SmartGen

MAKING CONTROL SMARTER

MEM40

ENGINE MONITORING CONTROLLER

COMMUNICATION PROTOCOL

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Table 1 Software Version

Date	Version	Content
2023-01-05	V1.0	Original release.
2024-12-30	V1.1	1. Update alarms in data field, and add MIO14 expansion module alarms in data field; 2. Update and add parameters in data field, modify the PLC address mapping data field; 3. Modify the description of Function Code 05.

CONTENTS

1. DESCRIPTION

This protocol describes read and write command format of RS485 half-duplex serial port communication and definition of internal information data for the third-party to develop and use.

The controller is used as the slave, using Modbus-RTU protocol, and does not support other protocols such as Modbus-ASCII.

Communication address: 1~254
Baud rate: 9600bps
Start bit: 1-bit
Data bit: 8-bit
Parity bit: No/Odd/Even parity (default: no parity)
Stop bit: 2-bit

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

Data check mode: CRC16.

Internal registers of controller are in the unit of “word (double bytes)”.

Communication timeout period: over 200ms.

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

Once maximum 120 data of byte register can be read.

When RS485 is connected, 120Ω twisted pair with shielding layer shall be used, and the shielding layer shall be grounded at one end.

RS485 cable must be connected from RPU interface.

2. WIRING DIAGRAM

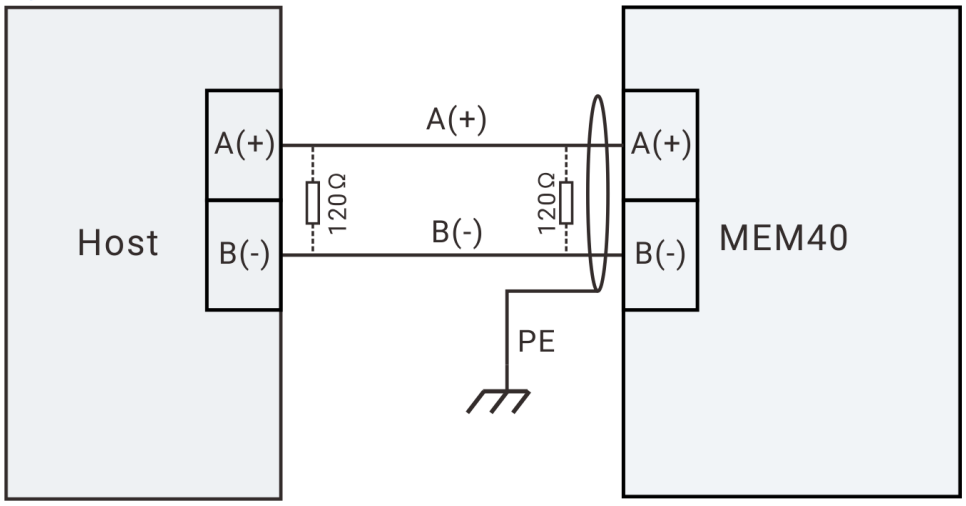

Fig.1 Single Unit Communication Wiring Diagram

NOTE1: 120Ω matching resistor of the master engine can be automatically connected according to site situation.

NOTE2: This diagram is RS485 wiring diagram.

