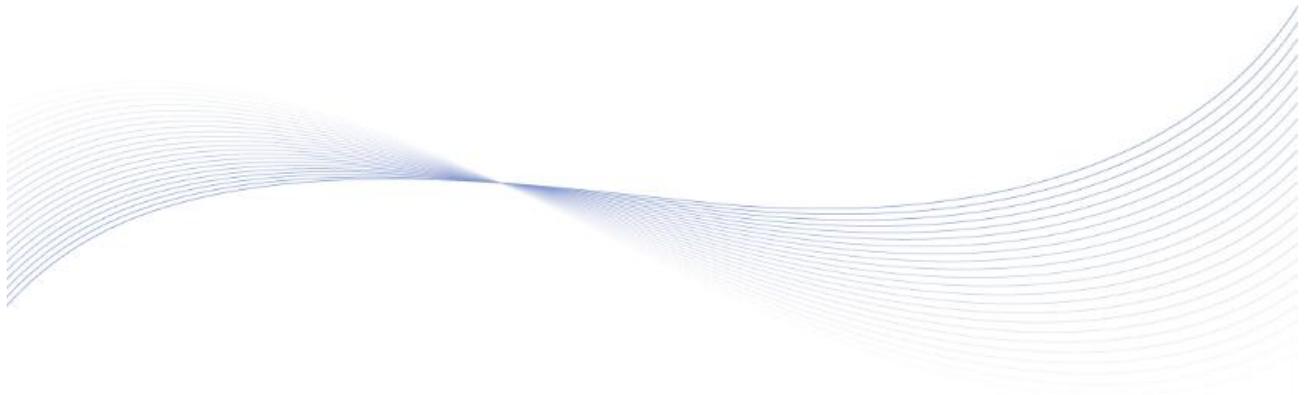

SmartGen

MAKING CONTROL SMARTER

APC715N
ENGINE PUMP CONTROLLER
COMMUNICATION PROTOCOL



郑州众智科技股份有限公司
SMARTGEN(ZHENGZHOU)TECHNOLOGY CO.,LTD.

SmartGen Registered trademark

No. 28 Xuemei Street, Zhengzhou, Henan, China

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

+86-371-67981000(overseas)

Fax: +86-371-67992952

Web: www.smartgen.com.cn/

www.smartgen.cn/

Email: sales@smartgen.cn

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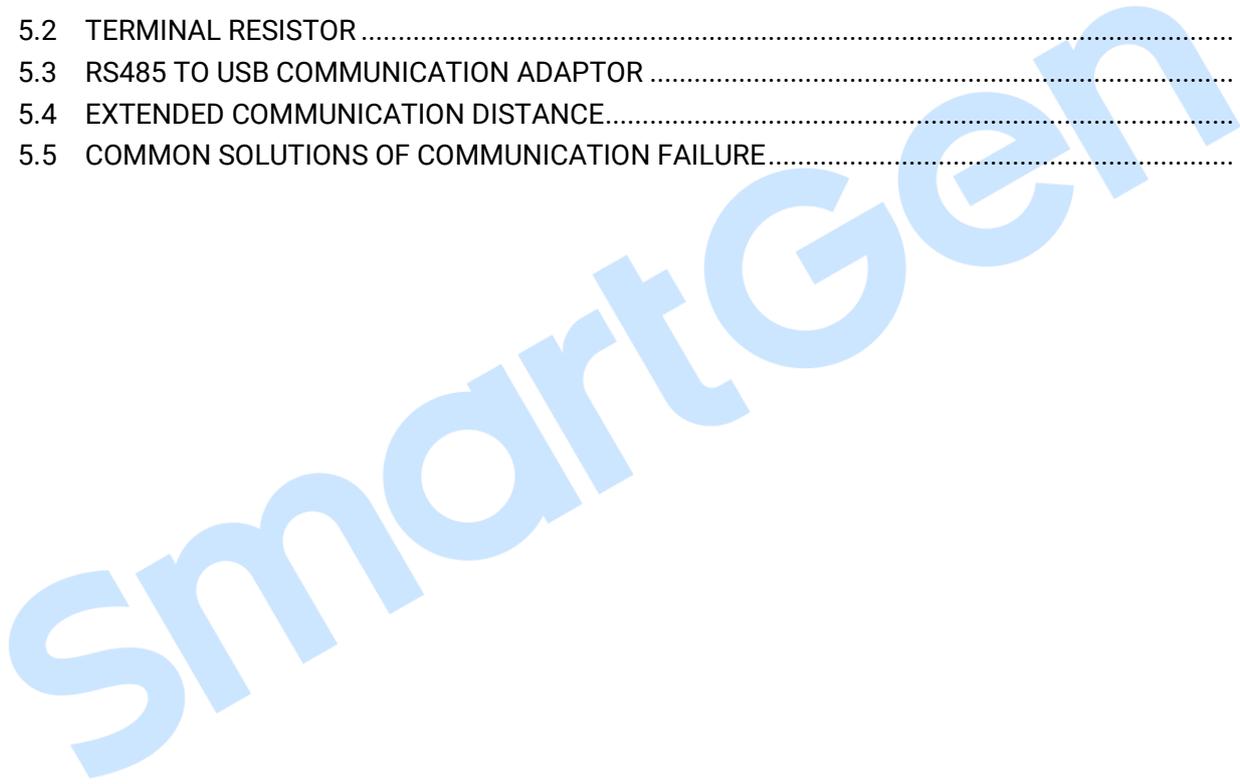
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Table 1 Version History

Date	Version	Content
2022-12-23	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.

APC715N has 2 RS485 ports.

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

Communication address: 1~254 (default: 1)

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

Start bit: 1-bit

Data bit: 8-bit

Parity bit: No/Odd/Even parity (Default: No parity)

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

Supported function code: 03H, 05H. Function code 03H is used for reading controller alarm, status information and related 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

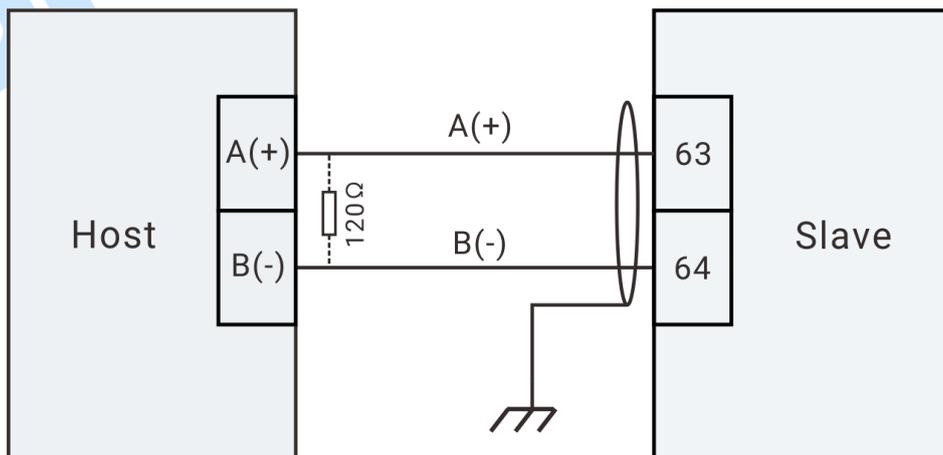


Fig.1 Single Unit Communication Wiring Diagram

NOTE1: 120Ω resistor at controller side is internally connected to terminal 64, if 120Ω resistor is required, it can be realized by short-connecting terminal 62 and 63.

