SmartGen

MAKING CONTROL SMARTER

HGM1791LT/HGM1791LT-CAN

GENSET CONTROLLER

COMMUNICATION PROTOCOL

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Table 1 Version History

Date	Version	Content
2025-09-28	V1.0	Original release.

CONTENTS

1 DESCRIPTION

This protocol describes the command format for reading and writing via the controller's RS485 half-duplex serial ports, as well as the definition of internal messages and data to facilitate third-party development and use.

MODBUS communication protocol allows the controller to transfer information and data effectively with PLC, RTU, SCADA system, and DCS of international brands, such as Schneider, Siemens, and Modicon, etc., or the third-party supervisory control system that is compatible with MODBUS. The monitoring system can be set up by installing the central communication master control software (such as KingView, Intouch, FIX, Synall, etc.) on PC (or IPC).

There is one RS485 port on the HGM1791LT series genset controller. The controller works as a slave module. It supports the Modbus-RTU protocol but does not support other protocols, such as Modbus-ASCII.

Modbus basic rules:

——All RS485 communication loops should follow the master-slave mode. Data can be transmitted between one master (e.g. PC) and 32 slaves by this mode.

——The master can transmit all information to the initialized device via the RS485 communication loop.

——No request communication can be sent from slave.

——All communication via the RS485 loop should be transmitted in “frame”.

——If master or slave receives frame which contains unknown command, no response will be sent.

Frame format:

Communication address: 1~254 (Default: 1)

Baud rate: 9600bps

Start bit: 1-bit

Data bit: 8-bit

Parity bit: None

Stop bit: 2-bit

Function code supported: 03H, 05H. Function code 03H is used for reading controller’s alarms, status and various kinds of electric parameters; Function code 05H is used for saving the single coil data into the bit memory inside the controller.

Data checking method: CRC16.

The register data inside the controller are packed as two bytes per register.

Communication timeout period: over 200ms.

Transmission distance: At a baud rate of 9600bps, the maximum transmission distance can reach up to 1,000 meters with 120-ohm shielded twisted pair cable.

A maximum of 120 registers can be read per request.

It can support the communication of 32 networked controllers.

RS485 cabling must use 120-ohm shielded twisted pair cable, and one end of the shield should be grounded.

2 WIRING DIAGRAM

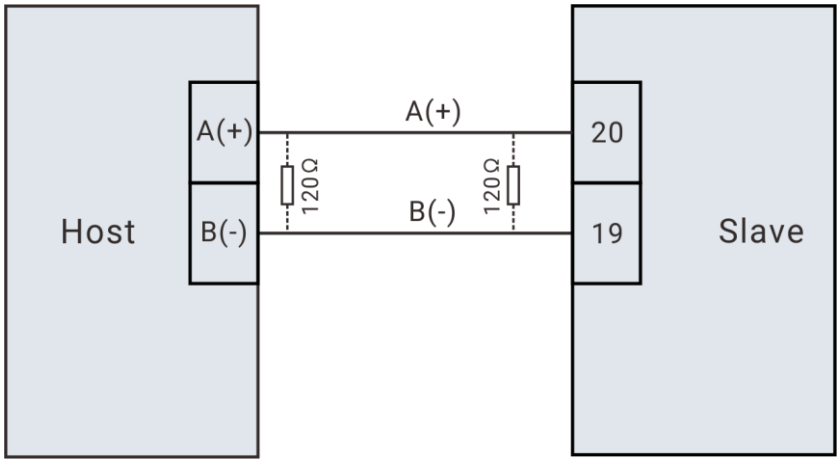

Fig.1 Single Device Communication Wiring Diagram

NOTE 1: Two 120-ohm resistors can be connected on both ends of the cable according to the site's requirement. See details in the instruction below.

