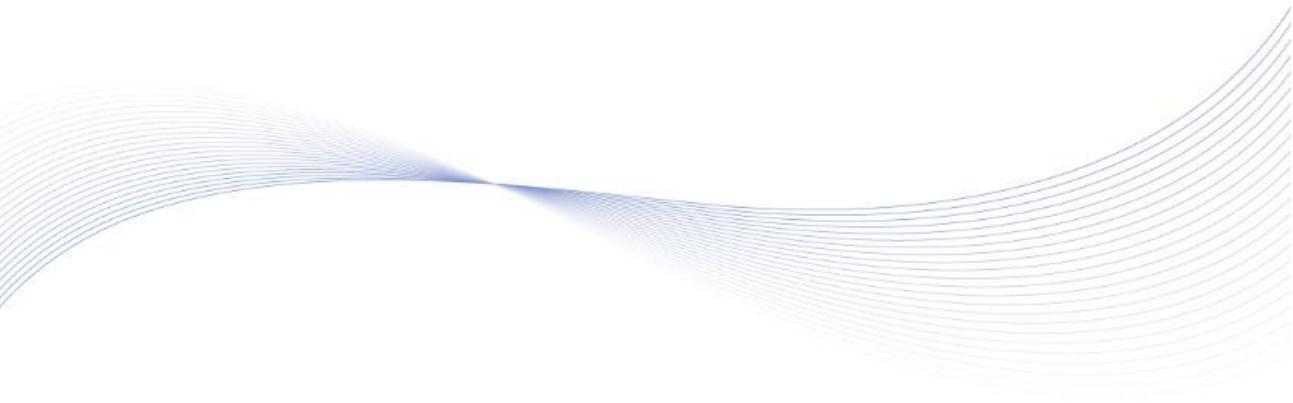# HGMS61/HGMS62
SPLIT TYPE GENSET CONTROLLER
COMMUNICATION PROTOCOL

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SmartGen Registered trademark

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Table 1 – Software Version

Date	Version	Content
2022-01-15	V1.0	Original release.
2023-08-29	V1.1	1. Both HGMS61 and HGMS62 are applicable to this communication protocol; 2. Modify this document according to the new template.
2024-09-04	V1.2	Modify the error of data ratio in Table 2.

CONTENT

SmartGen

1. DESCRIPTION

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

HGMS61/HGMS62 controller has 1 RS485 interface.

The controller is used as a slave, using Modbus-RTU protocol, and does not support other protocols such as Modbus-ASCII.

Communication address: 1~254 (default: 1)
Baud rate: 9600bps
Start bit: 1-bit
Data bit: 8-bit
Parity bit: No Parity
Stop bit: 1-bit

Supported function code: 03H, 05H. Function code 03H is used for reading controller alarm, coil and value data information; while function code 05H is used for sending remote command.

Data check mode: CRC16.

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

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.
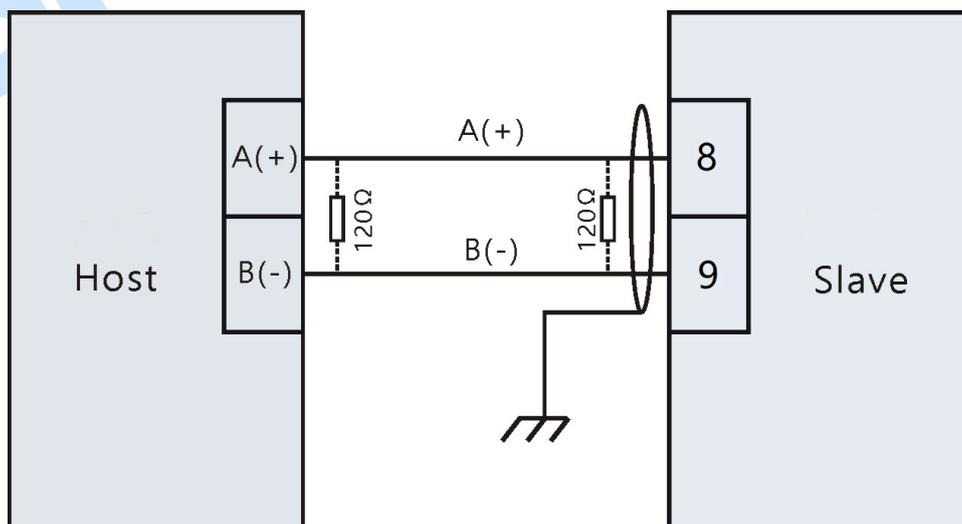
2. WIRING DIAGRAM

Fig.1 Single Unit Communication Wiring Diagram

NOTE1: 2 120Ω impedance resistors can be connected automatically according to site situation, details refer to the Content 5.
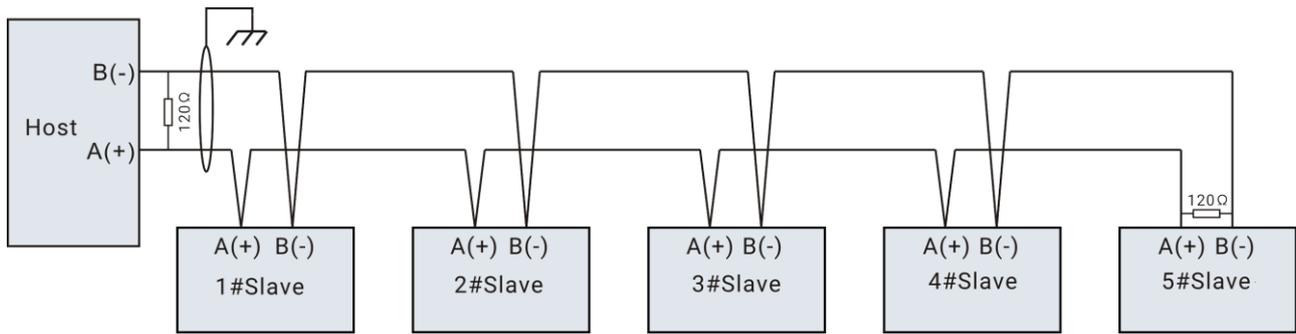
Fig.2 Multi-unit Communication Wiring Diagram

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.

