 10 Status	
		bit10	Output Port 11 Status	
		bit11	Output Port 12 Status	
		bit12	Output Port 13 Status	
		bit13	Output Port 14 Status	
		bit14	Output Port 15 Status	
		bit15	Output Port 16 Status	
145	40146	bit0	Output Port 17 Status	
		bit1	Output Port 18 Status	
		bit2	Output Port 19 Status	
		bit3	Output Port 20 Status	
		bit4	Reserved	
		bit5	Reserved	
		bit6	Reserved	
		bit7	Reserved	
		bit8	Reserved	
		bit9	Reserved	
		bit10	Reserved	
		bit11	Reserved	
		bit12	Reserved	
		bit13	Reserved	
		bit14	Reserved	
		bit15	Display Output Port Status	
146	40147	bit0	1#DIN16 Input Port 1 Status	
		bit1	1#DIN16 Input Port 2 Status	
		bit2	1#DIN16 Input Port 3 Status	
		bit3	1#DIN16 Input Port 4 Status	
		bit4	1#DIN16 Input Port 5 Status	
		bit5	1#DIN16 Input Port 6 Status	
		bit6	1#DIN16 Input Port 7 Status	

Modbus Address	PLC Address	Bit Address	Name	Description
		bit7	1#DIN16 Input Port 8 Status	
		bit8	1#DIN16 Input Port 9 Status	
		bit9	1#DIN16 Input Port 10 Status	
		bit10	1#DIN16 Input Port 11 Status	
		bit11	1#DIN16 Input Port 12 Status	
		bit12	1#DIN16 Input Port 13 Status	
		bit13	1#DIN16 Input Port 14 Status	
		bit14	1#DIN16 Input Port 15 Status	
		bit15	1#DIN16 Input Port 16 Status	
147	40148	bit0	2#DIN16 Input Port 1 Status	
		bit1	2#DIN16 Input Port 2 Status	
		bit2	2#DIN16 Input Port 3 Status	
		bit3	2#DIN16 Input Port 4 Status	
		bit4	2#DIN16 Input Port 5 Status	
		bit5	2#DIN16 Input Port 6 Status	
		bit6	2#DIN16 Input Port 7 Status	
		bit7	2#DIN16 Input Port 8 Status	
		bit8	2#DIN16 Input Port 9 Status	
		bit9	2#DIN16 Input Port 10 Status	
		bit10	2#DIN16 Input Port 11 Status	
		bit11	2#DIN16 Input Port 12 Status	
		bit12	2#DIN16 Input Port 13 Status	
		bit13	2#DIN16 Input Port 14 Status	
		bit14	2#DIN16 Input Port 15 Status	
		bit15	2#DIN16 Input Port 16 Status	
148	40149	bit0	1#DOUT16 Output Port 1 Status	
		bit1	1#DOUT16 Output Port 2 Status	
		bit2	1#DOUT16 Output Port 3 Status	
		bit3	1#DOUT16 Output Port 4 Status	
		bit4	1#DOUT16 Output Port 5 Status	
		bit5	1#DOUT16 Output Port 6 Status	
		bit6	1#DOUT16 Output Port 7 Status	
		bit7	1#DOUT16 Output Port 8 Status	
		bit8	1#DOUT16 Output Port 9 Status	

Modbus Address	PLC Address	Bit Address	Name	Description
		bit9	1#DOUT16 Output Port 10 Status	
		bit10	1#DOUT16 Output Port 11 Status	
		bit11	1#DOUT16 Output Port 12 Status	
		bit12	1#DOUT16 Output Port 13 Status	
		bit13	1#DOUT16 Output Port 14 Status	
		bit14	1#DOUT16 Output Port 15 Status	
		bit15	1#DOUT16 Output Port 16 Status	
149	40150	bit0	2#DOUT16 Output Port 1 Status	
		bit1	2#DOUT16 Output Port 2 Status	
		bit2	2#DOUT16 Output Port 3 Status	
		bit3	2#DOUT16 Output Port 4 Status	
		bit4	2#DOUT16 Output Port 5 Status	
		bit5	2#DOUT16 Output Port 6 Status	
		bit6	2#DOUT16 Output Port 7 Status	
		bit7	2#DOUT16 Output Port 8 Status	
		bit8	2#DOUT16 Output Port 9 Status	
		bit9	2#DOUT16 Output Port 10 Status	
		bit10	2#DOUT16 Output Port 11 Status	
		bit11	2#DOUT16 Output Port 12 Status	
		bit12	2#DOUT16 Output Port 13 Status	
		bit13	2#DOUT16 Output Port 14 Status	
		bit14	2#DOUT16 Output Port 15	

Modbus Address	PLC Address	Bit Address	Name	Description
			Status	
		bit15	2#DOUT16 Output Port 16 Status	
150	40151		Reserved	
151	40152		Reserved	
152	40153		Reserved	
153	40154		Reserved	
154	40155		Reserved	
155	40156		Reserved	
156	40157	bit0	Bus Normal	
		bit1	Reserved	
		bit2	Gen Normal	
		bit3	Gen On-load (Close Status)	
		bit4	Top Priority Light	
		bit5	Remote Control Active	
		bit6	Self-check Normal Light (0: light off, 1: green light on)	
		bit7	Bustie Switch 0 Status	
		bit8	Bustie Switch 1 Status	
		bit9	Bustie Switch 2 Status	
		bit10	Bustie Switch 3 Status	
		bit11	Bustie Switch 4 Status	
		bit12	Bustie Switch 5 Status	
		bit13	Power Normal Light (0: abnormal yellow light, 1: green light)	
		bit14	485 Normal Working	
		bit15	CAN Normal Working	
157	40158	bit0	MSC Normal Working	
		bit1	Ring Status	
		bit2	Alarm Light – Green Light Status	
		bit3	Alarm Light – Green Light Flat (1=flat, 0=fast flash)	
		bit4	Alarm Light – Red Light Status	
		bit5	Alarm Light – Red Light Flat (1=flat, 0=fast flash)	
		bit6	Alarm Light – Yellow Light Status	
		bit7	Alarm Light – Yellow Light Flat (1=flat, 0=slowly flash)	
		bit8	Running Light – Green Light	

Modbus Address	PLC Address	Bit Address	Name	Description
		bit9	Running Light – Green Light Flat (1=flat, 0=slowly flash)	
		bit10	Running Light – Red Light	Allow running light to indicate
		bit11	ACK Light Status	
		bit12	Mute Status	
		bit13	Frequency Synchronization	
		bit14	Voltage Synchronization	
		bit15	Phase Synchronization	
158	40159	bit0	Bustie Series Switch 0 Status	
		bit1	Bustie Series Switch 1 Status	
		bit2	Bustie Series Switch 2 Status	
		bit3	Bustie Series Switch 3 Status	
		bit4	Bustie Series Switch 4 Status	
		bit5	Bustie Series Switch 5 Status	
		bit6	Shore Switch 0 Status	
		bit7	Shore Switch 1 Status	
		bit8	Shore Switch 2 Status	
		bit9	Shore Switch 3 Status	
		bit10	Reserved	
		bit11	Reserved	
		bit12	Reserved	
		bit13	Reserved	
		bit14	Reserved	
		bit15	Reserved	

Example:

If need to read "Input Port 1 Status" and "Input Port 20 Status", firstly get their corresponding address is 142.0 and 143.3, by checking the table, it is known that you need to read 2 addresses' data.

Assume the slave (controller) address is 01, the master (can be computer) request command is as following:

Table 7 Master (Computer) RS485 Request Command

Slave Address	Function Code	Data				CRC	
		Starting Address (142)		Data Qty (2)		CRC 16 Calibration	
		MSB	LSB	MSB	LSB	LSB	MSB
01	03	00	8E	00	02	A4	20

Table 8 Client (Computer) Ethernet Request Command

MBAP						Function Code	Data			
Protocol Identifier		Protocol Type		Data Length		Logic Device ID		Starting Address (142)		Data Qty. (2)
								MSB	LSB	MSB	LSB
00	01	00	00	00	06	01	03	00	8E	00	02

Slave reponse command is as following:

Table 9 Slave (Controller) RS485 Response Command

Slave Address	Function Code	Data					CRC	
		Data Qty. (Bytes)	Data				CRC 16 Calibration	
			Data MSB of Address 142	Data LSB of Address 142	Data MSB of Address 143	Data LSB of Address 143	LSB	MSB
01	03	04	00	01	00	08	AA	35

Table 10 Server (Controller) Ethernet Response Command

MBAP							Function Code	Data				
								Data Qty. (Bytes)	Returned Data			
Protocol Identifier		Protocol Type		Data Length		Logic Device ID			Data MSB of Address 142	Data LSB of Address 142	Data MSB of Address 143	Data LSB of Address 143
00	01	00	00	00	07	01	03	04	00	01	00	08

Table 11 Data Analysis

Address	Received Data (Hex)	Convert to Binary	Data Signification
142	0001H	0000 0000 0000 0001 (correspond to 142.15, 142.14……. 142.1, 142.0)	Data of bit 0 is 1 indicates that input port 1 status is closed.
143	0008H	0000 0000 0000 1000 (correspond to 143.15, 143.14……. 143.1, 143.0)	Data of bit 143.3 is 1 indicates that input port 20 status is closed.

