

D08-1G、D08-1GM Flow Readout Box

Instruction Manual



D08-1G、D08-1GM Flow Readout Box revision:

Author	Date	Description	Revision
Zhao Di	09/12/2007	Initial version	1.01
Zhao Di	03/15/2010	The program in D08-1G/1GM were modified to make it more stable; The command of reading instantaneous flow set point value was added in D08-1G communication protocol. Please see Appendix 1 for details.	2.01


A NOTE TO OUR CUSTOMERS

Dear customer,

Thank you for purchasing SEVENSTAR D08 series Flow Readout Boxes.

This user manual is important when installing and doing maintenance. Please keep it carefully.

We strongly recommend that you read this manual thoroughly before you starting to use the product. This user manual introduces the important issues including the proper and safe use of the products.

And please notice the words and section with the symbol . Not in accordance with the user manual for the use of property caused by loss or personal injury, SEVENSTAR may not be responsible.

If you require any additional information or assistant of Sevenstar D08 series Flow Readout Boxes. Please feel free to contact your local Sevenstar Sales Agent or Sevenstar Customer Service at:
(8610)- 6436 2925.

Yours sincerely,

Sevenstar

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D08-1G Flow Accumulator Operating Instruction

1. GENERAL

D08-1G Flow Readout Box has been designed to provide power supply, flow setpoint and flow rate readout display for MFC&MFM. Besides D07 series MFC&MFM, D08-1G Flow Readout Box can also be used for other MFCs.

2. SPECIFICATIONS

Table 1. Specifications of D08-1G Flow Display

No.	Items	D08-1G
1	Output Power Supply	+15V \pm 5% 200mA , -15V \pm 5% 400mA
2	Flow Rate Readout Display Resolution	0.1% F.S.
3	Power Supply	85-265V AC 50Hz/60Hz
4	Max Power Consumption	10 W
5	Standard Power Supply	+5.00V, 5mA Voltage Tolerance: \pm 0.1%
6	Serial Communication Interface	RS232, RS485
7	Dimension	72 \times 72 \times 168 mm
8	Control Channel	1 Way MFC or 1 Way MFM
9	Weight	0.5 Kg

3. OPERATION PRINCIPLE

D08-1G Readout Box is consisted of $\pm 15V$ power supply, 5V signal voltage, modulus converter, instantaneous flow rate displayer, 6 keyboards and communication parts. The flow rate readout voltage (0V~+5V) of MFC/MFM is converted to digital signal A/D converter and sent to the MCU. The instantaneous flow rate readout can be indicated by the four-unit-LED displayer in SCCM (Standard Milliliter/Min) , SLM (Standard Liter/Min) or KSLM (Standard Kiloliter /Min, viz. Standard M³/Min).

D08-1G Readout Box can communicate with the Master via Standard RS232 or RS485 Serial Communication Interface (RS-232 and RS-485 is selected by the slide switch S2 on circuit board). Please refer to the Chapter 4.5 for more details of the serial communication.

4. INSTALLATION & CONNECTION

4.1 Dimensions are showed in figure 1:

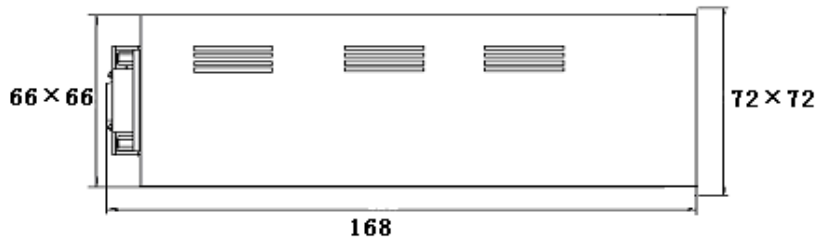


Figure1. Dimensions of D08-1G

4.2 Tapping Installation Dimensions: (67×67)mm.

4.3 Installation Mode: Standard Inlay Installation.

4.4 View of Readout Box

Front panel view(Figure 2) and back panel view(Figure 3).