3. CONTROLLER INTERNAL REGISTER ADDRESS AND DATA

3.1 ALARM, COIL, VALUE DATA FIELD CORRESPONDING TO FUNCTION CODE 03H

Table 2 – Alarm, Coil, Value Data Field

Modbus Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
Shutdown Alarm						
0000	Common Alarm	(0~1)	/	/	1 for active (LSB)	
	Common Shutdown Alarm	(0~1)	/	/	1 for active	
	Common Warning Alarm	(0~1)	/	/	1 for active	
	Common Trip and Stop Alarm	(0~1)	/	/	1 for active	
	Common Trip	(0~1)	/	/	1 for active	
	Common Trip and Stop Alarm & Common Shutdown Alarm	(0~1)	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	In Test Mode	(0~1)	/	/	1 for active	
	In Auto Mode	(0~1)	/	/	1 for active	
	In Manual Mode	(0~1)	/	/	1 for active	
	In Stop Mode	(0~1)	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active (MSB)	
0001	Emergency Stop Alarm	(0~1)	/	/	1 for active (LSB)	
	Overspeed Shutdown	(0~1)	/	/	1 for active	

Modbus Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
	Underspeed Shutdown	(0~1)	/	/	1 for active	
	Loss of Speed Signal Alarm	(0~1)	/	/	1 for active	
	Gen Overfreq Shutdown	(0~1)	/	/	1 for active	
	Gen Underfreq Shutdown	(0~1)	/	/	1 for active	
	Gen Overvolt Shutdown	(0~1)	/	/	1 for active	
	Gen Undervolt Shutdown	(0~1)	/	/	1 for active	
	Crank Failure Alarm	(0~1)	/	/	1 for active	
	Gen Overcurrent Shutdown	(0~1)	/	/	1 for active	
	Maintenance Due Shutdown	(0~1)	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reverse Power Shutdown	(0~1)	/	/	1 for active	
	Over Power Shutdown	(0~1)	/	/	1 for active	
	High Temp IN Shutdown	(0~1)	/	/	1 for active	
	Low OP IN Shutdown	(0~1)	/	/	1 for active (MSB)	
0002	ECU Comm. Fail Shutdown	(0~1)	/	/	1 for active (LSB)	
	Low Level IN Shutdown	(0~1)	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Sensor 1 Open Shutdown	(0~1)	/	/	1 for active	
	Sensor 1 High Shutdown	(0~1)	/	/	1 for active	
	Sensor 1 Low Shutdown	(0~1)	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Sensor 2 Open Shutdown	(0~1)	/	/	1 for active	
	Sensor 2 High Shutdown	(0~1)	/	/	1 for active	
	Sensor 2 Low Shutdown	(0~1)	/	/	1 for active	
	Reserved	/	/	/	1 for active (MSB)	
0003	Sensor 3 Open Shutdown	(0~1)	/	/	1 for active (LSB)	
	Sensor 3 High Shutdown	(0~1)	/	/	1 for active	
	Sensor 3 Low Shutdown	(0~1)	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Sensor 4 Open Shutdown	(0~1)	/	/	1 for active	
	Sensor 4 High Shutdown	(0~1)	/	/	1 for active	
	Sensor 4 Low Shutdown	(0~1)	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Sensor 5 Open Shutdown	(0~1)	/	/	1 for active	
	Sensor 5 High Shutdown	(0~1)	/	/	1 for active	
	Sensor 5 Low Shutdown	(0~1)	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	

Modbus Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active (MSB)	
0004	Reserved	/	/	/	1 for active (LSB)	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active (MSB)	
0005	Reserved	/	/	/	16-bit Unsigned	
0006	Reserved	/	/	/	16-bit Unsigned	
0007	Reserved	/	/	/	16-bit Unsigned	
0008	Input Port 1 Shutdown	(0~1)	/	/	1 for active (LSB)	
	Input Port 2 Shutdown	(0~1)	/	/	1 for active	
	Input Port 3 Shutdown	(0~1)	/	/	1 for active	
	Input Port 4 Shutdown	(0~1)	/	/	1 for active	
	Input Port 5 Shutdown	(0~1)	/	/	1 for active	
	Input Port 6 Shutdown	(0~1)	/	/	1 for active	
	Input Port 7 Shutdown	(0~1)	/	/	1 for active	
	Input Port 8 Shutdown	(0~1)	/	/	1 for active	
	Input Port 9 Shutdown	(0~1)	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active (MSB)	
0009	Reserved	/	/	/	16-bit Unsigned	
0010	Reserved	/	/	/	16-bit Unsigned	
0011	Reserved	/	/	/	16-bit Unsigned	
Shutdown Alarm						
0012	Overcurrent Trip and Stop	(0~1)	/	/	1 for active (LSB)	

Modbus Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
	Maintenance Due Trip and Stop	(0~1)	/	/	1 for active	
	Reverse Power Trip and Stop	(0~1)	/	/	1 for active	
	Over Power Trip and Stop	(0~1)	/	/	1 for active	
	Input Port 1 Trip and Stop	(0~1)	/	/	1 for active	
	Input Port 2 Trip and Stop	(0~1)	/	/	1 for active	
	Input Port 3 Trip and Stop	(0~1)	/	/	1 for active	
	Input Port 4 Trip and Stop	(0~1)	/	/	1 for active	
	Input Port 5 Trip and Stop	(0~1)	/	/	1 for active	
	Input Port 6 Trip and Stop	(0~1)	/	/	1 for active	
	Input Port 7 Trip and Stop	(0~1)	/	/	1 for active	
	Input Port 8 Trip and Stop	(0~1)	/	/	1 for active	
	Input Port 9 Trip and Stop	(0~1)	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active (MSB)	
0013	Reserved	/	/	/	16-bit Unsigned	
0014	Reserved	/	/	/	16-bit Unsigned	
0015	Reserved	/	/	/	16-bit Unsigned	
Shutdown Alarm						
0016	Overcurrent Trip	(0~1)	/	/	1 for active (LSB)	
	Maintenance Due Trip	(0~1)	/	/	1 for active	
	Reverse Power Trip	(0~1)	/	/	1 for active	
	Over Power Trip	(0~1)	/	/	1 for active	
	Input Port 1 Trip	(0~1)	/	/	1 for active	
	Input Port 2 Trip	(0~1)	/	/	1 for active	
	Input Port 3 Trip	(0~1)	/	/	1 for active	
	Input Port 4 Trip	(0~1)	/	/	1 for active	
	Input Port 5 Trip	(0~1)	/	/	1 for active	
	Input Port 6 Trip	(0~1)	/	/	1 for active	
	Input Port 7 Trip	(0~1)	/	/	1 for active	
	Input Port 8 Trip	(0~1)	/	/	1 for active	
	Input Port 9 Trip	(0~1)	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active (MSB)	
0017	Reserved	/	/	/	16-bit Unsigned	
0018	Reserved	/	/	/	16-bit Unsigned	
0019	Reserved	/	/	/	16-bit Unsigned	
Warning						
0020	Gen Overspeed Warning	(0~1)	/	/	1 for active (LSB)	
	Gen Underspeed Warning	(0~1)	/	/	1 for active	
	Loss of Speed Signal	(0~1)	/	/	1 for active	

