

Modbus transmitter Communication Protocol

V1.3

2019-12-05

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1. Communication Interface

9600, N, 8, 1 RS485 Modbus RTU

Data format: Float Inverse , Float ABCD

2. Floating point (four-byte) Data Type

Table 1.

Register	Function	Property
7000	I level alarm point(low alarm)	R/W
7002	II level alarm point(high alarm)	R/W
7004	Measure range	R
7006	Accuracy	R
7008	Unit	R
7010	Gas type	R
7012	Concentration	R
7014	Alarm Status	R
7016	Real-time AD Value	R
7018	Zero point AD Value	R/W
7020	Full range AD Value	R/W
7022	Device address	R/W

Note: Some configuration software (such as kingview) requires the register address in the table to be +1.

3. Data Specification

Accuracy:

1.000000

Resolution: 1

0.100000	Resolution: 0.1
0.010000	Resolution: 0.01
Unit:	
0.000000	%vol
1.000000	ppm
2.000000	%LEL
3.000000	°C
Gas type:	
0.000000	O2
1.000000	CO
2.000000	H2S
3.000000	NH3
4.000000	H2
5.000000	CL2
6.000000	SO2
7.000000	NO
8.000000	NO2
9.000000	HCHO
10.000000	O3
11.000000	LEL
12-15	Special gas (15 CO2)
Alarm Status:	
0.000000	Normal
1.000000	I level alarm point (low alarm)
2.000000	II level alarm point (high alarm)
3.000000	Malfunction
4.000000	Over range

4. Communication data

Modbus Poll was used for communication test. A sample as below:

4.1 Read all parameters

For example: Request data for device address 01 (read 16 Numbers from 7000)

(I Alarm point, II Alarm point, Range, Resolution,Unit, Gas type, Concentration, Alarm statues)

Master input:

Table 2

	Gas transmitter address	Order	Start address	Data length	CRC verify
Data sample	01	03	1B 58	00 10	C3 31
Data length	1	1	2	2	2

Slave output:

Table 3

	gas transmitter address	Order	Data length	Data	CRC Verify
Data sample	01	03	20	41 C8 00 00 42 48 00 00 42 C8 00 00 3F 80 00 00 40 00 00 00 41 30 00 00 00 00 00 00 00 00 00 00	37 80
Data length	1	1	1	32	2

Master input (8 Bytes):

01 03 1B 58 00 10 C3 31

Slave output 1: 37 bytes

01 03 20 41 C8 00 00 42 48 00 00 42 C8 00 00 3F 80 00 00 40 00 00 00 41 30 00
00 00 00 00 00 00 00 00 00 37 80

As figure 1:

Alias	07000
0 I alarm point	25.000000
1	

2	II alarm point	50.000000
3		
4	Range	100.000000
5		
6	Resolution	1.000000
7		
8	Unit	2.000000
9		
10	Gas type	11.000000
11		
12	Concentration	0.000000
13		
14	Status	0.000000
15		

Figure 1: Status without alarm

Slave output 2 (37 Bytes)

01 03 20 41 C8 00 00 42 48 00 00 42 C8 00 00 3F 80 00 00 40 00 00 00 41 30 00
00 42 34 00 00 3F 80 00 00 CA 56

As figure 2:

	Alias	07000
0	I alarm point	25.000000
1		
2	II alarm point	50.000000
3		
4	Range	100.000000
5		
6	Resolution	1.000000
7		
8	Unit	2.000000
9		
10	Gas type	11.000000
11		
12	Concentration	45.000000
13		
14	Status	1.000000
15		

Figure 2: I level alarm status

4.2 Read parts parameters

For example: Request data for device address 01 (read 10 Numbers from 7006)

(Resolution, Unit, Gas type, Concentration, Statues)

Master input:

Table 4

	Gas transmitter address	order	start address	Data length	CRC verify
Data sample	01	03	1B 5E	00 0A	A2 FB
Data length	1	1	2	2	2