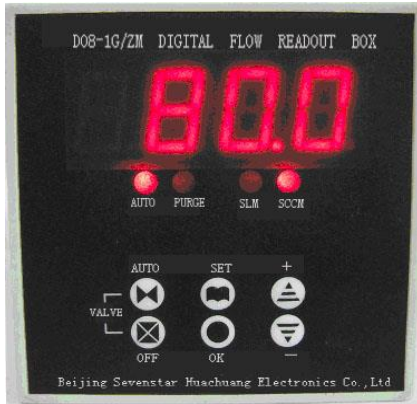


Figure2. Front panel view of D08-1G

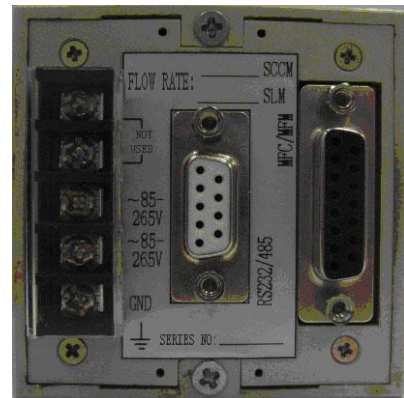


Figure3. Back panel view of D08-1G

4.5 Serial communication connection (Figure 4)

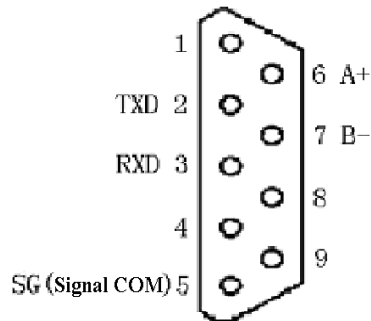


Figure4. 9-pin Standard D-Sub socket

If one Master(PC) is only communicated with one D08-1G Readout Box, RS232 communication mode is commended. If one Master(PC) is communicated with several D08-1G Readout Boxes (Maximum=16), RS485 communication mode should be chosen
 RS232 communication mode connection:

Please connect pin 2(TXD), pin 3(RXD) and pin 5(SG) of the 9-D connector in figure 4 to RXD, TXD and Signal COM of the standard RS232 serial port of the Master;

RS485 communication mode connection:

Please connect pin 6(A+) , pin 7(B-) in figure 4 to pin(A+), pin(B-) of standard RS485 serial port.

The Half-Duplex Mode is adopted in RS485 Communication. By different Mac addresses, the master(PC) can communicate with up to 16 1G Readout Boxes. (Please refer to the Appendix 1 for more details).

4.6 15 pin Standard D-Sub connector for MFC

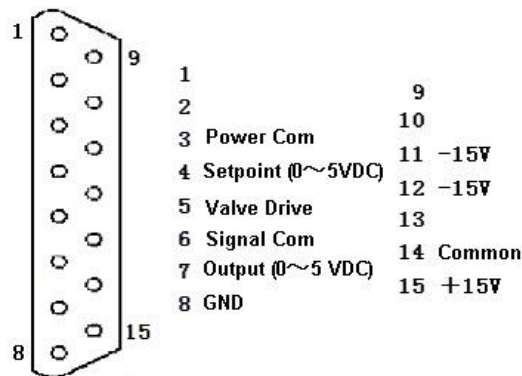


Figure 5. 15 pin Standard D-Sub connector for MFC

4.7 220VAC Power Connection

The wire color of three-core AC Power cable includes brown, blue and yellow-green. On the back of D08-1G, two '85-265V' ports are connected to the brown wire and the blue wire respectively, 'GND' port is connected to the yellow-green wire.

5. OPERATION PROCEDURE

5.1 Startup

Apply power to the Flow Readout Box and start operation.

5.2 Initial State

“Valve Drive ” is default. The red “ Valve Drive ” LBD will be ON.

Default full scale:100.0SCCM.

Default Mac address: 1.

5.3 Keys Definitions

The functions of 6 keys on the front panel of D08-1G Readout Box are shown below:

“SET ”:

This key is used to enter setting menu mentioned in 5.4. The setting menu includes five submenus.

“OK” :

This key is used to enter the menus and save the values.

“+” Key:

This key is used to increase the numeric values on the screen. The number will increase quickly if the key is pressed continuously.

“—” Key:

This key is used to decrease the numeric values on the screen. The number will decrease quickly if the key is pressed continuously.

“AUTO” :

This key is used to set the valve to “ Valve Drive ” state.

“OFF”

This key is used to set the valve state to “Close” state.

5.4 The submenus

Press “SET” key to enter submenu selection. The submenus can be changed by using the “+ /—” keys. The Display will return to the state of instantaneous flow rate readout display by pressing the “SET” key

Submenu1 : Setpoint

Press “SET” key to enter submenu 1. The screen will display “1”.

Press “+” key up to submenu 2. The screen will display “2” ;

Press “—” key down to submenu 5. The screen will display “5”;

Press “SET” key again to return to the state of instantaneous flow rate readout display;

In submenu1, from last bit to most bit, every bit of the setpoint will be set in sequence. The value can be increased or decreased by “+” and “-”. Press the “OK” to accept the value and shift to set next bit. Press the “OK” four times to back to submenu selection.

NOTICE

If exceeds the full scale, the setpoint will be automatically set to the full scale value after the “OK” key is pressed.

Submenu2: SELECT FULL SCALE

Similar as submenu 1, the full scale can be set in the submenu 2 in bit sequence. The only difference is that after numeric value setting, the position of radix point should be selected by “+” key. After that, press “OK” to save the full scale value and back to submenu selection.

NOTICE

The Full Scale’s radix point location will influence the revolution of the instantaneous flow rate readout. The radix point of flow rate readout will be set to the same position of the full scale automatically

Submenu3: SET UNIT

In the submenu selection, set the numeric value to “3” and press the “OK” key to enter submenu 3. The screen will display “31”. Use “+/-” keys to select “SLM” unit or “SCCM” unit. The SLM LBD and SCCM LBD will indicate which unit has been selected. After that, press “OK key” to save the unit and back to the submenu selection.

Submenu4: SET ADDRESS

Submenu 4 uses the same procedure as submenu1. The effective range of address is 0~255.

