

SmartGen

MAKING CONTROL SMARTER

ACC5100
DIESEL AIR COMPRESSOR CONTROLLER
COMMUNICATION PROTOCOL

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Table 1 – Software Version

Date	Version	Content
2024-03-16	V1.0	Original release.

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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.

ACC5100 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/Odd/Even Parity (default: no parity)

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

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

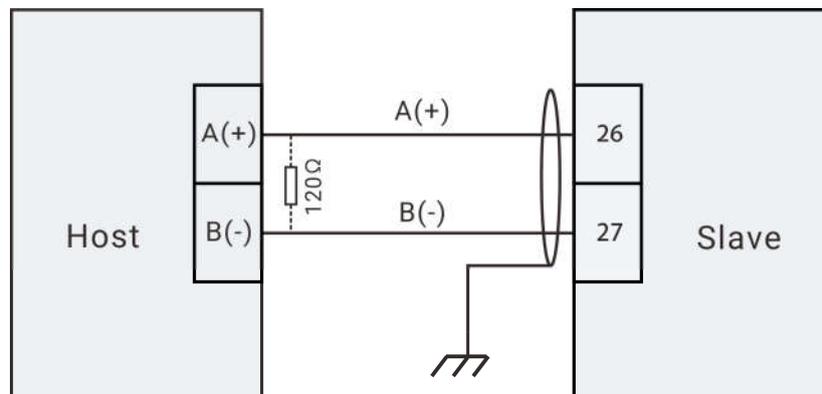


Fig.1 Single Unit Communication Wiring Diagram

NOTE1: There is a 120Ω resistor in the controller.

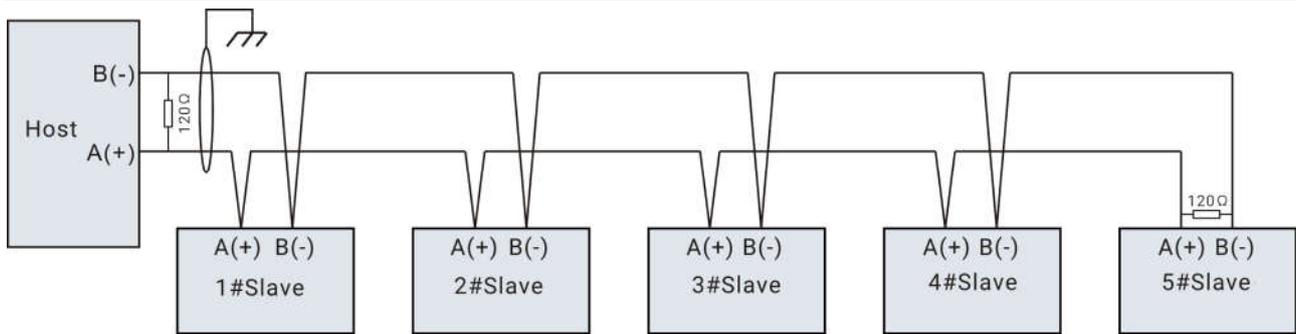


Fig.2 Multi-unit Communication Wiring Diagram

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, STATUS COIL DATA FIELD CORRESPONDING TO FUNCTION CODE 03H

Table 2 – Alarm, Status Coil Data Field

Modbus Address	PLC Address	Name	Description
0000.0	40001.0	Common Alarm	0 means no common alarm occurs; 1 means there is common alarm. (0000.0 is the boolean value of bit 0 of address 0) The following contents in turn.
0000.1	40001.1	Common Shutdown Alarm	
0000.2	40001.2	Common Warn Alarm	
0000.3	40001.3	Reserved	
0000.4	40001.4	Reserved	
0000.5	40001.5	Common Cooling Shutdown Alarm and Common Shutdown Alarm	
0000.6	40001.6	Reserved	
0000.7	40001.7	Reserved	
0000.8	40001.8	System In Test Mode	
0000.9	40001.9	System In Auto Mode	
0000.10	40001.10	System In Manual Mode	
0000.11	40001.11	System In Stop Mode	
0000.12	40001.12	Reserved	
0000.13	40001.13	Reserved	
0000.14	40001.14	Reserved	
0000.15	40001.15	Reserved	
0001.0	40002.0	Emergency Stop Alarm	
0001.1	40002.1	Engine Over Speed Shutdown	
0001.2	40002.2	Engine Under Speed Shutdown	

Modbus Address	PLC Address	Name	Description
0001.3	40002.3	Loss of Speed Signal Alarm	
0001.4	40002.4	Reserved	
0001.5	40002.5	Reserved	
0001.6	40002.6	Reserved	
0001.7	40002.7	Reserved	
0001.8	40002.8	Failed to Start Alarm	
0001.9	40002.9	Reserved	
0001.10	40002.10	Reserved	
0001.11	40002.11	ECU Alarm Shutdown	
0001.12	40002.12	Reserved	
0001.13	40002.13	Reserved	
0001.14	40002.14	High Temp. Shutdown	
0001.15	40002.15	Low Oil Pressure Shutdown	
0002.0	40003.0	ECU Comm. Fail Shutdown	
0002.1	40003.1	Low Coolant Level Shutdown	
0002.2	40003.2	Reserved	
0002.3	40003.3	Reserved	
0002.4	40003.4	Reserved	
0002.5	40003.5	Reserved	
0002.6	40003.6	Reserved	
0002.7	40003.7	Reserved	
0002.8	40003.8	Reserved	
0002.9	40003.9	Sensor 1 High Shutdown (Water Temp. ECU)	
0002.10	40003.10	Sensor 1 Low Shutdown (Water Temp. ECU)	
0002.11	40003.11	Reserved	
0002.12	40003.12	Reserved	
0002.13	40003.13	Reserved	
0002.14	40003.14	Sensor 2 Low Shutdown (Oil Pressure ECU)	
0002.15	40003.15	Reserved	
0003.0	40004.0	Reserved	
0003.1	40004.1	Reserved	
0003.2	40004.2	Reserved	
0003.3	40004.3	Reserved	
0003.4	40004.4	Reserved	
0003.5	40004.5	Reserved	
0003.6	40004.6	Reserved	
0003.7	40004.7	Reserved	
0003.8	40004.8	Sensor 5 Open Shutdown (Flex. 1)	
0003.9	40004.9	Sensor 5 High Shutdown	