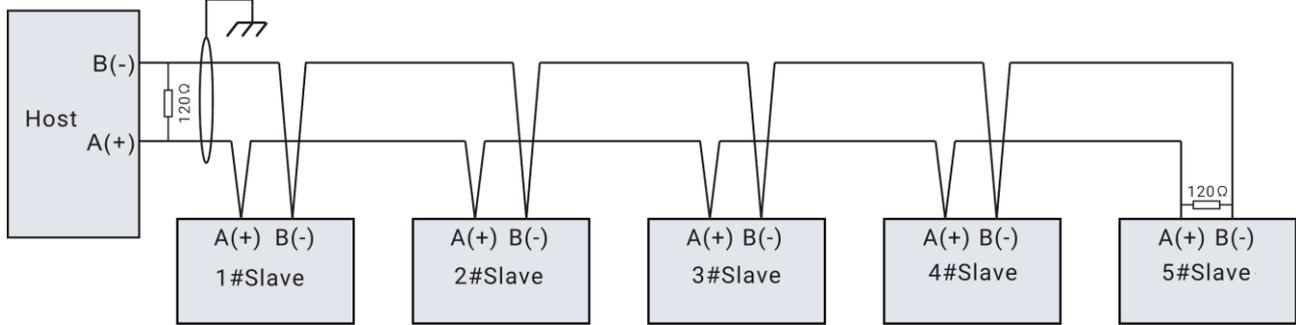


Fig.2 Multi-unit Communication Wiring Diagram

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	Item	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 Warning Alarm	
0000.3	40001.3	Common Cooling Shutdown Alarm	
0000.4	40001.4	Common Fault Idle Alarm	
0000.5	40001.5	Common Cooling Shutdown Alarm & Common Shutdown Alarm	
0000.6	40001.6	Common Indication	
0000.7	40001.7	Reserved	
0000.8	40001.8	In Test Mode	
0000.9	40001.9	In Auto Mode	
0000.10	40001.10	In Manual Mode	
0000.11	40001.11	In Stop Mode	
0000.12	40001.12	In GOV Mode	
0000.13	40001.13	In Manual/Auto GOV Mode	
0000.14	40001.14	Reserved	
0000.15	40001.15	Reserved	
0001.0	40002.0	Emergency Stop Alarm	

Modbus Address	PLC Address	Item	Description
0001.1	40002.1	Engine Overspeed Shutdown	
0001.2	40002.2	Underspeed Shutdown	
0001.3	40002.3	Speed Signal Loss 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	Crank Failure 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. IN Alarm Shutdown	
0001.15	40002.15	Low OP IN Alarm Shutdown	
0002.0	40003.0	ECU Comm. Failure Alarm Shutdown	
0002.1	40003.1	Engine High Temp. Alarm Shutdown	
0002.2	40003.2	Engine Low Temp. Alarm Shutdown	
0002.3	40003.3	Reserved	
0002.4	40003.4	Engine High OP Alarm Shutdown	
0002.5	40003.5	Engine Low OP Alarm Shutdown	
0002.6	40003.6	Reserved	
0002.7	40003.7	Reserved	
0002.8	40003.8	Sensor 1 Open Alarm Shutdown	
0002.9	40003.9	Sensor 1 High Alarm Shutdown	
0002.10	40003.10	Sensor 1 Low Alarm Shutdown	
0002.11	40003.11	Reserved	
0002.12	40003.12	Sensor 2 Open Alarm Shutdown	
0002.13	40003.13	Sensor 2 High Alarm Shutdown	
0002.14	40003.14	Sensor 2 Low Alarm Shutdown	
0002.15	40003.15	Reserved	
0003.0	40004.0	Sensor 3 Open Alarm Shutdown	
0003.1	40004.1	Sensor 3 High Alarm Shutdown	
0003.2	40004.2	Sensor 3 Low Alarm Shutdown	
0003.3	40004.3	Reserved	
0003.4	40004.4	Sensor 4 Open Alarm Shutdown	
0003.5	40004.5	Sensor 4 High Alarm Shutdown	
0003.6	40004.6	Sensor 4 Low Alarm Shutdown	
0003.7	40004.7	Reserved	
0003.8	40004.8	Sensor 5 Open Alarm Shutdown	

Modbus Address	PLC Address	Item	Description
0003.9	40004.9	Sensor 5 High Alarm Shutdown	
0003.10	40004.10	Sensor 5 Low Alarm Shutdown	
0003.11	40004.11	Reserved	
0003.12	40004.12	Sensor 6 Open Alarm Shutdown	
0003.13	40004.13	Sensor 6 High Alarm Shutdown	
0003.14	40004.14	Sensor 6 Low Alarm Shutdown	
0003.15	40004.15	Reserved	
0004.0	40005.0	Sensor 7 Open Alarm Shutdown	
0004.1	40005.1	Sensor 7 High Alarm Shutdown	
0004.2	40005.2	Sensor 7 Low Alarm Shutdown	
0004.3	40005.3	Reserved	
0004.4	40005.4	Sensor 8 Open Alarm Shutdown	
0004.5	40005.5	Sensor 8 High Alarm Shutdown	
0004.6	40005.6	Sensor 8 Low Alarm Shutdown	
0004.7	40005.7	Reserved	
0004.8	40005.8	Sensor 9 Open Alarm Shutdown	
0004.9	40005.9	Sensor 9 High Alarm Shutdown	
0004.10	40005.10	Sensor 9 Low Alarm Shutdown	
0004.11	40005.11	Reserved	
0004.12	40005.12	Sensor 10 Open Alarm Shutdown	
0004.13	40005.13	Sensor 10 High Alarm Shutdown	
0004.14	40005.14	Sensor 10 Low Alarm Shutdown	
0004.15	40005.15	Reserved	
0005.0	40006.0	AIN8 Sensor 1 Open	
0005.1	40006.1	AIN8 Sensor 1 High Shutdown	
0005.2	40006.2	AIN8 Sensor 1 Low Shutdown	
0005.3	40006.3	Reserved	
0005.4	40006.4	AIN8 Sensor 2 Open	
0005.5	40006.5	AIN8 Sensor 2 High Shutdown	
0005.6	40006.6	AIN8 Sensor 2 Low Shutdown	
0005.7	40006.7	Reserved	
0005.8	40006.8	AIN8 Sensor 3 Open	
0005.9	40006.9	AIN8 Sensor 3 High Shutdown	
0005.10	40006.10	AIN8 Sensor 3 Low Shutdown	
0005.11	40006.11	Reserved	
0005.12	40006.12	AIN8 Sensor 4 Open	
0005.13	40006.13	AIN8 Sensor 4 High Shutdown	
0005.14	40006.14	AIN8 Sensor 4 Low Shutdown	
0005.15	40006.15	Reserved	
0006.0	40007.0	AIN8 Sensor 5 Open	
0006.1	40007.1	AIN8 Sensor 5 High Shutdown	
0006.2	40007.2	AIN8 Sensor 5 Low Shutdown	
0006.3	40007.3	Reserved	

Modbus Address	PLC Address	Item	Description
0006.4	40007.4	AIN8 Sensor 6 Open	
0006.5	40007.5	AIN8 Sensor 6 High Shutdown	
0006.6	40007.6	AIN8 Sensor 6 Low Shutdown	
0006.7	40007.7	Reserved	
0006.8	40007.8	AIN8 Sensor 7 Open	
0006.9	40007.9	AIN8 Sensor 7 High Shutdown	
0006.10	40007.10	AIN8 Sensor 7 Low Shutdown	
0006.11	40007.11	Reserved	
0006.12	40007.12	AIN8 Sensor 8 Open	
0006.13	40007.13	AIN8 Sensor 8 High Shutdown	
0006.14	40007.14	AIN8 Sensor 8 Low Shutdown	
0006.15	40007.15	Reserved	
0007.0	40008.0	PLC Function 1 Shutdown	
0007.1	40008.1	PLC Function 2 Shutdown	
0007.2	40008.2	PLC Function 3 Shutdown	
0007.3	40008.3	PLC Function 4 Shutdown	
0007.4	40008.4	PLC Function 5 Shutdown	
0007.5	40008.5	PLC Function 6 Shutdown	
0007.6	40008.6	PLC Function 7 Shutdown	
0007.7	40008.7	PLC Function 8 Shutdown	
0007.8	40008.8	PLC Function 9 Shutdown	
0007.9	40008.9	PLC Function 10 Shutdown	
0007.10	40008.10	PLC Function 11 Shutdown	
0007.11	40008.11	PLC Function 12 Shutdown	
0007.12	40008.12	PLC Function 13 Shutdown	
0007.13	40008.13	PLC Function 14 Shutdown	
0007.14	40008.14	PLC Function 15 Shutdown	
0007.15	40008.15	PLC Function 16 Shutdown	
0008.0	40009.0	Input Port 1 Shutdown	
0008.1	40009.1	Input Port 2 Shutdown	
0008.2	40009.2	Input Port 3 Shutdown	
0008.3	40009.3	Input Port 4 Shutdown	
0008.4	40009.4	Input Port 5 Shutdown	
0008.5	40009.5	Input Port 6 Shutdown	
0008.6	40009.6	Input Port 7 Shutdown	
0008.7	40009.7	Input Port 8 Shutdown	
0008.8	40009.8	Input Port 9 Shutdown	
0008.9	40009.9	Reserved	
0008.10	40009.10	Reserved	
0008.11	40009.11	Reserved	
0008.12	40009.12	Authorization Time Due Shutdown	
0008.13	40009.13	High-pressure Pump Overspeed	

