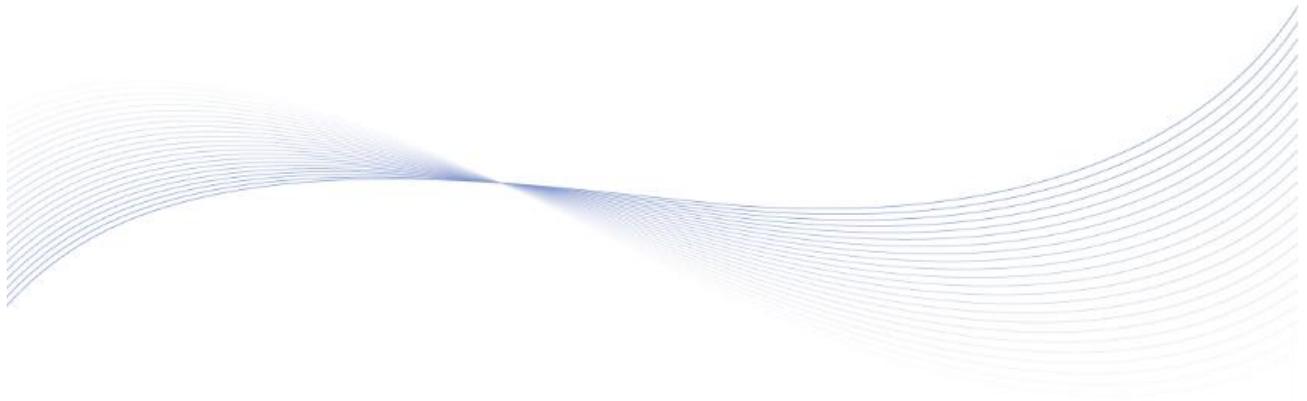




**HGM8110ZDC**  
**GENSET CONTROLLER**  
**COMMUNICATION PROTOCOL**



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## SmartGen Registered trademark

No. 28 Xuemei Street, Zhengzhou, Henan, China

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

+86-371-67981000(overseas)

Fax: +86-371-67992952

Web: [www.smartgen.com.cn/](http://www.smartgen.com.cn/)

[www.smartgen.cn/](http://www.smartgen.cn/)

Email: [sales@smartgen.cn](mailto:sales@smartgen.cn)

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**Table 1 – Software Version**

Date	Version	Note
2023-08-26	V1.0	Original release.

## 1 INTRODUCTION

This protocol describes read and write command format of RS485 half-duplex serial port and the definition of internal information data for the third-party to develop and use.

HGM8110ZDC genset control has 1 RS485 interface. Controller is used as slave unit and adopts Modbus-RTU protocol, doesn't support Modbus-ASCII and other protocols.

Data Format:

Communication Address: 1~254 (factory default:1)

Baud Rate: 9600bps

Start Bit: 1-bit

Data Bit: 8-bit

Parity Bit: No parity

Stop Bit: 1-bit (can be set)

Supported function code: 03H, 05H, 06H. Function code 03H is used for reading data register in the device (the data register saves the setting values of various sampling analog and parameter); function code 05H is used for sending remote control command; function code 06H is used for saving single data to the memory inside the device.

Data calibration method: CRC16.

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

Communication timeout period: over 200ms.

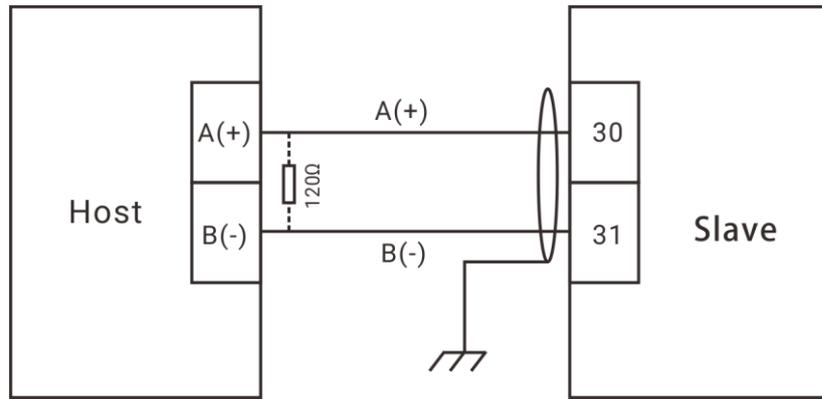
Communication distance: 9600 baud rate, the longest distance can reach 1,000m when using 120Ω shielding twisted pair line.

Once maximum 120 data of byte register can be read.

Up to 32 controllers can be deployed for network communication.

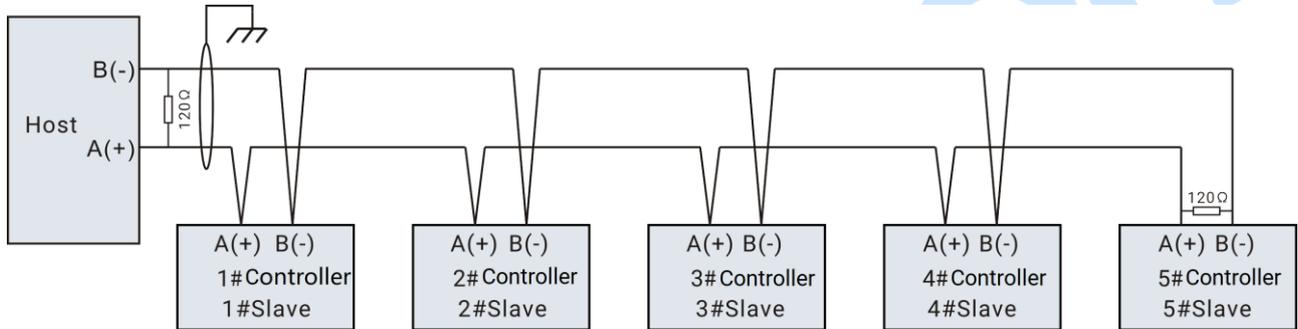
When RS485 is connected, 120Ω twisted pair line with shielding layer shall be used, and the shielding layer shall be grounded at one end.

**2 WIRING DIAGRAM**



**Fig.1 – Communication Wiring of Single Unit**

**Note 1:** 2 of 120Ω impedance matching resistors can be connected according to the on-site situation, please see the following description.



**Fig.2 – Communication Wiring of Multiple units**

**Note 1:** Please set the communication module address of each controller before networking. Do not have the same module address in the same network.

**Note 2:** The shielding layer of the communication cable is single-ended grounded on the host side.

### 3 CONTROLLER INTERNAL REGISTER ADDRESS AND DATA

#### 3.1 FUNCTION CODE 03H MAPPING COIL FIELD

**Table 2 – Alarm & Status Coil Field**

Modbus Address	PLC Address	Item	Description	Bit
0000.0	40001.0	Common Alarm	1 for active (LSB)	1bit
0000.1	40001.1	Common Shutdown Alarm	1 for active	1bit
0000.2	40001.2	Common Warning Alarm	1 for active	1bit
0000.3	40001.3	Common Trip and Stop	1 for active	1bit
0000.4	40001.4	Common Trip	1 for active	1bit
0000.5	40001.5	Common Trip Shutdown and Common Shutdown Alarm	1 for active	1bit
0000.6	40001.6	Reserved	1 for active	1bit
0000.7	40001.7	Reserved	1 for active	1bit
0000.8	40001.8	System In Test Mode	1 for active	1bit
0000.9	40001.9	System In Auto Mode	1 for active	1bit
0000.10	40001.10	System In Manual Mode	1 for active	1bit
0000.11	40001.11	System In Stop Mode	1 for active	1bit
0000.12	40001.12	Reserved	1 for active	1bit
0000.13	40001.13	Reserved	1 for active	1bit
0000.14	40001.14	Reserved	1 for active	1bit
0000.15	40001.15	Reserved	1 for active (MSB)	1bit
0001.0	40002.0	Emergency Stop Alarm		
0001.1	40002.1	Overspeed Shutdown		
0001.2	40002.2	Underspeed Shutdown		
0001.3	40002.3	Loss of Speed Signal Alarm		
0001.4	40002.4	Gen Over Frequency Shutdown		
0001.5	40002.5	Gen Under Frequency Shutdown		
0001.6	40002.6	Gen Over Voltage Shutdown		
0001.7	40002.7	Gen Under Voltage Shutdown		
0001.8	40002.8	Failed to Start Alarm		
0001.9	40002.9	Gen Over Current Shutdown		
0001.10	40002.10	Maintenance Time Due Shutdown		
0001.11	40002.11	ECU Alarm Shutdown		
0001.12	40002.12	Reverse Power Alarm Shutdown		
0001.13	40002.13	Over power Alarm Shutdown		
0001.14	40002.14	High Temperature Shutdown		
0001.15	40002.15	Low Oil Pressure Shutdown		
0002.0	40003.0	ECU Comm Fail Shutdown		
0002.1	40003.1	Reserved		