Table 12 Value Data Field

Modbus Address	PLC Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
200	40201	Bus UAB (LSB)	0~4294967295	0.1	V	32-bit Unsigned	NOTE2
201	40202	Bus UAB (MSB)					
202	40203	Bus UBC (LSB)	0~4294967295	0.1	V	32-bit Unsigned	
203	40204	Bus UBC (MSB)					
204	40205	Bus UCA (LSB)	0~4294967295	0.1	V	32-bit Unsigned	
205	40206	Bus UCA (MSB)					
206	40207	Bus UA (LSB)	0~4294967295	0.1	V	32-bit Unsigned	
207	40208	Bus UA (MSB)					
208	40209	Bus UB (LSB)	0~4294967295	0.1	V	32-bit Unsigned	
209	40210	Bus UB (MSB)					
210	40211	Bus UC (LSB)	0~4294967295	0.1	V	32-bit Unsigned	
211	40212	Bus UC (MSB)					
212	40213	Bus UA Phase	0~65535	0.1	°	16-bit Unsigned	NOTE3
213	40214	Bus UB Phase	0~65535	0.1	°	16-bit Unsigned	
214	40215	Bus UC Phase	0~65535	0.1	°	16-bit Unsigned	
215	40216	Bus Frequency	0~10000	0.01	Hz	16-bit Unsigned	
216	40217	Bus Max. Voltage (LSB)	0~4294967295	0.1	V	32-bit Unsigned	NOTE2
217	40218	Bus Max. Voltage (MSB)					
218	40219	Bus Min. Voltage (LSB)	0~4294967295	0.1	V	32-bit Unsigned	
219	40220	Bus Min. Voltage (MSB)					
220	40221	Bus ROCOF	0~10000	0.01	Hz/s	16-bit Unsigned	
221	40222	Bus Phase Change Value	0~1000	0.1	°	16-bit Unsigned	
222	40223	Gen ROCOF	0~10000	0.01	Hz/s	16-bit Unsigned	
223	40224	Gen Phase Change Value	0~1000	0.1	°	16-bit Unsigned	
224	40225	Max. Current	0~65535	0.1	A	16-bit Unsigned	
225	40226	Min. Current	0~65535	0.1	A	16-bit Unsigned	

Modbus Address	PLC Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
226	40227	Gen Average Voltage (LSB)	0~4294967295	0.1	V	32-bit Unsigned	NOTE2
227	40228	Gen Average Voltage (MSB)					
228	40229	Gen UAB (LSB)	0~4294967295	0.1	V	32-bit Unsigned	
229	40230	Gen UAB (MSB)					
230	40231	Gen UBC (LSB)	0~4294967295	0.1	V	32-bit Unsigned	
231	40232	Gen UBC (MSB)					
232	40233	Gen UCA (LSB)	0~4294967295	0.1	V	32-bit Unsigned	
233	40234	Gen UCA (MSB)					
234	40235	Gen UA (LSB)	0~4294967295	0.1	V	32-bit Unsigned	
235	40236	Gen UA (MSB)					
236	40237	Gen UB (LSB)	0~4294967295	0.1	V	32-bit Unsigned	
237	40238	Gen UB (MSB)					
238	40239	Gen UC (LSB)	0~4294967295	0.1	V	32-bit Unsigned	
239	40240	Gen UC (MSB)					
240	40241	Gen UA Phase	0~65535	0.1	°	16-bit Unsigned	NOTE3
241	40242	Gen UB Phase	0~65535	0.1	°	16-bit Unsigned	
242	40243	Gen UC Phase	0~65535	0.1	°	16-bit Unsigned	
243	40244	Gen Frequency	0~10000	0.01	Hz	16-bit Unsigned	
244	40245	Gen Max. Voltage (LSB)	0~4294967295	0.1	V	32-bit Unsigned	NOTE2
245	40246	Gen Max. Voltage (MSB)					
246	40247	Gen Min. Voltage (LSB)	0~4294967295	0.1	V	32-bit Unsigned	
247	40248	Gen Min. Voltage (MSB)					
248	40249	Voltage Difference (LSB)	0~4294967295	0.1	V	32-bit Unsigned	
249	40250	Voltage Difference (MSB)					
250	40251	Frequency Difference	0~10000	0.01	Hz	16-bit Unsigned	
251	40252	Phase Difference	0~65535	0.1	°	16-bit Unsigned	
252	40253	Current Gen	-1000~1000	0.1	%	16-bit	

Modbus Address	PLC Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
		Active PCT				Signed	
253	40254	Target Gen Active PCT	0~1000	0.1	%	16-bit Signed	
254	40255	Current Gen Reactive PCT	-1000~1000	0.1	%	16-bit Signed	
255	40256	Target Gen Reactive PCT	0~1000	0.1	%	16-bit Signed	
256	40257	GOV Output PCT	-1000~1000	0.1	%	16-bit Signed	
257	40258	AVR Output PCT	-1000~1000	0.1	%	16-bit Signed	
258	40259	A Phase Current	0~65535	0.1	A	16-bit Unsigned	
259	40260	B Phase Current	0~65535	0.1	A	16-bit Unsigned	
260	40261	C Phase Current	0~65535	0.1	A	16-bit Unsigned	
261	40262	Earth Current	0~65535	0.1	A	16-bit Unsigned	
262	40263	A Phase Current Phase	0~65535	0.1	°	16-bit Unsigned	
263	40264	B Phase Current Phase	0~65535	0.1	°	16-bit Unsigned	NOTE3
264	40265	C Phase Current Phase	0~65535	0.1	°	16-bit Unsigned	
265	40266	Reserved					
266	40267	A Phase Active Power (LSB)	-2,147,483,647 ~2,147,483,647	0.1	kW	32-bit Signed	
267	40268	A Phase Active Power (MSB)					
268	40269	B Phase Active Power (LSB)	-2,147,483,647 ~2,147,483,647	0.1	kW	32-bit Signed	
269	40270	B Phase Active Power (MSB)					
270	40271	C Phase Active Power (LSB)	-2,147,483,647 ~2,147,483,647	0.1	kW	32-bit Signed	NOTE2
271	40272	C Phase Active Power (MSB)					
272	40273	Total Active Power (LSB)	-2,147,483,647 ~2,147,483,647	0.1	kW	32-bit Signed	
273	40274	Total Active Power (MSB)					
274	40275	A Phase	-2,147,483,647	0.1	kvar	32-bit	

Modbus Address	PLC Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
		Reactive Power (LSB)	~2,147,483,647			Signed	
275	40276	A Phase Reactive Power (MSB)					
276	40277	B Phase Reactive Power (LSB)	-2,147,483,647 ~2,147,483,647	0.1	kvar	32-bit Signed	
277	40278	B Phase Reactive Power (MSB)					
278	40279	C Phase Reactive Power (LSB)	-2,147,483,647 ~2,147,483,647	0.1	kvar	32-bit Signed	
279	40280	C Phase Reactive Power (MSB)					
280	40281	Total Reactive Power (LSB)	-2,147,483,647 ~2,147,483,647	0.1	kvar	32-bit Signed	
281	40282	Total Reactive Power (MSB)					
282	40283	A Phase Apparent Power (LSB)	0~4294967295	0.1	kVA	32-bit Unsigned	
283	40284	A Phase Apparent Power (MSB)					
284	40285	B Phase Apparent Power (LSB)	0~4294967295	0.1	kVA	32-bit Unsigned	
285	40286	B Phase Apparent Power (MSB)					
286	40287	C Phase Apparent Power (LSB)	0~4294967295	0.1	kVA	32-bit Unsigned	
287	40288	C Phase Apparent Power (MSB)					
288	40289	Total Apparent Power (LSB)	0~4294967295	0.1	kVA	32-bit Unsigned	
289	40290	Total Apparent Power (MSB)					

