



SmartGen
ideas for power

HGM9300MPU(CAN) SERIES
GENSET CONTROLLER
COMMUNICATION PROTOCOL

SmartGen

SMARTGEN (ZHENGZHOU) TECHNOLOGY CO., LTD.



Chinese trademark

SmartGen English trademark

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This manual is suitable for HGM9310MPU/HGM9320MPU/HGM9310CAN/HGM9320CAN controllers only.

Table 1 Software Version

Date	Version	Note
2015-10-10	1.0	Original release.
2020-12-28	1.1	Modify "second" in No. 201 of 5.1; unify tables' style; header and footer change to the latest template.

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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 2 Data frame format

Item	Description
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 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. 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). HGM9300MPU(CAN) controllers use 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 4 ModBus Partial Function Code

Function code	Definition	Operation
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 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.

4.4.3 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.

4.4.4 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 03H

Table 5 Master Request

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

Table 6 Slave Response

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

4.5.3 CORRESPONDING DATA FIELD FORMAT TO FUNCTION CODE 05H

Table 7 Master Request

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

Table 8 Slave Response

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

4.5.4 CORRESPONDING DATA FIELD FORMAT TO FUNCTION CODE 06H

Table 9 Master Request

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

Table 10 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 format 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:

- Place a 16-bit CRC register as hex FFFF.
- Make the 8-bit data Exclusive OR with the low 8-bit of the CRC register, and put the result in the CRC register.
- Shift the contents of CRC register one bit to the right, and fill MSB with 0. Examine the moved-out bit.
- If LSB was 0: repeat Step 3 (another shift).
- If LSB was 1: CRC register Exclusive OR the with hex A001.
- Repeat Step 3 and 4 until 8 right shifts have been performed. When this is done, all 8-bit data are processed.
- Repeat Step 2 to 5 for the next data processing.
- 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>.

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4.7 EXAMPLES OF INFORMATION FRAME FORMAT

4.7.1 FUNCTION CODE 03H

Slave address is 01, starting address is 3 data of 0026H (each data with 2 bytes).

Table 11 Data Address

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

Table 12 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 Starting address is 0026H 26
Read Number	2	00 Read 3 data (total 6 bytes) 03
CRC code	2	E4 CRC code which calculated by PC. 00

Table 13 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 data (total 6 bytes)
Data 1	2	00 The content of address 0026H 14
Data 2	2	00 The content of address 0027H 14
Data 3	2	00 The content of address 0028H 05
CRC code	2	91 CRC code which calculated by slave. 71

4.7.2 FUNCTION CODE 05H

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

Table 14 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 15 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 Starting address for 0000H 00
Data	2	FF Set coil as 1 00
CRC code	2	CD CRC code which calculated by PC. FB

Table 16 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 Starting address is 0000H 00
Data	2	FF Set coil as 1 00
CRC code	2	CD CRC code which calculated by PC. FB

4.7.3 FUNCTION CODE 06H

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

Table 17 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 18 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 19 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 03H, 06H MAPPING DATA FIELD

06H function code can only be written to address 0199-0210 and 0225-0231, other addresses cannot be written.

Table 20 Function Code 03H, 06H Mapping Data Field

Address	Items	Description	Bytes
0000	Common Alarm	1 for active (LSB)	1bit
	Common Shutdown Alarm	1 for active	1bit
	Common Warning Alarm	1 for active	1bit
	Common Trip and Stop Alarm	1 for active	1bit
	Common Trip	1 for active	1bit
	Common ELE Trip & Common Shut Alarm	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	In Test Mode	1 for active	1bit
	In Auto Mode	1 for active	1bit
	In Manual Mode	1 for active	1bit
	In Stop Mode	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active (MSB)	1bit
0001	Emergency Stop Alarm	1 for active	1bit
	Over Speed Shutdown	1 for active	1bit
	Under Speed Shutdown	1 for active	1bit
	Loss of Speed Signal Alarm	1 for active	1bit
	Gen Over Frequency Shutdown	1 for active	1bit
	Gen Under Frequency Shutdown	1 for active	1bit
	Gen Over Voltage Shutdown	1 for active	1bit
	Gen Under Voltage Shutdown	1 for active	1bit
	Start Failure Alarm	1 for active	1bit
	Gen Over Current Shutdown	1 for active	1bit
	Maintenance Time Due Shutdown	1 for active	1bit
	ECU Shutdown	1 for active	1bit
	Reverse Power Shutdown	1 for active	1bit
	Over Power Shutdown	1 for active	1bit
	Aux High Temp Shutdown	1 for active	1bit
	Aux Low OP Shutdown	1 for active	1bit
0002	ECU Comm. Failure Shutdown	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit

Address	Items	Description	Bytes
	Reserved	1 for active	1bit
	Unbalanced Current Shutdown	1 for active	1bit
	Earth Fault Shutdown	1 for active	1bit
	Excitation Loss Fault Shutdown	1 for active	1bit
	Temp Sensor Open	1 for active	1bit
	High Temp Shutdown	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Oil Pressure Sensor Open	1 for active	1bit
	Reserved	1 for active	1bit
	Low OP Shutdown	1 for active	1bit
	Reserved	1 for active	1bit
0003	Level Sensor Open Circuit	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Flexible Sensor 1 Open	1 for active	1bit
	Flexible Sensor 1 High Shutdown	1 for active	1bit
	Flexible Sensor 1 Low Shutdown	1 for active	1bit
	Reserved	1 for active	1bit
	Flexible Sensor 2 Open	1 for active	1bit
	Flexible Sensor 2 High Shutdown	1 for active	1bit
	Flexible Sensor 2 Low Shutdown	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Input Module 2 Cylinder Temp High	1 for active	1bit
0004	Input Module 1 Comm. Failure	1 for active	1bit
	Input Module 1 Outlet Temp High	1 for active	1bit
	Input Module 1 Sensor 15 Open	1 for active	1bit
	Input Module 1 Sensor 15 High	1 for active	1bit
	Input Module 1 Sensor 15 Low	1 for active	1bit
	Input Module 1 Sensor 16 Open	1 for active	1bit
	Input Module 1 Sensor 16 High	1 for active	1bit
	Input Module 1 Sensor 16 Low	1 for active	1bit
	Input Module 1 Sensor 17 Open	1 for active	1bit
	Input Module 1 Sensor 17 High	1 for active	1bit
	Input Module 1 Sensor 17 Low	1 for active	1bit
	Input Module 1 Sensor 18 Open	1 for active	1bit
	Input Module 1 Sensor 18 High	1 for active	1bit
	Input Module 1 Sensor 18 Low	1 for active	1bit
	Input Module 1 Sensor 19 Open	1 for active	1bit
	Input Module 1 Sensor 19 High	1 for active	1bit

Address	Items	Description	Bytes
0005	Input Module 1 Sensor 19 Low		
	Input Module 1 Sensor 20 Open		
	Input Module 1 Sensor 20 High		
	Input Module 1 Sensor 20 Low		
	Input Module 1 Sensor 21 Open		
	Input Module 1 Sensor 21 High		
	Input Module 1 Sensor 21 Low		
	Input Module 1 Sensor 22 Open		
	Input Module 1 Sensor 22 High		
	Input Module 1 Sensor 22 Low		
	Input Module 1 Sensor 23 Open		
	Input Module 1 Sensor 23 High		
	Input Module 1 Sensor 23 Low		
	Input Module 1 Sensor 24 Open		
	Input Module 1 Sensor 24 High		
	Input Module 1 Sensor 24 Low		
0006	Input Module 2 Comm. Failure		
	Input Module 2 Outlet Temp High		
	Input Module 2 Sensor 15 Open		
	Input Module 2 Sensor 15 High		
	Input Module 2 Sensor 15 Low		
	Input Module 2 Sensor 16 Open		
	Input Module 2 Sensor 16 High		
	Input Module 2 Sensor 16 Low		
	Input Module 2 Sensor 17 Open		
	Input Module 2 Sensor 17 High		
	Input Module 2 Sensor 17 Low		
	Input Module 2 Sensor 18 Open		
	Input Module 2 Sensor 18 High		
	Input Module 2 Sensor 18 Low		
	Input Module 2 Sensor 19 Open		
	Input Module 2 Sensor 19 High		
0007	Input Module 2 Sensor 19 Low		
	Input Module 2 Sensor 20 Open		
	Input Module 2 Sensor 20 High		
	Input Module 2 Sensor 20 Low		
	Input Module 2 Sensor 21 Open		
	Input Module 2 Sensor21 High		
	Input Module 2 Sensor 21 Low		
	Input Module 2 Sensor 22 Open		
	Input Module 2 Sensor 22 High		
	Input Module 2 Sensor 22 Low		
	Input Module 2 Sensor 23 Open		
	Input Module 2 Sensor 23 High		

Address	Items	Description	Bytes
	Input Module 2 Sensor 23 Low		
	Input Module 2 Sensor 24 Open		
	Input Module 2 Sensor 24 High		
	Input Module 2 Sensor 24 Low		
0008	Aux Input 1 Shutdown	1 for active	1bit
	Aux Input 2 Shutdown	1 for active	1bit
	Aux Input 3 Shutdown	1 for active	1bit
	Aux Input 4 Shutdown	1 for active	1bit
	Aux Input 5 Shutdown	1 for active	1bit
	Aux Input 6 Shutdown	1 for active	1bit
	Aux Input 7 Shutdown	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	PLC 1	1 for active	1bit
	PLC 2	1 for active	1bit
	PLC 3	1 for active	1bit
	PLC 4	1 for active	1bit
0009	PLC 5		2Bytes
	PLC 6		
	PLC 7		
	PLC 8		
	PLC 9		
	PLC 10		
	PLC 11		
	PLC 12		
	PLC 13		
	PLC 14		
	PLC 15		
	PLC 16		
	PLC 17		
	PLC 18		
	PLC 19		
	PLC 20		
0010	Reserved		
	Reserved		
	Expansion Switch Input Comm. Failure		
	Expansion Switch Output Comm. Failure		
	Expansion Switch Input 1		
	Expansion Switch Input 2		
	Expansion Switch Input 3		
	Expansion Switch Input 4		