3. CONTROLLER INTERNAL REGISTER ADDRESS AND DATA OF FUNCTION CODE 03

Table 2 Data Field of Function Code 03H

Modbus Address	PLC Address	Item	Range (Decimal)	Ratio	Unit	Description	Remarks
0000	40001.0	Common Alarm	0-1			1 for active	1bit
	40001.1	Common Shutdown Alarm	0-1			1 for active	1bit
	40001.2	Common Warning Alarm	0-1			1 for active	1bit
	40001.3	Reserved	0-1			1 for active	1bit
	40001.4	Reserved	0-1			1 for active	1bit
	40001.5	Reserved	0-1			1 for active	1bit
	40001.6	Wind Wave Mode	0-1			1 for active	1bit
	40001.7	Reserved	0-1			1 for active	1bit
	40001.8	Local Mode	0-1			1 for active	1bit
	40001.9	Remote Mode	0-1			1 for active	1bit
	40001.10	Override Mode	0-1			1 for active	1bit
	40001.11	Self-check Mode	0-1			1 for active	1bit
	40001.12	Auto Mode	0-1			1 for active	1bit
	40001.13	Reserved	0-1			1 for active	1bit
	40001.14	Normal Running	0-1			1 for active	1bit
	40001.15	Reserved	0-1			1 for active	1bit
0001	40002.0	Emergency Stop Alarm	0-1			1 for active	1bit
	40002.1	Overspeed Shutdown Alarm	0-1			1 for active	1bit
	40002.2	Underspeed Shutdown	0-1			1 for active	1bit
	40002.3	Speed Signal Loss Shutdown Alarm	0-1			1 for active	1bit
	40002.4	ECU Shutdown Alarm	0-1			1 for active	1bit
	40002.5	ECU Comm. Failure Shutdown	0-1			1 for active	1bit
	40002.6	Remote Emergency Stop	0-1			1 for active	1bit
	40002.7	Reserved	0-1			1 for active	1bit
	40002.8	Water Temp. Shut. IN	0-1			1 for active	1bit
	40002.9	Oil Temp. Shut. IN	0-1			1 for active	1bit
	40002.10	OP Shut. IN	0-1			1 for active	1bit
	40002.11	High Water Temp. Shutdown	0-1			1 for active	1bit
	40002.12	High Oil Temp. Shutdown	0-1			1 for active	1bit

Modbus Address	PLC Address	Item	Range (Decimal)	Ratio	Unit	Description	Remarks
	40002.13	Low OP Shutdown	0-1			1 for active	1bit
	40002.14	MIO14 Sensor 1 Low Shutdown Alarm	0-1			1 for active	1bit
	40002.15	MIO14 Sensor 1 High Shutdown Alarm	0-1			1 for active	1bit
0002	40003.0	Sensor 1 High Shutdown Alarm	0-1			1 for active	1bit
	40003.1	Sensor 1 Low Shutdown Alarm	0-1			1 for active	1bit
	40003.2	Sensor 2 High Shutdown Alarm	0-1			1 for active	1bit
	40003.3	Sensor 2 Low Shutdown Alarm	0-1			1 for active	1bit
	40003.4	Sensor 3 High Shutdown Alarm	0-1			1 for active	1bit
	40003.5	Sensor 3 Low Shutdown Alarm	0-1			1 for active	1bit
	40003.6	Sensor 4 High Shutdown Alarm	0-1			1 for active	1bit
	40003.7	Sensor 4 Low Shutdown	0-1			1 for active	1bit
	40003.8	MIO14 Input 1 Shutdown	0-1			1 for active	1bit
	40003.9	MIO14 Input 2 Shutdown	0-1			1 for active	1bit
	40003.10	MIO14 Input 3 Shutdown	0-1			1 for active	1bit
	40003.11	MIO14 Input 4 Shutdown	0-1			1 for active	1bit
	40003.12	MIO14 Input 5 Shutdown	0-1			1 for active	1bit
	40003.13	MIO14 Input 6 Shutdown	0-1			1 for active	1bit
	40003.14	MIO14 Sensor 2 Low Shutdown Alarm	0-1			1 for active	1bit
	40003.15	MIO14 Sensor 2 High Shutdown Alarm	0-1			1 for active	1bit
0003	40004.0	Input 1 Shutdown	0-1			1 for active	1bit
	40004.1	Input 2 Shutdown	0-1			1 for active	1bit
	40004.2	Input 3 Shutdown	0-1			1 for active	1bit
	40004.3	Input 4 Shutdown	0-1			1 for active	1bit
	40004.4	Input 5 Shutdown	0-1			1 for active	1bit
	40004.5	Input 6 Shutdown	0-1			1 for active	1bit