Modbus Address	PLC Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
290	40291	A Phase Power Factor	-1000~1000	0.001		16-bit Unsigned	
291	40292	B Phase Power Factor	-1000~1000	0.001		16-bit Unsigned	
292	40293	C Phase Power Factor	-1000~1000	0.001		16-bit Unsigned	
293	40294	Average Power Factor	-1000~1000	0.001		16-bit Unsigned	
294	40295	Unbalanced Current PCT	-1000~1000	0.1	%	16-bit Unsigned	
295	40296	Reserved					
296	40297	Unbalanced Current	0~65535	0.1	A	16-bit Unsigned	
297	40298	Reserved					
298	40299	Reserved					
299	40300	Power Voltage	0~600	0.1	V	16-bit Unsigned	
300	40301	System Status	0~10	1	No.	16-bit Unsigned	See System Status Desc.
301	40302	System Status Delay	0~3600	1	s	16-bit Unsigned	
302	40303	GB Status	1~10	1	No.	16-bit Unsigned	See GB Status Desc.
303	40304	GB Delay	0~3600	1	s	16-bit Unsigned	
304	40305	Start/Stop Status	0~3	1	No.	16-bit Unsigned	See Start/Stop Status Desc.
305	40306	Start/Stop Delay	0~3600	1	s	16-bit Unsigned	
306	40307	Reserved					
307	40308	Reserved					
308	40309	Accumulated Running Hours (LSB)	0~4294967295	0.1	h	32-bit Unsigned	
309	40310	Accumulated Running Hours (MSB)					
310	40311	Accumulated Close Times	0~65535	1		16-bit Unsigned	
311	40312	Accumulated Start Times	0~65535	1		16-bit Unsigned	
312	40313	Accumulated Active Energy	0~4294967295	0.1	kWh	32-bit Unsigned	NOTE2

Modbus Address	PLC Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
		(LSB)					
313	40314	Accumulated Active Energy (MSB)					
314	40315	Accumulated Reactive Energy (LSB)	0~4294967295	0.1	kvarh	32-bit Unsigned	
315	40316	Accumulated Reactive Energy (MSB)					
316	40317	Accumulated Apparent Energy (LSB)	0~4294967295	0.1	kVAh	32-bit Unsigned	
317	40318	Accumulated Apparent Energy (MSB)					
318	40319	Reserved					
319	40320	Reserved					
320	40321	Bus Total Reactive Power (LSB)	-2,147,483,647 ~2,147,483,647	0.1	kvar	32-bit Signed	
321	40322	Bus Total Reactive Power MSB)					NOTE2
322	40323	Bus Total Active Power (LSB)	-2,147,483,647 ~2,147,483,647	0.1	kW	32-bit Signed	
323	40324	Bus Total Active Power (MSB)					
324	40325	Reserved					
325	40326	Reserved					
326	40327	Reserved					
327	40328	Reserved					
328	40329	Reserved					
329	40330	Reserved					
330	40331	Reserved					
331	40332	Reserved					
332	40333	Reserved					
333	40334	Reserved					
334	40335	Controller Time: Year	0~100	1	Year	16-bit Unsigned	
335	40336	Controller	1~12	1	Month	16-bit	

Modbus Address	PLC Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
		Time: Month				Unsigned	
336	40337	Controller Time: Day	1~31	1	Day	16-bit Unsigned	
337	40338	Controller Time: Week	0~6	1	Week	16-bit Unsigned	0: Sunday 1~6: Monday - Saturday
338	40339	Controller Time: Hour	0~23	1	h	16-bit Unsigned	
339	40340	Controller Time: Minute	0~59	1	min	16-bit Unsigned	
340	40341	Controller Time: Second	0~59	1	s	16-bit Unsigned	
341	40342	Module ID	0~15	1		16-bit Unsigned	
342	40343	Module Priority	0~15	1		16-bit Unsigned	
343	40344	Total Modules	0~32	1		16-bit Unsigned	
344	40345	Closed Gensets	0~32	1		16-bit Unsigned	
345	40346	Reserved					
346	40347	Bus Total Modules	0~32	1		16-bit Unsigned	
347	40348	Reserved					
348	40349	Genset Left Power	-32767~32767	0.1		16-bit Signed	
349	40350	Reserved					
350	40351	Genset Request Power	0~65535	0.1		16-bit Unsigned	
351	40352	Reserved					
352	40353	Bus Left Power (LSB)	-2,147,483,647 ~2,147,483,647	0.1	kW	32-bit Signed	
353	40354	Bus Left Power (MSB)					
354	40355	Bus Request Power (LSB)	-2,147,483,647 ~2,147,483,647	0.1	kW	32-bit Signed	NOTE2
355	40356	Bus Request Power (MSB)					
356	40357	Bus Total Apparent Power (LSB)	0~4294967295	0.1	kvar	32-bit Unsigned	
357	40358	Bus Total					

Modbus Address	PLC Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
		Apparent Power (MSB)					
358	40359	Total Normal Gensets	0~20	1	kW	16-bit Unsigned	
359	40360	Total Bus Starts	0~20	1	kW	16-bit Unsigned	
360	40361	Active Unbalanced PCT	0~2000	0.1	%	16-bit Unsigned	
361	40362	Reactive Unbalanced PCT	0~2000	0.1	%	16-bit Unsigned	
362	40363	1#HMP300 Active PCT (HC Feedback Active PCT)	-2000~2000	0.1	%	16-bit Signed	
363	40364	1#HMP300 Reactive PCT	-2000~2000	0.1	%	16-bit Signed	
364	40365	1#HMP300 Rated Active Power	0~65535	1	kW	16-bit Unsigned	
365	40366	1#HMP300 Rated Reactive Power	0~65535	1	kvar	16-bit Unsigned	
366	40367	2#HMP300 Active PCT (HC Feedback Active PCT)	-2000~2000	0.1	%	16-bit Signed	
367	40368	2#HMP300 Reactive PCT	-2000~2000	0.1	%	16-bit Signed	
368	40369	2#HMP300 Rated Active Power	0~65535	1	kW	16-bit Unsigned	
369	40370	2#HMP300 Rated Reactive Power	0~65535	1	kvar	16-bit Unsigned	
370	40371	Reserved					
371	40372	DG Total Reactive Power (LSB)	-2,147,483,647 ~2,147,483,647	0.1	kvar	32-bit Signed	NOTE2
372	40373	DG Total Reactive Power (MSB)					

Modbus Address	PLC Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
373	40374	DG Total Active Power (LSB)	-2,147,483,647 ~2,147,483,647	0.1	kW	32-bit Signed	
374	40375	DG Total Active Power (MSB)					
375	40376	DG Total Apparent Power (LSB)	0~4294967295	0.1	kVA	32-bit Unsigned	
376	40377	DG Total Apparent Power (mSB)					
377	40378	DG Total Left Active Power (LSB)	-2,147,483,647 ~2,147,483,647	0.1	kW	32-bit Signed	
378	40379	DG Total Left Active Power (MSB)					
379	40380	DG Total Left Reactive Power (LSB)	-2,147,483,647 ~2,147,483,647	0.1	kvar	32-bit Signed	
380	40381	DG Total Left Reactive Power (MSB)					
381	40382	Reserved					
382	40383	Reserved					
383	40384	Reserved					
384	40385	Reserved					
385	40386	SG Totals	0~3	1		16-bit Unsigned	
386	40387	Genset Max. Output PCT	0~2000	0.1	%	16-bit Unsigned	
387	40388	USB Status	0~2	1	No.	16-bit Unsigned	0: Normal; 1: Not Connected; 2: Error
388	40389	USB Capacity	0-65535	1	MB	16-bit Unsigned	
389	40390	USB Left Capacity	0-65535	1	MB	16-bit Unsigned	
390	40391	A Phase Voltage THD	0~1000	0.1	%	16-bit Unsigned	
391	40392	B Phase Voltage THD	0~1000	0.1	%	16-bit Unsigned	
392	40393	C Phase Voltage THD	0~1000	0.1	%	16-bit Unsigned	
393	40394	Gen	0~1000	0.1	%	16-bit	