Modbus Address	PLC Address	Name	Description
		(Flex. 1)	
0003.10	40004.10	Sensor 5 Low Shutdown (Flex. 1)	
0003.11	40004.11	Reserved	
0003.12	40004.12	Sensor 6 Open Shutdown (Flex. 2)	
0003.13	40004.13	Sensor 6 High Shutdown (Flex. 2)	
0003.14	40004.14	Sensor 6 Low Shutdown (Flex. 2)	
0003.15	40004.15	Reserved	
0004.0	40005.0	Sensor 7 Open Shutdown (Flex. 3)	
0004.1	40005.1	Sensor 7 High Shutdown (Flex. 3)	
0004.2	40005.2	Sensor 7 Low Shutdown (Flex. 3)	
0004.3	40005.3	Reserved	
0004.4	40005.4	Sensor 8 Open Shutdown (Flex. 4)	
0004.5	40005.5	Sensor 8 High Shutdown (Flex. 4)	
0004.6	40005.6	Sensor 8 Low Shutdown (Flex. 4)	
0004.7	40005.7	Reserved	
0004.8	40005.8	Sensor 9 Open Shutdown (Flex. 5)	
0004.9	40005.9	Sensor 9 High Shutdown (Flex. 5)	
0004.10	40005.10	Sensor 9 Low Shutdown (Flex. 5)	
0004.11	40005.11	Reserved	
0004.12	40005.12	Sensor 10 Open Shutdown (Flex. 6)	
0004.13	40005.13	Sensor 10 High Shutdown (Flex. 6)	
0004.14	40005.14	Sensor 10 Low Shutdown (Flex. 6)	
0004.15	40005.15	Reserved	
0005.0	40006.0	Input 1 Shutdown	
0005.1	40006.1	Input 2 Shutdown	
0005.2	40006.2	Input 3 Shutdown	
0005.3	40006.3	Input 4 Shutdown	

Modbus Address	PLC Address	Name	Description
0005.4	40006.4	Input 5 Shutdown	
0005.5	40006.5	Reserved	
0005.6	40006.6	Reserved	
0005.7	40006.7	Reserved	
0005.8	40006.8	Reserved	
0005.9	40006.9	Reserved	
0005.10	40006.10	Reserved	
0005.11	40006.11	Reserved	
0005.12	40006.12	End Of Mandate Time Shutdown	
0005.13	40006.13	Reserved	
0005.14	40006.14	Reserved	
0005.15	40006.15	Reserved	
0006.0	40007.0	Maintenance 1 Shutdown	
0006.1	40007.1	Maintenance 2 Shutdown	
0006.2	40007.2	Maintenance 3 Shutdown	
0006.3	40007.3	Maintenance 4 Shutdown	
0006.4	40007.4	Maintenance 5 Shutdown	
0006.5	40007.5	Maintenance 6 Shutdown	
0006.6	40007.6	Maintenance 7 Shutdown	
0006.7	40007.7	Maintenance 8 Shutdown	
0006.8	40007.8	Maintenance 9 Shutdown	
0006.9	40007.9	Maintenance 10 Shutdown	
0006.10	40007.10	Reserved	
0006.11	40007.11	Reserved	
0006.12	40007.12	Reserved	
0006.13	40007.13	Reserved	
0006.14	40007.14	Reserved	
0006.15	40007.15	Reserved	
0007.0	40008.0	Reserved	2Bytes
0008.0	40009.0	Reserved	2Bytes
0009.0	40010.0	Reserved	2Bytes
0010.0	40011.0	Reserved	2Bytes
0011.0	40012.0	Reserved	2Bytes
0012.0	40013.0	Reserved	2Bytes
0013.0	40014.0	Reserved	2Bytes
0014.0	40015.0	Reserved	2Bytes
0015.0	40016.0	Reserved	2Bytes
0016.0	40017.0	Reserved	2Bytes
0017.0	40018.0	Reserved	2Bytes
0018.0	40019.0	Reserved	2Bytes
0019.0	40020.0	Reserved	2Bytes
0020.0	40021.0	Engine Over Speed Warn	