Address	Items	Description	Bytes
	Expansion Switch Input 5		
	Expansion Switch Input 6		
	Expansion Switch Input 7		
	Expansion Switch Input 8		
	Expansion Switch Input 9		
	Expansion Switch Input 10		
	Expansion Switch Input 11		
	Expansion Switch Input 12		
0011	Expansion Switch Input 13		
	Expansion Switch Input 14		
	Expansion Switch Input 15		
	Expansion Switch Input 16		
	Input Module 1 Cylinder Temp Difference Large		
	Input Module 1 Cylinder Temp High		
	Input Module 2 Cylinder Temp Difference Large		
	Input Module 2 Cylinder Temp High		
	Reserved		
0012	Over Current Trip and Stop	1 for active	1bit
	Maintenance Time Due Trip and Stop	1 for active	1bit
	Reverse Power Trip and Stop	1 for active	1bit
	Over Power Trip and Stop	1 for active	1bit
	Input 1 Trip and Stop	1 for active	1bit
	Input 2 Trip and Stop	1 for active	1bit
	Input 3 Trip and Stop	1 for active	1bit
	Input 4 Trip and Stop	1 for active	1bit
	Input 5 Trip and Stop	1 for active	1bit
	Input 6 Trip and Stop	1 for active	1bit
	Input 7 Trip and Stop	1 for active	1bit
	Input 8 Trip and Stop	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Expansion Switch Input Comm. Failure	1 for active	1bit
	Expansion Switch Output Comm. Failure	1 for active	1bit
0013	PLC 1		
	PLC 2		

Address	Items	Description	Bytes
	PLC 3		
	PLC 4		
	PLC 5		
	PLC 6		
	PLC 7		
	PLC 8		
	PLC 9		
	PLC 10		
	PLC 11		
	PLC 12		
	PLC 13		
	PLC 14		
	PLC 15		
	PLC 16		
0014	PLC 17		
	PLC 18		
	PLC 19		
	PLC 20		
	Reserved		
	Reserved		
	Expansion Switch Input 1		
	Expansion Switch Input 2		
	Expansion Switch Input 3		
	Expansion Switch Input 4		
	Expansion Switch Input 5		
	Expansion Switch Input 6		
	Expansion Switch Input 7		
	Expansion Switch Input 8		
	Expansion Switch Input 9		
	Expansion Switch Input 10		
0015	Expansion Switch Input 11		
	Expansion Switch Input 12		
	Expansion Switch Input 13		
	Expansion Switch Input 14		
	Expansion Switch Input 15		
	Expansion Switch Input 16		
	Reserved		
	Excitation Loss Fault Trip and Stop		

Address	Items	Description	Bytes
	Earth Fault Trip and Stop		
	Unbalanced Current Trip and Stop		
0016	Over Current Trip	1 for active	1bit
	Maintenance Time Due Trip	1 for active	1bit
	Reverse Power Trip	1 for active	1bit
	Over Power Trip	1 for active	1bit
	Input 1 Trip	1 for active	1bit
	Input 2 Trip	1 for active	1bit
	Input 3 Trip	1 for active	1bit
	Input 4 Trip	1 for active	1bit
	Input 5 Trip	1 for active	1bit
	Input 6 Trip	1 for active	1bit
	Input 7 Trip	1 for active	1bit
	Input 8 Trip	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Expansion Switch Input Comm. Failure	1 for active	1bit
	Expansion Switch Output Comm. Failure	1 for active	1bit
0017	PLC 1		
	PLC 2		
	PLC 3		
	PLC 4		
	PLC 5		
	PLC 6		
	PLC 7		
	PLC 8		
	PLC 9		
	PLC 10		
	PLC 11		
	PLC 12		
	PLC 13		
	PLC 14		
	PLC 15		
	PLC 16		
0018	PLC 17		
	PLC 18		
	PLC 19		
	PLC 20		
	Reserved		
	Reserved		
	Expansion Switch Input 1		
	Expansion Switch Input 2		
	Expansion Switch Input 3		
	Expansion Switch Input 4		

Address	Items	Description	Bytes
	Expansion Switch Input 5		
	Expansion Switch Input 6		
	Expansion Switch Input 7		
	Expansion Switch Input 8		
	Expansion Switch Input 9		
	Expansion Switch Input 10		
0019	Expansion Switch Input 11		2Bytes
	Expansion Switch Input 12		
	Expansion Switch Input 13		
	Expansion Switch Input 14		
	Expansion Switch Input 15		
	Expansion Switch Input 16		
	Reserved		
	Excitation Loss Fault Trip		
	Earth Fault Trip		
	Unbalanced Current Trip		
	Reserved		
0020	Over Speed Warn	1 for active	1bit
	Under Speed Warn	1 for active	1bit
	Loss Of Speed Signal Warn	1 for active	1bit
	Gen Over Frequency Warn	1 for active	1bit
	Gen Under Frequency Warn	1 for active	1bit
	Gen Over Voltage Warn	1 for active	1bit
	Gen Under Voltage Warn	1 for active	1bit
	Gen Over Current Warn	1 for active	1bit
	Stop Failure Warn	1 for active	1bit
	Charging Failure Warn	1 for active	1bit
	Battery Over Voltage Warn	1 for active	1bit
	Battery Under Voltage Warn	1 for active	1bit
	Maintenance Time Due Warn	1 for active	1bit
	Reverse Power Warn	1 for active	1bit
	Over Power Warn	1 for active	1bit
	ECU Warn	1 for active	1bit
0021	Gen Loss of Phase Warn	1 for active	1bit
	Gen Reverse Phase Sequence Warn	1 for active	1bit
	Reserved	1 for active	1bit
	Unbalanced Current Warn	1 for active	1bit
	Earth Fault Warn	1 for active	1bit
	Excitation Loss Fault Warn	1 for active	1bit