NOTICE

During the communication, please make sure that address of the readout box is match with the slave address sent by the Master. Otherwise the Master cannot find the Slave. For the details, see 《The Communication Protocol of D08-1G Flow Readout Box》 .

Submenu5: PURGE

In the submenu selection, set the numeric value to “5” and press the “OK” key to enter submenu 5., the screen will display “51”. Press the “OK key”, the valve will be set to “Valve Purge” state, AUTO LBD will turn off, and PURGE LBD will blink. There are two methods to stop “Valve Purge” state. a) Press “Set” key to stop purge only. b) Press “Auto” key to stop purge and back to flow rate readout display.

NOTICE

The flow readout will overflow and blink if instantaneous flow rate readout is far greater than the full scale value.

5.5 SHUT DOWN

Disconnected AC power, the Readout Box will turn off.

SAFEGUARD FUNCTION when power is off

The setpoint, full scale and units will be saved automatically when power off.

6. EXAMPLES

I: The steps for changing the full Scale value from 100.0SCCM to 2000SCCM:

- 1 Press the “SET” , “1” will appear on the screen. And increase it to “2” by pressing “+”.
- 2 Press the “OK” to enter submenu2. Last bit “0” will flash.
- 3 Press the “OK” three times, thousands bit “1” will blink.
- 4 Press “+” to increase the numeric value to “2”.
- 5 Press the “OK”, the current location of the radix point will be shown and blink.
- 6 Press the “+” three times, the radix point will be set to the last bit. At that time, the radix point is disappear.
- 7 Press the “OK” to save and return to submenu2. Then press the “SET” to exit.

II: The steps for changing the unit from SCCM to SLM.

- 1 Press the “SET”. “1” will appear on the display. Then increase it to “3” by pressing the “+”.
- 2 Press the “OK” . The screen will display “31”.
- 3 Press the “+”. SCCM LBD will turn off and SLM LBD will turn on.
- 4 Press the “OK” to save and return to submenu3.
- 5 Press the “SET” to exit.

7. CAUTION

- 7.1 If voltage signal of flow rate readout is negative, “-00.0” will be displayed.
- 7.2 The “Valve drive” state can be changed to “OFF” state by pressing the “OFF”. At this time, the setpoint is disenabled. The setpoint can still be update in the submenu1. But MFC will follow the setpoint after back to the ”Valve drive” state.
- 7.3 D08-1G Flow Readout Box can also operate MFM. In this way, the “Valve control” and “Setpoint” are disenabled.
- 7.4 Please refer to appendix I for more information about communication protocol.

8. PRODUCTION SELECTION

8.1 Type selection

Type	Circuit				Cases			Display			Power supply			Output voltage		Other funtions							
	MFC	MFM	Ana.	Dig.	Mini-Type	Desk-style	Rack-desk-style	1 channel Display	Multi-Channel Display	Multi-Channel Multi-Display	~110 VAC	~220 VAC	~85-265 VAC	±15 VDC	+24 VDC	4~20mA/0~10mA I input	4~20mA/0~10mA I output	4~20mA / 1~5V Input Signal	4~20mA / 1~5V Output Signal	RS232/RS485 Commu-nication	Setpoint display	Flow Accumu-lator	
1F	✓	✓	✓		✓		✓						✓	✓		✓	✓						
1FM		✓	✓		✓		✓						✓	✓		✓							
1FP	✓	✓	✓		✓		✓						✓	✓		✓	✓					✓	
1/2/4	✓	✓	✓			✓		✓				✓		✓									
2F/3F/4F	✓	✓	✓			✓				✓	✓	✓		✓									
2B/3B/4B 2E/3E/4E	✓	✓	✓			✓				✓		✓		✓									
1K	✓	✓	✓		✓		✓						✓		✓			✓	1~5V				
1G	✓	✓		✓	✓		✓						✓	✓							✓		
1GM		✓		✓	✓		✓						✓	✓							✓		
8C	✓	✓		✓	✓		✓						✓	✓							✓		✓
8CM		✓		✓	✓		✓						✓	✓							✓		✓

8.2 Order form

D08- [t] - [b] - [s]

[t] – Type ←

1G

[c] – Communication type ←

-[2] RS232

-[4] RS485

[s] – Special request ←

-[-] percentage display(100.0),Chinese label.

-[S] List full scale(see table on right side) and other request.

Full scale	Code
5sccm	A
10sccm	B
20sccm	C
30sccm	D
50sccm	E
100sccm	F
200sccm	G
300sccm	H
500sccm	J
1slm	K
2slm	L
3slm	M
5slm	N
10slm	P
20slm	Q
30slm	R
50slm	U
100slm	V
150slm	W
200slm	X
250slm	Y
300slm	Z

APPENDIX 1

D08-1G COMMUNICATION PROTOCOL

1: Summary

This protocol is applied to the communication between the Master(PC) and D08-1G Flow Readout Box.

