ALC700

LIGHTING TOWER CONTROLLER

COMMUNICATION PROTOCOL

SMARTGEN (ZHENGZHOU) TECHNOLOGY CO., LTD.

Chinese trademark

English trademark

SmartGen — make your generator *smart*

SmartGen Technology Co., Ltd.

No.28 Jinsuo Road

Zhengzhou

Henan Province

P. R. 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

Table 1 Software Version

Date	Version	Note
2019-08-12	1.0	Original release.
2019-09-17	1.1	Modify the communication protocol contents; Modify the contents of function code 01, 05.
2021-04-30	1.2	Add lighting tower running time, accumulated start times.

CONTENT

1. INTRODUCTION

This protocol describes read and write command format of PC serial port and the definition of internal information data for the third-party to develop and use.

MODBUS communication protocol allows the module to transfer information and data effectively with PLC, RTU, SCADA system of international brands (such as, Schneider, Siemens, and Modicon), and DCS or third-party monitoring system compatible with MODBUS. The monitoring system can be set up if only adding central communication master software (such as Kingview, Intouch, FIX, Synall) basing on PC (or IPC).

2. MODBUS BASIC RULES

— All communication loops should follow the master-slave mode. If so, data can be transferred between a master (e.g. PC) and 32 slaves.
— No communication can start from slaves.
— In communication loop, all communication should be transmitted in "information frame".
— If received information frame contains unknown command, no response will be given.

3. DATA FRAME FORMAT

Communication is asynchronously transferred, using byte (data frame) as unit. Between master and slave, every transmitted data frame is 11-bit (stop bit: 2) serial data stream.

Table 2 Data frame format

Item	Bits
Start Bit	1-bit
Data Bit	8-bit
Parity Bit	No parity
Stop Bit	2-bit
Baud Rate	9600bps

4. COMMUNICATION PROTOCOL

4.1 ILLUSTRATION

When communication command is sent to the instrument, device who accords with the address code receives the communication command, then removes address code, and read the information. If no mistakes, it will execute commands, and sends the result back to the sender. Response information includes address code, function code of implemented action, data after implemented action and CRC. If an error occurs in receipt of the command, it will send no information.

4.2 INFORMATION FRAME FORMAT

Table 3 Information Frame Format

Initiating Structure	Address Code	Function Code	Data Field	CRC	End Structure
Delay (equivalent to 4 bytes)	1 byte 8-bit	1 byte 8-bit	N bytes N*8-bit	2 bytes 16-bit	Delay (equivalent to 4 bytes)

4.3 ADDRESS CODE

Address code is the first data frame (8-bit) in each transmitted information frame, which from 0 to 255. Device address range is 1-255, this byte shows that the slave defined by users will receive the information sent by the master. Each slave has a unique address code, and responses begin with the address code. The address code issued by the master means the slave address to be sent to, while address code issued by slave means the responded slave address.

4.4 FUNCTION CODE

4.4.1 ILLUSTRATION

This is the second data of each transmission. ModBus communication protocol defines function code as 1-255 (01H-0FFH). This controller uses part of it. Master sends the request and the slave executes actions according to the function code. By slave response slave can show that it has responded to the master and conducted the action as the function code issued by the slave is the same as the one issued by the master. If the function code MSB is 1 (function code>127), it means there is no response or response has error.

The following table shows the specific signification and operation of function code.

Table 4 ModBus Partial Function Code

Function Code	Definition	Operation
01H	Read Coils	Read single or multiple coils
03H	Read Registers	Read one or multiple registers data
05H	Place Single Coil	Place single coil
06H	Write Single Register	Write a 16-bit binary number into the register

4.4.2 01H READ COILS

With communication command of function code 01H, master can read all coils (such as breaker close, open, fault, auto/manual status, etc.) inside the device.

4.4.3 03H READ REGISTERS

With function code 03H command, the master can read the numerical registers inside the device (numerical registers contains various collected analogs and parameter setting values). Input register values of function code 03H mapping data field are 16 bits (2 bytes). So, from the device reads registers values are 2 bytes. Maximum number of readable registers is 125 each time.

