Modbus Protocol of Air Velocity &Volume Sensor

1. Data format

1.1 Data format: 1 start bit, 8 data bits, 1 stop bit, no/even check (no check by default)

1.2 Communication rate: 9600 /19200 Bit/s (default 9600)

2. Communication method

2.1 Communication protocol: MODBUS-RTU

2.2 Command code: 03/06 /16

2.3 Communication address: 1~64 DIP switch

2.4 **Description of internal register address**

Register	Address	Read &Write	Data Range	Description
Air velocity	40100 (0x63）	Read only	0-9999	Actual Air velocity *100 times
Air volume low	40101 (0x64)	Read only	0-65535	Air volume low 16 bits
Air volume high	40102 (0x65)	Read only	0-65535	Air volume high 16 bits
Duct area	40103 (0x66)	Read/write	0-9999	Actual area *1000 times Unit: square meter(㎡)
Update rate	40104 (0x67)	Read/write	1-20	Sampling time x10 times Unit: second（s）
Linear correction	40105 (0x68)	Read/write	1-999	Actual slope *100 times y=K*x
Signal remove	40106 (0x69)	Read/write	0-999	Remove signal *100 times

2.5 MODBUS-RTU Protocol：

03 function code: read register data

Host query frame structure:

Address code	Function code	Register address	Register quantity	CRC low	CRC high
1 byte	1 byte	2 byte	2 byte	1 byte	1 byte

Slave response frame structure:

Address code	Function code	Data length	Data 1. . . . Data n	CRC low	CRC high
1 byte	1 byte	1 byte	2 byte ……2 byte	1 byte	1 byte

For example: read the current air velocity value

Send：

Address	Function code	Register address	Data length	CRC
01	03	00 63	00 01	74 14

Return：

Address	Function code	Data length	Data	CRC
01	03	02	041A	3B 4F

*air velocity value=0x041 /100=1050/100=10.5 m/s

06：Write a single register value

Host setting frame structure

Address code	Function code	Register address	Register value	CRC low	CRC high
1 byte	1 byte	2 byte	2 byte	1 byte	1 byte

Slave response frame structure:

Address code	Function code	Register address	Register value	CRC low	CRC high
1 byte	1 byte	2 byte	2 byte	1 byte	1 byte

The response frame is the same as the host setting data packet, indicating that the setting is successful

For example: set the duct area 0.123 ㎡

Host setup frame：01 06 00 66 00 7B 29 f6

Slave return frame：01 06 00 66 00 7B 29 f6

View from the register table, the pipe area address is 40106 (for PLC and other representation methods), and the decimal is 0x66

The data to be written is: 0.123, "magnification 1000 times = 123, hexadecimal 0x007B

16：Write multiple register values continuously

Host setting frame structure：

Address code	Function code	Register start address	Register quantity	Quantity of bytes	Data 1. . . . Data n	CRC low	CRC high
1 byte	1 byte	2 byte	2 byte	1 byte	2 byte . . . . 2 byte	1 byte	1 byte

Slave response frame structure:

Address code	Function code	Register start address	Register quantity	CRC low	CRC high
1 byte	1 byte	2 byte	2 byte	1 byte	1 byte

For example：

Need to set the data: "duct area = 0.123" refresh rate = 1 s" linear correction = 1 (no correction), signal remove= 0.15m/s

The written data should be: dipe area = 123, refresh rate = 10, linear correction = 1000, signal remove = 15

The total quantity of registers to be written is: 4

The host sends the setting frame as：01 10 00 66 00 04 08 00 7b 00 0a 03 e8 00 0f ad 80

Address code	Function code	Register start address	Register quantity	Quantity of bytes	Data 1. . . . Data n	CRC low	CRC high
01	10	00 66	00 04	08	007b 000a 03e8 000f	ad	80

Slave answer:01 10 00 66 00 04 21 D5

Address code	Function code	Register start address	Register quantity	CRC low	CRC high
01	10	00 66	00 04	21	D5

2.6 Error detection

1. Command code error Error code: 0x01

2. Register address error Error code: 0x02

3. Data length error Error code: 0x03

4. Data check error Error code: 0x04

When a data error occurs, return

Address	Command+0x80	error code	CRC low	CRC high
1 byte	1 byte	1 byte	1 byte	1 byte

2.7 CRC16 Calculation

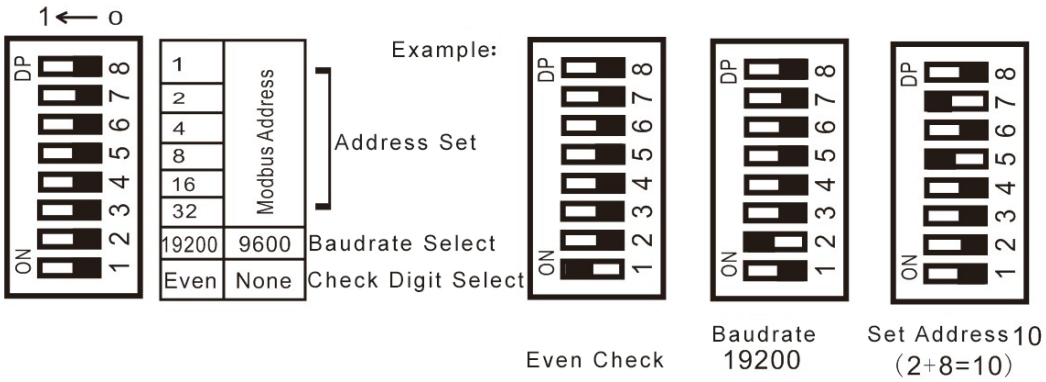
The Modbus_RTU protocol can be downloaded, including the CRC16 calculation method and source code, which can be used universally. And the table or calculation method can both be used.

The table look-up method is fast. Examples are not quoted here. Customers can check the relevant information by yourself.

The following is the direct calculation method

```
unsigned int crc16(unsigned char *addr,int num)
{
    unsigned int crc=0xffff;
    unsigned char i, p;
    for(p=0;p<num;p++)
    {       crc = crc^(*addr++);
            for(i = 0;i<8;i++) {
               if(crc & 0x0001) crc = (crc>>1)^0xa001;
               else   crc >>= 1;
               }
     }
     return(crc);
}
```

3. Address Setting:



4. Common problems and inspection methods

The device cannot connect to the PLC or computer
possible reason:

1) The computer has multiple COM ports, and the selected port is incorrect.
2) The device address is wrong, or there are devices with duplicate addresses.
3) The baud rate, check method, data bit and stop bit are wrong.
4) The host polling interval and waiting response time are too short, generally more than 100ms.
5) The 485 bus is disconnected, or the A and B wires are connected reversely.
6) There are too many devices or the wiring is too long, add a 485 booster, and add a 120Ω terminal resistance (add 120Ω resistance to A and B. This resistance is not integrated on the motherboard
7) The USB to 485 driver is not installed or damaged.
8) The equipment is damaged.

In short, the best way is to use the debugging assistant to monitor the data packets sent