Modbus Address	PLC Address	Item	Description	Bit
0002.2	40003.2	Reserved		
0002.3	40003.3	Gen Phase Sequence Wrong Shutdown		
0002.4	40003.4	Reserved		
0002.5	40003.5	Unbalanced Current Shutdown		
0002.6	40003.6	Earth Fault Shutdown		
0002.7	40003.7	Loss of Excitation Shutdown		
0002.8	40003.8	Temp. Sensor Open Shutdown		
0002.9	40003.9	High Temp. Shutdown		
0002.10	40003.10	Reserved		
0002.11	40003.11	DC Over Voltage Shutdown		
0002.12	40003.12	Oil Pressure Sensor Open		
0002.13	40003.13	Reserved		
0002.14	40003.14	Low Oil Pressure Shutdown		
0002.15	40003.15	DC Under Voltage Shutdown		
0003.0	40004.0	Level Sensor Open		
0003.1	40004.1	Reserved		
0003.2	40004.2	Reserved		
0003.3	40004.3	DC Over Current Shutdown		
0003.4	40004.4	Flexible Sensor 1 Open		
0003.5	40004.5	Flexible Sensor 1 High Shutdown		
0003.6	40004.6	Flexible Sensor 1 Low Shutdown		
0003.7	40004.7	DC Over Power Shutdown		
0003.8	40004.8	Flexible Sensor 2 Open		
0003.9	40004.9	Flexible Sensor 2 High Shutdown		
0003.10	40004.10	Flexible Sensor 2 Low Shutdown		
0003.11	40004.11	Reserved		
0003.12	40004.12	Reserved		
0003.13	40004.13	Reserved		
0003.14	40004.14	Reserved		
0003.15	40004.15	Reserved		
0004.0	40005.0	Exp1 Com Fail		
0004.1	40005.1	Exp 1 Exhaust Temp. High		
0004.2	40005.2	Exp 1 Sensor 15 Open		
0004.3	40005.3	Exp 1 Sensor 15 High		
0004.4	40005.4	Exp 1 Sensor 15 Low		
0004.5	40005.5	Exp 1 Sensor 16 Open		
0004.6	40005.6	Exp 1 Sensor 16 High		
0004.7	40005.7	Exp 1 Sensor 16 Low		
0004.8	40005.8	Exp 1 Sensor 17 Open		
0004.9	40004.9	Exp 1 Sensor 17 High		
0004.10	40005.10	Exp 1 Sensor 17 Low		
0004.11	40005.11	Exp 1 Sensor 18 Open		
0004.12	40005.12	Exp 1 Sensor 18 High		

Modbus Address	PLC Address	Item	Description	Bit
0004.13	40005.13	Exp 1 Sensor 18 Low		
0004.14	40005.14	Exp 1 Sensor 19 Open		
0004.15	40005.15	Exp 1 Sensor 19 High		
0005.0	40006.0	Exp 1 Sensor 19 Low		
0005.1	40006.1	Exp 1 Sensor 20 Open		
0005.2	40006.2	Exp 1 Sensor 20 High		
0005.3	40006.3	Exp 1 Sensor 20 Low		
0005.4	40006.4	Exp 1 Sensor 21 Open		
0005.5	40006.5	Exp 1 Sensor 21 High		
0005.6	40006.6	Exp 1 Sensor 21 Low		
0005.7	40006.7	Exp 1 Sensor 22 Open		
0005.8	40006.8	Exp 1 Sensor 22 High		
0005.9	40006.9	Exp 1 Sensor 22 Low		
0005.10	40006.10	Exp 1 Sensor 23 Open		
0005.11	40006.11	Exp 1 Sensor 23 High		
0005.12	40006.12	Exp 1 Sensor 23 Low		
0005.13	40006.13	Exp 1 Sensor 24 Open		
0005.14	40006.14	Exp 1 Sensor 24 High		
0005.15	40006.15	Exp 1 Sensor 24 Low		
0006.0	40007.0	Exp 2 Com Fail		
0006.1	40007.1	Exp 2 Exhaust Temp. High		
0006.2	40007.2	Exp 2 Sensor 15 Open		
0006.3	40007.3	Exp 2 Sensor 15 High		
0006.4	40007.4	Exp 2 Sensor 15 Low		
0006.5	40007.5	Exp 2 Sensor 16 Open		
0006.6	40007.6	Exp 2 Sensor 16 High		
0006.7	40007.7	Exp 2 Sensor 16 Low		
0006.8	40007.8	Exp 2 Sensor 17 Open		
0006.9	40007.9	Exp 2 Sensor 17 High		
0006.10	40007.10	Exp 2 Sensor 17 Low		
0006.11	40007.11	Exp 2 Sensor 18 Open		
0006.12	40007.12	Exp 2 Sensor 18 High		
0006.13	40007.13	Exp 2 Sensor 18 Low		
0006.14	40007.14	Exp 2 Sensor 19 Open		
0006.15	40007.15	Exp 2 Sensor 19 High		
0007.0	40008.0	Exp 2 Sensor 19 Low		
0007.1	40008.1	Exp 2 Sensor 20 Open		
0007.2	40008.2	Exp 2 Sensor 20 High		
0007.3	40008.3	Exp 2 Sensor 20 Low		
0007.4	40008.4	Exp 2 Sensor 21 Open		
0007.5	40008.5	Exp 2 Sensor 21 High		
0007.6	40008.6	Exp 2 Sensor 21 Low		
0007.7	40008.7	Exp 2 Sensor 22 Open		

Modbus Address	PLC Address	Item	Description	Bit
0007.8	40008.8	Exp 2 Sensor 22 High		
0007.9	40008.9	Exp 2 Sensor 22 Low		
0007.10	40008.10	Exp 2 Sensor 23 Open		
0007.11	40008.11	Exp 2 Sensor 23 High		
0007.12	40008.12	Exp 2 Sensor 23 Low		
0007.13	40008.13	Exp 2 Sensor 24 Open		
0007.14	40008.14	Exp 2 Sensor 24 High		
0007.15	40008.15	Exp 2 Sensor 24 Low		
0008.0	40009.0	Input 1 Shutdown		
0008.1	40009.1	Input 2 Shutdown		
0008.2	40009.2	Input 3 Shutdown		
0008.3	40009.3	Input 4 Shutdown		
0008.4	40009.4	Input 5 Shutdown		
0008.5	40009.5	Input 6 Shutdown		
0008.6	40009.6	Input 7 Shutdown		
0008.7	40009.7	Input 8 Shutdown		
0008.8	40009.8	Reserved		
0008.9	40009.9	Reserved		
0008.10	40009.10	Reserved		
0008.11	40009.11	Reserved		
0008.12	40009.12	PLC Function 1		
0008.13	40009.13	PLC Function 2		
0008.14	40009.14	PLC Function 3		
0008.15	40009.15	PLC Function 4		
0009.0	40010.0	PLC Function 5		
0009.1	40010.1	PLC Function 6		
0009.2	40010.2	PLC Function 7		
0009.3	40010.3	PLC Function 8		
0009.4	40010.4	PLC Function 9		
0009.5	40010.5	PLC Function 10		
0009.6	40010.6	PLC Function 11		
0009.7	40010.7	PLC Function 12		
0009.8	40010.8	PLC Function 13		
0009.9	40010.9	PLC Function 14		
0009.10	40010.10	PLC Function 15		
0009.11	40010.11	PLC Function 16		
0009.12	40010.12	PLC Function 17		
0009.13	40010.13	PLC Function 18		
0009.14	40010.14	PLC Function 19		
0009.15	40010.15	PLC Function 20		
0010.0	40011.0	Reserved		
0010.1	40011.1	Reserved		
0010.2	40011.2	Exp DI Com Fail		

Modbus Address	PLC Address	Item	Description	Bit
0010.3	40011.3	Exp DOUT Com Fail		
0010.4	40011.4	Exp DI Input 1		
0010.5	40011.5	Exp DI Input 2		
0010.6	40011.6	ExpDI Input 3		
0010.7	40011.7	Exp DI Input 4		
0010.8	40011.8	Exp DI Input 5		
0010.9	40011.9	ExpDI Input 6		
0010.10	40011.10	Exp DI Input 7		
0010.11	40011.11	Exp DI Input 8		
0010.12	40011.12	Exp DI Input 9		
0010.13	40011.13	Exp DI Input 10		
0010.14	40011.14	Exp DI Input 11		
0010.15	40011.15	Exp DI Input 12		
0011.0	40012.0	Exp DI Input 13		
0011.1	40012.1	Exp DI Input 14		
0011.2	40012.2	Exp DI Input 15		
0011.3	40012.3	Exp DI Input 16		
0011.4	40012.4	EXP1 Cyl Temp. Diff		
0011.5	40012.5	EXP1 Cyl Temp. High		
0011.6	40012.6	EXP2 Cyl Temp. Diff		
0011.7	40012.7	EXP2 Cyl Temp. High		
0011.8	40012.8	Reserved		
0011.9	40012.9	Reserved		
0011.10	40012.10	Reserved		
0011.11	40012.11	Reserved		
0011.12	40012.12	Reserved		
0011.13	40012.13	Reserved		
0011.14	40012.14	Reserved		
0011.15	40012.15	Reserved		
0012.0	40013.0	Overcurrent Trip Shutdown		
0012.1	40013.1	Maintenance Due Trip Shutdown		
0012.2	40013.2	Reverse Power Trip Shutdown		
0012.3	40013.3	Over Power Trip Shutdown		
0012.4	40013.4	Input 1 Trip and Stop		
0012.5	40013.5	Input 2 Trip and Stop		
0012.6	40013.6	Input 3 Trip and Stop		
0012.7	40013.7	Input 4 Trip and Stop		
0012.8	40013.8	Input 5 Trip and Stop		
0012.9	40013.9	Input 6 Trip and Stop		
0012.10	40013.10	Input 7 Trip and Stop		
0012.11	40013.11	Input 8 Trip and Stop		
0012.12	40013.12	Reserved		
0012.13	40013.13	Reserved		

