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Water Meter MODBUS Communication Protocol

1 Data type and frame format

1.1 Information transmission is asynchronous, in bytes, and each byte is transmitted in an 11-bit format：

Byte format (serial data)	11 bit binary
start bit	1 bit，0
data bits	8 bits, least significant bit sent first
parity bit	No checksum
Stop bit	1 bit，1
baud rate	2400 bit/S

The baud rate can be 2400, 4800, or 9600; the parity bit can be dd/even/no parity; the default is 9600 N 8 1 if there are no special instructions when selecting the product.

1.2 Frame Format

Name	Codes	Data length
Address code	01H	1 byte
Control code	CTR (Read -03, write single register -06, write multiple registers -10)	1 byte
Address field	A0、A1	2 byte
Number of registers	L	2 byte
Check code	Modbus-CS check	2 byte

2 Instruction function definition

Address	Number of registers	Data meaning	Definition
0001	0002	Positive cumulative flow（R/W）	Four-byte FLOAT type, little endian mode, unit m³
0003	0002	Negative cumulative flow（R/W）	Four-byte FLOAT type, little endian mode, unit m³
0005	0002	Instantaneous traffic（R）	Four-byte FLOAT type, little endian mode, unit m³
0007	0001	Pipe segment status（R）	0055: Empty pipe section 00AA：Pipe section full of water
0008	0002	Remaining traffic（R/W）	Four-byte FLOAT type, little endian mode, unit m³
000A	0002	Pressure value（*）（R）	Four-byte FLOAT type, little endian mode, unit Mpa
000C	0002	Temperature value（*）（R）	Four-byte FLOAT type, little endian mode, unit °C
000E	0001	Device address（R/W）	
000F	0003	Communication parameters（R/W）	Baud rate, parity bit, stop bit②③
0012	0004	Meter address（R/W）	
0016	0004	Device time（R/W）	
001A	0002	Battery voltage（R）	Four-byte FLOAT type, little endian mode, unit V
001C	0001	Valve status and	R:

		control（R/W）	0001 valve open 0002 Valve closed 0004 Valve abnormal 0008 Battery low voltage W: 0001 open valve 0002 close valve
001D	0001	Impulse coefficient（R/W）	
001E	0001	Pressure sensor status（*）（R）	

Notice：

①（*）means customized equipment。

②Customize device communication parameters：

Check digit: no check (0000), even check (0004), odd check (0008)

Stop bits: 1 stop bit (0000), 1.5 stop bits (4000), 2 stop bits (8000)

③Common device communication parameters：

Check digit: no check (0000), even check (0001), odd check (0002)

Stop bits: 1 stop bit (0000), 1.5 stop bits (0001), 2 stop bits (0002)

Communication protocol application examples

2.1 Read instantaneous traffic

command：

01 03 0005 0002 D4 0A

Address Read command Starting address Number of registers Check code

Response：

01 03 00 04 1E 85 0B 3F 13 E6

Address Read command Number of data bytes Data content Check code

The instantaneous flow rate is 0.545 m3/H.

2.2 Read multiple register data

command：

01 03 0001 001D D4 03

Address Read command Starting address Number of registers Check code

Response data parsing：

01 // Address

03 // Read control code

3A // Number of bytes 58

A4 70 AD 40 // Positive cumulative flow 5.42m³

C2 F5 78 40 // Negative cumulative flow 3.89m³

08 AC 1C 3E // Instantaneous traffic 0.153m³ /H

55 00 // Pipe section status 0055: Empty pipe section

00 00 00 40 // Remaining traffic 2m³

DF 4F 5D 3F // Pressure value 0.8645 Mpa

66 66 CA 41 // Temperature value 25.3℃

01 00 // Meter address 0001

80 25 // Baud rate 9600

00 00 // Check bit

00 00 // Stop bit

71 00 05 01 21 00 51 00 //Meter number 51002101050071

02 19 11 01 07 23 20 00 //Time 2023-07-01 11：19：02

66 66 66 40 // Battery voltage 3.6V

01 00 // Valve status 0001 Valve open

01 00 // Pulse coefficient 0001

6E 16 // Check code

2.3 Write device address

Command：

01 06 00 0E 0200 E969

Address Write command Register address Write data Check code

Response：

02 06 00 0E 0200 13 E6

Address Write command Register address Write data Check code

2.4 Control valve

Command：

01 06 00 1C 0200 49 6C

Address Write command Register address Close valve Check code

Response：

01 06 00 1C 0200 49 6C

Address Write command Register address Write data Check code

2.5 Modify communication parameters

Command：

01 10 00 0F 00 03 06 C0 12 01 00 00 00 7E 4F

Address Write command Register address Number of registers Number of bytes Data Verification

Response：

01 10 00 0F 00 03 B0 0B

Address Write command Register address Number of registers Check code

Data analysis:

C0 12 //Baud rate 4800, expressed in hexadecimal, low bit first

01 00 //Even parity check, expressed in hexadecimal, low bit first

00 00//1 stop bit, expressed in hexadecimal, low bit first