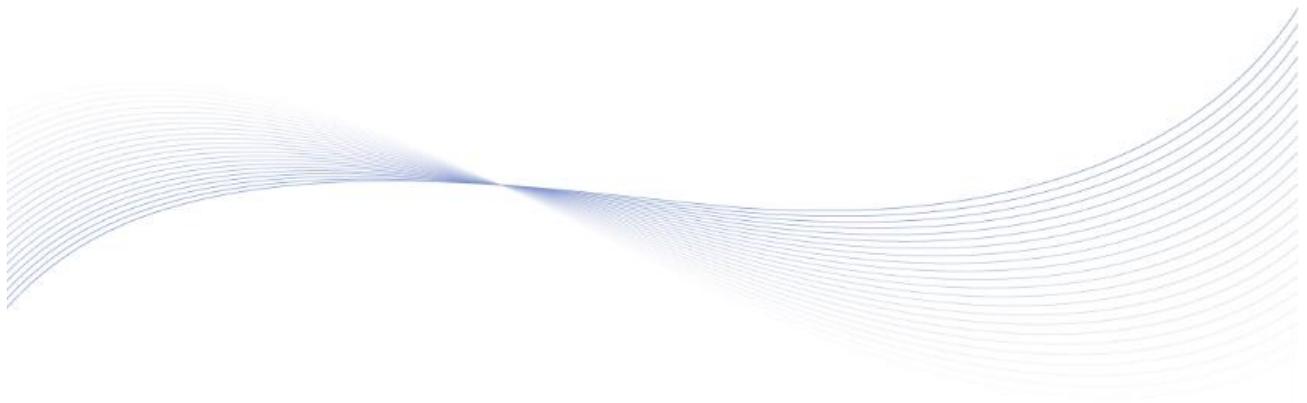




EP4301
ENGINE CONTROLLER
COMMUNICATION PROTOCOL



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

All rights reserved. No part of this publication may be reproduced in any material form (including photocopying or storing in any medium by electronic means or other) without the written permission of the copyright holder.

SmartGen reserves the right to change the contents of this document without prior notice.

Table 1 Software Version

Date	Version	Content
2024-10-23	V1.0	Original release.

CONTENTS

1 DESCRIPTION.....	4
2 WIRING DIAGRAM.....	4
3 ADDRESS AND DATA OF CONTROLLER INTERNAL REGISTERS	5
3.1 FUNCTION CODE 01H MAPPING COIL FIELD.....	5
3.2 FUNCTION CODE 03H MAPPING PARAMETERS OF DATA FIELD	8
3.3 ENGINE RUNNING STATUS.....	17
4 CONFIGURATION OF COMMUNICATION PARAMETERS.....	18
5 FAQ	19
5.1 GROUNDING OF THE CABLE SHIELD	19
5.2 RS485 TO USB CONVERTER.....	19
5.3 SOLUTIONS FOR COMMUNICATION FAILURE.....	19

SmartGen

1 DESCRIPTION

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

The EP4301 engine controller has one RS485 port and one USB port, and both follow the same communication protocol.

The controller works as a slave module. It supports the Modbus-RTU protocol but 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 parity, odd parity and even parity (Default: no parity)

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

Function code supported: 01H and 03H. Function code 01H is used for reading the alarms of the controller, and function code 03H is used for reading the status and various real-time data of the controller.

Data checking method: CRC16.

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

Communication timeout period: over 200ms.

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

A maximum of 120 registers can be read per request.

