Biosflow®

Coriolis Mass Flow Controllers/ Meters

Biosflow 6100/6101 Series Instruction Manual

More scientific fluid measurement and control equipment are available at Biosflow !

2021Q2V1.2

In order to maintain the performance and safety of the product, please be sure to read this instruction manual before installing and using the product. This can prevent accidents or product damage caused by incorrect use.

When the product fails or needs to be re-debugged, please be sure to contact our agent or Biosflow. We will let skilled service personnel respond appropriately, so please be sure to follow their instructions. If the user repairs or modifies the product by himself, it may cause a serious accident, and we will not be able to provide a formal warranty.

Please pay attention to the above and wish you a happy use!

This manual covers the following Biosflow Coriolis flow measurement and control devices:

- Biosflow 6110 Series Liquid/Gas Mass Flow Controllers
- Biosflow 6120 Series Liquid/Gas Mass Flow Controllers
- Biosflow 6130 Series Liquid/Gas Mass Flow Controllers
- Biosflow 6111 Series Liquid/Gas Mass Flow Meter
- Biosflow 6121 Series Liquid/Gas Mass Flow Meter
- Biosflow 6131 Series Liquid/Gas Mass Flow Meter
- Biosflow 6100 Series High Pressure/High Differential Mass Flow Controllers
- Biosflow 6101 Series High Pressure/High Pressure Differential Mass Flow Meters
- Biosflow 6100 Series Low Pressure Drop Mass Flow Controllers
- Biosflow 6101 Series Low Pressure Drop Mass Flow Meter

Includes 6100 Series mass flow controllers/flow meters with optional IP55 /65 protection for special environments

Contents

Ⅰ、Quick Start Guide

1. Common settings

Zero the flow controller. After connecting the flow controller and ensuring that no fluid is flowing through the device, power it up and make sure its set point is at zero.

Main monitoring page. The flow controller/flow meter main monitoring page can show parameter information such as instantaneous flow, medium temperature, medium density, set flow value and valve opening ratio.

Connect the flow controller. Make sure the direction of flow through the device is in the same direction as the arrow on the flow controller (usually left to right).

2. Flow control

Select your set point. Press the flow setting on the touch screen of the flow controller and enter the corresponding value to set the flow. At this time, the instantaneous flow is displayed in the first line of the screen, and the set value is displayed in the second line of the screen.

Monitor real-time flow readings. You can monitor the real-time readings of instantaneous flow, medium density, medium temperature, valve opening, etc. by watching the screen. The readings are updated in real time.

Get the accumulated flow reading. The accumulated flow reading can be switched to display by the "flow output ratio" in the lower right corner of the screen.

The cumulative flow option can be entered through the menu button in the upper left corner of the screen. It can be viewed in the "2Total" tab of the setting interface. In this menu, you can also touch the button to select Start Total and Clear Total to turn on/off the cumulative flow and clear the cumulative flow.

3. Maintenance and usage precautions

If your fluid media is clean, your flow controller will not require regular cleaning.

◆ Calibrate the flow controller regularly every year.

Request a factory calibration by contacting Biosflow.

◆ About Usage

(1) Please use according to the pressure range specified in the order.

(2) Please use in accordance with the ordered specifications for ambient temperature, humidity and cleanliness.

(3) As this is a precision instrument, do not subject it to strong impact.

◆ About moving

In order to prevent accidents and damage during transportation, please try to transport the product to the installation site in the state it was shipped from our factory. In particular, there are equipment that transports fastening screws (Biosflow 6120, 6130, 6121, 6131, etc.).

◆ About Installation

(1) Installation location

① This instrument is an indoor specification (except for customized specifications).

Installing in a place exposed to rain may cause malfunctions, so please avoid this. Install in a place with good ventilation and little humidity change.

② Please install it in a place without vibration and shock.

③ Please avoid using in places exposed to direct sunlight, high temperature, and high humidity.

④ Please install it in a place with less dust.

⑤ Please install it in a place without corrosive media (except customized specifications).

⑥ Connect to an electrically stable location.

Please install it in a place without strong electric or magnetic fields or radio frequency signals.
For the rack of the fixed equipment, please connect it to an electrically stable place in a way that allows the device to be grounded.

⑦ Please install it in a place where the ambient temperature is 0 to 70°C.

(2) Please lay the pipes in the direction of the flow and the arrow indicated on the product body . It is recommended to lay a section of hose at the outlet and inlet of the flow meter to reduce the impact of vibration on the equipment. It is not recommended to lay large-scale variable diameter pipes within 50cm before and after the flow meter.

(3) Be sure to install an additional filter on the inlet side of the media (see page 6 for filtering requirements).

(4) If complete shutoff is required, install a shutoff valve separately.

(5) After using highly viscous, corrosive media, flush thoroughly with an inert medium.