Modbus Address	PLC Address	Name	Description
0020.1	40021.1	Engine Under Speed Warn	
0020.2	40021.2	Loss of Speed Signal Warn	
0020.3	40021.3	Manual Regeneration	
0020.4	40021.4	Reserved	
0020.5	40021.5	Reserved	
0020.6	40021.6	Reserved	
0020.7	40021.7	Reserved	
0020.8	40021.8	Failed to Stop Warn	
0020.9	40021.9	Charge Alt Fail Warn	
0020.10	40021.10	Battery Over Voltage Warn	
0020.11	40021.11	Battery Under Voltage Warn	
0020.12	40021.12	Reserved	
0020.13	40021.13	Reserved	
0020.14	40021.14	Reserved	
0020.15	40021.15	ECU Warn	
0021.0	40022.0	Reserved	
0021.1	40022.1	Reserved	
0021.2	40022.2	Reserved	
0021.3	40022.3	Reserved	
0021.4	40022.4	Reserved	
0021.5	40022.5	Reserved	
0021.6	40022.6	Reserved	
0021.7	40022.7	Reserved	
0021.8	40022.8	Reserved	
0021.9	40022.9	Sensor 1 High Warn (Water Temp. ECU)	
0021.10	40022.10	Sensor 1 Low Warn (Water Temp. ECU)	
0021.11	40022.11	Reserved	
0021.12	40022.12	Reserved	
0021.13	40022.13	Reserved	
0021.14	40022.14	Sensor 2 Low Warn (Oil Pressure ECU)	
0021.15	40022.15	Reserved	
0022.0	40023.0	Reserved	
0022.1	40023.1	Reserved	
0022.2	40023.2	Reserved	
0022.3	40023.3	Reserved	
0022.4	40023.4	Reserved	
0022.5	40023.5	Reserved	
0022.6	40023.6	Reserved	
0022.7	40023.7	Reserved	
0022.8	40023.8	Sensor 5 Open Warn (Flex.1)	

Modbus Address	PLC Address	Name	Description
0022.9	40023.9	Sensor 5 High Warn (Flex.1)	
0022.10	40023.10	Sensor 5 Low Warn (Flex.1)	
0022.11	40023.11	Reserved	
0022.12	40023.12	Sensor 6 Open Warn (Flex.2)	
0022.13	40023.13	Sensor 6 High Warn (Flex.2)	
0022.14	40023.14	Sensor 6 Low Warn (Flex.2)	
0022.15	40023.15	Reserved	
0023.0	40024.0	Sensor 7 Open Warn (Flex.3)	
0023.1	40024.1	Sensor 7 High Warn (Flex.3)	
0023.2	40024.2	Sensor 7 Low Warn (Flex.3)	
0023.3	40024.3	Reserved	
0023.4	40024.4	Sensor 8 Open Warn (Flex.4)	
0023.5	40024.5	Sensor 8 High Warn (Flex.4)	
0023.6	40024.6	Sensor 8 Low Warn (Flex.4)	
0023.7	40024.7	Reserved	
0023.8	40024.8	Sensor 9 Open Warn (Flex.5)	
0023.9	40024.9	Sensor 9 High Warn (Flex.5)	
0023.10	40024.10	Sensor 9 Low Warn (Flex.5)	
0023.11	40024.11	Reserved	
0023.12	40024.12	Sensor 10 Open Warn (Flex.6)	
0023.13	40024.13	Sensor 10 High Warn (Flex.6)	
0023.14	40024.14	Sensor 10 Low Warn (Flex.6)	
0023.15	40024.15	End Of Mandate Time Warn	
0024.0	40025.0	Input 1 Warn	
0024.1	40025.1	Input 2 Warn	
0024.2	40025.2	Input 3 Warn	
0024.3	40025.3	Input 4 Warn	
0024.4	40025.4	Input 5 Warn	
0024.5	40025.5	Reserved	
0024.6	40025.6	Reserved	
0024.7	40025.7	Reserved	
0024.8	40025.8	Reserved	
0024.9	40025.9	Reserved	
0024.10	40025.10	Reserved	
0024.11	40025.11	Reserved	
0024.12	40025.12	Reserved	
0024.13	40025.13	Reserved	
0024.14	40025.14	Reserved	
0024.15	40025.15	Reserved	
0025.0	40026.0	Maintenance 1 Warn	
0025.1	40026.1	Maintenance 2 Warn	
0025.2	40026.2	Maintenance 3 Warn	
0025.3	40026.3	Maintenance 4 Warn	

Modbus Address	PLC Address	Name	Description
0025.4	40026.4	Maintenance 5 Warn	
0025.5	40026.5	Maintenance 6 Warn	
0025.6	40026.6	Maintenance 7 Warn	
0025.7	40026.7	Maintenance 8 Warn	
0025.8	40026.8	Maintenance 9 Warn	
0025.9	40026.9	Maintenance 10 Warn	
0025.10	40026.10	Reserved	
0025.11	40026.11	Reserved	
0025.12	40026.12	Reserved	
0025.13	40026.13	Reserved	
0025.14	40026.14	Reserved	
0025.15	40026.15	Reserved	
0026.0	40027.0	Reserved	2Bytes
0027.0	40028.0	Reserved	2Bytes
0028.0	40029.0	Reserved	2Bytes
0029.0	40030.0	Reserved	2Bytes
0030.0	40031.0	Reserved	2Bytes
0031.0	40032.0	Reserved	2Bytes
0032.0	40033.0	Reserved	2Bytes
0033.0	40034.0	Input 1 Indication	
0033.1	40034.1	Input 2 Indication	
0033.2	40034.2	Input 3 Indication	
0033.3	40034.3	Input 4 Indication	
0033.4	40034.4	Input 5 Indication	
0033.5	40034.5	Reserved	
0033.6	40034.6	Reserved	
0033.7	40034.7	Reserved	
0033.8	40034.8	Reserved	
0033.9	40034.9	Reserved	
0033.10	40034.10	Reserved	
0033.11	40034.11	Reserved	
0033.12	40034.12	Reserved	
0033.13	40034.13	Reserved	
0033.14	40034.14	Reserved	
0033.15	40034.15	Reserved	
0034.0	40035.0	Maintenance 1 Indication	
0034.1	40035.1	Maintenance 2 Indication	
0034.2	40035.2	Maintenance 3 Indication	
0034.3	40035.3	Maintenance 4 Indication	
0034.4	40035.4	Maintenance 5 Indication	
0034.5	40035.5	Maintenance 6 Indication	
0034.6	40035.6	Maintenance 7 Indication	
0034.7	40035.7	Maintenance 8 Indication	