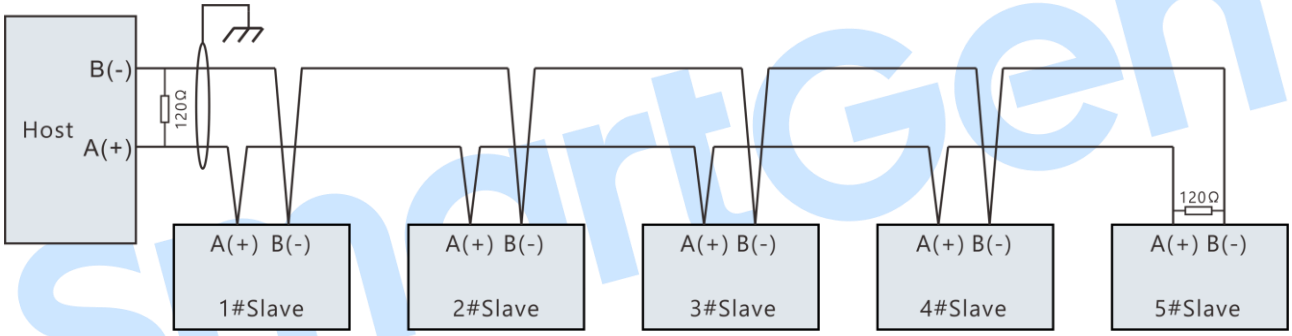

Fig.2 Multiple Devices Communication Wiring Diagram

NOTE 1: Please configure each controller's communication module address before networking. Same module address is not allowed in one network.

NOTE 2: One end of the communication cable shield should be grounded at the host side.

3 ADDRESS AND DATA OF CONTROLLER INTERNAL REGISTERS

3.1 FUNCTION CODE 03H MAPPING ALARM AND STATUS COIL OF DATA FIELD

Table 2 Alarm and Status Coil of Data Field

Modbus Address	PLC Address	Item	Description	Bytes
0000.0	40001.0	Common Alarm	"0" means no common alarm occurs "1" means a common alarm occurs (0000.0 means the Boolean value at Bit0 of address 0000) The content listed below follows the same rule 1 as active (low order)	1bit
0000.1	40001.1	Common Shutdown Alarm	1 as active	1bit
0000.2	40001.2	Common Warning Alarm	1 as active	1bit
0000.3	40001.3	Reserved		
0000.4	40001.4	Reserved		
0000.5	40001.5	Reserved		
0000.6	40001.6	Reserved		
0000.7	40001.7	On Load		
0000.8	40001.8	Reserved		
0000.9	40001.9	Auto Mode	1 as active	1bit
0000.10	40001.10	Manual Mode	1 as active	1bit
0000.11	40001.11	Stop Mode	1 as active	1bit
0000.12	40001.12	Rent Mode	1 as active	1bit
0000.13	40001.13	Reserved		
0000.14	40001.14	Reserved		
0000.15	40001.15	Cooling Down	1 as active (high order)	1bit
Shutdown Alarms				
0001.0	40002.0	Emergency Stop	1 as active	1bit
0001.1	40002.1	Over Speed Shutdown	1 as active	1bit
0001.2	40002.2	Under Speed Shutdown	1 as active	1bit
0001.3	40002.3	Loss of Speed Signal Shutdown	1 as active	1bit
0001.4	40002.4	Gen. Over Frequency Shutdown	1 as active	1bit
0001.5	40002.5	Gen. Under Frequency Shutdown	1 as active	1bit
0001.6	40002.6	Gen. Over Voltage Shutdown	1 as active	1bit
0001.7	40002.7	Gen. Under Voltage Shutdown	1 as active	1bit
0001.8	40002.8	Failed to Start Shutdown	1 as active	1bit
0001.9	40002.9	Gen. Over Current Shutdown	1 as active	1bit
0001.10	40002.10	Reserved		
0001.11	40002.11	ECU Shutdown	1 as active	1bit

