SmartGen

MAKING CONTROL SMARTER

HED200

ENGINE MONITORING MODULE

COMMUNICATION PROTOCOL

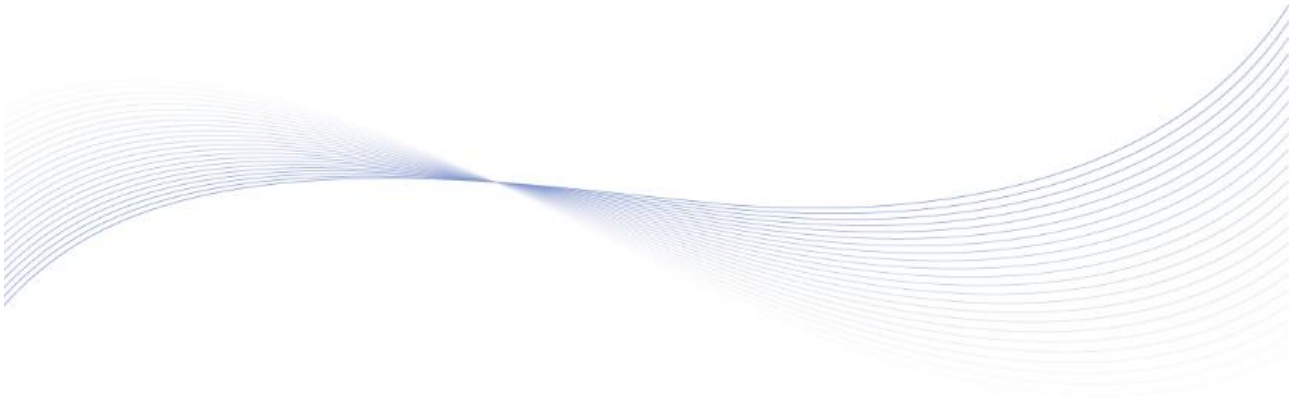

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Table 1 Software Version

Date	Version	Content
2024-06-19	V1.0	Original release.

1 DESCRIPTION

This protocol describes the module RS485 half-duplex serial port's reading and writing command format, and the definition of internal information & data for the third-party to develop and use.

The module works as a slave module, and uses Modbus-RTU protocol, but it doesn't support other protocols, such as Modbus-ASCII, etc.

Communication address: 1~254 (Default: 1)

Baud rate: 9600/19200/38400bps (Default: 9600bps)

Start bit: 1 bit

Data bit: 8 bits

Parity bit: None

Stop bit: 1 bit or 2 bits (Default: 1 bit)

Function code supported: 03H, 06H. Function code 03H is used for reading controller's alarms, status and various kinds of electric parameters; Function code 06H is used for writing single point register.

Data checking method: CRC16.

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

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 modules.