Modbus Address	PLC Address	Item	Description
		Alarm Shutdown	
0008.14	40009.14	High-pressure Pump Underspeed Alarm Shutdown	
0008.15	40009.15	Overflow Alarm Shutdown	
0009.0	40010.0	Maintenance 1 Alarm Shutdown	
0009.1	40010.1	Maintenance 2 Alarm Shutdown	
0009.2	40010.2	Maintenance 3 Alarm Shutdown	
0009.3	40010.3	Maintenance 4 Alarm Shutdown	
0009.4	40010.4	Maintenance 5 Alarm Shutdown	
0009.5	40010.5	Reserved	
0009.6	40010.6	Reserved	
0009.7	40010.7	Reserved	
0009.8	40010.8	Reserved	
0009.9	40010.9	Reserved	
0009.10	40010.10	Reserved	
0009.11	40010.11	Reserved	
0009.12	40010.12	PLC Function 17 Shutdown	
0009.13	40010.13	PLC Function 18 Shutdown	
0009.14	40010.14	PLC Function 19 Shutdown	
0009.15	40010.15	PLC Function 20 Shutdown	
0010.0	40011.0	Reserved	
0010.1	40011.1	Exp. Input Module Comm. Failure Alarm Shutdown	
0010.2	40011.2	Exp. AIN8 Comm. Failure Alarm Shutdown	
0010.3	40011.3	Exp. Output Module Comm. Failure Alarm Shutdown	
0010.4	40011.4	Exp. Input 1 Alarm Shutdown	
0010.5	40011.5	Exp. Input 2 Alarm Shutdown	
0010.6	40011.6	Exp. Input 3 Alarm Shutdown	
0010.7	40011.7	Exp. Input 4 Alarm Shutdown	
0010.8	40011.8	Exp. Input 5 Alarm Shutdown	
0010.9	40011.9	Exp. Input 6 Alarm Shutdown	
0010.10	40011.10	Exp. Input 7 Alarm Shutdown	
0010.11	40011.11	Exp. Input 8 Alarm Shutdown	
0010.12	40011.12	Exp. Input 9 Alarm Shutdown	
0010.13	40011.13	Exp. Input 10 Alarm Shutdown	
0010.14	40011.14	Exp. Input 11 Alarm Shutdown	
0010.15	40011.15	Exp. Input 12 Alarm Shutdown	
0011.0	40012.0	Exp. Input 13 Alarm Shutdown	
0011.1	40012.1	Exp. Input 14 Alarm Shutdown	
0011.2	40012.2	Exp. Input 15 Alarm Shutdown	
0011.3	40012.3	Exp. Input 16 Alarm Shutdown	

Modbus Address	PLC Address	Item	Description
0011.4	40012.4	Reserved	
0011.5	40012.5	Reserved	
0011.6	40012.6	Reserved	
0011.7	40012.7	Reserved	
0011.8	40012.8	Reserved	
0011.9	40012.9	Reserved	
0011.10	40012.10	Reserved	
0011.11	40012.11	Reserved	
0011.12	40012.12	Reserved	
0011.13	40012.13	Reserved	
0011.14	40012.14	Reserved	
0011.15	40012.15	Reserved	
0012.0	40013.0	Input 1 Cooling Shutdown	
0012.1	40013.1	Input 2 Cooling Shutdown	
0012.2	40013.2	Input 3 Cooling Shutdown	
0012.3	40013.3	Input 4 Cooling Shutdown	
0012.4	40013.4	Input 5 Cooling Shutdown	
0012.5	40013.5	Input 6 Cooling Shutdown	
0012.6	40013.6	Input 7 Cooling Shutdown	
0012.7	40013.7	Input 8 Cooling Shutdown	
0012.8	40013.8	Input 9 Cooling Shutdown	
0012.9	40013.9	Reserved	
0012.10	40013.10	Reserved	
0012.11	40013.11	Reserved	
0012.12	40013.12	PLC Function 1 Cooling Shutdown	
0012.13	40013.13	PLC Function 2 Cooling Shutdown	
0012.14	40013.14	PLC Function 3 Cooling Shutdown	
0012.15	40013.15	PLC Function 4 Cooling Shutdown	
0013.0	40014.0	PLC Function 5 Cooling Shutdown	
0013.1	40014.1	PLC Function 6 Cooling Shutdown	
0013.2	40014.2	PLC Function 7 Cooling Shutdown	
0013.3	40014.3	PLC Function 8 Cooling Shutdown	
0013.4	40014.4	PLC Function 9 Cooling Shutdown	
0013.5	40014.5	PLC Function 10 Cooling Shutdown	

Modbus Address	PLC Address	Item	Description
		Shutdown	
0013.6	40014.6	PLC Function 11 Cooling Shutdown	
0013.7	40014.7	PLC Function 12 Cooling Shutdown	
0013.8	40014.8	PLC Function 13 Cooling Shutdown	
0013.9	40014.9	PLC Function 14 Cooling Shutdown	
0013.10	40014.10	PLC Function 15 Cooling Shutdown	
0013.11	40014.11	PLC Function 16 Cooling Shutdown	
0013.12	40014.12	PLC Function 17 Cooling Shutdown	
0013.13	40014.13	PLC Function 18 Cooling Shutdown	
0013.14	40014.14	PLC Function 19 Cooling Shutdown	
0013.15	40014.15	PLC Function 20 Cooling Shutdown	
0014.0	40015.0	Reserved	
0014.1	40015.1	Exp. Input Module Comm. Failure Cooling Shutdown	
0014.2	40015.2	Exp. Output Module Comm. Failure Cooling Shutdown	
0014.3	40015.3	Reserved	
0014.4	40015.4	Reserved	
0014.5	40015.5	Reserved	
0014.6	40015.6	Exp. Input 1 Cooling Shutdown	
0014.7	40015.7	Exp. Input 2 Cooling Shutdown	
0014.8	40015.8	Exp. Input 3 Cooling Shutdown	
0014.9	40015.9	Exp. Input 4 Cooling Shutdown	
0014.10	40015.10	Exp. Input 5 Cooling Shutdown	
0014.11	40015.11	Exp. Input 6 Cooling Shutdown	
0014.12	40015.12	Exp. Input 7 Cooling Shutdown	
0014.13	40015.13	Exp. Input 8 Cooling Shutdown	
0014.14	40015.14	Exp. Input 9 Cooling Shutdown	
0014.15	40015.15	Exp. Input 10 Cooling Shutdown	
0015.0	40016.0	Exp. Input 11 Cooling Shutdown	
0015.1	40016.1	Exp. Input 12 Cooling Shutdown	
0015.2	40016.2	Exp. Input 13 Cooling Shutdown	
0015.3	40016.3	Exp. Input 14 Cooling Shutdown	

Modbus Address	PLC Address	Item	Description
0015.4	40016.4	Exp. Input 15 Cooling Shutdown	
0015.5	40016.5	Exp. Input 16 Cooling Shutdown	
0015.6	40016.6	Reserved	
0015.7	40016.7	Reserved	
0015.8	40016.8	Reserved	
0015.9	40016.9	Reserved	
0015.10	40016.10	Reserved	
0015.11	40016.11	Reserved	
0015.12	40016.12	Reserved	
0015.13	40016.13	Reserved	
0015.14	40016.14	Reserved	
0015.15	40016.15	Reserved	
0016.0	40017.0	Reserved	
0016.1	40017.1	Reserved	
0016.2	40017.2	Reserved	
0016.3	40017.3	Reserved	
0016.4	40017.4	Input 1 Fault Idle	
0016.5	40017.5	Input 2 Fault Idle	
0016.6	40017.6	Input 3 Fault Idle	
0016.7	40017.7	Input 4 Fault Idle	
0016.8	40017.8	Input 5 Fault Idle	
0016.9	40017.9	Input 6 Fault Idle	
0016.10	40017.10	Input 7 Fault Idle	
0016.11	40017.11	Input 8 Fault Idle	
0016.12	40017.12	Input 9 Fault Idle	
0016.13	40017.13	Reserved	
0016.14	40017.14	Exp. Input Comm. Failure Fault Idle	
0016.15	40017.15	Exp. Output Comm. Failure Fault Idle	
0017.0	40018.0	Exp. Input 1 Fault Idle	
0017.1	40018.1	Exp. Input 2 Fault Idle	
0017.2	40018.2	Exp. Input 3 Fault Idle	
0017.3	40018.3	Exp. Input 4 Fault Idle	
0017.4	40018.4	Exp. Input 5 Fault Idle	
0017.5	40018.5	Exo. Input 6 Fault Idle	
0017.6	40018.6	Exp. Input 7 Fault Idle	
0017.7	40018.7	Exp. Input 8 Fault Idle	
0017.8	40018.8	Exp. Input 9 Fault Idle	
0017.9	40018.9	Exp. Input 10 Fault Idle	
0017.10	40018.10	Exp. Input 11 Fault Idle	
0017.11	40018.11	Exp. Input 12 Fault Idle	
0017.12	40018.12	Exp. Input 13 Fault Idle	