Modbus Address	PLC Address	Name	Description
0034.8	40035.8	Maintenance 9 Indication	
0034.9	40035.9	Maintenance 10 Indication	
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	Reserved	
0035.7	40036.7	Reserved	
0035.8	40036.8	Reserved	
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	Reserved	
0037.0	40038.0	Fuel Relay Output Status	
0037.1	40038.1	Reserved	
0037.2	40038.2	Aux. Output 1 Status	
0037.3	40038.3	Aux. Output 2 Status	
0037.4	40038.4	Aux. Output 3 Status	
0037.5	40038.5	Aux. Output 4 Status	
0037.6	40038.6	Aux. Output 5 Status	
0037.7	40038.7	Aux. 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	Reserved	
0039	40040	Reserved	2Bytes

Modbus Address	PLC Address	Name	Description
0040	40041	Reserved	2Bytes
0041	40042	Reserved	2Bytes
0042.0	40043.0	Reserved	
0043.0	40044.0	Reserved	
0043.1	40044.1	Reserved	
0043.2	40044.2	Reserved	
0043.3	40044.3	Reserved	
0043.4	40044.4	Running Status Lamp	
0043.5	40044.5	Reserved	
0043.6	40044.6	Load Status Lamp	
0043.7	40044.7	LCD Heating Status	
0043.8	40044.8	Idle Running Status	
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	DPF Fault	
0044.1	40045.1	DPF Query	
0044.2	40045.2	DPF Inhibit Lamp	
0044.3	40045.3	DPF Exhaust Lamp	
0044.4	40045.4	DPF Response Lamp	
0044.5	40045.5	Driver Warning Lamp	
0044.6	40045.6	Reserved	
0044.7	40045.7	Reserved	
0044.8	40045.8	Reserved	
0044.9	40045.9	Reserved	
0044.10	40045.10	Reserved	
0044.11	40045.11	Reserved	
0044.12	40045.12	Reserved	
0044.13	40045.13	Reserved	
0044.14	40045.14	High Load Rate Protection Status	
0044.15	40045.15	Reserved	
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	
0045.4	40046.4	Input 5 Active	
0045.5	40046.5	Reserved	
0045.6	40046.6	Reserved	

Modbus Address	PLC Address	Name	Description
0045.7	40046.7	Reserved	
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	Reserved	2Bytes

Example:

If need to read “Emergency Shutdown Alarm” and “High Engine Temperature Shutdown Alarm”, firstly get their corresponding address is 0001.0 and 0002.9 by checking the table, it is known that you need to read 2 addresses’ data.

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

Table 3 – Master (Computer) Request Command

Slave Address	Function Code	Starting Address (0001)		Data Qty. (2)		CRC 16 Calibration	
		MSB	LSB	MSB	LSB	LSB	MSB
01	03	00	01	00	02	95	CB

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 0001	Data LSB of Address 0001	Data MSB of Address 0002	Data LSB of Address 0002	LSB	MSB
01	03	04	00	01	00	02	2A	32

Table 5 – Data Analysis

Address	Received Data (Hex)	Convert to Binary	Data Signification
0001	0001H	0000 0000 0000 0001 (correspond to 0001.15, 0001.14.....0001.1, 0001.0)	Data of bit 0 is 1 indicates emergency stop alarm.
0002	0002H	0000 0010 0000 0000 (correspond to 0002.15, 0002.14.....0002.1, 0002.0)	Data of bit 0002.9 is 1 indicates that high engine temperature alarm shutdown.