The slave received command format is slave address, function code, data field and the CRC code. The data of data field is in double bytes with every two bytes for a group, and high byte is in front.

4.4.4 05H PLACE SINGLE COIL

Master uses this command to save a single coil data into bit registers in the device (such as coil for ATS transfer control). The slave also uses this function code to respond information to the master.

4.4.5 06H WRITE SINGLE REGISTER

Master uses this command to save a single register data into registers in the device. The register in ModBus communication protocol refers 16-bit (2 bytes), and high byte is in advance. Thus all points of the device are 2 bytes. Format of command is slave address, function code, data field and CRC code.

4.5 DATA FIELD

4.5.1 ILLUSTRATION

Data field varies with different function codes.

4.5.2 CORRESPONDING DATA FIELD FORMAT TO FUNCTION CODE 01H

Table 5 Master Request

Data Sequence	Data Signification	Byte Count
1	Starting address	2
2	Read coil number	2

Table 6 Slave Response

Data Sequence	Data Signification	Byte Count
1	Loopback bytes	1
2	N-coil data	(N+7)/8 (take integer value)

4.5.3 CORRESPONDING DATA FIELD FORMAT TO FUNCTION CODE 03H

Table 7 Master Request

Data Sequence	Data Signification	Byte Count
1	Starting address	2
2	Read registers number	2

Table 8 Slave Response

Data Sequence	Data Signification	Byte Count
1	Loopback bytes	1
2	N-register data	N*2

4.5.4 CORRESPONDING DATA FIELD FORMAT TO FUNCTION CODE 05H

Table 9 Master Request

Data Sequence	Data Signification	Byte Count
1	Coil address	2
2	Forced single coil value	2

Table 10 Slave Response

Data Sequence	Data Signification	Byte Count
1	Coil address	2
2	Single coil value	2

4.5.5 CORRESPONDING DATA FIELD FORMAT TO FUNCTION CODE 06H

Table 11 Master Request

Data Sequence	Data Signification	Byte Count
1	Register address	2
2	Register value (2 bytes)	2

Table 12 Slave Response

Data Sequence	Data Signification	Byte Count
1	Register address	2
2	Register value (2 bytes)	2

4.6 ERROR CHECK CODE (CRC)

The Error Check Code allows master or slave to detect whether the received information has error. Sometimes, the transmission information occurs imperceptible changes due to electronic noise and other interference and the CRC code ensure the error information does not work to increase the system's safety and efficiency. CRC applies CRC-16 calibration method.

For 2 bytes CRC, low byte is in the front and high byte is in the back.

⚠**NOTE: All information frame formats are same: address code, function code, data field and CRC code.**

CRC includes 2 bytes, which is 16-bit binary number. CRC is counted by the sender and placed at the end of the transmitted information. Responded device will recalculate whether the CRC code of the received information is the same as that received. If they are different, then it means there is an error.

CRC counting method: first place 16-bit register as 1. Then gradually tackle with 8-bit data information. Only 8-bit data bit is used in the process of CRC counting. Start bit and stop bit are not included.

In the process of CRC counting, 8-bit data is Exclusive OR with the register data. The obtained result moves 1 bit to the low byte direction and fill MSB with 0. Check LSB again and if LSB is 1, then make register contents Exclusive OR with the preset values. If LSB is 0, then do not do Exclusive OR counting.

This process is repeated for many times. After the eighth bit move, the next 8-bit shall Exclusive OR with the current register contents. This also repeated for 8 times as the last one. Until all data information is handled, the last register contents are CRC value.

CRC-16 Code Calculation Procedure:
1) Place a 16-bit CRC register as hex FFFF.

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2) Make the 8-bit data Exclusive OR with the low 8-bit of the CRC register, and put the result in the CRC register.

3) Shift the contents of CRC register one bit to the right, and fill MSB with 0. Examine the moved-out bit.