Data format: hexadecimal

Baud rate: 9600 b/s

Data bits: 8 bits

Stop bit: 1 bit

Parity: None

2: DETAILED DATA FORMAT

2.1 Read flow Readout Box's current state

→ Request message from the Master (8 bytes):

01 03 00 02 00 05 24 09

which means:

- 01 Address of the device, here 1
- 03 Reading command;
- 00 02 Address to read, here 0x0002
- 00 05 Number of word to read: Here 5 words (10 bytes)
- 24 09 CRC(calculated)

← Answer message from the Slave device

01 03 0A (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) CRCL CRCH

which means:

- 01 Address of the device, here 1;
- 03 Reading command;
- 0A Number of bytes read;
- (1)~(4) Instantaneous flow rate;

The data “00~09” denotes corresponding number “0~9” ;

The data “10~19” denotes corresponding number “0.~9.”;

“0F” denotes blank;

“0A” denotes “-” ;

“1A” denotes “.” ;

Transferred sequence is from LSB to MSB;

For example: (1)~(4)=00 10 09 0F denotes the instantaneous flow is “90.0”;

(5)~(8) Full Scale

The Data definitions are the same as that of instantaneous flow rate;

For example: (5)~(8)=00 10 00 01 denotes the full scale is “100.0”;

(9) Units;

00 denotes SCCM and SCC(or SLM and SL);

01 denotes SCCM and SL(or SLM and KSL);

11 denotes SLM and SL(or KSLM and KSL);

(10) Valve state;

00 denotes “Valve OFF”; 80 denotes “Valve Drive”; FF denotes “Valve PURGE”;

CRCL CRC Lo

CRCH CRC Hi

2.2 Read Instantaneous flow set point value

→ Request message from the Master(PC) 8 bytes

01 03 01 0A 00 02 E5 F5

which means:

01 Address of the device, here 1;

03 Reading command;

01 0A Address to read, here 0x010A;

00 02 Number of word to read: Here 2 words(4 bytes);

E5 F5 CRC(calculated)

← Answer message from the Slave device

01 03 04 (1) (2) (3) (4) CRCL CRCH

which means:

01 Address of the device, here 1;

03 Reading command;

04 Number of bytes read, here 4 bytes;

(1)~(4) Instantaneous flow set point value;

The data "00~09" denotes corresponding number "0~9" ;

The data "10~19" denotes corresponding number "0.~9.";

Transferred sequence is from low digit to high digit;

For example: (1)~(4)=00 10 08 00 denotes the instantaneous set point flow is "80.0";

CRCL CRCH: CRC(calculated)

2.3 Changing the Valve state

→ Request message from the Master(PC) 8 bytes

01 06 00 16 00 00 68 0E

"Valve OFF"

01 06 00 16 00 80 69 AE

"Valve Control"

01 06 00 16 00 FF 28 4E

"Valve PURGE"

which means:

01 Address of the device, here 1

05 Command, here writing 1 word;

00 16 Starting address;

00 00 Valve OFF;

00 80 Valve Control;

00 FF Valve PURGE;

Last two bytes CRC(calculated)

← Answer message from the Slave device

The answer is identical to the request.

2.4 Set the setpoint value of instantaneous flow

→ Request message from the Master(PC) 8 bytes

01 06 01 0A (1) (2) CRCL CRCH

which means:

01 Address of the device, here 1

06 Command, here writing 1 word;

01 0A Starting address;

(1) (2) Setpoint value in hex. (1) is the Hi byte, (2) is the Lo byte;

NOTICE

When you set the setpoint value, you shouldn't be concerned about the location of radix point, because the radix point's location is identical to the Full Scale's.

Examples

Data	Radix point location	Setpoint value
00 00		0
	Decimal location	0.0
01 F4		500
	Decimal location	50.0
02 EE		750
	Decimal location	75.0
03 E8		1000
	Decimal location	100.0
1D 4C		7500
	Decimal location	750.0

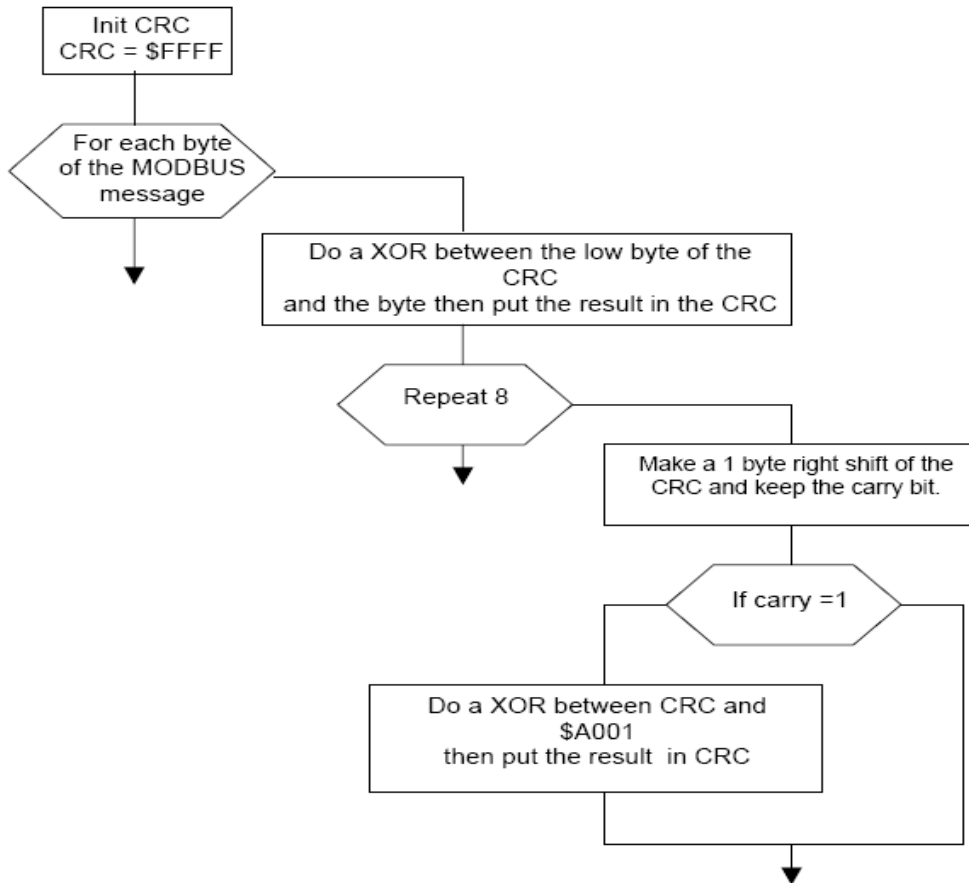
CRCL CRCH: CRC(calculated)