Modbus Address	PLC Address	Item	Description
0017.13	40018.13	Exp. Input 14 Fault Idle	
0017.14	40018.14	Exp. Input 15 Fault Idle	
0017.15	40018.15	Exp. Input 16 Fault Idle	
0018.0	40019.0	PLC Function 1 Fault Idle	
0018.1	40019.1	PLC Function 2 Fault Idle	
0018.2	40019.2	PLC Function 3 Fault Idle	
0018.3	40019.3	PLC Function 4 Fault Idle	
0018.4	40019.4	PLC Function 5 Fault Idle	
0018.5	40019.5	PLC Function 6 Fault Idle	
0018.6	40019.6	PLC Function 7 Fault Idle	
0018.7	40019.7	PLC Function 8 Fault Idle	
0018.8	40019.8	PLC Function 9 Fault Idle	
0018.9	40019.9	PLC Function 10 Fault Idle	
0018.10	40019.10	PLC Function 11 Fault Idle	
0018.11	40019.11	PLC Function 12 Fault Idle	
0018.12	40019.12	PLC Function 13 Fault Idle	
0018.13	40019.13	PLC Function 14 Fault Idle	
0018.14	40019.14	PLC Function 15 Fault Idle	
0018.15	40019.15	PLC Function 16 Fault Idle	
0019.0	40020.0	PLC Function 17 Fault Idle	
0019.1	40020.1	PLC Function 18 Fault Idle	
0019.2	40020.2	PLC Function 19 Fault Idle	
0019.3	40020.3	PLC Function 20 Fault Idle	
0019.4	40020.4	Reserved	
0019.5	40020.5	Reserved	
0019.6	40020.6	Reserved	
0019.7	40020.7	Reserved	
0019.8	40020.8	Reserved	
0019.9	40020.9	Reserved	
0019.10	40020.10	Reserved	
0019.11	40020.11	Reserved	
0019.12	40020.12	Reserved	
0019.13	40020.13	Reserved	
0019.14	40020.14	Reserved	
0019.15	40020.15	Reserved	
0020.0	40021.0	Engine Overspeed Warning	
0020.1	40021.1	Engine Underspeed Warning	
0020.2	40021.2	Speed Signal Loss Warning	
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	

Modbus Address	PLC Address	Item	Description
0020.8	40021.8	Stop Failure Warning	
0020.9	40021.9	Charging Failure Warning	
0020.10	40021.10	Battery 1 Overvoltage Warning	
0020.11	40021.11	Battery 1 Undervoltage Warning	
0020.12	40021.12	Maintenance Time Due Warning	
0020.13	40021.13	Reserved	
0020.14	40021.14	Reserved	
0020.15	40021.15	ECU Warning	
0021.0	40022.0	Reserved	
0021.1	40022.1	Engine High Temp. Warning	
0021.2	40022.2	Engine Low Temp. Warning	
0021.3	40022.3	Reserved	
0021.4	40022.4	Engine High OP Warning	
0021.5	40022.5	Engine Low OP Warning	
0021.6	40022.6	Reserved	
0021.7	40022.7	Reserved	
0021.8	40022.8	Sensor 1 Open Warning	
0021.9	40022.9	Aux. Sensor 1 High Warning	
0021.10	40022.10	Aux. Sensor 1 Low Warning	
0021.11	40022.11	Aux. Sensor 1 Error	
0021.12	40022.12	Sensor 2 Open Warning	
0021.13	40022.13	Aux. Sensor 2 High Warning	
0021.14	40022.14	Aux. Sensor 2 Low Warning	
0021.15	40022.15	Aux. Sensor 2 Error	
0022.0	40023.0	Sensor 3 Open Warning	
0022.1	40023.1	Aux. Sensor 3 High Warning	
0022.2	40023.2	Aux. Sensor 3 Low Warning	
0022.3	40023.3	Aux. Sensor 3 Error	
0022.4	40023.4	Sensor 4 Open Warning	
0022.5	40023.5	Aux. Sensor 4 High Warning	
0022.6	40023.6	Aux. Sensor 4 Low Warning	
0022.7	40023.7	Aux. Sensor 4 Error	
0022.8	40023.8	Sensor 5 Open Warning	
0022.9	40023.9	Aux. Sensor 5 High Warning	
0022.10	40023.10	Aux. Sensor 5 Low Warning	
0022.11	40023.11	Aux. Sensor 5 Error	
0022.12	40023.12	Sensor 6 Open Warning	
0022.13	40023.13	Aux. Sensor 6 High Warning	
0022.14	40023.14	Aux. Sensor 6 Low Warning	
0022.15	40023.15	Aux. Sensor 6 Error	
0023.0	40024.0	Sensor 7 Open Warning	
0023.1	40024.1	Aux. Sensor 7 High Warning	
0023.2	40024.2	Aux. Sensor 7 Low Warning	

Modbus Address	PLC Address	Item	Description
0023.3	40024.3	Aux. Sensor 7 Error	
0023.4	40024.4	Sensor 8 Open Warning	
0023.5	40024.5	Aux. Sensor 8 High Warning	
0023.6	40024.6	Aux. Sensor 8 Low Warning	
0023.7	40024.7	Aux. Sensor 8 Error	
0023.8	40024.8	Sensor 9 Open Warning	
0023.9	40024.9	Aux. Sensor 9 High Warning	
0023.10	40024.10	Aux. Sensor 9 Low Warning	
0023.11	40024.11	Aux. Sensor 9 Error	
0023.12	40024.12	Sensor 10 Open Warning	
0023.13	40024.13	Aux. Sensor 10 High Warning	
0023.14	40024.14	Aux. Sensor 10 Low Warning	
0023.15	40024.15	Aux. Sensor 10 Error	
0024.0	40025.0	AIN8 Sensor 1 Open	
0024.1	40025.1	AIN8 Sensor 1 High Warning	
0024.2	40025.2	AIN8 Sensor 1 Low Warning	
0024.3	40025.3	Reserved	
0024.4	40025.4	AIN8 Sensor 2 Open	
0024.5	40025.5	AIN8 Sensor 2 High Warning	
0024.6	40025.6	AIN8 Sensor 2 Low Warning	
0024.7	40025.7	Reserved	
0024.8	40025.8	AIN8 Sensor 3 Open	
0024.9	40025.9	AIN8 Sensor 3 High Warning	
0024.10	40025.10	AIN8 Sensor 3 Low Warning	
0024.11	40025.11	Reserved	
0024.12	40025.12	AIN8 Sensor 4 Open	
0024.13	40025.13	AIN8 Sensor 4 High Warning	
0024.14	40025.14	AIN8 Sensor 4 Low Warning	
0024.15	40025.15	Reserved	
0025.0	40026.0	AIN8 Sensor 5 Open	
0025.1	40026.1	AIN8 Sensor 5 High Warning	
0025.2	40026.2	AIN8 Sensor 5 Low Warning	
0025.3	40026.3	Reserved	
0025.4	40026.4	AIN8 Sensor 6 Open	
0025.5	40026.5	AIN8 Sensor 6 High Warning	
0025.6	40026.6	AIN8 Sensor 6 Low Warning	
0025.7	40026.7	Reserved	
0025.8	40026.8	AIN8 Sensor 7 Open	
0025.9	40026.9	AIN8 Sensor 7 High Warning	
0025.10	40026.10	AIN8 Sensor 7 Low Warning	
0025.11	40026.11	Reserved	
0025.12	40026.12	AIN8 Sensor 8 Open	
0025.13	40026.13	AIN8 Sensor 8 High Warning	