3.2 VALUE DATA FIELD CORRESPONDING TO FUNCTION CODE 03H

Table 6 – Value Data Field

Modbus Address	PLC Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
47	40048	Reserved				Unsigned	
48	40049	Reserved				Unsigned	
49	40050	Reserved				Unsigned	
50	40051	Engine Speed	(0-6000)	1	r/min	Unsigned	
51	40052	Battery Voltage	(0-600)	0.1	V	Signed (*10)	
52	40053	Charger Voltage	(0-600)	0.1	V	Signed (*10)	
53	40054	WL Frequency				Unsigned	
54	40055	Reserved				Unsigned	
55	40056	Reserved				Unsigned	
56	40057	Reserved					
57	40058	Reserved		0.1		Unsigned (*10)	
58	40059	Sensor 1 Value (Water Temp. ECU)	(-32768~+32767)	1	°C	Signed	
59	40060	Reserved		0.1		Unsigned (*10)	
60	40061	Sensor 2 Value (Oil Pressure ECU)	(0~32767)	1	kPa	Signed	
61	40062	Sensor 3 Resistance		0.1		Unsigned (*10)	
62	40063	Sensor 3 Value (Fuel Level)	(0~100)	1	%	Signed	
63	40064	Sensor 4 Resistance/Current/Voltage		0.1		Unsigned (*10)	
64	40065	Sensor 4 Value (Exhaust Pressure)	(0~30000)	1	kPa	Signed	
65	40066	Sensor 5 Resistance		0.1		Unsigned (*10)	
66	40067	Sensor 5 Value (Flexible 1)	(-32768~+32767)			Signed	
67	40068	Sensor 6 Resistance		0.1		Unsigned (*10)	
68	40069	Sensor 6 Value (Flex. 2)	(-32768~+32767)			Signed	
69	40070	Sensor 7 Resistance/Current		0.1		Unsigned (*10)	
70	40071	Sensor 7 Value (Flex. 3)	(-32768~+32767)			Signed	
71	40072	Sensor 8 Resistance/Current		0.1		Unsigned (*10)	
72	40073	Sensor 8 Value (Flex. 4)	(-32768~+32767)			Signed	
73	40074	Sensor 9 Resistance/Current		0.1		Unsigned (*10)	

Modbus Address	PLC Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
74	40075	Sensor 9 Value (Flex. 5)	(-32768~+32767)			Signed	
75	40076	Sensor 10 Resistance/Current		0.1		Unsigned (*10)	
76	40077	Sensor 10 Value (Flex. 6)	(-32768~+32767)			Signed	
77	40078	Coolant Pressure	(0~32767)	1	kPa	Signed	
78	40079	Coolant Level	(0~100)	1	%	Signed	
79	40080	Fuel Pressure	(0~32767)	1	kPa	Signed	
80	40081	Fuel Temperature	(-40~+32767)	1	°C	Signed	
81	40082	Engine Oil Temperature	(-40~+32767)	1	°C	Signed	
82	40083	Inlet Temperature	(-40~+32767)	1	°C	Signed	
83	40084	Turbo Pressure	(0~32767)	1	kPa	Signed	
84	40085	Exhaust Temperature	(-40~+32767)	1	°C	Signed	
85	40086	Fuel Consumption	(0~32767)	0.1	L	Signed	
86	40087	Total Fuel Used(LSB)	(0-99999999)	1	L	Signed	
87	40088	Total Fuel Used(MSB)			L	Signed	
88	40089	Reserved				Unsigned	
89	40090	Reserved				Unsigned	
90	40091	Engine load rate	(0~250)	1	%	Unsigned	
91	40092	Torque Percentage				Unsigned	
92	40093	Fuel Water Status				Unsigned	
93	40094	Ash Percentage				Signed	
94	40095	Engine Status	(0-15)				
95	40096	Engine Delay Value	(0-3600)	1	s	Unsigned	
96	40097	Reserved					
97	40098	Reserved					
98	40099	Reserved					
99	40100	Reserved					
100	40101	Reserved					
101	40102	Total Running Minutes	(0-65535)	1	h	Unsigned	
102	40103	Total Running Seconds	(0~59)	1	min	Unsigned	
103	40104	Total Start Times	(0~59)	1	s	Unsigned	
104	40105	Total Running Minutes	(0-65535)	1		Unsigned	
105	40106	Reserved				Unsigned	

Modbus Address	PLC Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
106	40107	Reserved					
107	40108	Reserved				Unsigned	
108	40109	Reserved					
109	40110	Reserved				Unsigned	
110	40111	Reserved				Unsigned	
111	40112	Reserved				Unsigned	
112	40113	Reserved				Unsigned	
113	40114	Controller Model				Unsigned	
114	40115	Controller Software Version				Unsigned (*10)	
115	40116	Controller Hardware Version				Unsigned (*10)	
116	40117	Release Time (Year)	(0-99)	1		Only reserve last two numbers	
117	40118	Release Time (Month)	(1-12)	1		Unsigned	
118	40119	Release Time (Day)	(1-31)	1		Unsigned	
119	40120	Reserved					
120	40121	Event Logs					
121	40122	Controller Time: Year				Only reserve last two numbers	
122	40123	Controller Time: Month				Unsigned	
123	40124	Controller Time: Day				Unsigned	
124	40125	Controller Time: Week				Unsigned	
125	40126	Controller Time: Hour				Unsigned	
126	40127	Controller Time: Minute				Unsigned	
127	40128	Controller Time: Second				Unsigned	
128	40129	Current Running Hours				Unsigned	
129	40130	Current Running Minutes				Unsigned	
130	40131	Current Running Seconds				Unsigned	
131	40132	Reserved				Unsigned	
132	40133	Reserved				Unsigned	
133	40134	Reserved				Unsigned	
134	40135	Reserved				Unsigned	