Modbus Address	PLC Address	Item	Description	Bit
0012.14	40013.14	Exp DI Com Fail		
0012.15	40013.15	Exp DOUT Com Fail		
0013.0	40014.0	PLC Function 1		
0013.1	40014.1	PLC Function 2		
0013.2	40014.2	PLC Function 3		
0013.3	40014.3	PLC Function 4		
0013.4	40014.4	PLC Function 5		
0013.5	40014.5	PLC Function 6		
0013.6	40014.6	PLC Function 7		
0013.7	40014.7	PLC Function 8		
0013.8	40014.8	PLC Function 9		
0013.9	40014.9	PLC Function 10		
0013.10	40014.10	PLC Function 11		
0013.11	40014.11	PLC Function 12		
0013.12	40014.12	PLC Function 13		
0013.13	40014.13	PLC Function 14		
0013.14	40014.14	PLC Function 15		
0013.15	40014.15	PLC Function 16		
0014.0	40015.0	PLC Function 17		
0014.1	40015.1	PLC Function 18		
0014.2	40015.2	PLC Function 19		
0014.3	40015.3	PLC Function 20		
0014.4	40015.4	Reserved		
0014.5	40015.5	Reserved		
0014.6	40015.6	ExpDI Input 1		
0014.7	40015.7	ExpDI Input 2		
0014.8	40015.8	ExpDI Input 3		
0014.9	40015.9	ExpDI Input 4		
0014.10	40015.10	ExpDI Input 5		
0014.11	40015.11	ExpDI Input 6		
0014.12	40015.12	ExpDI Input 7		
0014.13	40015.13	ExpDI Input 8		
0014.14	40015.14	ExpDI Input 9		
0014.15	40015.15	ExpDI Input 10		
0015.0	40016.0	ExpDI Input 11		
0015.1	40016.1	ExpDI Input 12		
0015.2	40016.2	ExpDI Input 13		
0015.3	40016.3	ExpDI Input 14		
0015.4	40016.4	ExpDI Input 15		
0015.5	40016.5	ExpDI Input 16		
0015.6	40016.6	Reserved		
0015.7	40016.7	Reserved		
0015.8	40016.8	Reserved		

Modbus Address	PLC Address	Item	Description	Bit
0015.9	40016.9	Reserved		
0015.10	40016.10	Reserved		
0015.11	40016.11	Reserved		
0015.12	40016.12	Reserved		
0015.13	40016.13	Loss of Excitation Trip Shutdown		
0015.14	40016.14	Earth Fault Trip Shutdown		
0015.15	40016.15	Current Unbalanced Trip Shutdown		
0016.0	40017.0	Current Unbalanced Trip Shutdown		
0016.1	40017.1	Reserved		
0016.2	40017.2	Reverse Power Trip		
0016.3	40017.3	Over Power Trip		
0016.4	40017.4	Input 1 Trip		
0016.5	40017.5	Input 2 Trip		
0016.6	40017.6	Input 3 Trip		
0016.7	40017.7	Input 4 Trip		
0016.8	40017.8	Input 5 Trip		
0016.9	40017.9	Input 6 Trip		
0016.10	40017.10	Input 7 Trip		
0016.11	40017.11	Input 8 Trip		
0016.12	40017.12	Reserved		
0016.13	40017.13	Reserved		
0016.14	40017.14	Exp DI Com Fail		
0016.15	40017.15	Exp DOUT Com Fail		
0017.0	40018.0	PLC Function 1		
0017.1	40018.1	PLC Function 2		
0017.2	40018.2	PLC Function 3		
0017.3	40018.3	PLC Function 4		
0017.4	40018.4	PLC Function 5		
0017.5	40018.5	PLC Function 6		
0017.6	40018.6	PLC Function 7		
0017.7	40018.7	PLC Function 8		
0017.8	40018.8	PLC Function 9		
0017.9	40018.9	PLC Function 10		
0017.10	40018.10	PLC Function 11		
0017.11	40018.11	PLC Function 12		
0017.12	40018.12	PLC Function 13		
0017.13	40018.13	PLC Function 14		
0017.14	40018.14	PLC Function 15		
0017.15	40018.15	PLC Function 16		
0018.0	40019.0	PLC Function 17		
0018.1	40019.1	PLC Function 18		
0018.2	40019.2	PLC Function 19		
0018.3	40019.3	PLC Function 20		

Modbus Address	PLC Address	Item	Description	Bit
0018.4	40019.4	Reserved		
0018.5	40019.5	Reserved		
0018.6	40019.6	ExpDI Input 1		
0018.7	40019.7	ExpDI Input 2		
0018.8	40019.8	ExpDI Input 3		
0018.9	40019.9	ExpDI Input 4		
0018.10	40019.10	ExpDI Input 5		
0018.11	40019.11	ExpDI Input 6		
0018.12	40019.12	ExpDI Input 7		
0018.13	40019.13	ExpDI Input 8		
0018.14	40019.14	ExpDI Input 9		
0018.15	40019.15	ExpDI Input 10		
0019.0	40020.0	ExpDI Input 11		
0019.1	40020.1	ExpDI Input 12		
0019.2	40020.2	ExpDI Input 13		
0019.3	40020.3	ExpDI Input 14		
0019.4	40020.4	ExpDI Input 15		
0019.5	40020.5	ExpDI Input 16		
0019.6	40020.6	DC Over Current Trip		
0019.7	40020.7	DC Over Power Trip		
0019.8	40020.8	Reserved		
0019.9	40020.9	Reserved		
0019.10	40020.10	Reserved		
0019.11	40020.11	Reserved		
0019.12	40020.12	Loss of Excitation Trip		
0019.13	40020.13	Earth Fault Trip		
0019.14	40020.14	Current Unbalanced Trip		
0019.15	40020.15	Reserved		
0020.0	40021.0	Over Speed Warning		
0020.1	40021.1	Under Speed Warning		
0020.2	40021.2	Loss Of Speed Signal Warning		
0020.3	40021.3	Gen Over Frequency Warning		
0020.4	40021.4	Gen Under Frequency Warning		
0020.5	40021.5	Gen Over Voltage Warning		
0020.6	40021.6	Gen Under Voltage Warning		
0020.7	40021.7	Gen Over Current Warning		
0020.8	40021.8	Fail to Stop Warning		
0020.9	40021.9	Charge Alt Fail Warning		
0020.10	40021.10	Battery Over Voltage Warning		
0020.11	40021.11	Battery Under Voltage Warning		
0020.12	40021.12	Maintenance Due Warning		
0020.13	40021.13	Reverse Power Warning		
0020.14	40021.14	Over Power Warning		

Modbus Address	PLC Address	Item	Description	Bit
0020.15	40021.15	ECU Warning		
0021.0	40022.0	Gen Loss of Phase Warning		
0021.1	40022.1	Gen Reverse Phase Sequence Warning		
0021.2	40022.2	Reserved		
0021.3	40022.3	Current Unbalanced Warning		
0021.4	40022.4	Earth Fault Warning		
0021.5	40022.5	Loss of Excitation Warning		
0021.6	40022.6	Reserved		
0021.7	40022.7	Reserved		
0021.8	40022.8	Temp. Sensor Open		
0021.9	40022.9	High Temp. Warning		
0021.10	40022.10	Low Temp. Warning		
0021.11	40022.11	Reserved		
0021.12	40022.12	Oil Pressure Sensor Open		
0021.13	40022.13	Reserved		
0021.14	40022.14	Low Oil Pressure Warning		
0021.15	40022.15	Reserved		
0022.0	40023.0	Level Sensor Open		
0022.1	40023.1	Reserved		
0022.2	40023.2	Low Level Warning		
0022.3	40023.3	Reserved		
0022.4	40023.4	Flexible Sensor 1 Open		
0022.5	40023.5	Flexible Sensor 1 High		
0022.6	40023.6	Flexible Sensor 1 Low		
0022.7	40023.7	DC Over Voltage Warning		
0022.8	40023.8	Flexible Sensor 2 Open		
0022.9	40023.9	Flexible Sensor 2 High		
0022.10	40023.10	Flexible Sensor 2 Low		
0022.11	40023.11	DC Under Voltage Warning		
0022.12	40023.12	Reserved		
0022.13	40023.13	Reserved		
0022.14	40023.14	Reserved		
0022.15	40023.15	DC Over Current Warning		
0023.0	40024.0	Exp1 Com Fail		
0023.1	40024.1	Exp1 Exhaust Temp High		
0023.2	40024.2	Exp1 Sensor 15 Open		
0023.3	40024.3	Exp1 Sensor 15 High		
0023.4	40024.4	Exp1 Sensor 15 Low		
0023.5	40024.5	Exp1 Sensor 16 Open		
0023.6	40024.6	Exp1 Sensor 16 High		
0023.7	40024.7	Exp1 Sensor 16 Low		
0023.8	40024.8	Exp1 Sensor 17 Open		
0023.9	40024.9	Exp1 Sensor 17 High		

