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Water meter
Communication protocol

Modbus

Revise history

Changed from version 2.103 to 2.107

Version	Location	Description	Revision time
2.103		Initial version	2019.10.07
2.104		Added pressure register	2024.06.19
2.105		Added high-resolution flow volume register	2024.12.10
2.106		Add minute and related codes to the unit codes Remove function code 0x10 from registers 0x604 and 0x605 Delete registers 0x60A and 0x60B	2024.12.11
2.107		Minor revisions Registers 0x300 to 0x30B are only supported in some products	2025.03.07

1 Date-Register map table

Register	Date type	Function Code	Information analysis	Read-Write
0x0200	Int16	0x03	Positive flow volume high-16bit	Only read
0x0201	Int16	0x03	Positive flow volume low-16bit	Only read
0x0202	Int16	0x03	Positive flow volume unit and fractional part	Only read
0x0203	Int16	0x03	Negative flow volume high-16bit	Only read
0x0204	Int16	0x03	Negative flow volume low-16bit	Only read
0x0205	Int16	0x03	Negative flow volume unit and fractional part	Only read
0x0300	Int16	0x03	Net flow volume integer part in cubic meters high-16bit	Only read
0x0301	Int16	0x03	Net flow volume integer part in cubic meters low-16bit	Only read
0x0302	Int16	0x03	Net flow volume fractional part in milliliters high-16bit	Only read
0x0303	Int16	0x03	Net flow volume fractional part in milliliters low-16bit	Only read
0x0304	Int16	0x03	Negative flow volume integer part in cubic meters high-16bit	Only read
0x0305	Int16	0x03	Negative flow volume integer part in cubic meters low-16bit	Only read
0x0306	Int16	0x03	Negative flow volume fractional part in milliliters high-16bit	Only read
0x0307	Int16	0x03	Negative flow volume fractional part in milliliters low-16bit	Only read
0x0308	Int16	0x03	Positive flow volume integer part in cubic meters high-16bit	Only read
0x0309	Int16	0x03	Positive flow volume integer part in cubic meters low-16bit	Only read
0x030A	Int16	0x03	Positive flow volume fractional part in milliliters high-16bit	Only read
0x030B	Int16	0x03	Positive flow volume fractional part in milliliters low-16bit	Only read
0x0400	Int16	0x03	Flow rate high-16bit	Only read
0x0401	Int16	0x03	Flow rate low-16bit	Only read
0x0402	Int16	0x03	Flow rate unit and fractional part	Only read
0x0403	Int16	0x03	Water temperature high-16bit	Only read
0x0404	Int16	0x03	Water temperature low-16bit	Only read
0x0405	Int16	0x03	Water temperature unit and fractional part	Only read
0x0406	Int16	0x03	Operating time high-16bit	Only read
0x0407	Int16	0x03	Operating time low-16bit	Only read
0x0408	Int16	0x03	Operating time unit and fractional part	Only read
0x0409	Int16	0x03	Warning time high-16bit	Only read
0x040A	Int16	0x03	Warning time low-16bit	Only read
0x040B	Int16	0x03	Warning time unit and fractional part	Only read
0x040C	Int16	0x03	Device status	Only read
0x040D	Int16	0x03	Pressure high-16bit	Only read
0x040E	Int16	0x03	Pressure low-16bit	Only read
0x040F	Int16	0x03	Pressure unit and fractional part	Only read
0x0600	Int16	0x03	Software version (e.g., 0x03A1 = Ver3.A1)	Only read
0x0601	Int16	0x03	Hardware version (e.g., 0x020B = Ver2.0B)	Only read
0x0602	Int16	0x03	Secondary address high-16bit	Only read
0x0603	Int16	0x03	Secondary address low-16bit	Only read
0x0604	Int16	0x03/0x06	Address	Read and write
0x0605	Int16	0x03/0x06	Communication parameters	Read and write

0xFEFF	Char (12)	0x10	Setting the date and time (Y.M.D.H.m.s)	Only write

Unit	code
L	0x29
m^3	0x2C
L/h	0x32
m^3 /h	0x35
℃	0x40
K	0x41
h	0x50
d	0x51
min	0x5F
kPa	0x6E

2 Request master and response slave

2.1 Read positive flow volume

Request master:

0x01	0x03	0x02	0x00	0x00	0x03	0x04	0x73

Slave Address: 0x01
Function: 0x03
Starting Address:0x0200, No. of Points:0x0003
CRC16: 0x04 0x73
Response slave:

0x01	0x03	0x06	0x07	0x5B	0xCD	0x15	0x2C	0x01	0xB7	0x67

Byte Count: 0x06
Date: 0x07 0x5B 0xCD 0x15, mean 0x75BCD15 = 123456789
Date: 0x2C 0x01, mean m^3-Unit, One fractional part.
Positive flow volume is 12345678.9m^3

2.2 Read negative flow volume

Request master:

0x01	0x03	0x02	0x03	0x00	0x03	0xF4	0x73

Slave Address: 0x01
Function: 0x03
Starting Address:0x0203, No. of Points:0x0003
CRC16: 0xF4 0x73
Response slave:

0x01	0x03	0x06	0x07	0x5B	0xCD	0x15	0x2C	0x01	0xB7	0x67

Byte Count: 0x06
Date: 0x07 0x5B 0xCD 0x15, mean 0x75BCD15 = 123456789
Date: 0x2C 0x01, mean m^3-Unit, One fractional part
Negative flow volume is 12345678.9m^3

2.3 Read high-resolution net flow volume

Request master:

0x01	0x03	0x03	0x00	0x00	0x04	0x44	0x4D

Slave Address: 0x01
Function: 0x03
Starting Address:0x0300, No. of Points:0x0004
CRC16: 0x44 0x4D
Response slave:

0x01	0x03	0x08	0x00	0x00	0x30	0x6B	0x00	0x0A	0x5B	0xF5	0x6E	0x9B

Byte Count: 0x08
Date: 0x00 0x00 0x30 0x6B, mean 0x0000306B = 12395m³
Date: 0x00 0x0A 0x5B 0xF5, mean 0x000A5BF5 = 678901mL
High-resolution net flow volume is 12395.678901m³

2.4 Read high-resolution negative flow volume

Request master:

0x01	0x03	0x03	0x04	0x00	0x04	0x05	0x8C

Slave Address: 0x01
Function: 0x03
Starting Address:0x0304, No. of Points:0x0004
CRC16: 0x05 0x8C
Response slave:

0x01	0x03	0x08	0x00	0x00	0x00	0x1F	0x00	0x0A	0x9C	0x1E	0xC9	0x1F

Byte Count: 0x08
Date: 0x00 0x00 0x00 0x1F, mean 0x0000001F = 31m³
Date: 0x00 0x0A 0x9C 0x1E, mean 0x000A9C1E = 695326mL
High-resolution negative flow volume is 31.695326m³

2.5 Read high-resolution positive flow volume

Request master:

0x01	0x03	0x03	0x08	0x00	0x04	0xC5	0x8F

Slave Address: 0x01
Function: 0x03
Starting Address:0x0308, No. of Points:0x0004
CRC16: 0xC5 0x8F
Response slave:

0x01	0x03	0x08	0x00	0x00	0x30	0x4B	0x00	0x0F	0x02	0x17	0x45	0x44

Byte Count: 0x08
Date: 0x00 0x00 0x30 0x4B, mean 0x0000304B = 12363m³
Date: 0x00 0x0F 0x02 0x17, mean 0x000F0217 = 983575mL
High-resolution positive flow volume is 12363.983575m³

2.6 Read flow rate

Request master:

0x01	0x03	0x04	0x00	0x00	0x03	0x04	0xFB

Slave Address: 0x01
Function: 0x03
Starting Address:0x0400, No. of Points:0x0003
CRC16: 0x04 0xFB
Response slave:

0x01	0x03	0x06	0x07	0x5B	0xCD	0x15	0x35	0x03	0x3D	0x36

Byte Count: 0x06
Date: 0x07 0x5B 0xCD 0x15, mean 0x75BCD15 = 123456789
Date: 0x35 0x03, mean m³/h-Unit, three fractional parts
Flow rate is 123456.789m³/h

2.7 Read water temperature

Request master:

0x01	0x03	0x04	0x03	0x00	0x03	0xF4	0xFB

Slave Address: 0x01
Function: 0x03
Starting Address:0x0403, No. of Points:0x0003
CRC16: 0xF4 0xFB
Response slave:

0x01	0x03	0x06	0x07	0x5B	0xCD	0x15	0x40	0x02	0xDA	0x66

Byte Count: 0x06
Date: 0x07 0x5B 0xCD 0x15, mean 0x75BCD15 = 123456789
Date: 0x40 0x02, mean ℃-Unit, two fractional parts
Water temperature is 1234567.89℃

2.8 Read operating time

Request master:

0x01	0x03	0x04	0x06	0x00	0x03	0xE4	0xFA

Slave Address: 0x01
Function: 0x03
Starting Address:0x0406, No. of Points:0x0003
CRC16: 0xE4 0xFA
Response slave:

0x01	0x03	0x06	0x07	0x5B	0xCD	0x15	0x50	0x00	0x56	0x67

Byte Count: 0x06
Date: 0x07 0x5B 0xCD 0x15, mean 0x75BCD15 = 123456789
Date: 0x50 0x00, mean h-Unit, none fractional part
Operating time is 123456789h

2.9 Read warning time

Request master:

0x01	0x03	0x04	0x09	0x00	0x03	0xD4	0xF9

Slave Address: 0x01
Function: 0x03
Starting Address:0x0409, No. of Points:0x0003
CRC16: 0xD4 0xF9
Response slave:

0x01	0x03	0x06	0x07	0x5B	0xCD	0x15	0x50	0x00	0x56	0x67

Byte Count: 0x06
Date: 0x07 0x5B 0xCD 0x15, mean 0x75BCD15 = 123456789
Date: 0x50 0x00, mean h-Unit, none fractional part
Warning time is 123456789h

2.10 Read device status

Request master:

0x01	0x03	0x04	0x0C	0x00	0x01	0x45	0x39

Slave Address: 0x01
Function: 0x03
Starting Address:0x040C, No. of Points:0x0001
CRC16: 0x45 0x39
Response slave:

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

Byte Count: 0x02
Date length: 0x00 0x04, mean 0x0004
Device status is 0x0004(acc. to table 2.10.1)

Table 2.10.1 Device status

	0	1
BIT0	Reserved	Reserved
BIT1	Water temperature is normal	Water temperature is low
BIT2	Battery voltage is normal	Battery voltage is low

BIT3	Flow rate normal	Flow rate exceeds Q4
BIT4	Water meter full pipe	Water meter empty pipe
BIT5	Transducer signal is normal	Transducer signal is abnormal
BIT6	Reset seals	Set seals
BIT7	Factory flag is not set	Factory flag is set
BIT8	Reserved	Reserved
BIT9	Water temperature is normal (history)	Water temperature is low (history)
BIT10	Battery voltage is normal (history)	Battery voltage is low (history)
BIT11	Flow rate normal (history)	Flow rate exceeds Q4 (history)
BIT12	Water meter full pipe (history)	Water meter empty pipe (history)
BIT13	Reserved	Reserved
BIT14	Reserved	Reserved
BIT15	Reserved	Reserved

2.11 Read pressure

Request master:

0x01	0x03	0x04	0x0D	0x00	0x03	0x95	0x38

Slave Address: 0x01
Function: 0x03
Starting Address:0x040D, No. of Points:0x0003
CRC16: 0x95 0x38
Response slave:

0x01	0x03	0x06	0x07	0x5B	0xCD	0x15	0x6E	0x00	0x46	0x07

Byte Count: 0x06
Date: 0x07 0x5B 0xCD 0x15, mean 0x75BCD15 = 123456789
Date: 0x6E 0x00, mean kPa-Unit, none fractional part
Warning time is 123456789kPa

2.12 Read software versions

Request master:

0x01	0x03	0x06	0x00	0x00	0x01	0x84	0x82

Slave Address: 0x01
Function: 0x03

Starting Address:0x0600, No. of Points:0x0001
CRC16: 0x84 0x82
Response slave:

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

Byte Count: 0x02
Date: 0x12 0x34, mean 0x1234 = 12.34
Software versions is 12.34

2.13 Read Hardware versions

Request master:

0x01	0x03	0x06	0x01	0x00	0x01	0xD5	0x42

Slave Address: 0x01
Function: 0x03
Starting Address:0x0601, No. of Points:0x0001
CRC16: 0xD5 0x42
Response slave:

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

Byte Count: 0x02
Date: 0x12 0x34, mean 0x1234 = 12.34
Hardware versions is 12.34

2.14 Read secondary address

Request master:

0x01	0x03	0x06	0x02	0x00	0x02	0x65	0x43

Slave Address: 0x01
Function: 0x03
Starting Address:0x0602, No. of Points:0x0002
CRC16: 0x65 0x43
Response slave:

0x01	0x03	0x04	0x00	0xBC	0x61	0x4E	0x92	0x73

Byte Count: 0x04
Date: 0x00 0xBC 0x61 0x4E, mean 0x00BC614E = 12345678
Secondary address is 12345678

2.15 Read address

Request master:

0x01	0x03	0x06	0x04	0x00	0x01	0xC5	0x43

Slave Address: 0x01
Function: 0x03
Starting Address:0x0604, No. of Points:0x0001
CRC16: 0xC5 0x43

Response slave:

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

Byte Count: 0x02
Date: 0x00 0x01, mean 0x0001
Address is 01

2.16 Read communication parameters

Request master:

0x01	0x03	0x06	0x05	0x00	0x01	0x94	0x83

Slave Address: 0x01
Function: 0x03
Starting Address:0x0605, No. of Points:0x0001
CRC16: 0x94 0x83
Response slave:

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

Byte Count: 0x02
Date: 0x00 0x24, mean 0x0024
Communication parameters is 0x0024(acc. to table 2.16.1)

Table 2.16.1 Communication parameters

BIT15~BIT8	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
Reserved	00b: EN13757 01b: Modbus 10b: CJ188 11b: Reserved		00b: even parity 01b: none parity 10b: even parity 11b: odd parity		0b: one stop 1b: two stops	000b: 2400bps 001b: 300bps 010b: 600bps 011b: 1200bps 100b: 2400bps 101b: 4800bps 110b: 9600bps 111b: 2400bps		

2.19 Setting address

Request master:

0x02	0x06	0x06	0x04	0x00	0x03	0x88	0xB1

Slave Address: 0x02
Function: 0x06
Register Address:0x0604
Setting address: 0x0003
CRC16: 0x88 0xB1
Response slave:

0x02	0x06	0x06	0x04	0x00	0x03	0x88	0xB1

Address of before setting: 0x02
Function: 0x06
Register Address:0x0604
Setting address: 0x0003
CRC16: 0x88 0xB1

2.20 Setting communication parameters

Request master:

0x03	0x06	0x06	0x05	0x00	0x16	0x19	0x6F

Slave Address:0x03
Function: 0x06

Register Address:0x0605
Setting communication parameters: 0x0016(acc. to table 3.12.1)
CRC16: 0x19 0x6F
Response slave:

0x03	0x06	0x06	0x05	0x00	0x16	0x19	0x6F

Slave Address: 0x03
Function: 0x06
Register Address:0x0605
Setting communication parameters: 0x0016(acc. to table 2.16.1)
CRC16: 0x19 0x6F

2.21 Setting the date and time

Request master:

0x01	0x10	0xFE	0xFF	0x00	0x01	0x0C	0x31	0x32	0x30	0x35	0x31	0x35	0x31	0x36	0x33	0x31	0x31	0x36	0xAF	0x96

Slave Address: 0x01
Function: 0x10
Starting Address:0xFEFF, No. of Registers: 0x0001
Byte Count:0x0C
Setting the date and time: 0x31 0x32 (12 month), 0x30 0x35 (05day), 0x31 0x35 (15year), 0x31 0x36 (16hour), 0x33 0x31 (31 minute), 0x31 0x36 (16 second)
CRC16: 0xAF 0x96

Response slave:

0x01	0x10	0xFE	0xFF	0x00	0x01	0x00	0x11

Slave Address: 0x01
Function: 0x10
Starting Address:0xFEFF
No. of Registers: 0x0001
CRC16: 0x00 0x11

2.22 Response error code analysis

Response slave mode

0x01	0x80	0x01	0x80	0x00

Slave Address: 0x01
Error code: 0x8001
CRC16: 0x80 0x00

Error code

Error code	analysis
0x8001	Setting date error
0x8002	Address error
0x8003	The sum of address and #Points is error (too long or zero)
0x8030	Address it too long than 0xF7 (247)