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

2 WIRING DIAGRAM

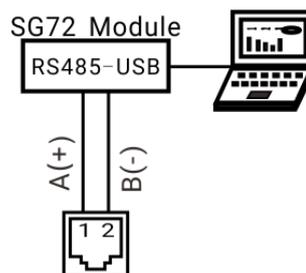


Fig. 1 RS485 Communication Wiring Diagram

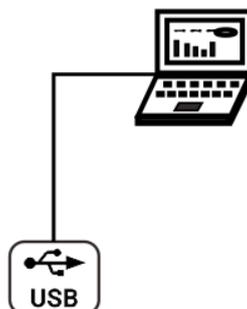


Fig. 2 USB Communication Wiring Diagram

3 ADDRESS AND DATA OF CONTROLLER INTERNAL REGISTERS

3.1 FUNCTION CODE 01H MAPPING COIL FIELD

Table 2 Alarm and Status Coils of Data Field

Modbus Address	PLC Address	Item	Description
000.0	40001.0	Common Alarm	"0" means no common alarm occurs "1" means a common alarm is active (000.0 means the Boolean value at Bit0 of address 000) The content listed below follows the same rule
000.1	40001.1	Common Warning Alarm	
000.2	40001.2	Common Shutdown Alarm	
000.3	40001.3	Reserved	
000.4	40001.4	Reserved	
000.5	40001.5	Reserved	
000.6	40001.6	Reserved	
000.7	40001.7	Reserved	
000.8	40001.8	Emergency Stop Output	
000.9	40001.9	Overspeed Shutdown	
000.10	40001.1	Underspeed Shutdown	
000.11	40001.11	Reserved	
000.12	40001.12	High Engine Temp. Shutdown	
000.13	40001.13	Low Oil Pressure Shutdown	
000.14	40001.14	Maintenance 2 Shutdown	
000.15	40001.15	Maintenance 1 Shutdown	
001.0	40002.0	Overspeed Warning	
001.1	40002.1	Reserved	
001.2	40002.2	Reserved	
001.3	40002.3	Reserved	
001.4	40002.4	Maintenance 1 Warning	
001.5	40002.5	Maintenance 2 Warning	
001.6	40002.6	Maintenance 3 Warning	
001.7	40002.7	Reserved	
001.8	40002.8	Reserved	
001.9	40002.9	Reserved	
001.10	40002.1	High Engine Temp. Warning	
001.11	40002.11	Stop Failure Warning	
001.12	40002.12	Low Fuel Level Warning	
001.13	40002.13	Charge Alternator Failure Warning	
001.14	40002.14	Battery Undervoltage Warning	
001.15	40002.15	Battery Overvoltage Warning	
002.0	40003.0	Sensor 5 Open Warning	

Modbus Address	PLC Address	Item	Description
002.1	40003.1	Reserved	
002.2	40003.2	Sensor 4 Open Warning	
002.3	40003.3	Sensor 1 Open Warning	
002.4	40003.4	Sensor 2 Open Warning	
002.5	40003.5	Sensor 3 Open Warning	
002.6	40003.6	Reserved	
002.7	40003.7	Low Oil Pressure Warning	
002.8	40003.8	Maintenance 3 Shutdown	
002.9	40003.9	Flex. Sensor 4 Open Shutdown	
002.10	40003.1	Flex. Sensor 5 Open Shutdown	
002.11	40003.11	Flex. Sensor 6 Open Shutdown	
002.12	40003.12	Flex. Sensor 1 Open Shutdown	
002.13	40003.13	Flex. Sensor 2 Open Shutdown	
002.14	40003.14	Flex. Sensor 3 Open Shutdown	
002.15	40003.15	Start Failure Alarm	
003.0	40004.0	Reserved	
003.1	40004.1	Input 1 Status	
003.2	40004.2	Input 2 Status	
003.3	40004.3	Input 3 Status	
003.4	40004.4	Reserved	
003.5	40004.5	Reserved	
003.6	40004.6	Reserved	
003.7	40004.7	Reserved	
003.8	40004.8	Crank Relay Output	
003.9	40004.9	Fuel Relay Output	
003.10	40004.1	Aux. Output 1 Status	
003.11	40004.11	Aux. Output 2 Status	
003.12	40004.12	Aux. Output 3 Status	
003.13	40004.13	CAN Termination Resistor Status	
003.14	40004.14	RS485 Termination Resistor	
003.15	40004.15	Reserved	
004.0	40005.0	Reserved	
004.1	40005.1	Reserved	
004.2	40005.2	Reserved	
004.3	40005.3	Reserved	
004.4	40005.4	Reserved	
004.5	40005.5	Reserved	
004.6	40005.6	Reserved	
004.7	40005.7	Reserved	
004.8	40005.8	Sensor 6 Open Warning	
004.9	40004.9	Sensor 6 High Warning	
004.10	40004.10	Sensor 6 Low Warning	
004.11	40004.11	Reserved	