Modbus Address	PLC Address	Item	Description	Bit
0023.10	40024.10	Exp1 Sensor 17 Low		
0023.11	40024.11	Exp1 Sensor 18 Open		
0023.12	40024.12	Exp1 Sensor 18 High		
0023.13	40024.13	Exp1 Sensor 18 Low		
0023.14	40024.14	Exp1 Sensor 19 Open		
0023.15	40024.15	Exp1 Sensor 19 High		
0024.0	40025.0	Exp1 Sensor 19 Low		
0024.1	40025.1	Exp1 Sensor 20 Open		
0024.2	40025.2	Exp1 Sensor 20 High		
0024.3	40025.3	Exp1 Sensor 20 Low		
0024.4	40025.4	Exp1 Sensor 21 Open		
0024.5	40025.5	Exp1 Sensor 21 High		
0024.6	40025.6	Exp1 Sensor 21 Low		
0024.7	40025.7	Exp1 Sensor 22 Open		
0024.8	40025.8	Exp1 Sensor 22 High		
0024.9	40025.9	Exp1 Sensor 22 Low		
0024.10	40025.10	Exp1 Sensor 23 Open		
0024.11	40025.11	Exp1 Sensor 23 High		
0024.12	40025.12	Exp1 Sensor 23 Low		
0024.13	40025.13	Exp1 Sensor 24 Open		
0024.14	40025.14	Exp1 Sensor 24 High		
0024.15	40025.15	Exp1 Sensor 24 Low		
0025.0	40026.0	Exp2 Com Fail		
0025.1	40026.1	Exp2 Exhaust Temp. High		
0025.2	40026.2	Exp2 Sensor 15 Open		
0025.3	40026.3	Exp2 Sensor 15 High		
0025.4	40026.4	Exp2 Sensor 15 Low		
0025.5	40026.5	Exp2 Sensor 16 Open		
0025.6	40026.6	Exp2 Sensor 16 High		
0025.7	40026.7	Exp2 Sensor 16 Low		
0025.8	40026.8	Exp2 Sensor 17 Open		
0025.9	40026.9	Exp2 Sensor 17 High		
0025.10	40026.10	Exp2 Sensor 17 Low		
0025.11	40026.11	Exp2 Sensor 18 Open		
0025.12	40026.12	Exp2 Sensor 18 High		
0025.13	40026.13	Exp2 Sensor 18 Low		
0025.14	40026.14	Exp2 Sensor 19 Open		
0025.15	40026.15	Exp2 Sensor 19 High		
0026.0	40027.0	Exp2 Sensor 19 Low		
0026.1	40027.1	Exp2 Sensor 20 Open		
0026.2	40027.2	Exp2 Sensor 20 High		
0026.3	40027.3	Exp2 Sensor 20 Low		
0026.4	40027.4	Exp2 Sensor 21 Open		

Modbus Address	PLC Address	Item	Description	Bit
0026.5	40027.5	Exp2 Sensor 21 High		
0026.6	40027.6	Exp2 Sensor 21 Low		
0026.7	40027.7	Exp2 Sensor 22 Open		
0026.8	40027.8	Exp2 Sensor 22 High		
0026.9	40027.9	Exp2 Sensor 22 Low		
0026.10	40027.10	Exp2 Sensor 23 Open		
0026.11	40027.11	Exp2 Sensor 23 High		
0026.12	40027.12	Exp2 Sensor 23 Low		
0026.13	40027.13	Exp2 Sensor 24 Open		
0026.14	40027.14	Exp2 Sensor 24 High		
0026.15	40027.15	Exp2 Sensor 24 Low		
0027.0	40028.0	DC Over Power Warning		
0027.1	40028.1	Exp DI Com Fail		
0027.2	40028.2	Exp DOUT Com Fail		
0027.3	40028.3	Exp DI Input 1		
0027.4	40028.4	Exp DI Input 2		
0027.5	40028.5	ExpDI Input 3		
0027.6	40028.6	ExpDI Input 4		
0027.7	40028.7	ExpDI Input 5		
0027.8	40028.8	ExpDI Input 6		
0027.9	40028.9	ExpDI Input 7		
0027.10	40028.10	ExpDI Input 8		
0027.11	40028.11	ExpDI Input 9		
0027.12	40028.12	ExpDI Input 10		
0027.13	40028.13	ExpDI Input 11		
0027.14	40028.14	ExpDI Input 12		
0027.15	40028.15	ExpDI Input 13		
0028.0	40029.0	ExpDI Input 14		
0028.1	40029.1	ExpDI Input 15		
0028.2	40029.2	ExpDI Input 16		
0028.3	40029.3	Reserved		
0028.4	40029.4	Reserved		
0028.5	40029.5	Reserved		
0028.6	40029.6	Reserved		
0028.7	40029.7	Reserved		
0028.8	40029.8	Reserved		
0028.9	40029.9	Reserved		
0028.10	40029.10	Reserved		
0028.11	40029.11	Exp1 Cylinder Temp. Diff		
0028.12	40029.12	Exp1 Cylinder Temp. High		
0028.13	40029.13	Exp2 Cylinder Temp. Diff		
0028.14	40029.14	Exp2 Cylinder Temp. Diff		
0028.15	40029.15	Reserved		

Modbus Address	PLC Address	Item	Description	Bit
0029.0	40030.0	Input 1 Warning		
0029.1	40030.1	Input 2 Warning		
0029.2	40030.2	Input 3 Warning		
0029.3	40030.3	Input 4 Warning		
0029.4	40030.4	Input 5 Warning		
0029.5	40030.5	Input 6 Warning		
0029.6	40030.6	Input 7 Warning		
0029.7	40030.7	Input 8 Warning		
0029.8	40030.8	Reserved		
0029.9	40030.9	Reserved		
0029.10	40030.10	Reserved		
0029.11	40030.11	Reserved		
0029.12	40030.12	PLC Function 1		
0029.13	40030.13	PLC Function 2		
0029.14	40030.14	PLC Function 3		
0029.15	40030.15	PLC Function 4		
0030.0	40031.0	PLC Function 5		
0030.1	40031.1	PLC Function 6		
0030.2	40031.2	PLC Function 7		
0030.3	40031.3	PLC Function 8		
0030.4	40031.4	PLC Function 9		
0030.5	40031.5	PLC Function 10		
0030.6	40031.6	PLC Function 11		
0030.7	40031.7	PLC Function 12		
0030.8	40031.8	PLC Function 13		
0030.9	40031.9	PLC Function 14		
0030.10	40031.10	PLC Function 15		
0030.11	40031.11	PLC Function 16		
0030.12	40031.12	PLC Function 17		
0030.13	40031.13	PLC Function 18		
0030.14	40031.14	PLC Function 19		
0030.15	40031.15	PLC Function 20		
0031.0	40032.0	Reserved		
0031.1	40032.1	Reserved		
0031.2	40032.2	Indicate during Non-power on Time		
0031.3	40032.3	PLC Function 19		
0031.4	40032.4	PLC Function 1		
0031.5	40032.5	PLC Function 2		
0031.6	40032.6	PLC Function 3		
0031.7	40032.7	PLC Function 4		
0031.8	40032.8	PLC Function 5		
0031.9	40032.9	PLC Function 6		
0031.10	40032.10	PLC Function 7		

