ZP Communication protocol for heat meters

Modbus

Table of Contents

1 Description

The Modbus protocol is an application layer messaging protocol on layer 7 of the OSI model, which provides client/server communication between devices connected to different types of bus or network.

This document describes the data format defined for heat meters on the basis of the generic MODBUS protocol, and is suitable for use by meter reading devices such as host computers to read the meters produced by our company.

Please refer to the Modbus Application Protocol V1.1b for the detailed Modbus technical standard.

2. Interface description

Table 2.1

Communication interface	RS485	M-Bus
Signal definition	Red line: power; white line: B; green line: A; black line: ground	No polarity
Communication parameters	8 data bits, 1 stop bit, even parity, 2400bps	
Initial address code of the heat meter	0x01, broadcast address 0x00, address can be set to 1~254	
Data checksum	CRC16	

3 MODBUS address in short version

Table 3.1

Register Address	Data type	Function Code	Data Description	Read and write status
0x0000	Int	0x03	Positive cumulative energy (unit: 1/100 KWh (small bore); 1/100 MWh (large bore)) high 16 digits	Read only
0x0001	Int	0x03	Positive cumulative energy (unit: 1/100 KWh (small bore); 1/100 MWh (large bore)) high 16 digits	Read only
0x0004	Int	0x03	Inlet water temperature (unit: 1/100° C) high 16 bits	Read only
0x0005	Int	0x03	Inlet water temperature (unit: 1/100° C) high 16 bits	Read only
0x0006	Int	0x03	Return water temperature (in 1/100° C) high 16 bits	Read only
0x0007	Int	0x03	Return water temperature (in 1/100° C) high 16 bits	Read only
0x0008	Int	0x03	Absolute value of temperature difference in 1/100° C high 16 bits	Read only
0x0009	Int	0x03	Absolute value of temperature difference in 1/100° C high 16 bits	Read only
0x000A	Int	0x03	Positive Cumulative flow rate in 1/100m³ high 16 digits	Read only
0x000B	Int	0x03	Positive Cumulative flow rate in 1/100m³ low 16 digits	Read only
0x000C	Int	0x03	Instantaneous flow rate (unit: 1/10000m³/h) high 16 bits	Read only
0x000D	Int	0x03	Instantaneous flow rate (unit: 1/10000m³/h) low 16 bits	Read only
0x000E	Int	0x03	Power (in 1/100kW) high 16 bits	Read only
0x000F	Int	0x03	Power (in 1/100kW) low 16 bits	Read only
0x0010	Int	0x03	Fault Codes	Read only
0x0011	Int	0x03	Operating time (unit: h)	
0x0013	10字节	0x03	Real time time	Read only
				Read only
0x0607	Int	0x03/0x10/0x06	Communication address	Reading and writing
0x0608	Int	0x03/0x10/0	Communication parameters	Reading

		x06		and writing
0xFEFF	Char	0x10	Calibration time	write only

3.1 Read positive cumulative energy

Upper hex send:

01 03 00 00 00 02 C4 0B

0x01	0x03	0x00	0x00	0x00	0x02	0xC4	0x0B

Address: 0x01

Read function code: 0x03

Data register address: 0x0000, data length 0x0002

CRC16 checksum: 0xC4 0x0B

Calorimeter response:

01 03 04 01 23 45 67 79 7F

0x01	0x03	0x04	0x01	0x23	0x45	0x67	0x79	0x7F

Length of data byte: 0x04

Read 0x04 bytes: 0x01 0x23 0x45 0x67, i.e. 0x1234567, decimal 190887.43kWh

3.2 Reading the inlet water temperature

Upper hex send:

01 03 00 04 00 02 85 CA

0x01	0x03	0x00	0x04	0x00	0x02	0x85	0xCA

Address: 0x01

Read function code: 0x03

Data register address: 0x0004, data length 0x0002

CRC16 checksum: 0x85 0xCA

Heat meter reply:

01 03 04 00 00 14 B4 F5 44

0x01	0x03	0x04	0x00	0x00	0x14	0xB4	0xF5	0x44

Length of data byte: 0x04

Read 0x04 bytes: 0x00 0x00 0x14 0xB4, i.e. 0x000014B4, decimal 5300, corresponding incoming water temperature: 53.00° C

CRC16 checksum: 0xF5 0x44

3.3 Read return water temperature

Upper hex send:

01 03 00 06 00 02 24 0A

0x01	0x03	0x00	0x06	0x00	0x02	0x24	0x0A

Address: 0x01

Read function code: 0x03

Data register address: 0x0006, data length 0x0002

CRC16 checksum: 0x24 0x0A

Heat meter reply:

01 03 04 00 00 13 88 F7 65

0x01	0x03	0x04	0x00	0x00	0x13	0x88	0xF7	0x65

Length of data byte: 0x04

Read 0x04 bytes: 0x00 0x00 0x13 0x88, i.e. 0x00001388, decimal 5000, corresponding return water temperature: 50.00° C

CRC16 checksum: 0xF7 0x65

3.4 Reading the absolute value of the temperature difference

Upper unit hexadecimal send:

01 03 00 08 00 02 45 C9

0x01	0x03	0x00	0x08	0x00	0x02	0x45	0xC9

Address: 0x01

Read function code: 0x03

Data register address: 0x0008, data length 0x0002

CRC16 checksum: 0x45 0xC9

Heat meter reply:

01 03 04 00 00 01 2C FA 7E

0x01	0x03	0x04	0x00	0x00	0x01	0x2C	0xFA	0x7E

Length of data byte: 0x04

Read 0x04 bytes: 0x00 0x00 0x01 0x2C, i.e. 0x0000012C, decimal 300, corresponding absolute value of temperature difference: 3.00° C

CRC16 checksum: 0xFA 0x7E

3.5 Reading of positive cumulative flow

Upper unit hexadecimal send:

01 03 00 0A 00 02 E4 09

0x01	0x03	0x00	0x0A	0x00	0x02	0xE4	0x09

Address: 0x01

Read function code: 0x03

Data register address: 0x000A, data length 0x0002

CRC16 checksum: 0xE4 0x09

Heat meter reply:

01 03 04 01 23 45 67 79 7F

0x01	0x03	0x04	0x01	0x23	0x45	0x67	0x79	0x7F

Length of data byte: 0x04

Read 0x04 bytes: 0x01 0x23 0x45 0x67, i.e. 0x01234567, decimal 19088743, corresponding positive cumulative flow: 190887.43 m^3

CRC16 checksum: 0x79 0x7F

3.6 Reading flow rates

Upper unit hexadecimal send:

01 03 00 0C 00 02 04 08

0x01	0x03	0x00	0x0C	0x00	0x02	0x04	0x08

Address: 0x01

Read function code: 0x03

Data register address: 0x000C, data length 0x0002

CRC16 checksum: 0x04 0x08

Heat meter reply:

01 03 04 01 23 45 67 79 7F

0x01	0x03	0x04	0x01	0x23	0x45	0x67	0x79	0x7F

Length of data byte: 0x04

Read 0x04 bytes: 0x01 0x23 0x45 0x67, i.e. 0x01234567, decimal 19088743, corresponding flow rate: 1908.8743 m^3/h

CRC16 checksum: 0x79 0x7F

3.7 Power reading

Upper unit hexadecimal send:

01 03 00 0E 00 02 A5 C8

0x01	0x03	0x00	0x0E	0x00	0x02	0xA5	0xC8

Address: 0x01

Read function code: 0x03

Data register address: 0x000E, data length 0x0002

CRC16 checksum: 0xA5 0xC8

Heat meter reply:

01 03 04 01 23 45 67 79 7F

0x01	0x03	0x04	0x01	0x23	0x45	0x67	0x79	0x7F

Length of data byte: 0x04

Read 0x04 bytes: 0x01 0x23 0x45 0x67, i.e. 0x01234567, decimal 19088743, corresponding power: 190887.43 kW

CRC16 checksum: 0x79 0x7F

3.8 Reading fault codes

Upper unit hexadecimal send:

01 03 00 10 00 01 85 CF

0x01	0x03	0x00	0x10	0x00	0x01	0x85	0xCF

Address: 0x01

Read function code: 0x03

Data register address: 0x0010, data length 0x0001

CRC16 checksum: 0x85 0xCF

Heat meter reply:

01 03 02 00 04 B9 87

0x01	0x03	0x02	0x00	0x04	0xB9	0x87

Length of data byte: 0x02

Read 0x02 bytes: 0x00 0x04, i.e. 0x0004 (battery voltage fault), refer to table 3.9.1 for fault codes