Modbus Address	PLC Address	Item	Description
0004.12	40004.12	Reserved	
0004.13	40004.13	Reserved	
0004.14	40004.14	Regeneration service required	
0004.15	40004.15	ECU Warning	
0005.0	40005.0	ECU Shutdown	
0005.1	40005.1	ECU Comm. Failure Shutdown	
0005.2	40005.2	Sensor 4 High Shutdown	
0005.3	40005.3	Sensor 4 Low Shutdown	
0005.4	40005.4	Sensor 6 High Shutdown	
0005.5	40005.5	Sensor 6 Low Shutdown	
0005.6	40005.6	High Water Temp. Shutdown	
0005.7	40005.7	Low Oil Pressure Shutdown	
0005.8	40005.8	Sensor 1 High Warning	
0005.9	40005.9	Sensor 1 Low Warning	
0005.10	40005.10	Sensor 2 High Warning	
0005.11	40005.11	Sensor 2 Low Warning	
0005.12	40005.12	Sensor 3 High Warning	
0005.13	40005.13	Sensor 3 Low Warning	
0005.14	40005.14	Sensor 4 High Warning	
0005.15	40005.15	Sensor 4 Low Warning	
0006.0	40006.0	Sensor 1 High Shutdown	
0006.1	40006.1	Sensor 1 Low Shutdown	
0006.2	40006.2	Sensor 2 High Shutdown	
0006.3	40006.3	Sensor 2 Low Shutdown	
0006.4	40006.4	Sensor 3 High Shutdown	
0006.5	40006.5	Sensor 3 Low Shutdown	
0006.6	40006.6	Sensor 5 High Shutdown	
0006.7	40006.7	Sensor 5 Low Shutdown	
0006.8	40006.8	Input 1 Warning	
0006.9	40006.9	Input 2 Warning	
0006.10	40006.10	Input 3 Warning	
0006.11	40006.11	Sensor 5 High Warning	
0006.12	40006.12	Sensor 5 Low Warning	
0006.13	40006.13	Reserved	
0006.14	40006.14	Reserved	
0006.15	40006.15	Reserved	
0007.0	40007.0	Input 1 Shutdown	
0007.1	40007.1	Input 2 Shutdown	
0007.2	40007.2	Input 3 Shutdown	
0007.3	40007.3	Reserved	
0007.4	40007.4	Reserved	
0007.5	40007.5	Reserved	
0007.6	40007.6	Reserved	

Modbus Address	PLC Address	Item	Description
0007.7	40007.7	Reserved	

EXAMPLE:

The slave address is 00, read 32 coils of the start address 000.0.

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

Table 3 Master (PC) Request Frame

Slave Address	Function Code	Start Address (0000H)		Request Data Length (32)		CRC 16	
		MSB	LSB	MSB	LSB	LSB	MSB
01	01	00	00	00	20	3D	D2

The slave response is as following:

Table 4 Slave (Controller) Response Frame

Slave Address	Function Code	Data Length (Bytes)	Data				CRC 16	
			Data 1	Data 2	Data 3	Data 4	LSB	MSB
01	01	04	Data of Address 000.7-000.0	Data of Address 000.15-000.8	Data of Address 001.7-001.0	Data of Address 001.15-001.8	18	26

Data Analysis:

The value of Coils 000.7-000.0 is 30H in hexadecimal, and 00110000 in binary. The Coil 000.7 is the high order bit and the Coil 000.0 is the low order bit. The status of the Coils 000.7-000.0 is OFF-OFF-ON-ON-OFF-OFF-OFF.

3.2 FUNCTION CODE 03H MAPPING PARAMETERS OF DATA FIELD

Table 5 Parameters of Data Field

Modbus Address	PLC Address	Item	Range (Decimal)	Ratio	Unit	Description	Remarks
0000	40001	Reserved					
0001	40002	Reserved					
0002	40003	Reserved					
0003	40004	Reserved					
0004	40005	Reserved					
0005	40006	Reserved					
0006	40007	Reserved					
0007	40008	Reserved					
0008	40009	Reserved					
0009	40010	Reserved					
0010	40011	Reserved					
0011	40012	Reserved					
0012	40013	Reserved					
0013	40014	Reserved					
0014	40015	Reserved					

