

INHA[®]



INHA[®]

Mass Flow Controller and Meter

关于我们 ABOUT US

INHA® Mass flow controller and meter are widely used in petrochemical, metallurgy, university laboratories, research institutes, aerospace, food manufacturing, pharmaceutical manufacturing, thermal power, nuclear power, natural gas filling station, semiconductor, solar energy, LCD panel manufacturing and other industries. INHA® Adhering to the business philosophy of "quality first, reputation first, management first and service sincere", we are committed to providing world-class products and services in all fields of gas flow equipment application. Our years of experience and accumulation, our professionalism and continuous innovation, our integrity and high-quality service have been unanimously affirmed and praised by customers in various industries.

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Safety warnings and precautions

1、Warning :

Please pay attention to the specification of this product, and do not use it beyond the specification of this product. Otherwise, serious personal injury or equipment damage may be caused.

2、ESD prevention

This product is a precision instrument, so the company strongly recommends the use of standard ESD prevention during operation.

3、Startup preheating

To ensure the accuracy of the product, the power must be turned on for 10-15 minutes before use.

4、Check and adjust zero point

After preheating, check the zero point of the equipment (especially when it is used for the first time). In the case of no ventilation, it can be adjusted through the zero adjustment button.

5、The gas contains trace water

The gas containing water will damage the sensor in the product. Before use, add a drying filter in the front section. If the sensor is damaged due to moisture in the gas, our company will not be responsible for free maintenance.

6、Use of toxic gas

Before using this product to detect toxic gases, you must check for leaks. In case of gas leakage, please stop using and contact our company.

7、Use of explosive gas

This product can measure and control flammable and explosive gases, including air mixed with hydrogen or hydrocarbons or oxygen mixed with hydrogen or hydrocarbons. However, this product is not applicable to hazardous areas with explosive gases in the environment.

8、Use of corrosive gases

Please confirm that the gas you use will not react with the contact material of this product. If you are not sure, please contact our company and we will give you further suggestions.

9、Use of liquid gas

When using liquid gas, customers need to master the characteristics of the gas and provide the company with the temperature, pressure and other relevant technical parameters that the controller can adapt to. During the control process, the front pipe of the controller and the controller base shall be heated appropriately to ensure that the gas passing through the product will not be condensed. A one-way valve shall be added at the back end of the product to prevent the back flow of liquefied gas at the back end.

10、Replace gas

Before changing the gas, please confirm that the gas to be replaced will not react with the contact material of this product. If you are not sure, please contact our company. After using toxic gas, explosive gas and special corrosive gas, if you want to use other gases, you must purge them with nitrogen for 1-2 hours before using them.

11、Working temperature

The working environment temperature of this product is 0~50 °C.

12、Working pressure

Please refer to the customized pressure for the maximum working pressure of this product. If you use a high-pressure product, you need to slowly increase the pressure from low to high. If the pressure

13、Working pressure difference (pressure difference between inlet and outlet)

The standard differential pressure is 0.3Mpa. Please consult our company for other differential pressures. If the differential pressure range is too low during use, the control may not reach the full range. When the differential pressure is too high, it may cause slight internal leakage or the valve cannot be opened normally. Therefore, when users use this product, regardless of whether the reaction chamber they are working in is vacuum or high pressure, the pressure difference between the inlet and outlet ends should be kept within the required pressure difference range, and the air pressure should be relatively stable.

In order to make the controller work in the best condition, the pressure difference between the inlet pressure and the outlet pressure shall be 0.3Mpa.

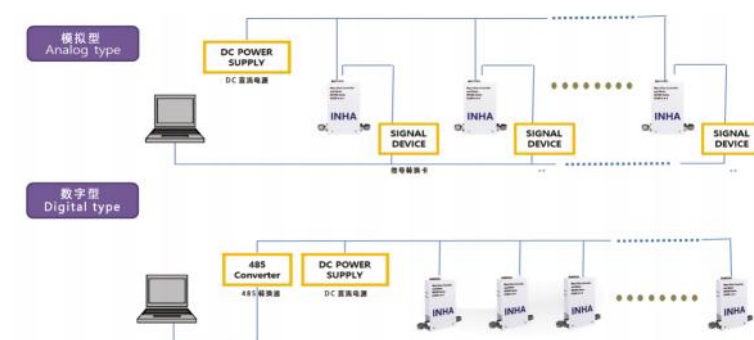
14、Range and flow

Please do not use this product beyond the range. The product is generally calibrated according to nitrogen before delivery, and the flow specification is determined according to nitrogen flow. Use products of the same specification to measure different gases. When the flow detection value is the same, the actual flow value may be different. Please convert according to the mass flow conversion coefficient of different gases relative to the calibration gas (nitrogen) given in this manual.

15、Control mode

This digital flowmeter is an analog digital integration, which supports analog signal voltage 0-5V/current 4-20mA and Rs485 digital signal communication, and some products support local key operation.

Compared with the traditional analog control MFC/MFM, the MFC/MFM device configured with Rs485 communication does not need an AD/DA converter, and the connection is relatively simple, which can achieve the goal of cost saving.



16、Pipes and media

This product is a precision measuring instrument. The pipeline and gas to be used must be purified, and oil, liquid and dust must be avoided. If necessary, another filter shall be installed in the air circuit. If the product outlet is connected with a liquid source, a one-way valve shall be installed at the product outlet to prevent damage caused by liquid backflow. If the product cannot be used normally or is damaged due to excessive oil contamination or gas impurities in the pipeline or entering liquid components, it is not a product quality problem, and our company will not provide free maintenance services.

17、Ensure

The Company does not guarantee, guarantee or represent the suitability of the product, or assume any responsibility for the application or use of any product or circuit. The "typical" coefficients vary in different applications. All operating factors, including "typical" ones, must be proved to be effective by the customer's technical experts.

The company has the right to change the product specifications and information, and to improve its reliability, performance and design.

1、Overview of MFC and MFM products

MFC, namely Mass Flow Controller (abbreviated as MFC), can be manually set or connected to a computer. The gas flow regulator connected with automatic control can quickly and accurately control the gas flow within a wide range. Even if the system pressure fluctuates or the ambient temperature changes slightly, its normal operation will not be affected. In principle, temperature and pressure compensation are not required.

*MFC : MF-10AC, MF-10DC, MF-200DC, MF-200DLC, MF-300DC, MF-300DLC, MF-400DC, MF-400DLC, MF-500DC, MF-500DLC.....

MFM, namely Mass Flow Meter (abbreviated as MFM), is a device that can measure different gas flows. It can quickly and accurately measure the gas flow in a wide range.

*MFM : MF-10AM, MF-10DM, MF-200DM, MF-200DLM, MF-300DM, MF-300DLM, MF-400DM, MF-400DLM, MF-500DM, MF-500DLM.....

(1) The measurement and control of gas flow will not be inaccurate due to temperature or pressure fluctuations. For most gas flow measurement and control systems, it is difficult to avoid system pressure fluctuations and temperature changes of environment and medium. For the precision gas mass flow controller, it can be ignored.

(2) Automation of gas measurement and control

MFC can output gas flow measurement value as standard electrical signal. In this way, it is easy to realize digital display of flow, automatic measurement of accumulated flow, automatic data recording, computer management, etc., and automatic control of flow. The electronic signal control mode of this product is digital quantity+analog quantity. The input and output signals are 0~5V/4~20mA or RS485.

(3) Precise quantitative flow control

(3) Precise quantitative control flow MFC can accurately control the gas dosing, which is more accurate for the flow control of many process processes and the proportional control of different gases. This product has a wide flow range, and the flow control range is 2~100% of the full range (the range ratio is 50:1).

(4) Connection method

This product supports analog signal 0-5V/4-20mA and digital signal RS485 control, and can be used with Read out Box, PLC and Pc.

2、Purpose and characteristics

MFC and MFM have important applications in scientific research and production in petrochemical industry, biochemical industry, semiconductor and integrated circuit industry, special materials discipline, medicine, vegetable and fruit preservation, aerated beverage, environmental protection, vacuum and other fields. Typical occasions include: electronic process equipment, such as oxidation, CVD, MOCVD, diffusion, epitaxy, plasma etching, ion implantation, sputtering, and micro reaction device, gas mixing and gas distribution system, vacuum coating equipment, optical fiber smelting, gas chromatograph and other analytical instruments.

3、Main technical indicators

MFC and MFM are usually calibrated with nitrogen (N₂) at the factory. Sccm: standard ml/min; Slpm: standard liter/minute; 1000sccm=1liter; 30slpm=30liters ; sccm : s=standard ; cc=cm³ ; M=minute; slpm : s=standard ; l=liter ; p=per ; M=minute.

Our products are calibrated at 20 °C and 1.1Atm by default.

4、Structure and working principle

4.1 Structure

The gas mass flowmeter consists of flow sensor, shunt channel, flow amplification circuit and other components; On the basis of the gas mass flowmeter, the regulating valve and PID control circuit constitute MFC. The structure is shown in Figure 2.

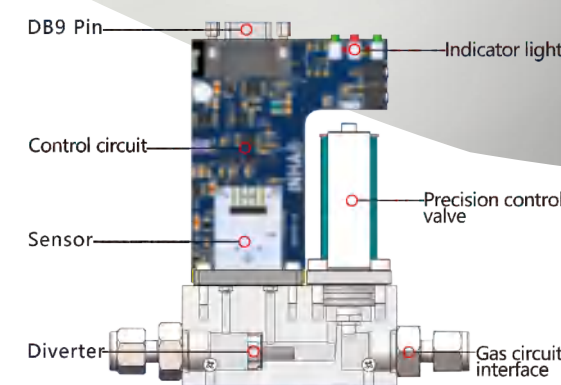


Figure 2

4.2 Working principle

The flow sensor adopts the principle of capillary heat transfer temperature difference calorimetry to measure the gas mass flow (without temperature and pressure compensation).

The flow signal measured by the sensor heating bridge is sent to the amplifier for amplification. The amplified flow detection voltage is compared with the set voltage. The differential signal is amplified to control the regulating valve. The closed-loop control of the flow through the channel makes it equal to the set flow.

The diverter determines the flow of the main channel.

The matched flow indicator is equipped with stable power supply, input signal control, output signal acquisition, valve controlled cleaning and other functions.

The flow detection signal output by the controller is proportional to the mass flow through the channel. The flow control range of MFC is 2%~100% of the customized range (the range ratio is 50:1)

The working principle of the controller is shown in Figure 3:

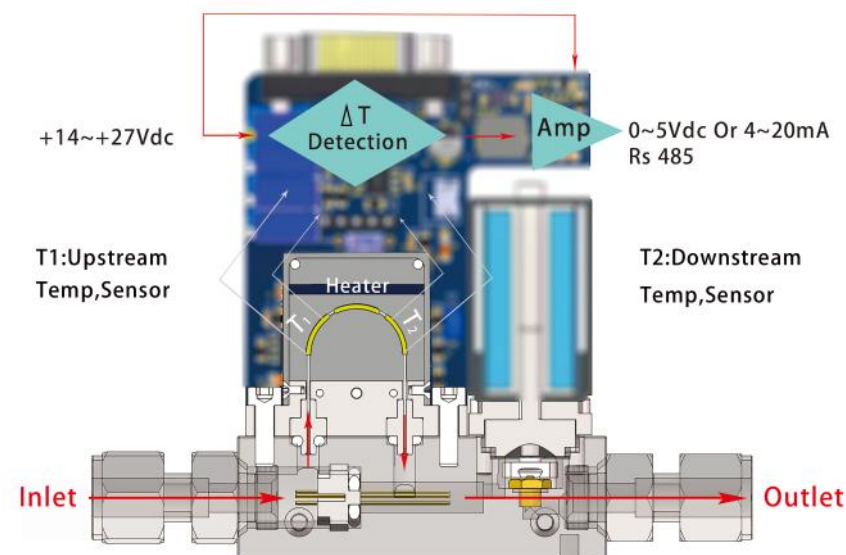


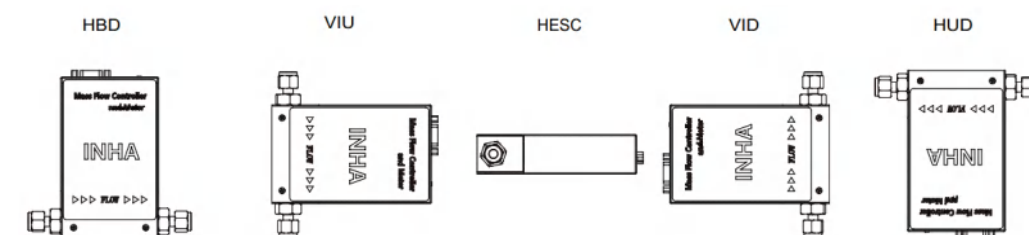
Figure 3

Note: When the flow exceeds the full scale value (flow output signal), the output signal of the flow does not correspond linearly with the actual flow. During cleaning, the flow display is not accurate, which may lead to the abnormal phenomenon that the flow increases but decreases, but it will not damage the product itself.

5、Installation

5.1 Installation position

It is recommended that MFC should be installed in a horizontal plane. However, there is no special requirement for the position. If zero point shift is found during non horizontal installation, please adjust the zero point before proceeding. If the user indicates the installation position in advance when ordering, the company can also adjust the installation position according to the user's desire before leaving the factory; If there is no special requirement, the factory shall be debugged according to the horizontal HBD standard.



5.2 Installation precautions

Whether the fitting gas circuit connector is installed correctly.

Whether the gas inlet and outlet directions are correct (please confirm the direction indicated by the product Flow label before installation).

Use gas (refer to product label).

Power signal (refer to product label).

Whether the wiring is correct (refer to the product label).

During pipeline construction, please pay attention not to leave residual pollutants in the pipeline or products.

In order to prevent pipe deformation during product installation, please fix it on the ground before installation.

Avoid vibration and impact after installation.

A pressure regulator must be installed at the front of the product.

When supplying gas, use according to the customized pressure of the product.

In order to prevent pollutants and moisture from entering, it is recommended to install filters and water removal devices at the front of this product.

Please cut off the power supply of the product before installation.

5.3 Precautions for cable arrangement

The power supply device must be turned off when cabling.

The power supply ensures that the appropriate voltage is used.

Please be careful when arranging wires to avoid wire breakage due to excessive force. At the same time, pay attention to the use of heat shrinkable tubes to avoid product damage due to short circuit.

If operating with equipment with NOISE occurrence, please ensure that FG is grounded.

MF 10 SERIES

Mass Flow Controller And Meter



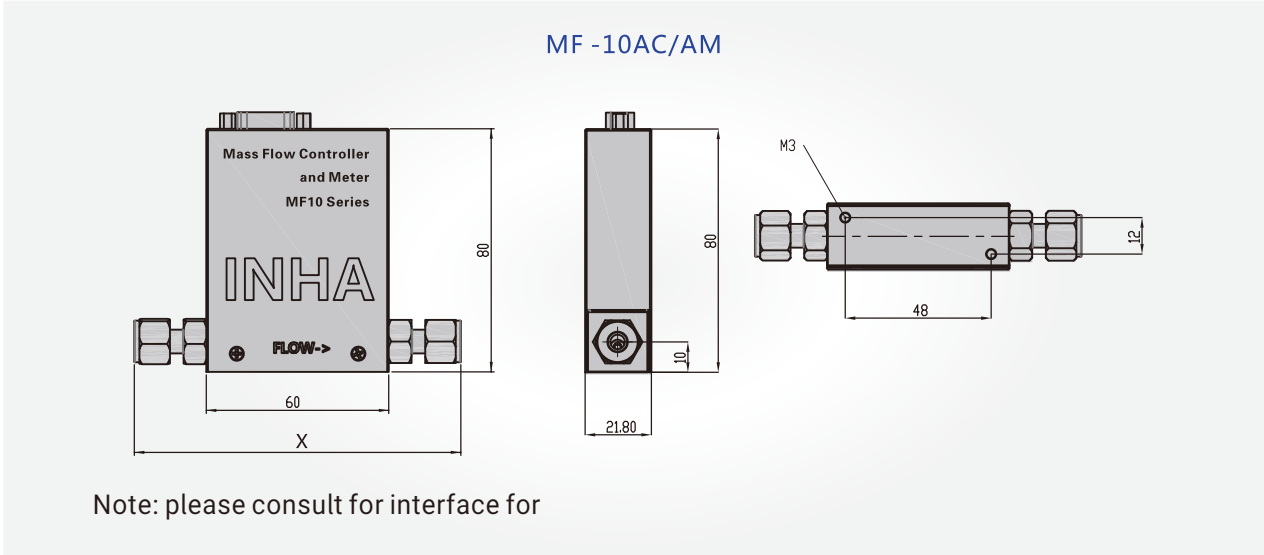
Characteristics

- Fast response speed
- High accuracy
- Stable flow control / measurement
- Wide pressure range
- Excellent corrosion resistance
- Excellent linearity
- New sensor manufacturing process, high precision
- Mini type, small size, space saving

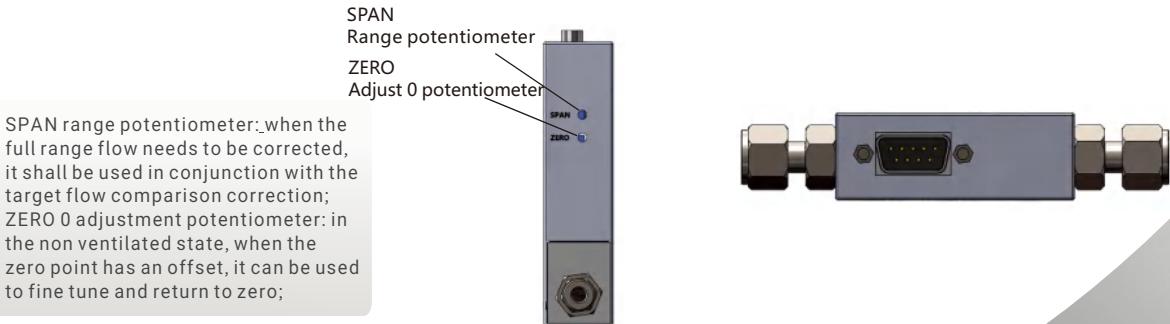
Product specification

Model	MF-10AC Flow Controller	MF-10AM Flow Meter
Flow specification (N2)	20 SCCM~5 SLM	
Range ratio	2% ~ 100% of Full Scale	
Accuracy	≤ ±1.0% of Full Scale	
Linear accuracy	≤ ±0.5% of Full Scale	
Repeatability	≤ ±0.2% of Full Scale	
Response time	≤ 2 sec	
Normal operating temperature range	0 ~ 50°C (Accuracy Guaranteed: 15 ~ 35°C)	
Normal operating pressure range	0 bar ~ 10 bar	
Leakage rate	1 × 10 ⁻⁹ atm. cc/sec He	
Power Supply	+15Vdc or 24Vdc/300mA	
Signal type	0 ~ 5Vdc	
Seal type	Viton/Buna/Kalrez/Teflon/Epdm	
Control type	Normally Closed Solenoid	×
Connector type	D-Sub 9 Pin Connector Male	
Air circuit interface type	1/8", 1/4" LOK	
Interface type	Analog Type	
Texture of material	SUS 316L	
Preheating time	15 min (Accuracy Guaranteed: 30 min)	