Modbus Address	PLC Address	Item	Description	Bytes
0001.12	40002.12	Reserved		
0001.13	40002.13	Reserved		
0001.14	40002.14	High Temp. Shutdown IN	1 as active	1bit
0001.15	40002.15	Low Oil Pressure Shutdown IN	1 as active	1bit
0002.0	40003.0	ECU Comm. Failure Shutdown	1 as active	1bit
0002.1	40003.1	High Temp. Shutdown (ECU)	1 as active	1bit
0002.2	40003.2	Low Oil Pressure Shutdown (ECU)	1 as active	1bit
0002.3	40003.3	Low Temp. Shutdown (ECU)	1 as active	1bit
0002.4	40003.4	External Shutdown Alarm Input	1 as active	1bit
0002.5	40003.5	High Oil Pressure Shutdown (ECU)	1 as active	1bit
0002.6	40003.6	Reserved		
0002.7	40003.7	Reserved		
0002.8	40003.8	Sensor 1 Temp. Open Shutdown	1 as active	1bit
0002.9	40003.9	Sensor 1 Temp. High Shutdown	1 as active	1bit
0002.10	40003.10	Sensor 1 Temp. Low Shutdown	1 as active	1bit
0002.11	40003.11	Reserved		
0002.12	40003.12	Sensor 2 Temp. Open Shutdown	1 as active	1bit
0002.13	40003.13	Sensor 2 Temp. High Shutdown	1 as active	1bit
0002.14	40003.14	Sensor 2 Temp. Low Shutdown	1 as active	1bit
0002.15	40003.15	Reserved		
0003.0	40004.0	Sensor 3 Temp. Open Shutdown	1 as active	1bit
0003.1	40004.1	Sensor 3 Temp. High Shutdown	1 as active	1bit
0003.2	40004.2	Sensor 3 Temp. Low Shutdown	1 as active	1bit
0003.3	40004.3	Reserved		
0003.4	40004.4	Sensor 1 Oil Pressure Open Shutdown	1 as active	1bit
0003.5	40004.5	Sensor 1 Oil Pressure High Shutdown	1 as active	1bit
0003.6	40004.6	Sensor 1 Oil Pressure Low Shutdown	1 as active	1bit
0003.7	40004.7	Reserved		
0003.8	40004.8	Sensor 2 Oil Pressure Open Shutdown	1 as active	1bit
0003.9	40004.9	Sensor 2 Oil Pressure High Shutdown	1 as active	1bit
0003.10	40004.10	Sensor 2 Oil Pressure Low Shutdown	1 as active	1bit
0003.11	40004.11	Reserved		
0003.12	40004.12	Sensor 3 Oil Pressure Open Shutdown	1 as active	1bit
0003.13	40004.13	Sensor 3 Oil Pressure High Shutdown	1 as active	1bit
0003.14	40004.14	Sensor 3 Oil Pressure Low Shutdown	1 as active	1bit
0003.15	40004.15	Reserved		
0004.0	40005.0	Sensor 1 Level Open Shutdown	1 as active	1bit