Modbus Address	PLC Address	Item	Description	Bit
0031.11	40032.11	PLC Function 8		
0031.12	40032.12	PLC Function 9		
0031.13	40032.13	PLC Function 10		
0031.14	40032.14	PLC Function 11		
0031.15	40032.15	PLC Function 12		
0032.0	40033.0	PLC Function 13		
0032.1	40033.1	PLC Function 14		
0032.2	40033.2	PLC Function 15		
0032.3	40033.3	PLC Function 16		
0032.4	40033.4	PLC Function 17		
0032.5	40033.5	PLC Function 18		
0032.6	40033.6	Auto Mode Input		
0032.7	40033.7	Auto Mode Inhibit		
0032.8	40033.8	Reserved		
0032.9	40033.9	PLC Function 20		
0032.10	40033.10	Alternative Config 1		
0032.11	40033.11	Alternative Config 2		
0032.12	40033.12	Alternative Config 3		
0032.13	40033.13	Over Current Indication		
0032.14	40033.14	Reverse Power Indication		
0032.15	40033.15	Over Power Indication		
0033.0	40034.0	Input 1 Indicate		
0033.1	40034.1	Input 2 Indicate		
0033.2	40034.2	Input 3 Indicate		
0033.3	40034.3	Input 4 Indicate		
0033.4	40034.4	Input 5 Indicate		
0033.5	40034.5	Input 6 Indicate		
0033.6	40034.6	Input 7 Indicate		
0033.7	40034.7	Input 8 Indicate		
0033.8	40034.8	Reserved		
0033.9	40034.9	Reserved		
0033.10	40034.10	Exp DI Com Fail		
0033.11	40034.11	Exp DOUT Com Fail		
0033.12	40034.12	Reserved		
0033.13	40034.13	Loss of Excitation		
0033.14	40034.14	Earth Fault		
0033.15	40034.15	Current Unbalanced		
0034.0	40035.0	Reserved		
0034.1	40035.1	Reserved		
0034.2	40035.2	Gen Normal Running Indication		
0034.3	40035.3	Gen Stop Indication		
0034.4	40035.4	Reserved		
0034.5	40035.5	Gen Onload Indication		

Modbus Address	PLC Address	Item	Description	Bit
0034.6	40035.6	Auto Mode Indication		
0034.7	40035.7	Non Auto Mode Indication		
0034.8	40035.8	Reserved		
0034.9	40035.9	Reserved		
0034.10	40035.10	Reserved		
0034.11	40035.11	Reserved		
0034.12	40035.12	Reserved		
0034.13	40035.13	Reserved		
0034.14	40035.14	Reserved		
0034.15	40035.15	Reserved		
0035.0	40036.0	Emergency Input Port Status		
0035.1	40036.1	Input 1 Status		
0035.2	40036.2	Input 2 Status		
0035.3	40036.3	Input 3 Status		
0035.4	40036.4	Input 4 Status		
0035.5	40036.5	Input 5 Status		
0035.6	40036.6	Input 6 Status		
0035.7	40036.7	Input 1 Status		
0035.8	40036.8	Input 1 Status		
0035.9	40036.9	Reserved		
0035.10	40036.10	Reserved		
0035.11	40036.11	Reserved		
0035.12	40036.12	Reserved		
0035.13	40036.13	Reserved		
0035.14	40036.14	Reserved		
0035.15	40036.15	Reserved		
0036.0	40037.0	Exp DI Input 1		
0036.1	40037.1	Exp DI Input 2		
0036.2	40037.2	Exp DI Input 3		
0036.3	40037.3	Exp DI Input 4		
0036.4	40037.4	Exp DI Input 5		
0036.5	40037.5	Exp DI Input 6		
0036.6	40037.6	Exp DI Input 7		
0036.7	40037.7	Exp DI Input 8		
0036.8	40037.8	Exp DI Input 9		
0036.9	40037.9	Exp DI Input 10		
0036.10	40037.10	Exp DI Input 11		
0036.11	40037.11	Exp DI Input 12		
0036.12	40037.12	Exp DI Input 13		
0036.13	40037.13	Exp DI Input 14		
0036.14	40037.14	Exp DI Input 15		
0036.15	40037.15	Exp DI Input 16		
0037.0	40038.0	Fuel Relay Output Status		

Modbus Address	PLC Address	Item	Description	Bit
0037.1	40038.1	Start Relay Output Status		
0037.2	40038.2	Relay Output 1 Status		
0037.3	40038.3	Relay Output 2 Status		
0037.4	40038.4	Relay Output 3 Status		
0037.5	40038.5	Relay Output 4 Status		
0037.6	40038.6	Relay Output 5 Status		
0037.7	40038.7	Relay Output 6 Status		
0037.8	40038.8	Reserved		
0037.9	40038.9	Reserved		
0037.10	40038.10	Reserved		
0037.11	40038.11	Reserved		
0037.12	40038.12	Reserved		
0037.13	40038.13	Reserved		
0037.14	40038.14	Reserved		
0037.15	40038.15	Reserved		
0038.0	40039.0	ExpDI Output 1		
0038.1	40039.1	ExpDI Output 1		
0038.2	40039.2	ExpDI Output 1		
0038.3	40039.3	ExpDI Output 1		
0038.4	40039.4	ExpDI Output 1		
0038.5	40039.5	ExpDI Output 1		
0038.6	40039.6	ExpDI Output 1		
0038.7	40039.7	ExpDI Output 1		
0038.8	40039.8	ExpDI Output 1		
0038.9	40039.9	ExpDI Output 1		
0038.10	40039.10	ExpDI Output 1		
0038.11	40039.11	ExpDI Output 1		
0038.12	40039.12	ExpDI Output 1		
0038.13	40039.13	ExpDI Output 1		
0038.14	40039.14	ExpDI Output 1		
0038.15	40039.15	ExpDI Output 1		
0039.0	40040.0	ExpDI Input 1 Indication		
0039.1	40040.1	ExpDI Input 2 Indication		
0039.2	40040.2	ExpDI Input 3 Indication		
0039.3	40040.3	ExpDI Input 4 Indication		
0039.4	40040.4	ExpDI Input 5 Indication		
0039.5	40040.5	ExpDI Input 6 Indication		
0039.6	40040.6	ExpDI Input 7 Indication		
0039.7	40040.7	ExpDI Input 8 Indication		
0039.8	40040.8	ExpDI Input 9 Indication		
0039.9	40040.9	ExpDI Input 10 Indication		
0039.10	40040.10	ExpDI Input 11 Indication		
0039.11	40040.11	ExpDI Input 12 Indication		

Modbus Address	PLC Address	Item	Description	Bit
0039.12	40040.12	ExpDI Input 13 Indication		
0039.13	40040.13	ExpDI Input 14 Indication		
0039.14	40040.14	ExpDI Input 15 Indication		
0039.15	40040.15	ExpDI Input 16 Indication		
0040	40041	Reserved		2Bytes
0041	40042	Reserved		2Bytes
0042.0	40043.0	Exp DI Comm Fail		
0042.1	40043.1	Exp DOUT Comm Fail		
0042.2	40043.2	Exp Input 1 Comm Fail		
0042.3	40043.3	Exp Input 2 Comm Fail		
0042.4	40043.4	Reserved		
0042.5	40043.5	Reserved		
0042.6	40043.6	Reserved		
0042.7	40043.7	Reserved		
0042.8	40043.8	Reserved		
0042.9	40043.9	Reserved		
0042.10	40043.10	Reserved		
0042.11	40043.11	Reserved		
0042.12	40043.12	Reserved		
0042.13	40043.13	Reserved		
0042.14	40043.14	Reserved		
0042.15	40043.15	Reserved		
0043.0	40044.0	Reserved		
0043.1	40044.1	Reserved		
0043.2	40044.2	Gen Normal		
0043.3	40044.3	Gen Closed		
0043.4	40044.4	Running Indicator Status		
0043.5	40044.5	Mute Indicator Status		
0043.6	40044.6	Reserved		
0043.7	40044.7	Reserved		
0043.8	40044.8	Reserved		
0043.9	40044.9	Reserved		
0043.10	40044.10	Reserved		
0043.11	40044.11	Reserved		
0043.12	40044.12	Reserved		
0043.13	40044.13	Reserved		
0043.14	40044.14	Reserved		
0043.15	40044.15	Reserved		
0044.0	40045.0	Reserved		2Bytes
0045.0	40046.0	Input 1 Active		
0045.1	40046.1	Input 2 Active		
0045.2	40046.2	Input 3 Active		
0045.3	40046.3	Input 4 Active		

Modbus Address	PLC Address	Item	Description	Bit
0045.4	40046.4	Input 5 Active		
0045.5	40046.5	Input 6 Active		
0045.6	40046.6	Input 7 Active		
0045.7	40046.7	Input 8 Active		
0045.8	40046.8	Reserved		
0045.9	40046.9	Reserved		
0045.10	40046.10	Reserved		
0045.11	40046.11	Reserved		
0045.12	40046.12	Reserved		
0045.13	40046.13	Reserved		
0045.14	40046.14	Reserved		
0045.15	40046.15	Reserved		
0046.0	40047.0	Exp DI Input 1 Active		
0046.1	40047.1	Exp DI Input 2 Active		
0046.2	40047.2	Exp DI Input 3 Active		
0046.3	40047.3	Exp DI Input 4 Active		
0046.4	40047.4	Exp DI Input 5 Active		
0046.5	40047.5	Exp DI Input 6 Active		
0046.6	40047.6	Exp DI Input 7 Active		
0046.7	40047.7	Exp DI Input 8 Active		
0046.8	40047.8	Exp DI Input 9 Active		
0046.9	40047.9	Exp DI Input 10 Active		
0046.10	40047.10	Exp DI Input 11 Active		
0046.11	40047.11	Exp DI Input 12 Active		
0046.12	40047.12	Exp DI Input 13 Active		
0046.13	40047.13	Exp DI Input 14 Active		
0046.14	40047.14	Exp DI Input 15 Active		
0046.15	40047.15	Exp DI Input 16 Active		

Example:

If "System in Manual Mode" status needs to be read, first to check the table above to find that the address corresponding to the digital is 0000.10 bit and to know that one address data needs to be read.