Modbus Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
	Warning					
	Gen Overfreq Warning	(0~1)	/	/	1 for active	
	Gen Underfreq Warning	(0~1)	/	/	1 for active	
	Gen Overvolt Warning	(0~1)	/	/	1 for active	
	Gen Undervolt Warning	(0~1)	/	/	1 for active	
	Gen Overcurrent	(0~1)	/	/	1 for active	
	Stop Failure Warning	(0~1)	/	/	1 for active	
	Charge Failure Warning	(0~1)	/	/	1 for active	
	Battery Overvolt Warning	(0~1)	/	/	1 for active	
	Battery Undervolt Warning	(0~1)	/	/	1 for active	
	Maintenance Due Warning	(0~1)	/	/	1 for active	
	Reverse Power Warning	(0~1)	/	/	1 for active	
	Over Power Warning	(0~1)	/	/	1 for active	
	ECU Warning	(0~1)	/	/	1 for active (MSB)	
0021	Gen Loss of Phase Warning	(0~1)	1	kVA	1 for active (LSB)	
	Gen Reverse Phase Seq. Warning	(0~1)	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	ATS Transfer Failure Warning	(0~1)	/	/	1 for active	
	Sensor 1 Open Warning	(0~1)	/	/	1 for active	
	Sensor 1 High Warning	(0~1)	/	/	1 for active	
	Sensor 1 Low Warning	(0~1)	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Sensor 2 Open Warning	(0~1)	/	/	1 for active	
	Sensor 2 High Warning	(0~1)	/	/	1 for active	
	Sensor 2 Low Warning	(0~1)	/	/	1 for active	
	Reserved	/	/	/	1 for active (MSB)	
0022	Sensor 3 Open Warning	(0~1)	/	/	1 for active (LSB)	
	Sensor 3 High Warning	(0~1)	/	/	1 for active	
	Sensor 3 Low Warning	(0~1)	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Sensor 4 Open Warning	(0~1)	/	/	1 for active	
	Sensor 4 High Warning	(0~1)	/	/	1 for active	
	Sensor 4 Low Warning	(0~1)	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Sensor 5 Open Warning	(0~1)	/	/	1 for active	
	Sensor 5 High Warning	(0~1)	/	/	1 for active	
	Sensor 5 Low Warning	(0~1)	/	/	1 for active	

Modbus Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active (MSB)	
0023	Reserved	/	/	/	16-bit Unsigned	
0024	Reserved	/	/	/	16-bit Unsigned	
0025	Reserved	/	/	/	16-bit Unsigned	
0026	Reserved	/	/	/	1 for active (LSB)	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Cycle Start Comm. Failure Warn	(0~1)	/	/	1 for active (MSB)	
0027	Reserved	/	/	/	16-bit Unsigned	
0028	Reserved	/	/	/	16-bit Unsigned	
0029	Input Port 1 Warning	(0~1)	/	/	1 for active (LSB)	
	Input Port 2 Warning	(0~1)	/	/	1 for active	
	Input Port 3 Warning	(0~1)	/	/	1 for active	
	Input Port 4 Warning	(0~1)	/	/	1 for active	
	Input Port 5 Warning	(0~1)	/	/	1 for active	
	Input Port 6 Warning	(0~1)	/	/	1 for active	
	Input Port 7 Warning	(0~1)	/	/	1 for active	
	Input Port 8 Warning	(0~1)	/	/	1 for active	
	Input Port 9 Warning	(0~1)	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Box Temp High Warning	(0~1)	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	

Modbus Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
	Reserved	/	/	/	1 for active (MSB)	
0030	Reserved	/	/	/	16-bit Unsigned	
Indication						
0031	Inhibit Alarm Shutdown Indication	(0~1)	/	/	1 for active (LSB)	
	Maintenance Due Indication	(0~1)	/	/	1 for active	
	In Not Run Indication	(0~1)	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active (MSB)	
0032	Reserved	/	/	/	1 for active (LSB)	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Auto Mode Input	(0~1)	/	/	1 for active	
	Auto Mode Inactive	(0~1)	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Alternative Config. 1 Indication	(0~1)	/	/	1 for active	
	Alternative Config. 2 Indication	(0~1)	/	/	1 for active	
	Alternative Config. 3 Indication	(0~1)	/	/	1 for active	
	Overcurrent Indication	(0~1)	/	/	1 for active	
	Reverse Power Indication	(0~1)	/	/	1 for active	
	Over Power Indication	(0~1)	/	/	1 for active (MSB)	
0033	Input Port 1 Indication	(0~1)	/	/	1 for active (LSB)	
	Input Port 2 Indication	(0~1)	/	/	1 for active	
	Input Port 3 Indication	(0~1)	/	/	1 for active	
	Input Port 4 Indication	(0~1)	/	/	1 for active	

Modbus Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
	Input Port 5 Indication	(0~1)	/	/	1 for active	
	Input Port 6 Indication	(0~1)	/	/	1 for active	
	Input Port 7 Indication	(0~1)	/	/	1 for active	
	Input Port 8 Indication	(0~1)	/	/	1 for active	
	Input Port 9 Indication	(0~1)	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active (MSB)	
0034	Mains Normal Indication	(0~1)	/	/	1 for active (LSB)	
	Mains Abnormal Indication	(0~1)	/	/	1 for active	
	Gen Normal Run Indication	(0~1)	/	/	1 for active	
	Gen Stop Indication	(0~1)	/	/	1 for active	
	Mains On-load Indication	(0~1)	/	/	1 for active	
	Gen On-load Indication	(0~1)	/	/	1 for active	
	Auto Mode Indication	(0~1)	/	/	1 for active	
	Not In Auto Mode Indication	(0~1)	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active (MSB)	
0035	Emergency Input Port Status	(0~1)	/	/	1 for active (LSB)	
	Input Port 1 Status	(0~1)	/	/	1 for active	
	Input Port 2 Status	(0~1)	/	/	1 for active	
	Input Port 3 Status	(0~1)	/	/	1 for active	
	Input Port 4 Status	(0~1)	/	/	1 for active	
	Input Port 5 Status	(0~1)	/	/	1 for active	
	Input Port 6 Status	(0~1)	/	/	1 for active	
	Input Port 7 Status	(0~1)	/	/	1 for active	
	Input Port 8 Status	(0~1)	/	/	1 for active	
	Input Port 9 Status	(0~1)	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	

