



**SmartGen**  
ideas for power

**HAT828**  
**HIGH SPEED ATS CONTROLLER**  
**COMMUNICATION PROTOCOL**

SmartGen

**SMARTGEN (ZHENGZHOU) TECHNOLOGY CO., LTD.**



Chinese trademark

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**Table 1 – Software Version**

Date	Version	Content
2021-05-14	V1.0	Original release.
2021-06-23	V1.1	Modify this protocol according to the latest communication protocol template, not affecting protocol content.



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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.

HAT828 controller has 2 RS485 interfaces with same communication protocol.

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: 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 or 2 bits (default: 2-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.

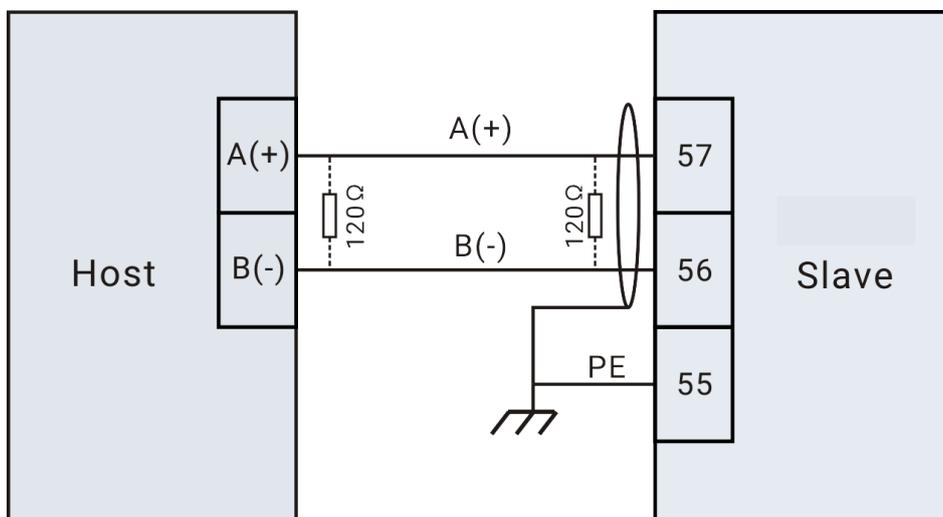
Communication distance: 9600 baud rate, the longest distance can reach 1,000m when using 120Ω shielding twisted pair.

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.

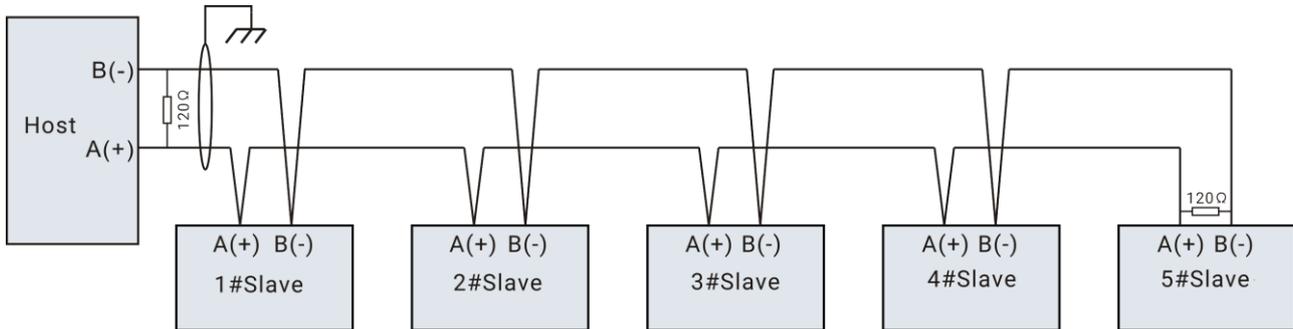
## 2. WIRING DIAGRAM



**Fig.1 Single Unit Communication Wiring Diagram**

**NOTE1:** 2 120Ω impedance resistors can be connected automatically according to site situation, details refer to the following description.

**NOTE2:** This figure is RS485-1 wiring diagram, RS485-2 wiring diagram is as above.



**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

In the following table, S1 refers to 1# power, S2 refers to 2# power, "/" means this item is reserved.

