HFC6100LT

FAN 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
2021-01-15	1.0	Original release.

This protocol only suits for HFC6100LT fan controller.

The below table is the description of the signs used in this protocol.

Table 2 Sign Description

Sign	Description
NOTE	Highlights an essential element of a procedure to ensure correctness.
CAUTION!	Indicates a procedure or practice, which, if not strictly observed, could result in damage or destruction of equipment.
WARNING!	Indicates a procedure or practice, which could result in injury to personnel or loss of life if not followed correctly.

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 10-bit (stop bit: 1) or 11-bit (stop bit: 2) serial data stream.

Table 3 Data frame format

Item	Bits
Start bit	1-bit
Data bit	8-bit
Parity bit	No parity
Stop bit	1-bit or 2-bit can be set.
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 4 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. 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 range>127), it means there is no response or response has error.

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

Table 5 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 analog 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 advance.

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 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 6 Master Request

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

Table 7 Slave Response

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

4.5.3 CORRESPONDING DATA FIELD FORMAT TO FUNCTION CODE 03H

Table 8 Master Request

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

Table 9 Slave Response

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

4.5.4 CORRESPONDING DATA FIELD FORMAT TO FUNCTION CODE 05H

Table 10 Master Request

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

Table 11 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 12 Master Request

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

Table 13 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 the receiving device to detect a packet that has been corrupted with transmission errors. 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.

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 20H (decimal 32) coils of starting address 0000H.

Table 14 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 Starting address is 0000 00
Read Number	2	00 Read 28 coils 1C
CRC Code	2	3D CRC code which calculated by PC. C3

Table 15 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 CRC code which calculated by slave. 26

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 data of 0026H (each data with 2 bytes).

Table 16 Point Data Address

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

Table 17 Function Code 03H Master Request Example

Request	Bytes	Example (Hex)	
Slave Address	1	01	Send to the slave 01
Function Code	1	03	Read registers
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 18 Function Code 03H Slave Response Example

Response	Bytes	Example (Hex)	
Slave Address	1	01	Respond to the slave 01
Function Code	1	03	Read registers
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 0000H. Set 0000H unit as 1.

Table 19 Coil Data Address

Address	Data (Hex)
0000	0
0001	1
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 20 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 for 0000H
Data	2	FF 00	Set coil as 1
CRC Code	2	CD FB	CRC code which calculated by PC.

Table 21 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 0000H
Data	2	FF 00	Set coil as 1
CRC Code	2	CD FB	CRC code which calculated by PC.

4.7.4 FUNCTION CODE 06H

Slave address is 01, place 1 point content with starting address 00E3H as 0002H.

Table 22 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 23 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 PC.

4.8 ERROR HANDLING

When device detected 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 24 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 25 Function Code 01H Mapping Coil Field

Address	Item	Description	Bytes	Remark
0000	Common Alarm	1 for active (LSB)	1bit	
0001	Common Warning Alarm	1 for active	1bit	
0002	Common Shutdown Alarm	1 for active	1bit	
0003	Reserved	1 for active	1bit	
0004	Reserved	1 for active	1bit	
0005	Reserved	1 for active	1bit	
0006	Reserved	1 for active	1bit	
0007	Reserved	1 for active	1bit	
0008	Sensor 1 Open Alarm	1 for active	1bit	
0009	Sensor 1 High Alarm	1 for active	1bit	
0010	Sensor 2 Open Alarm	1 for active	1bit	
0011	Sensor 2 High Alarm	1 for active	1bit	
0012	Sensor 3 Open Alarm	1 for active	1bit	
0013	Sensor 3 High Alarm	1 for active	1bit	
0014	Sensor 4 Open Alarm	1 for active	1bit	
0015	Sensor 4 High Alarm	1 for active	1bit	
0016	Sensor 5 Open Alarm	1 for active	1bit	
0017	Sensor 5 High Alarm	1 for active	1bit	
0018	Reserved	1 for active	1bit	
0019	Reserved	1 for active	1bit	
0020	Reserved	1 for active	1bit	
0021	Reserved	1 for active	1bit	
0022	Reserved	1 for active	1bit	
0023	Reserved	1 for active	1bit	
0024	Reserved	1 for active	1bit	
0025	Reserved	1 for active	1bit	
0026	Reserved	1 for active	1bit	
0027	Reserved	1 for active	1bit	
0028	Reserved	1 for active	1bit	
0029	Reserved	1 for active	1bit	
0030	Reserved	1 for active	1bit	
0031	Reserved	1 for active	1bit	
0032	Battery Under Voltage Alarm	1 for active	1bit	
0033	Battery Over Voltage Alarm	1 for active	1bit	
0034	Reserved	1 for active	1bit	
0035	Reserved	1 for active	1bit	
0036	Reserved	1 for active	1bit	
0037	Reserved	1 for active	1bit	
0038	Reserved	1 for active	1bit	