← Answer message from the Slave device

The answer is identical to the request.

3: CRC calculation algorithm

The CRC is calculated from all the bytes of the message excepted the CRC itself by using a “Cyclic redundancy check” with the following algorithm:



C code for a CRC calculation:

```
CRC=0xFFFF;
for(i=0;i<length(message)-1;i++)
{
    CRC=CRC^(message[i] & 0x00FF);
    for(j=0;j<8;j++)
        {
            carry=CRC & 0x0001;
            CRC=CRC>>1;
            if(carry==0x0001)CRC=CRC^0xA001;
        }
}
```

Pascal Code for a CRC calculation:

```
PROCEDURE CALCRC(var CRC:word; c:char);
Var carry:word;
    l:byte
BEGIN
CRC := CRC XOR ( ord(c) AND $00FF );
For d := 0 To 7 Do
    Begin
        carry := CRC AND $0001 ;
        CRC := CRC SHR 1 ;
        If carry = $0001 Then CRC := CRC XOR $A001 ;
    End;
END;
CRC := $FFFF;
For i := 1 To Length(Message) Do CALCRC(CRC, Message [i]);
Message := Message + chr( (CRC + 256) MOD (((CRC div 256)+1)*256))+ chr(CRC div 256);
```

D08-1GM Flow Readout Box Operating Instruction

1. GENERAL

D08-1GM Flow Readout Box has been designed to provide power supply, flow rate readout display for MFM. Besides D07 series MFM, D08-1GM Flow Readout Box can also be used for other MFMs.

2. SPECIFICATIONS

Table 1. Specifications of D08-1GM Flow Display

No.	Items	D08-1GM
1	Output Power Supply	+15V \pm 5% 200mA , -15V \pm 5% 400mA
2	Flow Rate Readout Display Resolution	0.1% F.S.
3	Power Supply	85-265V AC 50Hz/60Hz
4	Max Power Consumption	10 W
5	Standard Power Supply	+5.00V, 5mA Voltage Tolerance: \pm 0.1%
6	Serial Communication Interface	RS232, RS485
7	Dimension	72 \times 72 \times 168 mm
8	Control Channel	1 Way MFC or 1 Way MFM
9	Weight	0.5 Kg

3. OPERATION PRINCIPLE

D08-1GM Readout Box is consisted by $\pm 15V$ power supply, 5V signal voltage, modulus converter, instantaneous flow rate displayer, 4 keyboards and communication parts. The flow rate readout voltage (0V~+5V) of MFM is converted to signal by the A/D converter and sent to the MCU. The instantaneous flow rate readout can be indicated by the four-unit-LED displayer in SCCM (Standard Milliliter/Min), SLM (Standard Liter/Min) or KSLM (Standard Kilo-liter /Min, viz. Standard M³/Min).

D08-1GM Readout Box can communicate with the Master via Standard RS232 or RS485 Serial Communication Interface. (RS-232 and RS-485 is selected by the slide switch S2 on circuit board). Please refer to the Chapter 4.5 for more details of the serial communication.