#### 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
500.0	40501.0	Common Alarm	0 means no common alarm occurs; 1 means there is common alarm. (500.0 is the boolean value of bit 0 of address 500) The following contents in turn.
500.1	40501.1	Common Warn Alarm	
500.2	40501.2	Common Fault Alarm	
500.3	40501.3	/	
500.4	40501.4	/	
500.5	40501.5	/	
500.6	40501.6	Audible Alarm	
500.7	40501.7	/	
500.8	40501.8	Auto Mode	0: Manual Mode 1: Auto Mode
500.9	40501.9	/	
500.10	40501.1	S1 Master	S1 refers to 1# power. 1 means 1# power as normal power; 0 means 1# power as standby power.
500.11	40501.11	S2 Master	S2 refers to 2# power.

Modbus Address	PLC Address	Name	Description
			1 means 2# power as normal power; 0 means 2# power as standby power.
500.12	40501.12	/	
500.13	40501.13	/	
500.14	40501.14	/	
500.15	40501.15	Genset Start Output	0 means genset start signal not output; 1 means genset start signal outputs.
501.0	40502.0	S1 Voltage Normal	
501.1	40502.1	S1 Voltage Abnormal	
501.2	40502.2	S1 Volt Instant. Abnormal	
501.3	40502.3	/	
501.4	40502.4	/	
501.5	40502.5	/	
501.6	40502.6	/	
501.7	40502.7	S1 Genset Start Output	
501.8	40502.8	S1 Blackout	
501.9	40502.9	S1 Over Voltage	
501.10	40502.1	S1 Under Voltage	
501.11	40502.11	S1 Over Frequency	
501.12	40502.12	S1 Under Frequency	
501.13	40502.13	S1 Loss of Phase	
501.14	40502.14	S1 Reverse Phase Seq.	
501.15	40502.15	/	
502.0	40503.0	S2 Voltage Normal	
502.1	40503.1	S2 Voltage Abnormal	
502.2	40503.2	S2 Volt Instant. Abnormal	
502.3	40503.3	/	
502.4	40503.4	/	
502.5	40503.5	/	
502.6	40503.6	/	
502.7	40503.7	S2 Genset Start Output	
502.8	40503.8	S2 Blackout	
502.9	40503.9	S2 Over Voltage	
502.10	40503.1	S2 Under Voltage	
502.11	40503.11	S2 Over Frequency	
502.12	40503.12	S2 Under Frequency	
502.13	40503.13	S2 Loss of Phase	
502.14	40503.14	S2 Reverse Phase Seq.	
502.15	40503.15	/	
503.0	40504.0	ATS Transfer Failure	
503.1	40504.1	S1 Close Failure	
503.2	40504.2	/	

Modbus Address	PLC Address	Name	Description
503.3	40504.3	/	
503.4	40504.4	S2 Close Failure	
503.5	40504.5	/	
503.6	40504.6	/	
503.7	40504.7	/	
503.8	40504.8	/	
503.9	40504.9	/	
503.10	40504.1	/	
503.11	40504.11	S1 Genset Fault	
503.12	40504.12	S2 Genset Fault	
503.13	40504.13	/	
503.14	40504.14	Sync. Failure Fault	
503.15	40504.15	/	
504.0	40505.0	/	
504.1	40505.1	/	
504.2	40505.2	/	
504.3	40505.3	Battery Under Voltage Warn	
504.4	40505.4	Battery Over Voltage Warn	
504.5	40505.5	Sync. Failure Warn	
504.6	40505.6	/	
504.7	40505.7	/	
504.8	40505.8	/	
504.9	40505.9	/	
504.10	40505.1	/	
504.11	40505.11	/	
504.12	40505.12	/	
504.13	40505.13	/	
504.14	40505.14	/	
504.15	40505.15	/	
505.0	40506.0	Aux. Input 1 Status	0 means input port not work; 1 means input port works.
505.1	40506.1	Aux. Input 2 Status	Refer to "Aux. Input 1 Status" description.
505.2	40506.2	Aux. Input 3 Status	
505.3	40506.3	Aux. Input 4 Status	
505.4	40506.4	Aux. Input 5 Status	
505.5	40506.5	Aux. Input 6 Status	
505.6	40506.6	Aux. Input 7 Status	
505.7	40506.7	Aux. Input 8 Status	
505.8	40506.8	/	
505.9	40506.9	/	
505.10	40506.1	/	
505.11	40506.11	/	