Address	Item	Description	Bytes	Remark
0039	Reserved	1 for active	1bit	
0040	1# Fan Fault Input	1 for active	1bit	
0041	2# Fan Fault Input	1 for active	1bit	
0042	3# Fan Fault Input	1 for active	1bit	
0043	4# Fan Fault Input	1 for active	1bit	
0044	5# Fan Fault Input	1 for active	1bit	
0045	6# Fan Fault Input	1 for active	1bit	
0046	7# Fan Fault Input	1 for active	1bit	
0047	8# Fan Fault Input	1 for active	1bit	
0048	9# Fan Fault Input	1 for active	1bit	
0049	10# Fan Fault Input	1 for active	1bit	
0050	11# Fan Fault Input	1 for active	1bit	
0051	12# Fan Fault Input	1 for active	1bit	
0052	Reserved	1 for active	1bit	
0053	Reserved	1 for active	1bit	
0054	Reserved	1 for active	1bit	
0055	Reserved	1 for active	1bit	
0056	In Manual Mode	1 for active	1bit	
0057	In Auto Mode	1 for active	1bit	
0058	Reserved	1 for active	1bit	
0059	Reserved	1 for active	1bit	
0060	Reserved	1 for active	1bit	
0061	Reserved	1 for active	1bit	
0062	Reserved	1 for active	1bit	
0063	Reserved	1 for active	1bit	
0064	Aux. Input Port 1	1 for active	1bit	
0065	Aux. Input Port 2	1 for active	1bit	
0066	Aux. Input Port 3	1 for active	1bit	
0067	Aux. Input Port 4	1 for active	1bit	
0068	Aux. Input Port 5	1 for active	1bit	
0069	Aux. Input Port 6	1 for active	1bit	
0070	Aux. Input Port 7	1 for active	1bit	
0071	Aux. Input Port 8	1 for active	1bit	
0072	Aux. Input Port 9	1 for active	1bit	
0073	Aux. Input Port 10	1 for active	1bit	
0074	Aux. Input Port 11	1 for active	1bit	
0075	Aux. Input Port 12	1 for active	1bit	
0076	Aux. Input Port 13	1 for active	1bit	
0077	Aux. Input Port 14	1 for active	1bit	
0078	Aux. Input Port 15	1 for active	1bit	
0079	Aux. Input Port 16	1 for active	1bit	
0080	Aux. Input Port 17	1 for active	1bit	
0081	Aux. Input Port 18	1 for active	1bit	
0082	Reserved	1 for active	1bit	

Address	Item	Description	Bytes	Remark
0083	Reserved	1 for active	1bit	
0084	Reserved	1 for active	1bit	
0085	Reserved	1 for active	1bit	
0086	Reserved	1 for active	1bit	
0087	Reserved	1 for active	1bit	
0088	Digital Output Port 1	1 for active	1bit	
0089	Digital Output Port 2	1 for active	1bit	
0090	Digital Output Port 3	1 for active	1bit	
0091	Digital Output Port 4	1 for active	1bit	
0092	Digital Output Port 5	1 for active	1bit	
0093	Digital Output Port 6	1 for active	1bit	
0094	Digital Output Port 7	1 for active	1bit	
0095	Digital Output Port 8	1 for active	1bit	
0096	Digital Output Port 9	1 for active	1bit	
0097	Digital Output Port 10	1 for active	1bit	
0098	Digital Output Port 11	1 for active	1bit	
0099	Digital Output Port 12	1 for active	1bit	
00100	1#PWM Output Port	1 for active	1bit	
00101	2#PWM Output Port	1 for active	1bit	
00102	3#PWM Output Port	1 for active	1bit	
00103	4#PWM Output Port	1 for active	1bit	
00104	Reserved	1 for active	1bit	
00105	Reserved	1 for active	1bit	
00106	Reserved	1 for active	1bit	
00107	Reserved	1 for active	1bit	
00108	Reserved	1 for active	1bit	
00109	Reserved	1 for active	1bit	
00110	Reserved	1 for active	1bit	
00111	Reserved	1 for active	1bit	

5.2. FUNCTION CODE 03H, 06H MAPPING COIL FIELD

06H function code can only be written to address 012-047 and 057-063, other addresses cannot be written.