Modbus Address	PLC Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
		Unbalanced Voltage PCT				Unsigned	
394	40395	PLC Status	0~2	1	No.	16-bit Unsigned	0: Normal 1: PLC Fault 2: PLC Empty
395	40396	AI1 Value	0~65535	0.1 0.1 1 1	kW kvar kW/ kVA °C	16-bit Unsigned	Detailed value is selected according to AI input function. 1: 0.1kW 2: 0.1kvar 3: 1kW/kVA 4: 1°C
396	40397	AI2 Value	0~65535	0.1 0.1 1 1	kW kvar kW/ kVA °C	16-bit Unsigned	
397	40398	Reserved					
398	40399	Reserved					
399	40400	Reserved					
400	40401	Reserved					
401	40402	Reserved					
402	40403	Reserved					
403	40404	Reserved					
404	40405	Reserved					
405	40406	Reserved					
406	40407	Reserved					
407	40408	A Phase Current THD	0~1000	0.1	%	16-bit Unsigned	
408	40409	B Phase Current THD	0~1000	0.1	%	16-bit Unsigned	
409	40410	C Phase Current THD	0~1000	0.1	%	16-bit Unsigned	
410	40411	External Adjusting Freq.	0~20000	0.01	Hz	16-bit Unsigned	
411	40412	External Adjusting Volt.	0~65535	0.1	V	16-bit Unsigned	
412	40413	Bus Reserved Power	0~65535	0.1	kW	16-bit Unsigned	
413	40414	Reserved					
414	40415	Reserved					
415	40416	Reserved					

Modbus Address	PLC Address	Name		Range (Decimal)	Ratio	Unit	Description	Remark
416	40417	Reserved						
417	40418	Reserved						
418	40419	MCU Temperature		-400~1250	0.1	°C	16-bit Signed	
419	40420	Engine Data	Speed	0~65535	1	r/min	16-bit Unsigned	
420	40421		Water Temp.	0~65535	1	°C	16-bit Unsigned	
421	40422		Oil Temp.	0~65535	1	°C	16-bit Unsigned	
422	40423		Oil Press.	0~65535	1	kPa	16-bit Unsigned	
423	40424		Battery Voltage	0~65535	0.1	V	16-bit Unsigned	
424	40425		Charger D+	0~65535	0.1	V	16-bit Unsigned	
425	40426		Reserved					
426	40427		Reserved					
427	40428		Reserved					
428	40429		Reserved					
429	40430		Reserved					
430	40431	User A	Accu. Running Hours (LSB)	0~4294967295	0.1	h	32-bit Unsigned	NOTE2
431	40432		Accu. Running Hours (MSB)					
432	40433		Accu. Close Times	0~65535	1		16-bit Unsigned	
433	40434		Accu. Start Times	0~65535	1		16-bit Unsigned	
434	40435		Accu. Active Energy (LSB)	0~4294967295	0.1	kWh	32-bit Unsigned	NOTE2
435	40436		Accu. Active Energy (MSB)					

Modbus Address	PLC Address	Name		Range (Decimal)	Ratio	Unit	Description	Remark
436	40437		Accu. Reactive Energy (LSB)	0~4294967295	0.1	kvarh	32-bit Unsigned	
437	40438		Accu. Reactive Energy (MSB)					
438	40439		Accu. Apparent Energy (LSB)	0~4294967295	0.1	kVAh	32-bit Unsigned	
439	40440		Accu. Apparent Energy (MSB)					
440	40441		Reserved					
441	40442		Reserved					
442	40443		Accu. Running Hours (LSB)	0~4294967295	0.1	h	32-bit Unsigned	NOTE2
443	40444		Accu. Running Hours (MSB)					
444	40445	User B	Accu. Close Times	0~65535	1		16-bit Unsigned	
445	40446		Accu. Start Times	0~65535	1		16-bit Unsigned	
446	40447		Accu. Active Energy (LSB)	0~4294967295	0.1	kWh	32-bit Unsigned	NOTE2
447	40448		Accu. Active Energy (MSB)					
448	40449		Accu. Reactive Energy	0~4294967295	0.1	kvarh	32-bit Unsigned	

Modbus Address	PLC Address	Name		Range (Decimal)	Ratio	Unit	Description	Remark
			(LSB)					
449	40450		Accu. Reactive Energy (MSB)					
450	40451		Accu. Apparent Energy (LSB)	0~4294967295	0.1	kVAh	32-bit Unsigned	
451	40452		Accu. Apparent Energy (MSB)					
452	40453		Reserved					
453	40454		Reserved					
454	40455	Reserved						
455	40456	Reserved						
456	40457	HC 1 Status		0~6	1	No.	16-bit Unsigned	
457	40458	HC 1 Delay		0~3600	1	s	16-bit Unsigned	
458	40459	HC 2 Status		0~6	1	No.	16-bit Unsigned	
459	40460	HC 2 Delay		0~3600	1	s	16-bit Unsigned	See HC Status Desc.
460	40461	HC 3 Status		0~6	1	No.	16-bit Unsigned	
461	40462	HC 3 Delay		0~3600	1	s	16-bit Unsigned	
462	40463	HC 4 Status		0~6	1	No.	16-bit Unsigned	
463	40464	HC 4 Delay		0~3600	1	s	16-bit Unsigned	
464	40465	Reserved						
465	40466	Reserved						
466	40467	Reserved						
467	40468	Reserved						
468	40469	Bus Average Voltage (LSB)		0~4294967295	0.1	V	32-bit Unsigned	NOTE2
469	40470	Bus Average Voltage (MSB)						
470	40471	Reserved						
471	40472	Reserved						

Modbus Address	PLC Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
472	40473	Reserved					
473	40474	Reserved					
474	40475	Reserved					
475	40476	Reserved					
476	40477	Reserved					
477	40478	Reserved					
478	40479	Reserved					
479	40480	Reserved					
480	40481	Reserved					
481	40482	Reserved					
482	40483	Reserved					
483	40484	Reserved					
484	40485	Reserved					
485	40486	Reserved					
486	40487	Reserved					
487	40488	Reserved					
488	40489	Reserved					
489	40490	Reserved					
490	40491	Reserved					
491	40492	Reserved					
492	40493	Reserved					
493	40494	Reserved					
494	40495	Reserved					
495	40496	Reserved					
496	40497	Reserved					
497	40498	Reserved					
498	40499	Reserved					
499	40500	Reserved					

NOTE1: Actual value=received data*ratio. Take frequency as the example, received data is 5000 (1388H), ratio is 0.01Hz, so the actual frequency value is 50.00Hz (5000*0.01Hz);

NOTE2: For 4-byte data, the actual value=received data MSB*65536 + received data LSB;

NOTE3: When the received data is 32766, it means no normal data, "###" can be displayed;

NOTE4: Definition of signed number. Take received data 8000H as the example, transfer it to binary 1000 0000 0000 0000b, the MSB is 1, which is a negative number. One's complement is obtained by subtracting 1 from it, which is inverted to obtain the absolute value of the negative number. Then transfer it to -32768 in decimal.

Example:

Read "Accumulated Running Hours (current is 123456 times), firstly get their corresponding address is 308 and 309 by checking the table, then it is known that you need to read 2 words' data.

Assume the slave address is 01, the master request command is as following:

Table 13 Master RS485 Request Command

Slave Address	Function Code	Data				CRC	
		Starting Address (308)		Data Qty. (2)		CRC 16 Calibration	
		MSB	LSB	MSB	LSB	LSB	MSB
01	03	01	34	00	02	84	39

Table 14 Client Ethernet Request Command

MBAP						Function Code	Data			
Protocol Identifier		Protocol Type		Data Length		Logic Device ID		Remote Address (404)		Remote Data	
								MSB	LSB	MSB	LSB
00	01	00	00	00	06	01	03	01	34	00	02

Slave response command is as following:

Table 15 Controller RS485 Response Command

Slave Address	Function Code	Data					CRC	
		Data Qty. (Bytes)	Returned Data				CRC 16 Calibration	
			Data MSB of Address 308	Data LSB of Address 308	Data MSB of Address 309	Data LSB of Address 309	LSB	MSB
01	03	04	E2	40	00	01	0C	5F

Table 16 Controller Ethernet Response Command

MBAP						Function Code	Data					
							Data Qty. (Bytes)	Returned Data				
Protocol Identifier		Protocol Type		Data Length		Logic Device ID		Data MSB of Address 308	Data LSB of Address 308	Data MSB of Address 309	Data LSB of Address 309
00	01	00	00	00	07	01	03	04	E2	40	00	01

Fill the received data into the corresponding address, as shown in the table below:

Table 17 Data Analysis

Address	Received Data (Hex)	Combination (Hex)	Accu. Running Hours (Decimal)
308	E240H	0001E240H	123456
309	0001H		