4) If LSB was 0: repeat Step 3 (another shift).
   If LSB was 1: CRC register Exclusive OR the with hex A001.

5) Repeat Step 3 and 4 until 8 right shifts have been performed. When this is done, all 8-bit data are processed.

6) Repeat Step 2 to 5 for the next data processing.

7) The final CRC register value is the CRC code. Low 8-bit data is transmitted first and high 8-bit data is at the last.

⚠**NOTE: The calculating of CRC code starts from <slave address> and except for all bytes of <CRC code>.**

4.7 EXAMPLES OF INFORMATION FRAME FORMAT

4.7.1 FUNCTION CODE 01H

Slave address is 00, read 1 CH (decimal 28) coils of starting address 0000H.

Table 13 Function Code 01H Master Request Example

Request	Bytes	Example (Hex)	
Slave Address	1	01	Send to the slave 01
Function Code	1	01	Read coils
Starting Address	2	00 00	Starting address is 0000
Read Number	2	00 1C	Read 28 coils
CRC Code	2	3D C3	CRC code which calculated by PC.

Table 14 Function Code 01H Slave Response Example

Response	Bytes	Example (Hex)	
Slave Address	1	01	Respond to the slave 01
Function Code	1	01	Read coils
Read Bytes	1	04	Respond coil quantity: 28 (total 4 bytes)
Data 1	1	30	The content of address 07—00
Data 2	1	00	The content of address 0F—08
Data 3	1	93	The content of address 17—10
Data 4	1	0A	The content of address 1C—18
CRC Code	2	18 26	CRC code which calculated by slave.

⚠**NOTE:** The value of coil 07—00 is expressed in Hex as 30H, is 00110000 in binary. The coil 07 is high bit, 00 is low bit. The status of coil 07—00 is OFF—OFF—ON—ON—OFF—OFF—OFF—OFF.

4.7.2 FUNCTION CODE 03H

Slave address is 01, starting address is 3 points of 0026H.

Table 15 Data Address Example

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

Table 16 Function Code 03H Master Request Example

Request	Bytes	Example (Hex)	
Slave Address	1	01	Send to the slave 01
Function Code	1	03	Read point register
Starting Address	2	00 26	Starting address is 0026H
Read Number	2	00 03	Read 3 data (total 6 bytes)
CRC Code	2	E4 00	CRC code which calculated by PC.

Table 17 Function Code 03H Slave Response Example

Response	Bytes	Example (Hex)	
Slave Address	1	01	Respond to the slave 01
Function Code	1	03	Read point register
Read Bytes	1	06	3 points (total 6 bytes)
Point 1 Data	2	00 14	The content of address 0026H
Point 2 Data	2	00 14	The content of address 0027H
Point 3 Data	2	00 05	The content of address 0028H
CRC Code	2	91 71	CRC code which calculated by slave.

4.7.3 FUNCTION CODE 05H

Slave address is 01 and starting address is 1 coil of 0002H. Set 0002 unit as 1.

Table 18 Coil Data Address Example

Address	Data (Hex)
0000	0
0001	0
0002	0

Illustration: Hex value FF00 forced coil is 1. 0000H is forced as 0. Other values are illegal and do not affect the state of the coil.

Table 19 Function Code 05H Master Request Example

Request	Bytes	Example (Hex)	
Slave Address	1	01	Send to the slave 01
Function Code	1	05	Forced coil
Starting Address	2	00 00	Starting address is 0002
Data	2	FF 00	Set coil as 1
CRC Code	2	2D FA	CRC code which calculated by PC.

Table 20 Function Code 05H Slave Response Example

Response	Bytes	Example (Hex)	
Slave Address	1	01	Respond to the slave 01
Function Code	1	05	Forced coil
Starting Address	2	00 00	Starting address is 0002
Data	2	FF 00	Set coil as 1
CRC Code	2	2D FA	CRC code which calculated by slave.