Modbus Address	PLC Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
135	40136	Maintenance 1 Time (Hours)	(0-65535)	1	h	Unsigned	
136	40137	Maintenance 1 Time (Minutes)	(0~59)	1	min	Unsigned	
137	40138	Maintenance 1 Time (Seconds)	(0~59)	1	s	Unsigned	
138	40139	Maintenance 2 Time (Hours)	(0-65535)	1	h	Unsigned	
139	40140	Maintenance 2 Time (Minutes)	(0~59)	1	min	Unsigned	
140	40141	Maintenance 2 Time (Seconds)	(0~59)	1	s	Unsigned	
141	40142	Maintenance 3 Time (Hours)	(0-65535)	1	h	Unsigned	
142	40143	Maintenance 3 Time (Minutes)	(0~59)	1	min	Unsigned	
143	40144	Maintenance 3 Time (Seconds)	(0~59)	1	s	Unsigned	
144	40145	Maintenance 4 Time (Hours)	(0-65535)	1	h	Unsigned	
145	40146	Maintenance 4 Time (Minutes)	(0~59)	1	min	Unsigned	
146	40147	Maintenance 4 Time (Seconds)	(0~59)	1	s	Unsigned	
147	40148	Maintenance 5 Time (Hours)	(0-65535)	1	h	Unsigned	
148	40149	Maintenance 5 Time (Minutes)	(0~59)	1	min	Unsigned	
149	40150	Maintenance 5 Time (Seconds)	(0~59)	1	s	Unsigned	
150	40151	User Total Running Hours A	(0-65535)	1	h	Unsigned	
151	40152	User Total Running Minutes A	(0~59)	1	min	Unsigned	
152	40153	User Total Running Seconds A	(0~59)	1	s	Unsigned	
153	40154	Reserved				Unsigned	
154	40155	Reserved	(0-65535)	1	h	Unsigned	
155	40156	Reserved	(0~59)	1	min	Unsigned	
156	40157	Reserved	(0~59)	1	s	Unsigned	
157	40158	Reserved				Unsigned	
158	40159	Reserved				Unsigned	
159	40160	Reserved				Unsigned	

Modbus Address	PLC Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
160	40161	Maintenance 6 Due Countdown (Hours)	(0-65535)	1	h	Unsigned	
161	40162	Maintenance 6 Due Countdown (Minutes)	(0~59)	1	min	Unsigned	
162	40163	Maintenance 6 Due Countdown (Seconds)	(0~59)	1	s	Unsigned	
163	40164	Maintenance 7 Due Countdown (Hours)	(0-65535)	1	h	Unsigned	
164	40165	Maintenance 7 Due Countdown (Minutes)	(0~59)	1	min	Unsigned	
165	40166	Maintenance 7 Due Countdown (Seconds)	(0~59)	1	s	Unsigned	
166	40167	Maintenance 8 Due Countdown (Hours)	(0-65535)	1	h	Unsigned	
167	40168	Maintenance 8 Due Countdown (Minutes)	(0~59)	1	min	Unsigned	
168	40169	Maintenance 8 Due Countdown (Seconds)	(0~59)	1	s	Unsigned	
169	40170	Maintenance 9 Due Countdown (Hours)	(0-65535)	1	h	Unsigned	
170	40171	Maintenance 9 Due Countdown (Minutes)	(0~59)	1	min	Unsigned	
171	40172	Maintenance 9 Due Countdown (Seconds)	(0~59)	1	s	Unsigned	
172	40173	Maintenance 10 Due Countdown (Hours)	(0-65535)	1	h	Unsigned	
173	40174	Maintenance 10 Due Countdown (Minutes)	(0~59)	1	min	Unsigned	
174	40175	Maintenance 10 Due Countdown (Seconds)	(0~59)	1	s	Unsigned	
175	40176	ECU Alarm SPN1 (Low)				Unsigned	4 Bytes
176	40177	ECU Alarm SPN1 (High)					
177	40178	ECU Alarm SPN1 FMI (High 8-bit) ECU Alarm SPN1 ALARM (Low 8-bit)				Unsigned	2Bytes
178	40179	ECU Alarm SPN2				Unsigned	

Modbus Address	PLC Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
179	40180	(Low) ECU Alarm SPN2 (High)					
180	40181	ECU Alarm SPN2 FMI (High 8-bit) ECU Alarm SPN2 ALARM (Low 8-bit)				Unsigned	
181	40182	ECU Alarm SPN3 (Low)				Unsigned	
182	40183	ECU Alarm SPN3 (High)					
183	40184	ECU Alarm SPN3 FMI (High 8-bit) ECU Alarm SPN3 ALARM (Low 8-bit)				Unsigned	
184	40185	ECU Alarm SPN4 (Low)				Unsigned	
185	40186	ECU Alarm SPN4 (High)					
186	40187	ECU Alarm SPN4 FMI (High 8-bit) ECU Alarm SPN4 ALARM (Low 8-bit)				Unsigned	
187	40188	ECU Alarm SPN5 (Low)				Unsigned	
188	40189	ECU Alarm SPN5 (High)					
189	40190	ECU Alarm SPN5 FMI (High 8-bit) ECU Alarm SPN5 ALARM (Low 8-bit)				Unsigned	
190	40191	ECU Alarm SPN6 (Low)				Unsigned	
191	40192	ECU Alarm SPN6 (High)					
192	40193	ECU Alarm SPN6 FMI (High 8-bit) ECU Alarm SPN6 ALARM (Low 8-bit)				Unsigned	
193	40194	ECU Alarm SPN7 (Low)				Unsigned	
194	40195	ECU Alarm SPN7 (High)					
195	40196	ECU Alarm SPN7 FMI				Unsigned	