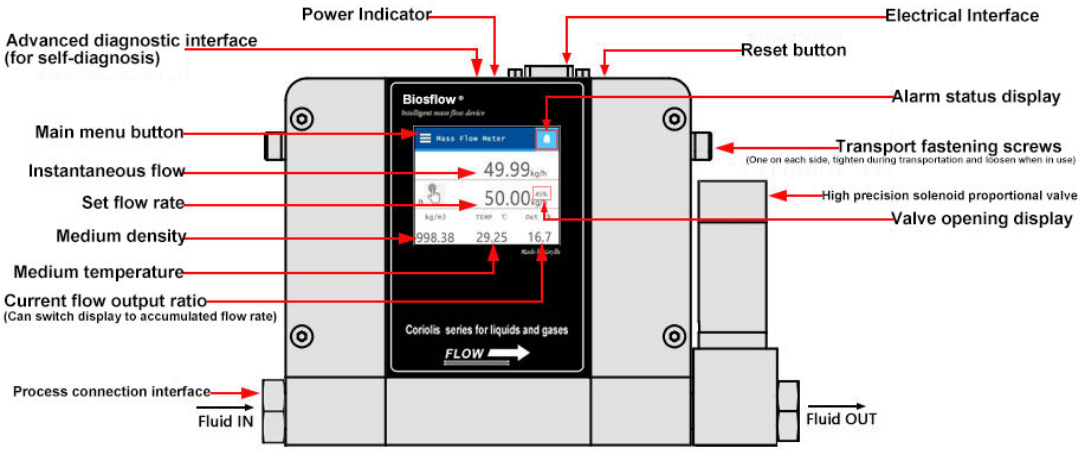
(6) If the flow meter outlet is connected to a liquid source bottle, a one-way valve should be installed at the flow meter outlet to prevent liquid backflow from damaging the flow meter.

Ⅱ、Start using your device

1. Know your device

1.1 Flow controller interface and display information

The following diagram shows the default configuration of a standard Grylls mass flow controller (8120 series) with a post-valve. Your flow controller may look different and have different connections , especially if a different flow controller/meter was ordered.



(The above diagram takes the 6120 controller series as an example. The function keys of each specific model may be slightly different)

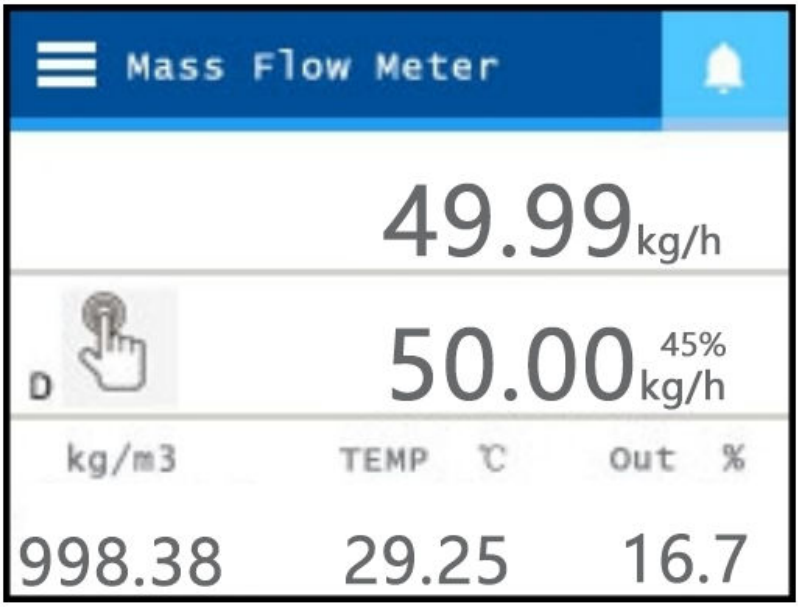
Note: Power indicator, reset button, transport fastening screws, touch screen display, high-precision electromagnetic

The configuration of components such as proportional valves varies according to the equipment selection and is not a standard configuration. Please refer to the equipment function configuration required during selection for details.

1.2 Flow controller display

The following figure shows the various features of the flow controller display. The display has a built-in backlight function, so the screen display can be clearly seen even in a dimly lit environment. For more information, see the controller basic functions page and detailed introduction on page 16.

Main display



(The display screen of Biosflow 6100 series is an optional feature, please refer to the actual model selection)

2. Install

There is no straight pipe requirement upstream or downstream of the flow controller. Most Bisoflow flow.5 controllers can be mounted in any position, including inverted.

Biosflow 6100 series flow controllers must be zeroed after initial installation, after changing the operating conditions or installation location. If the display screen is selected, zero it in the screen menu. If the display screen is not selected, press and hold the zeroing button on the top of the case for more than 5 seconds and then release it to zero. Please note that the 8100 series must be zeroed when the fluid is full and there is no flow to eliminate zero point errors, which will affect the measurement accuracy of the equipment.

Note: When assembling a flow controller equipped with a large electromagnetic proportional valve (SPV03, LPDV03, HPV03, etc.), the valve should be kept vertical (right side up). If other directions are required, please indicate this when selecting the model or contact Bisoflow.