Modbus Address	PLC Address	Item	Range (Decimal)	Ratio	Unit	Description	Remarks
	40004.6	Input 7 Shutdown	0-1			1 for active	1bit
	40004.7	Input 8 Shutdown	0-1			1 for active	1bit
	40004.8	Reserved	0-1			1 for active	1bit
	40004.9	Reserved	0-1			1 for active	1bit
	40004.10	Reserved	0-1			1 for active	1bit
	40004.11	Reserved	0-1			1 for active	1bit
	40004.12	Reserved	0-1			1 for active	1bit
	40004.13	Reserved	0-1			1 for active	1bit
	40004.14	RPU Overspeed Shutdown	0-1			1 for active	1bit
	40004.15	MIO14 Overspeed Shutdown	0-1			1 for active	1bit
0004	40005.0	Overspeed Warning	0-1			1 for active	1bit
	40005.1	Underspeed Warning	0-1			1 for active	1bit
	40005.2	Speed Signal Loss Warning	0-1			1 for active	1bit
	40005.3	Charging Failure Warning	0-1			1 for active	1bit
	40005.4	Crank Failure Warning	0-1			1 for active	1bit
	40005.5	Stop Failure Warning	0-1			1 for active	1bit
	40005.6	Reserved	0-1			1 for active	1bit
	40005.7	Reserved	0-1			1 for active	1bit
	40005.8	Reserved	0-1			1 for active	1bit
	40005.9	MEM40RM Comm. Failure	0-1			1 for active	1bit
	40005.10	MIO14 Comm. Failure	0-1			1 for active	1bit
	40005.11	Reserved	0-1			1 for active	1bit
	40005.12	Reserved	0-1			1 for active	1bit
	40005.13	Reserved	0-1			1 for active	1bit
	40005.14	Reserved	0-1			1 for active	1bit
	40005.15	Fuel Leak Warn IN	0-1			1 for active	1bit
0005	40006.0	Sensor 1 Open Warn	0-1			1 for active	1bit
	40006.1	Sensor 1 High Warn	0-1			1 for active	1bit
	40006.2	Sensor 1 Low Warn	0-1			1 for active	1bit
	40006.3	Reserved	0-1			1 for active	1bit
	40006.4	Sensor 2 Open Warn	0-1			1 for active	1bit
	40006.5	Sensor 2 High Warn	0-1			1 for active	1bit
	40006.6	Sensor 2 Low Warn	0-1			1 for active	1bit
	40006.7	Reserved	0-1			1 for active	1bit
	40006.8	Sensor 3 Open Warn	0-1			1 for active	1bit
	40006.9	Sensor 3 High Warn	0-1			1 for active	1bit
	40006.10	Sensor 3 Low Warn	0-1			1 for active	1bit
	40006.11	Reserved	0-1			1 for active	1bit

Modbus Address	PLC Address	Item	Range (Decimal)	Ratio	Unit	Description	Remarks
	40006.12	Sensor 4 Open Warn	0-1			1 for active	1bit
	40006.13	Sensor 4 High Warn	0-1			1 for active	1bit
	40006.14	Sensor 4 Low Warn	0-1			1 for active	1bit
	40006.15	Reserved	0-1			1 for active	1bit
0006	40007.0	High Water Temp. Warn	0-1			1 for active	1bit
	40007.1	High Oil Temp. Warn	0-1			1 for active	1bit
	40007.2	Low OP Warn	0-1			1 for active	1bit
	40007.3	Input 7 Warning	0-1			1 for active	1bit
	40007.4	Input 8 Warning	0-1			1 for active	1bit
	40007.5	Reserved	0-1			1 for active	1bit
	40007.6	Input 1 Warning	0-1			1 for active	1bit
	40007.7	Input 2 Warning	0-1			1 for active	1bit
	40007.8	Input 3 Warning	0-1			1 for active	1bit
	40007.9	Input 4 Warning	0-1			1 for active	1bit
	40007.10	Input 5 Warning	0-1			1 for active	1bit
	40007.11	Input 6 Warning	0-1			1 for active	1bit
	40007.12	ECU Warning	0-1			1 for active	1bit
	40007.13	RPU Speed Wire Broken Warning	0-1			1 for active	1bit
	40007.14	Power Overvoltage Warning	0-1			1 for active	1bit
	40007.15	Power Undervoltage Warning	0-1			1 for active	1bit
0007	40008.0	MIO14 Input 1 Warning	0-1			1 for active	1bit
	40008.1	MIO14 Input 2 Warning	0-1			1 for active	1bit
	40008.2	MIO14 Input 3 Warning	0-1			1 for active	1bit
	40008.3	MIO14 Input 4 Warning	0-1			1 for active	1bit
	40008.4	MIO14 Input 5 Warning	0-1			1 for active	1bit
	40008.5	MIO14 Input 6 Warning	0-1			1 for active	1bit
	40008.6	RPU Input 1 Wire Broken Warning	0-1			1 for active	1bit
	40008.7	RPU Input 2 Wire Broken Warning	0-1			1 for active	1bit
	40008.8	RPU Input 3 Wire Broken Warning	0-1			1 for active	1bit
	40008.9	RPU Input 4 Wire	0-1			1 for active	1bit