Modbus Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
	Reserved	/	/	/	1 for active (MSB)	
0036	Reserved	/	/	/	16-bit Unsigned	
0037	Fuel Relay Output Status	(0~1)	/	/	1 for active (LSB)	
	Crank Relay Output Status	(0~1)	/	/	1 for active	
	Aux. Output 1 Status	(0~1)	/	/	1 for active	
	Aux. Output 2 Status	(0~1)	/	/	1 for active	
	Aux. Output 3 Status	(0~1)	/	/	1 for active	
	Aux. Output 4 Status	(0~1)	/	/	1 for active	
	Aux. Output 5 Status	(0~1)	/	/	1 for active	
	Aux. Output 6 Status	(0~1)	/	/	1 for active	
	Aux. Output 7 Status	(0~1)	/	/	1 for active	
	Aux. Output 8 Status	(0~1)	/	/	1 for active	
	Aux. Output 9 Status	(0~1)	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active (MSB)	
0038	Reserved	/	/	/	16-bit Unsigned	
0039	Reserved	/	/	/	16-bit Unsigned	
0040	Reserved	/	/	/	16-bit Unsigned	
0041	Reserved	/	/	/	16-bit Unsigned	
0042	Reserved	/	/	/	16-bit Unsigned	
0043	Mains Normal	/	/	/	1 for active (LSB)	
	Mains Close	(0~1)	/	/	1 for active	
	Gen Normal	(0~1)	/	/	1 for active	
	Gen Close	(0~1)	/	/	1 for active	
	Alarm LED Status	(0~1)	/	/	1 for active	
	Running LED Status	(0~1)	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active (MSB)	
Others						
0044	Mains Abnormal	(0~1)	/	/	1 for active (LSB)	
	Mains Overvolt	(0~1)	/	/	1 for active	
	Mains Undervolt	(0~1)	/	/	1 for active	

Modbus Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
	Mains Overfreq	(0~1)	/	/	1 for active	
	Mains Underfreq	(0~1)	/	/	1 for active	
	Mains Loss of Phase	(0~1)	/	/	1 for active	
	Mains Reverse Phase Sequence	(0~1)	/	/	1 for active	
	Mains Blackout	(0~1)	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active (MSB)	
0045	Input Port 1 Active	(0~1)	/	/	1 for active (LSB)	
	Input Port 2 Active	(0~1)	/	/	1 for active	
	Input Port 3 Active	(0~1)	/	/	1 for active	
	Input Port 4 Active	(0~1)	/	/	1 for active	
	Input Port 5 Active	(0~1)	/	/	1 for active	
	Input Port 6 Active	(0~1)	/	/	1 for active	
	Input Port 7 Active	(0~1)	/	/	1 for active	
	Input Port 8 Active	(0~1)	/	/	1 for active	
	Input Port 9 Active	(0~1)	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active	
	Reserved	/	/	/	1 for active (MSB)	
0046	Reserved	/	/	/	16-bit Unsigned	
0047	Reserved	/	/	/	16-bit Unsigned	
0048	Reserved	/	/	/	16-bit Unsigned	
0049	Reserved	/	/	/	16-bit Unsigned	
0050	Reserved	/	/	/	16-bit Unsigned	
0051	Reserved	/	/	/	16-bit Unsigned	
0052	Reserved	/	/	/	16-bit Unsigned	
0053	Reserved	/	/	/	16-bit Unsigned	
0054	Reserved	/	/	/	16-bit Unsigned	
0055	Mains UAB	(0~30000)	1	V	16-bit Signed	
0056	Mains UBC	(0~30000)	1	V	16-bit Signed	
0057	Mains UCA	(0~30000)	1	V	16-bit Signed	
0058	Mains UA	(0~30000)	1	V	16-bit Signed	

Modbus Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
0059	Mains UB	(0~30000)	1	V	16-bit Signed	
0060	Mains UC	(0~30000)	1	V	16-bit Signed	
0061	Mains UA Phase	(-360~360)	1	°	16-bit Signed	
0062	Mains UB Phase	(-360~360)	1	°	16-bit Signed	
0063	Mains UC Phase	(-360~360)	1	°	16-bit Signed	
0064	Mains Frequency	(0~99.9)	0.1	Hz	16-bit Unsigned	NOTE1
0065	Reserved	/	/	/	16-bit Unsigned	
0066	Reserved	/	/	/	16-bit Unsigned	
0067	Reserved	/	/	/	16-bit Unsigned	
0068	Reserved	/	/	/	16-bit Unsigned	
0069	Reserved	/	/	/	16-bit Unsigned	
0070	Reserved	/	/	/	16-bit Unsigned	
0071	Reserved	/	/	/	16-bit Unsigned	
0072	Reserved	/	/	/	16-bit Unsigned	
0073	Reserved	/	/	/	16-bit Unsigned	
0074	Reserved	/	/	/	16-bit Unsigned	
0075	Gen UAB	(0~30000)	1	V	16-bit Signed	
0076	Gen UBC	(0~30000)	1	V	16-bit Signed	
0077	Gen UCA	(0~30000)	1	V	16-bit Signed	
0078	Gen UA	(0~30000)	1	V	16-bit Signed	
0079	Gen UB	(0~30000)	1	V	16-bit Signed	
0080	Gen UC	(0~30000)	1	V	16-bit Signed	
0081	Gen UA Phase	(-360~360)	1	°	16-bit Signed	
0082	Gen UB Phase	(-360~360)	1	°	16-bit Signed	
0083	Gen UC Phase	(-360~360)	1	°	16-bit Signed	
0084	Gen Frequency	(0~99.9)	0.1	Hz	16-bit Unsigned	
0085	Reserved	/	/	/	16-bit Unsigned	
0086	Reserved	/	/	/	16-bit Unsigned	
0087	Reserved	/	/	/	16-bit Unsigned	
0088	Reserved	/	/	/	16-bit Unsigned	
0089	Reserved	/	/	/	16-bit Unsigned	
0090	Reserved	/	/	/	16-bit Unsigned	
0091	Reserved	/	/	/	16-bit Unsigned	
0092	Reserved	/	/	/	16-bit Unsigned	
0093	Reserved	/	/	/	16-bit Unsigned	
0094	Reserved	/	/	/	16-bit Unsigned	
0095	A Phase Current	(0~6000)	0.1	A	16-bit Unsigned	
0096	B Phase Current	(0~6000)	0.1	A	16-bit Unsigned	
0097	C Phase Current	(0~6000)	0.1	A	16-bit Unsigned	
0098	N Wire Current	(0~6000)	0.1	A	16-bit Unsigned	
0099	A Phase Current Phase	(-360~360)	1	°	16-bit Signed	
0100	B Phase Current Phase	(-360~360)	1	°	16-bit Signed	
0101	C Phase Current Phase	(-360~360)	1	°	16-bit Signed	