Modbus Address	PLC Address	Name	Description
505.12	40506.12	/	
505.13	40506.13	/	
505.14	40506.14	/	
505.15	40506.15	/	
506.0	40507.0	Aux. Output 1 Status	1 means output port works; 0 means output port not work.
506.1	40507.1	Aux. Output 2 Status	Refer to "Aux. Output 1 Status" description.
506.2	40507.2	Aux. Output 3 Status	
506.3	40507.3	Aux. Output 4 Status	
506.4	40507.4	Aux. Output 5 Status	
506.5	40507.5	Aux. Output 6 Status	
506.6	40507.6	Aux. Output 7 Status	
506.7	40507.7	Aux. Output 8 Status	
506.8	40507.8	Aux. Output 9 Status	
506.9	40507.9	Aux. Output 10 Status	
506.10	40507.1	/	
506.11	40507.11	/	
506.12	40507.12	/	
506.13	40507.13	/	
506.14	40507.14	/	
506.15	40507.15	/	
507.0	40508.0	S1 Close Control Output	
507.1	40508.1	/	
507.2	40508.2	S2 Close Control Output	
507.3	40508.3	/	
507.4	40508.4	S1 Closed	
507.5	40508.5	S2 Closed	
507.6	40508.6	/	
507.7	40508.7	/	
507.8	40508.8	/	
507.9	40508.9	/	
507.10	40508.1	/	
507.11	40508.11	/	
507.12	40508.12	Remote Start On-load	
507.13	40508.13	Remote Start Off-load	
507.14	40508.14	Gen Start Mains NG	
507.15	40508.15	Scheduled Run	
508.0	40509.0	/	
508.1	40509.1	/	
508.2	40509.2	/	
508.3	40509.3	/	
508.4	40509.4	Scheduled Not Run	

Modbus Address	PLC Address	Name	Description
508.5	40509.5	/	
508.6	40509.6	/	
508.7	40509.7	/	
508.8	40509.8	/	
508.9	40509.9	/	
508.10	40509.1	Start Inhibit	
508.11	40509.11	/	
508.12	40509.12	S1 Close Inhibit	
508.13	40509.13	S2 Close Inhibit	
508.14	40509.14	/	
508.15	40509.15	/	
509.0	40510.0	/	
509.1	40510.1	/	
509.2	40510.2	/	
509.3	40510.3	/	
509.4	40510.4	/	
509.5	40510.5	Elevator Control	
509.6	40510.6	/	
509.7	40510.7	/	
509.8	40510.8	/	
509.9	40510.9	/	
509.10	40510.1	/	
509.11	40510.11	Auto Trans./Restore Digital Input	
509.12	40510.12	Remote Inhibit Digital Input	
509.13	40510.13	/	
509.14	40510.14	/	
509.15	40510.15	/	

**Example:**

If need to read “Aux. Output 1 Status” and “S1 Closed”, firstly get their corresponding address is 506.0 and 507.4 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 (506)		Data Qty. (2)		CRC 16 Calibration	
		MSB	LSB	MSB	LSB	LSB	MSB
<b>01</b>	<b>03</b>	<b>01</b>	<b>FA</b>	<b>00</b>	<b>02</b>	<b>E5</b>	<b>C6</b>

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 506	Data LSB of Address 506	Data MSB of Address 507	Data LSB of Address 507	LSB	MSB
01	03	04	00	01	00	10	AA	3F

**Table 5 – Data Analysis**

Address	Received Data (Hex)	Convert to Binary	Data Signification
506	0001H	0000 0000 0000 0001 (correspond to 506.15, 506.14.....506.1, 506.0)	Data of bit 0 is 1 indicates that Aux. output 1 status is output.
507	0010H	0000 0000 0001 0000 (correspond to 507.15, 507.14.....507.1, 507.0)	Data of bit 507.4 is 1 indicates that S1 switch is closed.