3. Process connection

Your controller is shipped from the factory with threaded plugs installed on its ports. To reduce the chance of contaminating the MFC core, do not remove these plugs until you are ready to install the device.

The standard Biosflow gas/liquid flow controller has internal threads on both the inlet and outlet. Optional welded VCRs and other specialty accessories may have external threaded connectors.

If you are using a fitting that does not have a face seal, use thread seal Teflon tape to prevent leaks around the port threads, but do not wrap around the first two threads. This will minimize the possibility of the tape entering the fluid media and plugging the core element.

If the fittings you are using have face seals, you do not need to apply Teflon tape to the threads.

WARNING: Do not use pipe dope or sealants on process connections as these compounds may cause permanent damage to the sensor if they enter the MFC core.

4. Filter

When the fluid pressure is sufficient, a filter can be connected in series to prevent large particles from entering the flow .ontroller. The recommended maximum particle sizes are as follows:

- For devices with flow ranges of 100 g/h or less, 3 microns.
- For devices with flow ranges between 1kg/h and 100kg/h, 50 microns.
- For devices with flow ranges of 100 kg/h or more, 140 microns.

5. Connect flow controller

Your Biosflow flow controller can measure and control positive pressure flow formed by positive pressure fluid, or negative pressure flow formed by suction. Connect the controller so that the fluid flows in the same direction as the flow arrow, which is usually from left to right because you are looking at the front of the device.

Note: Measuring and controlling negative pressure flow needs to be specified when selecting the model.

WARNING: Using the flow controller above the maximum specified internal line pressure, or above the maximum recommended differential pressure between the inlet and outlet, may result in permanent damage to the internal core sensor.

A common cause of this problem is the momentary application of high pressure fluid from a fast acting solenoid valve upstream or downstream of the flow controller. If you suspect a damaged core sensor, discontinue use of the equipment and contact Biosflow.
The pressure limits are shown in the table below:

Biosflow 6100 series flow meter/flow controller pressure parameter table

Flow Meter	Static pressure resistance	Flow Controller	Static pressure/pressure difference resistance
Biosflow 6111	435/1450 PSIG	Biosflow 6110	435PSIG/72.5 PSID
Biosflow 6121	435/1450 PSIG	Biosflow 6120	435PSIG/72.5 PSID
Biosflow 6131	435/1450 PSIG	Biosflow 6130	435PSIG/72.5 PSID

Note: Biosflow's 6101 series flowmeters and 6100 series flow controllers usually have a normal withstand pressure of 435PSIG, and the optional maximum withstand pressure is 1450PSIG. The maximum withstand pressure depends on the specific working conditions. If you need higher withstand pressure and higher or lower pressure difference products, please contact Biosflow.

6. Power and signal connections

Power can be supplied to the controller via a multi-pin connector such as a DB9 or DB15 on the top of the device.

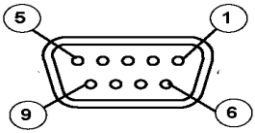
The Biosflow 6110 and 6120 series MFCs require a power supply of 24Vdc at least 1000mA.

The Biosflow 6130 Large Valve series MFCs require a power supply of 24Vdc at least 1200mA.

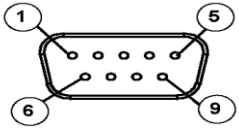
If the device is powered by ±15Vdc, a power supply with a positive and negative 15V of no less than 600mA is required. (Only some customized models of Biosflow are powered by ± 15Vdc)

6.1 DB9 series electrical interface line sequence definition

If your device was ordered with a DB9 connector, be sure to check the calibration label or calibration data sheet on the device and refer to the appropriate wire map definition.



Front view of female connector



Front view of male connector

Analog output = select 0-5V/4-20mA or other analog quantity according to the actual output of the device

Analog input = select 0-5V/4-20mA or other analog quantity according to the actual input of the device

Analog output 2 = second analog output (non-standard configuration function)

TX (+) = Serial port RS-232TX or RS-485 (+)

RX (-) = Serial port RS-232RX or RS-485(-)

NC = Not Connected

Optional = Optional function connection port

Power Input = (+Vdc)

Ground = common for power, analog signal and alarm (but it is recommended to use independent defined pins)

General pin sequence definition

Pinout	DB9M-1 24Vdc/15Vdc	DB9M-2 ±15Vdc	DB9M-3	DB9-4	DB9-5
1	TX (+)	NC	TX (+)	TX (+)	RX (-)
2	Analog Output	Analog Output	Analog Output	Analog Output	Analog Output
3	Analog Input	Power common terminal	Analog Input	power Input	power Input
4	Signal Common Terminal	Analog Input	Public End	Public End	Public End
5	NC	Valve Control	NC	NC	NC
6	RX (-)	Power Supply(+)	RX (-)	Analog Input	Analog Input
7	Power Supply(+)	Power Supply(-)	Power Input	Public End	Public End
8	Power Supply(-)	Power Supply(-)	Public End	Public End	Public End
9	Chassic Ground	Signal Common Terminal	Public End	RX (-)	TX (+)

Note: If there is no special customization, the wiring definition of Biosflow factory equipment is based on DB9M-1 in the table above.