Slave output:

Table 5

	Gas transmitter address	Order	Data length	Data	CRC Verify
Data sample	01	03	14	3F 80 00 00 40 00 00 00 41 30 00 00 42 34 00 00 3F 80 00 00	54 69
Data length	1	1	1	20	2

Master input (8 Bytes):

01 03 1B 5E 00 0A A2 FB

Slave output 1: 25 Bytes

01 03 14 3F 80 00 00 40 00 00 00 41 30 00 00 42 34 00 00 3F 80 00 00 54 69

Alias	07000
0 I alarm point	
1	
2 II alarm point	
3	

4	Range	
5		
6	Resolution	1.000000
7		
8	Unit	2.000000
9		
10	Gas type	11.000000
11		
12	Concentration	45.000000
13		
14	Status	1.000000
15		

Figure 3

4.3 Only read concentration value

For example: Request data for device address 01 (read 2 Numbers from 7012)

(Concentration value)

Master input:

Table 6

	Gas transmitter address	order	start address	Data length	CRC verify
Data sample	01	03	1B 64	00 02	83 30
Data length	1	1	2	2	2

Slave output:

Table 7

	Gas transmitter address	Order	Data length	Data	CRC Verify
Data sample	01	03	04	41 A733 33	0B 09
Data length	1	1	1	4	2

Master input (8 Bytes):

01 03 1B 64 00 02 83 30

Slave output 1: 9 Bytes

01 03 04 41 A7 33 33 0B 09 ,As figure 4

	Alias	
0		0700

1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12	Concentration	20.9
13		

Figure 4

4.4 Alarm point set up

Set up the I-level alarm value and II-level alarm value of address 01

I-Alarm point: 25.0 IIAlarm point:50.0

Master output:

Table 8

	Gas transmitters address	order	Start address	Number of registers	Data length	data	CRC verify
Data sample (hexadecimal)	01	10	1B 58	00 04	08	41 C8 00 00 42 48 00 00	AB 20
Data length	1	1	2	2	1	8	2

Master input: (17 Bytes)

01 10 1B 58 00 04 08 41 C8 00 00 42 48 00 00 AB 20

Slave output (8 Bytes)

01 10 1B 58 00 04 46 FD

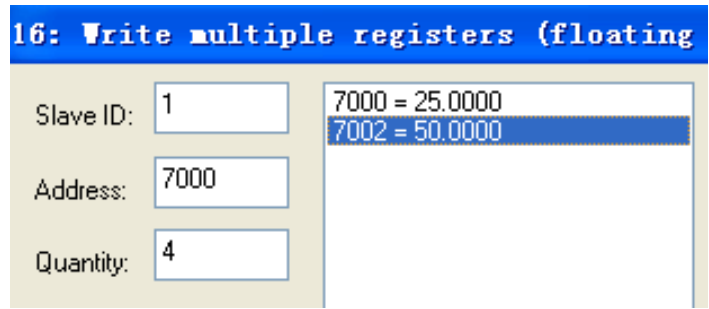


Figure 5: Set up value

5. IEEE754 data format

Float Inverse, Float ABCD

Common configuration software: ModScan32 setting instructions

For example, Read 7000~7014 Register value

Note it is 7001, so register address +1 (7000+1) as below Figure 6.