3D dimension drawing



"X" size specification		
Interface specification	1/8 " Lok	1/4 " Lok
Unit (mm)	105.81	109.26



Key Function Description

LED indicator description

Electrical connection

Number	Function	Electrical connection mode	Analog signal compatibility	Electrical connection mode	Analog signal compatibility
		MF-10AC Flow Controller		MF-10AM Flow Meter	
1	Land	•	•	Land	•
2	+15V / + 24V power supply	•	•	+15V / + 24V power supply	•
3	Empty	×	×	Empty	×
4	Signal common terminal	•	•	Signal common terminal	•
5	Valve control	•	•	Empty	×
6	Signal output	•	•	Signal output	•
7	Power supply common terminal	•	•	Power supply common terminal	•
8	Signal input	•	•	Empty	×
9	Empty	×	×	Empty	×

MF 10 SERIES

Mass Flow Controller And Meter



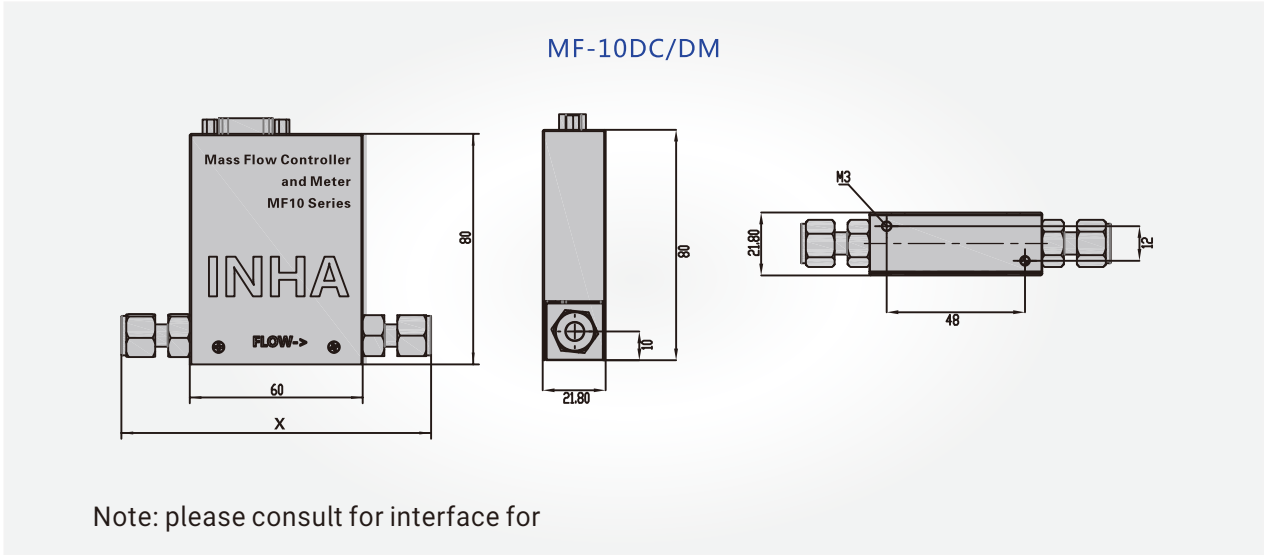
Characteristics

- Faster response speed
- All digital architecture
- Stable flow control / measurement
- Wide pressure range
- Excellent corrosion resistance
- Excellent linearity
- New sensor manufacturing process, high precision
- Mini type, small size, space saving

Product specification

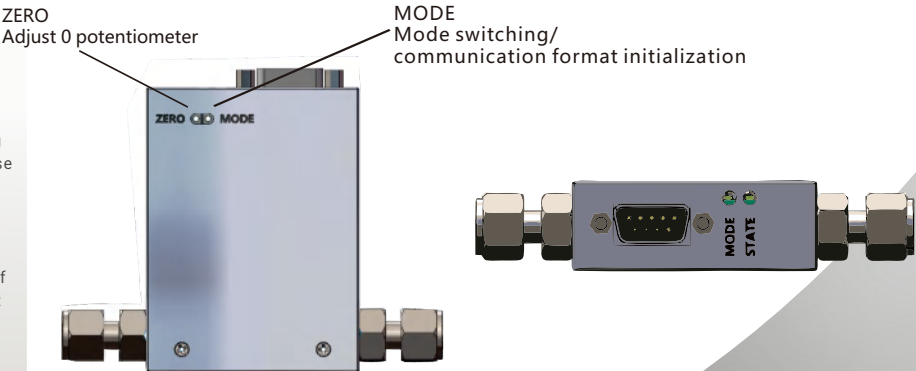
Model	MF-10DC Flow Controller	MF-10DM Flow Meter
Flow specification (N2)	3 SCCM~5 SLM	
Range ratio	2% ~ 100% of Full Scale	
Accuracy	≤±1.0% of Full Scale	
Linear accuracy	≤±0.5% of Full Scale	
Repeatability	≤±0.2% of Full Scale	
Response time	≤1 sec	
Normal operating temperature range	0 ~ 50°C(Accuracy Guaranteed:15 ~ 35°C)	
Normal operating pressure range	0bar ~ 10bar	
Leakage rate	1x10-9 atm. cc/sec He	
Power Supply	+14Vdc~27Vdc/300mA	
Signal type	0~5Vdc or Rs485(Modbus Rtu)	
Seal type	Viton/Buna/Kalrez/Teflon/Epdm	
Control type	Normally Closed Solenoid	×
Connector type	D-Sub 9 Pin Connector Male	
Air circuit interface type	1/8",1/4" LOK	
Interface type	Digital Type	
Texture of material	SUS 316L	
Preheating time	15 min (Accuracy Guaranteed: 30 min)	

3D dimension drawing



"X" size specification		
Interface specification	1/8 " Lok	1/4 " Lok
Unit (mm)	105.81	109.26

Mode switching: Press the MODE button lightly once, the green light flashes for analog mode, and the blue light flashes for digital mode.
Initialization of communication format: long press the MODE button for about 10 seconds, release when the MODE mode light flashes red, and wait for the initialization of communication format to complete. (Communication format: 9600 N 8 1; communication address: 1)
Automatic zero adjustment: under the status of no ventilation, long press the ZERO button for about 10 seconds, release when the red light of the STATE status light flashes, and wait for the completion of zero adjustment.



Key Function Description

LED indicator description

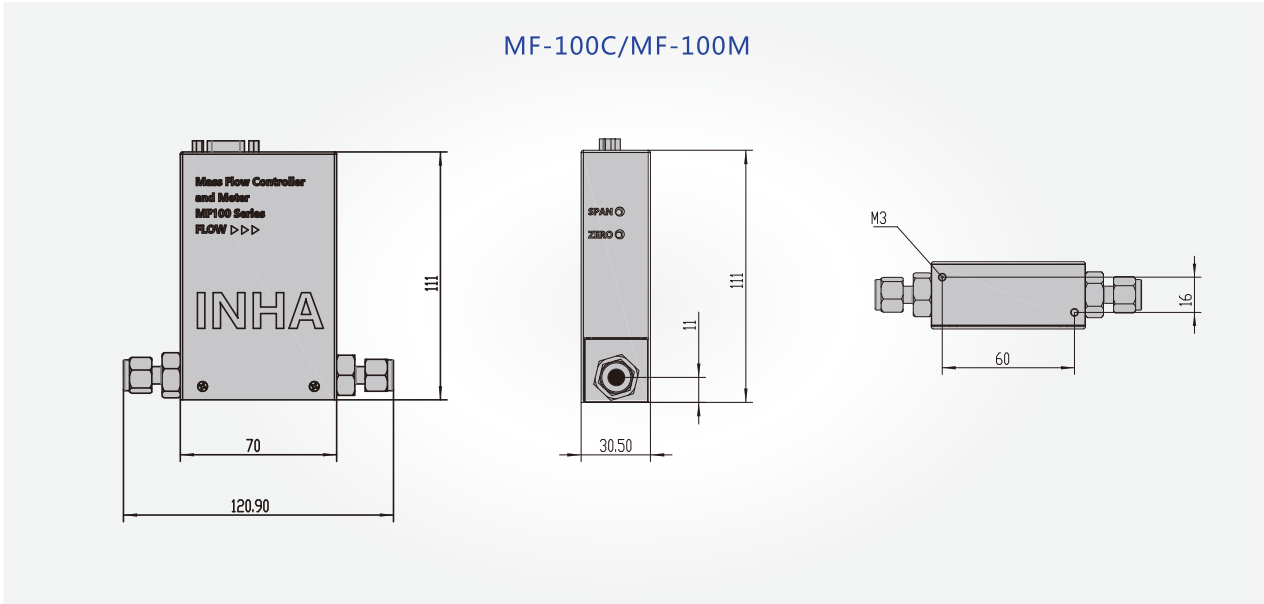
Electrical connection

	Electrical connection mode		Analog signal compatibility	
	MF-10DC Flow Controller		MF-10DM Flow Meter	
Number	Function		Function	
1	Land	•	Land	•
2	+14V ~ + 27V power supply	•	+14V ~ + 27V power supply	•
3	Rs-485B(-)	•	Rs-485B(-)	•
4	Signal common terminal	•	Signal common terminal	•
5	Valve control	•	Empty	×
6	Signal output	•	Signal output	•
7	Power supply common terminal	•	Power supply common terminal	•
8	Signal input	•	Empty	×
9	Rs-485A(+)	•	Rs-485A(+)	•

MF-100 SERIES

Mass Flow Controller And Meter

3D dimension drawing



Characteristics

- Fast response speed
- High accuracy
- Accurate flow control / measurement
- Wide pressure range
- Excellent corrosion resistance
- Excellent linearity



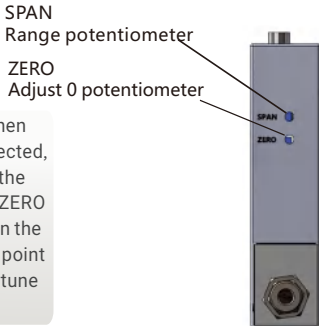
Product specification

Model	MF-100C Flow Controller	MF-100M Flow Meter
Flow specification (N2)	10 SCCM ~ 30 SLM	
Range ratio	2%~100% of Full Scale	
Accuracy	±1.0% of Full Scale	
Linear accuracy	±0.5% of Full Scale	
Repeatability	±0.2% of Full Scale	
Response time	≤2 sec	
Normal operating temperature range	0~50°C(Accuracy Guaranteed:15~35°C)	
Normal operating pressure range	0bar~30bar	
Leakage rate	1x10-9 atm. cc/sec He	
Power Supply	+15Vdc or +24Vdc/300mA	
Signal type	0~5Vdc or 4~20mA	
Seal type	Viton/Buna/Kalrez/Teflon/Epdm	
Control type	Normally Closed Solenoid	×
Connector type	D-Sub 9 Pin Connector Male	
Air circuit interface type	1/8",1/4",3/8" LOK, 1/4"VCR	
Interface type	Analog Type	
Texture of material	SUS 316L/Aluminium	
Preheating time	15 min (Accuracy Guaranteed: 30 min)	

MF-100C/MF-100M

"X" size specification				
Interface specification	1/8 " Lok	1/4 " Lok	3/8 " Lok	1/4 " VCR
Unit (mm)	116.7	121.3	124.4	117.8

SPAN range potentiometer: when the full range flow needs to be corrected, it shall be used in conjunction with the target flow comparison correction;ZERO **0 adjustment potentiometer:** in the non ventilated state, when the zero point has an offset, it can be used to fine tune and return to zero;



Key Function Description

LED indicator description

Electrical connection

	Electrical connection mode	Analog signal compatibility	Electrical connection mode	Analog signal compatibility
MF-100C Flow Controller		MF-100M Flow Meter		
Number	Function		Function	
1	Land	•	Land	•
2	+15V / +24V power supply	•	+15V / +24V power supply	•
3	Empty	×	Empty	×
4	Signal common terminal	•	Signal common terminal	•
5	Valve control	•	Empty	×
6	Signal output	•	Signal output	•
7	Power supply common terminal	•	Power supply common terminal	•
8	Signal input	•	Empty	×
9	Empty	×	Empty	×

MF-200 SERIES

Mass Flow Controller And Meter

Characteristics

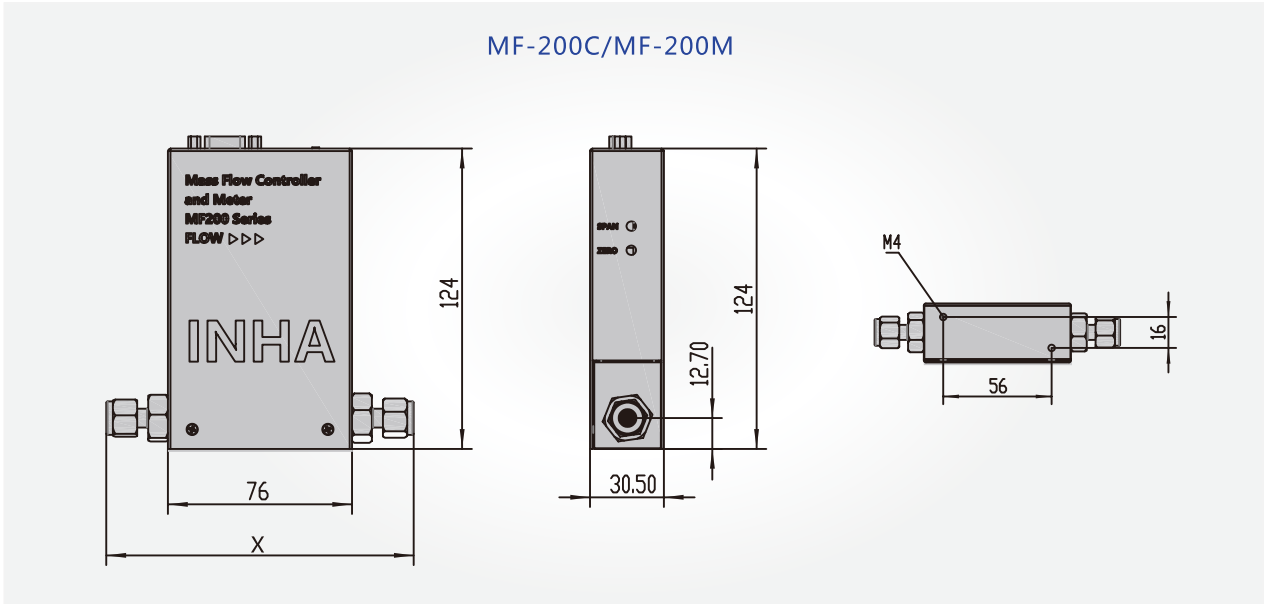
- Fast response speed
- High accuracy
- Accurate flow control / measurement
- Wide pressure range
- Excellent corrosion resistance
- Excellent linearity



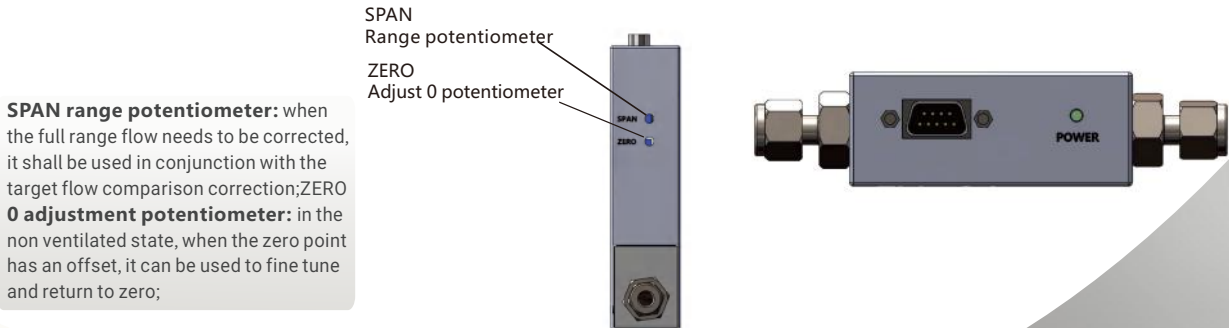
Product specification

Model	MF-200C Flow Controller	MF-200M Flow Meter
Flow specification (N2)	10 SCCM ~ 30 SLM	
Range ratio	2%~100% of Full Scale	
Accuracy	±1.0% of Full Scale	
Linear accuracy	±0.5% of Full Scale	
Repeatability	±0.2% of Full Scale	
Response time	≤2 sec	
Normal operating temperature range	0~50°C(Accuracy Guaranteed:15~35°C)	
Normal operating pressure range	0bar~100bar	
Leakage rate	1x10-9 atm. cc/sec He	
Power Supply	+15Vdc or 24Vdc/300mA	
Signal type	0~5Vdc or 4~20mA	
Seal type	Viton/Buna/Kalrez/Teflon/Epdm	
Control type	Normally Closed Solenoid	×
Connector type	D-Sub 9 Pin Connector Male	
Air circuit interface type	1/8",1/4",3/8",1/2" LOK, 1/4", 1/2"VCR	
Interface type	Analog Type	
Texture of material	SUS 316L	
Preheating time	15 min (Accuracy Guaranteed: 30 min)	

3D dimension drawing



"X" size specification						
Interface specification	1/8 " Lok	1/4 " Lok	3/8 " Lok	1/2 " Lok	1/4 " VCR	1/2 " VCR
Unit (mm)	122.7	127.3	130.4	134.4	123.8	131.4