CRC16 checksum: 0xB9 0x87

3.9 Read the working hours

Upper unit hexadecimal send:

01 03 00 11 00 01 D4 0F

0x01	0x03	0x00	0x11	0x00	0x01	0xD4	0x0F

Address: 0x01

Read function code: 0x03

Data register address: 0x0011, data length 0x0001

CRC16 checksum: 0xD4 0x0F

Heat meter reply:

01 03 02 12 34 B5 33

0x01	0x03	0x02	0x12	0x34	0xB5	0x33

Length of data byte: 0x02

Read 0x02 bytes: 0x12 0x34, i.e. 0x1234, decimal 4660h

CRC16 checksum: 0xB5 0x33

3.10 Reading mailing addresses

Upper unit hexadecimal send:

01 03 06 07 00 01 35 43

0x01	0x03	0x06	0x07	0x00	0x01	0x35	0x43

Address: 0x01

Read function code: 0x03

Data register address: 0x0607, data length 0x0001

CRC16 checksum: 0x35 0x43

Heat meter reply:

01 03 02 00 01 79 84

0x01	0x03	0x02	0x00	0x01	0x79	0x84

Length of data byte: 0x02

Read 0x02 bytes: 0x00 0x01, i.e. 0x0001, communication address is 1

CRC16 checksum: 0x79 0x84

3.11 Write communication address

Upper unit hexadecimal send:

01 06 06 07 00 02 B9 42

0x01	0x06	0x06	0x07	0x00	0x02	0xB9	0x42

Address: 0x01

Write number function code: 0x06

Data register address: 0x0607, data content: 0x0002

CRC16 checksum: 0xB9 0x42

Heat meter reply:

01 06 06 07 00 02 B9 42

0x01	0x06	0x06	0x07	0x00	0x02	0xB9	0x42

If the write is successful, the original data is returned

3.12 Reading communication parameters

Upper unit hexadecimal send:

01 03 06 08 00 01 05 40

0x01	0x03	0x06	0x08	0x00	0x01	0x05	0x40

Address: 0x01

Read function code: 0x03

Data register address: 0x0608, data length 0x0001

CRC16 checksum: 0x05 0x40

Heat meter reply:

01 03 02 00 24 B8 5F

0x01	0x03	0x02	0x00	0x24	0xB8	0x5F

Data byte length: 0x02

Read 0x02 bytes: 0x00 0x24, i.e. 0x0024, 2400bps even parity, refer to Table 3.26.1 for communication parameters

3.13 Writing time

Upper unit hexadecimal send:

00 10 FE FF 00 06 0C 30 38 30 31 31 35 31 32 30 30 30 38 5A 66

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
0	1	F	F	0	0	0	3	3	3	3	3	3	3	3	3	3	3	3	5	6
0	0	E	F	0	6	C	0	8	0	1	1	5	1	2	0	0	0	8	A	6

Address: 0x00

Write number function code: 0x10

Data register address: 0xFEFF, number of data registers: 0x0006, number of data bytes: 0x0C Data content (ASCII code): 0x30 0x38 0x30 0x31 0x31 0x35 0x31 0x32 0x30 0x30 0x30 0x38, i.e. 080115120008 (August 1, 15 years 12:00 08 seconds)

CRC16 checksum: 0x5A 0x66

3.14 Reading the current time

Upper unit hexadecimal send:

37 03 00 13 00 05 71 9A

0x01	0x03	0x00	0x13	0x00	0x05	0x71	0x9A

Address: 0x01

Read function code: 0x03

Data register address: 0x0013, data length 0x0005

CRC16 checksum: 0x71 0x9A

Heat meter reply:

37 03 0A 07 E5 00 07 00 1E 00 0E 00 27 D4 D5

Length of data byte: 0x0A

Read 0x0A bytes: 07 E5 00 07 00 1E 00 0E 00 27

0x07 0xE5 i.e. 0x07E5, decimal 2021, means year 2021

0x00 0x07 i.e. 0x0007 for the month of July

0x00 0x1E i.e. 0x001E for 30 days

0x00 0x0E which is 0x000E for 14 hours

0x00 0x27 is 0x0027, which means 39 minutes

Combined i.e. 30 July 2021 at 14:29

CRC16 checksum: 0xD4 0xd5