Table 18 Remote Coil Field

Modbus Address	PLC Address	Name	Description
0	1	Remote Start Key	Only send FF00H active
1	2	Remote Stop Key	Only send FF00H active
2	3	Remote Manual Key	Only send FF00H active
3	4	Remote Auto Key	Only send FF00H active
4	5	Remote Semi-auto Key	Only send FF00H active
5	6	Remote Gen Close Key	Only send FF00H active
6	7	Remote Gen Open Key	Only send FF00H active
7	8	Remote Up Key	Only send FF00H active
8	9	Remote Down Key	Only send FF00H active
9	10	Remote Left Key	Only send FF00H active
10	11	Remote Right Key	Only send FF00H active
11	12	Remote Confirm Key	Only send FF00H active
12	13	Remote Top Priority Key	Only send FF00H active
13	14	Remote ACK Key	Only send FF00H active
14	15	Remote Alarm Reset	Only send FF00H active
15	16	Remote Light Consumer Active	Only send FF00H active
16	17	Reserved	Only send FF00H active
17	18	Remote Alarm Mute	Only send FF00H active
18	19	Reserved	Only send FF00H active
19	20	Reserved	Only send FF00H active
20	21	Remote Output Port 1 Output	Only send FF00H or 0000H active Output for sending FF00H; Not output for sending 0000H.
21	22	Remote Output Port 2 Output	
22	23	Remote Output Port 3 Output	
23	24	Remote Output Port 4 Output	
24	25	Remote Output Port 5 Output	
25	26	Remote Output Port 6 Output	
26	27	Remote Output Port 7 Output	
27	28	Remote Output Port 8 Output	
28	29	Remote Output Port 9 Output	
29	30	Remote Output Port 10 Output	
30	31	Remote Output Port 11 Output	
31	32	Remote Output Port 12 Output	
32	33	Remote Output Port 13 Output	
33	34	Remote Output Port 14 Output	
34	35	Remote Output Port 15 Output	
35	36	Remote Output Port 16 Output	
36	37	Remote Output Port 17 Output	
37	38	Remote Output Port 18 Output	
38	39	Remote Output Port 19 Output	

Modbus Address	PLC Address	Name	Description
39	40	Remote Output Port 20 Output	
40	41	Reserved	
41-50	42-51	Reserved	
51	52	Remote 1#DOUT16 Output Port 1 Output	
52	53	Remote 1#DOUT16 Output Port 2 Output	
53	54	Remote 1#DOUT16 Output Port 3 Output	
54	55	Remote 1#DOUT16 Output Port 4 Output	
55	56	Remote 1#DOUT16 Output Port 5 Output	
56	57	Remote 1#DOUT16 Output Port 6 Output	
57	58	Remote 1#DOUT16 Output Port 7 Output	
58	59	Remote 1#DOUT16 Output Port 8 Output	Only send FF00H or 0000H active Output for sending FF00H; Not output for sending 0000H.
59	60	Remote 1#DOUT16 Output Port 9 Output	
60	61	Remote 1#DOUT16 Output Port 20 Output	
61	62	Remote 1#DOUT16 Output Port 11 Output	
62	63	Remote 1#DOUT16 Output Port 12 Output	
63	64	Remote 1#DOUT16 Output Port 13 Output	
64	65	Remote 1#DOUT16 Output Port 14 Output	
65	66	Remote 1#DOUT16 Output Port 15 Output	
66	67	Remote 1#DOUT16 Output Port 16 Output	
67-70	68-71	Reserved	
71	72	Remote 2#DOUT16 Output Port 1 Output	
72	73	Remote 2#DOUT16 Output Port 2 Output	Only send FF00H or 0000H active Output for sending FF00H; Not output for sending 0000H.
73	74	Remote 2#DOUT16 Output Port 3 Output	
74	75	Remote 2#DOUT16 Output Port	

Modbus Address	PLC Address	Name	Description
		4 Output	
75	76	Remote 2#DOUT16 Output Port 5 Output	
76	77	Remote 2#DOUT16 Output Port 6 Output	
77	78	Remote 2#DOUT16 Output Port 7 Output	
78	79	Remote 2#DOUT16 Output Port 8 Output	
79	80	Remote 2#DOUT16 Output Port 9 Output	
80	81	Remote 2#DOUT16 Output Port 10 Output	
81	82	Remote 2#DOUT16 Output Port 11 Output	
82	83	Remote 2#DOUT16 Output Port 12 Output	
83	84	Remote 2#DOUT16 Output Port 13 Output	
84	85	Remote 2#DOUT16 Output Port 14 Output	
85	86	Remote 2#DOUT16 Output Port 15 Output	
86	87	Remote 2#DOUT16 Output Port 16 Output	

NOTE: Remote command in the above table can be sent once only.

Example:

Remotely control controller to work in auto mode, firstly get its remote address is 3 by checking the table.

Assume that slave address is 01, the master request command is as following:

Table 19 Master RS485 Request Command

Slave Address	Function Code	Data				CRC	
		Remote Address (404)		Remote Data		CRC 16 Calibration	
		MSB	LSB	MSB	LSB	LSB	MSB
01	**05**	**00**	**03**	**FF**	**00**	**7C**	**3A**

Table 20 Client Ethernet Request Command

MBAP								Function Code	Data			
Protocol Identifier		Protocol Type		Data Length		Logic Device ID		Function Code	Remote Address (404)		Remote Data	
									MSB	LSB	MSB	LSB
00	01	00	00	00	06	01		05	00	03	FF	00

Controller response command is as following:

Table 21 Controller RS485 Response Command

Slave Address	Function Code	Data				CRC	
		Remote Address (404)		Remote Data		CRC 16 Calibration	
		MSB	LSB	MSB	LSB	LSB	MSB
01	05	00	03	FF	00	7C	3A

Table 22 Controller Ethernet Response Command

MBAP								Function Code	Data			
Protocol Identifier		Protocol Type		Data Length		Logic Device ID		Function Code	Remote Address (404)		Remote Data	
									MSB	LSB	MSB	LSB
00	01	00	00	00	06	01		05	00	03	FF	00

Whether the remote command is executed successfully can be confirmed by reading the auto mode status of address 1.13 via function code 03H.

2.4 ALARM BIT DESCRIPTION OF ALARM FIELD

Table 23 Alarm Bit Description of Alarm Field

Offset Address	Item	Description	Bits
0000	Bus Overvoltage 1	1 for active (bit0)	1bit
	Bus Overvoltage 2	1 for active (bit1)	1bit
	Bus Overvoltage 3	1 for active (bit2)	1bit
	Bus Undervoltage 1	1 for active (bit3)	1bit
	Bus Undervoltage 2	1 for active (bit4)	1bit
	Bus Undervoltage 3	1 for active (bit5)	1bit
	Bus Overfrequency 1	1 for active (bit6)	1bit
	Bus Overfrequency 2	1 for active (bit7)	1bit
	Bus Overfrequency 3	1 for active (bit8)	1bit
	Bus Underfrequency 1	1 for active (bit9)	1bit
	Bus Underfrequency 2	1 for active (bit10)	1bit
	Bus Underfrequency 3	1 for active (bit11)	1bit
	Bus ROCOF	1 for active (bit12)	1bit
	Bus Vector Shift	1 for active (bit13)	1bit
	Bus Loss of Phase	1 for active (bit14)	1bit
	Bus Reverse Phase Sequence	1 for active (bit15)	1bit