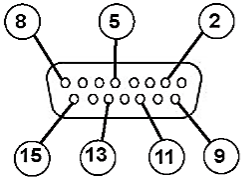
Additional pinout definitions

Pinout	DB9-6	DB9-7	DB9-8	DB9-9	DB9-10
1	Analog Output 2	RX (-)	TX (+)	NC	Power Input
2	Analog Output	Analog Output	Analog Output	Analog Output	Analog Iutput
3	Power Input	Public End	Analog Iutput	Power Input	Analog Output
4	Public End	Power Input	RX (-)	Public End	NC
5	Public End	Public End	Analog Output 2	NC	Public End
6	Analog Iutput	TX (+)	NC	Analog Iutput	Public End
7	Public End	Analog Iutput	Power Input	Public End	RX (-)
8	TX(+)	Current Output	Public End	RX (-)	TX (+)
9	RX (-)	Public End	Public End	TX (+)	NC

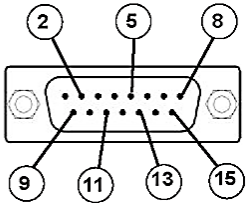
Due to cable manufacturing variations, when using blunt-cut multi-strand cable, use continuity checking and color to identify the correct wire sequence/pinout.

6.2 DB15 series electrical interface line sequence definition

If your device was ordered with a DB15 connector, be sure to check the calibration label or calibration data sheet on the device and refer to the appropriate pinout diagram.



Front view of female connector



Front view of male connector

Analog output = select 0-5V/4-20mA or other analog quantity according to the actual output of the device

Analog input = select 0-5V/4-20mA or other analog quantity according to the actual input of the device

Analog output 2 = second analog output (non-standard configuration function)

TX (+) = Serial port RS-232TX or RS-485 (+)

RX (-) = Serial port RS-232RX or RS-485(-)

NC = Not Connected

Optional = Optional function connection port

Power Input = (+Vdc)

Ground = common for power, analog signal and alarm (but it is recommended to use independent defined pins)

Due to cable manufacturing variations, when using blunt-cut multi-strand cable, use continuity checking and color to identify the correct wire sequence/pinout.

General pin sequence definition

Pinout	DB15-1	DB15-2	DB15-3	DB15-4	DB15-5	DB15-6	DB15-7
1	Signal Common Terminal	Public End	Public End	NC	NC	Public End	Public End
2	Analog Input Current	Analog Output	Analog Output	RX (-)	Analog Output	NC	Analog Output
3	Analog Input Voltage	Analog Iutput	NC	NC	NC	NC	NC
4	NC	Public End	NC	NC	NC	Analog Output	NC
5	Power Input(+)	Public End	Power Input	Public End	Public End	Power Input	Public End
6	Power Input(-)	Public End	NC	Analog Output	NC	NC	NC
7	Analog Input Current	Power Input	NC	Public End	Power Input	Analog Output	NC
8	Analog Output Voltage	TX (+)	Analog Iutput	NC	Analog Iutput	NC	Analog Iutput
9	Signal Common Terminal	Public End	Public End	NC	Analog Output 2	Public End	Public End
10	NC	NC	Public End	Analog Output 2	NC	Public End	Public End
11	Analog Output 2	NC	Analog Output 2	Power Input	Public End	Analog Output 2	Analog Output 2
12	NC	Analog Output	NC	Public End	Public End	NC	RX (-)
13	NC	NC	NC	NC	RX (-)	NC	Power Input
14	RX (-)	NC	RX (-)	Analog Iutput	TX (+)	RX (-)	TX (+)
15	TX (+)	RX (-)	TX (+)	TX (+)	Public End	TX (+)	Public End

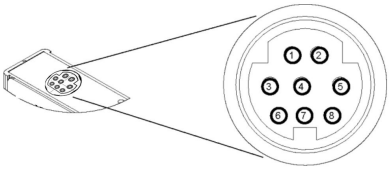
Note: If there is no special customization, the wiring definition of the factory equipment should refer to DB15-1 in the above table.

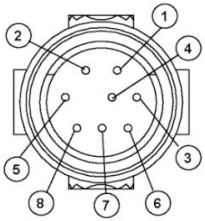
Additional pinout definitions

Pinout	DB15-8	DB15-9
1	Public End	Public End
2	Analog Output	Analog Output
3	Public End	Analog Input
4	NC	Public End
5	Power Input	Public End
6	NC	Public End
7	NC	Power Input
8	Analog Input	TX (+)
9	Public End	Public End
10	Public End	NC
11	Analog Output 2	NC
12	NC	Analog Output 2
13	RX (-)	NC
14	Public End	NC
15	TX (+)	RX (-)

6.3 8-pin aviation plug series electrical interface line sequence definition

If the device's electrical interface is an 8-pin aviation connector, please refer to the pinout diagram below. Only applicable to models with optional IP55 protection.





