



Siargo Ltd.

MFGD Series MEMS Gas Mass Flow Meter

Modbus RTU Protocol

(V1.0)

Siargo Ltd.

2401 Mission College Blvd, Ste 250,

Santa Clara, CA 95054, USA

Tel: +1-408-969 0368

Fax: +1-408 777 8091

Email: info@Siargo.com.

1 Hardware connection

The MFGD protocol is based on standard Modbus RTU mode. A master (PC or PLC) can communicate with several slaves (MFGD), setting parameter or getting data.

The hardware layer is TIA/EIA-485-A.

2 Communication parameter

The UART parameter is shown as table-1.

Table-1 Modbus Communication parameter

Communication parameter	protocol
	RTU
Baud rate(Bits per second)	9600 bps
Start bits	1 bit
Data bits	8 bits
Stop bits	2 bits
Even/Odd parity	None
Bits period	104.2µs
Bytes period	1.1458ms (11 bits)
Maximum data length	20
Maximum Node	247

3 Frame

The framing function is accord with The Standard Modbus RTU framing, which is shown as below:

Start_bits	Address	Function code	Data	CRC	Stop_bits
T1-T2-T3-T4	8Bit	8Bit	N 8Bit ($20 \geq n \geq 0$)	16Bit	T1-T2-T3-T4

Start_bits: 4 periods bit time, to indicate a new frame.

Address: The address, can be set as 0 to 247. 0 is broadcast address.

Function code : Define the action that MFGD should takes, or indicate that which code the MFGD is responding .

Data: Including the address of register, length of data and the data.

CRC : CRC verify code , the low byte is flowed by high byte. For example, the 16bit CRC code is divide as BYTE_H BYTE_L, in the frame, the BYTE_L goes first, then the BYTE_H, at last, is the stop signal.

Stop_bits: 4 periods bit time, to indicate that the current framing is over.

4 Function code

The MFGD Modbus Function-code is a subclass of Standard Modbus Function-Code .By using these function-code, We can set or read the registers of the MF5GD Flow Meter.

They are shown as table-2:

Table-2 MFGD Series MEMS gas mass flow meter Modbus function-code

CODE	name		action
0x03	Read register	int、 char、 float	Read register (one or more)
0x06	Set single register	int、 char、 float	Write one single 16bit register
0x08	CRC verify	int	Check the communication
0x16	Set multi registers	int、 char、 float	Write multi registers

5 Registers

The MFGD series MEMS gas flow meter has several registers .We can get the information (such as “address”, “flow rate” and so on) form reading these registers, or we can write into some of the registers for setting parameters of the Flow meter.

The registers are shown as table-3:

Table-3 The register of MFGD series MEMS gas mass flow meter

NAME	Description	REGISTER	Modbus
Communication Protocol	The communicate protocol of MFGD (W/R)	0x0000	40000(0x0000)
Address	The address of MFGD flow meter (W/R)	0x0001	40001(0x0001)
Flow Rate	The current flow rate (R)	0x0002~ 0x0003	40002(0x0002)
Total	The accumulative total of flow rate (W/R)	0x0004~ 0x0006	40004(0x0004)
SN	Series Number of the MFGD (R)	0x0007~ 0x000C	

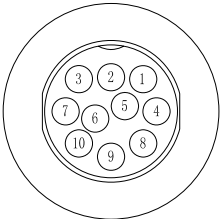
* R-read only , W-write only , W/R - read and write;

Table-4 Description of registers

(1) Communicate Protocol	0x0000	WRITE	A
		READ	A
Description	Protocol mode		
Value type	UINT16		
Detail	Value = 0: Mode A, Siargo flow meter communicate mode Value = 1: ModBus mode		
(2) Flow meter	0x0001	WRITE	A

Address		READ	A
Description	The address of flow meter in modbus protocol		
Value type	UINT16		
Detail	Value from 1 to 247. 0 is broadcast address, do not used for customer.		
<hr/>			
(3) Flow Rate	0x0002~0x0003	WRITE	N
		READ	A
Description	The current flow rate		
Value type	UINT16		
Detail	<p>Flowrate = (value(0x0002) * 65536 + value(0x0003)) /1000</p> <p>Example:</p> <p>When the LCD shows 20.34 SLPM, we can get “0” form register 0x0002 and “20340” form register 0x0003.</p> <p>Thus, flowrate = (0*65536 + 20340)/1000= 20.340</p>		
<hr/>			
(4) Total	0x0004~0x0006	WRITE	A
		READ	A
Description	The accumulative total of flow		
Value type	UINT32 + UINT16		
Detail	<p>V1 = value (0x0004) * 65536 +value (0x0005);</p> <p>V2 = value (0x0006)</p> <p>Total = (V1 *1000 + V2)/1000 ;</p> <p>Example:</p> <p>When the LCD shows 3452.245NCM, we can get “0” from register 0x0004, “3452” from register 0x0005, “245” from register 0x0006.</p> <p>Then, V1 = 0*65536 + 3452; V2= 245</p> <p>Total =(3452*1000+245) /1000=3452.245</p>		
<hr/>			
(5) SN	0x0007~0x000C	WRITE	N
		READ	A
Description	Series Number of the MFGD		
Value type	UINT8 (12 bits)		
detail	<p>SN= value(0x0007), value(0x0008),.....,value (0x000C);</p> <p>When you get 12 bits are 2A 47 37 41 45 49 30 32 30 35 38 2A , then the SN of the MFGD is *G7AEI02058*.</p>		

6 Connection

Pin	Definition	Description		Notes
1	POWER	Power supply for Communication(+)		4V<Vdc<10V, Idc >50mA
2	GND	Power/Signal GND (Common)		
3	RS485-A	RS485 A+		
4	RS485-B	RS485 B-		
5	Pulse output	Pulse output for total		
6~10	For other use	For other use		