Modbus Address	PLC Address	Item	Description	Bytes
0004.1	40005.1	Sensor 1 Level High Shutdown	1 as active	1bit
0004.2	40005.2	Sensor 1 Level Low Shutdown	1 as active	1bit
0004.3	40005.3	Reserved		
0004.4	40005.4	Sensor 2 Level Open Shutdown	1 as active	1bit
0004.5	40005.5	Sensor 2 Level High Shutdown	1 as active	1bit
0004.6	40005.6	Sensor 2 Level Low Shutdown	1 as active	1bit
0004.7	40005.7	Reserved		
0004.8	40005.8	Sensor 3 Level Open Shutdown	1 as active	1bit
0004.9	40005.9	Sensor 3 Level High Shutdown	1 as active	1bit
0004.10	40005.10	Sensor 3 Level Low Shutdown	1 as active	1bit
0004.11	40005.11	Reserved		
0004.12	40005.12	Reserved		
0004.13	40005.13	Reserved		
0004.14	40005.14	Reserved		
0004.15	40005.15	Reserved		
Warning Alarms				
0020.0	40021.0	Over Speed Warning	1 as active	1bit
0020.1	40021.1	Under Speed Warning	1 as active	1bit
0020.2	40021.2	Loss of Speed Signal Warning	1 as active	1bit
0020.3	40021.3	Gen. Over Frequency Warning	1 as active	1bit
0020.4	40021.4	Gen. Under Frequency Warning	1 as active	1bit
0020.5	40021.5	Gen. Over Voltage Warning	1 as active	1bit
0020.6	40021.6	Gen. Under Voltage Warning	1 as active	1bit
0020.7	40021.7	Gen. Over Current Warning	1 as active	1bit
0020.8	40021.8	Stop Failure Warning	1 as active	1bit
0020.9	40021.9	Reserved		
0020.10	40021.10	Battery Over Voltage Warning	1 as active	1bit
0020.11	40021.11	Battery Under Voltage Warning	1 as active	1bit
0020.12	40021.12	Reserved		
0020.13	40021.13	Reverse Power Warning	1 as active	1bit
0020.14	40021.14	Over Power Warning	1 as active	1bit
0020.15	40021.15	ECU Warning	1 as active	1bit
0021.0	40022.0	Reserved		
0021.1	40022.1	Reserved		
0021.2	40022.2	High Temp. Warning (ECU)	1 as active	1bit
0021.3	40022.3	Low Oil Pressure Warning (ECU)	1 as active	1bit
0021.4	40022.4	Low Temp. Warning (ECU)	1 as active	1bit
0021.5	40022.5	Reserved		
0021.6	40022.6	High Oil Pressure Warning (ECU)	1 as active	1bit
0021.7	40022.7	Reserved		
0021.8	40022.8	Sensor 1 Temp. Open Warning	1 as active	1bit
0021.9	40022.9	Sensor 1 Temp. High Warning	1 as active	1bit
0021.10	40022.10	Sensor 1 Temp. Low Warning	1 as active	1bit

Modbus Address	PLC Address	Item	Description	Bytes
0021.11	40022.11	Reserved		
0021.12	40022.12	Sensor 2 Temp. Open Warning	1 as active	1bit
0021.13	40022.13	Sensor 2 Temp. High Warning	1 as active	1bit
0021.14	40022.14	Sensor 2 Temp. Low Warning	1 as active	1bit
0021.15	40022.15	Reserved		
0022.0	40023.0	Sensor 3 Temp. Open Warning	1 as active	1bit
0022.1	40023.1	Sensor 3 Temp. High Warning	1 as active	1bit
0022.2	40023.2	Sensor 3 Temp. Low Warning	1 as active	1bit
0022.3	40023.3	Reserved		
0022.4	40023.4	Sensor 1 Oil Pressure Open Warning	1 as active	1bit
0022.5	40023.5	Sensor 1 Oil Pressure High Warning	1 as active	1bit
0022.6	40023.6	Sensor 1 Oil Pressure Low Warning	1 as active	1bit
0022.7	40023.7	Reserved		
0022.8	40023.8	Sensor 2 Oil Pressure Open Warning	1 as active	1bit
0022.9	40023.9	Sensor 2 Oil Pressure High Warning	1 as active	1bit
0022.10	40023.10	Sensor 2 Oil Pressure Low Warning	1 as active	1bit
0022.11	40023.11	Reserved		
0022.12	40023.12	Sensor 3 Oil Pressure Open Warning	1 as active	1bit
0022.13	40023.13	Sensor 3 Oil Pressure High Warning	1 as active	1bit
0022.14	40023.14	Sensor 3 Oil Pressure Low Warning	1 as active	1bit
0022.15	40023.15	Reserved		
0023.0	40024.0	Sensor 1 Level Open Warning	1 as active	1bit
0023.1	40024.1	Sensor 1 Level High Warning	1 as active	1bit
0023.2	40024.2	Sensor 1 Level Low Warning	1 as active	1bit
0023.3	40024.3	Reserved		
0023.4	40024.4	Sensor 2 Level Open Warning	1 as active	1bit
0023.5	40024.5	Sensor 2 Level High Warning	1 as active	1bit
0023.6	40024.6	Sensor 2 Level Low Warning	1 as active	1bit
0023.7	40024.7	Reserved		
0023.8	40024.8	Sensor 3 Level Open Warning	1 as active	1bit
0023.9	40024.9	Sensor 3 Level High Warning	1 as active	1bit
0023.10	40024.10	Sensor 3 Level Low Warning	1 as active	1bit
0023.11	40024.11	Reserved		
0023.12	40024.12	Reserved		
0023.13	40024.13	Reserved		
0023.14	40024.14	Reserved		
0023.15	40024.15	Reserved		
Status				
0035.0	40036.0	Emergency Stop Input Status	1 as active	1bit
0035.1	40036.1	Aux. Input 1	1 as active	1bit
0035.2	40036.2	Aux. Input 2	1 as active	1bit
0035.3	40036.3	Aux. Input 3	1 as active	1bit
0037.0	40038.0	Fuel Relay Output Status	1 as active	1bit