Pinout	Function Definition	8-pin plug cable wiring sequence
1	0-5Vdc/4-20mA or other analog output	1
2	Models with a second analog output [4-20mA, 0-5Vdc, 1-5Vdc, 0-10Vdc] or basic alarm output	2
3	Serial port RS-232RX/RS-485 (-) input signal (receive)	3
4	Analog setting input, 0-5Vdc/4-20mA or other analog quantity	4
5	Serial RS-232TX/RS-485 (+) output signal (transmit)	5
6	Power supply (+)	6
7	Power supply (-)	7
8	Public End (common for power supply, digital communication, analog signals and alarms)	8
Note: The above pinout applies to all flow controllers with an 8-pin aviation plug connector. The availability of different output signals depends on the options ordered. The actual output signal is based on the options specified when placing an order or consulting Biosflow.		

6.4 RS-232/RS-485 digital input/output signals

To use RS-232 or RS-485 digital signals, connect the RS-232/RS-485 output signal, RS-232/RS-485 input signal and ground to the serial port, either a PC with a built-in serial port or a serial port converted via USB or an equivalent interface such as a PLC, DCS, etc.

DB9, DB15 and 8-pin aviation plug interface for RS-232/RS485 signals

9-pin serial connector		15-pin serial connector		8-pin aviation plug connector	
Pinout	**Function**	**Pinout**	**Function**	**Function**	**Pinout**
4	Public End	9	Public End	Public End	8
1	Transmission	15	Transmission	Receive	3
6	Receive	14	Receive	Transmission	5

6.5 Analog signal

Initial analog output signal

Your Biosflow controller has an initial analog output signal that is linear over itsfull range. For the standard 0-5Vdc and optional 0-10Vdc output signals, the zero flow condition is typically around 0.010Vdc. Zero flow for the optional 1-5Vdc and 4-20mA output signals is 1Vdc and 4mA, respectively. Full scale flow is 5Vdc for 0-5Vdc and 1-5Vdc signals, 10Vdc for 0-10Vdc signals, and 20mA for 4-20mA signals.

The default 15-pin DB15 electrical connector for the BiosFlow places the primary analog output on pin 8 for voltage signals and pin 7 for 4-20mA current signals. The signal ground is common and connected to either pin 1 or pin 9.

The Biosflow 9-pin DB9 electrical connector places the primary analog output on line 2 for voltage signals and line 2 for 4-20mA current signals when current signals are selected. The signal ground is common and is connected to line 4 or 8.

Optional: Second Analog Output Signal

The Biosflow's default 15-pin DB15 electrical connector provides an optional second analog output on line 11 for voltage or current signals. Your device's second analog signal may not be identical to its primary output signal.

Check the ordering information included with the meter to determine which output signals were ordered.

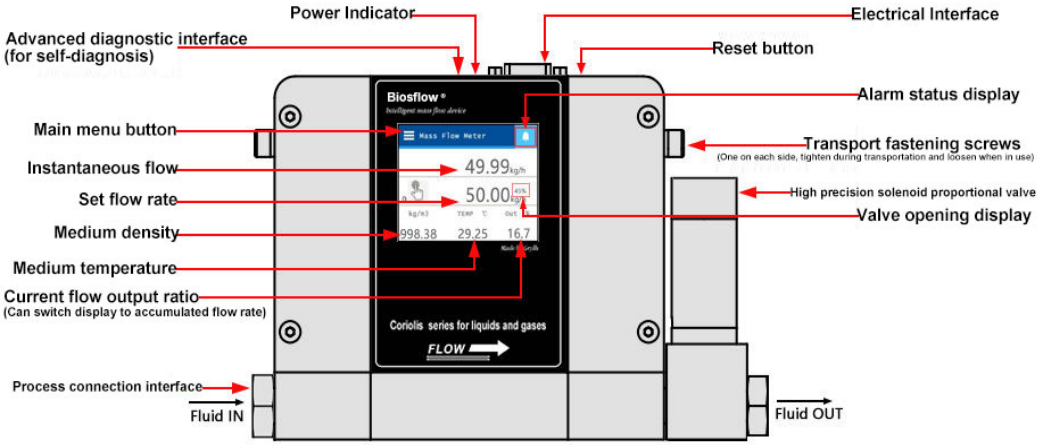
Option: 4-20mA current output signal

Your controller can be equipped with a 4-20mA current signal. Please inform the Biosflow engineer when selecting and ordering products.

Note: Do not connect 4-20mA devices to a "loop powered" system, as this will damage some circuits and void the warranty. If the device must be connected to a loop powered system, please install a signal isolator and use an independent power supply.