4.7.4   FUNCTION CODE 06H

Slave address is 01, set 1 point content of starting address 00E3H as 0002H.

Table 21 Function Code 06H Master Request Example

Request	Bytes	Example (Hex)	
Slave Address	1	01	Send to the slave 01
Function Code	1	06	Write single register
Starting Address	2	00 E3	Starting address is 00E3H
Data	2	00 02	Place 1 point data (total 2 bytes)
CRC Code	2	F9 FD	CRC code which calculated by PC.

Table 22 Function Code 06H Slave Response Example

Response	Bytes	Example (Hex)	
Slave Address	1	01	Respond to the slave 01
Function Code	1	06	Write single register
Starting Address	2	00 E3	Starting address is 00E3H
Data	2	00 02	Place 1 point data (total 2 bytes)
CRC Code	2	F9 FD	CRC code which calculated by slave.

4.8 ERROR HANDLING

When device detects other errors except the CRC code, the slave must send information to the master. The function code MSB is 1, which means the response function code by slave should add 128 based on the function code. The following codes show that unexpected errors have occurred.

CRC error received from the master will be ignored by the device.

Table 23 Frame Format of Error Code Responded by Slave (CRC excluded)

Item	Bytes
Address Code	1 byte
Function Code	1 byte (MSB is 1)
Error Code	1 byte
CRC Code	2 bytes

Error code:

01   illegal function code

The function code received in the query is not an allowable action for the slave.

02   illegal data address

The data address received in the query is not an allowable address for the slave.

03   illegal data value

A value contained in the query data field is not an allowable value for the slave.

5. ATTACHMENT: ADDRESS AND DATA

5.1 FUNCTION CODE 01H MAPPING COIL FIELD

Table 24 Function Code 01H Mapping Coil Field

Coil		
Address	Item	Description
0	Common Alarm	1 for active
1	Common Warning Alarm	1 for active
2	Common Shutdown Alarm	1 for active
3	Common Electrical Trip Alarm	1 for active
4	Emergency Stop Alarm	1 for active
5	High Water Temperature Shutdown	1 for active
6	Low Oil Pressure Shutdown	1 for active
7	Gen Over Speed Shutdown	1 for active
8	Gen Under Speed Shutdown	1 for active
9	Speed Signal Loss Alarm	1 for active
10	Gen Over Frequency Shutdown	1 for active
11	Gen Under Frequency Shutdown	1 for active
12	Gen Over Voltage Shutdown	1 for active
13	Gen Under Voltage Shutdown	1 for active
14	Gen Over Current Shutdown	1 for active
15	Crank Failure Alarm	1 for active
16	Oil Pressure Sensor Open Alarm	1 for active
17	Input Port 1 Shutdown	1 for active
18	Input Port 2 Shutdown	1 for active
19	Input Port 3 Shutdown	1 for active
20	Input Port 4 Shutdown	1 for active
21	Input Port 5 Shutdown	1 for active
22	Flexible Sensor Upper Limit Shutdown	1 for active
23	Low Fuel Level Shutdown	1 for active
24	Reserved	1 for active
25	Reserved	1 for active
26	Reserved	1 for active
27	Reserved	1 for active
28	Reserved	1 for active
29	Flexible Sensor Open	1 for active
30	Flexible Sensor Lower Limit Shutdown	1 for active
31	Temperature Open Shutdown	1 for active
32	Reserved	1 for active
33	Reserved	1 for active
34	Reserved	1 for active
35	Reserved	1 for active
36	Reserved	1 for active
37	Reserved	1 for active