Suppose slave (controller) address is 01, host (maybe computer) request command is as the following table:

**Table 3 – Master (Computer) Request Command**

Slave Address	Function Code	Starting Address(0000)		Request Data Qty.(1)		CRC 16 Calibration	
		MSB	LSB	MSB	LSB	LSB	MSB
<b>01</b>	<b>03</b>	<b>00</b>	<b>00</b>	<b>00</b>	<b>01</b>	<b>84</b>	<b>0A</b>

The slave response command is as following:

**Table 4 – Slave (Controller) Response Command**

Slave Address	Function Code	Data Qty. (Bytes)	Data		CRC 16 Calibration	
			Data MSB of Address 0000	Data LSB of Address 0000	LSB	MSB
<b>01</b>	<b>03</b>	<b>02</b>	<b>84</b>	<b>07</b>	<b>9A</b>	<b>86</b>

**Table 5 – Data Analysis**

Address	Received Data (Hexadecimal)	Convert to binary	Data Meaning
0000	8407H	1000 0100 0000 0111 (respectively corresponds to 0000.15, 0000.14.....0000.1, 0000.0)	The 10th bit of data is 1, indicates that system is active in manual mode.

## 3.2 FUNCTION CODE 03H, 06H MAPPING DATA FIELD

06H function code can be written only to address 0199-0210, 0225-0231 and 0336-0337.

**Table 6 – Data Field**

Modbus Address	PLC Address	Item	Ratio	Description	Bytes
0047	40048	Reserved			2Bytes
0048	40049	Reserved			2Bytes
0049	40050	Reserved			2Bytes
0050	40051	Reserved			2Bytes
0051	40052	Reserved			2Bytes
0052	40053	Reserved			2Bytes
0053	40054	Reserved			2Bytes
0054	40055	Reserved			2Bytes
0055	40056	Reserved			2Bytes
0056	40057	Reserved			2Bytes
0057	40058	Reserved			2Bytes
0058	40059	Reserved			2Bytes
0059	40060	Reserved			2Bytes
0060	40061	Reserved			2Bytes
0061	40062	Reserved			2Bytes
0062	40063	Reserved			2Bytes
0063	40064	Reserved			2Bytes
0064	40065	Reserved			2Bytes
0065	40066	Reserved			2Bytes
0066	40067	Reserved			2Bytes
0067	40068	Reserved			2Bytes
0068	40069	Reserved			2Bytes
0069	40070	Reserved			2Bytes
0070	40071	Reserved			2Bytes
0071	40072	Reserved			2Bytes
0072	40073	Reserved			2Bytes
0073	40074	Reserved			2Bytes
0074	40075	Reserved			2Bytes
0075	40076	Gen UAB		Signed	2Bytes
0076	40077	Gen UBC		Signed	2Bytes
0077	40078	Gen UCA		Signed	2Bytes
0078	40079	Gen UA		Signed	2Bytes
0079	40080	Gen UB		Signed	2Bytes
0080	40081	Gen UC		Signed	2Bytes
0081	40082	Gen UA Phase	0.1	Signed	2Bytes
0082	40083	Gen UB Phase	0.1	Signed	2Bytes
0083	40084	Gen UC Phase	0.1	Signed	2Bytes
0084	40085	Gen frequency	0.01	Signed	2Bytes

Modbus Address	PLC Address	Item	Ratio	Description	Bytes
0085	40086	Reserved			2Bytes
0086	40087	Reserved			2Bytes
0087	40088	Reserved			2Bytes
0088	40089	Reserved			2Bytes
0089	40090	Reserved			2Bytes
0090	40091	Reserved			2Bytes
0091	40092	Reserved			2Bytes
0092	40093	Reserved			2Bytes
0093	40094	Reserved			2Bytes
0094	40095	Reserved			2Bytes
0095	40096	A Phase Current	0.1	Signed	2Bytes
0096	40097	B Phase Current	0.1	Signed	2Bytes
0097	40098	C Phase Current	0.1	Signed	2Bytes
0098	40099	N Line Current	0.1	Signed	2Bytes
0099	40100	Reserved			2Bytes
0100	40101	Reserved			2Bytes
0101	40102	Reserved			2Bytes
0102	40103	Reserved			2Bytes
0103	40104	A Phase Active Power	0.1	Signed	4Bytes
0104	40105				
0105	40106	B Phase Active Power	0.1	Signed	4Bytes
0106	40107				
0107	40108	C Phase Active Power	0.1	Signed	4Bytes
0108	40109				
0109	40110	Total Active Power	0.1	Signed	4Bytes
0110	40111				
0111	40112	A Power Reactive Power	0.1	Signed	4Bytes
0112	40113				
0113	40114	B Power Reactive Power	0.1	Signed	4Bytes
0114	40115				
0115	40116	C Power Reactive Power	0.1	Signed	4Bytes
0116	40117				
0117	40118	Total Reactive Power	0.1	Signed	4Bytes
0118	40119				
0119	40120	A Phase Apparent Power	0.1	Signed	4Bytes
0120	40121				
0121	40122	B Phase Apparent Power	0.1	Signed	4Bytes
0122	40123				
0123	40124	C Phase Apparent Power	0.1	Signed	4Bytes
0124	40125				
0125	40126	Total Apparent Power	0.1	Signed	4Bytes
0126	40127				
0127	40128	A Phase Power Factor	0.01	Signed	2Bytes

Modbus Address	PLC Address	Item	Ratio	Description	Bytes
0128	40129	B Phase Power Factor	0.01	Signed	2Bytes
0129	40130	C Phase Power Factor	0.01	Signed	2Bytes
0130	40131	Average Power Factor	0.01	Signed	2Bytes
0131	40132	Reserved			2Bytes
0132	40133	GND Current Percentage			2Bytes
0133	40134	Reserved			2Bytes
0134	40135	Reserved			2Bytes
0135	40136	Reserved			2Bytes
0136	40137	Reserved			2Bytes
0137	40138	Reserved			2Bytes
0138	40139	Reserved			2Bytes
0139	40140	Reserved			2Bytes
0140	40141	Reserved			2Bytes
0141	40142	Engine Speed		Signed	2Bytes
0142	40143	Battery Voltage	0.1	Signed	2Bytes
0143	40144	Charger Voltage	0.1	Signed	2Bytes
0144	40145	Reserved			2Bytes
0145	40146	Reserved			2Bytes
0146	40147	Reserved			2Bytes
0147	40148	Reserved			2Bytes
0148	40149	Temp. Sensor Resistance Value	0.1	Unsigned	2Bytes
0149	40150	Temp. Sensor Value		Signed	2Bytes
0150	40151	Pressure Sensor Resistance Value	0.1	Unsigned	2Bytes
0151	40152	Pressure Sensor Value		Signed	2Bytes
0152	40153	Level Sensor Resistance Value	0.1	Unsigned	2Bytes
0153	40154	Level Sensor Value		Signed	2Bytes
0154	40155	Flexible Sensor 1 Resistance Value	0.1	Unsigned	2Bytes
0155	40156	Flexible Sensor 1 Value		Signed	2Bytes
0156	40157	Flexible Sensor 2 Resistance Value	0.1	Unsigned	2Bytes
0157	40158	Flexible Sensor 2 Value		Signed	2Bytes
0158	40159	Reserved			2Bytes
0159	40160	Reserved			2Bytes
0160	40161	Reserved			2Bytes
0161	40162	Load Percentage		Signed, engine is not the ECU, and this is reserved.	2Bytes
0162	40163	Coolant Level			2Bytes
0163	40164	Engine Oil Temp.			2Bytes
0164	40165	Coolant Pressure			2Bytes
0165	40166	Fuel Pressure			2Bytes
0166	40167	Fuel Temp.			2Bytes
0167	40168	Inlet Temp.			2Bytes
0168	40169	Outlet Temp.			2Bytes
0169	40170	Turbine Pressure			2Bytes
0170	40171	Fuel Consumption			2Bytes