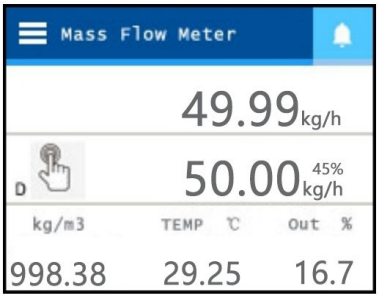
Ⅲ、Flow controller function introduction

1. Flow controller basic function interface

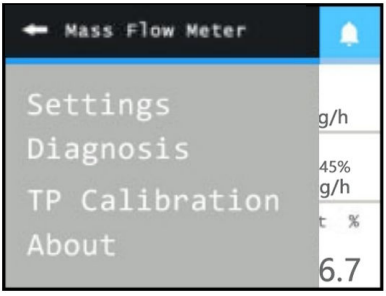


(The above diagram takes the 8120 series as an example)

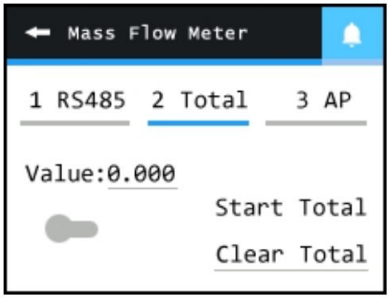
Click the ☰ in the upper left corner to enter the drop-down menu.



Click the ← in the upper left corner to return to the main interface.



Select "Settings" to enter the settings menu, and click the corresponding numbered tab to enter that tab.

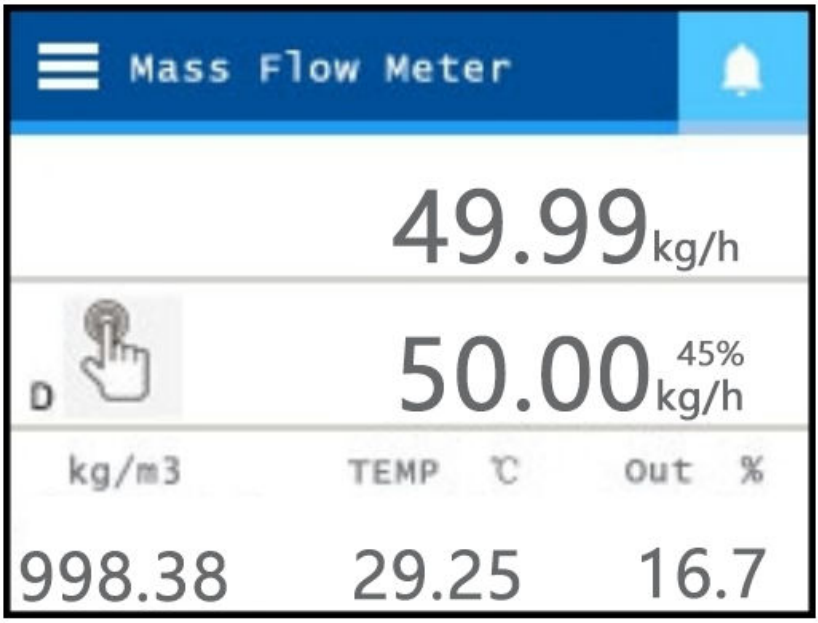


2. Collect real-time data

As shown in the figure below, the following information can be displayed on the main monitoring interface:

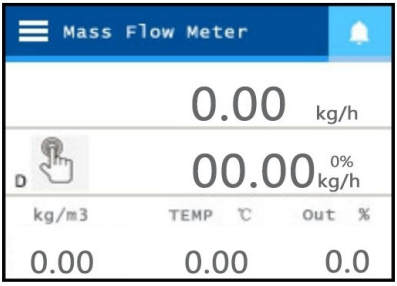
- Instantaneous flow
- Set flow rate
- Medium density
- Medium temperature
- Valve opening
- Alarm status display
- Cumulative flow (need to switch display)

Note: The above displayed information may vary depending on the device selected.

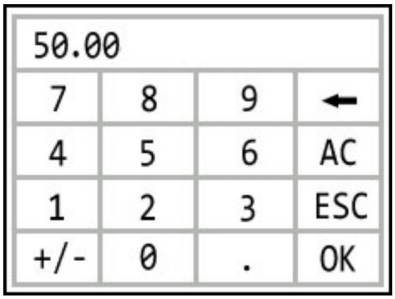


3. Set the flow rate

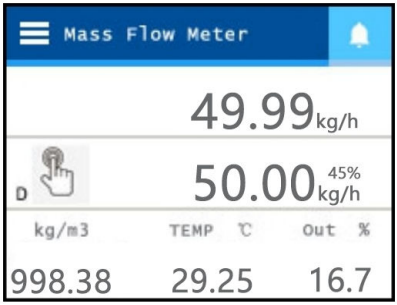
(1) In the main monitoring interface, press the (flow setting key) on the screen to enter the flow setting interface.



(2) In the dialog box that pops up on the screen, enter the flow value you want to control.



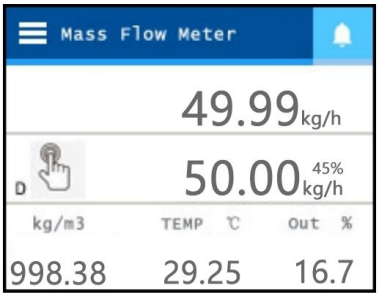
(3) After completing the input, click the "OK" button in the lower right corner of the screen to return to the main monitoring interface.