Modbus Address	PLC Address	Item	Range (Decimal)	Ratio	Unit	Description	Remarks
0015	40016	Reserved					
0016	40017	Reserved					
0017	40018	Reserved					
0018	40019	Reserved					
0019	40020	Reserved					
0020	40021	Reserved					
0021	40022	Reserved					
0022	40023	Reserved					
0023	40024	Reserved					
0024	40025	Reserved					
0025	40026	Reserved					
0026	40027	Reserved					
0027	40028	Reserved					
0028	40029	Reserved					
0029	40030	Reserved					
0030	40031	Reserved					
0031	40032	Reserved					
0032	40033	Reserved					
0033	40034	Reserved					
0034	40035	Flex. Sensor 1 Value	(-32768~+32767)	1		16-bit Signed	
0035	40036	Flex. Sensor 1 Sampling Value	(0~65535)	0.1		16-bit Unsigned	
0036	40037	Flex. Sensor 2 Value	(-32768~+32767)	1		16-bit Signed	
0037	40038	Flex. Sensor 2 Sampling Value	(0~65535)	0.1		16-bit Unsigned	
0038	40039	Aux. Sensor 3 Value	(-32768~+32767)	1		16-bit Signed	
0039	40040	Flex. Sensor 3 Sampling Value	(0~65535)	0.1		16-bit Unsigned	
0040	40041	Speed	(0~9999)	1	r/min	16-bit Unsigned	
0041	40042	Battery Voltage	(0~50)	0.1	V	16-bit Unsigned	
0042	40043	D+ Voltage	(0~32767)	0.1	V	16-bit Unsigned	
0043	40044	Reserved					
0044	40045	Reserved					
0045	40046	Reserved					
0046	40047	Reserved					
0047	40048	Reserved					
0048	40049	Reserved					
0049	40050	Reserved					
0050	40051	Reserved					
0051	40052	Reserved					

Modbus Address	PLC Address	Item	Range (Decimal)	Ratio	Unit	Description	Remarks
0052	40053	Reserved					
0053	40054	Reserved					
0054	40055	Reserved					
0055	40056	Reserved					
0056	40057	Reserved					
0057	40058	Reserved					
0058	40059	Reserved					
0059	40060	Controller Running Status	(0~15)	No.		16-bit Unsigned	See details in Table 9 Engine Running Status
0060	40061	Delay	(0~3600)	1	s	16-bit Unsigned	
0061	40062	Engine Oil Pressure	(0~32767)	1	kPa	16-bit Unsigned	
0062	40063	Reserved					
0063	40064	Reserved					
0064	40065	Reserved					
0065	40066	Reserved					
0066	40067	Reserved					
0067	40068	Reserved					
0068	40069	Reserved					
0069	40070	Reserved					
0070	40071	Reserved					
0071	40072	Reserved					
0072	40073	Reserved					
0073	40074	Reserved					
0074	40075	Reserved					
0075	40076	Reserved					
0076	40077	Reserved					
0077	40078	Accumulated Start Times	(0~999999)	1		Unsigned (MSB)	
0078	40079	Accumulated Start Times				Unsigned (LSB)	
0079	40080	Reserved					
0080	40081	Reserved					
0081	40082	Reserved					
0082	40083	Reserved					
0083	40084	Controller Software Version		0.1		16-bit Unsigned	
0084	40085	Controller Hardware Version		0.1		16-bit Unsigned	

Modbus Address	PLC Address	Item	Range (Decimal)	Ratio	Unit	Description	Remarks
0085	40086	Reserved					
0086	40087	Reserved					
0087	40088	Reserved					
0088	40089	Reserved					
0089	40090	Reserved					
0090	40091	Reserved					
0091	40092	Reserved					
0092	40093	Reserved					
0093	40094	Reserved					
0094	40095	Coolant Level	0~100	0.1	%	16-bit Signed	
0095	40096	Oil Temp.	(-40~+32767)	1	°C	16-bit Signed	
0096	40097	Coolant Pressure	(0~32767)	1	kPa	16-bit Signed	
0097	40098	Fuel Pressure	(0~32767)	1	kPa	16-bit Signed	
0098	40099	Fuel Temp.	(-40~+32767)	1	°C	16-bit Signed	
0099	40100	Inlet Temp.	(-40~+32767)	1	°C	16-bit Signed	
0100	40101	Exhaust Temp.	(-40~+32767)	1	°C	16-bit Signed	
0101	40102	Turbo Pressure	(0~32767)	1	kPa	16-bit Signed	
0102	40103	Fuel Consumption	(0~32767)	0.1	L/h	16-bit Signed	
0103	40104	Reserved					
0104	40105	Accumulated Fuel Consumption	(0~99999999)	1	L	16-bit Signed	
0105	40106					16-bit Signed	
0106	40107	Coolant Temp.	(-40~+32767)	1	°C	16-bit Signed	
0107	40108	Inlet Pressure	(0~500)	1	kPa	16-bit Signed	
0108	40109	Turbo Inlet Temp.	(-273~+1734.96875)	1	°C	16-bit Signed	
0109	40110	Reserved					
0110	40111	Intercooler Temp.	(-40~+210)	1	°C	16-bit Signed	
0111	40112	Left Turbo Exhaust Temp.	(-273~+1734.96875)	1	°C	16-bit Signed	
0112	40113	Right Turbo Exhaust Temp.	(-273~+1734.96875)	1	°C	16-bit Signed	
0113	40114	Air Filter Differential Pressure 1	(0~12.5)	1	kPa	16-bit Signed	
0114	40115	Air Filter Differential Pressure 2	(0~12.5)	1	kPa	16-bit Signed	
0115	40116	Crankcase Pressure	(-250~+251.99)	1	kPa	16-bit Signed	
0116	40117	Fuel Filter Differential Pressure	(0~32767)	1	kPa	16-bit Signed	
0117	40118	Lubricating Oil	(0~32767)	1	kPa	16-bit Signed	