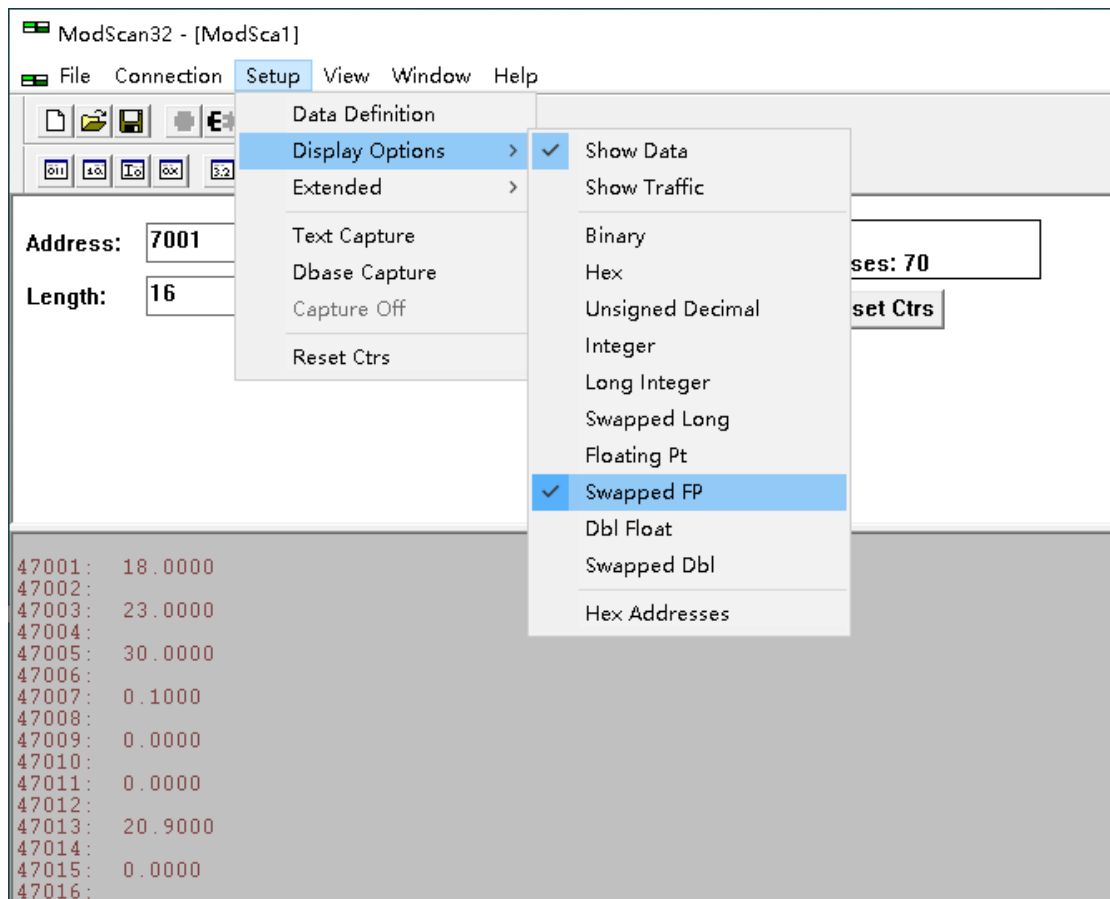


Figure 6

5.1 PLC setting instructions :

The following takes Delta PLC as an example:

For example: device address 1, current concentration register 7012 value is: 20.9

Delta PLC needs to exchange the data read by Modbus for byte exchange as follows:

MODRD K1 K7012 K2

Device address 1, register 7012, read quantity 2, read results will be placed in D1050 and D1051, MOV D1050 D101

MOV D1051 D100,

Put D1050 in D101, and D1051 in D100. The 32-bit floating point number corresponding to D100 value of the register, The ladder diagram is shown in Figure 7 and Figure 8. Figure 7 shows that the monitoring value is set to hexadecimal.

The value of the register.