Modbus Address	PLC Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
		(High 8-bit) ECU Alarm SPN7 ALARM (Low 8-bit)					
196 197	40197 40198	ECU Alarm SPN8 (Low) ECU Alarm SPN8 (High)				Unsigned	
198	40199	ECU Alarm SPN8 FMI (High 8-bit) ECU Alarm SPN8 ALARM (Low 8-bit)				Unsigned	
199 200	40200 40201	ECU Alarm SPN9 (Low) ECU Alarm SPN9 (High)				Unsigned	
201	40202	ECU Alarm SPN9 FMI (High 8-bit) ECU Alarm SPN9 ALARM (Low 8-bit)				Unsigned	
202 203	40203 40204	ECU Alarm SPN10 (Low) ECU Alarm SPN10 (High)				Unsigned	
204	40205	ECU Alarm SPN10 FMI (High 8-bit) ECU Alarm SPN10 ALARM (Low 8-bit)				Unsigned	
205	40206	ECU Alarm Type				Unsigned	2Bytes
206	40207	ECU Alarm Warnings Number				Unsigned	2Bytes
207 208	40208 40209	Post-processing ECU Alarm SPN1 (Low) Post-processing ECU Alarm SPN1 (High)				Unsigned	4 Bytes
209	40210	Post-processing ECU Alarm SPN1 FMI (High 8-bit) Post-processing ECU Alarm SPN1 ALARM (Low 8-bit)				Unsigned	2Bytes
210 211	40211 40212	Post-processing ECU Alarm SPN2 (Low) Post-processing ECU Alarm SPN2 (High)				Unsigned	

Modbus Address	PLC Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
212	40213	Post-processing ECU Alarm SPN2 FMI (High 8-bit) Post-processing ECU Alarm SPN2 ALARM (Low 8-bit)				Unsigned	
213 214	40214 40215	Post-processing ECU Alarm SPN3 (Low) Post-processing ECU Alarm SPN3 (High)				Unsigned	
215	40216	Post-processing ECU Alarm SPN3 FMI (High 8-bit) Post-processing ECU Alarm SPN3 ALARM (Low 8-bit)				Unsigned	
216 217	40217 40218	Post-processing ECU Alarm SPN4 (Low) Post-processing ECU Alarm SPN4 (High)				Unsigned	
218	40219	Post-processing ECU Alarm SPN4 FMI (High 8-bit) Post-processing ECU Alarm SPN4 ALARM (Low 8-bit)				Unsigned	
219 220	40220 40221	Post-processing ECU Alarm SPN5 (Low) Post-processing ECU Alarm SPN5 (High)				Unsigned	
221	40222	Post-processing ECU Alarm SPN5 FMI (High 8-bit) Post-processing ECU Alarm SPN5 ALARM (Low 8-bit)				Unsigned	
222 223	40223 40224	Post-processing ECU Alarm SPN6 (Low) Post-processing ECU Alarm SPN6 (High)				Unsigned	
224	40225	Post-processing ECU Alarm SPN6 FMI (High 8-bit) Post-processing ECU				Unsigned	

Modbus Address	PLC Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
		Alarm SPN6 ALARM (Low 8-bit)					
225 226	40226 40227	Post-processing ECU Alarm SPN7 (Low) Post-processing ECU Alarm SPN7 (High)				Unsigned	
227	40228	Post-processing ECU Alarm SPN7 FMI (High 8-bit) Post-processing ECU Alarm SPN7 ALARM (Low 8-bit)				Unsigned	
228 229	40229 40230	Post-processing ECU Alarm SPN8 (Low) Post-processing ECU Alarm SPN8 (High)				Unsigned	
230	40231	Post-processing ECU Alarm SPN8 FMI (High 8-bit) Post-processing ECU Alarm SPN8 ALARM (Low 8-bit)				Unsigned	
231 232	40232 40233	Post-processing ECU Alarm SPN9 (Low) Post-processing ECU Alarm SPN9 (High)				Unsigned	
233	40234	Post-processing ECU Alarm SPN9 FMI (High 8-bit) Post-processing ECU Alarm SPN9 ALARM (Low 8-bit)				Unsigned	
234 235	40235 40236	Post-processing ECU Alarm SPN10 (Low) Post-processing ECU Alarm SPN10 (High)				Unsigned	
236	40237	Post-processing ECU Alarm SPN10 FMI (High 8-bit) Post-processing ECU Alarm SPN10 ALARM (Low 8-bit)				Unsigned	
237	40238	Post-processing ECU Alarm Type				Unsigned	

Modbus Address	PLC Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
238	40239	Post-processing ECU Alarm Warnings Number				Unsigned	
239	40240	Urea level		1	%	Signed	
240	40241	Smoke Load Rate		1	%	Unsigned	
241	40242	SCR Intake Temp.		1	°C	Unsigned	
242	40243	SCR Exhaust Temp.		1	°C	Unsigned	
243 244	40244 40245	ECU Running Time		1		Signed	4 Bytes
245	40246	DPF Outlet Temp.		1	°C	Signed	
246	40247	LCD Temp.		1	°C	Signed	
247	40248	Fuel Level		1	%	Unsigned	
248	40249	Exhaust Pressure		1	Kpa	Unsigned	
249	40250	Exhaust Temp.		1	C	Signed	

NOTE1: Actual value=Received Data*Ratio. Take frequency as the example, received data is 276 (114H), ratio is 0.1V, so the actual frequency value is 27.6V(276*0.1V);

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 the received data is 32767, it means no normal data, "+++" can be displayed;

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 "Total Fuel Used (current is 123456L)", firstly get their corresponding address is 0086 and 0087 by checking the table, then it is known that you need to read 2 words' data.