Modbus Address	PLC Address	Item	Description	Bytes
0037.1	40038.1	Crank Relay Output Status	1 as active	1bit
0037.2	40038.2	Aux. Output 1 Status	1 as active	1bit
0037.3	40038.3	Aux. Output 2 Status	1 as active	1bit
0037.4	40038.4	Aux. Output 3 Status	1 as active	1bit
0037.5	40038.5	Reserved		
0037.6	40038.6	Reserved		
0037.7	40038.7	Reserved		
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		

EXAMPLE:

If “Sensor 1 Temp. Open Warning” needs to be read, check the table above and find its address is 0021.8, so it needs to read one data address.

Assuming the slave (controller) address is 01, the master/host (could be PC) request command is as following:

Table 3 Master (PC) Request Frame

Slave Address	Function Code	Start Address (21)		Request Data Length (1)		CRC 16	
		MSB	LSB	MSB	LSB	LSB	MSB
01	**03**	**00**	**15**	**00**	**01**	**95**	**CE**

The slave response is as following:

Table 4 Slave (Controller) Response Frame

Slave Address	Function Code	Data Length (Bytes)	Data		CRC 16	
			Data of Address 0021 MSB	Data of Address 0021 LSB	LSB	MSB
01	**03**	**02**	**01**	**00**	**B9**	**D4**

Table 5 Data Analysis

Address	Data Received (Hex)	Convert to Binary	Meaning
0021	0100H	0000 0001 0000 0000 (Mapping to 0021.15, 0021.14, ..., 0021.1, 0021.0 respectively)	Data of Bit8 is 1, which means Sensor 1 Temp. Open Warning is active.

3.2 FUNCTION CODE 03H MAPPING PARAMETERS OF DATA FIELD

Table 6 Parameters of Data Field

Modbus Address	PLC Address	Item	Range (Decimal)	Ratio	Unit	Description	Remarks
00060	40061	Gen. UAB	0~65535	1	V	16-bit Unsigned	
00061	40062	Reserved					
00062	40063	Reserved					
00063	40064	Gen. UA	0~65535	1	V	16-bit Unsigned	
00064	40065	Reserved					
00065	40066	Reserved					
00066	40067	Reserved					
00067	40068	Reserved					
00068	40069	Reserved					
00069	40070	Gen. Frequency	0~100	0.1	Hz	16-bit Unsigned	
00070	40071	Phase A Current	0~65535	0.1	A	16-bit Unsigned	
00071	40072	Reserved					
00072	40073	Reserved					
00073	40074	Reserved					
00074	40075	Reserved					
00075	40076	Reserved					
00076	40077	Reserved					
00077	40078	Reserved					
00078	40079	Reserved					
00079	40080	Reserved					
00080	40081	Active Power	-60000~ 60000	0.1	kW	32-bit Signed	LSB
00081	40082						MSB
00082	40083	Reserved					
00083	40084	Reserved					
00084	40085	Reserved					
00085	40086	Reserved					
00086	40087	Reserved					
00087	40088	Reserved					
00088	40089	Reactive Power	-60000~ 60000	0.1	kvar	32-bit Signed	LSB
00089	40090						MSB
00090	40091	Reserved					
00091	40092	Reserved					
00092	40093	Reserved					
00093	40094	Reserved					
00094	40095	Reserved					
00095	40096	Reserved					
00096	40097	Apparent Power	-60000~ 60000	0.1	kVA	32-bit Signed	LSB
00097	40098						MSB
00098	40099	Reserved					
00099	400100	Reserved					