Modbus Address	PLC Address	Item	Range (Decimal)	Ratio	Unit	Description	Remarks
		Filter Differential Pressure					
0118	40119	Barometric Pressure	(0~32767)	1	kPa	16-bit Signed	
0119	40120	Throttle Percentage	0~100	1	%	16-bit Signed	
0120	40121	Reserved					
0121	40122	Reserved					
0122	40123	Reserved					
0123	40124	Reserved					
0124	40125	Controller Issue Year					
0125	40126	Controller Issue Month					
0126	40127	Controller Issue Day					
0127	40128	Reserved					
0128	40129	Reserved					
0129	40130	Reserved					
0130	40131	Reserved					
0131	40132	Reserved					
0132	40133	Reserved					
0133	40134	Reserved					
0134	40135	Reserved					
0135	40136	Reserved					
0136	40137	Reserved					
0137	40138	Reserved					
0138	40139	Reserved					
0139	40140	ECU Running Time	(0~99999999)	1	h	Unsigned (LSB)	
0140	40141					Unsigned (MSB)	
0141	40142					Reserved	
0142	40143					Reserved	
0143	40144	Reserved					
0144	40145	Reserved					
0145	40146	Accumulated Running Hours	(0~999999)	1	h	16-bit Unsigned	
0146	40147	Accumulated Running Hours				16-bit Unsigned	
0147	40148	Accumulated Running Minutes	(0~59)	1	min	16-bit Unsigned	
0148	40149	Accumulated Running Seconds	(0~59)	1	s	16-bit Unsigned	
0149	40150	Reserved					

Modbus Address	PLC Address	Item	Range (Decimal)	Ratio	Unit	Description	Remarks
0150	40151	Reserved					
0151	40152	Reserved					
0152	40153	Reserved					
0153	40154	DEF Tank Level	0~100	0.1	%	16-bit Signed	
0154	40155	DEF Tank Temp.	(-40~+210)	1	°C	16-bit Signed	
0155	40156	DEF Supply Quantity	(0~19276.5)	1	g/h	16-bit Signed	
0156	40157	DEF Supply Pressure	(0~2000)	1	kPa	16-bit Signed	
0157	40158	DPF Soot Content	(0~250)	0.1	%	16-bit Signed	
0158	40159	DPF Ash Content	(0~250)	0.1	%	16-bit Signed	
0159	40160	SCR Inlet Temp.	(-273~+32767)	1	°C	16-bit Signed	
0160	40161	SCR Outlet Temp.	(-273~+32767)	1	°C	16-bit Signed	
0161	40162	Maintenance 1 Accumulated Hours	(0~65535)	1	h	16-bit Unsigned	
0162	40163	Maintenance 1 Accumulated Minutes	(0~59)	1	min	16-bit Unsigned	
0163	40164	Maintenance 1 Accumulated Seconds	(0~59)	1	s	16-bit Unsigned	
0164	40165	Maintenance 2 Accumulated Hours	(0~65535)	1	h	16-bit Unsigned	
0165	40166	Maintenance 2 Accumulated Minutes	(0~59)	1	min	16-bit Unsigned	
0166	40167	Maintenance 2 Accumulated Seconds	(0~59)	1	s	16-bit Unsigned	
0167	40168	Maintenance 3 Accumulated Hours	(0~65535)	1	h	16-bit Unsigned	
0168	40169	Maintenance 3 Accumulated Minutes	(0~59)	1	min	16-bit Unsigned	
0169	40170	Maintenance 3 Accumulated Seconds	(0~59)	1	s	16-bit Unsigned	
0170	40171	Number of Event Logs	(0~65535)	1	No.	16-bit Unsigned	
0171	40172	Aux. Sensor 4	(-32768~	1		16-bit Signed	