Modbus Address	PLC Address	Item	Ratio	Description	Bytes
0171	40172	Total Fuel Consumption			4Bytes
0172	40173				2Bytes
0173	40174				Air Pressure
0174	40175	Inlet Temp.			2Bytes
0175	40176	Reserved			2Bytes
0176	40177	Reserved			2Bytes
0177	40178	Reserved			2Bytes
0178	40179	Reserved			2Bytes
0179	40180	Reserved			2Bytes
0180	40181	Reserved			2Bytes
0181	40182	Reserved			2Bytes
0182	40183	Reserved			4Bytes
0183	40184				4Bytes
0184	40185	Reserved			4Bytes
0185	40186				4Bytes
0186	40187	Reserved			4Bytes
0187	40188				4Bytes
0188	40189	Reserved			2Bytes
0189	40190	Generator Status		<a href="#">Generator Status Table</a>	2Bytes
0190	40191	Gen Delay Value			2Bytes
0191	40192	Remote Start Status		<a href="#">Remote Start Status Table</a>	2Bytes
0192	40193	Remote Start Delay Value			2Bytes
0193	40194	Gen ATS Status		<a href="#">Switch Status</a>	2Bytes
0194	40195	Gen ATS Transfer Delay Value			2Bytes
0195	40196	Reserved			2Bytes
0196	40197	Reserved			2Bytes
0197	40198	Reserved			2Bytes
0198	40199	Reserved			2Bytes
0199	40200	Total Running (Hour)			2Bytes
0200	40201	Total Running (Minute)			2Bytes
0201	40202	Total Running (Second)			2Bytes
0202	40203	Total Start Times			2Bytes
0203	40204	Total Energy kWh	0.1	Signed	4Bytes
0204	40205				4Bytes
0205	40206	Total Energy kVarh	0.1	Signed	4Bytes
0206	40207				4Bytes
0207	40208	Total Energy kVAh	0.1	Signed	4Bytes
0208	40209				4Bytes
0209	40210	Reserved			4Bytes
0210	40211				4Bytes
0211	40212	Maintenance Remaining Time (Hour)			2Bytes

Modbus Address	PLC Address	Item	Ratio	Description	Bytes
0212	40213	Maintenance Remaining Time (Minute)			2Bytes
0213	40214	Maintenance Remaining Time (Second)			2Bytes
0214	40215	Reserved			2Bytes
0215	40216				2Bytes
0216	40217	Sensor Com Voltage			2Bytes
0217	40218	Controller Model		Unsigned	2Bytes
0218	40219	Controller Software Version	0.1	Unsigned	2Bytes
0219	40220	Controller Hardware Version	0.1	Unsigned	2Bytes
0220	40221	Release Year		Only save the last digits of year	2Bytes
0221	40222	Release Month		Unsigned	2Bytes
0222	40223	Release Day		Unsigned	2Bytes
0223	40224	LCD Temp.		Signed	2Bytes
0224	40225	LCD Heating		Unsigned	2Bytes
0225	40226	Controller Time: Year		Only save the last digits of year	2Bytes
0226	40227	Controller Time: Month		Unsigned	2Bytes
0227	40228	Controller Time: Day		Unsigned	2Bytes
0228	40229	Controller Time: Week		Unsigned	2Bytes
0229	40230	Controller Time: Hour		Unsigned	2Bytes
0230	40231	Controller Time: Minute		Unsigned	2Bytes
0231	40232	Controller Time: Second		Unsigned	2Bytes
0232	40233	Reserved			2Bytes
0233	40234	Reserved			2Bytes
0234	40235	Reserved			2Bytes
0235	40236	Reserved			4Bytes
0236	40237				
0237	40238	Reserved			2Bytes
0238	40239	Exp AIN24-1, Sensor 15		Signed	2Bytes
0239	40240	Exp AIN24-1, Sensor 16		Signed	2Bytes
0240	40241	Exp AIN24-1, Sensor 17		Signed	2Bytes
0241	40242	Exp AIN24-1, Sensor 18		Signed	2Bytes
0242	40243	Exp AIN24-1, Sensor 19		Signed	2Bytes
0243	40244	Exp AIN24-1, Sensor 20		Signed	2Bytes
0244	40245	Exp AIN24-1, Sensor 21		Signed	2Bytes
0245	40246	Exp AIN24-1, Sensor 22		Signed	2Bytes
0246	40247	Exp AIN24-1, Sensor 23		Signed	2Bytes
0247	40248	Exp AIN24-1, Sensor 24		Signed	2Bytes
0248	40249	Exp AIN24-1, Sensor 15		Signed	2Bytes
0249	40250	Exp AIN24-2, Sensor 15		Signed	2Bytes

Modbus Address	PLC Address	Item	Ratio	Description	Bytes
0250	40251	Exp AIN24-2, Sensor 15		Signed	2Bytes
0251	40252	Exp AIN24-2, Sensor 16		Signed	2Bytes
0252	40253	Exp AIN24-2, Sensor 17		Signed	2Bytes
0253	40254	Exp AIN24-2, Sensor 18		Signed	2Bytes
0254	40255	Exp AIN24-2, Sensor 19		Signed	2Bytes
0255	40256	Exp AIN24-2, Sensor 20		Signed	2Bytes
0256	40257	Exp AIN24-2, Sensor 21		Signed	2Bytes
0257	40258	Exp AIN24-2, Sensor 22		Signed	2Bytes
0258	40259	Reserved			2Bytes
0259	40260	Reserved			2Bytes
0260	40261	Reserved			2Bytes
0261	40262	Reserved			2Bytes
0262	40263	Reserved			2Bytes
0263	40264	Reserved			2Bytes
0264	40265	Reserved			2Bytes
0265	40266	Reserved			2Bytes
0266	40267	Reserved			2Bytes
0267	40268	Reserved			2Bytes
0268	40269	Reserved			2Bytes
0269	40270	Reserved			2Bytes
0270	40271	Total Running Hour (A)			2Bytes
0271	40272	Total Running Minute (A)			2Bytes
0272	40273	Total Running Second (A)			2Bytes
0273	40274	Total Start Times (A)			2Bytes
0274	40275	Total Energy kWh(A)	0.1	Signed	4Bytes
0275	40276				
0276	40277	Total Running Hour (B)			2Bytes
0277	40278	Total Running Minute (B)			2Bytes
0278	40279	Total Running Second (B)			2Bytes
0279	40280	Total Start Times (B)			2Bytes
0280	40281	Total Energy kWh (B)	0.1	Signed	4Bytes
0281	40282				
0282	40283	Reserved			2Bytes
0283	40284	Reserved			2Bytes
0284	40285	Reserved			2Bytes
0285	40286	Exp AIN24-1, Sensor 1	0.1	Signed	2Bytes
0286	40287	Exp AIN24-1, Sensor 2	0.1	Signed	2Bytes
0287	40288	Exp AIN24-1, Sensor 3	0.1	Signed	2Bytes
0288	40289	Exp AIN24-1, Sensor 4	0.1	Signed	2Bytes
0289	40290	Exp AIN24-1, Sensor 5	0.1	Signed	2Bytes
0290	40291	Exp AIN24-1, Sensor 6	0.1	Signed	2Bytes
0291	40292	Exp AIN24-1, Sensor 7	0.1	Signed	2Bytes
0292	40293	Exp AIN24-1, Sensor 8	0.1	Signed	2Bytes

Modbus Address	PLC Address	Item	Ratio	Description	Bytes
0293	40294	Exp AIN24-1, Sensor 9	0.1	Signed	2Bytes
0294	40295	Exp AIN24-1, Sensor 10	0.1	Signed	2Bytes
0295	40296	Exp AIN24-1, Sensor 11	0.1	Signed	2Bytes
0296	40297	Exp AIN24-1, Sensor 12	0.1	Signed	2Bytes
0297	40298	Exp AIN24-1, Sensor 13	0.1	Signed	2Bytes
0298	40299	Exp AIN24-1, Sensor 14	0.1	Signed	2Bytes
0299	40300	Exp AIN24-2, Sensor 1	0.1	Signed	2Bytes
0300	40301	Exp AIN24-2, Sensor 2	0.1	Signed	2Bytes
0301	40302	Exp AIN24-2, Sensor 3	0.1	Signed	2Bytes
0302	40303	Exp AIN24-2, Sensor 4	0.1	Signed	2Bytes
0303	40304	Exp AIN24-2, Sensor 5	0.1	Signed	2Bytes
0304	40305	Exp AIN24-2, Sensor 6	0.1	Signed	2Bytes
0305	40306	Exp AIN24-2, Sensor 7	0.1	Signed	2Bytes
0306	40307	Exp AIN24-2, Sensor 8	0.1	Signed	2Bytes
0307	40308	Exp AIN24-2, Sensor 9	0.1	Signed	2Bytes
0308	40309	Exp AIN24-2, Sensor 10	0.1	Signed	2Bytes
0309	40310	Exp AIN24-2, Sensor 11	0.1	Signed	2Bytes
0310	40311	Exp AIN24-2, Sensor 12	0.1	Signed	2Bytes
0311	40312	Exp AIN24-2, Sensor 13	0.1	Signed	2Bytes
0312	40313	Exp AIN24-2, Sensor 14	0.1	Signed	2Bytes
0313	40314	Reserved			2Bytes
0314	40315	Reserved			2Bytes
0315	40316	Reserved			2Bytes
0316	40317	Reserved			2Bytes
0317	40318	Reserved			2Bytes
0318	40319	Reserved			2Bytes
0319	40320	Reserved			2Bytes
0320	40321	Reserved			2Bytes
0321	40322	Reserved			2Bytes
0322	40323	Reserved			2Bytes
0323	40324	Reserved			2Bytes
0324	40325	Reserved			2Bytes
0325	40326	Reserved			2Bytes
0326	40327	Reserved			2Bytes
0327	40328	Reserved			2Bytes
0328	40329	Reserved			2Bytes
0329	40330	Reserved			2Bytes
0330	40331	Reserved			2Bytes
0331	40332	Reserved			2Bytes
0332	40333	Reserved			2Bytes
0333	40334	DC Voltage			2Bytes
0334	40335	DC Current			2Bytes
0335	40336	DC Power	0.1	Unsigned	2Bytes