Coil		
Address	Item	Description
38	Reserved	1 for active
39	Reserved	1 for active
40	Overcurrent Trip	1 for active
41	Input Port 1 Electrical Trip	1 for active
42	Input Port 2 Electrical Trip	1 for active
43	Input Port 3 Electrical Trip	1 for active
44	Input Port 4 Electrical Trip	1 for active
45	Reserved	1 for active
46	Reserved	1 for active
47	Reserved	1 for active
48	High Water Temperature Warning	1 for active
49	Low Oil Pressure Warning	1 for active
50	Gen Over Speed Warning	1 for active
51	Gen Under Speed Warning	1 for active
52	Speed Signal Loss Warning	1 for active
53	Gen Over Frequency Warning	1 for active
54	Gen Under Frequency Warning	1 for active
55	Gen Over Voltage Warning	1 for active
56	Gen Under Voltage Warning	1 for active
57	Gen Over Current Warning	1 for active
58	Stop Failure Warning	1 for active
59	Fuel Level Low Warning	1 for active
60	Charging Failure Warning	1 for active
61	Battery Under Voltage Warning	1 for active
62	Battery Over Voltage Warning	1 for active
63	Input Port 1 Warning	1 for active
64	Input Port 2 Warning	1 for active
65	Input Port 3 Warning	1 for active
66	Input Port 4 Warning	1 for active
67	Input Port 5 Warning	1 for active
68	Input Port 6 Warning	1 for active
69	Flexible Sensor Lower Limit Warning	1 for active
70	Flexible Sensor Upper Limit Warning	1 for active
71	Battery Under Voltage Crank Warning	1 for active
72	Reserved	1 for active
73	Reserved	1 for active
74	Reserved	1 for active
75	Reserved	1 for active
76	Reserved	1 for active
77	Reserved	1 for active
78	Reserved	1 for active
79	Reserved	1 for active
80	Auto Scheduled Start Mode	1 for active

Coil		
Address	Item	Description
81	Auto SMS Start Mode	1 for active
82	Auto Remote Start Mode	1 for active
83	Reserved	1 for active
84	Reserved	1 for active
85	Reserved	1 for active
86	Reserved	1 for active
87	Reserved	1 for active
88	Reserved	1 for active
89	Reserved	1 for active
90	Reserved	1 for active
91	Reserved	1 for active
92	Auto Sunrise/Sunset Start Mode	1 for active
93	System in Auto Mode	1 for active
94	System in Manual Mode	1 for active
95	System in Stop Mode	1 for active
96	Input Port 1 Status	1 for active
97	Input Port 2 Status	1 for active
98	Input Port 3 Status	1 for active
99	Input Port 4 Status	1 for active
100	Input Port 5 Status	1 for active
101	Input Port 6 Status	1 for active
102	Emergency Input Port Status	1 for active
103	Unit Normal Running	1 for active
104	Crank Relay Output Status	1 for active
105	Fuel Relay Output Status	1 for active
106	Aux. Output Port 1 Status	1 for active
107	Aux. Output Port 2 Status	1 for active
108	Aux. Output Port 3 Status	1 for active
109	Aux. Output Port 4 Status	1 for active
110	Aux. Output Port 5 Status	1 for active
111	Aux. Output Port 6 Status	1 for active
112	Aux. LED1 Status	1 for active
113	Aux. LED2 Status	1 for active
114	Aux. LED3 Status	1 for active
115	Aux. LED4 Status	1 for active
116	Lamp Input Port 1 Status	1 for active
117	Lamp Input Port 2 Status	1 for active
118	Lamp Input Port 3 Status	1 for active
119	Lamp Input Port 4 Status	1 for active
120	Lamp Input Port 5 Status	1 for active
121	Lamp Input Port 6 Status	1 for active
122	Lamp Input Port 7 Status	1 for active
123	Lamp Input Port 8 Status	1 for active

Coil		
Address	Item	Description
124	Common Under/Over Frequency Shutdown Alarm	1 for active
125	Common Under/Over Frequency Warning Alarm	1 for active
126	Common Under/Over Voltage Shutdown Alarm	1 for active
127	Common Under/Over Voltage Warning Alarm	1 for active
128	Reserved	1 for active
129	Reserved	1 for active
130	Reserved	1 for active
131	Reserved	1 for active
132	Reserved	1 for active
133	Reserved	1 for active
134	Reserved	1 for active
135	Reserved	1 for active
136	Lamp Output Port 1 Status	1 for active
137	Lamp Output Port 2 Status	1 for active
138	Lamp Output Port 3 Status	1 for active
139	Lamp Output Port 4 Status	1 for active
140	Lamp Output Port 5 Status	1 for active
141	Lamp Output Port 6 Status	1 for active
142	Lamp Output Port 7 Status	1 for active
143	Lamp Output Port 8 Status	1 for active