Offset Address	Item	Description	Bits
0001	Gen Overvoltage 1	1 for active (bit0)	1bit
	Gen Overvoltage 2	1 for active (bit1)	1bit
	Gen Overvoltage 3	1 for active (bit2)	1bit
	Gen Undervoltage 1	1 for active (bit3)	1bit
	Gen Undervoltage 2	1 for active (bit4)	1bit
	Gen Undervoltage 3	1 for active (bit5)	1bit
	Gen Overfrequency 1	1 for active (bit6)	1bit
	Gen Overfrequency 2	1 for active (bit7)	1bit
	Gen Overfrequency 3	1 for active (bit8)	1bit
	Gen Underfrequency 1	1 for active (bit9)	1bit
	Gen Underfrequency 2	1 for active (bit10)	1bit
	Gen Underfrequency 3	1 for active (bit11)	1bit
	Gen Overcurrent 1	1 for active (bit12)	1bit
	Gen Overcurrent 2	1 for active (bit13)	1bit
	Gen Overcurrent 3	1 for active (bit14)	1bit
	Gen Overcurrent 4	1 for active (bit15)	1bit
0002	Gen Overcurrent 5	1 for active (bit0)	1bit
	Gen Overcurrent 6	1 for active (bit1)	1bit
	Gen ROCOF 1	1 for active (bit2)	1bit
	Gen ROCOF 2	1 for active (bit3)	1bit
	Gen Reverse Power 1	1 for active (bit4)	1bit
	Gen Reverse Power 2	1 for active (bit5)	1bit
	Gen Over Power 1	1 for active (bit6)	1bit
	Gen Over Power 2	1 for active (bit7)	1bit
	Gen Voltage Unbalance 1	1 for active (bit8)	1bit
	Gen Voltage Unbalance 2	1 for active (bit9)	1bit
	Gen Current Unbalance 1	1 for active (bit10)	1bit
	Gen Current Unbalance 2	1 for active (bit11)	1bit
	Earth Fault 1	1 for active (bit12)	1bit
	Earth Fault 2	1 for active (bit13)	1bit
	Gen Loss of Excitation 1	1 for active (bit14)	1bit
	Gen Loss of Excitation 2	1 for active (bit15)	1bit
0003	Voltage THD 1	1 for active (bit0)	1bit
	Voltage THD 2	1 for active (bit1)	1bit
	Low Power Factor 1	1 for active (bit2)	1bit
	Low Power Factor 2	1 for active (bit3)	1bit
	NEL 1 Trip	1 for active (bit4)	1bit
	NEL 2 Trip	1 for active (bit5)	1bit
	NEL 3 Trip	1 for active (bit6)	1bit
	Power Overvoltage 1	1 for active (bit7)	1bit
	Power Overvoltage 2	1 for active (bit8)	1bit
	Power Undervoltage 1	1 for active (bit9)	1bit
	Power Undervoltage 2	1 for active (bit10)	1bit

Offset Address	Item	Description	Bits
	Active Distribution Unbalance 1	1 for active (bit11)	1bit
	Active Distribution Unbalance 2	1 for active (bit12)	1bit
	Reactive Distribution Unbalance 1	1 for active (bit13)	1bit
	Reactive Distribution Unbalance 2	1 for active (bit14)	1bit
	Gen Insufficient Capacity	1 for active (bit15)	1bit
0004	Gen Loss of Phase	1 for active (bit0)	1bit
	Gen Reverse Phase Sequence	1 for active (bit1)	1bit
	Start Failure	1 for active (bit2)	1bit
	No Running Feedback Fault	1 for active (bit3)	1bit
	Stop Failure	1 for active (bit4)	1bit
	Engine Fault	1 for active (bit5)	1bit
	Frequency/Voltage Fault	1 for active (bit6)	1bit
	Frequency Error	1 for active (bit7)	1bit
	External Start	1 for active (bit8)	1bit
	External Stop	1 for active (bit9)	1bit
	External Overcurrent Short	1 for active (bit10)	1bit
	Emergency Stop	1 for active (bit11)	1bit
	Reserved	1 for active (bit12)	1bit
	Few Bus Modules	1 for active (bit13)	1bit
	ID Address Error	1 for active (bit14)	1bit
	Bus Input Fault	1 for active (bit15)	1bit
0005	Abnormal Trip of Main Switch	1 for active (bit0)	1bit
	External Open of Main Switch	1 for active (bit1)	1bit
	Close Failure	1 for active (bit2)	1bit
	Open Failure	1 for active (bit3)	1bit
	Close Feedback Fault	1 for active (bit4)	1bit
	Open Feedback Fault	1 for active (bit5)	1bit
	Synchronization Failure	1 for active (bit6)	1bit
	Unloading Failure	1 for active (bit7)	1bit
	Bus Switch 0 Feedback Fault	1 for active (bit8)	1bit
	Bus Switch 1 Feedback Fault	1 for active (bit9)	1bit
	Bus Switch 2 Feedback Fault	1 for active (bit10)	1bit
	Bus Switch 3 Feedback Fault	1 for active (bit11)	1bit
	Bus Switch 4 Feedback Fault	1 for active (bit12)	1bit
	Bus Switch 5 Feedback Fault	1 for active (bit13)	1bit
	Bus Switch 6 Feedback Fault	1 for active (bit14)	1bit
	Reserved	1 for active (bit15)	1bit
0006	Input Port 1	1 for active (bit0)	1bit
	Input Port 2	1 for active (bit1)	1bit
	Input Port 3	1 for active (bit2)	1bit
	Input Port 4	1 for active (bit3)	1bit
	Input Port 5	1 for active (bit4)	1bit
	Input Port 6	1 for active (bit5)	1bit

Offset Address	Item	Description	Bits
	Input Port 7	1 for active (bit6)	1bit
	Input Port 8	1 for active (bit7)	1bit
	Input Port 9	1 for active (bit8)	1bit
	Input Port 10	1 for active (bit9)	1bit
	Input Port 11	1 for active (bit10)	1bit
	Input Port 12	1 for active (bit11)	1bit
	Input Port 13	1 for active (bit12)	1bit
	Input Port 14	1 for active (bit13)	1bit
	Input Port 15	1 for active (bit14)	1bit
	Input Port 16	1 for active (bit15)	1bit
0007	Input Port 17	1 for active (bit0)	1bit
	Input Port 18	1 for active (bit1)	1bit
	Input Port 19	1 for active (bit2)	1bit
	Input Port 20	1 for active (bit3)	1bit
	Reserved	1 for active (bit4)	1bit
	Reserved	1 for active (bit5)	1bit
	AI1 Open Circuit	1 for active (bit6)	1bit
	AI2 Open Circuit	1 for active (bit7)	1bit
	AI1 Upper Limit 1 Alarm	1 for active (bit8)	1bit
	AI1 Upper Limit 2 Alarm	1 for active (bit9)	1bit
	AI1 Lower Limit 1 Alarm	1 for active (bit10)	1bit
	AI1 Lower Limit 2 Alarm	1 for active (bit11)	1bit
	AI2 Upper Limit 1 Alarm	1 for active (bit12)	1bit
	AI2 Upper Limit 2 Alarm	1 for active (bit13)	1bit
	AI2 Lower Limit 1 Alarm	1 for active (bit14)	1bit
	AI2 Lower Limit 2 Alarm	1 for active (bit15)	1bit
0008	1#DIN16 Input Port 1	1 for active (bit0)	1bit
	1#DIN16 Input Port 2	1 for active (bit1)	1bit
	1#DIN16 Input Port 3	1 for active (bit2)	1bit
	1#DIN16 Input Port 4	1 for active (bit3)	1bit
	1#DIN16 Input Port 5	1 for active (bit4)	1bit
	1#DIN16 Input Port 6	1 for active (bit5)	1bit
	1#DIN16 Input Port 7	1 for active (bit6)	1bit
	1#DIN16 Input Port 8	1 for active (bit7)	1bit
	1#DIN16 Input Port 9	1 for active (bit8)	1bit
	1#DIN16 Input Port 10	1 for active (bit9)	1bit
	1#DIN16 Input Port 11	1 for active (bit10)	1bit
	1#DIN16 Input Port 12	1 for active (bit11)	1bit
	1#DIN16 Input Port 13	1 for active (bit12)	1bit
	1#DIN16 Input Port 14	1 for active (bit13)	1bit
	1#DIN16 Input Port 15	1 for active (bit14)	1bit
	1#DIN16 Input Port 16	1 for active (bit15)	1bit
0009	2#DIN16 Input Port 1	1 for active (bit0)	1bit