Address	Items	Description	Bytes
	Reserved	1 for active	1bit
	Switch Transfer Failure Warn	1 for active	1bit
	Temp Sensor Open Warn	1 for active	1bit
	High Temp Warn	1 for active	1bit
	Low Temp Warn	1 for active	1bit
	Reserved	1 for active	1bit
	Oil Pressure Sensor Open Warn	1 for active	1bit
	Reserved	1 for active	1bit
	Low OP Warn	1 for active	1bit
	Reserved	1 for active	1bit
0022	Level Sensor Open	1 for active	1bit
	Reserved	1 for active	1bit
	Low Level Warn	1 for active	1bit
	Reserved	1 for active	1bit
	Flexible Sensor 1 Open Warn	1 for active	1bit
	Flexible Sensor 1 High Warn	1 for active	1bit
	Flexible Sensor 1 Low Warn	1 for active	1bit
	Reserved	1 for active	1bit
	Flexible Sensor 2 Open Warn	1 for active	1bit
	Flexible Sensor 2 High Warn	1 for active	1bit
	Flexible Sensor 2 Low Warn	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Input Module 2 Cylinder Temp High	1 for active	1bit
0023	Input Module 1 Comm. Failure		
	Input Module 1 Outlet Temp High		
	Input Module 1 Sensor 15 Open		
	Input Module 1 Sensor 15 High		
	Input Module 1 Sensor 15 Low		
	Input Module 1 Sensor 16 Open		
	Input Module 1 Sensor 16 High		
	Input Module 1 Sensor 16 Low		
	Input Module 1 Sensor 17 Open		
	Input Module 1 Sensor 17 High		
	Input Module 1 Sensor 17 Low		
	Input Module 1 Sensor 18 Open		
	Input Module 1 Sensor 18 High		
	Input Module 1 Sensor 18 Low		
	Input Module 1 Sensor 19 Open		
	Input Module 1 Sensor 19 High		
0024	Input Module 1 Sensor 19 Low		
	Input Module 1 Sensor 20 Open		

Address	Items	Description	Bytes
	Input Module 1 Sensor 20 High		
	Input Module 1 Sensor 20 Low		
	Input Module 1 Sensor 21 Open		
	Input Module 1 Sensor 21 High		
	Input Module 1 Sensor 21 Low		
	Input Module 1 Sensor 22 Open		
	Input Module 1 Sensor 22 High		
	Input Module 1 Sensor 22 Low		
	Input Module 1 Sensor 23 Open		
	Input Module 1 Sensor 23 High		
	Input Module 1 Sensor 23 Low		
	Input Module 1 Sensor 24 Open		
	Input Module 1 Sensor 24 High		
	Input Module 1 Sensor 24 Low		
0025	Input Module 2 Comm. Failure		
	Input Module 2 Outlet Temp High		
	Input Module 2 Sensor 15 Open		
	Input Module 2 Sensor 15 High		
	Input Module 2 Sensor 15 Low		
	Input Module 2 Sensor 16 Open		
	Input Module 2 Sensor 16 High		
	Input Module 2 Sensor 16 Low		
	Input Module 2 Sensor 17 Open		
	Input Module 2 Sensor 17 High		
	Input Module 2 Sensor 17 Low		
	Input Module 2 Sensor 18 Open		
	Input Module 2 Sensor 18 High		
	Input Module 2 Sensor 18 Low		
	Input Module 2 Sensor 19 Open		
	Input Module 2 Sensor 19 High		
0026	Input Module 2 Sensor 19 Low		
	Input Module 2 Sensor 20 Open		
	Input Module 2 Sensor 20 High		
	Input Module 2 Sensor 20 Low		
	Input Module 2 Sensor 21 Open		
	Input Module 2 Sensor 21 High		
	Input Module 2 Sensor 21 Low		
	Input Module 2 Sensor 22 Open		
	Input Module 2 Sensor 22 High		
	Input Module 2 Sensor 22 Low		
	Input Module 2 Sensor 23 Open		
	Input Module 2 Sensor 23 High		
	Input Module 2 Sensor 23 Low		
	Input Module 2 Sensor 24 Open		