Modbus Address	PLC Address	Item	Description
0025.14	40026.14	AIN8 Sensor 8 Low Warning	
0025.15	40026.15	Reserved	
0026.0	40027.0	Exp. Input 1 Warning	
0026.1	40027.1	Exp. Input 2 Warning	
0026.2	40027.2	Exp. Input 3 Warning	
0026.3	40027.3	Exp. Input 4 Warning	
0026.4	40027.4	Exp. Input 5 Warning	
0026.5	40027.5	Exp. Input 6 Warning	
0026.6	40027.6	Exp. Input 7 Warning	
0026.7	40027.7	Exp. Input 8 Warning	
0026.8	40027.8	Exp. Input 9 Warning	
0026.9	40027.9	Exp. Input 10 Warning	
0026.10	40027.10	Exp. Input 11 Warning	
0026.11	40027.11	Exp. Input 12 Warning	
0026.12	40027.12	Exp. Input 13 Warning	
0026.13	40027.13	Exp. Input 14 Warning	
0026.14	40027.14	Exp. Input 15 Warning	
0026.15	40027.15	Exp. Input 16 Warning	
0027.0	40028.0	PLC Function 1 Warning	
0027.1	40028.1	PLC Function 2 Warning	
0027.2	40028.2	PLC Function 3 Warning	
0027.3	40028.3	PLC Function 4 Warning	
0027.4	40028.4	PLC Function 5 Warning	
0027.5	40028.5	PLC Function 6 Warning	
0027.6	40028.6	PLC Function 7 Warning	
0027.7	40028.7	PLC Function 8 Warning	
0027.8	40028.8	PLC Function 9 Warning	
0027.9	40028.9	PLC Function 10 Warning	
0027.10	40028.10	PLC Function 11 Warning	
0027.11	40028.11	PLC Function 12 Warning	
0027.12	40028.12	PLC Function 13 Warning	
0027.13	40028.13	PLC Function 14 Warning	
0027.14	40028.14	PLC Function 15 Warning	
0027.15	40028.15	PLC Function 16 Warning	
0028.0	40029.0	PLC Function 17 Warning	
0028.1	40029.1	PLC Function 18 Warning	
0028.2	40029.2	PLC Function 19 Warning	
0028.3	40029.3	PLC Function 20 Warning	
0028.4	40029.4	Reserved	
0028.5	40029.5	Reserved	
0028.6	40029.6	Gearbox Overspeed Warning	
0028.7	40029.7	Gearbox Underspeed Warning	
0028.8	40029.8	Overflow Warning	

Modbus Address	PLC Address	Item	Description
0028.9	40029.9	Battery 2 Overvoltage Warning	
0028.10	40029.10	Battery 2 Underspeed Warning	
0028.11	40029.11	Authorization Time Due Warning	
0028.12	40029.12	Reserved	
0028.13	40029.13	Exp. Input Module Comm. Failure Warning	
0028.14	40029.14	Exp. Output Module Comm. Failure Warning	
0028.15	40029.15	Exp. AIN8 Module Comm. Failure Warning	
0029.0	40030.0	Input 1 Warning	
0029.1	40030.1	Input 2 Warning	
0029.2	40030.2	Input 3 Warning	
0029.3	40030.3	Input 4 Warning	
0029.4	40030.4	Input 5 Warning	
0029.5	40030.5	Input 6 Warning	
0029.6	40030.6	Input 7 Warning	
0029.7	40030.7	Input 8 Warning	
0029.8	40030.8	Input 9 Warning	
0029.9	40030.9	Reserved	
0029.10	40030.10	Reserved	
0029.11	40030.11	Reserved	
0029.12	40030.12	Reserved	
0029.13	40030.13	Reserved	
0029.14	40030.14	Reserved	
0029.15	40030.15	Reserved	
0030.0	40031.0	Maintenance 1 Warning	
0030.1	40031.1	Maintenance 2 Warning	
0030.2	40031.2	Maintenance 3 Warning	
0030.3	40031.3	Maintenance 4 Warning	
0030.4	40031.4	Maintenance 5 Warning	
0030.5	40031.5	Reserved	
0030.6	40031.6	Reserved	
0030.7	40031.7	Reserved	
0030.8	40031.8	Reserved	
0030.9	40031.9	Reserved	
0030.10	40031.10	Reserved	
0030.11	40031.11	Reserved	
0030.12	40031.12	Reserved	
0030.13	40031.13	Reserved	
0030.14	40031.14	Reserved	
0030.15	40031.15	Reserved	
0031.0	40032.0	Inhibit Alarm Shutdown	

Modbus Address	PLC Address	Item	Description
		Indication	
0031.1	40032.1	Maintenance Time Due Indication	
0031.2	40032.2	In Scheduled Not Run Indication	
0031.3	40032.3	Reserved	
0031.4	40032.4	Exp. Input Module Comm. Failure Indication	
0031.5	40032.5	Exp. Output Module Comm. Failure Indication	
0031.6	40032.6	PLC Function 1 Indication	
0031.7	40032.7	PLC Function 2 Indication	
0031.8	40032.8	PLC Function 3 Indication	
0031.9	40032.9	PLC Function 4 Indication	
0031.10	40032.10	PLC Function 5 Indication	
0031.11	40032.11	PLC Function 6 Indication	
0031.12	40032.12	PLC Function 7 Indication	
0031.13	40032.13	PLC Function 8 Indication	
0031.14	40032.14	PLC Function 9 Indication	
0031.15	40032.15	PLC Function 10 Indication	
0032.0	40033.0	Exp. Input 1 Indication	
0032.1	40033.1	Exp. Input 2 Indication	
0032.2	40033.2	Exp. Input 3 Indication	
0032.3	40033.3	Exp. Input 4 Indication	
0032.4	40033.4	Exp. Input 5 Indication	
0032.5	40033.5	Exp. Input 6 Indication	
0032.6	40033.6	Exp. Input 7 Indication	
0032.7	40033.7	Exp. Input 8 Indication	
0032.8	40033.8	Exp. Input 9 Indication	
0032.9	40033.9	Exp. Input 10 Indication	
0032.10	40033.10	Exp. Input 11 Indication	
0032.11	40033.11	Exp. Input 12 Indication	
0032.12	40033.12	Exp. Input 13 Indication	
0032.13	40033.13	Exp. Input 14 Indication	
0032.14	40033.14	Exp. Input 15 Indication	
0032.15	40033.15	Exp. Input 16 Indication	
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	Input 6 Indication	
0033.6	40034.6	Input 7 Indication	
0033.7	40034.7	Input 8 Indication	

Modbus Address	PLC Address	Item	Description
0033.8	40034.8	Input 9 Indication	
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	Reserved	
0034.6	40035.6	PLC Function 11 Indication	
0034.7	40035.7	PLC Function 12 Indication	
0034.8	40035.8	PLC Function 13 Indication	
0034.9	40035.9	PLC Function 14 Indication	
0034.10	40035.10	PLC Function 15 Indication	
0034.11	40035.11	PLC Function 16 Indication	
0034.12	40035.12	PLC Function 17 Indication	
0034.13	40035.13	PLC Function 18 Indication	
0034.14	40035.14	PLC Function 19 Indication	
0034.15	40035.15	PLC Function 20 Indication	
0035.0	40036.0	Emergency Input Port Status	0 represents input port is inactive, 1 represents input port is active.
0035.1	40036.1	Input 1 Status	
0035.2	40036.2	Input 2 Status	
0035.3	40036.3	Input 3 Status	
0035.4	40036.4	Input 4 Status	
0035.5	40036.5	Input 5 Status	
0035.6	40036.6	Input 6 Status	
0035.7	40036.7	Input 7 Status	
0035.8	40036.8	Input 8 Status	
0035.9	40036.9	Input 9 Status	
0035.10	40036.10	Reserved	
0035.11	40036.11	Reserved	
0035.12	40036.12	Reserved	
0035.13	40036.13	Reserved	
0035.14	40036.14	Reserved	
0035.15	40036.15	Reserved	
0036.0	40037.0	Exp. Input 1 Status	0 represents input port is inactive, 1 represents input port is active.