Key Function Description

LED indicator description

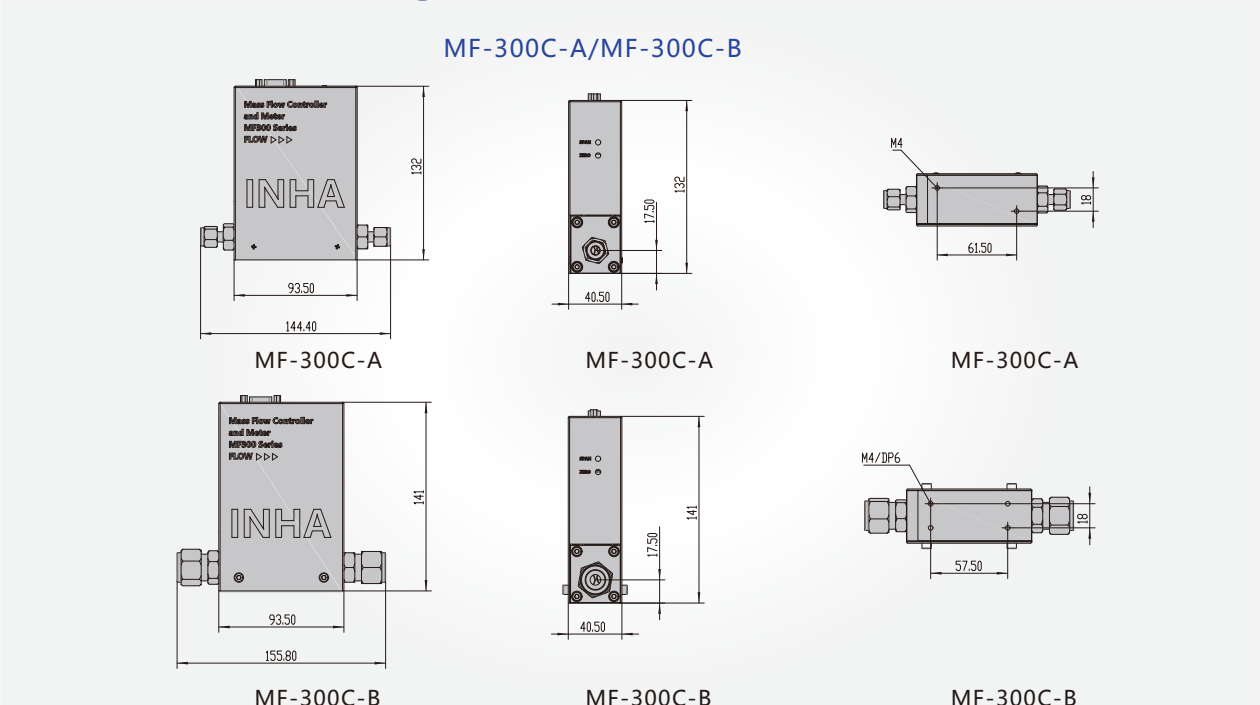
Electrical connection

Electrical connection mode		Analog signal compatibility	Electrical connection mode		Analog signal compatibility
MF-200C Flow Controller			MF-200M Flow Meter		
Number	Function		Function		
1	Land	•	Land	•	
2	+15V / + 24V power supply	•	+15V / + 24V power supply	•	
3	Empty	×	Empty	×	
4	Signal common terminal	•	Signal common terminal	•	
5	Valve control	•	Empty	×	
6	Signal output	•	Signal output	•	
7	Power supply common terminal	•	Power supply common terminal	•	
8	Signal input	•	Empty	×	
9	Empty	×	Empty	×	

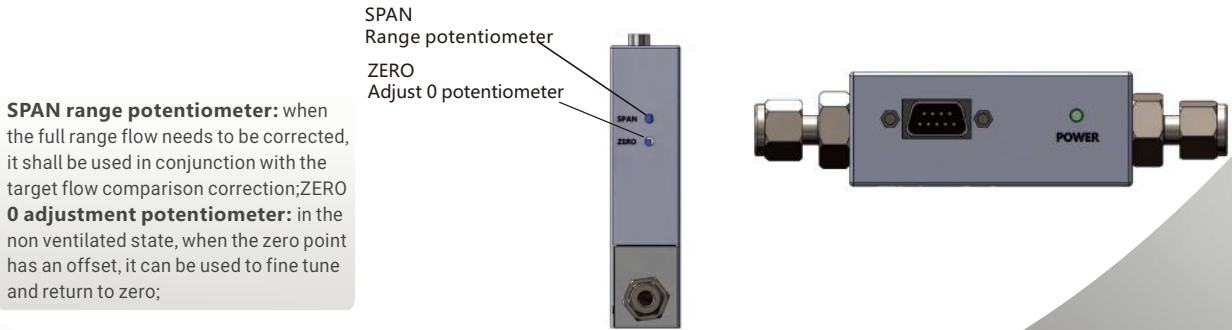
MF-300 SERIES

Mass Flow Controller And Meter

3D dimension drawing



"X" size specification					
Interface specification	1/4 " Lok	3/8 " Lok	1/2 " Lok	1/4 " VCR	1/2 " VCR
Unit (mm)	144.8	147.8	151.5	141.3	148.5



Key Function Description

LED indicator description

Electrical connection

Number	Electrical connection mode		Analog signal compatibility	
	MF-300C Flow Controller		MF-300M Flow Meter	
Function			Function	
1	Land	•	Land	•
2	+15V / +24V power supply	•	+15V / +24V power supply	•
3	Empty	×	Empty	×
4	Signal common terminal	•	Signal common terminal	•
5	Valve control	•	Empty	×
6	Signal output	•	Signal output	•
7	Power supply common terminal	•	Power supply common terminal	•
8	Signal input	•	Empty	×
9	Empty	×	Empty	×

Characteristics

- Fast response speed
- High accuracy
- Accurate flow control / measurement
- Wide pressure range
- Excellent corrosion resistance
- Excellent linearity



Product specification

Model	MF-300C-A Flow Controller	MF-300C-B Flow Controller	MF-300M Flow Meter
Flow specification (N2)	30SLM ~ 100SLM	30SLM ~ 200SLM	30SLM ~ 200SLM
Range ratio	2%~100% of Full Scale		
Accuracy	±1.0% of Full Scale		
Linear accuracy	±0.5% of Full Scale		
Repeatability	±0.2% of Full Scale		
Response time	≤2 sec		
Normal operating temperature range	0 ~ 50°C (Accuracy Guaranteed: 15 ~ 35°C)		
Normal operating pressure range	0bar ~ 100bar		
Leakage rate	1x10 ⁻⁹ atm. cc/sec He		
Power Supply	+15Vdc or 24Vdc/300mA		
Signal type	0 ~ 5Vdc or 4 ~ 20mA		
Seal type	Viton/Buna/Kalrez/Teflon/Epdm		
Control type	Normally Closed Solenoid		×
Connector type	D-Sub 9 Pin Connector Male		
Air circuit interface type	1/4", 3/8", 1/2" LOK, 1/4", 1/2" VCR		
Interface type	Analog Type		
Texture of material	SUS 316L		
Preheating time	15 min (Accuracy Guaranteed: 30 min)		

MF-200 SERIES

Mass Flow Controller And Meter

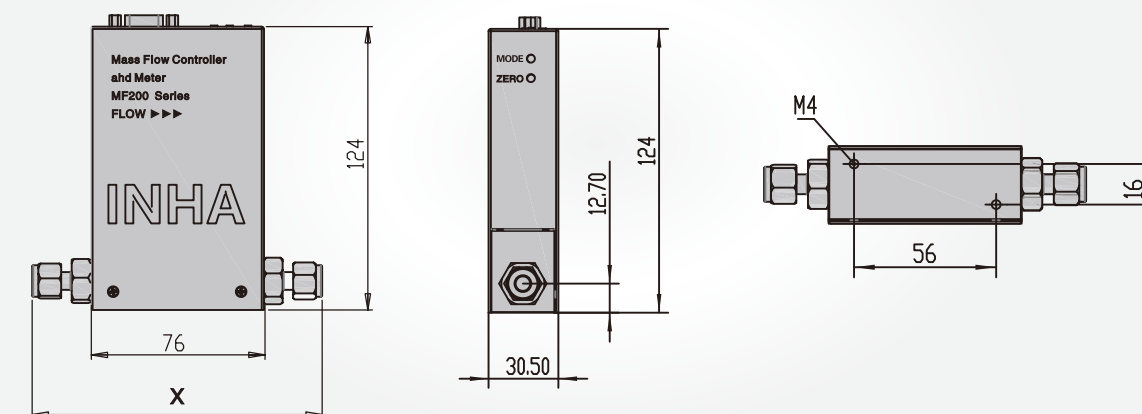
Characteristics

- All digital architecture
- Faster response speed
- High accuracy
- Stable flow control / measurement
- Wide pressure range
- Excellent corrosion resistance
- Excellent linearity
- New sensor manufacturing technology



3D dimension drawing

MF-200DC/MF-200DM



Product specification

Model	MF-200DC Flow Controller	MF-200DM Flow Meter
Flow specification (N2)	3 SCCM~40 SLM	
Range ratio	2%~100% of Full Scale	
Accuracy	≤±1.0% of Full Scale	
Linear accuracy	≤±0.5% of Full Scale	
Repeatability	≤±0.2% of Full Scale	
Response time	≤1 sec	
Normal operating temperature range	0~50°C(Accuracy Guaranteed:15~35°C)	
Normal operating pressure range	0~100 Bar(g)	
Leakage rate	1x10 ⁻⁹ atm.cc/sec He	
Power Supply	+14Vdc~27Vdc/300mA	
Signal type	0~5Vdc or 4~20mA/RS485(Modbus Rtu)	
Seal type	Viton/Buna/Kalrez/Teflon/Epdm	
Control type	Normally Closed Solenoid	×
Connector type	D-Sub 9 Pin Connector Male	
Air circuit interface type	1/8" ,1/4" ,3/8" ,1/2" LOK,1/4" ,1/2" VCR	
Interface type	Digital Type	
Texture of material	SUS 316L/Teflon	
Preheating time	15 min (Accuracy Guaranteed: 30 min)	

"X" size specification

Interface specification	1/8 " Lok	1/4 " Lok	3/8 " Lok	1/2 " Lok	1/4 " VCR	1/2 " VCR
Unit (mm)	122.7	127.3	130.4	134.4	123.8	131.4

Electrical connection

	Electrical connection mode	Analog signal compatibility	Electrical connection mode	Analog signal compatibility
	MF-200DC Flow Controller		MF-200DM Flow Meter	
Number	Function	•	Function	•
1	Land	•	Land	•
2	+14V ~ +27V power supply	•	+14V ~ +27V power supply	•
3	Rs-485B(-)	•	Rs-485B(-)	•
4	Signal common terminal	•	Signal common terminal	•
5	Valve control	•	Empty	×
6	Signal output	•	Signal output	•
7	Power supply common terminal	•	Power supply common terminal	•
8	Signal input	•	Empty	×
9	Rs-485A(+)	•	Rs-485A(+)	•

MF-300 SERIES

Mass Flow Controller And Meter

Characteristics

- All digital architecture
- Faster response speed
- High accuracy
- Stable flow control / measurement
- Wide pressure range
- Excellent corrosion resistance
- Excellent linearity
- New sensor manufacturing technology

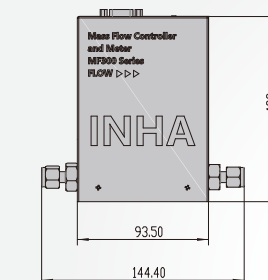


Product specification

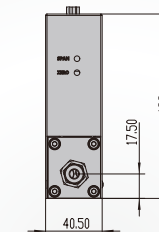
Model	MF-300DC-A Flow Controller	MF-300DC-B Flow Controller	MF-300DM Flow Meter
Flow specification (N2)	30SLM ~ 100SLM	30SLM ~ 200SLM	30SLM ~ 200SLM
Range ratio	2%~100% of Full Scale		
Accuracy	≤ ±1.0% of Full Scale		
Linear accuracy	≤ ±0.5% of Full Scale		
Repeatability	≤ ±0.2% of Full Scale		
Response time	≤1 sec		
Normal operating temperature range	0~50℃(Accuracy Guaranteed:15~35℃)		
Normal operating pressure range	0~100 Bar(g)		
Leakage rate	1x10-9 atm.cc/sec He		
Power Supply	+14Vdc~27Vdc/300mA		
Signal type	0~5Vdc or 4~20mA/Rs485(Modbus Rtu)		
Seal type	Viton/Buna/Kalrez/Teflon/Epdm		
Control type	Normally Closed Solenoid	×	
Connector type	D-Sub 9 Pin Connector Male		
Air circuit interface type	1/4" ,3/8" ,1/2" LOK,1/4" ,1/2" VCR		
Interface type	Digital Type		
Texture of material	SUS 316L		
Preheating time	15 min (Accuracy Guaranteed: 30 min)		

3D dimension drawing

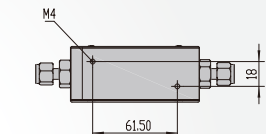
MF-300DC-A/MF-300DC-B



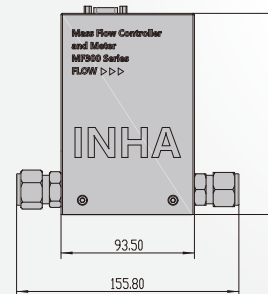
MF-300DC-A



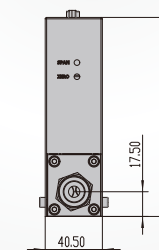
MF-300DC-A



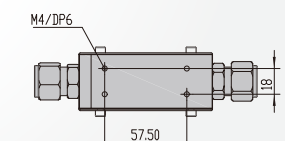
MF-300DC-A



MF-300DC-B



MF-300DC-B



MF-300DC-B

"X" size specification

Interface specification	1/4 " Lok	3/8 " Lok	1/2 " Lok	1/4 " VCR	1/2 " VCR
Unit (mm)	144.8	147.8	151.5	141.3	148.5

Electrical connection

Number	MF-300DC Flow Controller		MF-300DM Flow Meter	
	Electrical connection mode	Analog signal compatibility	Electrical connection mode	Analog signal compatibility
1	Land	•	Land	•
2	+14V ~ +27V power supply	•	+14V ~ +27V power supply	•
3	Rs-485B(-)	•	Rs-485B(-)	•
4	Signal common terminal	•	Signal common terminal	•
5	Valve control	•	Empty	×
6	Signal output	•	Signal output	•
7	Power supply common terminal	•	Power supply common terminal	•
8	Signal input	•	Empty	×
9	Rs-485A(+)	•	Rs-485A(+)	•

MF-400 SERIES

Mass Flow Controller And Meter

Characteristics

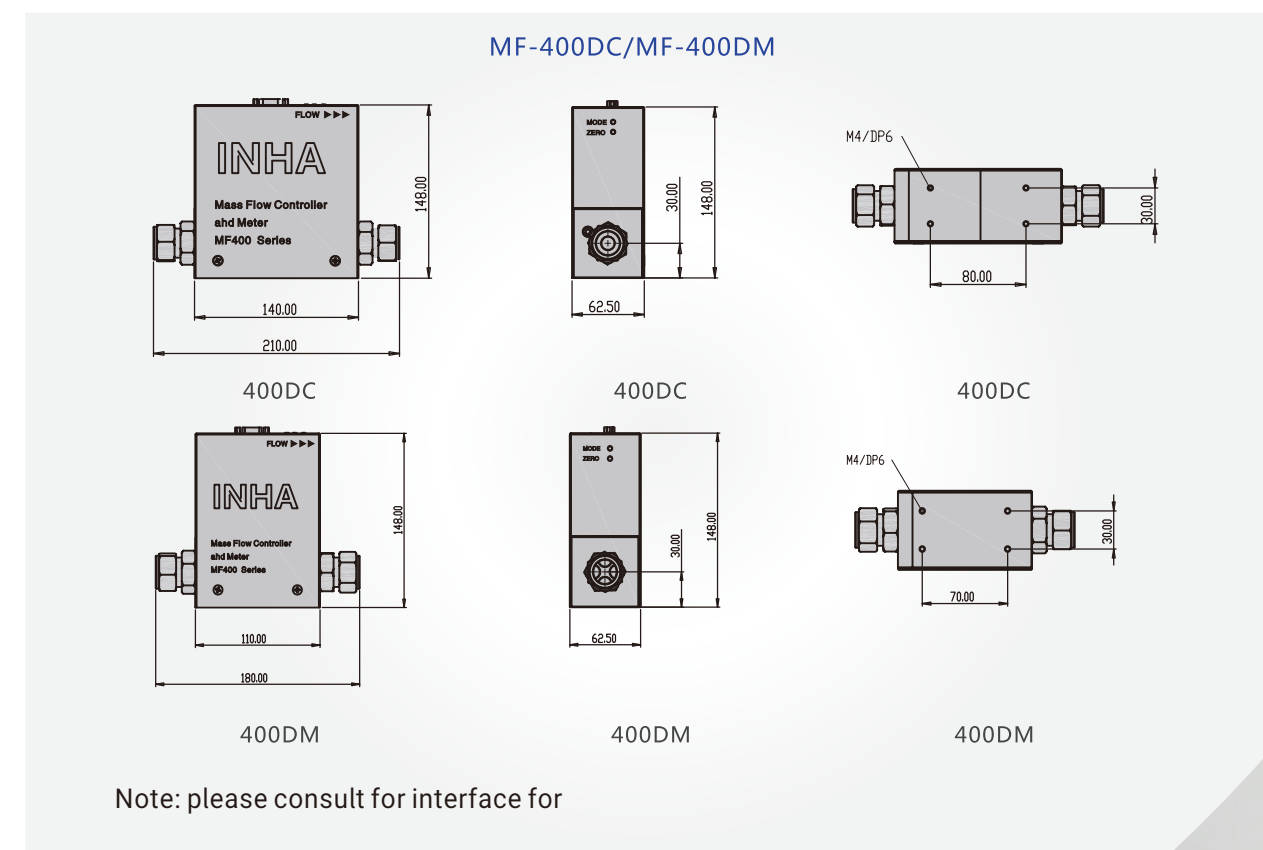
- All digital architecture
- Faster response speed
- High accuracy
- Stable flow control / measurement
- Wide pressure range
- Excellent corrosion resistance
- Excellent linearity
- New sensor manufacturing technology