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

Table 7 – Master Request Command

Slave Address	Function Code	Starting Address (0086)		Data Qty. (2)		CRC 16 Calibration	
		MSB	LSB	MSB	LSB	LSB	MSB
01	03	00	56	00	02	24	1B

Slave response command is as following:

Table 8 – Slave Response Command

Slave Address	Function Code	Data Qty. (Bytes)	Data				CRC 16 Calibration	
			Data MSB of Address 0086	Data LSB of Address 0086	Data MSB of Address 0087	Data LSB of Address 0087	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 9 – Data Analysis

Address	Received Data (Hex)	Combination (Hex)	S1 Accum. Close Times (Decimal)
0086	E240H	0001E240H	123456
0087	0001H		

3.3 REMOTE COIL FIELD CORRESPONDING TO FUNCTION CODE 05H

Table 10 – Remote Coil Field

Modbus Address	PLC Address	Name	Description
0	1	Remote Start Key	1 for active
1	2	Remote Stop Key	1 for active
2	3	Reserved	1 for active
3	4	Remote Load Key	1 for active
4	5	Remote Alarm Reset Key	1 for active
5	6	Remote Maintenance Key	1 for active
6	7	Reserved	1 for active
7	8	Remote Up Key	1 for active
8	9	Remote Down Key	1 for active
9	10	Reserved	1 for active
10	11	Reserved	1 for active
11	12	Remote I Confirm/Scroll Screen Key	1 for active
12	13	Reserved	1 for active
13	14	Reserved	1 for active
14	15	Reserved	1 for active
15	16	Remote Oil Engine Quick Stop	1 for active
16	17	Reserved	
17	18	Reserved	
18	19	Reserved	
19	20	Reserved	
20	21	Remote Output Port 1 Output	1 for active; 0 for inactive
21	22	Remote Output Port 2 Output	1 for active; 0 for inactive
22	23	Remote Output Port 3 Output	1 for active; 0 for inactive
23	24	Remote Output Port 4 Output	1 for active; 0 for inactive
24	25	Remote Output Port 5 Output	1 for active; 0 for inactive

Modbus Address	PLC Address	Name	Description
25	26	Remote Output Port 6 Output	1 for active; 0 for inactive
26	27	Remote Output Port 1 Output	
27	28	Reserved	
28	29	Reserved	
29	30	Reserved	

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

Example:

Remotely control controller to start, its address is 0.

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

Table 11 – Master Request Command

Slave Address	Function Code	Remote Address (0)		Data		CRC 16 Calibration	
		MSB	LSB	MSB	LSB	LSB	MSB
01	05	00	00	FF	00	8C	3A

Slave response command is as following:

Table 12 – Slave Response Command

Slave Address	Function Code	Remote Address (0)		Data		CRC 16 Calibration	
		MSB	LSB	MSB	LSB	LSB	MSB
01	05	00	00	FF	00	8C	3A

3.4 ENGINE STATUS

Table 13 – Engine Status

No.	Contents	Range	Description
0	Standby		No delay will be displayed in this status
1	Pre-heat		
2	Fuel Output		
3	Crank Disconnect		
4	rank Rest		
5	Safety On		
6	Start Idle		
7	Warming Up		
8	Waiting for Load		No delay will be displayed in this status

No.	Contents	Range	Description
9	Normal Running		No delay will be displayed in this status
10	Cooling		
11	Stop Idle		
12	Energize to Stop		
13	Wait Stop Time		
14	Failed to Stop		No delay will be displayed in this status
15	After Stop Time		

4. COMMUNICATION PARAMETERS CONFIGURATION

- 1) In the home page of main interface, press  key to enter menu interface;
- 2) Press Down key to select "Parameter Setting", then press  key to enter parameter password interface;
- 3) Input correct password (*default 01234*), press  key to enter the main interface of parameter;
- 4) Select "Module Setting" via  key, press  key to enter submenu;
- 5) Select "Communication Address" via ,  key, Press  key to enter parameter edit function;
- 6) Move the data bit to be modified via  key, and modify the value via  key and  key, press  key to confirm the modified content, and the selected state disappears after editing
- 7) The setting method of "Communication Stop Bit" is the same;
- 8) Press  key to return the main interface.

NOTE: The configuration will be active after RS4854 communication is configured.

5. FAQ

5.1 COMMUNICATION LINE SHIELDING LAYER GROUNDED

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

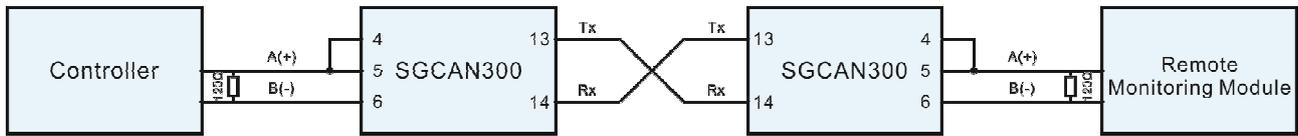


Fig.3 SGCAN300 Application Diagram

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 is correct;
- 3) Check whether the RS485 converter (if configured) is normal;
- 4) Check whether the terminal resistor is correctly connected;
- 5) Disconnect the RS485 wiring and measure the voltage difference between terminal A and B of RS485. If the voltage difference is between $\pm 200\text{mV}$, the communication port is abnormal.
- 6) 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;