Modbus Address	PLC Address	Item	Description
0036.1	40037.1	Exp. Input 2 Status	
0036.2	40037.2	Exp. Input 3 Status	
0036.3	40037.3	Exp. Input 4 Status	
0036.4	40037.4	Exp. Input 5 Status	
0036.5	40037.5	Exp. Input 6 Status	
0036.6	40037.6	Exp. Input 7 Status	
0036.7	40037.7	Exp. Input 8 Status	
0036.8	40037.8	Exp. Input 9 Status	
0036.9	40037.9	Exp. Input 10 Status	
0036.10	40037.10	Exp. Input 11 Status	
0036.11	40037.11	Exp. Input 12 Status	
0036.12	40037.12	Exp. Input 13 Status	
0036.13	40037.13	Exp. Input 14 Status	
0036.14	40037.14	Exp. Input 15 Status	
0036.15	40037.15	Exp. Input 16 Status	
0037.0	40038.0	Fuel Relay Output Status	1 represents output port is active, 0 represents output port is inactive.
0037.1	40038.1	Crank Relay Output Status	
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	Aux. Output 7 Status	
0037.9	40038.9	Aux. Output 8 Status	
0037.10	40038.10	Aux. Output 9 Status	
0037.11	40038.11	Aux. Output 10 Status	
0037.12	40038.12	Reserved	
0037.13	40038.13	Reserved	
0037.14	40038.14	Reserved	
0037.15	40038.15	Reserved	
0038.0	40039.0	Exp. Output 1 Status	
0038.1	40039.1	Exp. Output 2 Status	
0038.2	40039.2	Exp. Output 3 Status	
0038.3	40039.3	Exp. Output 4 Status	
0038.4	40039.4	Exp. Output 5 Status	
0038.5	40039.5	Exp. Output 6 Status	
0038.6	40039.6	Exp. Output 7 Status	
0038.7	40039.7	Exp. Output 8 Status	
0038.8	40039.8	Exp. Output 9 Status	
0038.9	40039.9	Exp. Output 10 Status	
0038.10	40039.10	Exp. Output 11 Status	

Modbus Address	PLC Address	Item	Description
0038.11	40039.11	Exp. Output 12 Status	
0038.12	40039.12	Exp. Output 13 Status	
0038.13	40039.13	Exp. Output 14 Status	
0038.14	40039.14	Exp. Output 15 Status	
0038.15	40039.15	Exp. Output 16 Status	
0039	40040	Reserved	2Bytes
0040	40041	Reserved	2Bytes
0041	40042	Reserved	2Bytes
0042.0	40043.0	Exp. Input Module Comm. Failure Status	1 represents the status is active, 0 represents the status is inactive.
0042.1	40043.1	Exp. Output Module Comm. Failure Status	
0042.2	40043.2	Reserved	
0042.3	40043.3	Reserved	
0042.4	40043.4	Reserved	
0042.5	40043.5	Reserved	
0042.6	40043.6	Reserved	
0042.7	40043.7	Reserved	
0042.8	40043.8	Reserved	
0042.9	40043.9	Reserved	
0042.10	40043.10	Reserved	
0042.11	40043.11	Reserved	
0042.12	40043.12	Reserved	
0042.13	40043.13	Reserved	
0042.14	40043.14	Reserved	
0042.15	40043.15	Reserved	
0043.0	40044.0	Reserved	1 represents status light is on; 0 represents status light is off.
0043.1	40044.1	Reserved	
0043.2	40044.2	Reserved	
0043.3	40044.3	Reserved	
0043.4	40044.4	Running Status Light	
0043.5	40044.5	Alarm Mute Light	
0043.6	40044.6	Reserved	
0043.7	40044.7	Reserved	
0043.8	40044.8	Reserved	
0043.9	40044.9	Engine Fault Indicator	
0043.10	40044.10	DPF Regeneration Status Light	
0043.11	40044.11	DPF Regeneration Inhibit Indicator	
0043.12	40044.12	DPF Exhaust Temp. High Indicator	
0043.13	40044.13	Reserved	

Modbus Address	PLC Address	Item	Description
0043.14	40044.14	Reserved	
0043.15	40044.15	Driver Warning Light	
0044.0	40045.0	Reserved	
0044.1	40045.1	Reserved	
0044.2	40045.2	Reserved	
0044.3	40045.3	Reserved	
0044.4	40045.4	Reserved	
0044.5	40045.5	Reserved	
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	Reserved	
0044.15	40045.15	Reserved	
0045.0	40046.0	Input 1 Active	0 represents input port is inactive, 1 represents input port is 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	Input 6 Active	
0045.6	40046.6	Input 7 Active	
0045.7	40046.7	Input 8 Active	
0045.8	40046.8	Input 9 Active	
0045.9	40046.9	Reserved	
0045.10	40046.10	Reserved	
0045.11	40046.11	Reserved	
0045.12	40046.12	Reserved	
0045.13	40046.13	Reserved	
0045.14	40046.14	Reserved	
0045.15	40046.15	Reserved	
0046.0	40047.0	Exp. Input 1 Active	0 represents input port is inactive, 1 represents input port is active.
0046.1	40047.1	Exp. Input 2 Active	
0046.2	40047.2	Exp. Input 3 Active	
0046.3	40047.3	Exp. Input 4 Active	
0046.4	40047.4	Exp. Input 5 Active	
0046.5	40047.5	Exp. Input 6 Active	
0046.6	40047.6	Exp. Input 7 Active	

Modbus Address	PLC Address	Item	Description
0046.7	40047.7	Exp. Input 8 Active	
0046.8	40047.8	Exp. Input 9 Active	
0046.9	40047.9	Exp. Input 10 Active	
0046.10	40047.10	Exp. Input 11 Active	
0046.11	40047.11	Exp. Input 12 Active	
0046.12	40047.12	Exp. Input 13 Active	
0046.13	40047.13	Exp. Input 14 Active	
0046.14	40047.14	Exp. Input 15 Active	
0046.15	40047.15	Exp. Input 16 Active	

Example:

If need to read “Emergency Stop Alarm” and “Engine High Temp. Alarm Shutdown”, firstly get their corresponding addresses are 0001.0 and 0002.1 by checking the above table, then it is known that you need to read 2 addresses’ data.

Assume that the slave (controller) address is 01, 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 Decimal	Data Signification
0001	0001H	0000 0000 0000 0001 (correspond to 0001.15, 0001.14.....0001.1, 0001.0)	The data of bit 0 is 1, which represents emergency stop alarm
0002	0002H	0000 0000 0000 0010 (correspond to 0002.15, 0002.14.....0002.1, 0002.0)	The data of bit 0002.1 is 1, which represents engine high temp alarm shutdown

3.2 VALUE DATA FIELD CORRESPONDING TO FUNCTION CODE 03H

Table 6 Value Data Field

Modbus Address	PLC Address	Item	Range (Decimal)	Ratio	Unit	Description	Remark
0047-120	40048-40121	Reserved					
121	40122	Urea Level	(0~100)	1	%	16-bit Signed	
122	40123	SCR Inlet Temp	(-32768~+32767)	1	°C	16-bit Signed	
123	40124	SCR Exhaust Temp	(-32768~+32767)	1	°C	16-bit Signed	
124	40125	Engine Load Rate	(0~250)	1	%	16-bit Signed	
125	40126	Reserved					
126	40127	Reserved					
127	40128	Reserved					
128	40129	Reserved					
129	40130	Reserved					
130	40131	Reserved					
131	40132	Engine Temp	(-32768~+32767)	1	°C	16-bit Signed	
132	40133	Engine OP	(0~32767)	1	kPa	16-bit Signed	
133	40134	Fuel Level	(0~100)	1	%	16-bit Signed	
134	40135	Water Outlet Pressure	(-32768~+32767)	1	kPa	16-bit Signed	
135	40136	Water Inlet Pressure	(-32768~+32767)	1	kPa	16-bit Signed	
136	40137	Pipeline Pressure	(-32768~+32767)	1	kPa	16-bit Signed	
137	40138	Reserved					
138	40139	Reserved					
139	40140	Gearbox Speed	(0~6000)	1	r/min	16-bit Unsigned	
140	40141	Head	(0~65535)	1	m	16-bit Unsigned	
141	40142	Engine Speed	(0~6000)	1	r/min	16-bit Unsigned	
142	40143	Battery 1 Voltage	(0~600)	0.1	V	16-bit Unsigned	
143	40144	Charger Voltage	(0~600)	0.1	V	16-bit Unsigned	
144	40145	Reserved					
145	40146	Battery 2 Voltage	(0~600)	0.1	V	16-bit Unsigned	
146	40147	Flow	(0~65535)	1	m ³ /h	16-bit Unsigned	
147	40148	GOV Output PCT	(-1000~1000)	0.1	%	16-bit Signed	
148	40149	Sensor 1 Resist. Value	(0~65535)			16-bit Unsigned	
149	40150	Sensor 1 Value	(-32768~+32767)			16-bit Signed	
150	40151	Sensor 2 Resist.	(0~65535)			16-bit Unsigned	