Modbus Address	PLC Address	Item	Range (Decimal)	Ratio	Unit	Description	Remarks
000100	400101	Reserved					
000101	400102	Power Factor	-100~100	0.01	CosΦ	16-bit Signed	
000102	400103	Load Output Percentage	0~100	1	%	16-bit Unsigned	
000103	400104	Speed	0~32766	1	RPM	16-bit Signed	
000104	400105	Battery Voltage	0~600	0.1	V	16-bit Unsigned	
000105	400106	Aux. Sensor 1 Resistance Value	0~60000	0.1	Ω	16-bit Unsigned	
000106	400107	Aux. Sensor 1 Value	0~999	1		16-bit Signed	
000107	400108	Aux. Sensor 2 Resistance Value	0~60000	0.1	Ω	16-bit Unsigned	
000108	400109	Aux. Sensor 2 Value	0~999	1		16-bit Signed	
000109	400110	Aux. Sensor 3 Resistance Value	0~60000	0.1	Ω	16-bit Unsigned	
000110	400111	Aux. Sensor 3 Value	0~999	1		16-bit Signed	
000111	400112	Reserved					
000112	400113	Reserved					
000113	400114	Reserved					
000114	400115	Coolant Level	0~100	1	%	16-bit Signed	
000115	400116	Oil Temp.	-39~210	1	°C	16-bit Signed	
000116	400117	Coolant Pressure	0~500	1	kPa	16-bit Signed	
000117	400118	Fuel Pressure	0~1000	1	kPa	16-bit Signed	
000118	400119	Fuel Temp.	-272~1735	1	°C	16-bit Signed	
000119	400120	Inlet Temp.	-39~210	1	°C	16-bit Signed	
000120	400121	Exhaust Temp.	-272~1735	1	°C	16-bit Unsigned	
000121	400122	Turbo Pressure	0~500	1	kPa	16-bit Unsigned	
000122	400123	Fuel Used	0~32127	0.1	L/h	16-bit Signed	
000123	400124	Total Fuel Used	0~ 99999999	1	L	32-bit Signed	LSB
000124	400125						MSB
000125	400126	Controller Running Status		No.			Controller Running Status
000126	400127	Delay	0~3600	1	Sec	16-bit Unsigned	
000127	400128	Auto Running Status: 0 Start 1 Stop 2 No Delay					Remote Start Status
000128	400129	Delay	0~3600	1	Sec	16-bit Unsigned	
000129	400130	Reserved					
000130	400131	Reserved					
000131	400132	Reserved					
000132	400133	Reserved					
000133	400134	Reserved					
000134	400135	Reserved					

