

# SmartGen

MAKING CONTROL SMARTER

## HGM8151 GENSET CONTROLLER TCP MODBUS PROTOCOL

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**Table 1 Version History**

Date	Version	Content
2021-11-09	1.0	Original release.
2022-02-18	1.1	Update to the latest format.
2023-03-13	1.2	1. Update the HGM8151 protocol; 2. Modify the real-time data address; 3. Modify 05 control code address; 4. Add 06 function code description.

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## 1 OVERVIEW

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

MODBUS is message transmission protocol of application layer for client or server communication between devices connected by different types of buses or networks. These devices are connected to one Ethernet TCP/IP network.

Controller is used as the slave, adopts Modbus-RTU protocol, not support other protocols like Modbus-ASCII.

Supported function code: 03H, 05H. Function code 03H is used for reading controller alarm, status information and various electricity data, function code 05H is used for sending remote command.

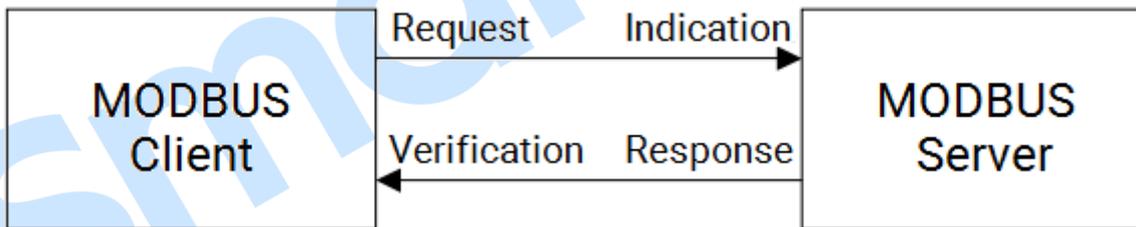
## 2 PROTOCOL DESCRIPTION

### 2.1 CLIENT/SERVER MODEL

MODBUS message transmission service provides client or server communication between devices. These devices are connected to one Ethernet TCP/IP network.

This client/server model is based on the following 4 messages:

- 1) MODBUS request
- 2) MODBUS verification
- 3) MODBUS indication
- 4) MODBUS response



**Fig.1 Client/Server Model**

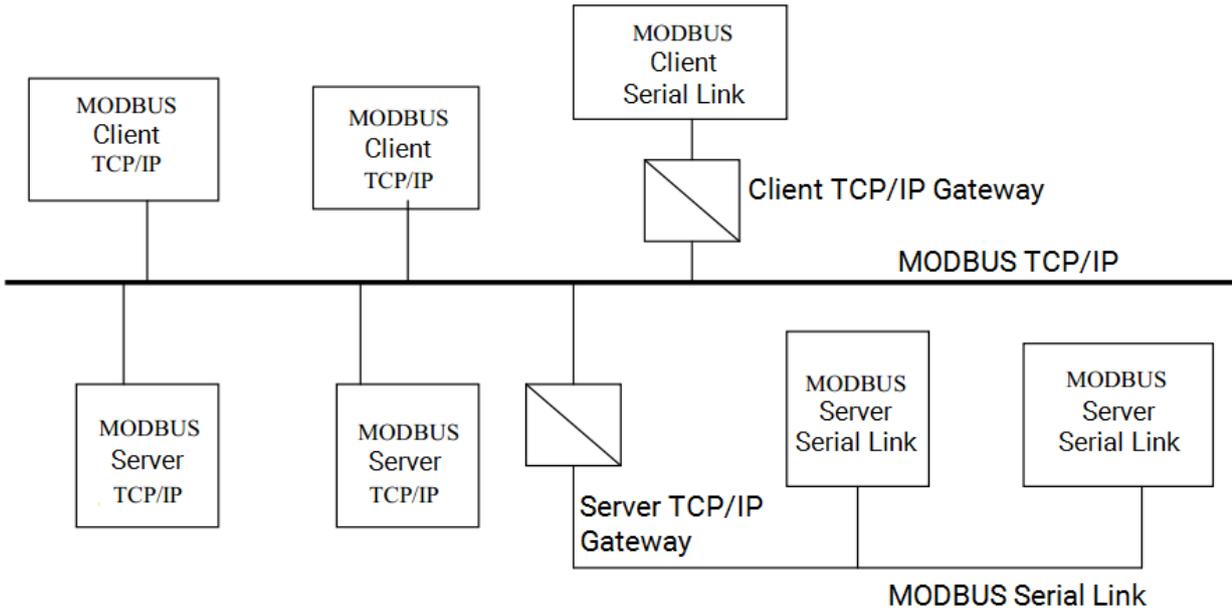
MODBUS request is message sent by client on the network to start transaction processing.

MODBUS indication is request message received by server.

MODBUS response is the response information sent by server.

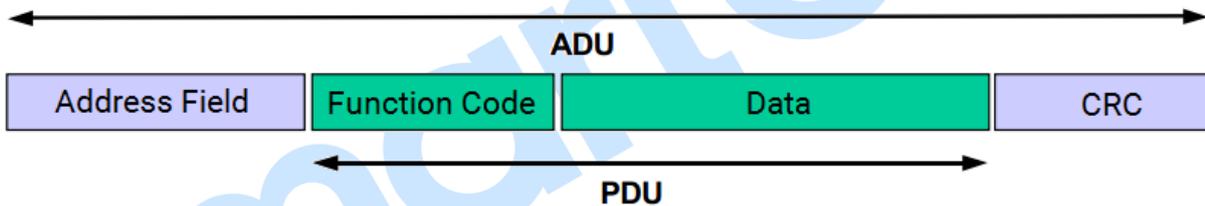
MODBUS verification is the response information received by the client.

**2.2 OVERALL COMMUNICATION STRUCTURE**



**Fig.2 MODBUS TCP/IP Communication Structure**

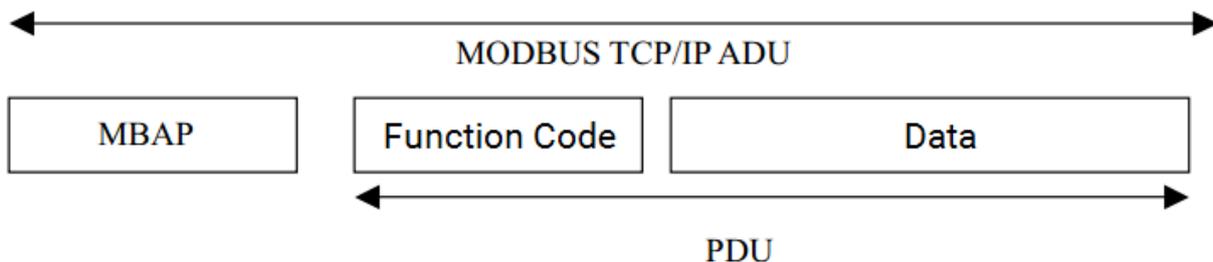
Modbus protocol of client/server model defines one simple protocol data unit (PDU) independent of basic communication layer. Modbus protocol mapping on specific bus or network can introduce some additional fields on the application data unit (ADU).



**Fig.3 General MODBUS Frame**

**2.3 MODBUS ADU ON TCP/IP**

The encapsulation of MODBUS request or response in MODBUS TCP/IP network is showing as follows:



**Fig.4 MODBUS Request/Response on TCP/IP**

A special header is used on TCP/IP to identify MODBUS application data units, which is called MBAP (MODBUS protocol header). It provides some differences compared with MODBUS RTU application data unit used on the serial link:

- Single byte unit identifier of MBAP is used to replace common-used MODBUS slave address field on MODBUS serial link. This unit identifier is used for device communication while these devices use single IP address to support multiple independent MODBUS terminal units, like bridge, router and gateway.
- All MODBUS request and response are designed in such a way that receiver can verify message completion. For function code that MODBUS PDU has fixed length, function code alone is enough. For function code that carries a variable data in request or response, data field includes bytes.
- When MODBUS is carried on TCP, even if the message is divided into multiple packets for transmission, additional length information needs to be carried on MBAP so that the receiver can identify the message boundary. The existence of explicit and implicit length rule and the use of CRC-32 error check code (on Ethernet) will produce minimal undetected interference to request or response messages.

**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 client side.

## 2.4 MBAP DESCRIPTION

**Table 2 MBAP**

Field	Length	Description	Client	Server
Transaction Process Identifier	2 bytes	Identification code of MODBUS request or response transaction process	Start client	The receiver replicates from the received request.
Protocol Identifier	2 bytes	0=MODBUS protocol	Start client	The receiver replicates from the received request.
Length	2 bytes	Follow-up data quantity	Start client (request)	Start server (response).
Unit Identifier	1 byte	Remote slave Identification code connected on serial link or other buses	Start client	The receiver replicates from the received request.

The message header is 7 bytes long.

Transaction process identifier: used for transaction pairing. MODBUS server replicates it in response.

Protocol identifier: used for multiplexing in the system. It identifies MODBUS protocol by value 0.

Length: length field is the bytes of next field, including unit identifier and data field.

Unit identifier: used for routing within the system. It is specially used to communicate with MODBUS or MODBUS+serial link slave by the gateway between Ethernet TCP-IP network and MODBUS serial link. MODBUS client sets this field in request, server must use same value to return this field in response.

TCP is used to send all MODBUS/TCP ADU on the registered 502 port.

**NOTE3:** Big-endian is used to code different fields.

2.5 MODBUS PDU CHECK

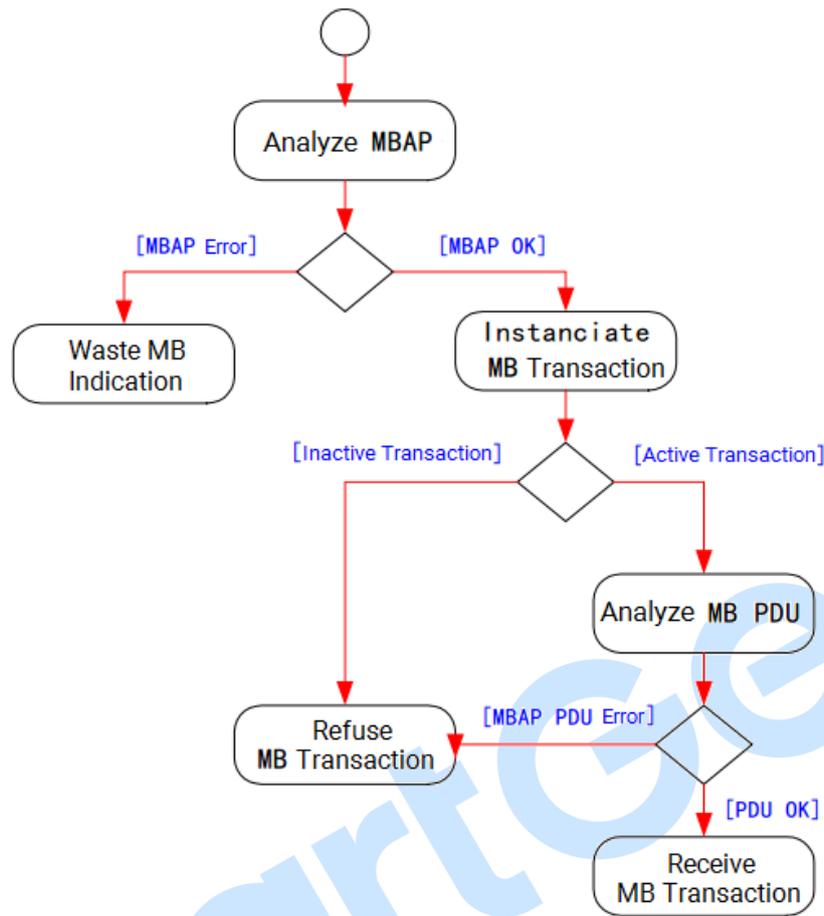


Fig.5 MODBUS PDU Check Flowchart

2.6 HANDLE MODBUS VERIFICATION

In TCP connection, when receiving a response frame, transaction process identifier in MBAP will be used to associate the response with the original request previously sent to the TCP connection.