Table 26 Function Code 03H, 06H Mapping Coil Field

Address	Item	Range	Coefficient	Unit	Description	Bytes	Remark
0001	Sensor 1 Temp Value	(-50-300)	1	°C	16-bit Signed	2Bytes	Note 1
0002	Sensor 1 Resist.	(0-6000)	1	Ω	16-bit Unsigned	2Bytes	
0003	Sensor 2 Temp Value	(-50-300)	1	°C	16-bit Signed	2Bytes	Note 1
0004	Sensor 2 Resist.	(0-6000)	1	Ω	16-bit Unsigned	2Bytes	
0005	Sensor 3 Temp Value	(-50-300)	1	°C	16-bit Signed	2Bytes	Note 1
0006	Sensor 3 Resist.	(0-6000)	1	Ω	16-bit Unsigned	2Bytes	
0007	Sensor 4 Temp Value	(-50-300)	1	°C	16-bit Signed	2Bytes	Note 1
0008	Sensor 4 Resist.	(0-6000)	1	Ω	16-bit Unsigned	2Bytes	
0009	Sensor 5 Temp Value	(-50-300)	1	°C	16-bit Signed	2Bytes	Note 1
0010	Sensor 5 Resist.	(0-6000)	1	Ω	16-bit Unsigned	2Bytes	
0011	Battery Voltage	(0-60.0)	0.1	V	16-bit Signed	2Bytes	
0012	Reserved						
0013	Output 1 Accum. Running Hours	(0-65535)	1	h	16-bit Unsigned	2Bytes	
0014	Output 1 Accum. Running Minutes	(0-59)	1	min	16-bit Unsigned	2Bytes	
0015	Output 1 Accum. Running Seconds	(0-59)	1	s	16-bit Unsigned	2Bytes	
0016	Output 2 Accum. Running Hours	(0-65535)	1	h	16-bit Unsigned	2Bytes	
0017	Output 2 Accum. Running Minutes	(0-59)	1	min	16-bit Unsigned	2Bytes	
0018	Output 2 Accum. Running Seconds	(0-59)	1	s	16-bit Unsigned	2Bytes	
0019	Output 3 Accum. Running Hours	(0-65535)	1	h	16-bit Unsigned	2Bytes	
0020	Output 3 Accum. Running Minutes	(0-59)	1	min	16-bit Unsigned	2Bytes	
0021	Output 3 Accum.	(0-59)	1	s	16-bit	2Bytes	

Address	Item	Range	Coefficient	Unit	Description	Bytes	Remark
	Running Seconds				Unsigned		
0022	Output 4 Accum. Running Hours	(0-65535)	1	h	16-bit Unsigned	2Bytes	
0023	Output 4 Accum. Running Minutes	(0-59)	1	min	16-bit Unsigned	2Bytes	
0024	Output 4 Accum. Running Seconds	(0-59)	1	s	16-bit Unsigned	2Bytes	
0025	Output 5 Accum. Running Hours	(0-65535)	1	h	16-bit Unsigned	2Bytes	
0026	Output 5 Accum. Running Minutes	(0-59)	1	min	16-bit Unsigned	2Bytes	
0027	Output 5 Accum. Running Seconds	(0-59)	1	s	16-bit Unsigned	2Bytes	
0028	Output 6 Accum. Running Hours	(0-65535)	1	h	16-bit Unsigned	2Bytes	
0029	Output 6 Accum. Running Minutes	(0-59)	1	min	16-bit Unsigned	2Bytes	
0030	Output 6 Accum. Running Seconds	(0-59)	1	s	16-bit Unsigned	2Bytes	
0031	Output 7 Accum. Running Hours	(0-65535)	1	h	16-bit Unsigned	2Bytes	
0032	Output 7 Accum. Running Minutes	(0-59)	1	min	16-bit Unsigned	2Bytes	
0033	Output 7 Accum. Running Seconds	(0-59)	1	s	16-bit Unsigned	2Bytes	
0034	Output 8 Accum. Running Hours	(0-65535)	1	h	16-bit Unsigned	2Bytes	
0035	Output 8 Accum. Running Minutes	(0-59)	1	min	16-bit Unsigned	2Bytes	
0036	Output 8 Accum. Running Seconds	(0-59)	1	s	16-bit Unsigned	2Bytes	
0037	Output 9 Accum. Running Hours	(0-65535)	1	h	16-bit Unsigned	2Bytes	
0038	Output 9 Accum. Running Minutes	(0-59)	1	min	16-bit Unsigned	2Bytes	
0039	Output 9 Accum. Running Seconds	(0-59)	1	s	16-bit Unsigned	2Bytes	
0040	Output 10 Accum. Running Hours	(0-65535)	1	h	16-bit Unsigned	2Bytes	
0041	Output 10 Accum. Running Minutes	(0-59)	1	min	16-bit Unsigned	2Bytes	
0042	Output 10 Accum. Running Seconds	(0-59)	1	s	16-bit Unsigned	2Bytes	
0043	Output 11 Accum.	(0-65535)	1	h	16-bit	2Bytes	