Product specification

Model	MF-400DC Flow Controller	MF-400DM Flow Meter
Flow specification (N2)	100SLM~500SLM	
Range ratio	2%~100% of Full Scale	
Accuracy	≤±2.0% of Full Scale	
Linear accuracy	≤±0.5% of Full Scale	
Repeatability	≤±0.2% of Full Scale	
Response time	≤2 sec	
Normal operating temperature range	0~50°C(Accuracy Guaranteed:15~35°C)	
Normal operating pressure range	0~30 Bar(g)	
Leakage rate	1x10 ⁻⁹ atm.cc/sec He	
Power Supply	+14Vdc~27Vdc/300mA	
Signal type	0~5Vdc or 4~20mA/RS485(Modbus Rtu)	
Seal type	Viton/Buna/Kalrez/Teflon/Epdm	
Control type	Normally Closed Solenoid	×
Connector type	D-Sub 9 Pin Connector Male	
Air circuit interface type	1/2" ,3/4" LOK	
Interface type	Digital Type	
Texture of material	SUS 316L	
Preheating time	15 min (Accuracy Guaranteed: 30 min)	

3D dimension drawing



Electrical connection

	MF-400DC Flow Controller		MF-400DM Flow Meter	
	Electrical connection mode	Analog signal compatibility	Electrical connection mode	Analog signal compatibility
Number	Function	•	Function	•
1	Land	•	Land	•
2	+14V ~ +27V power supply	•	+14V ~ +27V power supply	•
3	Rs-485B(-)	•	Rs-485B(-)	•
4	Signal common terminal	•	Signal common terminal	•
5	Empty	×	Empty	×
6	Signal output	•	Signal output	•
7	Power supply common terminal	•	Power supply common terminal	•
8	Signal input	•	Empty	×
9	Rs-485A(+)	•	Rs-485A(+)	•

MF-500 SERIES

Mass Flow Controller And Meter

Characteristics

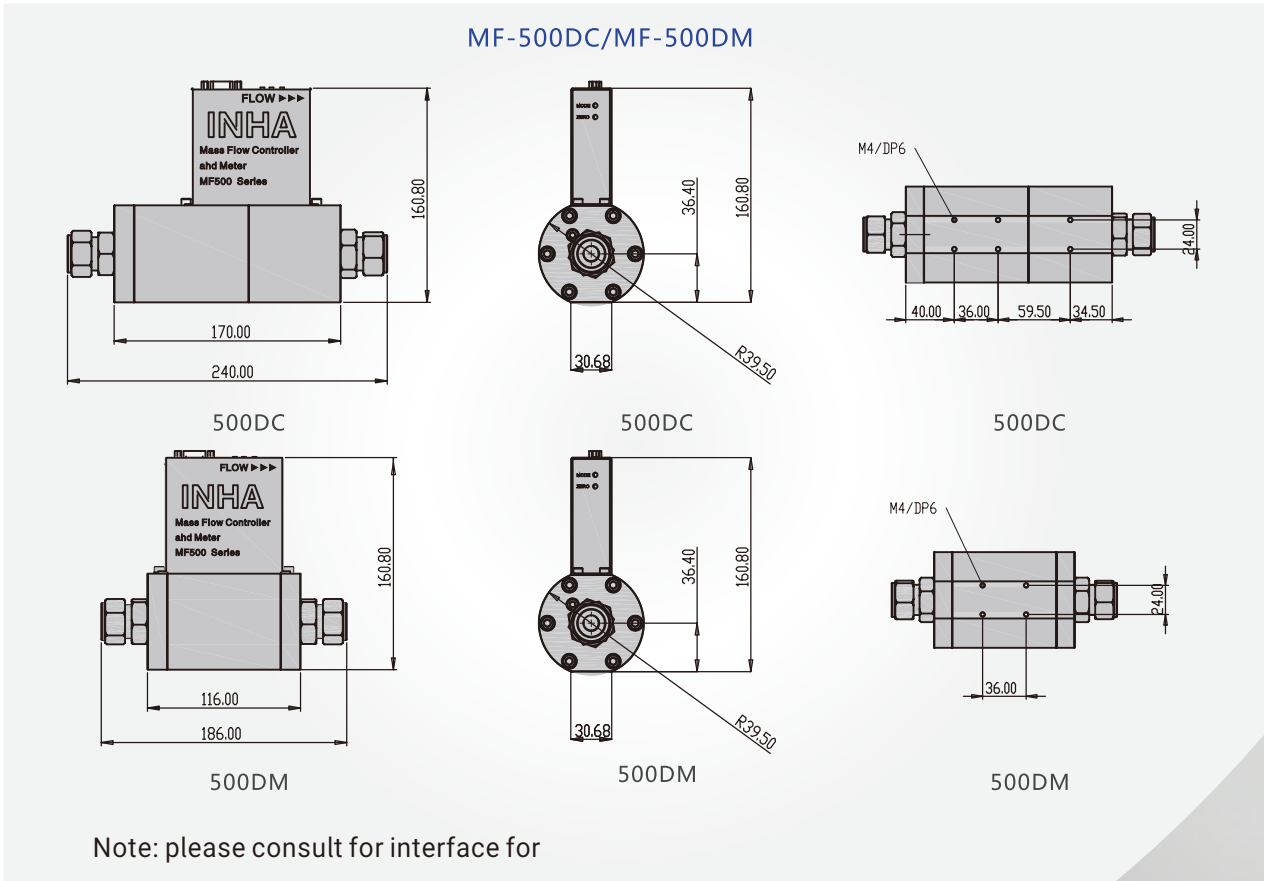
- All digital architecture
- Faster response speed
- High accuracy
- Stable flow control / measurement
- Wide pressure range
- Excellent corrosion resistance
- Excellent linearity
- New sensor manufacturing technology



Product specification

Model	MF-500DC Flow Controller	MF-500DM Flow Meter
Flow specification (N2)	500SLM~1500SLM	
Range ratio	2%~100% of Full Scale	
Accuracy	≤±2.0% of Full Scale	
Linear accuracy	≤±0.5% of Full Scale	
Repeatability	≤±0.2% of Full Scale	
Response time	≤2 sec	
Normal operating temperature range	0~50°C(Accuracy Guaranteed:15~35°C)	
Normal operating pressure range	0~30 Bar(g)	
Leakage rate	1x10-9 atm.cc/sec He	
Power Supply	+14Vdc~27Vdc/300mA	
Signal type	0~5Vdc or 4~20mA/RS485(Modbus Rtu)	
Seal type	Viton/Buna/Kalrez/Teflon/Epdm	
Control type	Normally Closed Solenoid	×
Connector type	D-Sub 9 Pin Connector Male	
Air circuit interface type	1/2" ,3/4" LOK	
Interface type	Digital Type	
Texture of material	SUS 316L	
Preheating time	15 min (Accuracy Guaranteed: 30 min)	

3D dimension drawing



Electrical connection

	Electrical connection mode	Analog signal compatibility	Electrical connection mode	Analog signal compatibility
	MF-500DC Flow Controller		MF-500DM Flow Meter	
Number	Function	•	Function	•
1	Land	•	Land	•
2	+14V ~ +27V power supply	•	+14V ~ +27V power supply	•
3	Rs-485B(-)	•	Rs-485B(-)	•
4	Signal common terminal	•	Signal common terminal	•
5	Empty	×	Empty	×
6	Signal output	•	Signal output	•
7	Power supply common terminal	•	Power supply common terminal	•
8	Signal input	•	Empty	×
9	Rs-485A(+)	•	Rs-485A(+)	•

MF-600 SERIES

Mass Flow Controller And Meter

3D dimension drawing

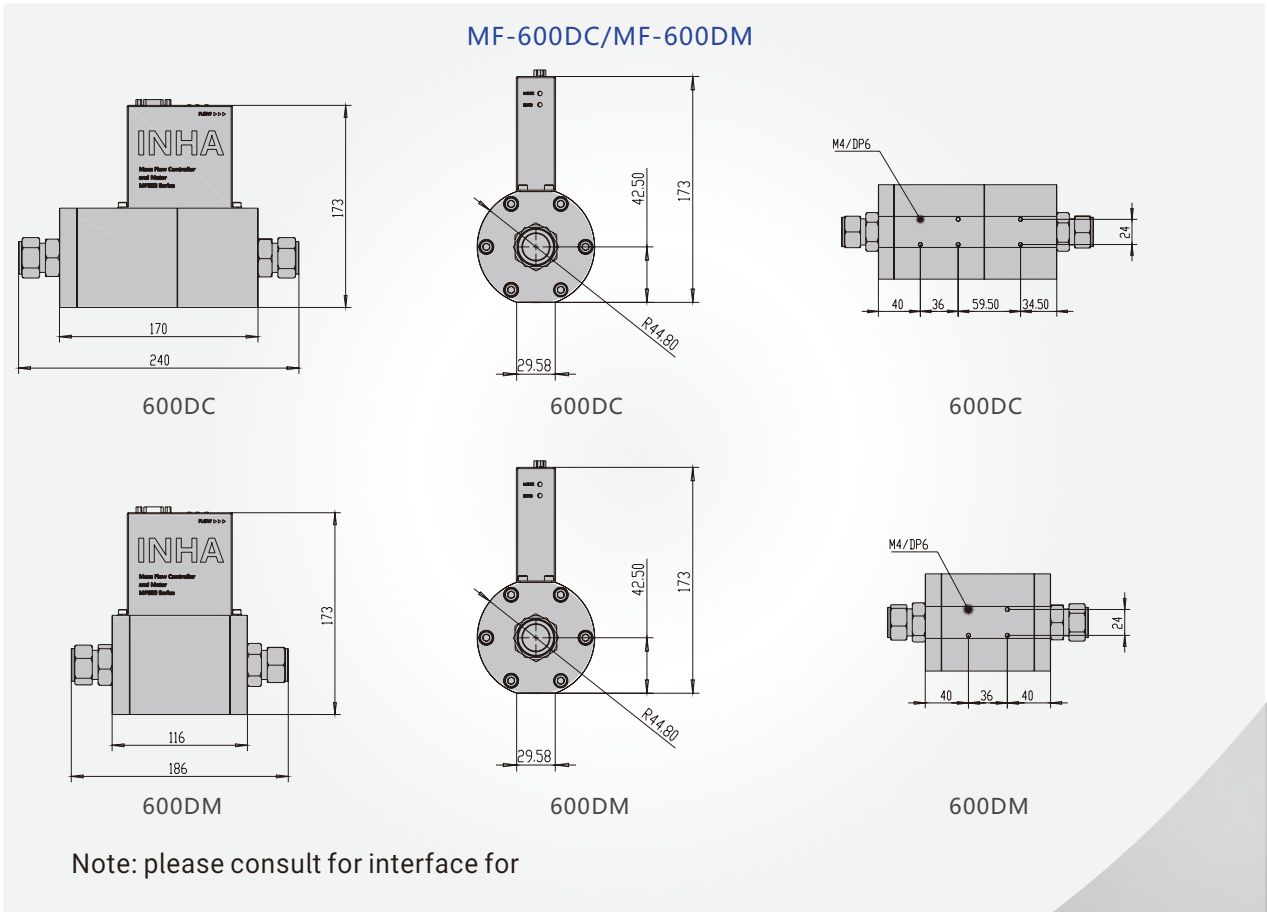
Characteristics

- All digital architecture
- Faster response speed
- High accuracy
- Stable flow control / measurement
- Wide pressure range
- Excellent corrosion resistance
- Excellent linearity
- New sensor manufacturing technology



Product specification

Model	MF-600DC Flow Controller	MF-600DM Flow Meter
Flow specification (N2)	1500SLM~3000SLM	
Range ratio	2%~100% of Full Scale	
Accuracy	±2.0% of Full Scale	
Linear accuracy	±0.5% of Full Scale	
Repeatability	±0.2% of Full Scale	
Response time	≤2 sec	
Normal operating temperature range	0~50°C(Accuracy Guaranteed:15~35°C)	
Normal operating pressure range	0~30 Bar(g)	
Leakage rate	1x10 ⁻⁹ atm.cc/sec He	
Power Supply	+14Vdc~27Vdc/300mA	
Signal type	0~5Vdc or 4~20mA/Rs485(Modbus Rtu)	
Seal type	Viton/Buna/Kalrez/Teflon/Epdm	
Control type	Normally Closed Solenoid	×
Connector type	D-Sub 9 Pin Connector Male	
Air circuit interface type	1/2" ,3/4" LOK	
Interface type	Digital Type	
Texture of material	SUS 316L	
Preheating time	15 min (Accuracy Guaranteed: 30 min)	



	Electrical connection mode	Analog signal compatibility	Electrical connection mode	Analog signal compatibility
MF-600DC Flow Controller		MF-600DM Flow Meter		
Number	Function		Function	
1	Land	•	Land	•
2	+14V ~ +27V power supply	•	+14V ~ +27V power supply	•
3	Rs-485B(-)	•	Rs-485B(-)	•
4	Signal common terminal	•	Signal common terminal	•
5	Empty	×	Empty	×
6	Signal output	•	Signal output	•
7	Power supply common terminal	•	Power supply common terminal	•
8	Signal input	•	Empty	×
9	Rs-485A(+)	•	Rs-485A(+)	•

MF-200 SERIES

Mass Flow Controller And Meter

Characteristics

- LCD display
- All digital architecture
- Faster response speed
- High accuracy
- Stable flow control / measurement
- Wide pressure range
- Excellent corrosion resistance
- Excellent linearity
- New sensor manufacturing technology
- Support local / remote control / measurement

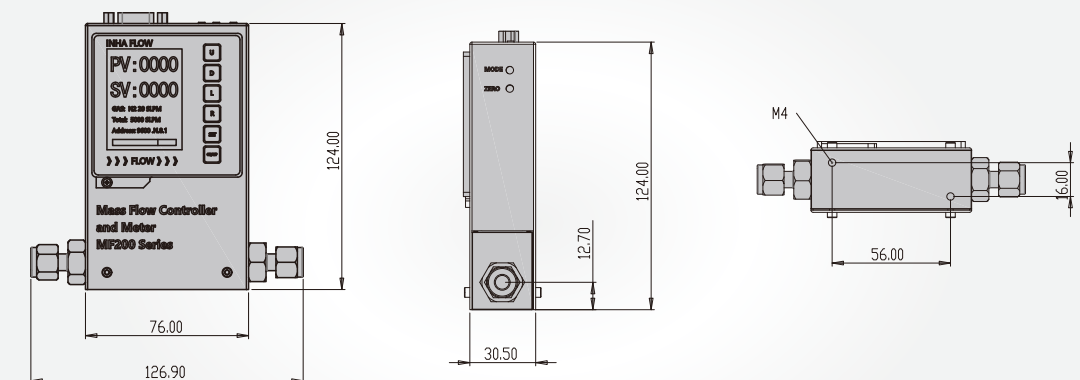


Product specification

Model	MF-200DLC Flow Controller	MF-200DLM Flow Meter
Flow specification (N2)	3SCCM~40 SLM	
Range ratio	2%~100% of Full Scale	
Accuracy	±1.0% of Full Scale	
Linear accuracy	±0.5% of Full Scale	
Repeatability	±0.2% of Full Scale	
Response time	≤1 sec	
Normal operating temperature range	0~50°C(Accuracy Guaranteed:15~35°C)	
Normal operating pressure range	0bar~100bar	
Leakage rate	1x10-9 atm. cc/sec He	
Power Supply	+14Vd ~ 27Vdc/300mA	
Signal type	0~5Vdc or 4~20mA/Rs485(Modbus Rtu)	
Seal type	Viton/Buna/Kalrez/Teflon/Epdm	
Control type	Normally Closed Solenoid	×
Connector type	D-Sub 9 Pin Connector Male	
Air circuit interface type	1/8",1/4",3/8",1/2" LOK, 1/4",1/2"VCR	
Interface type	Digital Type	
Texture of material	SUS 316L	
Preheating time	15 min (Accuracy Guaranteed: 30 min)	

3D dimension drawing

MF-200DLC/MF-200DLM



Note: please consult for interface for

"X" size specification

Interface specification	1/8 " Lok	1/4 " Lok	3/8 " Lok	1/2 " Lok	1/4 " VCR	1/2 " VCR
Unit (mm)	122.7	127.3	130.4	134.4	123.8	131.4

Electrical connection

	Electrical connection mode	Analog signal compatibility	Electrical connection mode	Analog signal compatibility
	MF-200DLC Flow Controller		MF-200DLM Flow Meter	
Number	Function		Function	
1	Land	•	Land	•
2	+14V ~ +27V power supply	•	+14V ~ +27V power supply	•
3	Rs-485B(-)	•	Rs-485B(-)	•
4	Signal common terminal	•	Signal common terminal	•
5	Valve control	•	Empty	×
6	Signal output	•	Signal output	•
7	Power supply common terminal	•	Power supply common terminal	•
8	Signal input	•	Empty	×
9	Rs-485A(+)	•	Rs-485A(+)	•

MF-300 SERIES

Mass Flow Controller And Meter

Characteristics

- LCD display
- All digital architecture
- Faster response speed
- High accuracy
- Stable flow control / measurement
- Wide pressure range
- Excellent corrosion resistance
- Excellent linearity
- New sensor manufacturing technology
- Support local / remote control / measurement

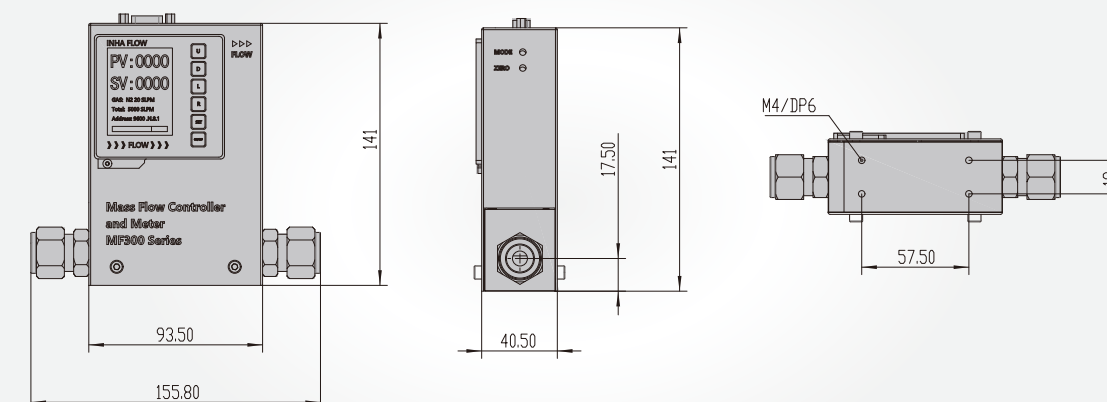


Product specification

Model	MF-300DLC Flow Controller	MF-300DLM Flow Meter
Flow specification (N2)	30 SLM ~ 200 SLM	
Range ratio	2% ~ 100% of Full Scale	
Accuracy	±1.0% of Full Scale	
Linear accuracy	±0.5% of Full Scale	
Repeatability	±0.2% of Full Scale	
Response time	≤1 sec	
Normal operating temperature range	0 ~ 50°C (Accuracy Guaranteed: 15 ~ 35°C)	
Normal operating pressure range	0 bar ~ 100 bar	
Leakage rate	1x10 ⁻⁹ atm. cc/sec He	
Power Supply	+14Vdc ~ 27Vdc/300mA	
Signal type	0 ~ 5Vdc or 4 ~ 20mA / Rs485 (Modbus Rtu)	
Seal type	Viton/Buna/Kalrez/Teflon/Epdm	
Control type	Normally Closed Solenoid	×
Connector type	D-Sub 9 Pin Connector Male	
Air circuit interface type	1/4", 3/8", 1/2" LOK, 1/4", 1/2" VCR	
Interface type	Digital Type	
Texture of material	SUS 316L	
Preheating time	15 min (Accuracy Guaranteed: 30 min)	