- 1) If the identifier not involve any unsolved transactions, response must be abandoned;
- 2) If the identifier involves unsolved transactions, response must be decomposed so that sending MODBUS verification (positive or negative) to user application. Response decomposition can check response of MBAP and MODBUS PDU;
- 3) MBAP

After checking the protocol identifier is 0x0000, length gives the response size.

If response comes from MODBUS server directly connected to TCP/IP network, TCP connection identification code can clearly identify remote server. Therefore, unit identifier in MBAP is inactive, which must be abandoned.

If remote server is connected to one serial link subnet, and response comes from one bridge, router or gateway, unit identifier (value≠0xFF) will identify remote MODBUS server that sends initial response.

4) MODBUS response PDU

Function code must be checked, analyze MODBUS response format according to MODBUS protocol:

- If function code is same with that in request, and response format is correct, then MODBUS response is sent to user application as positive verification;
- If function code is a MODBUS abnormal code (function code+80H), an abnormal response will be sent to user application as positive verification;
- If function code is different from that in request (=unintended function code), or if response format is wrong, then a wrong signal is sent to user application as negative verification.

**NOTE4:** Positive verification refers to the verification that server receives request and makes response. It not means that server can complete operations required in request.

## 2.7 FUNCTION CODE

### 2.7.1 ILLUSTRATION

Function code is the second data of each communication transmission. ModBus communication protocol defines function code as 1-255 (01H-0FFH). This controller uses a part of it. By master request master can tell slave to conduct certain action. 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 slave does not respond, or response has an error.

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

**Table 3 MODBUS Partial Function Codes**

Function Code	Definition	Operation
03H	Read Registers	Read one or multiple register data
05H	Place Single Coil	Place single coil
06H	Write Registers	Write registers

### 2.7.2 03H READ REGISTERS

With communication command of function code 03H, master can read the numerical registers (all kinds of collected analog and parameter setting values are stored in the register) inside the device. Input register value of function code 03H mapping data field is 16-bit (2 bytes). So register values read from the device are 2 bytes. For each time maximum readable register values are 125.

### 2.7.3 05H PLACE SINGLE COIL

With this command master can store single coil data to bit registers (e.g. coil for ATS transfer control). Slave also can respond information to the master with this command.

### 2.7.4 06H WRITE SINGLE REGISTER

With this command master can store single coil data to register. The register refers to 16-bit (i.e 2 bytes) in ModBus communication protocol, and MSB is in front. Generally, coil in device like this is w bytes. Slave also can respond information to the master with this command.

**2.8 DATA FIELD**

**2.8.1 ILLUSTRATION**

Data field varies with different function codes.

**2.8.2 CORRESPONDING DATA FIELD FORMAT TO FUNCTION CODE 03H**

**Table 4 Client Request**

Data Sequence	Data Signification	Bytes
1	Starting Address	2
2	Read Register Number	2

**Table 5 Server Response**

Data Sequence	Data Signification	Bytes
1	Loopback Bytes	1
2	N Register Data	N

**2.8.3 CORRESPONDING DATA FIELD FORMAT TO FUNCTION CODE 05H**

**Table 6 Client Request**

Data Sequence	Data Signification	Bytes
1	Coil Address	2
2	Forced Single Coil Value	2

**Table 7 Server Response**

Data Sequence	Data Signification	Bytes
1	Coil Address	2
2	Single Coil Value	2

**2.8.4 CORRESPONDING DATA FIELD FORMAT TO FUNCTION CODE 06H**

**Table 8 Client Request**

Data Sequence	Data Signification	Bytes
1	Register Address	2
2	Register Value ( 2 bytes)	2

**Table 9 Server Response**

Data Sequence	Data Signification	Bytes
1	Register Address	1
2	Register Value ( 2 bytes)	N

---

## 2.9 MODBUS TCP EXAMPLE MESSAGE

### 2.9.1 CLIENT REQUEST

19 B2 00 00 00 06 06 03 00 27 00 02

The above is message content sent by MODBUS client, which is MODBUS TCP/IP protocol format. The front 6 bytes are header handle;

19 B2 00 00 00 06

19 B2 two bytes are the check information sent by client, server just copies their contents and puts into corresponding position of response message;

00 00 two bytes refer to protocol identifier and they are MODBUS protocol;

00 06 two bytes mean that how many bytes are there after the header handle, which means the byte length after this byte. There are 6 bytes "06 03 00 27 00 02" after 00 06, so these two bytes refer to 6.

PDU:

"06 03 00 27 00 02"

06 means slave address;

03 is function code;

00 27 is register address of client request;

00 02 is register length (register numbers) of request.

### 2.9.2 SERVER RESPONSE

19 B2 00 00 00 07 06 03 04 00 00 00 00

Header handle: "19 B2 00 00 00 07"

19 B2 are server's returned check code, copied from client request;

Others' meaning is same with client's.

PDU:

"06 03 04 00 00 00 00"

06 is slave address, slave address numbers;

03 is function code;

04 represents the register value number to be read returned to client request. Because the master address reads 2 registers for slave address, i.e. 2 16-bit registers (2 words), so here is 4 bytes. 04 means the register byte length to be returned from the slave address to the master address due to 2 words are 4 bytes;

00 00 00 00 represents the value of 4 bytes.

**3 CONTROLLER INTERNAL REGISTER ADDRESS AND DATA**

**3.1 ALARM DATA FORM CORRESPONDING TO FUNCTION CODE 03H**

**Table 10 Alarm Data Form**

Modbus Address	PLC Address	Name	Description
0000.0	40001.0	Common Alarm	1 for active
0000.1	40001.1	Common Shutdown Alarm	1 for active
0000.2	40001.2	Common Warn Alarm	1 for active
0000.3	40001.3	Common Trip and Stop Alarm	1 for active
0000.4	40001.4	Common Trip Alarm	1 for active
0000.5	40001.5	Common Trip & Stop Alarm and Common Shutdown Alarm	1 for active
0000.6	40001.6	Reserved	1 for active
0000.7	40001.7	Reserved	1 for active
0000.8	40001.8	System in Test Mode	1 for active
0000.9	40001.9	System in Auto Mode	1 for active
0000.10	40001.10	System in Manual Mode	1 for active
0000.11	40001.11	System in Stop Mode	1 for active
0000.12	40001.12	Reserved	1 for active
0000.13	40001.13	Reserved	1 for active
0000.14	40001.14	Reserved	1 for active
0000.15	40001.15	HMP300 Communication Failure	1 for active
0001.0	40002.0	Emergency Stop Alarm	1 for active
0001.1	40002.1	Overspeed Alarm	1 for active
0001.2	40002.2	Underspeed Alarm	1 for active
0001.3	40002.3	Loss of Speed Signal	1 for active
0001.4	40002.4	Gen Overfrequency	1 for active
0001.5	40002.5	Gen Underfrequency	1 for active
0001.6	40002.6	Gen Overvoltage	1 for active
0001.7	40002.7	Gen Undervoltage	1 for active
0001.8	40002.8	Crank Failure Alarm	1 for active
0001.9	40002.9	Gen Overcurrent	1 for active
0001.10	40002.10	Maintenance Time Due Alarm Shutdown	1 for active
0001.11	40002.11	ECU Alarm Shutdown	1 for active
0001.12	40002.12	Reverse Power Alarm	1 for active
0001.13	40002.13	Over Power Alarm	1 for active
0001.14	40002.14	High Temp. Alarm Shutdown	1 for active
0001.15	40002.15	Low Oil Pressure Alarm Shutdown	1 for active
0002.0	40003.0	ECU Communication Failure	1 for active
0002.1	40003.1	MSC ID Error	1 for active
0002.2	40003.2	Voltage Bus Error	1 for active
0002.3	40003.3	Gen Sequence Wrong Alarm Shutdown	1 for active
0002.4	40003.4	Voltage Bus Sequence Wrong Shutdown	1 for active

Modbus Address	PLC Address	Name	Description
0002.5	40003.5	Current Imbalance	1 for active
0002.6	40003.6	Earth Fault	1 for active
0002.7	40003.7	Loss of Excitation Fault Alarm Shutdwon	1 for active
0002.8	40003.8	Temp. Sensor Open	1 for active
0002.9	40003.9	High Temp. Alarm	1 for active
0002.10	40003.10	Reserved	1 for active
0002.11	40003.11	Reserved	1 for active
0002.12	40003.12	OP Sensor Open	1 for active
0002.13	40003.13	Reserved	1 for active
0002.14	40003.14	Low OP Alarm	1 for active
0002.15	40003.15	Reserved	1 for active
0003.0	40004.0	Level Sensor Open	1 for active
0003.1	40004.1	Reserved	1 for active
0003.2	40004.2	Reserved	1 for active
0003.3	40004.3	Reserved	1 for active
0003.4	40004.4	Sensor 1 Open	1 for active
0003.5	40004.5	Sensor 1 High Alarm Shutdown	1 for active
0003.6	40004.6	Sensor 1 Low Alarm Shutdown	1 for active
0003.7	40004.7	Reserved	1 for active
0003.8	40004.8	Sensor 2 Open	1 for active
0003.9	40004.9	Sensor 2 High Alarm Shutdown	1 for active
0003.10	40004.10	Sensor 2 Low Alarm Shutdown	1 for active
0003.11	40004.11	Reserved	1 for active
0003.12	40004.12	Reserved	1 for active
0003.13	40004.13	Reserved	1 for active
0003.14	40004.14	Reserved	1 for active
0003.15	40004.15	Reserved	1 for active
0004.0	40005.0	Input 1 Comm. Failure Alarm	1 for active
0004.1	40005.1	Input 1 High Exhaust Temp.	1 for active
0004.2	40005.2	Input 1 Sensor 15 Open	1 for active
0004.3	40005.3	Input 1 Sensor 15 High	1 for active
0004.4	40005.4	Input 1 Sensor 15 Low	1 for active
0004.5	40005.5	Input 1 Sensor 16 Open	1 for active
0004.6	40005.6	Input 1 Sensor 16 High	1 for active
0004.7	40005.7	Input 1 Sensor 16 Low	1 for active
0004.8	40005.8	Input 1 Sensor 17 Open	1 for active
0004.9	40005.9	Input 1 Sensor 17 High	1 for active
0004.10	40005.10	Input 1 Sensor 17 Low	1 for active
0004.11	40005.11	Input 1 Sensor 18 Open	1 for active
0004.12	40005.12	Input 1 Sensor 18 High	1 for active
0004.13	40005.13	Input 1 Sensor 18 Low	1 for active
0004.14	40005.14	Input 1 Sensor 19 Open	1 for active
0004.15	40005.15	Input 1 Sensor 19 High	1 for active