Modbus Address	Name		Range (Decimal)	Ratio	Unit	Description	Remark
0102	N Wire Current Phase		(-360~360)	1	°	16-bit Signed	
0103	A Phase Active	MSB	(-999999 ~999999)	0.1	kW	32-bit Signed	NOTE2
0104	Power	LSB					
0105	B Phase Active	MSB	(-999999 ~999999)	0.1	kW	32-bit Signed	NOTE2
0106	Power	LSB					
0107	C Phase Active	MSB	(-999999 ~999999)	0.1	kW	32-bit Signed	NOTE2
0108	Power	LSB					
0109	Total Active Power	MSB	(-999999 ~999999)	0.1	kW	32-bit Signed	NOTE2
0110		LSB					
0111	A Phase Reactive	MSB	(-999999 ~999999)	0.1	kvar	32-bit Signed	NOTE2
0112	Power	LSB					
0113	B Phase Reactive	MSB	(-999999 ~999999)	0.1	kvar	32-bit Signed	NOTE2
0114	Power	LSB					
0115	C Phase Reactive	MSB	(-999999 ~999999)	0.1	kvar	32-bit Signed	NOTE2
0116	Power	LSB					
0117	Total Reactive Power	MSB	(-999999 ~999999)	0.1	kvar	32-bit Signed	NOTE2
0117		LSB					
0119	A Phase Apparent	MSB	(-999999 ~999999)	0.1	kVA	32-bit Signed	NOTE2
0120	Power	LSB					
0121	B Phase Apparent	MSB	(-999999 ~999999)	0.1	kVA	32-bit Signed	NOTE2
0122	Power	LSB					
0123	C Phase Apparent	MSB	(-999999 ~999999)	0.1	kVA	32-bit Signed	NOTE2
0124	Power	LSB					
0125	Total Apparent	MSB	(-999999 ~999999)	0.1	kVA	32-bit Signed	NOTE2
0126	Power	LSB					
0127	A Phase Power Factor		(-1.00~1.00)	0.01	CosΦ	16-bit Signed	
0128	B Phase Power Factor		(-1.00~1.00)	0.01	CosΦ	16-bit Signed	
0129	C Phase Power Factor		(-1.00~1.00)	0.01	CosΦ	16-bit Signed	
0130	Average Power Factor		(-1.00~1.00)	0.01	CosΦ	16-bit Signed	
0131	Current Run Time (h)		(0~9999)	1	h	16-bit Unsigned	
0132	Current Run Time (min)		(0~59)	1	min	16-bit Unsigned	
0133	Current Run Time (s)		(0~59)	1	s	16-bit Unsigned	
0134	Current Energy		(-999999 ~999999)	0.1	kwh	32-bit Signed	NOTE2
0135							
0136	Average Power		(-999999 ~999999)	0.1	kW	32-bit Signed	NOTE2
0137							
0138	History Power		(-999999 ~999999)	0.1	kW	32-bit Signed	NOTE2
0139							
0140	Load Percentage		(0~100)	1	%	16-bit Unsigned	
0141	Engine Speed		(0~6000)	1	r/min	16-bit Unsigned	
0142	Battery Voltage		(0~60)	0.1	V	16-bit Unsigned	
0143	Charger Voltage		(0~60)	0.1	V	16-bit Unsigned	
0144	Reserved		/	/	/	16-bit Unsigned	

Modbus Address	Name		Range (Decimal)	Ratio	Unit	Description	Remark
0145	Reserved		/	/	/	16-bit Unsigned	
0146	Reserved		/	/	/	16-bit Unsigned	
0147	Reserved		/	/	/	16-bit Unsigned	
0148	Reserved		/	/	/	16-bit Unsigned	
0149	Water Temp Value		(-50~10000)	1	°C	16-bit Signed	NOTE4
0150	Reserved		/	/	/	16-bit Unsigned	
0151	Oil Pressure Value		(0~1000)	1	kPa	16-bit Signed	NOTE4
0152	Reserved		/	/	/	16-bit Unsigned	
0153	Level Value		(0~200)	1	%	16-bit Signed	NOTE4
0154	Reserved		/	/	/	16-bit Unsigned	
0155	Sensor 1 Value		/	/	/	16-bit Signed	NOTE4
0156	Reserved		/	/	/	16-bit Unsigned	
0157	Sensor 2 Value		/	/	/	16-bit Signed	NOTE4
0158	Reserved		/	/	/	16-bit Unsigned	
0159	Reserved		/	/	/	16-bit Unsigned	
0160	Reserved		/	/	/	16-bit Unsigned	
0161	Reserved		/	/	/	16-bit Unsigned	
0162	Coolant Level		(0~200)	1	%	16-bit Unsigned	
0163	Oil Temperature		(-40~300)	1	°C	16-bit Signed	
0164	Coolant Pressure		(0~1000)	1	kPa	16-bit Signed	
0165	Fuel Pressure		(0~1000)	1	kPa	16-bit Signed	
0166	Fuel Temperature		(-40~300)	1	°C	16-bit Signed	NOTE3
0167	Inlet Temperature		(-40~300)	1	°C	16-bit Signed	
0168	Outlet Temperature		(-40~300)	1	°C	16-bit Signed	
0169	Turbo Pressure		(0~1000)	1	kPa	16-bit Signed	
0170	Fuel Consumption		(0~1000)	0.1	L/h	16-bit Signed	
0171	Accumulated Fuel	LSB	(0~99999999)	1	L	32-bit Unsigned	NOTE2
0172	Consumption	MSB					
0173	ECU Accumulated	LSB	(0~210554060.7)	0.1	h	32-bit Unsigned	NOTE2
0174	Run Time	MSB					
0175	Reserved		/	/	/	16-bit Unsigned	
0176	Reserved		/	/	/	16-bit Unsigned	
0177	Reserved		/	/	/	16-bit Unsigned	
0178	Reserved		/	/	/	16-bit Unsigned	
0179	Reserved		/	/	/	16-bit Unsigned	
0180	Reserved		/	/	/	16-bit Unsigned	
0181	Reserved		/	/	/	16-bit Unsigned	
0182	Reserved		/	/	/	16-bit Unsigned	
0183	Reserved		/	/	/	16-bit Unsigned	
0184	Reserved		/	/	/	16-bit Unsigned	
0185	Reserved		/	/	/	16-bit Unsigned	
0186	Reserved		/	/	/	16-bit Unsigned	
0187	Reserved		/	/	/	16-bit Unsigned	