Modbus Address	PLC Address	Item	Range (Decimal)	Ratio	Unit	Description	Remarks
		Value	+32767)				
0172	40173	Flex. Sensor 4 Sampling Value	(0~65535)	0.1		16-bit Unsigned	
0173	40174	Aux. Sensor 5 Value	(-32768~+32767)	1		16-bit Signed	
0174	40175	Flex. Sensor 5 Sampling Value	(0~65535)	0.1		16-bit Unsigned	
0175	40176	Aux. Sensor 6 Value	(-32768~+32767)	1		16-bit Signed	
0176	40177	Flex. Sensor 6 Sampling Value	(0~65535)	0.1		16-bit Unsigned	
0177	40178	ECU Alarm SPN1 (Low)				32-bit Unsigned	
0178	40179	ECU Alarm SPN1 (High)					
0179	40180	SPN1 FMI (Low 8 bits) SPN1 OC (High 8 bits)				16-bit Unsigned	
0180	40181	ECU Alarm SPN1 (Low)				32-bit Unsigned	
0181	40182	ECU Alarm SPN1 (High)					
0182	40183	SPN1 FMI (Low 8 bits) SPN1 OC (High 8 bits)				16-bit Unsigned	
0183	40184	ECU Alarm SPN1 (Low)				32-bit Unsigned	
0184	40185	ECU Alarm SPN1 (High)					
0185	40186	SPN1 FMI (Low 8 bits) SPN1 OC (High 8 bits)				16-bit Unsigned	
0186	40187	ECU Alarm SPN1 (Low)				32-bit Unsigned	
0187	40188	ECU Alarm SPN1 (High)					
0188	40189	SPN1 FMI (Low 8 bits) SPN1 OC (High 8 bits)				16-bit Unsigned	

Modbus Address	PLC Address	Item	Range (Decimal)	Ratio	Unit	Description	Remarks
0189	40190	ECU Alarm SPN1 (Low)				32-bit Unsigned	
0190	40191	ECU Alarm SPN1 (High)					
0191	40192	SPN1 FMI (Low 8 bits) SPN1 OC (High 8 bits)				16-bit Unsigned	
0192	40193	ECU Alarm SPN1 (Low)				32-bit Unsigned	
0193	40194	ECU Alarm SPN1 (High)					
0194	40195	SPN1 FMI (Low 8 bits) SPN1 OC (High 8 bits)				16-bit Unsigned	
0195	40196	ECU Alarm SPN1 (Low)				32-bit Unsigned	
0196	40197	ECU Alarm SPN1 (High)					
0197	40198	SPN1 FMI (Low 8 bits) SPN1 OC (High 8 bits)				16-bit Unsigned	
0198	40199	ECU Alarm SPN1 (Low)				32-bit Unsigned	
0199	40200	ECU Alarm SPN1 (High)					
0200	40201	SPN1 FMI (Low 8 bits) SPN1 OC (High 8 bits)				16-bit Unsigned	
0201	40202	ECU Alarm SPN1 (Low)				32-bit Unsigned	
0202	40203	ECU Alarm SPN1 (High)					
0203	40204	SPN1 FMI (Low 8 bits) SPN1 OC (High 8 bits)				16-bit Unsigned	
0204	40205	ECU Alarm SPN1 (Low)				32-bit Unsigned	
0205	40206	ECU Alarm SPN1 (High)					

Modbus Address	PLC Address	Item	Range (Decimal)	Ratio	Unit	Description	Remarks
0206	40207	SPN1 FMI (Low 8 bits) SPN1 OC (High 8 bits)				16-bit Unsigned	

NOTE 1: Actual value = data received * ratio. Take the Battery Voltage as the example: if the data received is 278, ratio is 0.1, then the actual voltage value is 27.8V.