Modbus Address	PLC Address	Name	Description
0005.0	40006.0	Input 1 Sensor 19 Low	1 for active
0005.1	40006.1	Input 1 Sensor 20 Open	1 for active
0005.2	40006.2	Input 1 Sensor 20 High	1 for active
0005.3	40006.3	Input 1 Sensor 20 Low	1 for active
0005.4	40006.4	Input 1 Sensor 21 Open	1 for active
0005.5	40006.5	Input 1 Sensor 21 High	1 for active
0005.6	40006.6	Input 1 Sensor 21 Low	1 for active
0005.7	40006.7	Input 1 Sensor 22 Open	1 for active
0005.8	40006.8	Input 1 Sensor 22 High	1 for active
0005.9	40006.9	Input 1 Sensor 22 Low	1 for active
0005.10	40006.10	Input 1 Sensor 23 Open	1 for active
0005.11	40006.11	Input 1 Sensor 23 High	1 for active
0005.12	40006.12	Input 1 Sensor 23 Low	1 for active
0005.13	40006.13	Input 1 Sensor 24 Open	1 for active
0005.14	40006.14	Input 1 Sensor 24 High	1 for active
0005.15	40006.15	Input 1 Sensor 24 Low	1 for active
0006.0	40007.0	Input 2 Comm. Failure Alarm	1 for active
0006.1	40007.1	Input 2 High Exhaust Temp.	1 for active
0006.2	40007.2	Input 2 Sensor 15 Open	1 for active
0006.3	40007.3	Input 2 Sensor 15 High	1 for active
0006.4	40007.4	Input 2 Sensor 15 Low	1 for active
0006.5	40007.5	Input 2 Sensor 16 Open	1 for active
0006.6	40007.6	Input 2 Sensor 16 High	1 for active
0006.7	40007.7	Input 2 Sensor 16 Low	1 for active
0006.8	40007.8	Input 2 Sensor 17 Open	1 for active
0006.9	40007.9	Input 2 Sensor 17 High	1 for active
0006.10	40007.10	Input 2 Sensor 17 Low	1 for active
0006.11	40007.11	Input 2 Sensor 18 Open	1 for active
0006.12	40007.12	Input 2 Sensor 18 High	1 for active
0006.13	40007.13	Input 2 Sensor 18 Low	1 for active
0006.14	40007.14	Input 2 Sensor 19 Open	1 for active
0006.15	40007.15	Input 2 Sensor 19 High	1 for active
0007.0	40008.0	Input 2 Sensor 19 Low	1 for active
0007.1	40008.1	Input 2 Sensor 20 Open	1 for active
0007.2	40008.2	Input 2 Sensor 20 High	1 for active
0007.3	40008.3	Input 2 Sensor 20 Low	1 for active
0007.4	40008.4	Input 2 Sensor 21 Open	1 for active
0007.5	40008.5	Input 2 Sensor 21 High	1 for active
0007.6	40008.6	Input 2 Sensor 21 Low	1 for active
0007.7	40008.7	Input 2 Sensor 22 Open	1 for active
0007.8	40008.8	Input 2 Sensor 22 High	1 for active
0007.9	40008.9	Input 2 Sensor 22 Low	1 for active
0007.10	40008.10	Input 2 Sensor 23 Open	1 for active
0007.11	40008.11	Input 2 Sensor 23 High	1 for active

Modbus Address	PLC Address	Name	Description
0007.12	40008.12	Input 2 Sensor 23 Low	1 for active
0007.13	40008.13	Input 2 Sensor 24 Open	1 for active
0007.14	40008.14	Input 2 Sensor 24 High	1 for active
0007.15	40008.15	Input 2 Sensor 24 Low	1 for active
0008.0	40009.0	Input 1 Shutdown	1 for active
0008.1	40009.1	Input 2 Shutdown	1 for active
0008.2	40009.2	Input 3 Shutdown	1 for active
0008.3	40009.3	Input 4 Shutdown	1 for active
0008.4	40009.4	Input 5 Shutdown	1 for active
0008.5	40009.5	Input 6 Shutdown	1 for active
0008.6	40009.6	Input 7 Shutdown	1 for active
0008.7	40009.7	Input 8 Shutdown	1 for active
0008.8	40009.8	Reserved	1 for active
0008.9	40009.9	Reserved	1 for active
0008.10	40009.10	Reserved	1 for active
0008.11	40009.11	Reserved	1 for active
0008.12	40009.12	PLC Function 1	1 for active
0008.13	40009.13	PLC Function 2	1 for active
0008.14	40009.14	PLC Function 3	1 for active
0008.15	40009.15	PLC Function 4	1 for active
0009.0	40010.0	PLC Function 5	1 for active
0009.1	40010.1	PLC Function 6	1 for active
0009.2	40010.2	PLC Function 7	1 for active
0009.3	40010.3	PLC Function 8	1 for active
0009.4	40010.4	PLC Function 9	1 for active
0009.5	40010.5	PLC Function 10	1 for active
0009.6	40010.6	PLC Function 11	1 for active
0009.7	40010.7	PLC Function 12	1 for active
0009.8	40010.8	PLC Function 13	1 for active
0009.9	40010.9	PLC Function 14	1 for active
0009.10	40010.10	PLC Function 15	1 for active
0009.11	40010.11	PLC Function 16	1 for active
0009.12	40010.12	PLC Function 17	1 for active
0009.13	40010.13	PLC Function 18	1 for active
0009.14	40010.14	PLC Function 19	1 for active
0009.15	40010.15	PLC Function 20	1 for active
0010.0	40011.0	Reserved	1 for active
0010.1	40011.1	Reserved	1 for active
0010.2	40011.2	Exp. Input Comm. Failure	1 for active
0010.3	40011.3	Exp. Output Comm. Failure	1 for active
0010.4	40011.4	Exp. Input 1	1 for active
0010.5	40011.5	Exp. Input 2	1 for active
0010.6	40011.6	Exp. Input 3	1 for active
0010.7	40011.7	Exp. Input 4	1 for active

Modbus Address	PLC Address	Name	Description
0010.8	40011.8	Exp. Input 5	1 for active
0010.9	40011.9	Exp. Input 6	1 for active
0010.10	40011.10	Exp. Input 7	1 for active
0010.11	40011.11	Exp. Input 8	1 for active
0010.12	40011.12	Exp. Input 9	1 for active
0010.13	40011.13	Exp. Input 10	1 for active
0010.14	40011.14	Exp. Input 11	1 for active
0010.15	40011.15	Exp. Input 12	1 for active
0011.0	40012.0	Exp. Input 13	1 for active
0011.1	40012.1	Exp. Input 14	1 for active
0011.2	40012.2	Exp. Input 15	1 for active
0011.3	40012.3	Exp. Input 16	1 for active
0011.4	40012.4	Input Module 1 Cylinder Temp. Difference Large	1 for active
0011.5	40012.5	Input Module 1 Cylinder Temp. High	1 for active
0011.6	40012.6	Input Module 2 Cylinder Temp. Difference Large	1 for active
0011.7	40012.7	Input Module 2 Cylinder Temp. High	1 for active
0011.8	40012.8	Reserved	1 for active
0011.9	40012.9	Reserved	1 for active
0011.10	40012.10	Reserved	1 for active
0011.11	40012.11	Reserved	1 for active
0011.12	40012.12	Reserved	1 for active
0011.13	40012.13	Reserved	1 for active
0011.14	40012.14	Reserved	1 for active
0011.15	40012.15	Reserved	1 for active
Trip and Stop Alarm Area			
0012.0	40013.0	Overcurrent Trip and Stop	1 for active
0012.1	40013.1	Maintenance Due Trip and Stop	1 for active
0012.2	40013.2	Reverse Power Trip and Stop	1 for active
0012.3	40013.3	Over Power Trip and Stop	1 for active
0012.4	40013.4	Input 1 Trip and Stop	1 for active
0012.5	40013.5	Input 2 Trip and Stop	1 for active
0012.6	40013.6	Input 3 Trip and Stop	1 for active
0012.7	40013.7	Input 4 Trip and Stop	1 for active
0012.8	40013.8	Input 5 Trip and Stop	1 for active
0012.9	40013.9	Input 6 Trip and Stop	1 for active
0012.10	40013.10	Input 7 Trip and Stop	1 for active
0012.11	40013.11	Input 8 Trip and Stop	1 for active
0012.12	40013.12	Reserved	1 for active
0012.13	40013.13	Reserved	1 for active
0012.14	40013.14	Exp. Input Comm. Failure	1 for active
0012.15	40013.15	Exp. Output Comm. Failure	1 for active
0013.0	40014.0	PLC Function 1	1 for active

Modbus Address	PLC Address	Name	Description
0013.1	40014.1	PLC Function 2	1 for active
0013.2	40014.2	PLC Function 3	1 for active
0013.3	40014.3	PLC Function 4	1 for active
0013.4	40014.4	PLC Function 5	1 for active
0013.5	40014.5	PLC Function 6	1 for active
0013.6	40014.6	PLC Function 7	1 for active
0013.7	40014.7	PLC Function 8	1 for active
0013.8	40014.8	PLC Function 9	1 for active
0013.9	40014.9	PLC Function 10	1 for active
0013.10	40014.10	PLC Function 11	1 for active
0013.11	40014.11	PLC Function 12	1 for active
0013.12	40014.12	PLC Function 13	1 for active
0013.13	40014.13	PLC Function 14	1 for active
0013.14	40014.14	PLC Function 15	1 for active
0013.15	40014.15	PLC Function 16	1 for active
0014.0	40015.0	PLC Function 17	1 for active
0014.1	40015.1	PLC Function 18	1 for active
0014.2	40015.2	PLC Function 19	1 for active
0014.3	40015.3	PLC Function 20	1 for active
0014.4	40015.4	Reserved	1 for active
0014.5	40015.5	Reserved	1 for active
0014.6	40015.6	Exp. Input 1	1 for active
0014.7	40015.7	Exp. Input 2	1 for active
0014.8	40015.8	Exp. Input 3	1 for active
0014.9	40015.9	Exp. Input 4	1 for active
0014.10	40015.10	Exp. Input 5	1 for active
0014.11	40015.11	Exp. Input 6	1 for active
0014.12	40015.12	Exp. Input 7	1 for active
0014.13	40015.13	Exp. Input 8	1 for active
0014.14	40015.14	Exp. Input 9	1 for active
0014.15	40015.15	Exp. Input 10	1 for active
0015.0	40016.0	Exp. Input 11	1 for active
0015.1	40016.1	Exp. Input 12	1 for active
0015.2	40016.2	Exp. Input 13	1 for active
0015.3	40016.3	Exp. Input 14	1 for active
0015.4	40016.4	Exp. Input 15	1 for active
0015.5	40016.5	Exp. Input 16	1 for active
0015.6	40016.6	Mains Overfreq. Trip and Stop	1 for active
0015.7	40016.7	Mains Underfreq. Trip and Stop	1 for active
0015.8	40016.8	Mains Overvolt Trip and Stop	1 for active
0015.9	40016.9	Mains Undervolt Trip and Stop	1 for active
0015.10	40016.10	Mains ROCOF Trip and Stop	1 for active
0015.11	40016.11	Mains Vector Shift Trip and Stop	1 for active
0015.12	40016.12	Sync. Failure Trip and Stop	1 for active

Modbus Address	PLC Address	Name	Description
0015.13	40016.13	Loss of Excitation Fault Trip and Stop	1 for active
0015.14	40016.14	Earth Fault Trip and Stop	1 for active
0015.15	40016.15	Unbalanced Current Trip and Stop	1 for active
Trip Alarm Area			
0016.0	40017.0	Overcurrent Trip	1 for active
0016.1	40017.1	Reserved	1 for active
0016.2	40017.2	Reverse Power Trip	1 for active
0016.3	40017.3	Over Power Trip	1 for active
0016.4	40017.4	Input 1 Trip	1 for active
0016.5	40017.5	Input 2 Trip	1 for active
0016.6	40017.6	Input 3 Trip	1 for active
0016.7	40017.7	Input 4 Trip	1 for active
0016.8	40017.8	Input 5 Trip	1 for active
0016.9	40017.9	Input 6 Trip	1 for active
0016.10	40017.10	Input 7 Trip	1 for active
0016.11	40017.11	Input 8 Trip	1 for active
0016.12	40017.12	Reserved	1 for active
0016.13	40017.13	Reserved	1 for active
0016.14	40017.14	Exp. Input Comm. Failure	1 for active
0016.15	40017.15	Exp. Output Comm. Failure	1 for active
0017.0	40018.0	PLC Function 1	1 for active
0017.1	40018.1	PLC Function 2	1 for active
0017.2	40018.2	PLC Function 3	1 for active
0017.3	40018.3	PLC Function 4	1 for active
0017.4	40018.4	PLC Function 5	1 for active
0017.5	40018.5	PLC Function 6	1 for active
0017.6	40018.6	PLC Function 7	1 for active
0017.7	40018.7	PLC Function 8	1 for active
0017.8	40018.8	PLC Function 9	1 for active
0017.9	40018.9	PLC Function 10	1 for active
0017.10	40018.10	PLC Function 11	1 for active
0017.11	40018.11	PLC Function 12	1 for active
0017.12	40018.12	PLC Function 13	1 for active
0017.13	40018.13	PLC Function 14	1 for active
0017.14	40018.14	PLC Function 15	1 for active
0017.15	40018.15	PLC Function 16	1 for active
0018.0	40019.0	PLC Function 17	1 for active
0018.1	40019.1	PLC Function 18	1 for active
0018.2	40019.2	PLC Function 19	1 for active
0018.3	40019.3	PLC Function 20	1 for active
0018.4	40019.4	Reserved	1 for active
0018.5	40019.5	Reserved	1 for active
0018.6	40019.6	Exp. Input 1	1 for active
0018.7	40019.7	Exp. Input 2	1 for active