### 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
1000	41001	UAB1 (1# AB Line Voltage)	0~65000	1	V	16-bit Unsigned	
1001	41002	UBC1 (1# BC Line Voltage)	0~65000	1	V	16-bit Unsigned	
1002	41003	UCA1 (1# CA Line Voltage)	0~65000	1	V	16-bit Unsigned	
1003	41004	UA1 (1# A Phase Voltage)	0~65000	1	V	16-bit Unsigned	
1004	41005	UB1 (1# B Phase Voltage)	0~65000	1	V	16-bit Unsigned	
1005	41006	UC1 (1# C Phase Voltage)	0~65000	1	V	16-bit Unsigned	
1006	41007	UA1 Phase (1# A Phase)	0~360.0	0.1	°	16-bit Unsigned	<a href="#">NOTE1</a>
1007	41008	UB1 Phase (1# B Phase)	0~360.0	0.1	°	16-bit Unsigned	
1008	41009	UC1 Phase	0~360.0	0.1	°	16-bit	

Modbus Address	PLC Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
		(1# C Phase)				Unsigned	
1009	41010	Frequency 1 (1# Power Frequency)	0~100.00	0.01	Hz	16-bit Unsigned	
1010	41011	/					
1011	41012	/					
1012	41013	/					
1013	41014	/					
1014	41015	/					
1015	41016	/					
1016	41017	/					
1017	41018	/					
1018	41019	/					
1019	41020	/					
1020	41021	UAB2 (2# AB Line Voltage)	0~65000	1	V	16-bit Unsigned	
1021	41022	UBC2 (2# BC Line Voltage)	0~65000	1	V	16-bit Unsigned	
1022	41023	UCA2 (2# CA Line Voltage)	0~65000	1	V	16-bit Unsigned	
1023	41024	UA2 (2# A Phase Voltage)	0~65000	1	V	16-bit Unsigned	
1024	41025	UB2 (2# B Phase Voltage)	0~65000	1	V	16-bit Unsigned	
1025	41026	UC2 (2# C Phase Voltage)	0~65000	1	V	16-bit Unsigned	
1026	41027	UA2 Phase (2# A Phase)	0~360.0	0.1	°	16-bit Unsigned	
1027	41028	UB2 Phase (2# B Phase)	0~360.0	0.1	°	16-bit Unsigned	
1028	41029	UC2 Phase (2# C Phase)	0~360.0	0.1	°	16-bit Unsigned	
1029	41030	Frequency 2 (2# Power Frequency)	0~100.00	0.01	Hz	16-bit Unsigned	
1030	41031	S1S2 Volt. Diff. (1/2# Power)	-32768~ +32767	1	V	16-bit Signed	<a href="#">NOTE4</a>



Modbus Address	PLC Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
		Volt. Difference)					
1031	41032	S1S2 Freq. Diff. (1/2# Power Freq. Difference)	-100.00~ +100.00	0.01	Hz	16-bit Signed	
1032	41033	S1S2 Phase Diff. (1/2# Power Phase Difference)	-180.0~ +180.0	0.1	°	16-bit Signed	
1033	41034	/					
1034	41035	/					
1035	41036	/					
1036	41037	/					
1037	41038	/					
1038	41039	/					
1039	41040	/					
1040	41041	/					
1041	41042	/					
1042	41043	/					
1043	41044	/					
1044	41045	/					
1045	41046	/					
1046	41047	/					
1047	41048	/					
1048	41049	/					
1049	41050	/					
1050	41051	/					
1051	41052	/					
1052	41053	/					
1053	41054	/					
1054	41055	/					
1055	41056	/					
1056	41057	/					
1057	41058	/					
1058	41059	/					
1059	41060	/					
1060	41061	/					
1061	41062	/					
1062	41063	/					
1063	41064	/					
1064	41065	/					
1065	41066	/					
1066	41067	/					
1067	41068	/					

Modbus Address	PLC Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
1068	41069	/					
1069	41070	/					
1070	41071	/					
1071	41072	/					
1072	41073	/					
1073	41074	/					
1074	41075	/					
1075	41076	/					
1076	41077	/					
1077	41078	/					
1078	41079	/					
1079	41080	/					
1080	41081	Battery Voltage (Measured Voltage of controller DC Power Input Port)	0~3276.7	0.1	V	16-bit Unsigned	
1081	41082	/					
1082	41083	/					
1083	41084	/					
1084	41085	/					
1085	41086	/					
1086	41087	/					
1087	41088	/					
1088	41089	S1 Voltage Status	0~65535	No		16-bit Unsigned	See <a href="#">S1 Power Status</a>
1089	41090	S1 Voltage Delay	0~65535	1	s	16-bit Unsigned	
1090	41091	S2 Voltage Status	0~65535	No		16-bit Unsigned	See <a href="#">S2 Power Status</a>
1091	41092	S2 Voltage Delay	0~65535	1	s	16-bit Unsigned	
1092	41093	Genset Status	0~65535	No		16-bit Unsigned	See <a href="#">Genset Status</a>
1093	41094	Genset Delay	0~65535	1	s	16-bit Unsigned	
1094	41095	ATS Status	0~65535	No		16-bit Unsigned	See <a href="#">ATS Status</a>
1095	41096	ATS Delay	0~65535	1	s	16-bit Unsigned	
1096	41097	/					
1097	41098	/					