Modbus Address	Name		Range (Decimal)	Ratio	Unit	Description	Remark
0188	Reserved		/	/	/	16-bit Unsigned	
0189	Generator Status		(0~14)	1		See Generator Status Table	
0190	Gen Delay Value		(0~6000)	1	s	16-bit Unsigned	
0191	Remote Start Status		(0~2)	1		See Remote Start Status Table	
0192	Remote Start Delay Value		(0~6000)	1	s	16-bit Unsigned	
0193	ATS Status		(0~5)	1		See ATS Running Status Table	
0194	ATS Transfer Delay Value		(0~6000)	1	s	16-bit Unsigned	
0195	Mains Status		(0~3)	1		See Mains Status Table	
0196	Mains Delay Value		(0~6000)	1	s	16-bit Unsigned	
0197	Reserved		/	/	/	16-bit Unsigned	
0198	Reserved		/	/	/	16-bit Unsigned	
0199	Accumulated Run Hours		(0~9999)	1	h	16-bit Unsigned	
0200	Accumulated Run Minutes		(0~59)	1	min	16-bit Unsigned	
0201	Accumulated Run Minutes		(0~59)	1	s	16-bit Unsigned	
0202	Accumulated Start Times		(0~9999)	1		16-bit Unsigned	
0203	Accumulated Energy kWh	LSB	(0~99999999 9)	0.1	kWh	32-bit Signed	NOTE2
0204		MSB					
0205	Accumulated Energy kvarh	LSB	(0~99999999 9)	0.1	kvarh	32-bit Signed	NOTE2
0206		MSB					
0207	Accumulated Energy KVAh	LSB	(0~99999999 9)	0.1	KVAh	32-bit Signed	NOTE2
0208		MSB					
0209	Accumulated Energy NkWh	LSB	(0~99999999 9)	0.1	NkWh	32-bit Signed	NOTE2
0210		MSB					
0211	Maintenance Left Time (h)		(0~9999)	1	h	16-bit Unsigned	
0212	Maintenance Left Time (min)		(0~59)	1	min	16-bit Unsigned	
0213	Maintenance Left Time (s)		(0~59)	1	s	16-bit Unsigned	
0214	Reserved		/	/	/	16-bit Unsigned	
0215	Reserved		/	/	/	16-bit Unsigned	
0216	Reserved		/	/	/	16-bit Unsigned	
0217	Controller Model		(0~65535)	1	/	16-bit Unsigned	
0218	Controller Software Version		(0~65535)	0.1	/	16-bit Unsigned	
0219	Controller Hardware Version		(0~65535)	0.1	/	16-bit Unsigned	
0220	Issue Year		(0~99)	1		Only save last 2 digits of year.	
0221	Issue Month		(0~12)	1		16-bit Unsigned	
0222	Issue Day		(1~31)	1		16-bit Unsigned	
0223	Reserved		/	/	/	16-bit Unsigned	
0224	Reserved		/	/	/	16-bit Unsigned	
0225	Controller Time: Year		(0~99)	1		Only save last 2 digits of	

Modbus Address	Name		Range (Decimal)	Ratio	Unit	Description	Remark
						year.	
0226	Controller Time: Month		(0~12)	1		16-bit Unsigned	
0227	Controller Time: Day		(1~31)	1		16-bit Unsigned	
0228	Controller Time: Week		(0~6)	1		16-bit Unsigned	
0229	Controller Time: Hour		(0~23)	1		16-bit Unsigned	
0230	Controller Time: Minute		(0~59)	1		16-bit Unsigned	
0231	Controller Time: Second		(0~59)	1		16-bit Unsigned	
0232-0284	Reserved					16-bit Unsigned	
0285	DM1 Alarm SPN1	SPN	(0~524287)	1		32-bit Unsigned	NOTE2
0286							
0287		FMI (Low 8-bit)	(0~31)	1		16-bit Unsigned	
		OC (High 8-bit)	(0~127)	1			
0288	DM1 Alarm SPN2	SPN	(0~524287)	1		32-bit Unsigned	NOTE2
0289							
0290		FMI (Low 8-bit)	(0~31)	1		16-bit Unsigned	
		OC (High 8-bit)	(0~127)	1			
0291	DM1 Alarm SPN3	SPN	(0~524287)	1		32-bit Unsigned	NOTE2
0292							
0293		FMI (Low 8-bit)	(0~31)	1		16-bit Unsigned	
		OC (High 8-bit)	(0~127)	1			
0294	DM1 Alarm SPN4	SPN	(0~524287)	1		32-bit Unsigned	NOTE2
0295							
0296		FMI (Low 8-bit)	(0~31)	1		16-bit Unsigned	
		OC (High 8-bit)	(0~127)	1			
0297	DM1 Alarm SPN5	SPN	(0~524287)	1		32-bit Unsigned	NOTE2
0298							
0299		FMI (Low 8-bit)	(0~31)	1		16-bit Unsigned	
		OC (High 8-bit)	(0~127)	1			
0300	DM1 Alarm SPN6	SPN	(0~524287)	1		32-bit Unsigned	NOTE2
0301							
0302		FMI (Low 8-bit)	(0~31)	1		16-bit Unsigned	

Modbus Address	Name		Range (Decimal)	Ratio	Unit	Description	Remark
		OC (High 8-bit)	(0~127)	1			
0303 0304	DM1 Alarm SPN7	SPN	(0~524287)	1		32-bit Unsigned	NOTE2
0305		FMI (Low 8-bit)	(0~31)	1		16-bit Unsigned	
		OC (High 8-bit)	(0~127)	1			
0306 0307	DM1 Alarm SPN8	SPN	(0~524287)	1		32-bit Unsigned	NOTE2
0308		FMI (Low 8-bit)	(0~31)	1		16-bit Unsigned	
		OC (High 8-bit)	(0~127)	1			
0309 0310	DM1 Alarm SPN9	SPN	(0~524287)	1		32-bit Unsigned	NOTE2
0311		FMI (Low 8-bit)	(0~31)	1		16-bit Unsigned	
		OC (High 8-bit)	(0~127)	1			
0312 0313	DM1 Alarm SPN10	SPN	(0~524287)	1		32-bit Unsigned	NOTE2
0314		FMI (Low 8-bit)	(0~31)	1		16-bit Unsigned	
		OC (High 8-bit)	(0~127)	1			
0315 0316	DM2 Alarm SPN1	SPN	(0~524287)	1		32-bit Unsigned	NOTE2
0317		FMI (Low 8-bit)	(0~31)	1		16-bit Unsigned	
		OC (High 8-bit)	(0~127)	1			
0318 0319	DM2 Alarm SPN2	SPN	(0~524287)	1		32-bit Unsigned	NOTE2
0320		FMI (Low 8-bit)	(0~31)	1		16-bit Unsigned	
		OC (High 8-bit)	(0~127)	1			
0321 0322	DM2 Alarm SPN3	SPN	(0~524287)	1		32-bit Unsigned	NOTE2
0323		FMI (Low 8-bit)	(0~31)	1		16-bit Unsigned	
		OC	(0~127)	1			