4. INSTALLATION & CONNECTION

4.1 Dimensions are showed in figure 1:

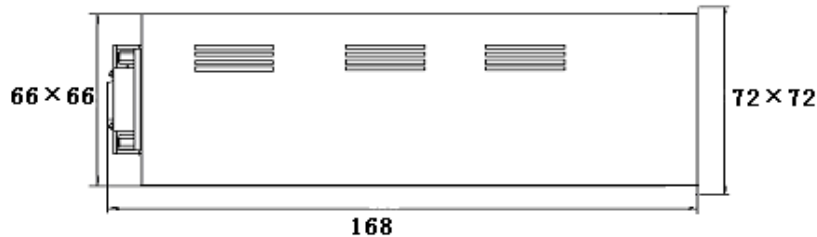


Figure1. Dimensions of D08-1GM

4.2 Tapping Dimensions: (67 × 67)mm.

4.3 Installation Mode: Standard Inlay Installation.

4.4 Front panel view(Figure 2) and back panel view(Figure 3).



Figure2. Front panel view of D08-1GM

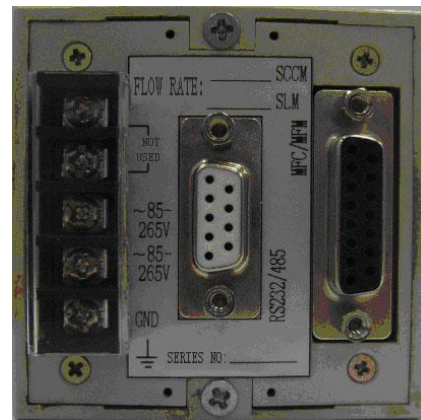


Figure3. Back panel view of D08-1GM

4.5 Serial communication connector (Figure 4)

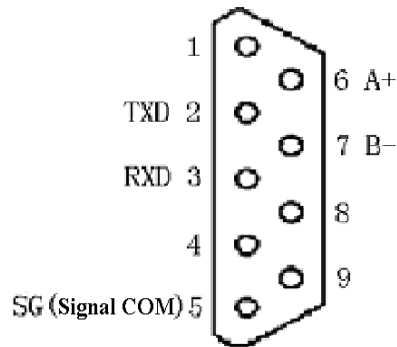


Figure4. 9-pin Standard D-Sub socket

If one Master(PC) is only communicated with one D08-1GM Readout Box, RS232 communication mode is commended. If one Master(PC) is communicated with several D08-1GM Readout Boxes (Maximum=16), RS485 communication mode should be chosen.

RS232 communication mode connection:

Please connect pin 2(TXD), pin 3(RXD) and pin 5(SG) of the 9-D connector in figure 4 to RXD, TXD and Signal COM of the standard RS232 serial port of the Master.

RS485 communication mode connection:

Please connect pin 6(A+) , pin 7(B-) in figure 4 to pin(A+), pin(B-) of standard RS485 serial port.

The Half-Duplex Mode is adopted in RS485 Communication. By different Mac addresses, the master(PC) can communicate with up to 16 1GM Readout Boxes. (Please refer to the Appendix 2 for more details).

4.6 15 pin Standard D-Sub connector for MFC

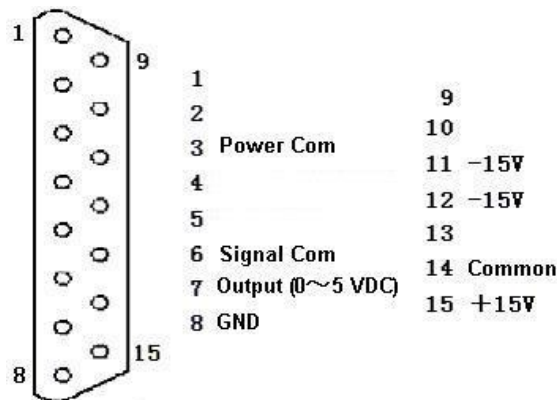


Figure 5. 15 pin Standard D-Sub connector for MFM

4.7 220VAC Power Connection

The wire color of three-core AC Power cable includes brown, blue and yellow-green. On the back of D08-1GM , two ‘~85-265V’ ports are connected to the brown wire and the blue wire respectively, ‘GND’ port is connected to the yellow-green wire.

5. OPERATION

5.1 Startup

Apply power to the Flow Readout Box and start operation.

5.2 Initial State

Default full scale:100.0SCCM.

Default Mac address: 1.

5.3 Keys Definitions

The functions of 4 keys on the front panel of D08-1GM Readout Box are shown below:

“SET”

This key is used to enter setting menu mentioned in 5.4. The setting menu includes three submenus.

“OK”

This key is used to enter the menus and save the values

“+”

This key is used to increase the numeric values on the screen. The number will increase quickly if the key is pressed continuously.

“_”

This key is used to decrease the numeric values on the screen. The number will decrease quickly if the key is pressed continuously.

5.4 The submenus

Press “SET” key to enter submenu selection. The submenus can be changed by using the “+/-” keys. The Display will return to the state of instantaneous flow rate readout display by pressing the “SET” key.

Submenu1 : SELECT FULL SCALE

Press “SET” key to enter submenu 1. The screen will display “1”.

Press “+” key up to submenu 2. The screen will display “2” ;

Press “-” key down to submenu 3. The screen will display “3”;

Press “SET” key again to return to the state of instantaneous flow rate readout display;

Press “OK” key to enter to the state of Full Scale. The set sequence is as follows:

In submenu1, from last bit to most bit, every bit of the setpoint will be set in sequence. The value can be increased or decreased by “+” and “-”. Press the “OK” to accept the value and shift to set next bit. Press the “OK” four times, the position of radix point should be selected by “+” key. After that, press “OK” to save the full scale value and back to submenu selection

NOTICE

The Full Scale’s radix point location will influence the revolution of the instantaneous flow rate readout. The radix point of flow rate readout will be set to the same position of the full scale automatically.