Modbus Address	PLC Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
1098	41099	/					
1099	41100	/					
1100	41101	Controller Time: Year	0~100	1	year	16-bit Unsigned	
1101	41102	Controller Time: Month	1~12	1	month	16-bit Unsigned	
1102	41103	Controller Time: Day	1~31	1	day	16-bit Unsigned	
1103	41104	Controller Time: Week	0~6	/		16-bit Unsigned	0: Sunday 1: Monday~Saturday
1104	41105	Controller Time: Hour	0~23	1	h	16-bit Unsigned	
1105	41106	Controller Time: Minute	0~59	1	min	16-bit Unsigned	
1106	41107	Controller Time: Second	0~59	1	s	16-bit Unsigned	
1107	41108	/					
1108	41109	/					
1109	41110	/					
1110	41111	/					
1111	41112	Continuous Supply Time (h)	0~65535	1	h	16-bit Unsigned	
1112	41113	Continuous Supply Time (min)	0~59	1	min	16-bit Unsigned	
1113	41114	Continuous Supply Time (s)	0~59	1	s	16-bit Unsigned	
1114	41115	Last Continuous Supply Time (h)	0~65535	1	h	16-bit Unsigned	
1115	41116	Last Continuous Supply Time (min)	0~59	1	min	16-bit Unsigned	
1116	41117	Last Continuous Supply Time (s)	0~59	1	s	16-bit Unsigned	
1117	41118	S1 Accum. Supply Time (h) LSB	0~4294967296	1	h	32-bit Unsigned	<a href="#">NOTE2</a>
1118	41119	S1 Accum. Supply Time (h) MSB					
1119	41120	S1 Accum.	0~59	1	min	16-bit	



Modbus Address	PLC Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
		Supply Time (min)				Unsigned	
1120	41121	S1 Accum. Supply Time (s)	0~59	1	s	16-bit Unsigned	
1121	41122	S2 Accum. Supply Time (h) LSB	0~4294967296	1	h	32-bit Unsigned	<a href="#">NOTE2</a>
1122	41123	S2 Accum. Supply Time (h) MSB					
1123	41124	S2 Accum. Supply Time (min)	0~59	1	min	16-bit Unsigned	
1124	41125	S2 Accum. Supply Time (s)	0~59	1	s	16-bit Unsigned	
1125	41126	/					
1126	41127	/					
1127	41128	/					
1128	41129	/					
1129	41130	S1 Accum. Close Times (LSB)	0~4294967296	1	time	32-bit Unsigned	<a href="#">NOTE2</a>
1130	41131	S1 Accum. Close Times (MSB)					
1131	41132	/					
1132	41133	/					
1133	41134	/					
1134	41135	/					
1135	41136	S2 Accum. Close Times (LSB)	0~4294967296	1	time	32-bit Unsigned	
1136	41137	S2 Accum. Close Times MSB)					
1137	41138	Accum. Auto Transfer Times (LSB)	0~4294967296	1	time	32-bit Unsigned	<a href="#">NOTE2</a>
1138	41139	Accum. Auto Transfer Times (MSB)					
1139	41140	Mains No Transfer Times (LSB)	0~4294967296	1	time	32-bit Unsigned	
1140	41141	Mains No Transfer Times (MSB)					

Modbus Address	PLC Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
1141	41142	Accum. Auto Transfer Run Time (h) LSB	0~4294967296	1	h	32-bit Unsigned	
1142	41143	Accum. Auto Transfer Run Time (h) MSB					
1143	41144	Accum. Auto Transfer Run Time (min)	0~59	1	min	16-bit Unsigned	
1144	41145	Accum. Auto Transfer Run Time (s)	0~59	1	s	16-bit Unsigned	