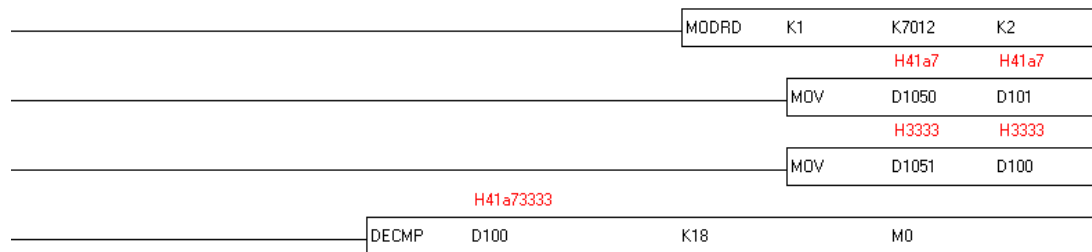


Figure 7 The monitoring value is hexadecimal

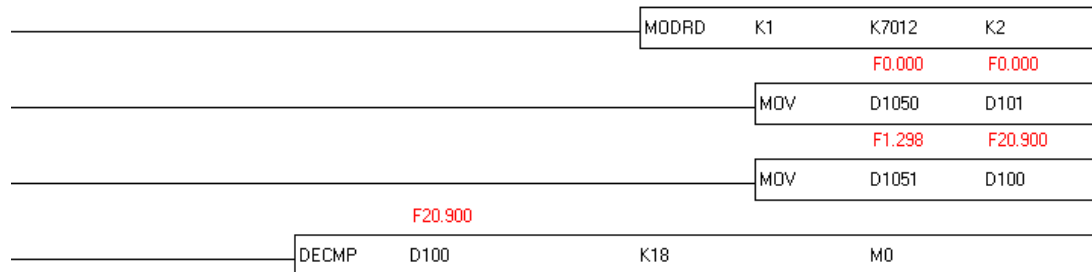


Figure 8: The monitoring value is floating point number

The original data of D1050 is: 0x333341A7, put the data bytes into D100, and the data of D100 is:

0x41A73333, the corresponding floating point number is: 20.9. The device monitoring interface is shown in Figure 9 :

Device name	Note	Status	Set value	Current value (16bits)	Current value (32bits)	Float	Patterns
D1050	Modbus communication instruction data processing			H41A7	H333341A7	F0.000	hexadecimal
D100				H3333	H41A73333	F020.900	hexadecimal

Figure 9. monitoring value is set to hexadecimal.

6. Calibration

The transmitter has been calibrated before it leaves the factory, generally, users do not need to calibrate it. Forbid to do gas calibration in the absence of standard gas.

- **Zero** **correction**

In a normal environment, the gas has a display value. Read the real-time AD value register and write the value to the zero point AD value register.

- **Gas** **calibration**

After injecting the standard gas, the real-time AD value will rise. When the real-time AD value is stable, the full-range AD value will be calculated according to the concentration of the standard gas, and write the calculated value into the full-range AD value register.

Formula:

$$\frac{(\text{Real-time AD} - \text{Zero point AD})}{\text{full range}} = \frac{(\text{Full range AD} - \text{Zero point AD})}{\text{range}}$$

Note:

1. Real-time AD is the stable AD value after standard gas is injected.
2. The carbon dioxide sensor is digital and cannot be calibrated by RS485.

7. Device address

0 Broadcast address (no return value)

1-255 Device address

Change device address:

Write the new address to the device address register, when a successful Settings message showed, the new address can be used to read the data. The new address range is 1-255

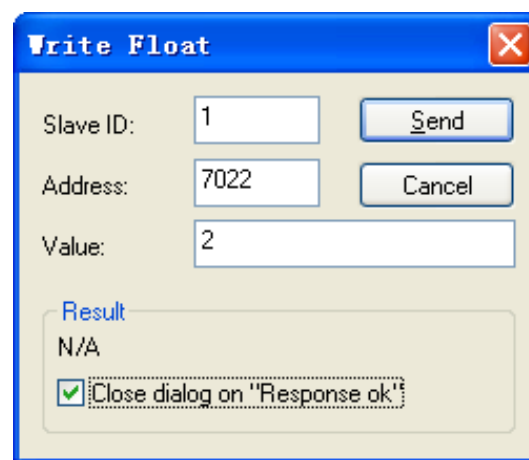


Figure 10. Monitoring values are floating point Numbers