3D dimension drawing

MF-300DLC/MF-300DLM



Note: please consult for interface for

"X" size specification					
Interface specification	1/4 " Lok	3/8 " Lok	1/2 " Lok	1/4 " VCR	1/2 " VCR
Unit (mm)	144.8	147.8	151.5	141.3	148.5

Electrical connection

		Electrical connection mode	Analog signal compatibility	Electrical connection mode	Analog signal compatibility
		MF-300DLC Flow Controller		MF-300DLM Flow Meter	
Number	Function			Function	
1	Land	•		Land	•
2	+14V ~ +27V power supply	•		+14V ~ +27V power supply	•
3	Rs-485B(-)	•		Rs-485B(-)	•
4	Signal common terminal	•		Signal common terminal	•
5	Valve control	•		Empty	×
6	Signal output	•		Signal output	•
7	Power supply common terminal	•		Power supply common terminal	•
8	Signal input	•		Empty	×
9	Rs-485A(+)	•		Rs-485A(+)	•

MF-400 SERIES

Mass Flow Controller And Meter

Characteristics

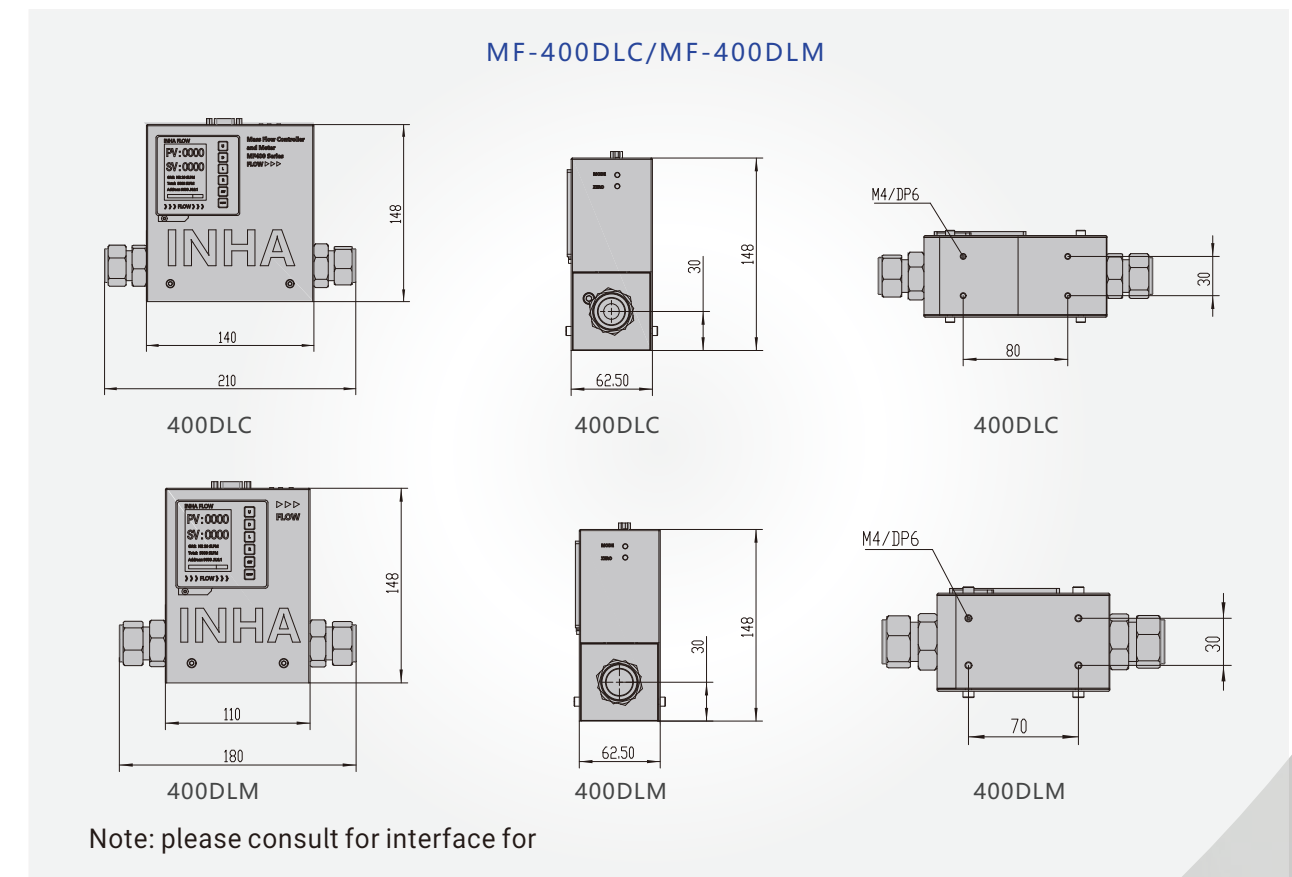
- LCD display
- All digital architecture
- Faster response speed
- High accuracy
- Stable flow control / measurement
- Wide pressure range
- Excellent corrosion resistance
- Excellent linearity
- New sensor manufacturing technology
- Support local / remote control / measurement



Product specification

Model	MF-400DLC Flow Controller	MF-400DLM Flow Meter
Flow specification (N2)	100 SLM ~ 500 SLM	
Range ratio	2% ~ 100% of Full Scale	
Accuracy	±2.0% of Full Scale	
Linear accuracy	±0.5% of Full Scale	
Repeatability	±0.2% of Full Scale	
Response time	≤2 sec	
Normal operating temperature range	0 ~ 50°C (Accuracy Guaranteed: 15 ~ 35°C)	
Normal operating pressure range	0 Bar ~ 30 Bar	
Leakage rate	1x10 ⁻⁹ atm. cc/sec He	
Power Supply	+14Vdc ~ 27Vdc/300mA	
Signal type	0 ~ 5Vdc or 4 ~ 20mA/Rs485 (Modbus Rtu)	
Seal type	Viton/Buna/Kalrez/Teflon/Epdm	
Control type	Normally Closed Solenoid	×
Connector type	D-Sub 9 Pin Connector Male	
Air circuit interface type	1/2", 3/4" LOK	
Interface type	Digital Type	
Texture of material	SUS 316L	
Preheating time	15 min (Accuracy Guaranteed: 30 min)	

3D dimension drawing



Electrical connection

	Electrical connection mode	Analog signal compatibility	Electrical connection mode	Analog signal compatibility
MF-400DLC Flow Controller			MF-400DLM Flow Meter	
Number	Function		Function	
1	Land	•	Land	•
2	+14V ~ +27V power supply	•	+14V ~ +27V power supply	•
3	Rs-485B(-)	•	Rs-485B(-)	•
4	Signal common terminal	•	Signal common terminal	•
5	Empty	×	Empty	×
6	Signal output	•	Signal output	•
7	Power supply common terminal	•	Power supply common terminal	•
8	Signal input	•	Empty	×
9	Rs-485A(+)	•	Rs-485A(+)	•

MF-500 SERIES

Mass Flow Controller And Meter

Characteristics

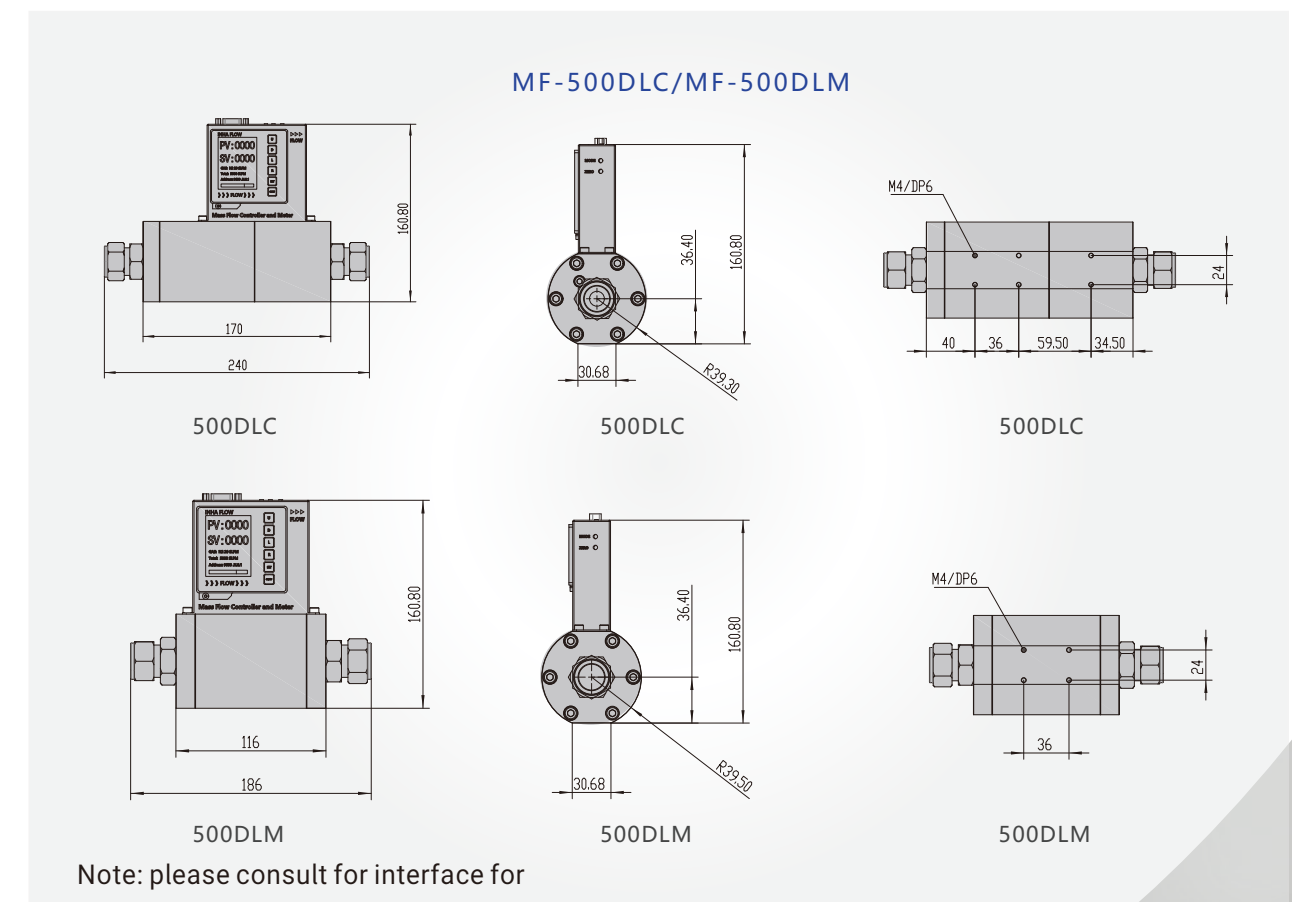
- LCD display
- All digital architecture
- Faster response speed
- High accuracy
- Stable flow control / measurement
- Wide pressure range
- Excellent corrosion resistance
- Excellent linearity
- New sensor manufacturing technology
- Support local / remote control / measurement



Product specification

Model	MF-500DLC Flow Controller	MF-500DLM Flow Meter
Flow specification (N2)	500 SLM ~ 1500 SLM	
Range ratio	2% ~ 100% of Full Scale	
Accuracy	±2.0% of Full Scale	
Linear accuracy	±0.5% of Full Scale	
Repeatability	±0.2% of Full Scale	
Response time	≤2 sec	
Normal operating temperature range	0 ~ 50°C(Accuracy Guaranteed:15 ~ 35°C)	
Normal operating pressure range	0Bar~30Bar	
Leakage rate	1x10-9 atm. cc/sec He	
Power Supply	+14Vdc ~ 27Vdc/300mA	
Signal type	0~5Vdc or 4~20mA/Rs485(Modbus Rtu)	
Seal type	Viton/Buna/Kalrez/Teflon/Epdm	
Control type	Normally Closed Solenoid	×
Connector type	D-Sub 9 Pin Connector Male	
Air circuit interface type	1/2",3/4" LOK	
Interface type	Digital Type	
Texture of material	SUS 316L	
Preheating time	15 min (Accuracy Guaranteed: 30 min)	

3D dimension drawing



Electrical connection

	Electrical connection mode	Analog signal compatibility	Electrical connection mode	Analog signal compatibility
MF-500DLC Flow Controller			MF-500DLM Flow Meter	
Number	Function		Function	
1	Land	•	Land	•
2	+14V ~ +27V power supply	•	+14V ~ +27V power supply	•
3	Rs-485B(-)	•	Rs-485B(-)	•
4	Signal common terminal	•	Signal common terminal	•
5	Empty	×	Empty	×
6	Signal output	•	Signal output	•
7	Power supply common terminal	•	Power supply common terminal	•
8	Signal input	•	Empty	×
9	Rs-485A(+)	•	Rs-485A(+)	•

MF-600 SERIES

Mass Flow Controller And Meter

Characteristics

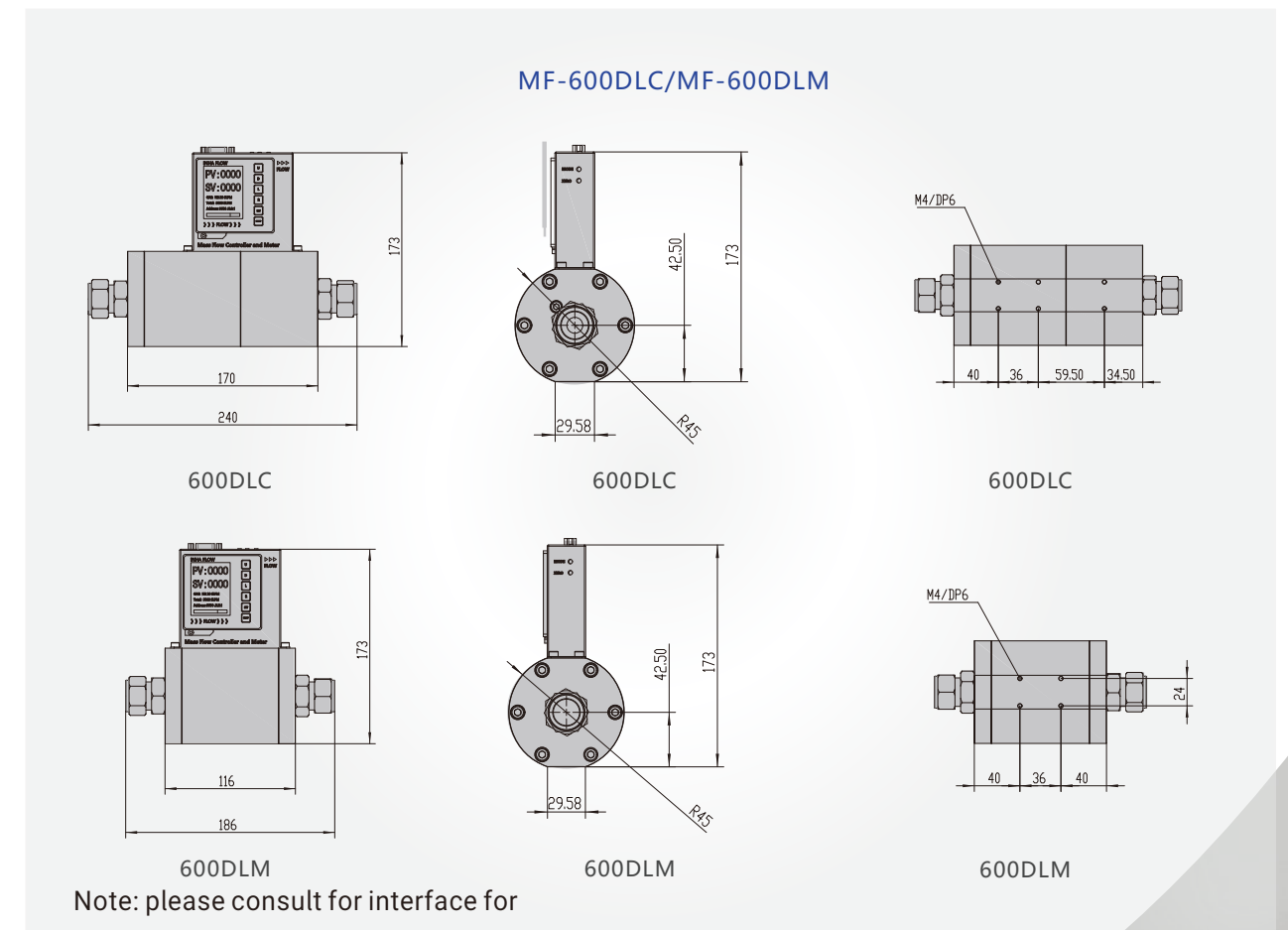
- LCD display
- All digital architecture
- Faster response speed
- High accuracy
- Stable flow control / measurement
- Wide pressure range
- Excellent corrosion resistance
- Excellent linearity
- New sensor manufacturing technology
- Support local / remote control / measurement