Modbus Address	Name		Range (Decimal)	Ratio	Unit	Description	Remark
		(High 8-bit)					
0324	DM2 Alarm SPN4	SPN	(0~524287)	1		32-bit Unsigned	NOTE2
0325							
0326		FMI (Low 8-bit)	(0~31)	1		16-bit Unsigned	
		OC (High 8-bit)	(0~127)	1			
0327	DM2 Alarm SPN5	SPN	(0~524287)	1		32-bit Unsigned	NOTE2
0328							
0329		FMI (Low 8-bit)	(0~31)	1		16-bit Unsigned	
		OC (High 8-bit)	(0~127)	1			
0330	DM2 Alarm SPN6	SPN	(0~524287)	1		32-bit Unsigned	NOTE2
0331							
0332		FMI (Low 8-bit)	(0~31)	1		16-bit Unsigned	
		OC (High 8-bit)	(0~127)	1			
0333	DM2 Alarm SPN7	SPN	(0~524287)	1		32-bit Unsigned	NOTE2
0334							
0335		FMI (Low 8-bit)	(0~31)	1		16-bit Unsigned	
		OC (High 8-bit)	(0~127)	1			
0336	DM2 Alarm SPN8	SPN	(0~524287)	1		32-bit Unsigned	NOTE2
0337							
0338		FMI (Low 8-bit)	(0~31)	1		16-bit Unsigned	
		OC (High 8-bit)	(0~127)	1			
0339	DM2 Alarm SPN9	SPN	(0~524287)	1		32-bit Unsigned	NOTE2
0340							
0341		FMI (Low 8-bit)	(0~31)	1		16-bit Unsigned	
		OC (High 8-bit)	(0~127)	1			
0342	DM2 Alarm SPN10	SPN	(0~524287)	1		32-bit Unsigned	NOTE2
0343							
0344		FMI (Low 8-bit)	(0~31)	1		16-bit Unsigned	
		OC (High 8-bit)	(0~127)	1			

Modbus Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
0345	ECU Shutdown Alarm Num.	(0~999)	1		16-bit Unsigned	
0346	ECU Warn Alarm Num.	(0~999)	1		16-bit Unsigned	

NOTE1: Actual value=Received Data*Ratio. Take frequency as the example, received data is 500 (01F4H), ratio is 0.1Hz, so the actual frequency value is 50.0Hz (500*0.1Hz);

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: When controller detects sensor open, the data is 32767, "++++" will display; When ECU or expand module communication fails, sensor data is 32766, "####" will display; the unit of flexible sensor 1-2 will be defined according to corresponding sensor types;

NOTE5: 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 Fuel Consumption (current is 123456L)", firstly get its corresponding address is 0171 and 0172 by checking the table, it is known that you need to read 2 addresses' data.

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

Table 3 – Master Request Command

Slave Address	Function Code	Starting Address (0171)		Data Qty. (2)		CRC 16 Calibration	
		MSB	LSB	MSB	LSB	LSB	MSB
01	03	00	AB	00	02	B5	EB

Slave response command is as following:

Table 4 – Slave Response Command

Slave Address	Function Code	Data Qty. (Bytes)	Data				CRC 16 Calibration	
			Data MSB of Address 0171	Data LSB of Address 0171	Data MSB of Address 0172	Data LSB of Address 0172	LSB	MSB
01	03	04	E2	40	00	01	0C	5F

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

Table 5 – Data Analysis

Address	Received Data (Hex)	Combination (Hex)	Accum. Fuel Consumption (Decimal)
0171	E240H	0001E240H	123456
0172	0001H		

SmartGen

3.2 REMOTE COIL FIELD CORRESPONDING TO FUNCTION CODE 05H

Table 6 – Remote Coil Field

Modbus Address	Name	Description
0000	Remote Start Key	Only Send FF00H Active
0001	Remote Stop Key	Only Send FF00H Active
0002	Reserved	
0003	Remote Auto Key	Only Send FF00H Active
0004	Remote Manual Key	Only Send FF00H Active
0005	HGMS61 Remote Gen Close Key HGMS62 Remote Mains C/O Key	Only Send FF00H Active
0006	HGMS61 Remote Gen Open Key HGMS62 Remote Gen C/O Key	Only Send FF00H Active

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 0003 by checking the table.

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

Table 7 – Master Request Command

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

Slave response command is as following:

Table 8 – Slave Response Command

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

Then whether the remote command is executed successfully can be confirmed by reading the auto mode status of address 0000 via function code 03H.

3.3 GENERATOR STATUS TABLE

Table 9 – Generator Status Table

Value (No.)	Name	Delay
0	Standby	No delay value for this status
1	Preheat	
2	Fuel Output	No delay value for this status
3	Cranking	

Value (No.)	Name	Delay
4	Crank Rest	
5	Safety Delay	
6	Start Idle	
7	Warming Up	
8	Wait for Load	No delay value for this status
9	Normal Running	No delay value for this status
10	Cooling	
11	Stop Idle	
12	ETS	
13	Wait for Stop	
14	After Stop	
15	Stop Failure	No delay value for this status

3.4 MAINS STATUS TABLE

Table 10 – Mains Status Table

Value (No.)	Content	Description
0	Mains Normal	No delay value for this status
1	Mains Normal Delay	
2	Mains Abnormal	No delay value for this status
3	Mains Abnormal Delay	

3.5 REMOTE START STATUS TABLE

Table 11 – Remote Start Status Description

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

3.6 ATS RUNNING STATUS TABLE

Table 12 – ATS Running Status Table

Value (No.)	Content	Delay
0	Off-load	No delay value for this status
1	Mains On-load	No delay value for this status
2	Gen On-load	No delay value for this status
3	Open Delay	
4	ATS Transfer Delay	
5	Mains Close Delay	
6	Gen Close Delay	
7	Wait for Opened	No delay value for this status
8	Wait Gen Closed	No delay value for this status
9	Wait Mains Closed	No delay value for this status
10	Normal	No delay value for this status