Address	Items	Description	Bytes
	Input Module 2 Sensor 24 High		
	Input Module 2 Sensor 24 Low		
0027	Reserved	1 for active	1bit
	Expansion Switch Input Comm. Failure	1 for active	1bit
	Expansion Switch Output Comm. Failure	1 for active	1bit
	Expansion Switch Input 1	1 for active	1bit
	Expansion Switch Input 2	1 for active	1bit
	Expansion Switch Input 3	1 for active	1bit
	Expansion Switch Input 4	1 for active	1bit
	Expansion Switch Input 5	1 for active	1bit
	Expansion Switch Input 6	1 for active	1bit
	Expansion Switch Input 7	1 for active	1bit
	Expansion Switch Input 8	1 for active	1bit
	Expansion Switch Input 9	1 for active	1bit
	Expansion Switch Input 10	1 for active	1bit
	Expansion Switch Input 11	1 for active	1bit
	Expansion Switch Input 12	1 for active	1bit
	Expansion Switch Input 13	1 for active	1bit
0028	Expansion Switch Input 14		
	Expansion Switch Input 15		
	Expansion Switch Input 16		
	Reserved		
	Input Module 1 Cylinder Temp Difference Large		
	Input Module 1 Cylinder Temp High		
	Input Module 2 Cylinder Temp Difference Large		
	Input Module 2 Cylinder Temp High		
	Reserved		
0029	Aux Input 1 Warn	1 for active	1bit
	Aux Input 2 Warn	1 for active	1bit
	Aux Input 3 Warn	1 for active	1bit
	Aux Input 4 Warn	1 for active	1bit
	Aux Input 5 Warn	1 for active	1bit
	Aux Input 6 Warn	1 for active	1bit
	Aux Input 7 Warn	1 for active	1bit
	Aux Input 8 Warn	1 for active	1bit

Address	Items	Description	Bytes
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	PLC 1	1 for active	1bit
	PLC 2	1 for active	1bit
	PLC 3	1 for active	1bit
	PLC 4	1 for active	1bit
0030	PLC 5		
	PLC 6		
	PLC 7		
	PLC 8		
	PLC 9		
	PLC 10		
	PLC 11		
	PLC 12		
	PLC 13		
	PLC 14		
	PLC 15		
	PLC 16		
	PLC 17		
	PLC 18		
	PLC 19		
	PLC 20		
0031	Reserved		2Bytes
0032	Reserved		2Bytes
0033	Reserved		2Bytes
0034	Reserved		2Bytes
0035	Emergency Stop Input Status	1 for active	1bit
	Digital Input 1 Status	1 for active	1bit
	Digital Input 2 Status	1 for active	1bit
	Digital Input 3 Status	1 for active	1bit
	Digital Input 4 Status	1 for active	1bit
	Digital Input 5 Status	1 for active	1bit
	Digital Input 6 Status	1 for active	1bit
	Digital Input 7 Status	1 for active	1bit
	Digital Input 8 Status	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit

Address	Items	Description	Bytes
0036	Reserved		2Bytes
0037	Fuel Relay Output Status	1 for active	1bit
	Crank Relay Output Status	1 for active	1bit
	Digital Output 1 Status	1 for active	1bit
	Digital Output 2 Status	1 for active	1bit
	Digital Output 3 Status	1 for active	1bit
	Digital Output 4 Status	1 for active	1bit
	Digital Output 5 Status	1 for active	1bit
	Digital Output 6 Status	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
0038	Reserved		2Bytes
0039	Reserved		2Bytes
0040	Reserved		2Bytes
0041	Reserved		2Bytes
0042	Reserved		2Bytes
0043	Mains OK	1 for active	1bit
	Mains Closed	1 for active	1bit
	Generator OK	1 for active	1bit
	Gen Closed	1 for active	1bit
	Alarm Indicator Status	1 for active	1bit
	Running Indicator Status	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
0044	Mains Abnormal	1 for active	1bit
	Mains Over Voltage	1 for active	1bit
	Mains Under Voltage	1 for active	1bit
	Mains Over Frequency	1 for active	1bit
	Mains Under Frequency	1 for active	1bit
	Mains Loss of Phase	1 for active	1bit

Address	Items	Description	Bytes
	Mains Reverse Phase Sequence	1 for active	1bit
	Mains Inactive	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
0045	Aux Input 1 Active	1 for active	1bit
	Aux Input 2 Active	1 for active	1bit
	Aux Input 3 Active	1 for active	1bit
	Aux Input 4 Active	1 for active	1bit
	Aux Input 5 Active	1 for active	1bit
	Aux Input 6 Active	1 for active	1bit
	Aux Input 7 Active	1 for active	1bit
	Aux Input 8 Active	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
	Reserved	1 for active	1bit
0046	Reserved		2Bytes
0047	Reserved		2Bytes
0048	Reserved		2Bytes
0049	Reserved		2Bytes
0050	Reserved		2Bytes
0051	Reserved		2Bytes
0052	Reserved		2Bytes
0053	Reserved		2Bytes
0054	Reserved		2Bytes
0055	Mains UAB		2Bytes
0056	Mains UBC		2Bytes
0057	Mains UCA		2Bytes
0058	Mains UA		2Bytes
0059	Mains UB		2Bytes
0060	Mains UC		2Bytes
0061	Mains UA Phase	Signed	2Bytes
0062	Mains UB Phase	Signed	2Bytes
0063	Mains UC Phase	Signed	2Bytes