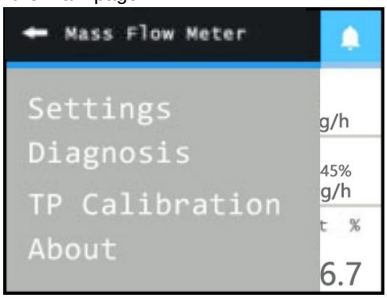
Note: The above function is only valid for 6100 series MFC.

4. Turn on/off the accumulated flow and clear the accumulated flow

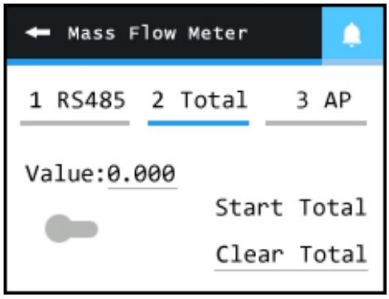
(1) In the main monitoring interface, press the menu button in the upper right corner of the screen to drop down the menu



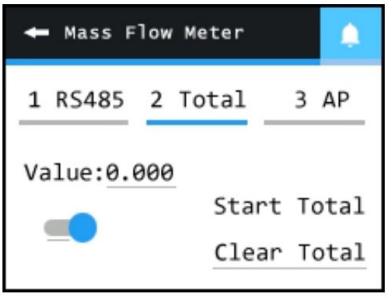
(2) Click the "Settings" button to enter the settings interface. Press the upper right corner of the screen to return to the main page.



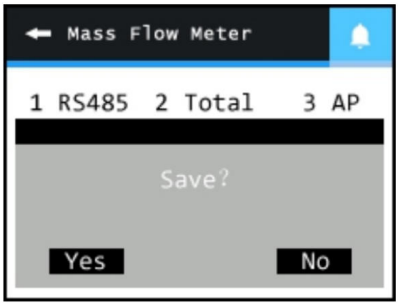
(3) Select the "2 Total" tab in the setting interface, click "Start Total", if the total function is in the stopped state, the following screen will be displayed.



(4) If the totalizing flow meter is already started, the following screen will be displayed.

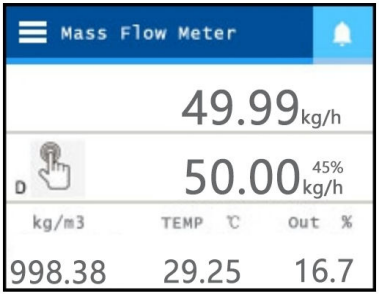


(5) Click the "Clear Total 1" button to clear the accumulated flow. In the pop-up selection screen, select "Yes" to return to the setting interface after clearing, and select "No" to return directly to the main interface.

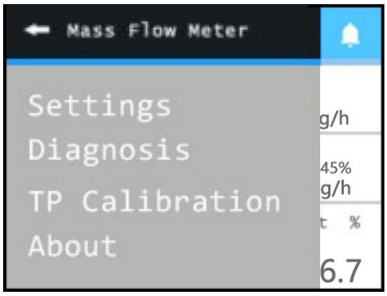


5. Cut-off setting of small flow signal

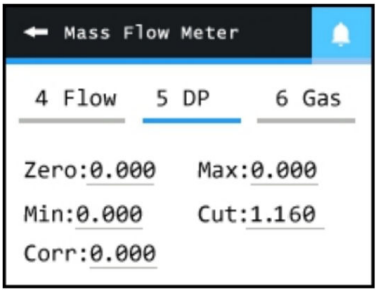
(1) In the main monitoring interface, press the menu button in the upper right corner of the screen to drop down the menu



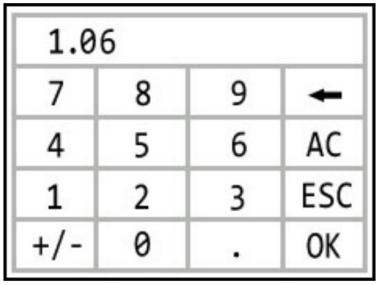
(2) Click the " Settings" button to enter the settings interface.



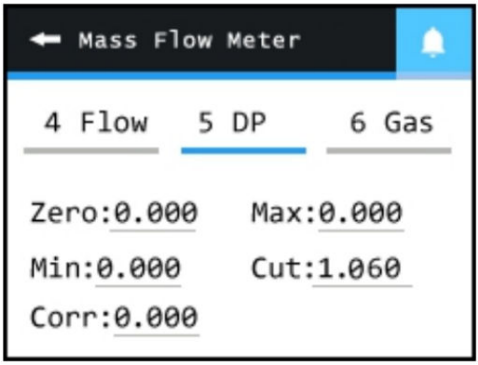
(3) Select the " 5 DP" tab on the settings interface.



(4) Click " Cut" to enter the input interface.