Address	Item	Range	Coefficient	Unit	Description	Bytes	Remark
	Running Hours				Unsigned		
0044	Output 11 Accum. Running Minutes	(0-59)	1	min	16-bit Unsigned	2Bytes	
0045	Output 11 Accum. Running Seconds	(0-59)	1	s	16-bit Unsigned	2Bytes	
0046	Output 12 Accum. Running Hours	(0-65535)	1	h	16-bit Unsigned	2Bytes	
0047	Output 12 Accum. Running Minutes	(0-59)	1	min	16-bit Unsigned	2Bytes	
0048	Output 12 Accum. Running Seconds	(0-59)	1	s	16-bit Unsigned	2Bytes	
0049	1#PWM Output	(0-100)	1	%	16-bit Unsigned	2Bytes	
0050	2#PWM Output	(0-100)	1	%	16-bit Unsigned	2Bytes	
0051	3#PWM Output	(0-100)	1	%	16-bit Unsigned	2Bytes	
0052	4#PWM Output	(0-100)	1	%	16-bit Unsigned	2Bytes	
0053	Software Version	(10-65535)	0.1		16-bit Unsigned	2Bytes	
0054	Hardware Version	(10-65535)	0.1		16-bit Unsigned	2Bytes	
0055	Reserved						
0056	LCD Temperature	(-40-200)	1	°C	16-bit Signed	2Bytes	
0057	SCM Internal Temp.	(-400-2000)	0.1	°C	16-bit Signed	2Bytes	
0058	Controller Time: Year	(0-99)	1		16-bit Unsigned	2Bytes	Note 2
0059	Controller Time: Month	(1-12)	1		16-bit Unsigned	2Bytes	
0060	Controller Time: Day	(1-31)	1		16-bit Unsigned	2Bytes	
0061	Controller Time: Week	(0-6)	1		16-bit Unsigned	2Bytes	
0062	Controller Time: Hour	(0-23)	1		16-bit Unsigned	2Bytes	
0063	Controller Time: Minute	(0-59)	1		16-bit Unsigned	2Bytes	
0064	Controller Time: Second	(0-59)	1		16-bit Unsigned	2Bytes	
0065	Issue Year	(0-99)	1		16-bit Unsigned	2Bytes	Note 2
0066	Issue Month	(1-12)	1		16-bit Unsigned	2Bytes	

Address	Item	Range	Coefficient	Unit	Description	Bytes	Remark
0067	Issue Day	(1-31)	1		16-bit Unsigned	2Bytes	

⚠NOTE 1: Controller detects sensor circuit is open, data is 32766, displays ++++.

⚠NOTE 2: Only save last two digits of year.

5.3. FUNCTION CODE 05H MAPPING DATA FIELD

Table 27 Function Code 05H Mapping Data Field

Address	Item	Description
0000H	Reserved	1 for active
0001H	Reserved	1 for active
0002H	Reserved	1 for active
0003H	Remote Oil Engine in Auto Status	1 for active
0004H	Remote Oil Engine in Manual Status	1 for active
0005H	Reserved	1 for active
0006H	Reserved	1 for active
0010H	Fan 1 Control	1 for active, 0 for inactive
0011H	Fan 2 Control	1 for active, 0 for inactive
0012H	Fan 3 Control	1 for active, 0 for inactive
0013H	Fan 4 Control	1 for active, 0 for inactive
0014H	Fan 5 Control	1 for active, 0 for inactive
0015H	Fan 6 Control	1 for active, 0 for inactive
0016H	Fan 7 Control	1 for active, 0 for inactive
0017H	Fan 8 Control	1 for active, 0 for inactive
0018H	Fan 9 Control	1 for active, 0 for inactive
0019H	Fan 10 Control	1 for active, 0 for inactive
001AH	Fan 11 Control	1 for active, 0 for inactive
001BH	Fan 12 Control	1 for active, 0 for inactive
0020H	PWM1 Speed Up	1 for active
0021H	PWM1 Speed Down	1 for active
0022H	PWM2 Speed Up	1 for active
0023H	PWM2 Speed Down	1 for active
0024H	PWM3 Speed Up	1 for active
0025H	PWM3 Speed Down	1 for active
0026H	PWM4 Speed Up	1 for active
0027H	PWM4 Speed Down	1 for active

_____