Modbus Address	PLC Address	Name	Description
0018.8	40019.8	Exp. Input 3	1 for active
0018.9	40019.9	Exp. Input 4	1 for active
0018.10	40019.10	Exp. Input 5	1 for active
0018.11	40019.11	Exp. Input 6	1 for active
0018.12	40019.12	Exp. Input 7	1 for active
0018.13	40019.13	Exp. Input 8	1 for active
0018.14	40019.14	Exp. Input 9	1 for active
0018.15	40019.15	Exp. Input 10	1 for active
0019.0	40020.0	Exp. Input 11	1 for active
0019.1	40020.1	Exp. Input 12	1 for active
0019.2	40020.2	Exp. Input 13	1 for active
0019.3	40020.3	Exp. Input 14	1 for active
0019.4	40020.4	Exp. Input 15	1 for active
0019.5	40020.5	Exp. Input 16	1 for active
0019.6	40020.6	Gen Under Voltage	1 for active
0019.7	40020.7	Gen Over Voltage	1 for active
0019.8	40020.8	Gen Capacity Lack	1 for active
0019.9	40020.9	Mains Breaker Failure	1 for active
0019.10	40020.10	Gen Breaker Failure	1 for active
0019.11	40020.11	MSC Too Few Trip	1 for active
0019.12	40020.12	Loss of Excitation Fault Trip	1 for active
0019.13	40020.13	Earth Fault Trip and not Stop	1 for active
0019.14	40020.14	Unbalanced Current Trip	1 for active
0019.15	40020.15	Sync. Failure Trip	1 for active
Warning Area			
0020.0	40021.0	Overspeed Warning	1 for active
0020.1	40021.1	Underspeed Warning	1 for active
0020.2	40021.2	Speed Signal Loss Warning	1 for active
0020.3	40021.3	Gen Overfreq. Warning	1 for active
0020.4	40021.4	Gen Underfreq. Warning	1 for active
0020.5	40021.5	Gen Overvolt Warning	1 for active
0020.6	40021.6	Gen Undervolt Warning	1 for active
0020.7	40021.7	Gen Overcurrent Warning	1 for active
0020.8	40021.8	Stop Failure Warning	1 for active
0020.9	40021.9	Charge Failure Warning	1 for active
0020.10	40021.10	Battery Overvolt Warning	1 for active
0020.11	40021.11	Battery Undervolt Warning	1 for active
0020.12	40021.12	Maintenance Due Warning	1 for active
0020.13	40021.13	Reverse Power Warning	1 for active
0020.14	40021.14	Over Power Warning	1 for active
0020.15	40021.15	ECU Warning	1 for active
0021.0	40022.0	Gen Loss of Phase Warning	1 for active
0021.1	40022.1	Gen Reverse Phase Sequence Warning	1 for active
0021.2	40022.2	Sync Failure Warning	1 for active

Modbus Address	PLC Address	Name	Description
0021.3	40022.3	Unbalanced Current Warning	1 for active
0021.4	40022.4	Earth Fault Warning	1 for active
0021.5	40022.5	Loss of Excitation Fault Warning	1 for active
0021.6	40022.6	Mains Breaker Failure Warning	1 for active
0021.7	40022.7	Gen Breaker Failure Warning	1 for active
0021.8	40022.8	Temp. Sensor Open	1 for active
0021.9	40022.9	High Temp. Warning	1 for active
0021.10	40022.10	Low Temp. Warning	1 for active
0021.11	40022.11	GOV Reach Limit	1 for active
0021.12	40022.12	Oil Pressure Sensor Open	1 for active
0021.13	40022.13	Reserved	1 for active
0021.14	40022.14	Low Oil Pressure Warning	1 for active
0021.15	40022.15	AVR Reach Limit	1 for active
0022.0	40023.0	Level Sensor Open	1 for active
0022.1	40023.1	Reserved	1 for active
0022.2	40023.2	Low Level Warning	1 for active
0022.3	40023.3	Gen Capacity Lack	1 for active
0022.4	40023.4	Aux. Sensor 1 Open	1 for active
0022.5	40023.5	Aux. Sensor 1 High	1 for active
0022.6	40023.6	Aux. Sensor 1 Low	1 for active
0022.7	40023.7	Reserved	1 for active
0022.8	40023.8	Aux. Sensor 2 Open	1 for active
0022.9	40023.9	Aux. Sensor 2 High	1 for active
0022.10	40023.10	Aux. Sensor 2 Low	1 for active
0022.11	40023.11	Water in Fuel Warning	1 for active
0022.12	40023.12	Reserved	1 for active
0022.13	40023.13	Reserved	1 for active
0022.14	40023.14	Reserved	1 for active
0022.15	40023.15	Reserved	1 for active
0023.0	40024.0	Input 1 Comm. Failure	1 for active
0023.1	40024.1	Input 1 Exhaust Temp. High	1 for active
0023.2	40024.2	Input Module 1 Sensor 15 Open	1 for active
0023.3	40024.3	Input Module 1 Sensor 15 High	1 for active
0023.4	40024.4	Input Module 1 Sensor 15 Low	1 for active
0023.5	40024.5	Input Module 1 Sensor 16 Open	1 for active
0023.6	40024.6	Input Module 1 Sensor 16 High	1 for active
0023.7	40024.7	Input Module 1 Sensor 16 Low	1 for active
0023.8	40024.8	Input Module 1 Sensor 17 Open	1 for active
0023.9	40024.9	Input Module 1 Sensor 17 High	1 for active
0023.10	40024.10	Input Module 1 Sensor 17 Low	1 for active
0023.11	40024.11	Input Module 1 Sensor 18 Open	1 for active
0023.12	40024.12	Input Module 1 Sensor 18 High	1 for active
0023.13	40024.13	Input Module 1 Sensor 18 Low	1 for active
0023.14	40024.14	Input Module 1 Sensor 19 Open	1 for active

Modbus Address	PLC Address	Name	Description
0023.15	40024.15	Input Module 1 Sensor 19 High	1 for active
0024.0	40025.0	Input Module 1 Sensor 19 Low	1 for active
0024.1	40025.1	Input Module 1 Sensor 20 Open	1 for active
0024.2	40025.2	Input Module 1 Sensor 20 High	1 for active
0024.3	40025.3	Input Module 1 Sensor 20 Low	1 for active
0024.4	40025.4	Input Module 1 Sensor 21 Open	1 for active
0024.5	40025.5	Input Module 1 Sensor 21 High	1 for active
0024.6	40025.6	Input Module 1 Sensor 21 Low	1 for active
0024.7	40025.7	Input Module 1 Sensor 22 Open	1 for active
0024.8	40025.8	Input Module 1 Sensor 22 High	1 for active
0024.9	40025.9	Input Module 1 Sensor 22 Low	1 for active
0024.10	40025.10	Input Module 1 Sensor 23 Open	1 for active
0024.11	40025.11	Input Module 1 Sensor 23 High	1 for active
0024.12	40025.12	Input Module 1 Sensor 23 Low	1 for active
0024.13	40025.13	Input Module 1 Sensor 24 Open	1 for active
0024.14	40025.14	Input Module 1 Sensor 24 High	1 for active
0024.15	40025.15	Input Module 1 Sensor 24 Low	1 for active
0025.0	40026.0	Input Module 2 Comm. Failure	1 for active
0025.1	40026.1	Input Module 2 Exhaust Temp. High	1 for active
0025.2	40026.2	Input Module 2 Sensor 15 Open	1 for active
0025.3	40026.3	Input Module 2 Sensor 15 High	1 for active
0025.4	40026.4	Input Module 2 Sensor 15 Low	1 for active
0025.5	40026.5	Input Module 2 Sensor 16Open	1 for active
0025.6	40026.6	Input Module 2 Sensor 16 High	1 for active
0025.7	40026.7	Input Module 2 Sensor 16 Low	1 for active
0025.8	40026.8	Input Module 2 Sensor 17 Open	1 for active
0025.9	40026.9	Input Module 2 Sensor 17 High	1 for active
0025.10	40026.10	Input Module 2 Sensor 17 Low	1 for active
0025.11	40026.11	Input Module 2 Sensor 18 Open	1 for active
0025.12	40026.12	Input Module 2 Sensor 18 High	1 for active
0025.13	40026.13	Input Module 2 Sensor 18 Low	1 for active
0025.14	40026.14	Input Module 2 Sensor 19 Open	1 for active
0025.15	40026.15	Input Module 2 Sensor 19High	1 for active
0026.0	40027.0	Input Module 2 Sensor 19 Low	1 for active
0026.1	40027.1	Input Module 2 Sensor 20 Open	1 for active
0026.2	40027.2	Input Module 2 Sensor 20 High	1 for active
0026.3	40027.3	Input Module 2 Sensor 20 Low	1 for active
0026.4	40027.4	Input Module 2 Sensor 21 Open	1 for active
0026.5	40027.5	Input Module 2 Sensor 21 High	1 for active
0026.6	40027.6	Input Module 2 Sensor 21 Low	1 for active
0026.7	40027.7	Input Module 2 Sensor 22 Open	1 for active
0026.8	40027.8	Input Module 2 Sensor 22 High	1 for active
0026.9	40027.9	Input Module 2 Sensor 22 Low	1 for active
0026.10	40027.10	Input Module 2 Sensor 23 Open	1 for active

Modbus Address	PLC Address	Name	Description
0026.11	40027.11	Input Module 2 Sensor 23 High	1 for active
0026.12	40027.12	Input Module 2 Sensor 23 Low	1 for active
0026.13	40027.13	Input Module 2 Sensor 24 Open	1 for active
0026.14	40027.14	Input Module 2 Sensor 24 High	1 for active
0026.15	40027.15	Input Module 2 Sensor 24 Low	1 for active
0027.0	40028.0	GSM Comm. Failure Warning	1 for active
0027.1	40028.1	Exp. Input Comm. Failure	1 for active
0027.2	40028.2	Exp. Output Comm. Failure	1 for active
0027.3	40028.3	Exp. Input 1	1 for active
0027.4	40028.4	Exp. Input 2	1 for active
0027.5	40028.5	Exp. Input 3	1 for active
0027.6	40028.6	Exp. Input 4	1 for active
0027.7	40028.7	Exp. Input 5	1 for active
0027.8	40028.8	Exp. Input 6	1 for active
0027.9	40028.9	Exp. Input 7	1 for active
0027.10	40028.10	Exp. Input 8	1 for active
0027.11	40028.11	Exp. Input 9	1 for active
0027.12	40028.12	Exp. Input 10	1 for active
0027.13	40028.13	Exp. Input 11	1 for active
0027.14	40028.14	Exp. Input 12	1 for active
0027.15	40028.15	Exp. Input 13	1 for active
0028.0	40029.0	Exp. Input 14	1 for active
0028.1	40029.1	Exp. Input 15	1 for active
0028.2	40029.2	Exp. Input 16	1 for active
0028.3	40029.3	Mains Overfreq. Warning	1 for active
0028.4	40029.4	Mains Underfreq. Warning	1 for active
0028.5	40029.5	Mains Overvolt Warning	1 for active
0028.6	40029.6	Mains Undervolt Warning	1 for active
0028.7	40029.7	Mains ROCOF Warning	1 for active
0028.8	40029.8	Mains Vector Shift Warning	1 for active
0028.9	40029.9	Large Freq. Difference Warning	1 for active
0028.10	40029.10	MSC Too Few Warning	1 for active
0028.11	40029.11	Input Module 1 Cylinder Temp Difference Large	1 for active
0028.12	40029.12	Input Module 1 Cylinder Temp High	1 for active
0028.13	40029.13	Input Module 2 Cylinder Temp Difference Large	1 for active
0028.14	40029.14	Input Module 2 Cylinder Temp High	1 for active
0028.15	40029.15	AIN8 Comm. Failure	1 for active
0029.0	40030.0	Input 1 Waring	1 for active
0029.1	40030.1	Input 2 Waring	1 for active
0029.2	40030.2	Input 3Waring	1 for active
0029.3	40030.3	Input 4 Waring	1 for active
0029.4	40030.4	Input 5 Waring	1 for active