**NOTE1:** Actual value=Received Data\*Ratio. Take frequency as the example, received data is 5000 (1388H), ratio is 0.01Hz, so the actual frequency value is 50.00Hz (5000\*0.01Hz);

**NOTE2:** For 4-byte data, the actual value=Received Data MSB\*65535 + Received Data LSB;

**NOTE3:** When the received data is 32766, it means no normal data, “###” can be displayed;

**NOTE4:** 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 “S1 Accum. Close Times (current is 123456 times)”, firstly get their corresponding address is 1129 and 1130 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 (1129)		Data Qty. (2)		CRC 16 Calibration	
		MSB	LSB	MSB	LSB	LSB	MSB
01	03	04	69	00	02	15	27

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 1129	Data LSB of Address 1129	Data MSB of Address 1130	Data LSB of Address 1130	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)
1129	E240H	0001E240H	123456
1130	0001H		

### 3.3 REMOTE COIL FIELD CORRESPONDING TO FUNCTION CODE 05H

**Table 10 – Remote Coil Field**

Modbus Address	PLC Address	Name	Description
400	401	Remote S1 Close	Send FF00H Active
401	402	Remote Open	Send FF00H Active
402	403	Remote S2 Close	Send FF00H Active
403	404	Remote Open (same as address 401)	Send FF00H Active
404	405	Auto/Manual	Manual Mode: Only Send 0000H Active Auto Mode: Only Send FF00H Active
405	406	S1 Master Status Set	Send FF00H Active
406	407	S2 Master Status Set	Send FF00H Active
407	408	Alarm Reset	Send FF00H Active
408	409	Remote Genset Start (S1)	Send FF00H Active
409	410	Remote Genset Stop (S1)	Send FF00H Active
410	411	Remote Genset Start (S2)	Send FF00H Active
411	412	Remote Genset Stop (S2)	Send FF00H Active
412	413	Remote Output 1 Output	Send FF00H Active
413	414	Remote Output 2 Output	Send FF00H Active
414	415	Remote Output 3 Output	Send FF00H Active
415	416	Remote Output 4 Output	Send FF00H Active
416	417	Remote Output 5 Output	Send FF00H Active
417	418	Remote Output 6 Output	Send FF00H Active
418	419	Remote Output 7 Output	Send FF00H Active
419	420	Remote Output 8 Output	Send FF00H Active
420	421	Remote Output 9 Output	Send FF00H Active
421	422	Remote Output 10 Output	Send FF00H Active

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

**Example:**

Remotely control controller to work in auto mode, firstly get its remote address is 404 by checking the table.

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

**Table 11 – Master Request Command**

Slave Address	Function Code	Remote Address (404)		Data		CRC 16 Calibration	
		MSB	LSB	MSB	LSB	LSB	MSB
01	05	01	94	FF	00	CC	2A

Slave response command is as following:

**Table 12 – Slave Response Command**

Slave Address	Function Code	Remote Address (404)		Data		CRC 16 Calibration	
		MSB	LSB	MSB	LSB	LSB	MSB
01	05	01	94	FF	00	CC	2A

Then whether the remote command is executed successfully can be confirmed by reading the auto mode status of address 500.8 via function code 03H.

### 3.4 S1 POWER STATUS DESCRIPTION

**Table 13 – S1 Power Status Description**

Value (No.)	Status	Delay
0	S1 Available	Delay (Unit: s)
1	S1 Unavailable	Delay (Unit: s)
2	S1 Voltage Normal	No Delay
3	S1 Blackout	No Delay
4	S1 Over Voltage	No Delay
5	S1 Under Voltage	No Delay
6	S1 Over Frequency	No Delay
7	S1 Under Frequency	No Delay
8	S1 Loss of Phase	No Delay
9	S1 Reverse Phase Sequence	No Delay
10	S1 Instant. Under Voltage	No Delay

**Example:**

If the content of address 1088 is 1, 1089 is 5, it indicates that currently 1# power is in voltage abnormal delay, countdown 5s.

If the content of address 1088 is 4, it indicates that currently 1# power has over voltage.