Modbus Address	PLC Address	Item	Range (Decimal)	Ratio	Unit	Description	Remarks
000135	400136	Total Running Hours	0~65535	1	Hour	16-bit Unsigned	
000136	400137	Accumulated Running Minutes	0~59	1	Min	16-bit Unsigned	
000137	400138	Total Running Seconds	0~59	1	Sec	16-bit Unsigned	
000138	400139	Total Starts	0~65535	1	Time	16-bit Unsigned	
000139	400140	Total Energy	0~100000000	0.1	kWh	32-bit Signed	LSB
000140	400141						MSB
000141	400142	Reserved					
000142	400143	Reserved					
000143	400144	Reserved					
000144	400145	Reserved					
000145	400146	Reserved					
000146	400147	Reserved					
000147	400148	Reserved					
000148	400149	Reserved					
000149	400150	Reserved					
000150	400151	Over Current Delay	0~65535	1	Sec	16-bit Unsigned	
000151	400152	Reserved					
000152	400153	Reserved					
000153	400154	Software Version	0~999	0.1		16-bit Unsigned	
000154	400155	Hardware Version	0~999	0.1		16-bit Unsigned	
000155	400156	Issue Year	0~99	1		16-bit Unsigned	
000156	400157	Issue Month	1~12	1		16-bit Unsigned	
000157	400158	Issue Day	1~31	1		16-bit Unsigned	
000158	400159	Reserved					
000159	400160	PC Software Version	0~9999	1		16-bit Unsigned	Four-part Type
000160	400161	Reserved					
000161	400162	Reserved					
000162	400163	Reserved					
000163	400164	Reserved					
000164	400165	Reserved					
000165	400166	Reserved					
000166	400167	Reserved					
000167	400168	Reserved					
000168	400169	Reserved					
000169	400170	Reserved					
000170	400171	Reserved					
000171	400172	Reserved					
000172	400173	Reserved					
000173	400174	Reserved					
000174	400175	Reserved					

Modbus Address	PLC Address	Item	Range (Decimal)	Ratio	Unit	Description	Remarks
000175	400176	Reserved					
000176	400177	Reserved					
000177	400178	Reserved					
000178	400179	Reserved					
000179	400180	Reserved					
000180	400181	MTU Running Time	0~2147483647	1	Sec	32-bit Signed	LSB
000181	400182						MSB
000182	400183	MTU FC	0~64254	1		16-bit Unsigned	
000183	400184	MTU Droop	0~1638	0.1		16-bit Unsigned	
000184	400185	MTU Demand Source	0~8191	1	RPM	16-bit Unsigned	
000185	400186	MTU SSD	0~255	1		16-bit Unsigned	

NOTE 1: If the controller detects that the sensor is open, the data is 32766, and "++++" will be shown; If ECU communication does not receive sensor data, the date is 32767, and "####" will be shown; The unit of the auxiliary sensor is determined according to the corresponding sensor type.

NOTE 2: Actual value = data received * ratio. Take the Frequency as the example: if the data received is 500 (1F4H), ratio is 0.1Hz, then the actual frequency value is 50.0Hz (500*0.1Hz).

NOTE 3: Definition of signed number: Take the data received "8000H" as the example, convert it to binary number "1000 0000 0000 0000b". The MSB is 1, which means it is negative. The number minus 1 will get its 1's complement, then inverting it will get the absolute value of the negative number. Finally convert the absolute value to decimal number -32768.

EXAMPLE:

If "Total Energy" (current value is 123456.7) needs to be read, check the table above and find its coil address is 0139 and 0140, so it needs to read two bytes of addresses, and its ratio is 0.1.

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

Table 6 Master Request Command

Slave Address	Function Code	Start Address (0139)		Request Data Length (2)		CRC 16	
		MSB	LSB	MSB	LSB	LSB	MSB
01	**03**	**00**	**8B**	**00**	**02**	**B4**	**21**

The slave response command is as following:

Table 7 Slave Response Command

Slave Address	Function Code	Data Length (Bytes)	Data				CRC 16	
			Data of Address 0139 MSB	Data of Address 0139 LSB	Data of Address 0140 MSB	Data of Address 0140 LSB	LSB	MSB
01	**03**	**04**	**D6**	**87**	**00**	**12**	**F2**	**5F**

Fill the data received into the address respectively, as shown in the table below.