Modbus Address	PLC Address	Item	Range (Decimal)	Ratio	Unit	Description	Remark
		Value					
151	40152	Sensor 2 Value	(-32768~+32767)			16-bit Signed	
152	40153	Sensor 3 Resist. Value	(0~65535)			16-bit Unsigned	
153	40154	Sensor 3 Value	(-32768~+32767)			16-bit Signed	
154	40155	Sensor 4 Resist. /Current/Voltage Value	(0~65535)			16-bit Unsigned	
155	40156	Sensor 4 Value	(-32768~+32767)			16-bit Signed	
156	40157	Sensor 5 Resist. /Current/Voltage Value	(0~65535)			16-bit Unsigned	
157	40158	Sensor 5 Value	(-32768~+32767)			16-bit Signed	
158	40159	Sensor 6 Resist. /Current/Voltage Value	(0~65535)			16-bit Unsigned	
159	40160	Sensor 6 Value	(-32768~+32767)			16-bit Signed	
160	40161	Sensor 7 Resist. /Current/Voltage Value	(0~65535)			16-bit Unsigned	
161	40162	Sensor 7 Value	(-32768~+32767)			16-bit Signed	
162	40163	Coolant Pressure	(0~32767)	1	kPa	16-bit Signed	
163	40164	Coolant Level	(0~100)	1	%	16-bit Signed	
164	40165	Fuel Pressure	(0~32767)	1	kPa	16-bit Signed	
165	40166	Fuel Temp	(-40~+32767)	1	°C	16-bit Signed	
166	40167	Oil Temp	(-40~+32767)	1	°C	16-bit Signed	
167	40168	Inlet Temp	(-40~+32767)	1	°C	16-bit Signed	
168	40169	Turbo Pressure	(0~32767)	1	kPa	16-bit Signed	
169	40170	Exhaust Temp	(-40~+32767)	1	°C	16-bit Signed	
170	40171	Fuel Consumption	(0~32767)	0.1	L	16-bit Signed	
171	40172	Total Fuel	(0~99999999)	1	L	32-bit Signed	
172	40173	Consumption					

Modbus Address	PLC Address	Item	Range (Decimal)	Ratio	Unit	Description	Remark
173	40174	Sensor 8 Resist. /Current/Voltage Value	(0~65535)			16-bit Unsigned	
174	40175	Sensor 8 Value	(-32768~+32767)			16-bit Signed	
175	40176	Sensor 9 Current Value	(0~65535)			16-bit Unsigned	
176	40177	Sensor 9 Value	(-32768~+32767)			16-bit Signed	
177	40178	Sensor 10 Current Value	(0~65535)			16-bit Unsigned	
178	40179	Sensor 10 Value	(-32768~+32767)			16-bit Signed	
179	40180	Reserved					
180	40181	Reserved					
181	40182	Reserved					
182	40183	Current Stat Flow	(0~99999999)	1	m ³	32-bit Unsigned	
183	40184						
184	40185	Reserved					
185	40186	Reserved					
186	40187	Reserved					
187	40188	Reserved					
188	40189	Reserved					
189	40190	Engine Status	(0~15)	No.		16-bit Unsigned	See Table 13 Engine Status
190	40191	Engine Delay Value	(0~3600)	1	s	16-bit Unsigned	
191	40192	Remote Start Status	(0~2)	No.		16-bit Unsigned	1: Remote Start 2: Remote Stop
192	40193	Remote Start Delay Value	(0~3600)	1	s	16-bit Unsigned	
193	40194	Reserved					
194	40195	Reserved					
195	40196	Reserved					
196	40197	Reserved					
197	40198	Reserved					

Modbus Address	PLC Address	Item	Range (Decimal)	Ratio	Unit	Description	Remark
198	40199	Reserved					
199	40200	Total Run Hours	(0~65535)	1	h	16-bit Unsigned	
200	40201	Total Run Minutes	(0~59)	1	min	16-bit Unsigned	
201	40202	Total Run Seconds	(0~59)	1	s	16-bit Unsigned	
202	40203	Total Start Times	(0-65535)	1		16-bit Unsigned	
203	40204	Total Flow	(0~99999999)	1	M ³	32-bit Unsigned	
204	40205						
205	40206	Reserved					
206	40207	Reserved					
207	40208	Reserved					
208	40209	Reserved					
209	40210	Reserved					
210	40211	Reserved					
211	40212	Maint. 1 Left Time (h)	(0~65535)	1	h	16-bit Unsigned	
212	40213	Maint. 1 Left Time (min)	(0~59)	1	min	16-bit Unsigned	
213	40214	Maint. 1 Left Time (s)	(0~59)	1	s	16-bit Unsigned	
214	40215	Reserved					
215	40216	Reserved					
216	40217	Reserved					
217	40218	Controller Model					
218	40219	Controller Software Version					
219	40220	Controller Hardware Version					
220	40221	Release Year	(0~99)	1		Only save last two digits of Year	
221	40222	Release Month	(1~12)	1		16-bit Unsigned	
222	40223	Release Day	(1~31)	1		16-bit Unsigned	
223	40224	Reserved					
224	40225	Reserved					
225	40226	Controller Time: Year	(0~99)			Only save last two digits of Year	
226	40227	Controller Time: Month	(1~12)	1		16-bit Unsigned	
227	40228	Controller Time:	(1~31)	1		16-bit Unsigned	

Modbus Address	PLC Address	Item	Range (Decimal)	Ratio	Unit	Description	Remark
		Day					
228	40229	Controller Time: Week	(0~6)	1		16-bit Unsigned	
229	40230	Controller Time: Hour	(0~23)	1	h	16-bit Unsigned	
230	40231	Controller Time: min	(0~59)	1	min	16-bit Unsigned	
231	40232	Controller Time: s	(0~59)	1	s	16-bit Unsigned	
232	40233	Reserved					
233	40234	Reserved					
234	40235	Reserved					
235	40236	Reserved					
236	40237	Reserved					
237	40238	Reserved					
238	40239	AIN8 Sensor 1 Resist./Current/ Voltage Value	(0~65535)			16-bit Unsigned	
239	40240	AIN8 Sensor 2 Resist./Current/ Voltage Value	(0~65535)			16-bit Unsigned	
240	40241	AIN8 Sensor 3 Resist./Current/ Voltage Value	(0~65535)			16-bit Signed	
241	40242	AIN8 Sensor 4 Resist./Current/ Voltage Value	(0~65535)			16-bit Unsigned	
242	40243	AIN8 Sensor 5 Resist./Current/ Voltage Value	(0~65535)			16-bit Unsigned	
243	40244	AIN8 Sensor 6 Resist./Current/ Voltage Value	(0~65535)			16-bit Unsigned	
244	40245	AIN8 Sensor 7 Resist./Current/ Voltage Value	(0~65535)			16-bit Unsigned	
245	40246	AIN8 Sensor 8 Resist./Current/ Voltage Value	(0~65535)			16-bit Unsigned	
246	40247	AIN8 Sensor 1 Value	(-32768~+32767)			16-bit Signed	
247	40248	AIN8 Sensor 2 Value	(-32768~+32767)			16-bit Signed	