Modbus Address	PLC Address	Item	Range (Decimal)	Ratio	Unit	Description	Remarks
		Broken Warning					
	40008.10	RPU Input 5 Wire Broken Warning	0-1			1 for active	1bit
	40008.11	RPU Fuel Wire Broken Warning	0-1			1 for active	1bit
	40008.12	RPU Shutdown Wire Broken Warning	0-1			1 for active	1bit
	40008.13	RPU Speed Wire Broken Warning	0-1			1 for active	1bit
	40008.14	RPU Battery 1 Fault	0-1			1 for active	1bit
	40008.15	RPU Battery 2 Fault	0-1			1 for active	1bit
0008	40009.0	Input 1 Indication	0-1			1 for active	1bit
	40009.1	Input 2 Indication	0-1			1 for active	1bit
	40009.2	Input 3 Indication	0-1			1 for active	1bit
	40009.3	Input 4 Indication	0-1			1 for active	1bit
	40009.4	Input 5 Indication	0-1			1 for active	1bit
	40009.5	Input 6 Indication	0-1			1 for active	1bit
	40009.6	Input 7 Indication	0-1			1 for active	1bit
	40009.7	Input 8 Indication	0-1			1 for active	1bit
	40009.8	Reserved	0-1			1 for active	1bit
	40009.9	Reserved	0-1			1 for active	1bit
	40009.10	MIO14 Input 1 Indication	0-1			1 for active	1bit
	40009.11	MIO14 Input 2 Indication	0-1			1 for active	1bit
	40009.12	MIO14 Input 3 Indication	0-1			1 for active	1bit
	40009.13	MIO14 Input 4 Indication	0-1			1 for active	1bit
	40009.14	MIO14 Input 5 Indication	0-1			1 for active	1bit
	40009.15	MIO14 Input 6 Indication	0-1			1 for active	1bit
0009	40010.0	Input 1 Active	0-1			1 for active	1bit
	40010.1	Input 2 Active	0-1			1 for active	1bit
	40010.2	Input 3 Active	0-1			1 for active	1bit
	40010.3	Input 4 Active	0-1			1 for active	1bit
	40010.4	Input 5 Active	0-1			1 for active	1bit
	40010.5	Input 6 Active	0-1			1 for active	1bit
	40010.6	Input 7 Active	0-1			1 for active	1bit
	40010.7	Input 8 Active	0-1			1 for active	1bit
	40010.8	Reserved	0-1			1 for active	1bit
	40010.9	Reserved	0-1			1 for active	1bit