5.2 FUNCTION CODE 03H MAPPING DATA FIELD

Table 25 Function Code 03H Mapping Data Field

Address	Item	Description	Bytes
0000	Reserved		2Bytes
0001	Reserved		2Bytes
0002	Reserved		2Bytes
0003	DC Voltage	Unsigned (*10)	2Bytes
0004	DC Current	Unsigned (*10)	2Bytes
0005	DC Power	Unsigned (*10)	2Bytes
0006	Gen UAB	Unsigned	2Bytes
0007	Gen UBC	Unsigned	2Bytes
0008	Gen UCA	Unsigned	2Bytes
0009	Gen UA	Unsigned	2Bytes
0010	Gen UB	Unsigned	2Bytes
0011	Gen UC	Unsigned	2Bytes
0012	Current IA	Unsigned	2Bytes
0013	Current IB	Unsigned	2Bytes
0014	Current IC	Unsigned	2Bytes
0015	Power Factor	Signed (*100)	2Bytes
0016	Reserved		2Bytes
0017	Reserved		2Bytes
0018	Reserved		2Bytes
0019	Reserved		2Bytes
0020	Battery Voltage	Unsigned (*10)	2Bytes
0021	Charger Voltage	Unsigned (*10)	2Bytes
0022	Temperature Sensor Temperature Value	Unsigned	2Bytes
0023	Oil Pressure Sensor Pressure Value	Unsigned	2Bytes
0024	Fuel Level Sensor Level Value	Unsigned	2Bytes
0025	Flexible Sensor Data	Unsigned	2Bytes
0026	Reserved		2Bytes
0027	Gen Frequency	Signed (*10)	2Bytes
0028	Active Power P1	Signed (*10)	2Bytes
0029	Active Power P2	Signed (*10)	2Bytes
0030	Active Power P3	Signed (*10)	2Bytes
0031	Total Active Power PS	Signed (*10)	2Bytes
0032	Reactive Power Q1	Signed (*10)	2Bytes
0033	Reactive Power Q2	Signed (*10)	2Bytes
0034	Reactive Power Q3	Signed (*10)	2Bytes
0035	Total Reactive Power QS	Signed (*10)	2Bytes
0036	Apparent Power S1	Signed (*10)	2Bytes
0037	Apparent Power S2	Signed (*10)	2Bytes
0038	Apparent Power S3	Signed (*10)	2Bytes
0039	Total Apparent Power S	Signed (*10)	2Bytes

Address	Item	Description	Bytes
0040	Engine Speed	Unsigned	2Bytes
0041	Genset Status	Unsigned	2Bytes
0042	Remote Start Status	Unsigned	2Bytes
0043	Reserved		2Bytes
0044	Reserved		2Bytes
0045	Genset Status Delay	Unsigned	2Bytes
0046	Remote Start Status Delay	Unsigned	2Bytes
0047	Reserved		2Bytes
0048	Reserved		2Bytes
0049	Controller Time Year	Unsigned	2Bytes
0050	Controller Time Month	Unsigned	2Bytes
0051	Controller Time Day	Unsigned	2Bytes
0052	Controller Time Hour	Unsigned	2Bytes
0053	Controller Time Minute	Unsigned	2Bytes
0054	Controller Time Second	Unsigned	2Bytes
0055	Controller Time Week	Unsigned	2Bytes
0056	Reserved		2Bytes
0057	Reserved		2Bytes
0058	Reserved		2Bytes
0059	Reserved		2Bytes
0060	Reserved		2Bytes
0061	Reserved		2Bytes
0062	Reserved		2Bytes
0063	Reserved		2Bytes
0064	Reserved		2Bytes
0065	Reserved		2Bytes
0066	Reserved		2Bytes
0067	Reserved		2Bytes
0068	Controller Software Version	Unsigned	2Bytes
0069	Reserved		2Bytes
0070	Issue Year	Unsigned	2Bytes
0071	Issue Month	Unsigned	2Bytes
0072	Issue Day	Unsigned	2Bytes