NOTE 2: If the data has 4 bytes, the actual value = high order bits of data received * 65536 + low order bits of data received.

NOTE 3: If the data received is 32766, it means there is no normal data, and “###” will be shown.

NOTE 4: If data received is 32767, it means there is no normal data, and “+++” will be shown.

NOTE 5: Definition of signed number: Take the data received “8000H” as the example, convert it to binary number “1000 0000 0000 0000b”. The MSB is 1, which means it is negative. The number minus 1 will get its 1’s complement, then inverting it will get the absolute value of the negative number. Finally convert the absolute value to decimal number -32768.

EXAMPLE:

If “ECU Running Time (current value is 123456h)” needs to be read, check the table above and find its Modbus address is 0139 and 0140, so it needs to read two bytes of data.

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

Table 6 Master Request Command

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

The slave response command is as following:

Table 7 Slave Response Command

Slave Address	Function Code	Data Length (Bytes)	Data				CRC 16	
			Data of Address 0139 MSB	Data of Address 0139 LSB	Data of Address 0140 MSB	Data of Address 0140 LSB	LSB	MSB
			01	03	04	E2		

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

Table 8 Data Analysis

Address	Data Received (Hex)	Data Combined (Hex)	ECU Running Time (Hex)
0139	E240H	0001E240H	123456
0140	0001H		

3.3 ENGINE RUNNING STATUS

Table 9 Engine Running Status

No.	Content	Description
0	Standby	No delay value in the status
1	Preheat	
2	Fuel Output	No delay value in the status
3	Crank	
4	Crank Rest	
5	Safety on Delay	
6	Start Idle	
7	High Speed Warming Up	
8	Wait to Load	No delay value in the status
9	Normal Running	No delay value in the status
10	High Speed Cooling	
11	Stop Idle	
12	ETS	
13	Wait for Stop	
14	Stop Failure	No delay value in the status

EXAMPLE:

If the value of address 059 is 1, the value of address 060 is 0, that means the engine is on standby, and there is no delay.

4 CONFIGURATION OF COMMUNICATION PARAMETERS

- 1) In the main screen, press the  key to enter the menu page;
- 2) Select the "Parameter Setting", then press the  key to enter the parameters password page;
- 3) Enter the correct password (**default: 00318**), press the  key to get into the parameter main page;
- 4) Select the "Module Setting", and press the  key to enter the submenu;
- 5) Press the  key,  key to select "Module Address", then press the  key to edit the parameter, the corresponding parameters will be selected;
- 6) Set the current selected parameter via  key and  key, then press the  key to confirm and end the setting editing, then the selected status will disappear;
- 7) The setting of "RS485 Comm. Setting" is same as the method above, and parameters of "Baud Rate", "Stop Bit", "Parity Bit" and "Termination Resistor Enable" are available to set in the "RS485 Comm. Setting";
- 8) Press the  key to return the previous menu.

NOTE: The configuration takes effect after the controller is restarted once the RS485 communication setting is completed.

5 FAQ

5.1 GROUNDING OF THE CABLE SHIELD

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

5.2 RS485 TO USB CONVERTER

It can communicate with PC via the SmartGen SG72A converter.

5.3 SOLUTIONS FOR COMMUNICATION FAILURE

- 1) Check the positive and negative of RS485, or network cable is connected correctly. Check the RS485 converter (if any) is normal;
 - 2) Check the termination resistors are connected correctly or not;
 - 3) Check the communication parameters setting is correct or not. Baud rate, data bit, parity bit and stop bit meet the requirement of controller;
 - 4) When using function code 03, the maximum data length to be read is 120 addresses, and the ending address can't exceed the greatest Modbus communication address. Please note that for the function code 06 mapping parameters data field, only one address can be written at a time;
 - 5) If there is offset address in the Modbus communication address, the actual Modbus communication address equals to the base address plus offset address;
 - 6) As for CRC-16, the low-order byte is checked first, the high-order byte is checked later;
 - 7) The frequency of multiple read operations for controller data should not be too high, and the recommended interval between two read operations is no less than 500ms;
 - 8) Disconnect the RS485 cables to the controller, test the voltage difference of RS485 Terminal A and B on the controller, if the result is between -200mV and +200mV, it means the communication port is abnormal;
 - 9) It is recommended to download third-party communication test software to verify whether the network communication is normal, such as NetAssist, PortHelper.
-