Modbus Address	PLC Address	Item	Range (Decimal)	Ratio	Unit	Description	Remarks
	40010.10	MIO14 Input 1 Active	0-1			1 for active	1bit
	40010.11	MIO14 Input 2 Active	0-1			1 for active	1bit
	40010.12	MIO14 Input 3 Active	0-1			1 for active	1bit
	40010.13	MIO14 Input 4 Active	0-1			1 for active	1bit
	40010.14	MIO14 Input 5 Active	0-1			1 for active	1bit
	40010.15	MIO14 Input 6 Active	0-1			1 for active	1bit
0010	40011.0	Reserved	0-1			1 for active	1bit
	40011.1	Reserved	0-1			1 for active	1bit
	40011.2	Reserved	0-1			1 for active	1bit
	40011.3	Reserved	0-1			1 for active	1bit
	40011.4	Reserved	0-1			1 for active	1bit
	40011.5	Reserved	0-1			1 for active	1bit
	40011.6	Reserved	0-1			1 for active	1bit
	40011.7	Reserved	0-1			1 for active	1bit
	40011.8	Reserved	0-1			1 for active	1bit
	40011.9	Reserved	0-1			1 for active	1bit
	40011.10	Reserved	0-1			1 for active	1bit
	40011.11	Reserved	0-1			1 for active	1bit
	40011.12	Reserved	0-1			1 for active	1bit
	40011.13	Reserved	0-1			1 for active	1bit
	40011.14	Reserved	0-1			1 for active	1bit
	40011.15	Reserved	0-1			1 for active	1bit
0011	40012.0	Reserved	0-1			1 for active	1bit
	40012.1	Reserved	0-1			1 for active	1bit
	40012.2	Reserved	0-1			1 for active	1bit
	40012.3	Reserved	0-1			1 for active	1bit
	40012.4	Reserved	0-1			1 for active	1bit
	40012.5	Reserved	0-1			1 for active	1bit
	40012.6	Reserved	0-1			1 for active	1bit
	40012.7	Reserved	0-1			1 for active	1bit
	40012.8	Reserved	0-1			1 for active	1bit
	40012.9	Reserved	0-1			1 for active	1bit
	40012.10	Reserved	0-1			1 for active	1bit
	40012.11	Reserved	0-1			1 for active	1bit
	40012.12	Reserved	0-1			1 for active	1bit
	40012.13	Reserved	0-1			1 for active	1bit
	40012.14	Reserved	0-1			1 for active	1bit
	40012.15	Reserved	0-1			1 for active	1bit
0012	40013.0	RPU Emergency Stop Status	0-1			1 for active	1bit
	40013.1	RPU Input 1 Status	0-1			1 for active	1bit
	40013.2	RPU Input 2 Status	0-1			1 for active	1bit
	40013.3	RPU Input 3 Status	0-1			1 for active	1bit

Modbus Address	PLC Address	Item	Range (Decimal)	Ratio	Unit	Description	Remarks
	40013.4	RPU Input 4 Status	0-1			1 for active	1bit
	40013.5	RPU Input 5 Status	0-1			1 for active	1bit
	40013.6	Reserved	0-1			1 for active	1bit
	40013.7	Reserved	0-1			1 for active	1bit
	40013.8	RPU Output 1 Status	0-1			1 for active	1bit
	40013.9	RPU Output 2 Status	0-1			1 for active	1bit
	40013.10	RPU Output 3 Status	0-1			1 for active	1bit
	40013.11	RPU Output 4 Status	0-1			1 for active	1bit
	40013.12	RPU Output 5 Status	0-1			1 for active	1bit
	40013.13	RPU Power Status	0-1			1 for active	1bit
	40013.14	Reserved	0-1			1 for active	1bit
	40013.15	Reserved	0-1			1 for active	1bit
0013	40014.0	MIO14 Overspeed Warning	0-1			1 for active	1bit
	40014.1	Reserved	0-1			1 for active	1bit
	40014.2	Reserved	0-1			1 for active	1bit
	40014.3	Reserved	0-1			1 for active	1bit
	40014.4	Reserved	0-1			1 for active	1bit
	40014.5	Reserved	0-1			1 for active	1bit
	40014.6	ECU1 Warning	0-1			1 for active	1bit
	40014.7	ECU1 Warning	0-1			1 for active	1bit
	40014.8	ECU2 Warning	0-1			1 for active	1bit
	40014.9	ECU2 Warning	0-1			1 for active	1bit
	40014.10	ECU3 Warning	0-1			1 for active	1bit
	40014.11	ECU3 Warning	0-1			1 for active	1bit
	40014.12	ECU4 Warning	0-1			1 for active	1bit
	40014.13	ECU4 Warning	0-1			1 for active	1bit
	40014.14	ECU5 Warning	0-1			1 for active	1bit
	40014.15	ECU5 Warning	0-1			1 for active	1bit
0014	40015.0	ECU6 Warning	0-1			1 for active	1bit
	40015.1	ECU6 Warning	0-1			1 for active	1bit
	40015.2	ECU7 Warning	0-1			1 for active	1bit
	40015.3	ECU7 Warning	0-1			1 for active	1bit
	40015.4	ECU8 Warning	0-1			1 for active	1bit
	40015.5	ECU8 Warning	0-1			1 for active	1bit
	40015.6	ECU9 Warning	0-1			1 for active	1bit
	40015.7	ECU9 Warning	0-1			1 for active	1bit
	40015.8	ECU10 Warning	0-1			1 for active	1bit
	40015.9	ECU10 Warning	0-1			1 for active	1bit
	40015.10	MIO14 Sensor 1 High Warn	0-1			1 for active	1bit
	40015.11	MIO14 Sensor 1 Low Warn	0-1			1 for active	1bit