Modbus Address	PLC Address	Name	Description
0029.5	40030.5	Input 6 Waring	1 for active
0029.6	40030.6	Input 7 Waring	1 for active
0029.7	40030.7	Input 8 Waring	1 for active
0029.8	40030.8	Reserved	1 for active
0029.9	40030.9	Reserved	1 for active
0029.10	40030.10	Reserved	1 for active
0029.11	40030.11	Reserved	1 for active
0029.12	40030.12	PLC Function 1	1 for active
0029.13	40030.13	PLC Function 2	1 for active
0029.14	40030.14	PLC Function 3	1 for active
0029.15	40030.15	PLC Function 4	1 for active
0030.0	40031.0	PLC Function 5	1 for active
0030.1	40031.1	PLC Function 6	1 for active
0030.2	40031.2	PLC Function 7	1 for active
0030.3	40031.3	PLC Function 8	1 for active
0030.4	40031.4	PLC Function 9	1 for active
0030.5	40031.5	PLC Function 10	1 for active
0030.6	40031.6	PLC Function 11	1 for active
0030.7	40031.7	PLC Function 12	1 for active
0030.8	40031.8	PLC Function 13	1 for active
0030.9	40031.9	PLC Function 14	1 for active
0030.10	40031.10	PLC Function 15	1 for active
0030.11	40031.11	PLC Function 16	1 for active
0030.12	40031.12	PLC Function 17	1 for active
0030.13	40031.13	PLC Function 18	1 for active
0030.14	40031.14	PLC Function 19	1 for active
0030.15	40031.15	PLC Function 20	1 for active
Indication Area			
0031.0	40032.0	Reserved	1 for active
0031.1	40032.1	Reserved	1 for active
0031.2	40032.2	In Scheduled Not Run Indication	1 for active
0031.3	40032.3	PLC Function 19	1 for active
0031.4	40032.4	PLC Function 1	1 for active
0031.5	40032.5	PLC Function 2	1 for active
0031.6	40032.6	PLC Function 3	1 for active
0031.7	40032.7	PLC Function 4	1 for active
0031.8	40032.8	PLC Function 5	1 for active
0031.9	40032.9	PLC Function 6	1 for active
0031.10	40032.10	PLC Function 7	1 for active
0031.11	40032.11	PLC Function 8	1 for active
0031.12	40032.12	PLC Function 9	1 for active
0031.13	40032.13	PLC Function 10	1 for active
0031.14	40032.14	PLC Function 11	1 for active
0031.15	40032.15	PLC Function 12	1 for active

Modbus Address	PLC Address	Name	Description
0032.0	40033.0	PLC Function 13	1 for active
0032.1	40033.1	PLC Function 14	1 for active
0032.2	40033.2	PLC Function 15	1 for active
0032.3	40033.3	PLC Function 16	1 for active
0032.4	40033.4	PLC Function 17	1 for active
0032.5	40033.5	PLC Function 18	1 for active
0032.6	40033.6	Auto Mode Input	1 for active
0032.7	40033.7	Auto Mode Invalid	1 for active
0032.8	40033.8	GSM Start Inhibit	1 for active
0032.9	40033.9	PLC Function 20	1 for active
0032.10	40033.10	Alt. Config. 1 Indication	1 for active
0032.11	40033.11	Alt. Config. 2 Indication	1 for active
0032.12	40033.12	Alt. Config. 3 Indication	1 for active
0032.13	40033.13	Overcurrent Indication	1 for active
0032.14	40033.14	Reverse Power Indication	1 for active
0032.15	40033.15	Over Power Indication	1 for active
0033.0	40034.0	Input 1 Indication	1 for active
0033.1	40034.1	Input 2 Indication	1 for active
0033.2	40034.2	Input 3 Indication	1 for active
0033.3	40034.3	Input 4 Indication	1 for active
0033.4	40034.4	Input 5 Indication	1 for active
0033.5	40034.5	Input 6 Indication	1 for active
0033.6	40034.6	Input 7 Indication	1 for active
0033.7	40034.7	Input 8 Indication	1 for active
0033.8	40034.8	Reserved	1 for active
0033.9	40034.9	Reserved	1 for active
0033.10	40034.10	Exp. Input Comm. Failure	1 for active
0033.11	40034.11	Exp. Output Comm. Failure	1 for active
0033.12	40034.12	Reserved	1 for active
0033.13	40034.13	Loss of Excitation Fault	1 for active
0033.14	40034.14	Loss of Excitation Fault	1 for active
0033.15	40034.15	Unbalanced Current	1 for active
0034.0	40035.0	Mains Normal	1 for active
0034.1	40035.1	Mains Abnormal	1 for active
0034.2	40035.2	Genset Start	1 for active
0034.3	40035.3	Genset Stop	1 for active
0034.4	40035.4	Mains On Load	1 for active
0034.5	40035.5	Gen On Load	1 for active
0034.6	40035.6	Auto Mode Input	1 for active
0034.7	40035.7	Auto Mode Invalid	1 for active
0034.8	40035.8	Reserved	1 for active
0034.9	40035.9	Reserved	1 for active
0034.10	40035.10	Reserved	1 for active
0034.11	40035.11	Reserved	1 for active

Modbus Address	PLC Address	Name	Description
0034.12	40035.12	Reserved	1 for active
0034.13	40035.13	Reserved	1 for active
0034.14	40035.14	Reserved	1 for active
0034.15	40035.15	Reserved	1 for active
Other Status Area			
0035.0	40036.0	Emergency Input Status	1 for active
0035.1	40036.1	Input 1 Status	1 for active
0035.2	40036.2	Input 2 Status	1 for active
0035.3	40036.3	Input 3 Status	1 for active
0035.4	40036.4	Input 4 Status	1 for active
0035.5	40036.5	Input 5 Status	1 for active
0035.6	40036.6	Input 6 Status	1 for active
0035.7	40036.7	Input 7 Status	1 for active
0035.8	40036.8	Input 8 Status	1 for active
0035.9	40036.9	Reserved	1 for active
0035.10	40036.10	Reserved	1 for active
0035.11	40036.11	Reserved	1 for active
0035.12	40036.12	Reserved	1 for active
0035.13	40036.13	Reserved	1 for active
0035.14	40036.14	Reserved	1 for active
0035.15	40036.15	Reserved	1 for active
0036.0	40037.0	Exp. Input 1	1 for active
0036.1	40037.1	Exp. Input 2	1 for active
0036.2	40037.2	Exp. Input 3	1 for active
0036.3	40037.3	Exp. Input 4	1 for active
0036.4	40037.4	Exp. Input 5	1 for active
0036.5	40037.5	Exp. Input 6	1 for active
0036.6	40037.6	Exp. Input 7	1 for active
0036.7	40037.7	Exp. Input 8	1 for active
0036.8	40037.8	Exp. Input 9	1 for active
0036.9	40037.9	Exp. Input 10	1 for active
0036.10	40037.10	Exp. Input 11	1 for active
0036.11	40037.11	Exp. Input 12	1 for active
0036.12	40037.12	Exp. Input 13	1 for active
0036.13	40037.13	Exp. Input 14	1 for active
0036.14	40037.14	Exp. Input 15	1 for active
0036.15	40037.15	Exp. Input 16	1 for active
0037.0	40038.0	Fuel Relay Output Status	1 for active
0037.1	40038.1	Start Relay Output Status	1 for active
0037.2	40038.2	Aux. Output 1 Status	1 for active
0037.3	40038.3	Aux. Output 2 Status	1 for active
0037.4	40038.4	Aux. Output 3 Status	1 for active
0037.5	40038.5	Aux. Output 4 Status	1 for active
0037.6	40038.6	Aux. Output 5 Status	1 for active

Modbus Address	PLC Address	Name	Description
0037.7	40038.7	Aux. Output 6 Status	1 for active
0037.8	40038.8	Reserved	1 for active
0037.9	40038.9	Reserved	1 for active
0037.10	40038.10	Reserved	1 for active
0037.11	40038.11	Reserved	1 for active
0037.12	40038.12	Reserved	1 for active
0037.13	40038.13	Reserved	1 for active
0037.14	40038.14	Reserved	1 for active
0037.15	40038.15	Reserved	1 for active
0038.0	40039.0	Exp. Output 1	1 for active
0038.1	40039.1	Exp. Output 1	1 for active
0038.2	40039.2	Exp. Output 1	1 for active
0038.3	40039.3	Exp. Output 1	1 for active
0038.4	40039.4	Exp. Output 1	1 for active
0038.5	40039.5	Exp. Output 1	1 for active
0038.6	40039.6	Exp. Output 1	1 for active
0038.7	40039.7	Exp. Output 1	1 for active
0038.8	40039.8	Exp. Output 1	1 for active
0038.9	40039.9	Exp. Output 1	1 for active
0038.10	40039.10	Exp. Output 1	1 for active
0038.11	40039.11	Exp. Output 1	1 for active
0038.12	40039.12	Exp. Output 1	1 for active
0038.13	40039.13	Exp. Output 1	1 for active
0038.14	40039.14	Exp. Output 1	1 for active
0038.15	40039.15	Exp. Output 1	1 for active
0039	40040	Exp. Output 1	
0040	40041	Exp. Output 1	
0041	40042	Exp. Output 1	
0042.0	40043.0	Exp. Input Comm. Failure	1 for active
0042.1	40043.1	Exp. Output Comm. Failure	1 for active
0042.2	40043.2	Input Module 1 Comm. Failure	1 for active
0042.3	40043.3	Input Module 2 Comm. Failure	1 for active
0042.4	40043.4	Reserved	1 for active
0042.5	40043.5	Reserved	1 for active
0042.6	40043.6	Reserved	1 for active
0042.7	40043.7	Reserved	1 for active
0042.8	40043.8	Reserved	1 for active
0042.9	40043.9	Reserved	1 for active
0042.10	40043.10	Reserved	1 for active
0042.11	40043.11	Reserved	1 for active
0042.12	40043.12	Reserved	1 for active
0042.13	40043.13	Reserved	1 for active
0042.14	40043.14	Reserved	1 for active
0042.15	40043.15	Reserved	1 for active

Modbus Address	PLC Address	Name	Description
0043.0	40044.0	Mains Normal	1 for active
0043.1	40044.1	Mains Close	1 for active
0043.2	40044.2	Gen Normal	1 for active
0043.3	40044.3	Gen Close	1 for active
0043.4	40044.4	Running Lamp Status	1 for active
0043.5	40044.5	Mute Lamp Status	1 for active
0043.6	40044.6	Reserved	1 for active
0043.7	40044.7	Reserved	1 for active
0043.8	40044.8	Reserved	1 for active
0043.9	40044.9	Reserved	1 for active
0043.10	40044.10	Reserved	1 for active
0043.11	40044.11	Reserved	1 for active
0043.12	40044.12	Reserved	1 for active
0043.13	40044.13	Reserved	1 for active
0043.14	40044.14	Reserved	1 for active
0043.15	40044.15	Reserved	1 for active
0044.0	40045.0	Mains Abnormal	1 for active
0044.1	40045.1	Mains Overvoltage	1 for active
0044.2	40045.2	Mains Undervoltage	1 for active
0044.3	40045.3	Mains Overfrequency	1 for active
0044.4	40045.4	Mains Underfrequency	1 for active
0044.5	40045.5	Mains Loss of Phase	1 for active
0044.6	40045.6	Mains Reverse Phase Sequence	1 for active
0044.7	40045.7	Mains Blackout	1 for active
0044.8	40045.8	Reserved	1 for active
0044.9	40045.9	Reserved	1 for active
0044.10	40045.10	Reserved	1 for active
0044.11	40045.11	Reserved	1 for active
0044.12	40045.12	Reserved	1 for active
0044.13	40045.13	Reserved	1 for active
0044.14	40045.14	Reserved	1 for active
0044.15	40045.15	Reserved	1 for active
0045.0	40046.0	Input 1 Active	1 for active
0045.1	40046.1	Input 2 Active	1 for active
0045.2	40046.2	Input 3 Active	1 for active
0045.3	40046.3	Input 4 Active	1 for active
0045.4	40046.4	Input 5 Active	1 for active
0045.5	40046.5	Input 6 Active	1 for active
0045.6	40046.6	Input 7 Active	1 for active
0045.7	40046.7	Input 8 Active	1 for active
0045.8	40046.8	Reserved	1 for active
0045.9	40046.9	Reserved	1 for active
0045.10	40046.10	Reserved	1 for active
0045.11	40046.11	Reserved	1 for active