Submenu2: SET UNIT

In the submenu selection, set the numeric value to “2” and press the “OK” key to enter submenu 2. The screen will display “21”. Use “+/-” keys to select “SLM” unit or “SCCM” unit. The SLM LBD and SCCM LBD(or SLM LBD and KSLM LBD) will indicate which unit has been selected. After that, press “OK key” to save the unit and back to the submenu selection.

Submenu3: SET ADDRESS

Submenu 3 uses the same procedure as submenu1.(without position of radix point.)

NOTICE

During the communication, please make sure that address of the readout box is match with the slave address sent by the Master. Otherwise the Master cannot find the Slave. For the details, see 《The Communication Protocol of D08-1GM Flow Readout Box》 .

5.5 SHUT DOWN

Disconnected AC power, the Readout Box will turn off.

SAFEGUARD FUNCTION when power is off

The setpoint, full scale and units will be saved automatically when power off.

6. EXAMPLES

I: The steps for changing the full Scale value from 100.0SCCM to 2000SCCM:

1. Press the “SET” , “1” will appear on the screen.
2. Press the “OK” to enter submenu2. Last bit “0” will flash.
3. Press the “OK” three times, thousands bit “1” will blink.
4. Press “+” to increase the numeric value to “2” .
5. Press the “OK”, the current location of the radix point will be shown and blink.
6. Press the “+” three times, the radix point will be set to the last bit. At that time, the radix point is disappear.
7. Press the “OK” to save and return to submenu1. Then press the “SET” to exit.

II: The steps for changing the unit from SCCM to SLM.

1. Press the “SET”. “1” will appear on the display. Then increase it to “2” by pressing “+” .
2. Press the “OK” . The screen will display “21” .
3. Press the “+” . SCCM LBD will turn off and SLM LBD will turn on.
4. Press the “OK” to save and return to submenu2.
5. Press the “SET” to exit.

7. CAUTION

7.1 If voltage signal of flow rate readout is negative, “-00.0” will be displayed.

7.2 Please refer to appendix II for more information about communication protocol.

8. PRODUCTION SELECTION

8.1 Type selection

Type	Circuit			Cases			Display			Power supply			Output voltage		Other functions								
	MFC	MFM	Ana.	Dig.	Mini-Type	Desk-style	Rack-desk-style	1 channel Display	Multi-Channel Display	Multi-Channel Multi-Display	~110 VAC	~220 VAC	~85-265 VAC	±15 VDC	+24 VDC	4~20mA/0~10mA I input	4~20mA/0~10mA I output	4~20mA / 1~5V Input Signal	4~20mA / 1~5V Output Signal	RS232/RS485 Communication	Setpoint display	Flow Accumulator	
1F	✓	✓	✓		✓		✓						✓	✓		✓	✓						
1FM		✓	✓	✓			✓						✓	✓		✓	✓						
1FP	✓	✓	✓		✓		✓						✓	✓		✓	✓					✓	
1/2/4	✓	✓	✓			✓			✓			✓		✓									
2F/3F/4F	✓	✓	✓			✓				✓	✓			✓									
2B/3B/4B 2E/3E/4E	✓	✓	✓			✓				✓	✓			✓									
1K	✓	✓	✓		✓		✓						✓		✓			✓	1~5V				
1G	✓	✓		✓	✓		✓						✓	✓						✓			
1GM		✓		✓	✓		✓						✓	✓						✓			
8C	✓	✓	✓	✓	✓		✓						✓	✓						✓			✓
8CM		✓		✓	✓		✓						✓	✓						✓			✓

8.2 Order form

D08- [t] - [b] - [s]

[t] – Type

1GM

[c] – Communication type

-[2] RS232

-[4] RS485

[s] – Special request

-[-] percentage display(100.0),Chinese label.

-[S] List full scale(see table on right side) and other request.

Full scale	Code
5sccm	A
10sccm	B
20sccm	C
30sccm	D
50sccm	E
100sccm	F
200sccm	G
300sccm	H
500sccm	J
1slm	K
2slm	L
3slm	M
5slm	N
10slm	P
20slm	Q
30slm	R
50slm	U
100slm	V
150slm	W
200slm	X
250slm	Y
300slm	Z

APPENDIX 2

D08-1GM COMMUNICATION PROTOCOL

1: Summary

This protocol is applied to the communication between the Master(PC) and D08-1GM Flow Readout Box.