Modbus Address	PLC Address	Item	Range (Decimal)	Ratio	Unit	Description	Remarks
	40015.12	MIO14 Sensor 1 Open Warn	0-1			1 for active	1bit
	40015.13	MIO14 Sensor 2 High Warn	0-1			1 for active	1bit
	40015.14	MIO14 Sensor 2 Low Warn	0-1			1 for active	1bit
	40015.15	MIO14 Sensor 2 Open Warn	0-1			1 for active	1bit
0015	40016.0	Reserved	0-1			1 for active	1bit
	40016.1	Reserved	0-1			1 for active	1bit
	40016.2	Reserved	0-1			1 for active	1bit
	40016.3	Reserved	0-1			1 for active	1bit
	40016.4	Reserved	0-1			1 for active	1bit
	40016.5	Reserved	0-1			1 for active	1bit
	40016.6	Reserved	0-1			1 for active	1bit
	40016.7	Reserved	0-1			1 for active	1bit
	40016.8	Reserved	0-1			1 for active	1bit
	40016.9	Reserved	0-1			1 for active	1bit
	40016.10	Reserved	0-1			1 for active	1bit
	40016.11	Reserved	0-1			1 for active	1bit
	40016.12	Reserved	0-1			1 for active	1bit
	40016.13	Reserved	0-1			1 for active	1bit
	40016.14	Reserved	0-1			1 for active	1bit
	40016.15	Reserved	0-1			1 for active	1bit
0016	40017.0	Emergency Stop Input Status	0-1			1 for active	1bit
	40017.1	Input 7 Status	0-1			1 for active	1bit
	40017.2	Input 8 Status	0-1			1 for active	1bit
	40017.3	Input 1 Status	0-1			1 for active	1bit
	40017.4	Input 2 Status	0-1			1 for active	1bit
	40017.5	Reserved	0-1			1 for active	1bit
	40017.6	Reserved	0-1			1 for active	1bit
	40017.7	Input 3 Status	0-1			1 for active	1bit
	40017.8	Input 4 Status	0-1			1 for active	1bit
	40017.9	Input 5 Status	0-1			1 for active	1bit
	40017.10	Input 6 Status	0-1			1 for active	1bit
	40017.11	Common Warning LED Status	0-1			1 for active	1bit
	40017.12	Normal Running LED Status	0-1			1 for active	1bit
	40017.13	Reserved	0-1			1 for active	1bit
	40017.14	Reserved	0-1			1 for active	1bit
	40017.15	Fault Alarm Status	0-1			1 for active	1bit

Modbus Address	PLC Address	Item	Range (Decimal)	Ratio	Unit	Description	Remarks
		Output					
0017	40018.0	Start Output Status	0-1			1 for active	1bit
	40018.1	Fuel Output Status	0-1			1 for active	1bit
	40018.2	Reserved	0-1			1 for active	1bit
	40018.3	Reserved	0-1			1 for active	1bit
	40018.4	Reserved	0-1			1 for active	1bit
	40018.5	Output 1 Status	0-1			1 for active	1bit
	40018.6	Output 2 Status	0-1			1 for active	1bit
	40018.7	Output 3 Status	0-1			1 for active	1bit
	40018.8	Output 4 Status	0-1			1 for active	1bit
	40018.9	Output 5 Status	0-1			1 for active	1bit
	40018.10	Output 6 Status	0-1			1 for active	1bit
	40018.11	Reserved	0-1			1 for active	1bit
	40018.12	Reserved	0-1			1 for active	1bit
	40018.13	Reserved	0-1			1 for active	1bit
	40018.14	Reserved	0-1			1 for active	1bit
	40018.15	Reserved	0-1			1 for active	1bit
0018	40019	Reserved					2Bytes
0019	40020.0	MIO14 Input 1 Status				1 for active	1bit
	40020.1	MIO14 Input 2 Status				1 for active	1bit
	40020.2	MIO14 Input 3 Status				1 for active	1bit
	40020.3	MIO14 Input 4 Status				1 for active	1bit
	40020.4	MIO14 Input 5 Status				1 for active	1bit
	40020.5	MIO14 Input 6 Status				1 for active	1bit
	40020.6	MIO14 Output 1 Status				1 for active	1bit
	40020.7	MIO14 Output 2 Status				1 for active	1bit
	40020.8	MIO14 Output 3 Status				1 for active	1bit
	40020.9	MIO14 Output 4 Status				1 for active	1bit
	40020.10	MIO14 Output 5 Status				1 for active	1bit
	40020.11	Reserved				1 for active	1bit
	40020.12	Reserved				1 for active	1bit
	40020.13	Reserved				1 for active	1bit
	40020.14	Reserved				1 for active	1bit
	40020.15	Reserved				1 for active	1bit
0020	40021	Reserved					2Bytes
0021	40022	Speed	0-9999	1	r/min		2Bytes
0022	40023	Engine Water Temp.	-40-150	1	˚C		2Bytes
0023	40024	Engine Oil Temp.	-40-150	1	˚C		2Bytes