Address	Items	Description	Bytes
0064	Mains Frequency	(*100)	2Bytes
0065	Reserved		2Bytes
0066	Reserved		2Bytes
0067	Reserved		2Bytes
0068	Reserved		2Bytes
0069	Reserved		2Bytes
0070	Reserved		2Bytes
0071	Reserved		2Bytes
0072	Reserved		2Bytes
0073	Reserved		2Bytes
0074	Reserved		2Bytes
0075	Gen UAB		2Bytes
0076	Gen UBC		2Bytes
0077	Gen UCA		2Bytes
0078	Gen UA		2Bytes
0079	Gen UB		2Bytes
0080	Gen UC		2Bytes
0081	Gen UA Phase	Signed	2Bytes
0082	Gen UB Phase	Signed	2Bytes
0083	Gen UC Phase	Signed	2Bytes
0084	Gen Frequency	Signed (*100)	2Bytes
0085	Reserved	Signed	2Bytes
0086	Reserved	Signed (*100)	2Bytes
0087	Reserved	Signed (*10)	2Bytes
0088	Reserved	Signed (*10)	2Bytes
0089	Reserved	Signed (*10)	2Bytes
0090	Reserved	Signed (*10)	2Bytes
0091	Reserved	Signed (*10)	2Bytes
0092	Reserved	Signed (*10)	2Bytes
0093	Reserved	Signed (*10)	2Bytes
0094	Reserved		2Bytes
0095	A-phase Current	(*10)	2Bytes
0096	B-phase Current	(*10)	2Bytes
0097	C-phase Current	(*10)	2Bytes
0098	Earth Current	(*10)	2Bytes
0099	Reserved		2Bytes
0100	Reserved		2Bytes
0101	Reserved		2Bytes
0102	Reserved		2Bytes
0103 0104	A-phase Active Power	Signed (*10)	4Bytes
0105 0106	B-phase Active Power	Signed (*10)	4Bytes
0107	C-phase Active Power	Signed (*10)	4Bytes



Address	Items	Description	Bytes
0108			
0109 0110	Total Active Power	Signed (*10)	4Bytes
0111 0112	A-phase Reactive Power	Signed (*10)	4Bytes
0113 0114	B-phase Reactive Power	Signed (*10)	4Bytes
0115 0116	C-phase Reactive Power	Signed (*10)	4Bytes
0117 0118	Total Reactive Power	Signed (*10)	4Bytes
0119 0120	A-phase Apparent Power	Signed (*10)	4Bytes
0121 0122	B-phase Apparent Power	Signed (*10)	4Bytes
0123 0124	C-phase Apparent Power	Signed (*10)	4Bytes
0125 0126	Total Apparent Power	Signed (*10)	4Bytes
0127	A-phase Power Factor	Signed (*100)	2Bytes
0128	B-phase Power Factor	Signed (*100)	2Bytes
0129	C-phase Power Factor	Signed (*100)	2Bytes
0130	Average Power Factor	Signed (*100)	2Bytes
0131	Reserved		2Bytes
0132	Reserved		2Bytes
0133	Reserved		2Bytes
0134	Reserved		2Bytes
0135	Reserved		2Bytes
0136	Reserved		2Bytes
0137	Reserved		2Bytes
0138	Reserved		2Bytes
0139	Reserved		2Bytes
0140	Reserved		2Bytes
0141	Engine Speed		2Bytes
0142	Battery Voltage	(*10)	2Bytes
0143	Charger Voltage	(*10)	2Bytes
0144	GSM Signal Strength		2Bytes
0145	Reserved		2Bytes
0146	Reserved		2Bytes
0147	Reserved		2Bytes
0148	Temp Sensor Resistance Value	Unsigned (*10)	2Bytes
0149	Temp Sensor Value	Signed	2Bytes
0150	Pressure Sensor Resistance Value	Unsigned (*10)	2Bytes
0151	Pressure Sensor Value	Signed	2Bytes

Address	Items	Description	Bytes
0152	Level Sensor Resistance Value	Unsigned (*10)	2Bytes
0153	Level Sensor Value	Signed	2Bytes
0154	Flexible Sensor 1 Resistance Value	Unsigned (*10)	2Bytes
0155	Flexible Sensor 1 Value	Signed	2Bytes
0156	Flexible Sensor 2 Resistance Value	Unsigned (*10)	2Bytes
0157	Flexible Sensor 2 Value	Signed	2Bytes
0158	Reserved		2Bytes
0159	Reserved		2Bytes
0160	Reserved		2Bytes
0161	Reserved		2Bytes
0162	Coolant Level	Signed; These items are "Reserved" if ECU is NOT used.	2Bytes
0163	Oil Temperature		2Bytes
0164	Coolant Pressure		2Bytes
0165	Fuel Pressure		2Bytes
0166	Fuel Temperature		2Bytes
0167	Inlet Temperature		2Bytes
0168	Outlet Temperature		2Bytes
0169	Turbo Pressure		2Bytes
0170	Fuel Consumption		2Bytes
0171 0172	Total Fuel Consumption		
0173	Reserved		2Bytes
0174	Reserved		2Bytes
0175	Reserved		2Bytes
0176	Reserved		2Bytes
0177	Reserved		2Bytes
0178	Reserved		2Bytes
0179	Reserved		2Bytes
0180	Reserved		2Bytes
0181	Reserved		2Bytes
0182	Reserved		2Bytes
0183		2Bytes	
0184	Reserved		2Bytes
0185		2Bytes	
0186	Reserved		2Bytes
0187		2Bytes	
0188	Reserved		2Bytes
0189	Generator Status	Generator Status Table	2Bytes
0190	Gen Delay Value		2Bytes
0191	Remote Start Status	Remote Start Status Table	2Bytes
0192	Remote Start Delay Value		2Bytes
0193	Switch Status	Switch Status Table	2Bytes
0194	Switch Transfer Delay Value		2Bytes