### 3.5 S2 POWER STATUS DESCRIPTION

**Table 14 – S2 Power Status Description**

Value (No.)	Status	Delay
0	S2 Available	Delay (Unit: s)
1	S2 Unavailable	Delay (Unit: s)
2	S2 Voltage Normal	No Delay
3	S2 Blackout	No Delay
4	S2 Over Voltage	No Delay

Value (No.)	Status	Delay
5	S2 Under Voltage	No Delay
6	S2 Over Frequency	No Delay
7	S2 Under Frequency	No Delay
8	S2 Loss of Phase	No Delay
9	S2 Reverse Phase Sequence	No Delay
10	S2 Instant. Under Voltage	No Delay

### 3.6 GENSET STATUS DESCRIPTION

**Table 15 – Genset Status Description**

Value (No.)	Status	Delay
0	Start Delay	Delay (Unit: s)
1	Stop Delay	Delay (Unit: s)
2	Scheduled Not Run	Delay (Unit: s)
3	Scheduled Run	Delay (Unit: s)
4	S1 Cycle Start	Delay (Unit: s)
5	S2 Cycle Start	Delay (Unit: s)
6	S1 Genset Start	No Delay
7	S2 Genset Start	No Delay
8	Genset Start	No Delay
9	Genset Standby	No Delay

**Example:**

If the content of address 1092 is 1, 1093 is 50, it indicates that genset is preparing to start, countdown 50s.

If the content of address 1092 is 6, it indicates that 1# power corresponding genset has been started.

### 3.7 ATS STATUS DESCRIPTION

**Table 16 – ATS Status Description**

Value (No.)	Status	Delay
0	Ready to Transfer	No Delay
1	S1 Closing	Delay (Unit: s)
2	S1 Opening	Delay (Unit: s)
3	S2 Closing	Delay (Unit: s)
4	S2 Opening	Delay (Unit: s)
5	Transfer Rest	Delay (Unit: s)
6	Closing S1 Again	Delay (Unit: s)
7	Opening S1 Again	Delay (Unit: s)
8	Closing S2 Again	Delay (Unit: s)
9	Opening S2 Again	Delay (Unit: s)
10	Wait for Sync.	Delay (Unit: s)
11	S1 Sync. Close	Delay (Unit: s)
12	S2 Sync. Close	Delay (Unit: s)

Value (No.)	Status	Delay
13	Wait S1 PF	Delay (Unit: s)
14	Wait S2 PF	Delay (Unit: s)
15	Elevator Control Delay	Delay (Unit: s)
16	S1 On-load	No Delay
17	S2 On-load	No Delay
18	Off-load	No Delay

#### 4. COMMUNICATION PARAMETERS VIEW AND CONFIGURATION

##### 4.1 VIEW CURRENT COMMUNICATION PARAMETERS

In controller main interface, press  key, the following interface is displayed.

Comm. 	Comm. Address	1
	RS485-1 <input type="checkbox"/>	9600bps, 8, N, 2
	RS485-2 <input type="checkbox"/>	9600bps, 8, N, 2
	USB <input type="checkbox"/>	
TIME 	Current Continuous Supply Time	0:00:00(h:m:s)
	Last Continuous Supply Time	0:00:00(h:m:s)
-----	Manual Mode	2021-05-31(1)20:39:19

**Fig.3 Communication Parameters Interface**

This interface displays **RS485-1 9600bps, 8, N, 2**, which indicates that the current communication rate of RS485-1 is 9600bps, data bit is 8-bit, no parity (N: No parity/E: Odd parity/E: even parity), stop bit is 2-bit.

##### 4.2 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 "Module 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  key to complete editing, then the selected status disappear;
- 7) Long press  key to return the main interface.

**NOTE:** The configuration will be active after parameter 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 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.

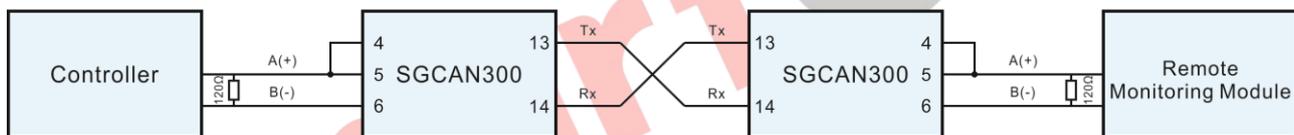
A regular RS485 network usually uses terminal resistor. It can also be not used in the case of network connection line is very short, temporary or laboratory test.

### 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.4 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 setting 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.