Modbus Address	PLC Address	Item	Range (Decimal)	Ratio	Unit	Description	Remarks
0024	40025	Engine Oil Pressure	0-1000	1	kpa		2Bytes
0025	40026	Reserved					2Bytes
0026	40027	Sensor 1 Data	0-9999	1		Select according to sensor type	2Bytes
0027	40028	Sensor 2 Data	0-9999	1			2Bytes
0028	40029	Sensor 3 Data	0-9999	1			2Bytes
0029	40030	Sensor 4 Data	0-9999	1			2Bytes
0030	40031	Power Voltage	0-600	0.1	V		2Bytes
0031	40032	Charger Voltage	0-600	0.1	V		2Bytes
0032	40033	Engine Status	0-15	1			2Bytes
0033	40034	Status Delay	0-3600	1	s		2Bytes
0034	40035	Remote Start Status	0-10	1			2Bytes
0035	40036	Remote Start Delay	0-3600	1	s		2Bytes
0036	40037	Reserved		1			2Bytes
0037	40038	Accumulated Running Time: Hour One Decimal Point	0-999999999	0.1	h		2Bytes
0038	40039						2Bytes
0039	40040	Accumulated Start Times	0-65535				2Bytes
0040	40041	Power 1 Voltage					2Bytes
0041	40042	Power 2 Voltage					2Bytes
0042	40043	Reserved					2Bytes
0043	40044	Controller Software Version					2Bytes
0044	40045	Controller Hardware Version					2Bytes
0045	40046	Release Year					2Bytes
0046	40047	Release Month					2Bytes
0047	40048	Release Day					2Bytes
0048	40049	Reserved					2Bytes
0049	40050	Total of Event Logs					2Bytes
0050	40051	Controller Time: Year					2Bytes
0051	40052	Controller Date: Month					2Bytes
0052	40053	Controller Date: Day					2Bytes
0053	40054	Controller Date: Week					2Bytes
0054	40055	Controller Time: Hour					2Bytes
0055	40056	Controller Time: Minute					2Bytes
0056	40057	Controller Time: Second					2Bytes
0057	40058	Sensor 4 Resistance/Current/ Voltage Value	0-9999	0.01	Ω/mA /V		2Bytes