Address	Items	Description	Bytes
0195	Mains Status	Mains Status Table	2Bytes
0196	Mains Delay Value		2Bytes
0197	Reserved		2Bytes
0198	Reserved		2Bytes
0199	Accumulated Run Time (h)		2Bytes
0200	Accumulated Run Time (min)		2Bytes
0201	Accumulated Run Time (s)		2Bytes
0202	Accumulated Start Times		2Bytes
0203 0204	Accumulated Energy kWh		4Bytes
0205 0206	Accumulated Energy kVarh		4Bytes
0207 0208	Accumulated Energy kVAh		4Bytes
0209 0210	Reserved		4Bytes
0211	Maintenance Remain Time (h)		2Bytes
0212	Maintenance Remain Time (min)		2Bytes
0213	Maintenance Remain Time (s)		2Bytes
0214	Reserved		2Bytes
0215		2Bytes	
0216	Reserved		2Bytes
0217	Controller Model		2Bytes
0218	Software Version	(*10)	2Bytes
0219	Hardware Version	(*10)	2Bytes
0220	Issue Date (year)	Save the last two digits only.	2Bytes
0221	Issue Date (month)		2Bytes
0222	Issue Date (day)		2Bytes
0223	Reserved		2Bytes
0224	Reserved		2Bytes
0225	Controller Time: year	Save the last two digits only.	2Bytes
0226	Controller Time: month		2Bytes
0227	Controller Time: day		2Bytes
0228	Controller Time: week		2Bytes
0229	Controller Time: hour		2Bytes
0230	Controller Time: minute		2Bytes
0231	Controller Time: second		2Bytes
0232	Reserved		2Bytes
0233	Reserved		2Bytes
0234	Reserved		2Bytes
0235	Reserved		2Bytes
0236		2Bytes	

Address	Items	Description	Bytes
0237	Reserved		2Bytes
0238	Expansion AIN24-1, Sensor 15	Signed	2Bytes
0239	Expansion AIN24-1, Sensor 16	Signed	2Bytes
0240	Expansion AIN24-1, Sensor 17	Signed	2Bytes
0241	Expansion AIN24-1, Sensor 18	Signed	2Bytes
0242	Expansion AIN24-1, Sensor 19	Signed	2Bytes
0243	Expansion AIN24-1, Sensor 20	Signed	2Bytes
0244	Expansion AIN24-1, Sensor 21	Signed	2Bytes
0245	Expansion AIN24-1, Sensor 22	Signed	2Bytes
0246	Expansion AIN24-1, Sensor 23	Signed	2Bytes
0247	Expansion AIN24-1, Sensor 24	Signed	2Bytes
0248	Expansion AIN24-2, Sensor 15	Signed	2Bytes
0249	Expansion AIN24-2, Sensor 16	Signed	2Bytes
0250	Expansion AIN24-2, Sensor 17	Signed	2Bytes
0251	Expansion AIN24-2, Sensor 18	Signed	2Bytes
0252	Expansion AIN24-2, Sensor 19	Signed	2Bytes
0253	Expansion AIN24-2, Sensor 20	Signed	2Bytes
0254	Expansion AIN24-2, Sensor 21	Signed	2Bytes
0255	Expansion AIN24-2, Sensor 22	Signed	2Bytes
0256	Expansion AIN24-2, Sensor 23	Signed	2Bytes
0257	Expansion AIN24-2, Sensor 24	Signed	2Bytes
0258	Reserved		
0259	Reserved		
0260	Reserved		
0261	Reserved		
0262	Reserved		
0263	Reserved		
0264	Reserved		
0265	Reserved		
0266	Reserved		
0267	Reserved		
0268	Reserved		
0269	Reserved		
0270	Reserved		
0271	Reserved		
0272	Reserved		
0273	Reserved		
0274	Reserved		
0275	Reserved		
0276	Reserved		
0277	Reserved		
0278	Reserved		
0279	Reserved		
0280	Reserved		