Product specification

Model	MF-600DLC Flow Controller	MF-600DLM Flow Meter
Flow specification (N2)	1500SLM~3000SLM	
Range ratio	2%~100% of Full Scale	
Accuracy	±2.0% of Full Scale	
Linear accuracy	±0.5% of Full Scale	
Repeatability	±0.2% of Full Scale	
Response time	≤2 sec	
Normal operating temperature range	0~50°C(Accuracy Guaranteed:15~35°C)	
Normal operating pressure range	0Bar~30Bar	
Leakage rate	1x10-9 atm. cc/sec He	
Power Supply	+14Vdc ~ 27Vdc/300mA	
Signal type	0~5Vdc or 4~20mA/Rs485(Modbus Rtu)	
Seal type	Viton/Buna/Kalrez/Teflon/Epdm	
Control type	Normally Closed Solenoid	×
Connector type	D-Sub 9 Pin Connector Male	
Air circuit interface type	1/2",3/4" LOK	
Interface type	Digital Type	
Texture of material	SUS 316L	
Preheating time	15 min (Accuracy Guaranteed: 30 min)	

3D dimension drawing



Electrical connection

	Electrical connection mode	Analog signal compatibility	Electrical connection mode	Analog signal compatibility
MF-600DLC Flow Controller		MF-600DLM Flow Meter		
Number	Function		Function	
1	Land	•	Land	•
2	+14V ~ +27V power supply	•	+14V ~ +27V power supply	•
3	Rs-485B(-)	•	Rs-485B(-)	•
4	Signal common terminal	•	Signal common terminal	•
5	Empty	×	Empty	×
6	Signal output	•	Signal output	•
7	Power supply common terminal	•	Power supply common terminal	•
8	Signal input	•	Empty	×
9	Rs-485A(+)	•	Rs-485A(+)	•

MF-200D-T SERIES

Mass Flow Controller (Special models for HCL and CL2)

Characteristics

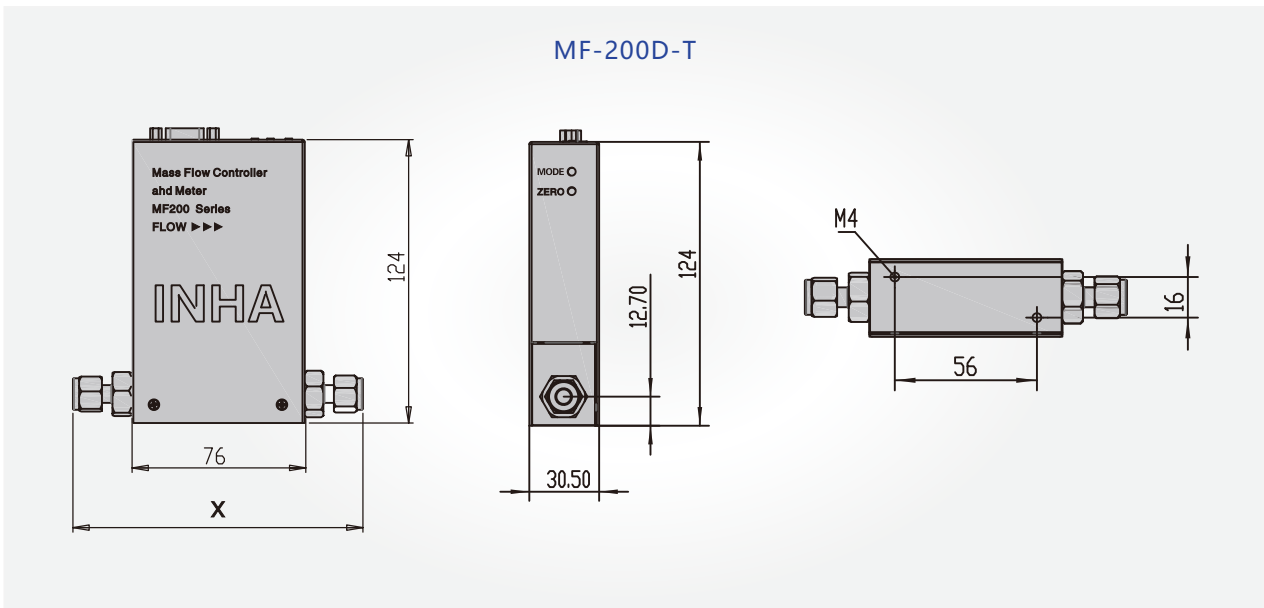
- All digital architecture
- Faster response time
- High accuracy
- Stable flow control/measurement
- Wide pressure range
- Excellent corrosion resistance
- Excellent linearity
- New sensor manufacturing process
- Low pressure and large flow



Product specification

Model	MF-200D-T Flow Controller
Flow specification (N2)	5SCCM~40SLM
Range ratio	2%~100% of Full Scale
Accuracy	≤±1.0% of Full Scale
Linear accuracy	≤±0.5% of Full Scale
Repeatability	≤±0.2% of Full Scale
Response time	≤1 sec
Normal operating temperature range	0~50°C(Accuracy Guaranteed:15~35°C)
Normal operating pressure range	0bar~10bar
Leakage rate	1x10-9 atm. cc/sec He
Power Supply	+14Vdc or 27Vdc/300mA
Signal type	0~5Vdc or 4~20mA/RS485(Modbus Rtu)
Seal type	Viton/Kalrez/Epdm
Control type	Normally Closed Solenoid
Connector type	D-Sub 9 Pin Connector Male
Air circuit interface type	3/8",1/2" LOK, 1/4", 1/2"VCR
Interface type	Digital Type
Texture of material	Teflon
Preheating time	15 min (Accuracy Guaranteed: 30 min)

3D dimension drawing



"X" size specification				
Interface specification	3/8 " Lok	1/2 " Lok	1/4 " VCR	1/2 " VCR
Unit (mm)	154.3	158	147.8	155

Electrical connection

Electrical connection mode		Analogue signal compatibility
MF-200D-T Flow Controller		
Number	Function	
1	Land	•
2	+14V ~ +27V power supply	•
3	RS-485B(-)	•
4	Signal common terminal	•
5	Valve control	•
6	Signal output	•
7	Power supply common terminal	•
8	Signal input	•
9	RS-485A(+)	•

MFL-400 SERIES

Mass Flow Controller

Characteristics

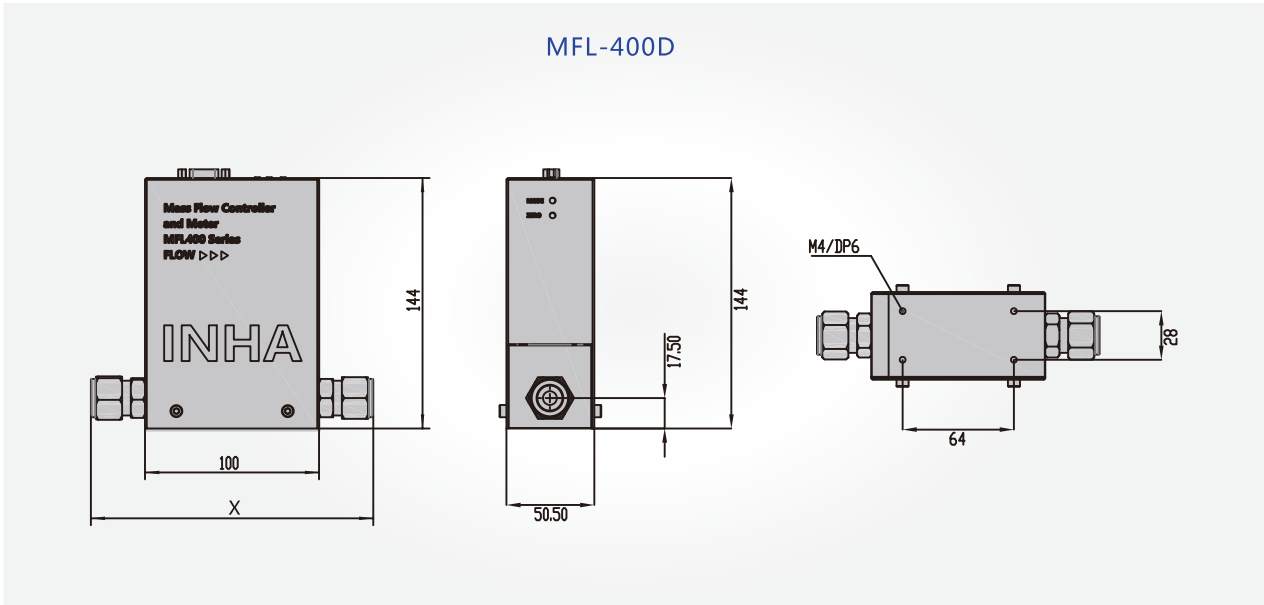
- All digital architecture
- Faster response time
- High accuracy
- Stable flow control/measurement
- Wide pressure range
- Excellent corrosion resistance
- Excellent linearity
- New sensor manufacturing process
- Low pressure and large flow



Product specification

Model	MFL-400D Flow Controller
Flow specification (N2)	200 SLM ~ 300 SLM
Range ratio	2% ~ 100% of Full Scale
Accuracy	±1.0% of Full Scale
Linear accuracy	±0.5% of Full Scale
Repeatability	±0.2% of Full Scale
Response time	≤1 sec
Normal operating temperature range	0 ~ 50°C(Accuracy Guaranteed:15 ~ 35°C)
Normal operating pressure range	0bar ~ 50bar
Leakage rate	1x10-9 atm. cc/sec He
Power Supply	+14Vdc or 27Vdc/300mA
Signal type	0 ~ 5Vdc or 4 ~ 20mA/RS485(Modbus Rtu)
Seal type	Viton/Buna/Kalrez/Teflon/Epdm
Control type	Normally Closed Solenoid
Connector type	D-Sub 9 Pin Connector Male
Air circuit interface type	3/8", 1/2" LOK, 1/4", 1/2"VCR
Interface type	Digital Type
Texture of material	SUS 316L/Aluminium
Preheating time	15 min (Accuracy Guaranteed: 30 min)

3D dimension drawing

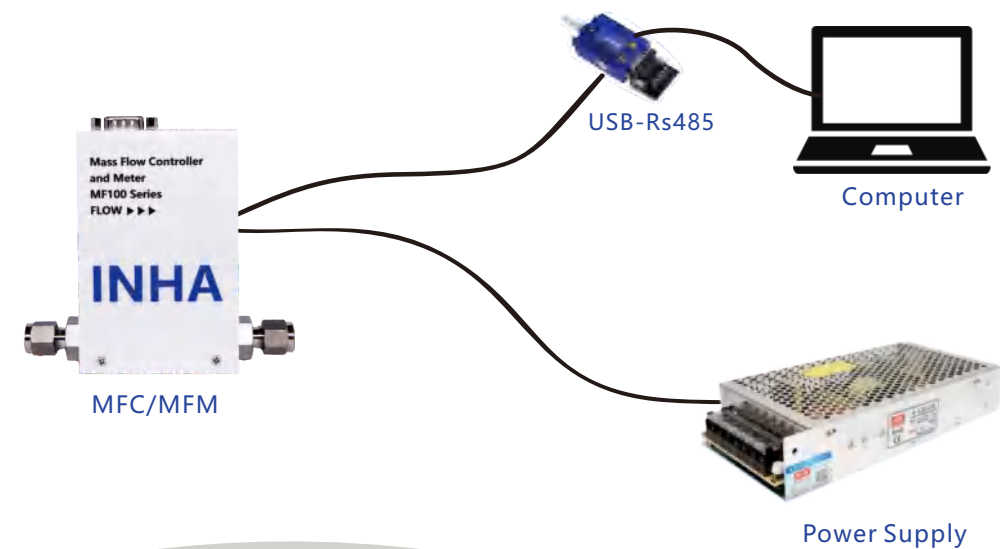


"X" size specification				
Interface specification	3/8 " Lok	1/2 " Lok	1/4 " VCR	1/2 " VCR
Unit (mm)	154.3	158	147.8	155

Electrical connection

Electrical connection mode		Analag signal compability
MFL-400D Flow Controller		
Number	Function	
1	Land	•
2	+14V ~ + 27V power supply	•
3	Rs-485B(-)	•
4	Signal common terminal	•
5	Valve control	•
6	Signal output	•
7	Power supply common terminal	•
8	Signal input	•
9	Rs-485A(+)	•

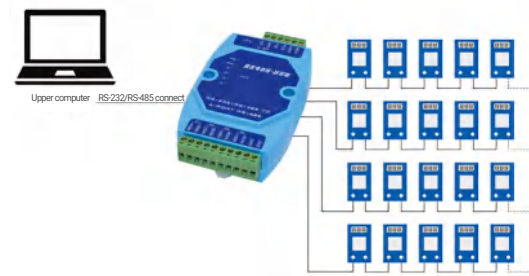
Schematic diagram of communication equipment connection



The digital MFC/MFM can be connected to the PC end and used with the software provided by the company; Customers can also develop their own programs for use through communication protocols; Compared with analog MFC/MFM, digital MFC/MFM has higher precision, better linearity and faster response speed; And digital MFC/MFM is compatible with analog MFC/MFM control mode, which can be used with MFX2000 (secondary instrument).

Definition of connection between module and MFC/MFM 9-pin interface

Modular	MFC/MFM 9 PIN
RS485+	⑨RS-485 A(+)
RS485-	③RS-485 B(-)



RS-485 bus division and signal amplification:
Flexible networking and stable signal amplification,
Rs485 HUB is recommended when multiple sets are used.

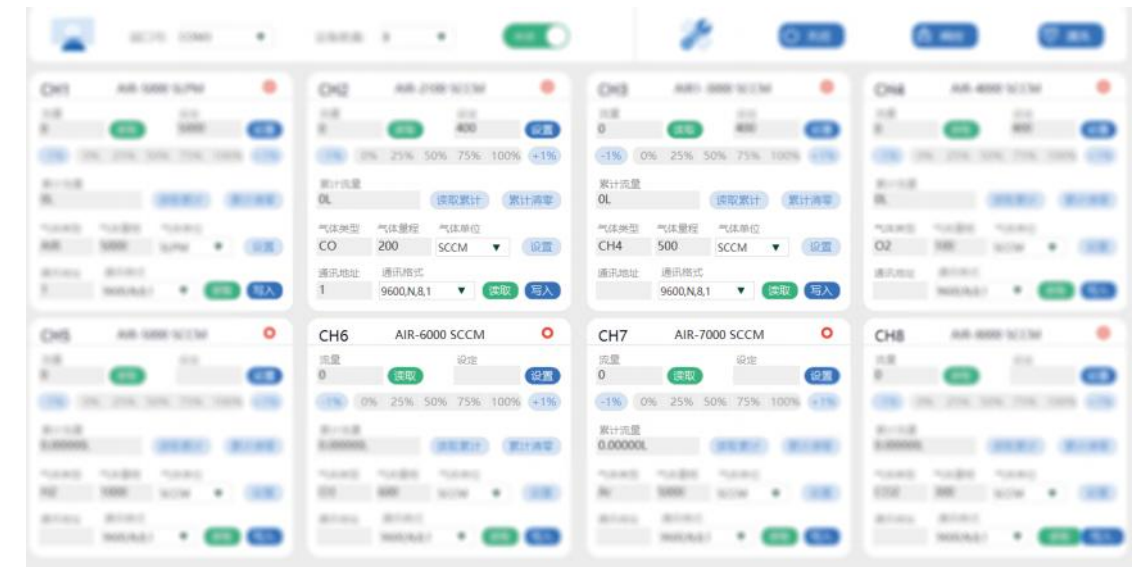


Figure 1

This operation can realize the separate channel setting, with the flow accumulation function, and support the change of gas and conversion range in the software; As shown in Figure 1.

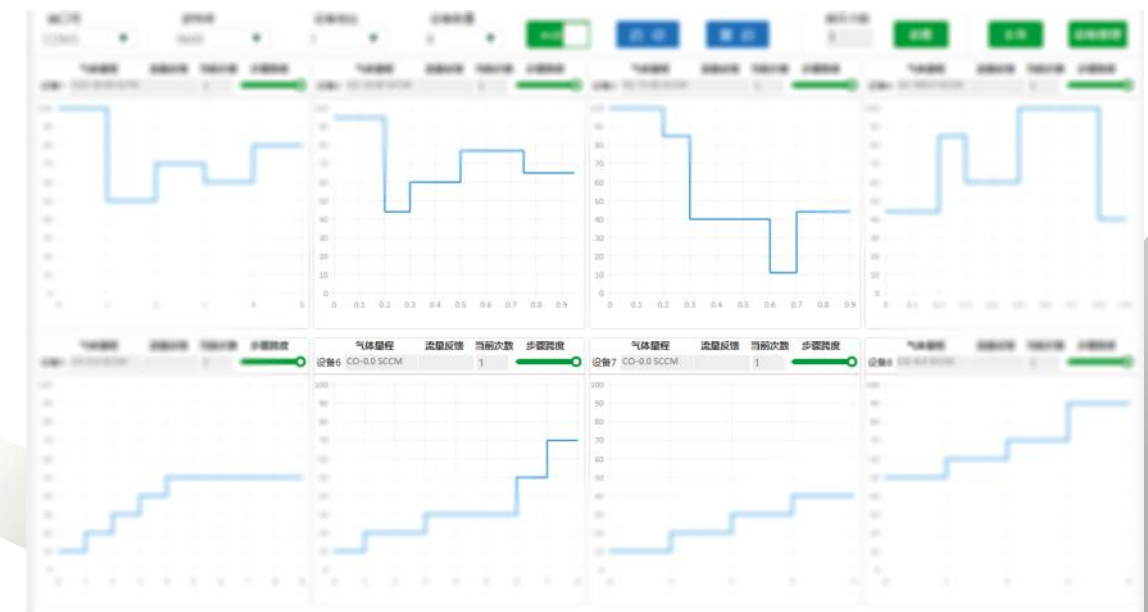


Figure 2

The operation interface is more intuitive; It supports multi scheme setting, and can realize up to 8 devices to read the cumulative control at the same time according to customer requirements; The current flowmeter operation status can be displayed in real time through various oscilloscopes to provide customers with more accurate and precise data acquisition.

As shown in Figure 2.

MFX-2000 SERIES

Read Out Box

Characteristics

- 2.2 inch LCD color display
- Support range change
- Support unit change
- Support cumulative function
- Based on 32bit microcomputer processor
- All metal housing
- Support RS-485 communication
- Support PC software operation



Product Overview

MFX-2000 flow indicator provides three flow display units, namely%, CCM and LPM. Set according to user's requirements before leaving the factory. The way of percentage display is to display the flow measurement value of MFM/MFC according to its percentage in the full range. For example, for MFM/MFC with specification of 50 CCM, when the display value is 80%, the actual flow is 40 CCM. For MFM/MFC of any specification, the full scale value is displayed as 100%. This method has good universality, and can be equipped with MFM/MFC of different ranges, but it is not intuitive, and some users are not used to it.