Modbus Address	PLC Address	Item	Range (Decimal)	Ratio	Unit	Description	Remarks
0058	40059	Sensor 5 Resistance/Current/ Voltage Value	0-9999	0.01	Ω/mA /V		2Bytes
0059	40060	Sensor 6 Resistance/Current/ Voltage Value	0-9999	0.01	Ω/mA /V		2Bytes
0060	40061	Sensor 7 Resistance	0-9999	0.01	Ω		2Bytes
0061	40062	Reserved					2Bytes
0062	40063	Reserved					2Bytes
0063	40064	RPU Speed Value	0-9999	1	r/min		2Bytes
0064	40065	Reserved					2Bytes
0065	40066	Coolant Level	0-100	1	%		2Bytes
0066	40067	Oil Temperature	-40-210	1	˚C		2Bytes
0067	40068	Coolant Pressure	0-500	1	kpa		2Bytes
0068	40069	Fuel Pressure	0-500	1	kpa		2Bytes
0069	40070	Fuel Temperature	-40-210	1	˚C		2Bytes
0070	40071	Inlet Temperature	-40-210	1	˚C		2Bytes
0071	40072	Exhaust Temperature	-273-1735	1	˚C		2Bytes
0072	40073	Turbo Pressure	0-500	1	kpa		2Bytes
0073	40074	Fuel Consumption	0-3,212	0.1	L/h		2Bytes
0074	40075	Total Fuel Consumption	0-2,105,540,607	1	L		2Bytes
0075	40076						2Bytes
0076	40077	Reserved					2Bytes
0077	40078	Reserved					2Bytes
0078	40079	Reserved					2Bytes
0079	40080	Reserved					2Bytes
0080	40081	Reserved					2Bytes
0081	40082	Reserved					2Bytes
0082	40083	Reserved					2Bytes
0083	40084	Reserved					2Bytes
0084	40085	Reserved					2Bytes
0085	40086	Reserved					2Bytes
0086	40087	MIO14 Speed	0-9999	1	r/min		2Bytes
0087	40088	MIO14 Sensor 1 Data	0-9999	1			2Bytes
0088	40089	MIO14 Sensor 2 Data	0-9999	1			2Bytes

NOTE1: Actual value=received data*ratio. Take power voltage value as the example, if received data is 240(00F0H), ratio is 0.1, then actual voltage value is 24.0V(240*0.01);

NOTE2: Definition of signed number. Take received data 8000H as the example, transfer it to binary 1000 0000 0000 0000b, the MSB is 1, which is a negative number. One's complement is obtained by subtracting 1 from it, which is inverted to obtain the absolute value of the negative number. Then transfer it to -32768 in decimal.

Example:

If need to read "Power Voltage Value (current is 24.0V)", firstly get its corresponding address is 0030 by checking the table, then it is known that you need to read 1 byte' data.

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

Table 3 Master Request Command

Slave Address	Function Code	Starting Address (0030)		Data Qty. (2)		CRC 16 Calibration	
		MSB	LSB	MSB	LSB	LSB	MSB
01	**03**	**00**	**1E**	**00**	**01**	**E4**	**0C**

Slave response command is as following:

Table 4 Slave Response Command

Slave Address	Function Code	Data Qty. (Bytes)	Data		CRC 16 Calibration	
			Data MSB of Address 0030	Data LSB of Address 0030	LSB	MSB
01	**03**	**02**	**00**	**F0**	**B8**	**00**

Fill the received data into the corresponding address, as shown in the table below:

Table 5 Data Analysis

Address	Received Data (Hex)	After Conversion (Decimal)	Power Voltage Value (Decimal)
0030	00F0	240	24.0V

4. CONTROLLER REGISTER ADDRESS AND DATA OF FUNCTION CODE 05H

Table 6 05 Function Code Address

Address	Item	Description
0000	Remote Start Key	1 for active
0001	Remote Stop Key	1 for active
0002	Remote Home Page Key	1 for active
0003	Remote Self-check Key	1 for active
0004	Remote Event Log Key	1 for active
0005	Remote Reset Key	1 for active
0006	Reserved	1 for active
0007	Remote Up Key	1 for active
0008	Remote Down Key	1 for active
0009	Reserved	1 for active
0010	Reserved	1 for active
0011	Remote Confirm Key	1 for active
0012	Remote Mute Key	1 for active
0013	Reserved	1 for active
0014	Remote/Local Key	1 for active

Example:

Set controller in “Remote Start”, firstly get its address is 0000 by checking the table, then it is known that you need to read 1 byte’ data.

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

Table 7 Master Request Command

Slave Address	Function Code	Starting Address (0000)		Reset Request Command		CRC 16 Calibration	
		MSB	LSB	MSB	LSB	LSB	MSB
01	**05**	**00**	**00**	**FF**	**00**	**8C**	**3A**

After execution, slave response command is same as request command, which is shown as following:

Table 8 Slave Response Command

Slave Address	Function Code	Starting Address (0000)		Reset Request Command		CRC 16 Calibration	
		MSB	LSB	MSB	LSB	LSB	MSB
01	**05**	**00**	**00**	**FF**	**00**	**8C**	**3A**