Address	Items	Description	Bytes
0281	Reserved		
0282	Reserved		
0283	Reserved		
0284	Reserved		
0285	Expansion AIN24-1, Sensor 1	Signed	2Bytes
0286	Expansion AIN24-1, Sensor 2	Signed	2Bytes
0287	Expansion AIN24-1, Sensor 3	Signed	2Bytes
0288	Expansion AIN24-1, Sensor 4	Signed	2Bytes
0289	Expansion AIN24-1, Sensor 5	Signed	2Bytes
0290	Expansion AIN24-1, Sensor 6	Signed	2Bytes
0291	Expansion AIN24-1, Sensor 7	Signed	2Bytes
0292	Expansion AIN24-1, Sensor 8	Signed	2Bytes
0293	Expansion AIN24-1, Sensor 9	Signed	2Bytes
0294	Expansion AIN24-1, Sensor 10	Signed	2Bytes
0295	Expansion AIN24-1, Sensor 11	Signed	2Bytes
0296	Expansion AIN24-1, Sensor 12	Signed	2Bytes
0297	Expansion AIN24-1, Sensor 13	Signed	2Bytes
0298	Expansion AIN24-1, Sensor 14	Signed	2Bytes
0299	Expansion AIN24-2, Sensor 1	Signed	2Bytes
0300	Expansion AIN24-2, Sensor 2	Signed	2Bytes
0301	Expansion AIN24-2, Sensor 3	Signed	2Bytes
0302	Expansion AIN24-2, Sensor 4	Signed	2Bytes
0303	Expansion AIN24-2, Sensor 5	Signed	2Bytes
0304	Expansion AIN24-2, Sensor 6	Signed	2Bytes
0305	Expansion AIN24-2, Sensor 7	Signed	2Bytes
0306	Expansion AIN24-2, Sensor 8	Signed	2Bytes
0307	Expansion AIN24-2, Sensor 9	Signed	2Bytes
0308	Expansion AIN24-2, Sensor 10	Signed	2Bytes
0309	Expansion AIN24-2, Sensor 11	Signed	2Bytes
0310	Expansion AIN24-2, Sensor 12	Signed	2Bytes
0311	Expansion AIN24-2, Sensor 13	Signed	2Bytes
0312	Expansion AIN24-2, Sensor 14	Signed	2Bytes

5.2. FUNCTION CODE 05H MAPPING DATA FIELD

Table 21 Function Code 05H Mapping Data Field

Address	Item	Description
0000	Remote Start Key	1 for active
0001	Remote Stop Key	1 for active
0002	Reserved	1 for active
0003	Remote Auto Key	1 for active
0004	Remote Manual Key	1 for active
0005	Remote Mains Close/Open Key	1 for active
0006	Remote Gen Close/Open Key	1 for active
0007	Remote Up Key	1 for active
0008	Remote Down Key	1 for active
0009	Remote Left Key	1 for active
0010	Remote Right Key	1 for active
0011	Remote Confirm Key	1 for active
0012	Remote Mute Key	1 for active
0013	Reserved	1 for active
0014	Reserved	1 for active
0015	Remote Oil Engine Fast Stop Key	1 for active
0016	Reserved	1 for active
0017	Reserved	1 for active
0018	Reserved	1 for active
0019	Remote Output 1	1 for active; 0 for inactive
0020	Remote Output 2	1 for active; 0 for inactive
0021	Remote Output 3	1 for active; 0 for inactive
0022	Remote Output 4	1 for active; 0 for inactive
0023	Remote Output 5	1 for active; 0 for inactive
0024	Remote Output 6	1 for active; 0 for inactive
0025	Reserved	1 for active
0026	Reserved	1 for active
0027	Reserved	1 for active
0028	Reserved	1 for active

5.3. GENERATOR STATUS TABLE

Table 22 Generator Status Table

No.	Items	Description
0	At Rest	This status has no "delay value".
1	Pre-heating	
2	Fuel Output	This status has no "delay value".
3	Cranking	
4	Crank Rest	
5	Safety On Delay	
6	Start Idle	
7	Warming Up	
8	Waiting for Load	This status has no "delay value".
9	Normal Running	This status has no "delay value".
10	Cooling Down	
11	Stop Idle	
12	ETS Hold	
13	Wait for Stop	
14	After Stop	
15	Stop Failure	This status has no "delay value".

5.4. REMOTE START STATUS TABLE

Table 23 Remote Start Status Table

No.	Items	Description
0	No Delay	This status has no "delay value".
1	Start Delay	
2	Stop Delay	

5.5. SWITCH STATUS TABLE

Table 24 Switch Status Table

No.	Items	Description
0	Load Off	This status has no "delay value".
1	Mains Closed	This status has no "delay value".
2	Gen Closed	This status has no "delay value".
3	Opening Delay	
4	Switch Transfer Delay	
5	Closing Mains Delay	
6	Closing Gen Delay	
7	Wait for Opened	This status has no "delay value".
8	Wait for Gen Closed	This status has no "delay value".
9	Wait for Mains Closed	This status has no "delay value".
10	Normal	This status has no "delay value".

5.6. MAINS STATUS TABLE

Table 25 Mains Status Table

No.	Items	Description
0	Mains OK	This status has no "delay value".
1	Normal Delay	
2	Mains Abnormal	This status has no "delay value".
3	Abnormal Delay	

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