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

2 WIRING DIAGRAM

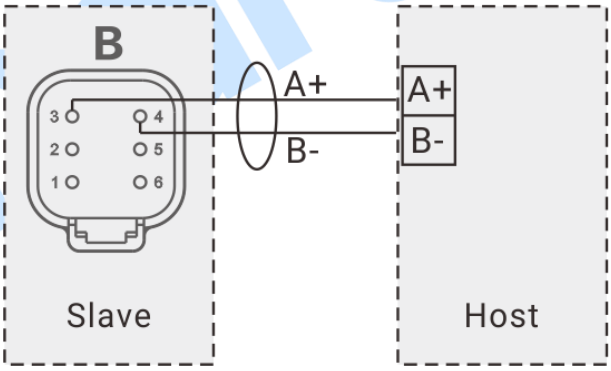

Fig.1 Single Device Communication Wiring Diagram

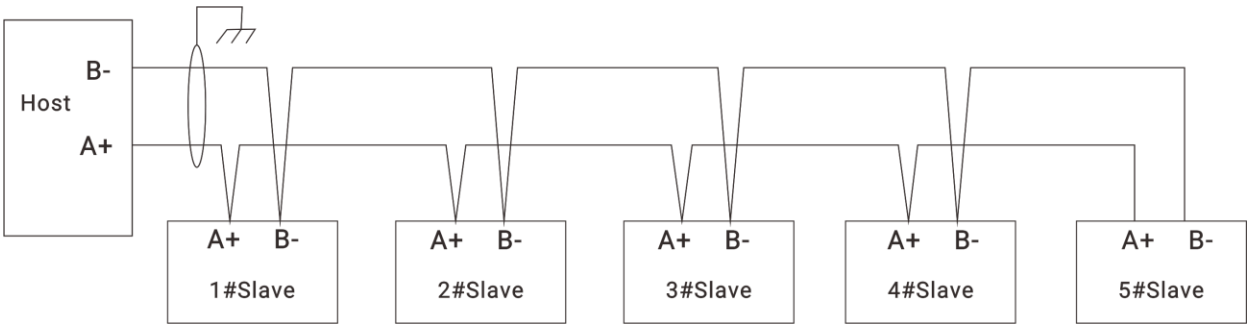

Fig.2 Multiple Devices Communication Wiring Diagram

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

3 MODULE INTERNAL REGISTER ADDRESS AND DATA

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

Table 2 Alarm and Coil Status of Data Field

Modbus Address	Function	Description
000.0	Common Alarm	"0" means there is no common alarm "1" means there are common alarms (000.0 means the Boolean value at bit 0 of address 000) The content listed below follows the same rule
000.1	Common Warning	
000.2	/	
000.3	Normal Running	
000.4	LCD Heating Status	
000.5	/	
000.6	/	
000.7	/	
000.8	/	
000.9	/	
000.10	/	
000.11	/	
000.12	/	
000.13	Output Status	
000.14	Input 1 Status	
000.15	Input 2 Status	
001.0	Sensor 1 Open Warning	
001.1	Sensor 1 High Warning	
001.2	Sensor 1 Low Warning	
001.3	Sensor 1 Error	
001.4	Sensor 2 Open Warning	
001.5	Sensor 2 High Warning	
001.6	Sensor 2 Low Warning	
001.7	Sensor 2 Error	
001.8	Maintenance 1 Warning	
001.9	Maintenance 2 Warning	
001.10	Maintenance 3 Warning	
001.11	Maintenance 4 Warning	
001.12	Maintenance 5 Warning	
001.13	Battery Undervoltage Warning	
001.14	Battery Overvoltage Warning	
001.15	Engine Overspeed Warning	
002.0	Charging Failure	
002.1	/	

Modbus Address	Function	Description
002.2	/	
002.3	/	
002.4	/	
002.5	Input 1 Warning	
002.6	Input 2 Warning	
002.7	High Coolant Temp. Input Warning	
002.8	Low Oil Pressure Input Warning	
002.9	/	
002.10	High Coolant Temp. Warning	
002.11	Low Coolant Temp. Warning	
002.12	Coolant Temperature Open Warning	
002.13	High Oil Pressure Warning	
002.14	Low Oil Pressure Warning	
002.15	Oil Pressure Open	
003	/	
004	/	
005	/	
006	/	
007	/	
008	/	
009	/	
010	/	
011	/	
012	/	
013	/	
014	/	

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3.2 FUNCTION CODE 03H MAPPING PARAMETERS OF DATA FIELD

Table 3 Parameters of Data Field

Modbus Address	Function	Ratio	Unit	Description	Remarks
0015	Engine Speed	1	rpm	16-bit Unsigned	
0016	/				
0017	/				
0018	Battery Voltage	0.1	V	16-bit Signed	
0019	Charger Voltage	0.1	V	16-bit Signed	
0020	Coolant Temp. Resistance Value	0.1	Ω	16-bit Signed	
0021	Coolant Temp.	1	°C	16-bit Signed	
0022	Oil Pressure Resistance/Current Value	0.1/0.01	Ω/mA	16-bit Unsigned	
0023	Engine Oil Pressure	1	kPa	16-bit Signed	
0024	/				
0025	/				
0026	/				
0027	/				
0028	/				
0029	/				
0030	/				
0031	/				
0032	/				
0033	/				
0034	/				
0035	/				
0036	/				
0037	/				
0038	/				
0039	/				
0040	/				
0041	/				
0042	/				
0043	/				
0044	/				
0045	/				
0046	/				
0047	/				
0048	/				
0049	/				
0050	/				
0051	/				
0052	/				