Modbus Address	PLC Address	Item	Range (Decimal)	Ratio	Unit	Description	Remark
248	40249	AIN8 Sensor 3 Value	(-32768~+32767)			16-bit Signed	
249	40250	AIN8 Sensor 4 Value	(-32768~+32767)			16-bit Signed	
250	40251	AIN8 Sensor 5 Value	(-32768~+32767)			16-bit Signed	
251	40252	AIN8 Sensor 6 Value	(-32768~+32767)			16-bit Signed	
252	40253	AIN8 Sensor 7 Value	(-32768~+32767)			16-bit Signed	
253	40254	AIN8 Sensor 8 Value	(-32768~+32767)			16-bit Signed	
254	40255	Reserved					
255	40256	Reserved					
256	40257	Reserved					
257	40258	Reserved					
258	40259	Maint. 2 Left Time (h)	(0~65535)	1	h	16-bit Unsigned	
259	40260	Maint. 2 Left Time (min)	(0~59)	1	min	16-bit Unsigned	
260	40261	Maint. 2 Left Time (s)	(0~59)	1	s	16-bit Unsigned	
261	40262	Maint. 3 Left Time (h)	(0~65535)	1	h	16-bit Unsigned	
262	40263	Maint. 3 Left Time (min)	(0~59)	1	min	16-bit Unsigned	
263	40264	Maint. 3 Left Time (s)	(0~59)	1	s	16-bit Unsigned	
264	40265	Maint. 4 Left Time (h)	(0~65535)	1	h	16-bit Unsigned	
265	40266	Maint. 4 Left Time (min)	(0~59)	1	min	16-bit Unsigned	
266	40267	Maint. 4 Left Time (s)	(0~59)	1	s	16-bit Unsigned	
267	40268	Maint. 5 Left Time (h)	(0~65535)	1	h	16bit Unsigned	
268	40269	Maint. 5 Left Time (min)	(0~59)	1	min	16-bit Unsigned	
269	40270	Maint. 5 Left Time (s)	(0~59)	1	s	16-bit Unsigned	
270	40271	User Subtotal Run Hours A	(0~65535)	1	h	16-bit Unsigned	
271	40272	User Subtotal	(0~59)	1	min	16-bit Unsigned	

Modbus Address	PLC Address	Item	Range (Decimal)	Ratio	Unit	Description	Remark
		Run Minutes A					
272	40273	User Subtotal Run Seconds A	(0~59)	1	s	16-bit Unsigned	
273	40274	User Subtotal Start Times A	(0~65535)	1		16-bit Unsigned	
274	40275	Reserved					
275	40276	Reserved					
276	40277	User Subtotal Run Hours B	(0~65535)	1	h	16-bit Unsigned	
277	40278	User Subtotal Run Minutes B	(0~59)	1	min	16-bit Unsigned	
278	40279	User Subtotal Run Seconds B	(0~59)	1	s	16-bit Unsigned	
279	40280	User Subtotal Start Times B	(0~65535)	1		16-bit Unsigned	
280	40281	Reserved					
281	40282	Reserved					
282	40283	Reserved					
283	40284	Reserved					
284	40285	Reserved					
285	40286	Reserved					
286	40287	Reserved					
287	40288	Reserved					
288	40289	Reserved					
289	40290	Reserved					
290	40291	Reserved					
291	40292	Reserved					
292	40293	Reserved					
293	40294	Reserved					

NOTE1: Actual value=Received Data*Ratio. Take voltage as the example, received data is 276 (114H), ratio is 0.1V, so the actual voltage 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 Consumption (current is 123456L)”, firstly get addresses are 0171 and 0172 by checking the table, then it is known that you need to read 2 bytes’ data.

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

Table 7 Master Request Command

Slave Address	Function Code	Remote Address (0171)		Request Data (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 8 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, which is shown as the following:

Table 9 Data Analysis

Address	Received Data (Hex)	Combination (Hex)	S1 Total Close Times (Decimal)
0171	E240H	0001E240H	123456
0172	0001H		

3.3 REMOTE COIL FIELD CORRESPONDING TO FUNCTION CODE 05H

Table 10 Remote Coil Field

Modbus Address	PLC Address	Item	Description
0	1	Remote Start Key	Only send FF00H active
1	2	Remote Stop Key	Only send FF00H active
2	3	Reserved	
3	4	Remote Auto Key	Only send FF00H active
4	5	Remote Manual Key	Only send FF00H active
5	6	Remote GOV Key	Only send FF00H active
6	7	Remote Alarm Reset	Only send FF00H active
7	8	Remote Up Key	Only send FF00H active
8	9	Remote Down Key	Only send FF00H active
9	10	Remote Left Key	Only send FF00H active
10	11	Remote Right Key	Only send FF00H active
11	12	Remote Confirm/Page Key	Only send FF00H active
12	13	Remote ESE Key	Only send FF00H active
13	14	Remote Speed Up Key	Only send FF00H active
14	15	Remote Speed Down Key	Only send FF00H active
15	16	Remote Fast Stop	Only send FF00H active
16	17	Reserved	
17	18	Reserved	
18	19	Reserved	
19	20	Reserved	

Modbus Address	PLC Address	Item	Description
20	21	Remote Output Port 1 Output	Only send FF00H active
21	22	Remote Output Port 2 Output	Only send FF00H active
22	23	Remote Output Port 3 Output	Only send FF00H active
23	24	Remote Output Port 4 Output	Only send FF00H active
24	25	Remote Output Port 5 Output	Only send FF00H active
25	26	Remote Output Port 6 Output	Only send FF00H active
26	27	Remote Output Port 7 Output	Only send FF00H active
27	28	Remote Output Port 8 Output	Only send FF00H active
28	29	Remote Output Port 9 Output	Only send FF00H active
29	30	Remote Output Port 10 Output	Only send FF00H active
30	31	Reserved	
31	32	Reserved	
32	33	Reserved	
33	34	Reserved	
34	35	Speed Up X1	
35	36	Speed Down X1	
36	37	Speed Up X10	
37	38	Speed Down X10	
38	39	Reserved	
39	40	Reserved	

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

Example:

Remotely control controller to start, get its remote 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

Table 13 Engine Status

No.	Item	Description
0	Standby	No delay value for this status
1	Preheat	
2	Fuel Output	No delay value for this status
3	Crank	
4	Crank Rest	
5	Safety Delay	
6	Start Idle	
7	High-speed Warming Up	
8	Wait for Load	No delay value for this status
9	Normal Running	No delay value for this status
10	High-speed Cooling	
11	Stop Idle	
12	ETS	
13	Wait for Stop	
14	After Stop	
15	Stop Failure	No delay value for this status

4 COMMUNICATION PARAMETER CONFIGURATION

- 1) In the home page of main interface, press  key to enter menu interface;
- 2) Press  key to select "Parameter Setting", then press  key to enter parameter password interface;
- 3) Input correct password (default 00318), 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, corresponding parameters will be in the selected status;
- 6) Set the current selected content via ,  key, press ,  to select the item needs to be modified at the same time, and then press  key to confirm, after the editing is completed, the selected status will disappear;
- 7) The setting method of "RS485 Communication Setting" is same as the above. "Baud Rate", "Stop Bit", "Parity Bit" can be set;
- 8) Press  key to return the previous interface.

NOTE: The configuration will be active when power is off after RS485 communication setting is completed.

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 optical fiber relay modules.

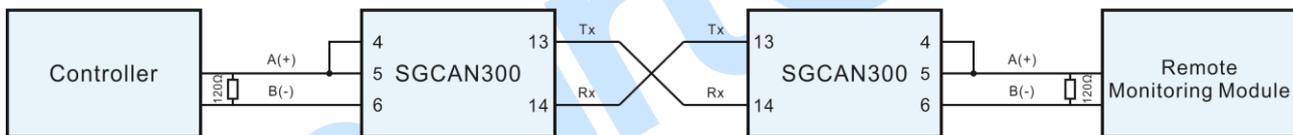


Fig.3 SGCAN300 Application Diagram

5.5 COMMON SOLUTIONS OF COMMUNICATION FAILURE

- 1) Check whether the positive and negative of RS485 is correctly connected;
- 2) Check whether the communication parameter in parameter setting is correct;
- 3) Check whether the RS485 converter (if configured) is normal;
- 4) Check whether the terminal resistor is correctly connected;
- 5) Disconnect the connection line of controller's RS485, measure the voltage difference of RS485's A and B terminal. If the difference is between +200mV, it means communication port has abnormal situation;
- 6) It is recommended to download third-party communication software such as modscan32, modbus poll to check whether communication is normal.