Table 8 Data Analysis

Address	Data Received (Hex)	Data Combined (Hex)	Total Energy (Decimal)
0139	D687H	0012D687H	123456.7
0140	0012H		

3.3 FUNCTION CODE 05H MAPPING REMOTE COIL FIELD

Table 9 Remote Coil Field

Modbus Address	PLC Address	Item	Description
0000	0001	Remote Start Key	1 as active (active when it is 0xFF00)
0001	0002	Remote Stop Key	
0002	0003	Remote Auto Key	

NOTE: The remote command in the table above only needs to be sent once.

EXAMPLE:

If the remote controller is in auto mode, check the table first and find its remote address is 2.

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

Table 10 Master Request Command

Slave Address	Function Code	Remote Address (2)		Remote Data		CRC 16	
		MSB	LSB	MSB	LSB	LSB	MSB
01	**05**	**00**	**02**	**FF**	**00**	**2D**	**FA**

The slave response command is as following:

Table 11 Slave Response Command

Slave Address	Function Code	Remote Address (2)		Remote Data		CRC 16	
		MSB	LSB	MSB	LSB	LSB	MSB
01	**05**	**00**	**02**	**FF**	**00**	**2D**	**FA**

To check whether the remote command is successfully executed, you can send function code 03H to read the Auto Mode status of address 0.9.

3.4 CONTROLLER RUNNING STATUS

Table 12 Controller Running Status

Address	Content	Description
0	At Rest	No delay value is shown in the status
1	Preheating	
2	Fuel On	No delay value is shown in the status
3	Cranking	
4	Crank Rest	
5	Safety on Delay	
6	Start Idle	
7	Warming Up	
8	Waiting for Load	No delay value is shown in the status
9	Normal Running	No delay value is shown in the status
10	Cooling Down	
11	Stop Idle	
12	ETS Hold	
13	Wait for Stop	
14	Failed to Stop	No delay value is shown in the status

3.5 REMOTE START STATUS

Table 13 Remote Start Status

No.	Content	Description
0	No Delay	No delay value is shown in the status
1	Start Delay	
2	Stop Delay	
3	Remote Start in Progress	No delay value is shown in the status

4 FAQ

4.1 GROUNDING OF THE CABLE SHIELD

To prevent the coupling of interference on the cable, one end of the cable shield should be grounded.

4.2 TERMINATION RESISTOR

At both ends of the linear network (between the two communication ports furthest apart), two 120-ohm termination resistors need to be installed in parallel. According to the signal transmission theory, the termination resistor can avoid the signal reflections and improve the signal integrity effectively. The value of two termination resistor in parallel is basically equal to the characteristic impedance of the transmission cable.

A standard RS-485 network will usually use the termination resistor. The resistor can be avoided while the cable is too short, or it is a temporary or lab test.

4.3 RS485 TO USB CONVERTER

It can communicate with PC via the SmartGen SG72A converter.

4.4 EXTEND TRANSMISSION DISTANCE

Adding two SmartGen SGCAN300 Repeaters can extend the communication distance to at most 10 kilometers.

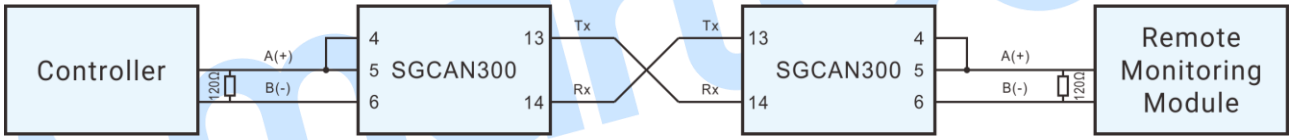

Fig. 3 SGCAN300 Application Diagram

4.5 SOLUTIONS FOR COMMUNICATION FAILURE

1) Check whether the positive and negative of RS485 is connected correctly;
2) Check whether the communication parameters setting is correct;
3) Check the RS485 converter (if any) is normal;
4) Check the termination resistors are connected correctly or not;
5) It is recommended to download third-party communication test software to verify whether the communication is normal, such as modscan32, modbus poll, etc.