According to the CCM or LPM display, the flow display range is matched with the corresponding MFM/MFC range when leaving the factory. The display value is the flow value when using, which is intuitive and customary, and is adopted by most users. After matching, in principle, it can also be connected to MFM/MFC of other ranges, but the displayed value needs to be corrected.

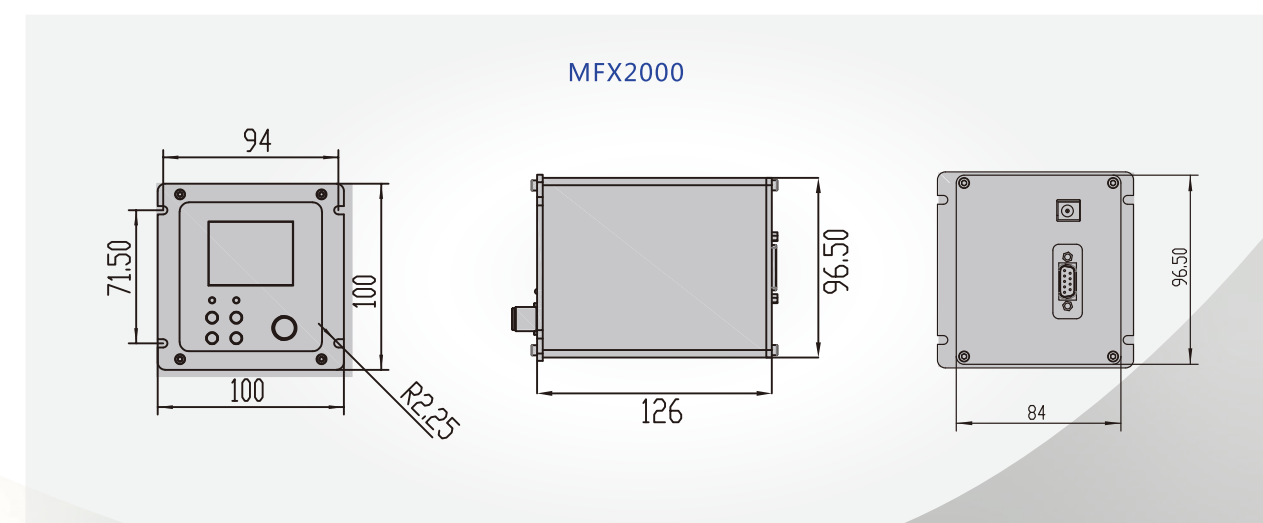
This display supports the function of cumulative clear 0.

Up to 8 channels of customization are supported.

Electrical connection (D-type 9-pin connector (female))

	Electrical connection mode	Voltage type
	MFX-2000	
Number	Function	
1	Shell grounding	•
2	Power supply + 15V+24V	•
3	Rs-485 B(-)	•
4	Set / output signal common terminal	•
5	Valve control	•
6	0-5vdc/4-20mA signal output	•
7	Power (ground)	•
8	0-5vdc/4-20mA signal input	•
9	Rs-485 A(+)	•

3D dimension drawing



Main technical indicators

Number	Model	MFX-2000
1	display	2.2inch LCD
2	Accuracy	±0.2%F.S(Full Scale)
3	output signal	4~20mA/0~5 Volts For Full Scale of MFC
4	Input signal	4~20mA/0~5 Volts into>100 KΩ
5	Output power	15Vdc /24Vdc (0.5Amp)
6	Preset units	SCCM , SLM , %
7	Interface form	I/O-9 Pin D-Sub(Male)
7	Power supply	+24Vdc(≥2.0Amp)

Operating Instructions (MFX-2000)

1. Description of LCD main window



Figure 1

1. The yellow display is the flow display
 2. The blue display shows the set flow
 3. Total is the cumulative flow
- As shown in Figure 1.

2. Range setting



Figure 2

1. Press the "MENU" button on the panel to enter the "Menu Interface"
 2. Turn the "knob" to adjust the rightmost "blue square ■" to the "range setting" position.
 3. Gently press the "knob" on the panel to change the "blue square ■" to "green square ■". Twist the "knob" to set the range. Press the "knob" again to step adjust the meaning of the numbers in the "blue square ■" and "green square ■". "0" represents one digit, "1" represents ten digits, "2" represents hundreds, and "3" represents thousands.
 4. After setting, press the "SET" button on the panel to prompt "Setting is complete".
 5. Exit and press the "MENU" button on the panel again.
- As shown in Figure 2.

3. Company Setting

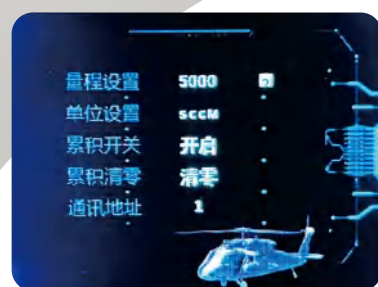


Figure 3

1. Press the "MENU" button on the panel to enter the "Menu Interface"
 2. Turn the "knob" to adjust the rightmost "blue square ■" to the "range setting" position.
 3. Gently press the "knob" on the panel to change the "blue square ■" to "green square ■". Twist the "knob" to set the range. Press the "knob" again to step adjust the meaning of the numbers in the "blue square ■" and "green square ■". "0" represents one digit, "1" represents ten digits, "2" represents hundreds, and "3" represents thousands.
 4. After setting, press the "SET" button on the panel to prompt "Setting is complete".
 5. Exit and press the "MENU" button on the panel again.
- As shown in Figure 3.

4. Accumulative opening

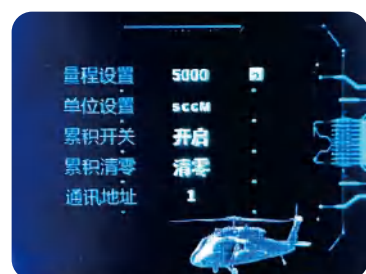


Figure 4

1. Press the "MENU" button on the panel to enter the "Menu Interface"
 2. Twist the "knob" on the panel to adjust the rightmost blue square ■ to the "accumulation switch" position.
 3. Gently press the "knob" on the panel to change the "blue square ■" to "green square ■", and twist the "knob" on the panel to set "ON" and "OFF".
 4. After setting, press the "SET" button on the panel to prompt "Setting is complete".
 5. Exit and press the "MENU" button on the panel again.
- As shown in Figure 4.

5. Cumulative reset

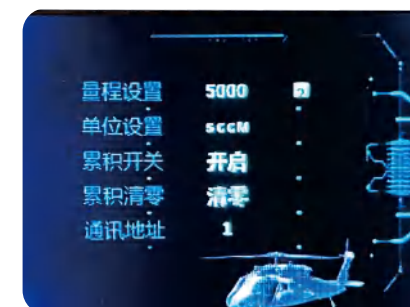


Figure 5

1. Press the "MENU" button on the panel to enter the "Menu Interface".
 2. Twist the "knob" on the panel to adjust the rightmost "blue square ■" to the "cumulative reset" position.
 3. Press the "knob" on the panel to "reset".
 4. Exit and press the "MENU" button on the panel again.
- As shown in Figure 5.

6. Mailing Address

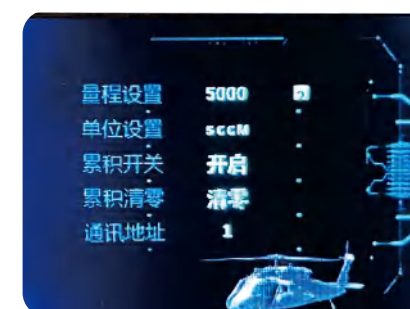


Figure 6

1. Press the "MENU" button on the panel to enter the "Menu Interface".
 2. Twist the "knob" on the panel to adjust the rightmost "blue square ■" to the "communication address" position.
 3. Adjust the "knob" to change the address. The MFX-2000 communication format is 9600. N.8.1.
 4. Exit and press the "MENU" button on the panel again.
- As shown in Figure 6.

7. Flow regulation



Figure 6

After the instrument is set, the flow shall be adjusted through the "knob" on the panel.

After the "valve control" is turned on, press the knob gently to display the cursor, press the knob again to adjust the cursor position, and turn left and right to set the flow rate.

As shown in Figure 6.

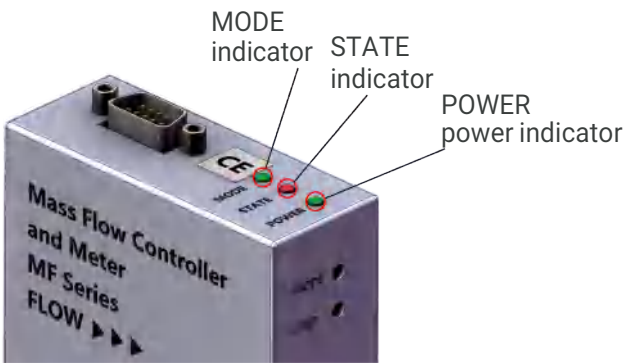
8. Valve control on/off

Press the "CON" button on the panel to turn the setting signal on or off. Turn the "knob" on the panel to adjust the flow after opening the valve control. When the valve control is opened, "LED 1" is green, and "LED 2" is green. When the valve control is closed, "LED 1" is green and "LED 2" is red.

9. Cleaning on/off

Press the "PURGE" button on the panel to turn cleaning on or off. When cleaning is turned on, "LED 1" is red and "LED 2" is green. When cleaning is turned off, "LED 1" is green and "LED 2" is green.

LED indicator description (MF digital series only)

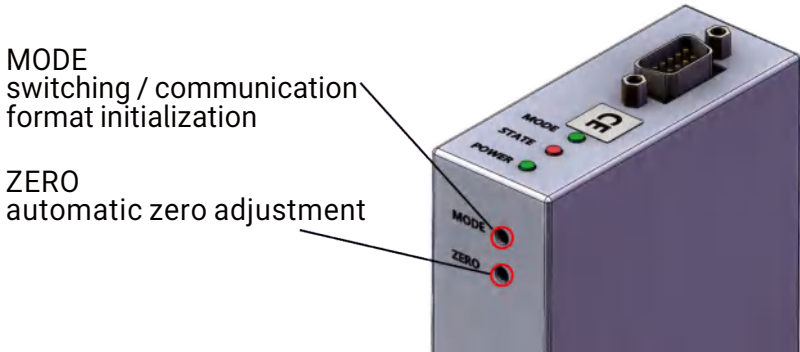


- Mode light:
- Analog mode ---- green LED
 - Digital mode ---- blue LED
- State status light:
- Normal state ----- blue LED is always on
 - Abnormal state — non blue normally on or flashing
- Power lamp:
- Power indication ---- orange LED is always on

Operation status indication (MF digital series only)

- (1) Priority 1 - zeroing: LED red flashes quickly during zeroing.
- (2) Priority 2 - line loss compensation switch: turn on line loss compensation and the blue LED flashes three times; Turn off line loss compensation and the green LED flashes three times.
- (3) Priority 3 - control signal and mode: LED Blue indicates the digital control mode, led blue flashes slowly when the control signal is valid, and LED is always on when the control signal is invalid; The LED green indicates the analog control mode, the control signal is valid, the LED green flashes slowly, and the control signal is invalid and always on.

Key function description (MF digital series only)



- On the side of the housing:** there are mode switching/communication reset and automatic zero setting buttons. Please read the instructions carefully when using. To avoid operational errors.When using, it is necessary to prepare a pin to facilitate the operation of extending into the hole.
- Mode switching:** Press the MODE button lightly once, the green light flashes for analog mode, and the blue light flashes for digital mode.
- Initialization of communication format:** long press the MODE button for about 10 seconds, release when the red LED of the MODE mode light flashes, and wait for the communication gridFormat initialization completed. (Communication format: 9600N81; communication address: 1)
- Automatic zero adjustment:** long press the ZERO button for about 10 seconds, release when the red light of the STATE status light flashes, and wait for the completion of zero adjustment.

STATE operation status indicator
(If the status conflict is high, the status indication with low priority will be canceled)

- (1) Priority 1 - communication initialization: LED red flashes quickly during initialization
- (2) Priority 2 - fault indication:

Fault type	Alarm status
Sensor fault or 0 point offset	Red light flashing 1T / S
The air supply is not turned on	Red light flashing 2T / S
Insufficient air inlet pressure	Red light flashing 3T / S
Set signal overrun	Red light flashing 4T / S
Temperature out of limit	Red light flashing 5T / S

- (3) Priority 3 - valve status:

Valve status	Indication status
Valve control	LED Blue, always on
Close	LED green, always on
Clean	LED red is always on

(* mf400mf500 does not have this function)

Communication protocol (MF digital series only)

Register description

The product protocol is the standard MODBUS-RTU protocol. It supports function codes 03h, 06h and 10h.

The factory defaultcommunication format is 9600N81 and the equipment address is 01H.

Table1: Read register description

Register name	Register address	Function code	Notes
Flow return	01H	03H	Read value = flow value, data range (- 2000 ~ 5000) = (- 40% ~ 100% * FS) Note: this data type is a signed 16 bit integer.
Set flow	02H	03H	Read data=Set data, Data range (0-5000) = (0-100%*FS)
Control mode	03H	03H	See attached table 1 for code table
Gas range	04H	03H	Read data= Range data
Flow unit	05H	03H	Data Code : 1: SCCM, 2: CCM, 3: SLPM, 4: LPM, 5: SCFM, 6: SCFH, 7: M3/H, 8: KG/H
Calibration pressure data	06H	03H	Read data= Pressure data *10
Calibration pressure unit	07H	03H	Data Code : 1-BAR,2-MPA,3-KPA,4-PSIA,5-PSIG,6-KGF/CM2
Gas coefficient	08H	03H	Conversion coefficient with N2 Read data= Coefficient *1000
Date of production	09H	03H	“Year”Top 12bit, “Month”Lower 4 bits, For example, read data : X;Year”data is X>>4 ; “month”data is X&0x000F.
Production date	0AH	03H	Read data = “Day”data
MFC S/N	0BH	03H	Read data(DEC) = S/N;
Calibration temperature	0CH	03H	Read data = Temperature data *10
Product types	0DH	03H	0 : MFC 1 : MFM
Gas type	00EH-012H	03H	The gas type has 5 registers and 10 characters, ASCLL code
Product model	013H-017H	03H	The gas type has 5 registers and 10 characters, ASCLL code
Read MFC temperature	018H	03H	Read data = Temperature data *10

Table2 : Description of MFC setting register

Register name	Register address	Function code	Notes
Set flow	31H	03H/06H/10H	Setting data = Flow data, Data range (0-5000) = (0-100%*FS)
Cumulative value clearing	32H	06H	Setting data 1, Run Cumulative value clearing
Cumulative value L16Bit	33H	03H	Cumulative value =(H16Bit<<16+L16Bit)/5000*Range (Power down storage)
Cumulative value H16Bit	34H	03H	
Valve control	35H	03H/06H/10H	Data code 0 : Auto-Control 1 : Valve close 2 : Valve open

Table 3 description of communication setting register

Register name	Register address	Function code	Notes
RTU Com format	41H	03H/06H/10H	See attached table 2 for code table
RTU addr	42H	03H/06H/10H	Setting data = Addr data, Data range (01H-7FH)
RTU Com dog	43H	03H/06H/10H	Set code : 0 : Disable, 1 : Enable Notes : If the communication watchdog function is enabled, it is recommended to send the flow setting value to feed the dog every 5 seconds. If it is not sent over 10 seconds, the flow rate should be set to 0.

Communication example

Example 1 : Read MFC traffic

Master device send data :

slave addr	Function code	Register high 8 bits	Register low 8 bits	Number high 8 bits	Number low 8 bits	CRCH	CRCL
01H	03H	00H	01H	00H	01H	D5H	CAH

Slave return data : (The data type is : short int)

slave addr	Function code	Byte number	DATAH	DATAL	CRCH	CRCL
01H	03H	02H	XXH	XXH	XXH	XXH

Example 2 : Set flow rate (This communication is invalid in external control mode)

Master device send data : (For example : Send data 2500=50%F.S)

slave addr	Function code	Register high 8 bits	Register low 8 bits	DATAH	DATAL	CRCH	CRCL
01H	06H	00H	31H	09H	C4H	DFH	C6H

Slave return data:

slave addr	Function code	Register high 8 bits	Register low 8 bits	DATAH	DATAL	CRCH	CRCL
01H	06H	00H	31H	09H	C4H	DFH	C6H

Example 3 : Communication settings

Master device send data : (Set Slave :9600 N 8 1,addr:01H)

slave addr	Function code	Register high 8 bits	Register low 8 bits	Number high 8 bits	Number low 8 bits	Byte number	DATA1H	DATA1L	DATA2H	DATA2L	CRCH	CRCL
01H	10H	00H	41H	00H	02H	04H	00H	00H	00H	01H	F7H	93H

Slave return data:

slave addr	Function code	Register high 8 bits	Register low 8 bits	Number high 8 bits	Number low 8 bits	CRCH	CRCL
01H	10H	00H	41H	00H	02H	11H	DCH

Instruction code

Schedule 1

Control mode code table

Instruction code	Control mode		Output mode	
	Number	Simulation	Number	Simulation
01H	RS-485	×	RS-485	0-5V
02H	RS-485	×	RS-485	4-20MA
03H	×	0-5V	RS-485	0-5V
04H	×	4-20MA	RS-485	4-20MA
Other	RS-485	×	RS-485	0-5V

Note: MF-10DC and MF-10DM do not support 4-20mA.