Modbus Address	PLC Address	Name	Description
0045.12	40046.12	Reserved	1 for active
0045.13	40046.13	Reserved	1 for active
0045.14	40046.14	Reserved	1 for active
0045.15	40046.15	Reserved	1 for active
0046.0	40047.0	Exp. Input 1 Active	1 for active
0046.1	40047.1	Exp. Input 2 Active	1 for active
0046.2	40047.2	Exp. Input 3 Active	1 for active
0046.3	40047.3	Exp. Input 4 Active	1 for active
0046.4	40047.4	Exp. Input 5 Active	1 for active
0046.5	40047.5	Exp. Input 6 Active	1 for active
0046.6	40047.6	Exp. Input 7 Active	1 for active
0046.7	40047.7	Exp. Input 8 Active	1 for active
0046.8	40047.8	Exp. Input 9 Active	1 for active
0046.9	40047.9	Exp. Input 10 Active	1 for active
0046.10	40047.10	Exp. Input 11 Active	1 for active
0046.11	40047.11	Exp. Input 12 Active	1 for active
0046.12	40047.12	Exp. Input 13 Active	1 for active
0046.13	40047.13	Exp. Input 14 Active	1 for active
0046.14	40047.14	Exp. Input 15 Active	1 for active
0046.15	40047.15	Exp. Input 16 Active	1 for active
0047.0	40048.0	AIN8 Sensor 1 Open Warning	1 for active
0047.1	40048.1	AIN8 Sensor 1 High Warning	1 for active
0047.2	40048.2	AIN8 Sensor 1 Low Warning	1 for active
0047.3	40048.3	Reserved	1 for active
0047.4	40048.4	AIN8 Sensor 2 Open Warning	1 for active
0047.5	40048.5	AIN8 Sensor 2 High Warning	1 for active
0047.6	40048.6	AIN8 Sensor 2 Low Warning	1 for active
0047.7	40048.7	Reserved	1 for active
0047.8	40048.8	AIN8 Sensor 3 Open Warning	1 for active
0047.9	40048.9	AIN8 Sensor 3 High Warning	1 for active
0047.10	40048.10	AIN8 Sensor 3 Low Warning	1 for active
0047.11	40048.11	Reserved	1 for active
0047.12	40048.12	AIN8 Sensor 4 Open Warning	1 for active
0047.13	40048.13	AIN8 Sensor 4 High Warning	1 for active
0047.14	40048.14	AIN8 Sensor 4 Low Warning	1 for active
0047.15	40048.15	Reserved	1 for active
0048.0	40049.0	AIN8 Sensor 5 Open Warning	1 for active
0048.1	40049.1	AIN8 Sensor 5 High Warning	1 for active
0048.2	40049.2	AIN8 Sensor 5 Low Warning	1 for active
0048.3	40049.3	Reserved	1 for active
0048.4	40049.4	AIN8 Sensor 6 Open Warning	1 for active
0048.5	40049.5	AIN8 Sensor 6 High Warning	1 for active
0048.6	40049.6	AIN8 Sensor 6 Low Warning	1 for active
0048.7	40049.7	Reserved	1 for active

Modbus Address	PLC Address	Name	Description
0048.8	40049.8	AIN8 Sensor 7 Open Warning	1 for active
0048.9	40049.9	AIN8 Sensor 7 High Warning	1 for active
0048.10	40049.10	AIN8 Sensor 7 Low Warning	1 for active
0048.11	40049.11	Reserved	1 for active
0048.12	40049.12	AIN8 Sensor 8 Open Warning	1 for active
0048.13	40049.13	AIN8 Sensor 8 High Warning	1 for active
0048.14	40049.14	AIN8 Sensor 8 Low Warning	1 for active
0048.15	40049.15	Reserved	1 for active
0049.0	40050.0	AIN8 Sensor 1 High Alarm Shutdown	1 for active
0049.1	40050.1	AIN8 Sensor 1 Low Alarm Shutdown	1 for active
0049.2	40050.2	AIN8 Sensor 2 High Alarm Shutdown	1 for active
0049.3	40050.3	AIN8 Sensor 2 Low Alarm Shutdown	1 for active
0049.4	40050.4	AIN8 Sensor 3 High Alarm Shutdown	1 for active
0049.5	40050.5	AIN8 Sensor 3 Low Alarm Shutdown	1 for active
0049.6	40050.6	AIN8 Sensor 4 High Alarm Shutdown	1 for active
0049.7	40050.7	AIN8 Sensor 4 Low Alarm Shutdown	1 for active
0049.8	40050.8	AIN8 Sensor 5 High Alarm Shutdown	1 for active
0049.9	40050.9	AIN8 Sensor 5 Low Alarm Shutdown	1 for active
0049.10	40050.10	AIN8 Sensor 6 High Alarm Shutdown	1 for active
0049.11	40050.11	AIN8 Sensor 6 Low Alarm Shutdown	1 for active
0049.12	40050.12	AIN8 Sensor 7 High Alarm Shutdown	1 for active
0049.13	40050.13	AIN8 Sensor 7 Low Alarm Shutdown	1 for active
0049.14	40050.14	AIN8 Sensor 8 High Alarm Shutdown	1 for active
0049.15	40050.15	AIN8 Sensor 8 Low Alarm Shutdown	1 for active
0050	0051	Reserved	
0051	0052	Reserved	
0052	0053	Reserved	
0053	0054	Reserved	
0054	0055	Reserved	

**Example:**

If need to read “Gen Underfrequency Shut Alarm” and “Temperature Sensor Open Shut Alarm”, firstly get their corresponding address are 0001.5 and 0002.8 by checking Alarm Data Table, it is known that you need to read 2 addresses’ data.

Assume the slave (controller) address is 01, the client request command is as following:

**Table 11 Client Request Command**

19 B2 00 00 00 06 01 03 00 01 00 02				
	Example	Length	Description	Remark
MBAP	0x19	1	Transaction process identifier Hi	Client initiated, server replicated for transaction pairing.
	0xB2	1	Transaction process	

			identifier Lo	
	0x0000	2	Protocol identifier	Client initiated, server replicated Modbus protocol = 0.
	0x0006	2	Length	From next to last in this byte.
	0x01	1	Unit identifier	Client initiated, server replicated remote terminal identification on serial link or other buses
Function Code	0x03	1	Function code, read registers	Refer to standard Modbus protocol.
Data	0x0001	2	Starting address	
	0x0002	2	Register numbers	
Check				

Server response information is as following:

**Table 12 Server (Controller) Response Command**

19 B2 00 00 00 07 01 03 04 00 20 01 00				
	Example	Length	Description	Remark
MBAP	0x19	1	Transaction process identifier Hi	Client initiated, server replicated for transaction pairing.
	0xB2	1	Transaction process identifier Lo	
	0x0000	2	Protocol identifier	Client initiated, server replicated Modbus protocol .
	0x0007	2	Length	From next to last in this byte.
	0x01	1	Unit identifier	Client initiated, server replicated remote terminal identification on serial link or other buses
Function Code	0x03	1	Function code, read registers	Refer to standard Modbus protocol.
Data	0x04	1	Byte numbers	
	0x0020 0x0100		Data	
Check				

**Table 13 Data Analysis**

Address	Received Data (Hex)	Convert to Binary	Data Signification
0001	0020H	0000 0000 0010 0000 (correspond to 0000.15, 0000.14..... 0000.1, 0000.0)	Data of bit 5 is 1 indicates that gen underfrequency shut alarm is active.
0002	0100H	0000 0001 0000 0000 (correspond to 0000.15, 0000.14..... 0000.1, 0000.0)	Data of bit 8 is 1 indicates that temperature sensor open shut alarm is active.

**3.2 VALUE DATA FIELD CORRESPONDING TO FUNCTION CODE 03H, 06H**

06H function code is only for 0199-0210 and 0225-0231, other addresses are not available.

**Table 14 Value Data Field**

Modbus Address	PLC Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
0000.0	40001.0	Common Alarm				1 for active	
0000.1	40001.1	Common Shutdown Alarm				1 for active	
0000.2	40001.2	Common Warning Alarm				1 for active	
0000.3	40001.3	Common Trip and Stop Alarm				1 for active	
0000.4	40001.4	Common Trip Alarm				1 for active	
0000.5	40001.5	Common Trip & Stop Alarm and Common Shutdown Alarm				1 for active	
0000.6	40001.6	Reserved				1 for active	
0000.7	40001.7	Reserved				1 for active	
0000.8	40001.8	In Test Mode				1 for active	
0000.9	40001.9	In Auto Mode				1 for active	
0000.10	40001.10	In Manual Mode				1 for active	
0000.11	40001.11	In Stop Mode				1 for active	
0000.12	40001.12	Reserved				1 for active	
0000.13	40001.13	Reserved				1 for active	
0000.14	40001.14	Reserved				1 for active	
0000.15	40001.15	HMP300 Comm. Failure				1 for active	
0001-0011	40002-40012	Stop Alarm Area				1 for active	
0012-0015	40013-40016	Trip and Stop Alarm Area				1 for active	
0016-0019	40017-40020	Trip Alarm Area				1 for active	
0020-	40021-	Warning Area				1 for active	

Modbus Address	PLC Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
0030	40031						
0031-0034	40032-40035	Indication Area				1 for active	
0035	40036	Other Status Area				1 for active	
0036	40037					1 for active	
0037	40038					1 for active	
0038	40039					1 for active	
0039	40040					1 for active	
0040	40041					1 for active	
0041	40042					1 for active	
0042	40043					1 for active	
0043	40044					1 for active	
0044	40045					1 for active	
0045	40046					1 for active	
0046	40047					1 for active	
0047	40048					1 for active	
0048	40049					1 for active	
0049	40050					1 for active	
0050	40051					1 for active	
0051	40052					1 for active	
0052	40053					1 for active	
0053	40054					1 for active	
0054	40055					1 for active	
0055	40056	Mains UAB			V	16-bit Signed	
0056	40057	Mains UBC			V	16-bit Signed	
0057	40058	Mains UCA			V	16-bit Signed	
0058	40059	Mains UA			V	16-bit Signed	
0059	40060	Mains UB			V	16-bit Signed	
0060	40061	Mains UC			V	16-bit Signed	
0061	40062	Mains UA Phase	(0-360.0)	0.1	°	16-bit Signed	
0062	40063	Mains UB Phase	(0-360.0)	0.1	°	16-bit Signed	
0063	40064	Mains UC Phase	(0-360.0)	0.1	°	16-bit Signed	
0064	40065	Mains Frequency		0.01	Hz	16-bit Signed	