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4. REMOTE START/STOP STEPS

Start Steps:

1) Sending 05 function code the order of pressing "Remote Manual Key" to make controller in manual mode;

2) Reading the data of 0000 address via 03 function code to obtain the current mode of the controller and ensure that the controller is in manual mode or not. If it is not in manual mode, please repeat step 1 and step 2;

3) When controller is in manual mode, send 05 function code the order of pressing "Remote Start Key";

4) Controller will enter the start process when receiving the order, reading the data of "Generator Status" address corresponding to "Generator Status Table" via 03 function code, which can obtain the start process of generator;

5) If "Generator Status" corresponding to "Generator Status Table" is between 1 (Preheat) and 8 (Wait for Loading), generator will enter the start process, otherwise, the controller is failed to entering the start process, then repeat step 3 and step 4;

6) If "Generator Status" is in "Normal Running", sending 05 function code the order of pressing "Remote Gen Close/Open" (Remote Gen Close");

7) When controller receives the order and performs the gen closing, reading the data of "ATS Status" address corresponding to "ATS Status Table" via 03 function code, which can obtain the closing process of generating;

8) If "ATS Status" corresponding to "ATS Table" is in "Gen Close Delay", then it enters the closing process. If it not enters the closing process, please repeat Step 6 and Step 7;

9) When "Generator Status" is in "Normal Running" and "ATS Status" is in "Gen On-load", the generator finishes the on-load running.

STOP MODE 1:

1) Sending 05 function code the order of pressing "Remote Manual" key to make controller in manual mode;

2) Reading the data of 0000 address via 03 function code to obtain the current mode of the controller and ensure that the controller is in manual mode or not. If it is not in manual mode, please repeat step 1 and step 2;

3) When controller is in manual mode, send 05 function code the order of pressing "Remote Control Gen Close/Open" (Remote Gen Open);

4) Controller will enter the Gen open process when receiving the order, reading the data of "ATStatus" address corresponding to "ATS Table" via 03 function code, which can obtain the Gen open process;

5) If "Gen ATS Status" corresponding to "ATS Table" is in "Open Delay", generator will enter the opening process, otherwise, the controller is failed to entering the opening process, then please repeat step 3 and step 4;

6) If "ATS Status" is in "Load Disconnected", it means gen open successfully, sending 05 function code the order of pressing "Remote Control Stop";

7) When controller receives the order and enters the stop progress, reading the data of "Generator Status" address corresponding to "Switch Status Table" via 03 function code, which can obtain the stop process of generator;

8) If "Generator Status" corresponding to "Generator Status Table" is between 10 (high-speed Cooling) and 13 (Wait for Stop), then it enters the stop process. If it not enters the stop process, please repeat Step 6 and Step 7;

9) When "Generator Status" is in "At Rest" and "ATS Status" is in "Load Disconnected", the generator finishes shutdown.

STOP MODE 2 (It is available for both AUTO mode and MANUAL mode):

1) Sending 05 function code the order of pressing "Remote Stop" key to make controller in stop mode;

2) Reading the data of 0000 address via 03 function code to obtain the current mode of the controller and ensure that the controller is in stop mode or not. If it is not in stop mode, please repeat step 1 and step 2;

3) When controller is in stop mode, the generator will enter the stop process;

4) Reading the data of "ATS Status" address corresponding to "ATS Table" via 03 function code to obtain the Gen open process, reading the data of "Generator Status" address corresponding to "Generator Status Table" to obtain the stop process of generator;

5) When "Generator Status" is in "At Rest" and "ATS Status" is in "Load Disconnected", the generator finishes shutdown

NOTE 1: Only once for each time of sending 05 function code the order of remote control.

NOTE 2: When "Generator Status" is in start process, the controller receives the order of "Remote Start" or pressing the start key, the "Generator Status" will go to next status, which can rapidly enter the Gen on-load running status.

NOTE 3: When "Generator Status" is in stop process, the controller receives the order of "Remote Stop" or pressing the stop key, "Generator Status" will go to next status, which can rapidly enter the stop status.

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 CANBUS relay module.
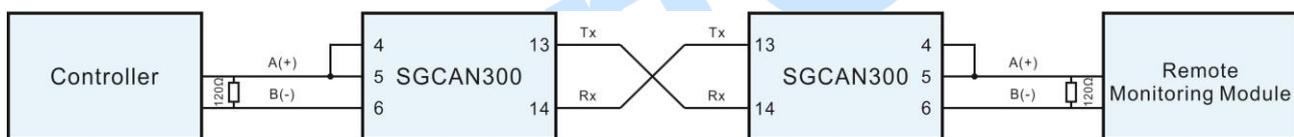
Fig.3 SGCAN300 Application Diagram

5.5 COMMON SOLUTIONS OF COMMUNICATION FAILURE

1) Check whether the positive and negative of RS485 or network cable are correctly connected; Check whether the RS485 converter (if configured) is normal;

2) Check whether the terminal resistor is correctly connected;

3) Check whether the communication parameter is correct; the baud rate, data bit and parity bit and stop bit should be the same as the requirement of the controller;

4) Whether the selected COM port corresponds to the USB port where RS485 converter is connected;

5) Whether the communication address is correct, factory default is 01;

6) When using 03 function code, up to 120 addresses can be read of data length for each time, and the last address can't exceed the max. Modbus communication address. The write function of 06 function code map data area can only write one address at a time;

7) If there is an offset address in Modbus communication address, you need to add the original base address to the offset address to obtain the correct Modbus communication address;

8) 05 function code using Modbus address for communication: despite 1 for active, 0 for inactive, only sending FF00H can make corresponding bit as 1, sending 0000H can make corresponding bit as 0; while using PLC address for communication: sending 1 to position 1, sending 0 to position 0;

9) Whether CRC-16 LSB first and MSB last are correct;

10) It is better not read controller data too fast for multiple times, the interval for 500ms is recommended.

11) Please configure the communication module address of the controller before networking. Don not have the same the module address in the same network;

12) Since the Modbus serial protocol does not support the multiple masters, multiple software can't communicate with the controller at the same time;

13) Disconnect the RS485 wiring and measure the voltage difference between terminal A and B of RS485. If the voltage difference is between +-200mV, the communication port is abnormal.

14) If the long communication distance results in the signal attenuation, it is better to replace the cable with high quality, or add a repeater in the middle of the communication cable;

15) The third-party software of serial port communication, such as modscan32 and modbus poll are recommended, which can verify the communication is normal or not.

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