Modbus Address	PLC Address	Item	Ratio	Description	Bytes
0336 0337	40337 40338	DC Total Energy	0.1	Unsigned	4Bytes

**Note 1:** Real Value = Received data\* Multiplier. Take frequency as example: if the received data is 5000 (1388H), and the multiplier is 0.01Hz, the actual frequency is 50.00Hz(5000\*0.01Hz);

**Note 2:** For 4-byte data, the actual value = received data MSB \* 65536 + received data LSB.

**Note 3:** When received data is 32766, it means no normal data and displays “###”.

**Note 4:** Signed number definition. Take the received data of 8000H as an example, convert it into a binary digit of 1000 0000 0000 0000b, the MSB is 1, a negative number. Subtract 1 to get the inverse code, reverse the inverse code, the result is the absolute value of the negative number, convert it to the decimal number is -32768.

Example:

Read “A Phase Active Power (current is 123456)”, first to check the table to get others addresses are 0103 and 0104, and to know that 2 letters needs to be read.

Suppose slave address is 01, host request command is as the following table:

**Table 7 – Host Request Command**

Slave Address	Function Code	Starting Address (0174)		Request Data Qty.(2)		CRC 16 Calibration	
		MSB	LSB	MSB	LSB	LSB	MSB
01	03	00	67	00	02	75	D4

The slave response command is as the following table:

**Table 8 – Slave Response Command**

Slave Address	Function Code	Data Number (bytes)	Data				CRC 16 Calibration	
			Data MSB of address 0174	Data LSB of address 174	Data MSB of address 0175	Data LSB of address 175	LSB	MSB
01	03	04	E2	40	00	01	0C	5F

Filled the received data into the corresponding address, as the following table:

**Table 9 – Data Analysis**

Address	Received Data (Hexadecimal)	After Combination (Hexadecimal)	A Phase Active Power (Decimal)
0103	E240H	0001E240H	123456
0104	0001H		

**3.3 FUNCTION CODE 05H MAPPING REMOTE CONTROL COIL FIELD**

**Table 10 – Remote Control Coil Field**

Modbus Address	PLC Address	Item	Description
0000	0001	Remote Control of Oil Engine in Start Status	Send FF00H active
0001	0002	Remote Control of Oil Engine in Stop Status	Send FF00H active
0002	0003	Remote Control of Oil Engine in Test Status	Send FF00H active
0003	0004	Remote Control of Oil Engine in Auto Status	Send FF00H active
0004	0005	Remote Control of Oil Engine in Manual Status	Send FF00H active
0005	0006	Remote Control of Oil Engine Gen Open	Send FF00H active
0006	0007	Remote Control of Oil Engine Gen Close	Send FF00H active
0007	0008	Reserved	Send FF00H active
0008	0009	Reserved	Send FF00H active
0009	0010	Reserved	Send FF00H active
0010	0011	Reserved	Send FF00H active
0011	0012	Remote Control of Confirm Key	Send FF00H active
0012	0013	Remote Control of Mute Key	Send FF00H active
0013	0014	Reserved	Send FF00H active
0014	0015	Reserved	Send FF00H active
0015	0016	Remote Oil Engine of Fast Stop	Send FF00H active
0016	0017	Reserved	Send FF00H active
0017	0018	Reserved	Send FF00H active
0018	0019	Reserved	Send FF00H active
0019	0020	Reserved	Send FF00H active
0020	0021	Remote Control 1 Output	Send FF00H active
0021	0022	Remote Control 2 Output	Send FF00H active
0022	0023	Remote Control 3 Output	Send FF00H active
0023	0024	Remote Control 4 Output	Send FF00H active
0024	0025	Remote Control 5 Output	Send FF00H active

Modbus Address	PLC Address	Item	Description
		Output	
0025	0026	Remote Control 6 Output	Send FF00H active

**Note:** The remote command in the table above can be sent only once.

Example:

Remote control the controller in auto mode, check the table to get the remote control address is 003.

Suppose the slave address is 01, host sends command as the following table:

**Table 11 – Master Request Command**

Slave Address	Function Code	Remote Control Address (0003)		Remote Data		CRC 16 Calibration	
		MSB	LSB	MSB	LSB	LSB	MSB
<b>01</b>	<b>05</b>	<b>00</b>	<b>03</b>	<b>FF</b>	<b>00</b>	<b>7C</b>	<b>3A</b>

Slave responses command as the following table:

**Table 12 – Slave Response Command**

Slave Address	Function Code	Remote Control Address (0003)		Remote Data		CRC 16 Calibration	
		MSB	LSB	MSB	LSB	LSB	MSB
<b>01</b>	<b>05</b>	<b>00</b>	<b>03</b>	<b>FF</b>	<b>00</b>	<b>7C</b>	<b>3A</b>

The automatic mode status of address 000.9 can be read by 03H function code to verify that the remote command is successfully executed.

### 3.4 GENERATOR STATUS TABLE

**Table 13 – Generator Status Table**

No.	Content	Description
0	Standby	No delay value for this status
1	Preheat	
2	Fuel Output	No delay value for this status
3	Crank	
4	Crank Rest	
5	Safety Run	
6	Start Idle	
7	High Speed Warming Up	
8	Wait for Load	No delay value for this status
9	Normal Running	No delay value for this status
10	High Speed Cooling	
11	High Speed Cooling	
12	High Speed Cooling	
13	High Speed Cooling	
14	High Speed Cooling	No delay value for this status
15	Completely Stop	

**3.5 REMOTE START STATUS**

**Table 14 – Remote Start Table**

Value (No.)	Content	Description
0	No Delay	No delay value for this status
1	Start Delay	
2	Stop Delay	

**3.6 SWITCH STATUS**

**Table 15 – Switch Status Table**

No.	Content	Description
0	Load Disconnect	No delay value for this status
1	Reserved	
2	Gen Close	No delay value for this status
3	Open Delay	
4	Switch Transfer Delay	
5	Reserved	
6	Gen Close Delay	
7	Wait for Open	No delay value for this status
8	Wait for Gen Close	No delay value for this status
9	Reserved	
10	Normal	No delay value for this status

## 4 COMMUNICATION PARAMETER VIEWING AND CONFIGURATION

- 1) In the homepage of main interface, press  key to enter menu interface;
- 2) Press down  key to select "Parameter Setting", press  to enter parameter password interface;
- 3) Input correct password (default 0318), press  to enter the main interface of parameter;
- 4) Select "Module Setting" via down  key, press  key to enter submenu;
- 5) Select "Communication Address" via  key, press  to enter parameter edit function, corresponding parameters will be in the selected status;
- 6) Set the current select content via  and , then press  key to confirm, after editing, then selected status will disappear;
- 7) Press  key to return the main interface.

**5 FAQ**

**5.1 COMMUNICATION LINE SHIELDING LAYER GROUNDED**

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

**5.2 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.

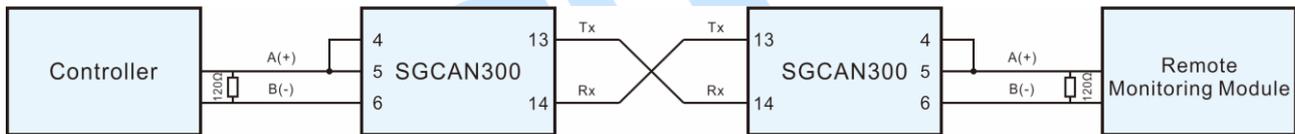
A regular RS485 network usually uses terminal resistor. It can also be not used in the case of network connection line is very short, temporary or laboratory test.

**5.3 RS485 TO USB COMMUNICATION ADAPTOR**

PC can communicate with SG72A module produced by our company.

**5.4 EXTENDED COMMUNICATION DISTANCE**

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



**Fig.3 - SGCAN300 Application Diagram**

**5.5 COMMON SOLUTIONS OF COMMUNICATION FAILURE**

- 1) Check whether the positive and negative of RS485 is correctly connected;
- 2) Check whether the communication parameter in parameter setting is correct;
- 3) Check whether the RS485 converter (if configured) is normal;
- 4) Check whether the terminal resistor is correctly connected;
- 5) 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;
- 6) It is recommended to download third-party communication software such as modscan32, modbus poll to check whether communication is normal.