Offset Address	Item	Description	Bits
	2#DIN16 Input Port 2	1 for active (bit1)	1bit
	2#DIN16 Input Port 3	1 for active (bit2)	1bit
	2#DIN16 Input Port 4	1 for active (bit3)	1bit
	2#DIN16 Input Port 5	1 for active (bit4)	1bit
	2#DIN16 Input Port 6	1 for active (bit5)	1bit
	2#DIN16 Input Port 7	1 for active (bit6)	1bit
	2#DIN16 Input Port 8	1 for active (bit7)	1bit
	2#DIN16 Input Port 9	1 for active (bit8)	1bit
	2#DIN16 Input Port 10	1 for active (bit9)	1bit
	2#DIN16 Input Port 11	1 for active (bit10)	1bit
	2#DIN16 Input Port 12	1 for active (bit11)	1bit
	2#DIN16 Input Port 13	1 for active (bit12)	1bit
	2#DIN16 Input Port 14	1 for active (bit13)	1bit
	2#DIN16 Input Port 15	1 for active (bit14)	1bit
	2#DIN16 Input Port 16	1 for active (bit15)	1bit
0010	1#DIN16 Comm. Failure	1 for active (bit0)	1bit
	2#DIN16 Comm. Failure	1 for active (bit1)	1bit
	1#DOUT16 Comm. Failure	1 for active (bit2)	1bit
	2#DOUT16 Comm. Failure	1 for active (bit3)	1bit
	Reserved	1 for active (bit4)	1bit
	Reserved	1 for active (bit5)	1bit
	Engine Controller Comm. Failure	1 for active (bit6)	1bit
	1#HMP300 Comm. Failure	1 for active (bit7)	1bit
	2#HMP300 Comm. Failure	1 for active (bit8)	1bit
	Reserved	1 for active (bit9)	1bit
	Reserved	1 for active (bit10)	1bit
	Reserved	1 for active (bit11)	1bit
	PLC Function 1	1 for active (bit12)	1bit
	PLC Function 2	1 for active (bit13)	1bit
	PLC Function 3	1 for active (bit14)	1bit
	PLC Function 4	1 for active (bit15)	1bit
0011	PLC Function 5	1 for active (bit0)	1bit
	PLC Function 6	1 for active (bit1)	1bit
	PLC Function 7	1 for active (bit2)	1bit
	PLC Function 8	1 for active (bit3)	1bit
	PLC Function 9	1 for active (bit4)	1bit
	PLC Function 10	1 for active (bit5)	1bit
	PLC Function 11	1 for active (bit6)	1bit
	PLC Function 12	1 for active (bit7)	1bit
	PLC Function 13	1 for active (bit8)	1bit
	PLC Function 14	1 for active (bit9)	1bit
	PLC Function 15	1 for active (bit10)	1bit
	PLC Function 16	1 for active (bit11)	1bit

Offset Address	Item	Description	Bits
	PLC Function 17	1 for active (bit12)	1bit
	PLC Function 18	1 for active (bit13)	1bit
	PLC Function 19	1 for active (bit14)	1bit
	PLC Function 20	1 for active (bit15)	1bit
0012	SG and DG Parallel Num. Over	1 for active (bit0)	1bit
	SG Insufficient Capacity	1 for active (bit1)	1bit
	DG Insufficient Capacity	1 for active (bit2)	1bit
	SG and DG Grid-connected Overtime	1 for active (bit3)	1bit
	SG Solenoid Valve Fault	1 for active (bit4)	1bit
	Reserved	1 for active (bit5)	1bit
	Reserved	1 for active (bit6)	1bit
	Reserved	1 for active (bit7)	1bit
	Reserved	1 for active (bit8)	1bit
	Reserved	1 for active (bit9)	1bit
	Reserved	1 for active (bit10)	1bit
	Reserved	1 for active (bit11)	1bit
	Reserved	1 for active (bit12)	1bit
	Reserved	1 for active (bit13)	1bit
	Reserved	1 for active (bit14)	1bit
	Reserved	1 for active (bit15)	1bit
0013	Voltage Asychronization	1 for active (bit0)	1bit
	Frequency Asychronization	1 for active (bit1)	1bit
	Phase Asychronization	1 for active (bit2)	1bit
	AI1 Fault	1 for active (bit3)	1bit
	AI2 Fault	1 for active (bit4)	1bit
	Bus Switch & Series Switch 0 Feedback Fault	1 for active (bit5)	1bit
	Bus Switch & Series Switch 1 Feedback Fault	1 for active (bit6)	1bit
	Bus Switch & Series Switch 2 Feedback Fault	1 for active (bit7)	1bit
	Bus Switch & Series Switch 3 Feedback Fault	1 for active (bit8)	1bit
	Bus Switch & Series Switch 4 Feedback Fault	1 for active (bit9)	1bit
	Bus Switch & Series Switch 5 Feedback Fault	1 for active (bit10)	1bit
	HC 1 Feedback Failure	1 for active (bit11)	1bit
	HC 2 Feedback Failure	1 for active (bit12)	1bit
	HC 3 Feedback Failure	1 for active (bit13)	1bit
	HC 4 Feedback Failure	1 for active (bit14)	1bit
	Shore Switch Feedback Failure	1 for active (bit15)	1bit
0014	HC 1 Request Failure	1 for deactive (bit0)	1bit
	HC 2 Request Failure	1 for active (bit1)	1bit

Offset Address	Item	Description	Bits
	HC 3 Request Failure	1 for active (bit2)	1bit
	HC 4 Request Failure	1 for active (bit3)	1bit
	Switch Error	1 for active (bit4)	1bit
	IP Address Error	1 for active (bit5)	1bit
	Mac Address Error	1 for active (bit6)	1bit
	SLD Configuration Error	1 for active (bit7)	1bit
	Shore Switch 0 Feedback Fault	1 for active (bit8)	1bit
	Shore Switch 1 Feedback Fault	1 for active (bit9)	1bit
	Shore Switch 2 Feedback Fault	1 for active (bit10)	1bit
	Shore Switch 3 Feedback Fault	1 for active (bit11)	1bit
	Ring Disconnect	1 for active (bit12)	1bit
	DG Inactive Input Fault	1 for active (bit13)	1bit
	Bus Dead Close Input Fault	1 for active (bit14)	1bit
	Reserved	1 for active (bit15)	1bit
0015	Current THD 1	1 for active (bit0)	1bit
	Current THD 2	1 for active (bit1)	1bit
	Voltage SHD 1	1 for active (bit2)	1bit
	Voltage SHD 2	1 for active (bit3)	1bit
	Current SHD 1	1 for active (bit4)	1bit
	Current SHD 2	1 for active (bit5)	1bit
	Gen Vector Shift 1	1 for active (bit6)	1bit
	Gen Vector Shift 2	1 for active (bit7)	1bit
	Reserved	1 for active (bit8)	1bit
	Reserved	1 for active (bit9)	1bit
	Reserved	1 for active (bit10)	1bit
	Reserved	1 for active (bit11)	1bit
	Reserved	1 for active (bit12)	1bit
	Reserved	1 for active (bit13)	1bit
	Reserved	1 for active (bit14)	1bit
	Reserved	1 for active (bit15)	1bit
0016	Reserved	1 for active (bit0)	1bit
	Reserved	1 for active (bit1)	1bit
	Reserved	1 for active (bit2)	1bit
	Reserved	1 for active (bit3)	1bit
	Reserved	1 for active (bit4)	1bit
	Reserved	1 for active (bit5)	1bit
	Reserved	1 for active (bit6)	1bit
	Reserved	1 for active (bit7)	1bit
	Reserved	1 for active (bit8)	1bit
	Reserved	1 for active (bit9)	1bit
	Reserved	1 for active (bit10)	1bit
	Reserved	1 for active (bit11)	1bit
	Reserved	1 for active (bit12)	1bit

Offset Address	Item	Description	Bits
	Reserved	1 for active (bit13)	1bit
	Reserved	1 for active (bit14)	1bit
	Reserved	1 for active (bit15)	1bit
0017	Reserved	1 for active (bit0)	1bit
	Reserved	1 for active (bit1)	1bit
	Reserved	1 for active (bit2)	1bit
	Reserved	1 for active (bit3)	1bit
	Reserved	1 for active (bit4)	1bit
	Reserved	1 for active (bit5)	1bit
	Reserved	1 for active (bit6)	1bit
	Reserved	1 for active (bit7)	1bit
	Reserved	1 for active (bit8)	1bit
	Reserved	1 for active (bit9)	1bit
	Reserved	1 for active (bit10)	1bit
	Reserved	1 for active (bit11)	1bit
	Reserved	1 for active (bit12)	1bit
	Reserved	1 for active (bit13)	1bit
	Reserved	1 for active (bit14)	1bit
	Reserved	1 for active (bit15)	1bit
0018	Reserved	1 for active (bit0)	1bit
	Reserved	1 for active (bit1)	1bit
	Reserved	1 for active (bit2)	1bit
	Reserved	1 for active (bit3)	1bit
	Reserved	1 for active (bit4)	1bit
	Reserved	1 for active (bit5)	1bit
	Reserved	1 for active (bit6)	1bit
	Reserved	1 for active (bit7)	1bit
	Reserved	1 for active (bit8)	1bit
	Reserved	1 for active (bit9)	1bit
	Reserved	1 for active (bit10)	1bit
	Reserved	1 for active (bit11)	1bit
	Reserved	1 for active (bit12)	1bit
	Reserved	1 for active (bit13)	1bit
	Reserved	1 for active (bit14)	1bit
	Reserved	1 for active (bit15)	1bit
0019	Reserved	1 for active (bit0)	1bit
	Reserved	1 for active (bit1)	1bit
	Reserved	1 for active (bit2)	1bit
	Reserved	1 for active (bit3)	1bit
	Reserved	1 for active (bit4)	1bit
	Reserved	1 for active (bit5)	1bit
	Reserved	1 for active (bit6)	1bit
	Reserved	1 for active (bit7)	1bit

Offset Address	Item	Description	Bits
	Reserved	1 for active (bit8)	1bit
	Reserved	1 for active (bit9)	1bit
	Reserved	1 for active (bit10)	1bit
	Reserved	1 for active (bit11)	1bit
	Reserved	1 for active (bit12)	1bit
	Reserved	1 for active (bit13)	1bit
	Reserved	1 for active (bit14)	1bit
	Reserved	1 for active (bit15)	1bit

Example:

If the content of address 1088 is 1, 1089 is 5, it indicates that currently 1# power is in voltage abnormal delay, countdown 5s.