5.3 FUNCTION CODE 05H MAPPING DATA FIELD

Table 26 Function Code 05H Mapping Data Field

Address	Item	Description
0	Remote Start Key	0xFF00 for active
1	Remote Stop Key	0xFF00 for active
2	Reserved	0xFF00 for active
3	Remote Auto Key	0xFF00 for active
4	Remote Manual Key	0xFF00 for active
5	Remote Emergency Stop Key	0xFF00 for active
6	Remote Maintenance Key	0xFF00 for active
7	Remote Flashlight Key	0xFF00 for active
8	Remote Mute Key	0xFF00 for active
9	Remote Up Key	0xFF00 for active
10	Remote Down Key	0xFF00 for active
11	Remote Confirm/Page Key	0xFF00 for active
12	Remote Light On Key	0xFF00 for active
13	Remote Light Off Key	0xFF00 for active
14	Reserved	
15	Reserved	
16	Remote Output Port 1 Output	It is active when output port is configured as "Remote Output". 0xFF00 for active, 0 for inactive.
17	Remote Output Port 2 Output	
18	Remote Output Port 3 Output	
19	Remote Output Port 4 Output	
20	Remote Control All Lights On	0xFF00 for active
21	Remote Control All Lights Off	0xFF00 for active
22	Remote Light 1 Output	It is active when system in manual mode. 0xFF00 for active, 0 for inactive.
23	Remote Light 2 Output	
24	Remote Light 3 Output	
25	Remote Light 4 Output	
26	Remote Light 5 Output	
27	Remote Light 6 Output	
28	Remote Light 7 Output	
29	Remote Light 8 Output	
30	Auto Scheduled Start	0xFF00 for active
31	Auto SMS Start	0xFF00 for active
32	Auto Sunrise/Sunset Start	0xFF00 for active
33	Auto Remote Start	0xFF00 for active

5.4 FUNCTION CODE 06H MAPPING DATA FIELD

Table 27 Function Code 06H Mapping Data Field

Address	Item	Description
10	Set Controller Time Year	Whether setting year/month/day or hour/minute/second, the last one should end with second, otherwise, set time is invalid.
11	Set Controller Time Month	
12	Set Controller Time Day	
13	Set Controller Time Hour	
14	Set Controller Time Minute	
15	Set Controller Time Second	
728	Accumulated Running Seconds	Unit running time (s)
729	Accumulated Running Minutes	Unit running time (min)
730	Accumulated Running Hours	Unit running time (h)
731	Accumulated Start Times	Unit start times

5.5 GENSET STATUS TABLE

Table 28 Genset Status Table

No.	Content	Description
0	Genset At Rest	This state does not display delay value.
1	Start Pre-heat Delay	
2	Fuel Output Delay	
3	Cranking	
4	Crank Rest Time	
5	Safety On Delay	
6	Start Idle Delay	
7	Start Warming Up Delay	
8	Genset Wait for Load	This state does not display delay value.
9	Genset Normal Running	This state does not display delay value.
10	Stop Cooling Delay	
11	Stop Idle Delay	
12	ETS Delay	
13	Wait for Stop	
14	After Stop	
15	Genset Stop Failure	This state does not display delay value.

5.6 REMOTE START STATUS TABLE

Table 29 Remote Start Status Table

No.	Content	Description
0	Wait for Remote Start Signal	This state does not display delay value.
1	Start Delay	
2	Stop Delay	
3	Remote Start Signal Active	This state does not display delay value.

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