Data format: hexadecimal

Baud rate: 9600 b/s

Data bits: 8 bits

Stop bits: 1 bit

Parity: None

2: DETAILED DATA FORMAT

2.1 Read flow Readout Box's current state

→ Request message from the Master (8 bytes):

01 03 00 02 00 05 24 09

which means:

- 01 Address of the device, here 1
- 03 Reading command;
- 00 02 Address to read, here 0x0002;
- 00 05 Number of word to read: Here 5 words(10 bytes)
- 24 09 CRC(calculated)

←Answer message from the Slave device

01 03 0A (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) CRCL CRCH

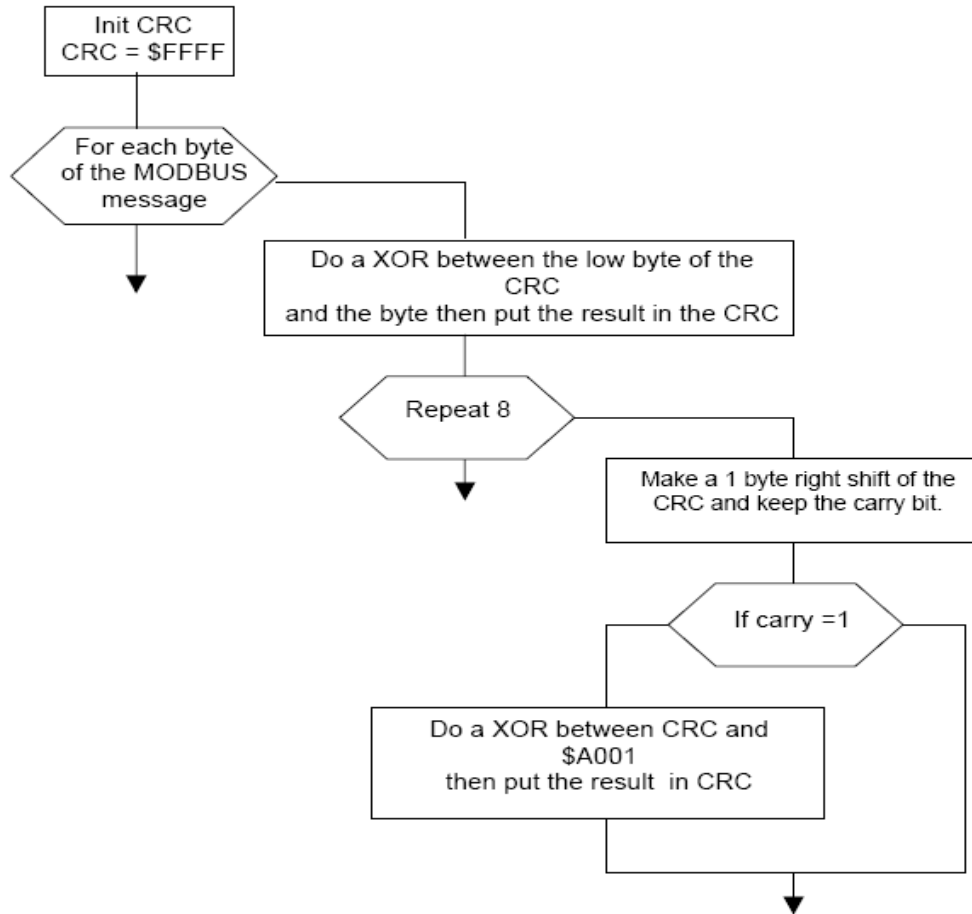
which means:

- 01 Address of the device, here 1
- 03 Reading command;
- 0A Number of bytes read;

- (1)~(4) Instantaneous flow rate;
The data "00~09" denotes corresponding number "0~9" ;
The data "10~19" denotes corresponding number "0.~9." ;
"0F" denotes blank;
"0A" denotes "-" ;
"1A" denotes "-." ;
Transferred sequence is from LSB to MSB;
For example: (1)~(4)=00 10 09 0F denotes the instantaneous flow is "90.0";
- (5)~(8) Full Scale
The Data definitions are the same as that of instantaneous flow rate;
For example: (5)~(8)=00 10 00 01 denotes the full scale is "100.0";
- (9) Units;
00 denotes SCCM and SCC(or SLM and SL);
01 denotes SCCM and SL(or SLM and KSL);
11 denotes SLM and SL(or KSLM and KSL);
- (10) Not defined
CRCL CRC Lo
CRCH CRC Hi

3: CRC calculation algorithm

The CRC is calculated from all the bytes of the message excepted the CRC itself by using a “Cyclic redundancy check” with the following algorithm:



C code for a CRC calculation:

```
CRC=0xFFFF;
for(i=0;i<length(message)-1;i++)
{
    CRC=CRC^(message[i] & 0x00FF);
    for(j=0;j<8;j++)
        {
            carry=CRC & 0x0001;
            CRC=CRC>>1;
            if(carry==0x0001)CRC=CRC^0xA001;
        }
}
```

Pascal Code for a CRC calculation:

```
PROCEDURE CALCRC(var CRC:word; c:char);
Var carry:word;
    l:byte
BEGIN
CRC := CRC XOR ( ord(c) AND $00FF );
For d := 0 To 7 Do
    Begin
        carry := CRC AND $0001 ;
        CRC := CRC SHR 1 ;
        If carry = $0001 Then CRC := CRC XOR $A001 ;
    End;
END;
CRC := $FFFF;
For i := 1 To Length(Message) Do CALCRC(CRC, Message [i]);
Message := Message + chr( (CRC + 256) MOD (((CRC div 256)+1)*256))+ chr(CRC div 256);
```



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D08 Series Flow Readout Boxes

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*Description may be changed following improvements to product. The information contained in this document is subject to change without notice.
*If there is any mistake in this uses manual, please feel free to contact us.