If the content of address 1088 is 4, it indicates that currently 1# power has over voltage.

2.5 SYSTEM STATUS DESCRIPTION

Table 24 System Status Description

Value (No.)	Status	Delay
0	Standby	No Delay
1	Start Output	Delay (unit: s)
2	Wait for Start	Delay (unit: s)
3	Stable Loading	Delay (unit: s)
4	Wait for Load	No Delay
5	Transient Fault	Delay (unit: s)
6	Normal Running	No Delay
7	High-speed Cooling	Delay (unit: s)
8	Stop Output	Delay (unit: s)
9	Wait for Stop	Delay (unit: s)
10	Stop Failure	No Delay

Example:

If the content of address 300 is 1, 301 is 5, it indicates that system is starting the engine, countdown 5s.

If the content of address 300 is 6, it indicates that genset has been running.

2.6 GB STATUS DESCRIPTION

Table 25 GB Status Description

Value (No.)	Status	Delay
0	Gen Synchronizing	No Delay
1	Gen Closed Output	Delay (unit: s)
2	Feedback Fault when Gen Closing	No Delay
3	Gen Close Failure	No Delay
4	Gen Closed	No Delay
5	Gen Loading	No Delay
6	Gen Unloading	No Delay
7	Gen Opened Output	Delay (unit: s)
8	Feedback Fault when Gen Opening	No Delay
9	Gen Open Failure	No Delay
10	Gen Opened	No Delay

2.7 START/STOP STATUS DESCRIPTION

Table 26 Start/Stop Status Description

Value (No.)	Status	Delay
0	None	No Delay
1	Start Delay	Delay (unit: s)
2	Stop Delay	Delay (unit: s)
3	Wait for Genset	No Delay

2.8 HC STATUS DESCRIPTION

Table 27 HC Status Description

Value (No.)	Status	Delay
0	No Request	No Delay
1	HC Request	No Delay
2	Stable HC	Delay (unit: s)
3	HC ACK Output	Delay (unit: s)
4	HC No Feedback	No Delay
5	HC Feedback	No Delay
6	HC Request Failure	No Delay

3   COMMUNICATION PARAMETERS VIEW AND CONFIGURATION

1) In the home page of main interface, long press ![Enter] key to enter menu interface;

2) Press Down key to select "Parameter Setting", then press ![Enter] key to enter parameter password interface;

3) Input correct password (default 00318), press ![Enter] key to enter the main interface of parameter;

4) Select "Module Setting" via ![Down] key, press ![Enter] key to enter sub-menu;

5) Select "Module Address", "RS485 Communication Setting", "Network Setting" via ![Up], ![Down] key, after pressing ![Enter] key, it enters parameter edit function, corresponding parameters will be in the selected status;

6) Set the current selected content via ![Up], ![Down] key, press ![Enter] to confirm, after the editing is completed, the selected status disappear;

7) Long press ![Return] key to return the main interface.

NOTE: The configuration will be active after parameter setting is completed.

4   FAQ

4.1   COMMUNICATION LINE SHIELDING LAYER GROUNDED

In order to prevent coupled interference signal on communication line, its single end need to be grounded.

4.2   TERMINAL RESISTOR

At both ends of the linear network (on the two communication ports furthest apart), it is necessary to connect 120Ω terminal resistor in parallel on a pair of communication lines. According to the transmission line theory, the terminal resistor can absorb reflected waves on the network, effectively enhancing the signal strength. The value of two terminal resistors in parallel should be approximately equal to the characteristic impedance of the transmission line at the communication frequency.

A regular RS485 network usually uses terminal resistor. It can also be not used in the case of network connection line is very short, temporary or laboratory test.

4.3   RS485 TO USB COMMUNICATION ADAPTOR

PC can communicate with SG72A module produced by our company.

4.4   NETWORK COMMUNICATION

It can be realized by using RJ45 cross or through wire with SF/UTP CAT5e or over.
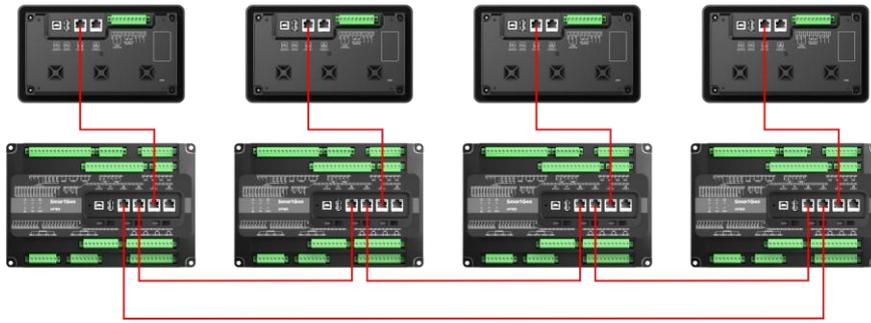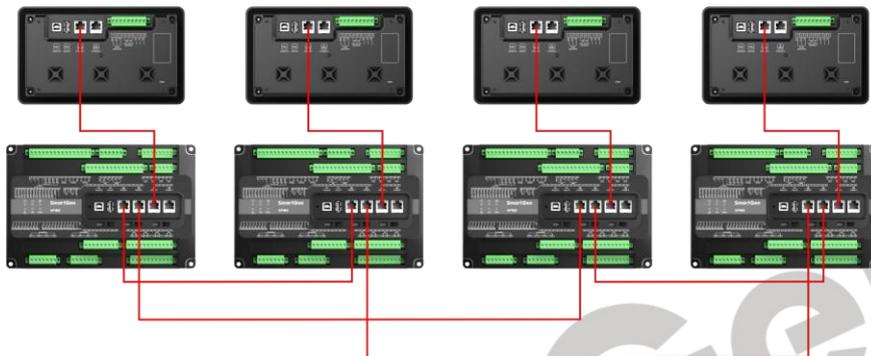
Fig.8 HPM6 Communication Connection Diagram 1

Fig.9 HPM6 Communication Connection Diagram 2

NOTE: Controller integrated switch function, which is ring redundancy connection. If externally connected switch, please do not or cautiously connect with controller internal ring (avoid external ring formation). It can be randomly connected if ring redundancy is not needed.

4.5   EXTENDED COMMUNICATION DISTANCE

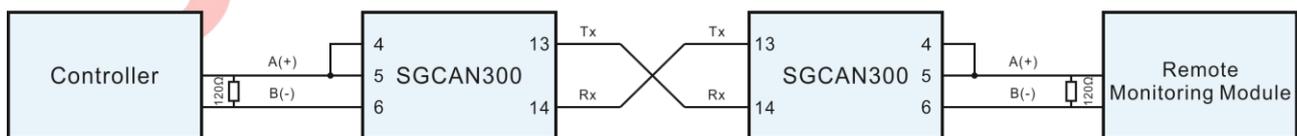Long distance (up to 10km) communication can be realized by a pair of SGCAN300 CANBUS relay modules.

Fig.10 SGCAN300 Application Diagram

4.6   COMMON SOLUTIONS OF COMMUNICATION FAILURE

1) Check whether the positive and negative of RS485 is correctly connected;
2) Check whether the RS485 converter (if configured) is normal;
3) Check whether the network cable interface light is illuminated or flashed;
4) Check whether ommunication parameter setting is correct;
5) Check whether the terminal resistor is correctly connected;
6) Disconnect the connection line of controller's RS485, measure the voltage difference of RS485's A and B terminal. If the difference is between ±200mV, it means communication port has abnormal situation;

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7) It is recommended to download HPM6 corresponding host computer software to check whether communication is normal.

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