Schedule 2

Communication format code table

Instruction code	Baud rate	Check bit	Data bit	Stop bit
00	9600	N	8	1
01	2400	N	8	1
02	4800	N	8	1
03	9600	N	8	1
04	19200	N	8	1
05	38400	N	8	1
06	57600	N	8	1
07	115200	N	8	1
08	2400	O	8	1
09	4800	O	8	1
10	9600	O	8	1
11	19200	O	8	1
12	38400	O	8	1
13	57600	O	8	1
14	115200	O	8	1
15	2400	E	8	1
16	4800	E	8	1
17	9600	E	8	1
18	19200	E	8	1
19	38400	E	8	1
20	57600	E	8	1
21	115200	E	8	1
Other	9600	N	8	1

Communication protocol (MFX-2000 only)

1. The product protocol is a standard MODBUS-RTU protocol, which supports function codes 03H, 06H and 10H.
2. Factory default communication format: 9600 N81, device address: 01H.
3. Register address description

Table1: Read register description

Register name	Register address	Function code	Notes
Read current traffic	01H	03H	Flow value=read value, data range (0~5000)=(0%~100% * FS)
Read device range	04H	03H	Range value=read value
Read flow unit	05H	03H	Flow unit code (0: SCCM, 2: SLM, 3: %

Table2 : Description of MFC setting register

Register name	Register address	Function code	Notes
Set flow	31H	03H/06H/10H	Set value=sending value, range (0~5000)
Cumulative value clearing	32H	06H	Send 1, execute the reset command
Cumulative value L16Bit	33H	03H	High 16 bit read value shifted to the left 16 bit+low 16 bit read value
Cumulative value H16Bit	34H	03H	
Valve control	35H	03H/06H/10H	Default valve control status, code (0: valve control 1: close 2: clean)

Table 3 description of communication setting register

Register name	Register address	Function code	Notes
Device address	42H	03H/06H/10H	Address value=sending value, range (01H-20H)

Example 1: Read traffic

Data issued by the host:

slave addr	Function code	Register high 8 bits	Register low 8 bits	Number high 8 bits	Number low 8 bits	CRCH	CRCL
01H	03H	00H	01H	00H	01H	D5H	CAH

Device returned data: (This data type is a signed 16 bit integer)

slave addr	Function code	Byte number	DATAH	DATAL	CRCH	CRCL
01H	03H	02H	XXH	XXH	XXH	XXH

Example 2: Setting the flow

Data issued by the host: (100%. FS=5000, for example, if the flow is set to 50%. FS, the data issued is 2500)

slave addr	Function code	Register high 8 bits	Register low 8 bits	DATAH	DATAL	CRCH	CRCL
01H	06H	00H	31H	09H	C4H	DFH	C6H

Equipment return data:

slave addr	Function code	Register high 8 bits	Register low 8 bits	DATAH	DATAL	CRCH	CRCL
01H	06H	00H	31H	09H	C4H	DFH	C6H

Flow conversion

Conversion method of different gases calibrated

This product is usually calibrated with nitrogen (N2) before delivery. If other gases are used for calibration, it shall be specially proposed with the sales personnel of the company when ordering.

The flow reading displayed by the MFC calibrated with nitrogen can be converted with the gas actually used by the user through the conversion coefficient to calculate the flow of the gas to be used. The gas conversion calculation formula is as follows:

$$\text{Actual gas flow rate} = \text{Gas display reading} \times \frac{\text{Actual inflow gas coefficient}}{\text{Calibrated gas coefficient}}$$

- Example 1: This MFC is calibrated as nitrogen

It is assumed that the gas used is carbon dioxide

When carbon dioxide flowed in, the data read out was 100sccm

Then the actual flow of carbon dioxide is: $100\text{sccm} \times 0.740 = 74.0\text{sccm}$

Conversion calculation formula of mixed gas:

$$\text{Conversion coefficient of mixed gas} = \frac{100}{\frac{p1}{\text{Coefficient of the first gas}} + \frac{p2}{\text{Coefficient of the second gas}} + \dots + \frac{pn}{\text{Coefficient of nth gas}}}$$

- Note: P1 = percentage of the first gas

P2 = percentage of second gas

⋮

PN = percentage of nth gas

Example 2: assuming that the gas used is 20% helium plus 80% chlorine, the flow of the whole mixture is required to be 20slm

$$\text{Conversion coefficient of mixed gas} = \frac{100}{20/1.386 + 80/0.876} = 0.946$$

Then, the equivalent flow of nitrogen is equal to: $20 / 0.946 = 21.14\text{slm}$

Common Gases

Gas Conversion Factors and Sealing Type

	Gas	Formula	Gas Factor	Recommended	allowed	Not recommended
1	1,1,2-Trichloro-1,1,2-Trifluoroethane (f113)	C2CL3F3	0.2310	Buna		Viton/Epdm/Kalrez
2	1,1-Difluoro-1-Chloroethane	C2H3CLF2	0.3410	Buna		
3	1,1-Difluoroethane	CH3CHF2	0.4150	Kalrez		
4	1,1-Difluoroethylene	CH2:CF2	0.4580	Viton		
5	1,2-Dibromotetrafluoroethane (f114B2)	C2Br2F4	0.2150	Teflon	Viton/Buna/Kalrez	Epdm
6	1,2-Dichloroethane(Ethylene dichloride)	C2H4CL2	0.3820	Kalrez		
7	1,2-Dichlorotetrafluoroethane (f114)	C2CL2F4	0.2310	Buna	Epdm	
8	1,3-Butadiene	C4H6	0.3540	Viton	Teflon-Kalrez	Buna/Epdm
9	1,1,1,2-Tetrafluoroethane(R134A)	C2H2F4	0.3070	Epdm		
10	1,1,2,2-Tetrafluoroethane(R134)	C2H2F4	0.2950			
11	1,2-Propylene Oxide	C3H6O	0.3480			
12	1-Butene	C4H8	0.2940	Viton	Kalrez	Buna/Epdm
13	1-Pentene, 4-Methyl	C6H12	0.2000			
14	2,2 Dichloro- 1,1,1- Trifluoroethane	C2HCL2F3	0.2590			
15	2,2-Dimethylpropane	C(CH3)4	0.2470	Buna		
16	2-Chloro-1,1,1,2-Tetrafluoroethane (R124)	C2HCLF4	0.0270			
17	2-Chlorobutane	C4H9CL	0.2340			
18	2-Methyl-1,3-Butadiene	C5H8	0.2470			
19	3-Methyl-1-butene	C5H10	0.2520			
20	Acetonitrile	C2H3N	0.5100			
21	Acetylene (Ethyne)	C2H2	0.6150	Viton	Epdm/Buna/Teflon-K	
22	Acrolein	C3H4O	0.3620			
23	Air	Air	0.9980	Viton	Epdm/Buna/Teflon-K	
24	Allene	C3H4	0.4780	Buna		
25	Ammonia	NH3	0.7860	Epdm/Teflon	Buna/Teflon	Viton
26	Argon	Ar	1.3950	Viton	Epdm/Buna/Teflon-K	
27	Arsine	AsH3	0.7540	Teflon-Kalrez		
28	Benzene	C6H6	0.2940			
29	Borane	H3B	0.7780			
30	Boron Trichloride	BCL3	0.4430	Teflon-Kalrez	Viton	
31	Boron Trifluoride	BF3	0.5790	Teflon-Kalrez	Viton	
32	Bromine	Br2	0.8000			
33	Bromine Pentafluoride	BrF5	0.2870	Teflon	Kalrez	Viton/Epdm/Buna
34	Bromine Trifluoride	BrF3	0.4390	Teflon	Kalrez	Viton/Epdm/Buna

	Gas	Fomula	Gas Factor	Recommended	allowed	Not recommended
35	Bromotrifluoroethylene	C2BrF3	0.3260	Viton	Buna	
36	Bromotrifluoromethane (f13B1)	CBrF3	0.4120	Buna	Epdm	Viton/Kalrez
37	Butane	C4H10	0.2570	Viton	Buna/Kalrez	Epdm
38	Carbon Dioxide	CO2	0.7400	Buna	Kalrez	Viton/Epdm
39	Carbon Disulfide	CS2	0.6380	Viton	Kalrez	Buna/Epdm
40	Carbon Monoxide	CO	0.9950	Viton	Buna/Epdm/Kalrez	
41	Carbon Tetrachloride	CCL4	0.3440	Viton	Kalrez	Buna/Epdm
42	Carbon Tetrafluoride (f14)	CF4	0.4400	Viton	Kalrez	
43	Carbonyl Fluoride	COF2	0.5670	Viton		
44	Carbonyl Sulfide	COS	0.6800	Viton		
45	Chlorine	CL2	0.8760	Viton	Kalrez	Buna/Epdm
46	Chlorine Dioxide	CLO2	0.6930	Viton	Kalrez	Buna/Epdm
47	Chlorine Trifluoride	CLF3	0.4330	Kalrez		
48	Chlorodifluoromethane (f22)	CHCLF2	0.5050	Epdm	Kalrez	Viton/Buna/Teflon
49	Chloroform (Trichloromethane)	CHCL3	0.4420	Viton	Kalrez	Buna/Epdm
50	Chloropentafluoroethane (f115)	C2CLF5	0.2430	Epdm		Buna
51	Chlorotrifluoroethylene	C2CLF3	0.3370	Teflon		
52	Chlorotrifluoromethane (f13)	CCLF3	0.4300	Kalrez		
53	CIS-2-Butene	C4H8	0.3200	Buna		
54	Cyanogen	(CN)2	0.4980	Kalrez		
55	Cyanogen Chloride	CLCN	0.6180	Kalrez		
56	Cyclobutane	C4H8	0.3870	Buna		
57	Cyclopropane	C3H6	0.5050	Buna		
58	Deuterium	D2	0.9950	Viton		
59	Diborane	B2H6	0.4480	Kalrez		
60	Diboromodifluoromethane(f12B2)	CBr2F2	0.3630	Viton		
61	Dichlorodifluoromethane (f12)	CCL2F2	0.3900	Buna		Viton/Teflon/Kelrez/Epdm
62	Dichloroethylene	C2H2CL2	0.3970			210
63	Dichlorofluoromethane (f21)	CHCL2F	0.4560	Kalrez		Viton/Epdm/Buna
64	Dichloromethane	CH2CL2	0.5220			
65	Dichlorosilane	SiH2CL2	0.4420	Kalrez		
66	Diethylamine	C4H11N	0.2220			
67	Diedthylsilane	C4H12Si	0.1830			
68	Difluoromethane (R32)	CF2H2	0.6270			
69	Dimethylamine	(CH3)2NH	0.3700	Kalrez		
70	Dimethylether	(CH3)2O	0.3920	Viton	Buna/Epdm/Kalrez	
71	Dimethylsulfide	C2H6S	0.3570			
72	Dimethylzinc	C2H6Zn	0.2340			
73	Disilane	Si2H6	0.3320	Teflon		
74	Ethane	C2H6	0.4900	Viton	Buna/Kalrez	Epdm
75	Ethanol	C2H6O	0.3940			
76	Ethyl Chloride	C2H5CL	0.4080	Viton	Buna/Kalrez	Epdm

	Gas	Fomula	Gas Factor	Recommended	allowed	Not recommended
77	Ethylacetylene	C4H6	0.3650	Buna		
78	Ethylene	C2H4	0.6190	Viton	Buna/Kalrez	Epdm
79	Ethylene Oxide	C2H4O	0.5890	Kalrez		Viton/Buna/Epdm
80	Fluorine	F2	0.9240	Metal		
81	Fluoroform (f23)	CHF3	0.5290	Kalrez		
82	Germanium Tetrachloride	GeCL4	0.2680	Kalrez		
83	Germanium Tetrafluoride	GeF4	0.3560			
84	Germanium Tetrahydride (Germane)	GeH4	0.5590			
85	Halothane(R123B1)	C2HBrCLF3	0.2570			
86	Helium	He	1.3860	Viton	Buna/Kalrez/Epdm	
87	Hexafluoroacetone	C3F6O	0.2190			
88	Hexafluorobenzine	C6F6	0.6320			
89	Hexafluorobutadiene	C4F6	0.2130			
90	Hexafluoroethane (f116)	C2F6	0.2550	Buna		
91	Hexafluoropropylene (HFP)	C3F6	0.2490	Buna		
92	Hexamethyldisilane (HMDS)	(CH2)6Si2	0.1390	Kalrez		
93	Hexamethyldisiloxane	C6H18OSi2	0.1100			
94	Hexane	C6H14	0.2040	Viton	Buna/Kalrez	Epdm
95	Hexylamine	C6H15N	0.1580			
96	Hydrogen	H2	1.0080	Viton	Buna/Epdm/Kalrez	
97	Hydrogen Bromide	HBr	0.9870	Viton	Epdm/Kalrez	Buna
98	Hydrogen Chloride	HCL	0.9830	Epdm	Kalrez	Buna
99	Hydrogen Cyanide	HCN	0.7440	Kalrez		
100	Hydrogen Fluoride	HF	0.9980	Kalrez		Viton/Buna/Epdm
101	Hydrogen Iodide	HI	0.9530	Kalrez		
102	Hydrogen Selenide	H2Se	0.8370	Kalrez		
103	Hydrogen Sulfide	H2S	0.8500	Teflon/Kalrez	Epdm	Viton/Buna
104	Iodine Pentafluoride	IF5	0.2830	Teflon		Viton/Buna/Epdm
105	Isobutane	C4H10	0.2600	Kalrez		
106	Isobutene	C4H8	0.2890	Kalrez		
107	Isopentane	C5H12	0.2110			
108	Krypton	Kr	1.3820	Viton		
109	Methacrolein	C4H6O	0.3130			
110	Methane	CH4	0.7630	Buna/Viton	Kalrez	Epdm
111	Methanol	CH4O	0.6090			
112	Methyl Bromide	CH3Br	0.6460			
113	Methyl Chloride	CH3CL	0.6870	Kalrez		Viton/Buna/Epdm
114	Methyl Fluoride	CH3F	0.7610			
115	Methyl Mercaptan	CH4S	0.5880			
116	Methyl Silane	CH6Si	0.3930			
117	Methyl Trichlorosilane (MTS)	CH3CL3Si	0.2670			
118	Methyl Vinyl Ether	C3H6O	0.3770	Kalrez		

	Gas	Fomula	Gas Factor	Recommended	allowed	Not recommended
119	Methylacetylene	C3H4	0.4730	Kalrez		
120	Monoethanolamine	C2H7NO	0.3050			
121	Monoethylamine (CH3CH2NH2)	C2H7	0.3590	Kalrez		
122	Monomethylamine	CH3NH2	0.5650	Kalrez		
123	Neon	Ne	1.3980	Viton	Buna/Epdm/Kalrez	
124	Nickel Carbonyl	Ni(CO)4	0.2120			
125	Nitric Acid	HNO3	0.4910			
126	Nitric Oxide	NO	0.9950	Kalrez	Viton	
127	Nitrogen	N2	1.0000	Viton	Buna/Epdm/Kalrez	
128	Nitrogen Dioxide	No2	0.7580	Kalrez		
129	Nitrogen Trifluoride	NF3	0.5010	Teflon	Kalrez	
130	Nitrogen Trioxide	N2O3	0.4430			
131	Nitrosyl Chloride	NOCL	0.6440	Kalrez		
132	Nitrous Oxide	N2O	0.7520	Buna		
133	Octofluorocyclobutane	C4F8	0.1690			
134	Octafluorotetrahydrofuran	C4F8O	0.1650			
135	Octofluorocyclobutane	C4F8	0.1690			
136	Oxygen	O2	0.9880	Viton	Epdm/Kalrez	Buna
137	Oxygen Difluoride	OF2	0.6720			
138	Ozone	O3	0.7380	Viton	Epdm/Kalrez	Buna
139	Pentafluoroethane	C2HF5	0.2870			
140	Pentane (n-Pentane)	C5H12	0.2120			
141	Perchloryl Fluoride	CLO3F	0.4480			
142	Perfluoro-2-Butene	C4F8	0.2680			
143	Perfluorobutane	C4F10	0.7380			
144	Perfluoromethyl-vinylether (PMVE)	PMVE	0.2960			
145	Perfluoropropane	C3F8	0.1790			
146	Phosgene	COCL2	0.5040	Kalrez		
147	Phosphine	PH3	0.7830	Kalrez		
148	Phosphorous Oxychloride	POCl3	0.3270			
149	Phosphorous Pentafluoride	PF5	0.3460			
150	Phosphorous Trifluoridide	PF3	0.4950			
151	Propadiene	C3H4	0.4390			
152	Propane (same as CH3CH2CH3)	C3H8	0.3430	Viton	Buna/Kalrez	Epdm
153	Epropylene (Propene)*	C3H6	0.4010	Viton	Kalrez	Buna/Epdm
154	Rhenium Hexafluoride	ReF6	0.2300			
155	Silane	SiH4	0.6250	Kalrez		
156	Silicon Tetrachloride	SiCL4	0.3100	Teflon-Kalrez		
157	Silicon Tetrafluoride	SiF4	0.3950	Teflon		
158	Sulfur Dioxide	SO2	0.7280	Epdm	Kalrez/Teflon	Buna/Viton
159	Sulfur Hexafluoride	SF6	0.2700	Epdm/Teflon	Buna	Kalrez
160	Sulfur Tetrafluoride	SF4	0.3530			

	Gas	Fomula	Gas Factor	Recommended	allowed	Not recommended
161	Sulfur Trioxide	SO3	0.5350			
162	Sulfuryl Fluoride	SO2F2	0.4230			
163	Tetrachloromethane	CCL4	0.3440			
164	Tetraethylsilane	C8H20Si	0.1110			
165	Tetrafluoroethylene (TFE)	C2F4	0.3610	Buna		Kalrez
166	Tetrafluorohydrazine	N2F4	0.3670			
167	Tetramethylsilane	C4H12Si	0.1830			
168	Titanium Tetrachloride	TiCl4	0.2960			
169	Toluene	(C6H5)CH3	0.2340			
170	Trans-2-Butene	C4H8	0.2910			
171	Trichlorofluoromethane (f11)	CCL3F	0.3740	Teflon		Buna/Epdm/Kalrez
172	Trichlorosilane	SiHCL3	0.3290	Viton/Kalrez		
173	Trifluoroethane	C2H3F3	0.3330			
174	Trifluoropropene	C3H3F3	0.2860			
175	Trimethyl Aluminum	C3H9Al	0.2590			
176	Trimethylamine	(CH3)3N	0.3160	Kalrez		
177	Trimethylgallium	C3H9Ga	0.2370			
178	Trimethyloxyborane (TMB)	B(OCH3)3	0.3000			
179	Trimethylsilane	C3H10Si	0.2350			
180	Tungsten Hexafluoride	Wf6	0.2270	Teflon		
181	Uranium Hexafluoride	Uf6	0.2200	Teflon		
182	Vinyl Bromide	C2H3Br	0.5240			
183	Vinyl Chloride	C2H3CL	0.5420	Viton	Kalrez	Buna/Epdm
184	Vinyl Fluoride	C2H3F	0.5760	Kalrez		
185	Water Vapor	H2O	0.8610			
186	Xenon	Xe	1.3830	Viton	Buna/Kalrez/Epdm	
187	z "gas mixture in volume"	mixgas	0.7420			