Modbus Address	PLC Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
0065	40066	ROCOF		0.01	Hz	16-bit Signed	
0066	40067	VS		0.1	°	16-bit Signed	
0067	40068	Reserved					
0068	40069	Reserved					
0069	40070	Reserved					
0070	40071	Reserved					
0071	40072	Reserved					
0072	40073	Reserved					
0073	40074	Reserved					
0074	40075	Reserved					
0075	40076	Gen UAB			V	16-bit Signed	
0076	40077	Gen UBC			V	16-bit Signed	
0077	40078	Gen UCA			V	16-bit Signed	
0078	40079	Gen UA			V	16-bit Signed	
0079	40080	Gen UB			V	16-bit Signed	
0080	40081	Gen UC			V	16-bit Signed	
0081	40082	Gen UA Phase	(0-360.0)	0.1	°	16-bit Signed	
0082	40083	Gen UB Phase	(0-360.0)	0.1	°	16-bit Signed	
0083	40084	Gen UC Phase	(0-360.0)	0.1	°	16-bit Signed	
0084	40085	Gen Frequency		0.01	Hz	16-bit Signed	
0085	40086	Volt Difference		1	V	16-bit Signed	
0086	40087	Freq. Difference		0.01	Hz	16-bit Signed	
0087	40088	Phase Difference		0.1	°	16-bit Signed	
0088	40089	Current Gen Active Power Percentage		0.1	%	16-bit Signed	
0089	40090	Target Gen Active Power Percentage		0.1	%	16-bit Signed	
0090	40091	Current Gen		0.1	%	16-bit	

Modbus Address	PLC Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
		Reactive Power Percent				Signed	
0091	40092	Target Gen Reactive Power Percent		0.1	%	16-bit Signed	
0092	40093	GOV Output Percent		0.1	%	16-bit Signed	
0093	40094	AVR Output Percent		0.1	%	16-bit Signed	
0094	40095	Reserved					
0095	40096	A-phase Current		0.1	A	16-bit Unsigned	
0096	40097	B-phase Current		0.1	A	16-bit Unsigned	
0097	40098	C-phase Current		0.1	A	16-bit Unsigned	
0098	40099	Earth Current		0.1	A	16-bit Unsigned	
0099	40100	Reserved					
0100	40101	Reserved					
0101	40102	Reserved					
0102	40103	Reserved					
0103	40104	A-phase Active Power		0.1	kW	32-bit Signed	
0104	40105						
0105	40106	B-phase Active Power		0.1	kW	32-bit Signed	
0106	40107						
0107	40108	C-phase Active Power		0.1	kW	32-bit Signed	
0108	40109						
0109	40110	Total Active Power		0.1	kW	32-bit Signed	
0110	40111						
0111	40112	A-phase Reactive Power		0.1	kvar	32-bit Signed	
0112	40113						
0113	40114	B-phase Reactive Power		0.1	kvar	32-bit Signed	
0114	40115						
0115	40116	C-phase Reactive Power		0.1	kvar	32-bit Signed	
0116	40117						
0117	40118	Total Reactive Power		0.1	kVA	32-bit Signed	
0118	40119						
0119	40120	A-phase Apparent Power		0.1	kVA	32-bit Signed	
0120	40121						
0121	40122	B-phase Apparent Power		0.1	kVA	32-bit Signed	
0122	40123						
0123	40124	C-phase Apparent		0.1	kVA	32-bit	

Modbus Address	PLC Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
0124	40125	Power				Signed	
0125	40126	Total Apparent Power		0.1	kVA	32-bit Signed	
0126	40127	Power				Signed	
0127	40128	A-phase Power Factor		0.01		16-bit Signed	
0128	40129	B-phase Power Factor		0.01		16-bit Signed	
0129	40130	C-phase Power Factor		0.01		16-bit Signed	
0130	40131	Average Phase Power Factor		0.01		S16-bit Signed	
0131	40132	Unbalanced Current Percent			%	S16-bit Unsigned	
0132	40133	Earth Current Percent			%	S16-bit Unsigned	
0133	40134	Unbalanced Current		0.1	A	S16-bit Unsigned	
0134	40135	Mains A-phase Current		0.1	A	S16-bit Unsigned	
0135	40136	Reserved					
0136	40137	Reserved					
0137	40138	Reserved					
0138	40139	Reserved					
0139	40140	Reserved					
0140	40141	Reserved					
0141	40142	Engine Speed		1	r/min	16-bit Signed	
0142	40143	Battery Voltage		0.1	V	16-bit Signed	
0143	40144	Charger Voltage		0.1	V	16-bit Signed	
0144	40145	GSM Signal Strength				16-bit Signed	
0145	40146	Reserved					
0146	40147	Reserved					
0147	40148	Reserved					
0148	40149	Temp Sensor Resistance Value		0.1	Ω	16-bit Unsigned	
0149	40150	Temp Sensor Value			°C	16-bit Signed	
0150	40151	Pressure Sensor Resistance Value		0.1	Ω	16-bit Unsigned	
0151	40152	Pressure Sensor			kPa	16-bit	

Modbus Address	PLC Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
		Value				Signed	
0152	40153	Level Sensor Resistance Value		0.1	Ω	16-bit Unsigned	
0153	40154	Level Sensor Value			%	16-bit Signed	
0154	40155	Aux. Sensor 1 Resistance Value		0.1	Ω	16-bit Unsigned	
0155	40156	Aux. Sensor 1 Value				16-bit Signed	
0156	40157	Aux. Sensor 2 Resistance Value		0.1	Ω	16-bit Unsigned	
0157	40158	Aux. Sensor 2 Value				16-bit Signed	
0158	40159	Reserved					
0159	40160	Reserved					
0160	40161	Reserved					
0161	40162	Load Percentage				16-bit Signed	It is reserved when the engine is not ECU engine.
0162	40163	Coolant Level				16-bit Signed	
0163	40164	Oil Temp				16-bit Signed	
0164	40165	Coolant Pressure				16-bit Signed	
0165	40166	Fuel Pressure				16-bit Signed	
0166	40167	Fuel Temperature				16-bit Signed	
0167	40168	Inlet Temperature				16-bit Signed	
0168	40169	Outlet Temperature				16-bit Signed	
0169	40170	Turbo Pressure				16-bit Signed	
0170	40171	Fuel Consump.				16-bit Signed	
0171	40172	Total Fuel Consumption				32-bit Signed	
0172	40173						
0173	40174	Air Pressure				16-bit Signed	
0174	40175	Intake Air Temperature				16-bit Signed	
0175	40176	Reserved					

Modbus Address	PLC Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
0176	40177	Reserved					
0177	40178	Reserved					
0178	40179	Mains B-phase Current		0.1	A	16-bit Unsigned	
0179	40180	Mains C-phase Current		0.1	A	16-bit Unsigned	
0180	40181	Mains Active Percentage		0.1	%	16-bit Signed	
0181	40182	Mains Reactive Percentage		0.1	%	16-bit Signed	
0182	40183	Mains Active Power		0.1	kW	32-bit Signed	
0183	40184						
0184	40185	Mains Reactive Power		0.1	kvar	32-bit Signed	
0185	40186						
0186	40187	Mains Apparent Power		0.1	kVA	32-bit Signed	
0187	40188						
0188	40189	Mains Power Factor		0.01		16-bit Signed	
0189	40190	Generator Status	(0-15)	1		16-bit Unsigned	Generator or Status Table
0190	40191	Gen Delay Value	(0-6000)	1	s	16-bit Unsigned	
0191	40192	Remote Start Status	(0-2)	1		16-bit Unsigned	Remote Start Status Table
0192	40193	Remote Start Delay Value	(0-6000)	1	s	16-bit Unsigned	
0193	40194	Switch Status	(0-7)	1		16-bit Unsigned	Switch Status Table
0194	40195	Switch Delay Value	(0-6000)	1	s	16-bit Unsigned	
0195	40196	Mains Status	(0-3)	1		16-bit Unsigned	
0196	40197	Mains Status Delay Value	(0-6000)	1	s	16-bit Unsigned	
0197	40198	Mains ATS Status				16-bit Unsigned	
0198	40199	Mains ATS Delay Value				16-bit Unsigned	

Modbus Address	PLC Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
0199	40200	Accum. Running Hours	(0-65535)	1	h		
0200	40201	Accum. Running Minutes	(0-65535)	1	min		
0201	40202	Accum. Running Seconds	(0-65535)	1	s		
0202	40203	Accum. Start Times	(0-65535)	1			
0203	40204	Accum. Energy kWh		0.1	kWh	32-bit Signed	
0204	40205						
0205	40206	Accum. Energy kvarh		0.1	kvarh	32-bit Signed	
0206	40207						
0207	40208	Accum. Energy kVAh		0.1	kVAh	32-bit Signed	
0208	40209						
0209	40210	Reserved					
0210	40211						
0211	40212	Maint. Left Time (h)				16-bit Unsigned	
0212	40213	Maint. Left Time (min)				16-bit Unsigned	
0213	40214	Maint. Left Time (s)				16-bit Unsigned	
0214	40215	Multi Units Total Reactive Power		0.1	kvar	32-bit Signed	
0215	40216						
0216	40217	Common (GND)		0.01		16-bit Signed	
0217	40218	Controller Model	(0-65535)			16-bit Unsigned	
0218	40219	Software Version	(0-65535)	0.1		16-bit Unsigned	
0219	40220	Hardware Version	(0-65535)	0.1		16-bit Unsigned	
0220	40221	Issue Year	(0-99)			16-bit Unsigned	Only save last two digits of year
0221	40222	Issue Month	(1-12)			16-bit Unsigned	
0222	40223	Issue Day	(1-31)			16-bit Unsigned	
0223	40224	Reserved					

Modbus Address	PLC Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
0224	40225	Reserved					
0225	40226	Controller Time: Year	(0-99)			16-bit Unsigned	Only save last two digits of year
0226	40227	Controller Time: Month	(1-12)	1		16-bit Unsigned	
0227	40228	Controller Time: Day	(1-31)	1		16-bit Unsigned	
0228	40229	Controller Time: Week	(0-6)	1		16-bit Unsigned	
0229	40230	Controller Time: Hour	(0-23)	1		16-bit Unsigned	
0230	40231	Controller Time: Minute	(0-59)	1		16-bit Unsigned	
0231	40232	Controller Time: Second	(0-59)	1		16-bit Unsigned	
0232	40233	Module MSC ID				16-bit Unsigned	
0233	40234	Module Priority				16-bit Unsigned	
0234	40235	Module Numbers				16-bit Unsigned	
0235	40236	Total Active Power of Multi Units		0.1	kW	32-bit Signed	
0236	40237						
0237	40238	Reserved					
0238	40239	AIN24-1 Sensor 15				16-bit Signed	
0239	40240	AIN24-1 Sensor 16				16-bit Signed	
0240	40241	AIN24-1 Sensor 17				16-bit Signed	
0241	40242	AIN24-1 Sensor 18				16-bit Signed	
0242	40243	AIN24-1 Sensor 19				16-bit Signed	
0243	40244	AIN24-1 Sensor 20				16-bit Signed	
0244	40245	AIN24-1 Sensor 21				16-bit Signed	
0245	40246	AIN24-1 Sensor 22				16-bit	

Modbus Address	PLC Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
						Signed	
0246	40247	AIN24-1 Sensor 23				16-bit Signed	
0247	40248	AIN24-1 Sensor 24				16-bit Signed	
0248	40249	AIN24-2 Sensor 15				16-bit Signed	
0249	40250	AIN24-2 Sensor 16				16-bit Signed	
0250	40251	AIN24-2 Sensor 17				16-bit Signed	
0251	40252	AIN24-2 Sensor 18				16-bit Signed	
0252	40253	AIN24-2 Sensor 19				16-bit Signed	
0253	40254	AIN24-2 Sensor 20				16-bit Signed	
0254	40255	AIN24-2 Sensor 21				16-bit Signed	
0255	40256	AIN24-2 Sensor 22				16-bit Signed	
0256	40257	AIN24-2 Sensor 23				16-bit Signed	
0257	40258	AIN24-2 Sensor 24				16-bit Signed	
0258	40259	Reserved					
0259	40260	Reserved					
0260	40261	Reserved					
0261	40262	Reserved					
0262	40263	Reserved					
0263	40264	Reserved					
0264	40265	Reserved					
0265	40266	Reserved					
0266	40267	Reserved					
0267	40268	Reserved					
0268	40269	Reserved					
0269	40270	Reserved					
0270	40271	User Accum. Running Hour A				16-bit Unsigned	
0271	40272	User Accum. Running Minute A				16-bit Unsigned	
0272	40273	User Accum.				16-bit	