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Modbus Address	Function	Ratio	Unit	Description	Remarks
0053	/				
0054	/				
0055	Aux. Sensor 1 Resistance/Current	0.1/0.01	Ω/mA	16-bit Unsigned	
0056	Aux. Sensor 1 Value	1		16-bit Signed	
0057	Aux. Sensor 2 Resistance/Current	0.1/0.01	Ω/mA	16-bit Unsigned	
0058	Aux. Sensor 2 Value	1		16-bit Signed	
0059	Number of Event Log	1		16-bit Unsigned	
0060	Running Hours	1	h	16-bit Unsigned	
0061	Running Minutes	1	min	16-bit Unsigned	
0062	Running Seconds	1	s	16-bit Unsigned	
0063	SCM Temp.	0.1	°C	16-bit Signed	
0064	LCD Temp.	0.01	°C	16-bit Signed	
0065	Controller Model			16-bit Unsigned	
0066	Controller Software Version	0.1		16-bit Unsigned	
0067	Controller Hardware Version	0.1		16-bit Unsigned	
0068	Release Year	1		16-bit Unsigned	Save the last two digits of the Year only.
0069	Release Month	1		16-bit Unsigned	
0070	Released Day	1		16-bit Unsigned	
0071	/				
0072	Controller Date: Year	1		16-bit Unsigned	Save the last two digits of the Year only.
0073	Controller Date: Month	1		16-bit Unsigned	
0074	Controller Date: Day	1		16-bit Unsigned	
0075	Controller Date: Week	1		16-bit Unsigned	
0076	Controller Time: Hour	1	h	16-bit Unsigned	
0077	Controller Time: Minute	1	min	16-bit Unsigned	
0078	Controller Time: Second	1	s	16-bit Unsigned	
0079	/				
0080	Maintenance 1 Countdown Hour	1	h	16-bit Unsigned	
0081	Maintenance 1 Countdown Minute	1	min	16-bit Unsigned	
0082	Maintenance 1 Countdown Second	1	s	16-bit Unsigned	
0083	Maintenance 2 Countdown Hour	1	h	16-bit Unsigned	
0084	Maintenance 2 Countdown Minute	1	min	16-bit Unsigned	
0085	Maintenance 2 Countdown Second	1	s	16-bit Unsigned	
0086	Maintenance 3 Countdown Hour	1	h	16-bit Unsigned	
0087	Maintenance 3 Countdown Minute	1	min	16-bit Unsigned	

Modbus Address	Function	Ratio	Unit	Description	Remarks
0088	Maintenance 3 Countdown Second	1	s	16-bit Unsigned	
0089	Maintenance 4 Countdown Hour	1	h	16-bit Unsigned	
0090	Maintenance 4 Countdown Minute	1	min	16-bit Unsigned	
0091	Maintenance 4 Countdown Second	1	s	16-bit Unsigned	
0092	Maintenance 5 Countdown Hour	1	h	16-bit Unsigned	
0093	Maintenance 5 Countdown Minute	1	min	16-bit Unsigned	
0094	Maintenance 5 Countdown Second	1	s	16-bit Unsigned	
0095	Key1 Count Value	1		16-bit Unsigned	
0096	Key2 Count Value	1		16-bit Unsigned	
0097	Key3 Count Value	1		16-bit Unsigned	
0098	Key4 Count Value	1		16-bit Unsigned	

3.3 FUNCTION CODE 06H MAPPING DATA REGISTER FIELD

Table 4 Data Register Field

Modbus Address	Function	Ratio	Description	Remarks
0000-0072	/			
0072	Controller Date: Year	1	16-bit Unsigned	Save the last two digits of the Year only.
0073	Controller Date: Month	1	16-bit Unsigned	
0074	Controller Date: Day	1	16-bit Unsigned	

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4 EXAMPLES OF MESSAGE FRAME FORMAT

4.1 FUNCTION CODE 03H

With the slave address 01 and the start address 0026H, three pieces of data are as follows (each data length is 2 bytes).

Table 5 Examples of Data Address

Address	Data (Hex)
0026H	0014
0027H	0014
0028H	0005

Table 6 Examples of 03H Master/Host Request

Master/Host Request	Bytes	Examples (Hex)	
Slave Address	1	01	Send to Slave 01
Function Code	1	03	Read single point register
Start Address	2	00 26	Start address is 0026H
Quantity of Registers	2	00 03	Read 3 registers (6 bytes in total)
CRC Code	2	E4 00	CRC code calculated by the master/host

Table 7 Examples of 03H Slave Response

Slave Response	Bytes	Examples (Hex)	
Slave Address	1	01	Return the slave address 01
Function Code	1	03	Read single point register
Quantity of Bytes	1	06	Read 3 registers (6 bytes in total)
Point 1 Data	2	00 14	Content of Address 0026H
Point 2 Data	2	00 14	Content of Address 0027H
Point 3 Data	2	00 05	Content of Address 0028H
CRC Code	2	91 71	CRC code calculated by the slave