Modbus Address	PLC Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
		Running Second A				Unsigned	
0273	40274	User Accum. Start Times A				16-bit Unsigned	
0274	40275	User Accum. Energy A		0.1	kWh	32-bit Signed	
0275	40276						
0276	40277	User Accum. Running Hour B				16-bit Unsigned	
0277	40278	User Accum. Running Minute B				16-bit Unsigned	
0278	40279	User Accum. Running Second B				16-bit Unsigned	
0279	40280	User Accum. Start Times B				16-bit Unsigned	
0280	40281	User Accum. Energy B		0.1	kWh	32-bit Signed	
0281	40282						
0282	40283	Module Numbers				16-bit Signed	
0283	40284	Current Module ID				16-bit Signed	
0284	40285	Current Module PRI				16-bit Signed	
0285	40286	AIN24-1 Sensor 1		0.1		16-bit Unsigned	
0286	40287	AIN24-1 Sensor 2		0.1		16-bit Unsigned	
0287	40288	AIN24-1 Sensor 3		0.1		16-bit Unsigned	
0288	40289	AIN24-1 Sensor 4		0.1		16-bit Unsigned	
0289	40290	AIN24-1 Sensor 5		0.1		16-bit Unsigned	
0290	40291	AIN24-1 Sensor 6		0.1		16-bit Unsigned	
0291	40292	AIN24-1 Sensor 7		0.1		16-bit Unsigned	
0292	40293	AIN24-1 Sensor 8		0.1		16-bit Unsigned	
0293	40294	AIN24-1 Sensor 9		0.1		16-bit Unsigned	
0294	40295	AIN24-1 Sensor		0.1		16-bit	

Modbus Address	PLC Address	Name	Range (Decimal)	Ratio	Unit	Description	Remark
		10				Unsigned	
0295	40296	AIN24-1 Sensor 11		0.1		16-bit Unsigned	
0296	40297	AIN24-1 Sensor 12		0.1		16-bit Unsigned	
0297	40298	AIN24-1 Sensor 13		0.1		16-bit Unsigned	
0298	40299	AIN24-1 Sensor 14		0.1		16-bit Unsigned	
0299	40300	AIN24-2 Sensor 1		0.1		16-bit Unsigned	
0300	40301	AIN24-2 Sensor 2		0.1		16-bit Unsigned	
0301	40302	AIN24-2 Sensor 3		0.1		16-bit Unsigned	
0302	40303	AIN24-2 Sensor 4		0.1		16-bit Unsigned	
0303	40304	AIN24-2 Sensor 5		0.1		16-bit Unsigned	
0304	40305	AIN24-2 Sensor 6		0.1		16-bit Unsigned	
0305	40306	AIN24-2 Sensor 7		0.1		16-bit Unsigned	
0306	40307	AIN24-2 Sensor 8		0.1		16-bit Unsigned	
0307	40308	AIN24-2 Sensor 9		0.1		16-bit Unsigned	
0308	40309	AIN24-2 Sensor 10		0.1		16-bit Unsigned	
0309	40310	AIN24-2 Sensor 11		0.1		16-bit Unsigned	
0310	40311	AIN24-2 Sensor 12		0.1		16-bit Unsigned	
0311	40312	AIN24-2 Sensor 13		0.1		16-bit Unsigned	
0312	40313	AIN24-2 Sensor 14		0.1		16-bit Unsigned	

**Example:**

Read "Battery Voltage (current is 29.1V)", firstly to check the table to get the address is 0142.  
Assume the slave address is 01, the client request command is as following:

**Table 15 Client Request Command**

19 B2 00 00 00 06 01 03 00 8E 00 01				
	Example	Length	Description	Remark
MBAP	0x19	1	Transaction process identifier Hi	Client initiated, server replicated for transaction pairing.
	0xB2	1	Transaction process identifier Lo	
	0x0000	2	Protocol identifier	Client initiated, server replicated Modbus protocol = 0.
	0x0006	2	Length	From next to last in this byte.
	0x01	1	Unit identifier	Client initiated, server replicated remote terminal identification on serial link or other buses
Function Code	0x03	1	Function code, read registers	Refer to standard Modbus protocol.
Data	0x008E	2	Starting address	
	0x0002	2	Register numbers	
Check				

Server response command is as following:

**Table 16 Server (Controller) Response Command**

19 B2 00 00 00 05 01 03 02 01 23				
	Example	Length	Description	Remark
MBAP	0x19	1	Transaction process identifier Hi	Client initiated, server replicated for transaction pairing.
	0xB2	1	Transaction process identifier Lo	
	0x0000	2	Protocol identifier	Client initiated, server replicated Modbus protocol = 0.
	0x0006	2	Length	From next to last in this byte.
	0x01	1	Unit identifier	Client initiated, server replicated remote terminal identification on serial link or other

				buses
Function Code	0x03	1	Function code, read registers	Refer to standard Modbus protocol.
Data	0x02	1	Byte numbers	
	0x0123		Data	
Check				

**Table 17 Data Analysis**

Address	Received Data (Hex)	Combination (Hex)	Mains (Decimal)
0142 ( Battery Voltage)	0123H	0123H	Corresponding decimal value 291, multiplier 0.1 and the battery voltage 29.1V.



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

**Table 18 Remote Coil Field**

Modbus Address	PLC Address	Name	Description
0000	0001	Remote Start Key	Sending FF00HH is active
0001	0002	Remote Stop Key	Sending FF00HH is active
0002	0003	Reserved	
0003	0004	Remote Auto Key	Sending FF00HH is active
0004	0005	Remote Manual Key	Sending FF00HH is active
0005	0006	Remote Mains C/O Key	Sending FF00HH is active
0006	0007	Remote Gen C/O Key	Sending FF00HH is active
0005	0006	Remote Gen Open Key	Sending FF00HH is active
0006	0007	Remote Gen Close Key	Sending FF00HH is active
0007	0008	Remote Up Key	Sending FF00HH is active
0008	0009	Remote Down Key	Sending FF00HH is active
0009	0010	Reserved	
0010	0011	Reserved	
0011	0012	Remote Confirm Key	Sending FF00HH is active
0012	0013	Remote Mute Key	Sending FF00HH is active
0013	0014	Reserved	
0014	0015	Reserved	
0015	0016	Remote Oil Engine Fast Stop Key	Sending FF00HH is active
0016	0017	Reserved	
0017	0018	Reserved	
0018	0019	Reserved	
0019	0020	Reserved	
0020	0021	Remote Output Port 1 Output	Sending FF00HH is active, sending 0000H will not output
0021	0022	Remote Output Port 2 Output	Sending FF00HH is active, sending 0000H will not output
0022	0023	Remote Output Port 3 Output	Sending FF00HH is active, sending 0000H will not output
0023	0024	Remote Output Port 4 Output	Sending FF00HH is active, sending 0000H will not output
0024	0025	Remote Output Port 5 Output	Sending FF00HH is active, sending 0000H will not output
0025	0026	Remote Output Port 6 Output	Sending FF00HH is active, sending 0000H will not output
0026	0027		

Modbus Address	PLC Address	Name	Description
0027	0028		
0028	0029		
0029	0030		

**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 client request command is as following:

**Table 19 Master RS485 Request Command**

19 B2 00 00 00 06 01 05 00 03 FF 00				
	Example	Length	Description	Remark
MBAP	0x19	1	Transaction process identifier Hi	Client initiated, server replicated for transaction pairing.
	0xB2	1	Transaction process identifier Lo	
	0x0000	2	Protocol identifier	Client initiated, server replicated Modbus protocol = 0.
	0x0006	2	Length	From next to last in this byte.
	0x01	1	Unit identifier	Client initiated, server replicated remote terminal identification on serial link or other buses
Function Code	0x05	1	Function code, read registers	Refer to standard Modbus protocol.
Data	0x0003	2	Starting address	
	0xFF00	2	Register target value	
Check				

Server respond command is as following:

**Table 20 Server Response Command**

19 B2 00 00 00 06 01 05 00 03 FF 00				
	Example	Length	Description	Remark
MBAP	0x19	1	Transaction process identifier Hi	Client initiated, server replicated for transaction pairing.
	0xB2	1	Transaction process identifier Lo	
	0x0000	2	Protocol identifier	Client initiated, server replicated Modbus protocol = 0.
	0x0006	2	Length	From next to last in this byte.
	0x01	1	Unit identifier	Client initiated, server replicated remote terminal identification on serial link or other buses
Function Code	0x05	1	Function code, read registers	Refer to standard Modbus protocol.
Data	0x0003	2	Starting address	
	0xFF00	2	Data	
Check				

Whether the remote command is executed successfully can be confirmed by reading the auto mode status of address 0000.8 via function code 03H.

### 3.4 DATA AREA FOR FUNCTION CODE 06H

**Table 21 Data Area for Function Code 06H**

Address	Item	Description
4352	Active Power Percentage of Load Parallel Output	Active in Generator Control Mode (Constant Power)
4354	Reactive Power Percentage of Load Parallel Output	Data Range: 0-1000 Corresponding Percentage: 0.0%-100.0%

**3.5 GENERATOR STATUS TABLE**

**Table 22 Generator Status**

No.	Content	Description
0	Standby	No delay for this status
1	Preheat	
2	Fuel Output	No delay for this status
3	Cranking	
4	Crank Rest	
5	Safety Delay	
6	Start Idle	
7	High-speed Warming Up	
8	Wait for Load	No delay for this status
9	Normal Running	No delay for this status
10	High-speed Cooling	
11	Stop Idle	
12	ETS	
13	Wait for Stop	
14	Stop Failure	No delay for this status
15	After Stop	

**3.6 REMOTE START STATUS TABLE**

**Table 23 Remote Start Status**

No.	Content	Description
0	No Delay	No delay for this status
1	Start Delay	
2	Stop Delay	

**3.7 SWITCH STATUS TABLE**

**Table 24 Switch Status Table**

No.	Content	Description
0	Gen Synchronizing	No delay for this status
1	Gen Close Delay	
2	Wait Gen Close	No delay for this status
3	Gen Closed	No delay for this status
4	Gen Off Load	No delay for this status
5	Open Delay	
6	Wait for Open	No delay for this status
7	Gen Open	No delay for this status

**Table 25 Mains Status**

No.	Content	Description
0	Mains Normal	No delay for this status
1	Mains Normal Delay	
2	Mains Abnormal	No delay for this status
3	Mains Abnormal Delay	

#### 4 COMMUNICATION PARAMETERS VIEW AND CONFIGURATION

##### 4.1 VIEW CURRENT COMMUNICATION PARAMETERS

In the controller main interface, press  key to check current IP parameters.

##### 4.2 COMMUNICATION PARAMETERS CONFIGURATION

- 1) In the home page of main interface, long 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 00318), press  key to enter the main interface of parameter;
- 4) Select "Module Setting" via  key, press  key to enter sub-menu;
- 5) Select "Communication Address" via  key, after pressing  key, it enters parameter edit function, corresponding parameters will be in the selected status;
- 6) Set the current selected content via ,  key, press  to confirm, after the editing is completed, the selected status disappear;
- 7) Long press  key to return the main interface.

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## 5 FAQ

### 5.1 COMMON SOLUTIONS OF COMMUNICATION FAILURE

- 1) Check whether the network cable is correctly connected;
- 2) Check whether communication parameter setting is correct;
- 3) It is recommended to download third-party communication software like NetAssist, PortHelper to check whether communication is normal.

### 5.2 CAUTIONS

**▲NOTE:** After changing controller network setting parameters (such as IP address, subnet mask, etc.), new setting parameters can be active after re-powering controller.

- 1) Set controller's IP address and subnet mask. The set IP address and IP address of monitoring equipment (like PC) should be in the same network segment and different. For example, IP address of monitoring equipment is 192.168.0.16, controller's IP address can be set as 192.168.0.18, subnet mask is 255.255.255.0.
- 2) Connect controller. Controller can connect monitoring equipment via cable directly or switch.
- 3) Monitoring equipment use TCP ModBus protocol to communicate with controller.

**▲NOTE:** Controller parameters can be set in this connection mode. Our test software can be connected in this way. Communication protocol can be obtained from related person.