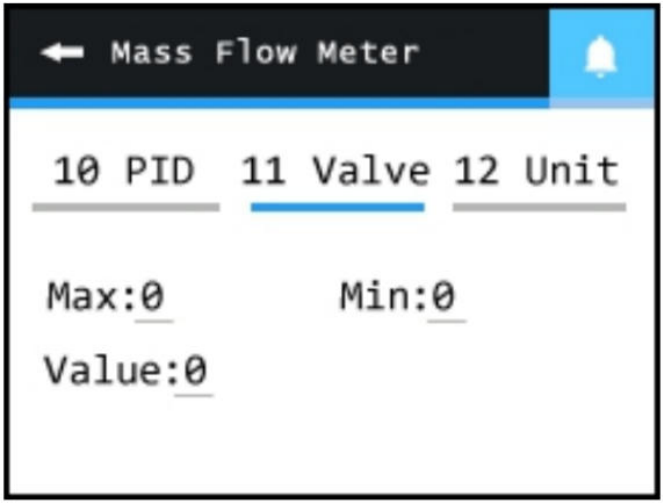


(5) After entering the data, click "OK" to save the data and return to the "5 DP" tab.



6. Valve control parameter options

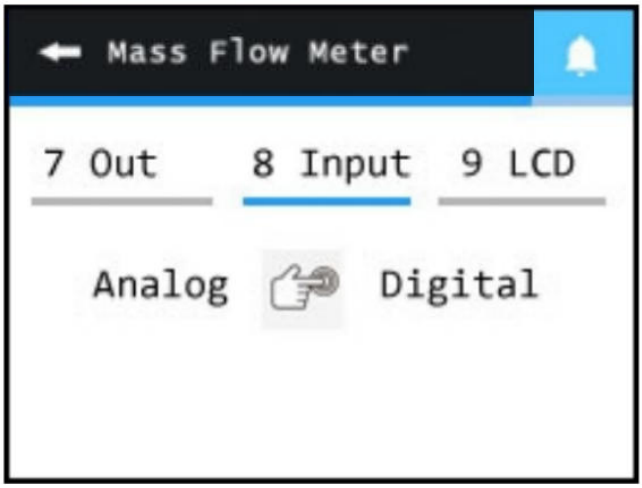
(1) Select the "11 Valve" tab on the setting interface.



(2) Click "Max" to set the maximum value of the valve control;
Click "Min" to set the minimum value of the valve control.

7. Communication control mode selection

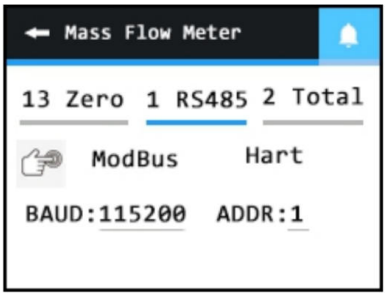
(1) Select the "8 Input" tab on the settings interface.



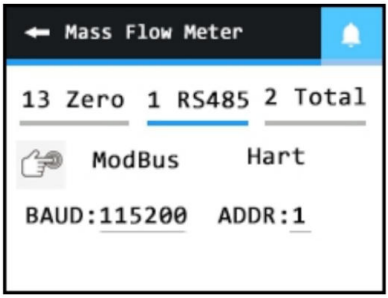
(2) Select “ Analog” as the analog input control mode.
Select "Digital" for digital input and local touch screen control.

8. Setting of digital communication parameters

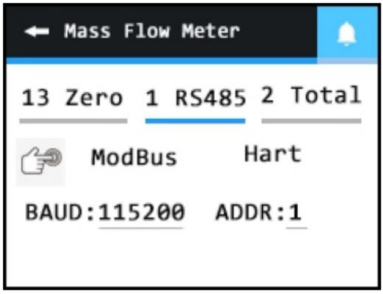
(1) Select the "1 RS485" option card in the setting interface.



(2) Click " ModBus" to select the Modbus protocol.



(3) Click " BAUD" to set the baud rate, and
click " ADDR" to set the device address



9. PID adjustment of controller

9.1 Principle of PID Control

Mass flow controllers use electronic PID controllers to determine how to actuate their valves to achieve a specified set point. We have adjusted these settings for your specific operating conditions, but changes to your process sometimes require field adjustments to maintain optimal control performance. If you experience problems with control stability, oscillation, or speed of response, fine-tuning the PID control loop algorithm and adjusting the gain settings of the proportional, integral, and derivative variables may help the PID control loop.

• The larger the P value, the faster the controller will correct the error between the command set point and the measured process value.

• The larger the I value, the faster the controller corrects the deviation based on the size of the error and the amount of time the error has occurred.

• The larger the value of D, the faster the controller predicts the corrections needed in the future based on the current rate of change in the system. This generally results in a slower system to minimize overshoot and oscillation.

Troubleshooting valve performance with PID tuning

The following problems can usually be solved by adjusting the PID gain value of the mass flow controller.

- Rapid oscillations around the set point

» Reduce the P value by 10%.

» Reduce the P value by 10% and then reduce the I value slightly. Overshoot set point

-

» Reduce the P value by 10%.

» If D is not 0, reduce P gain by 10 %. Delay or failure to reach set point

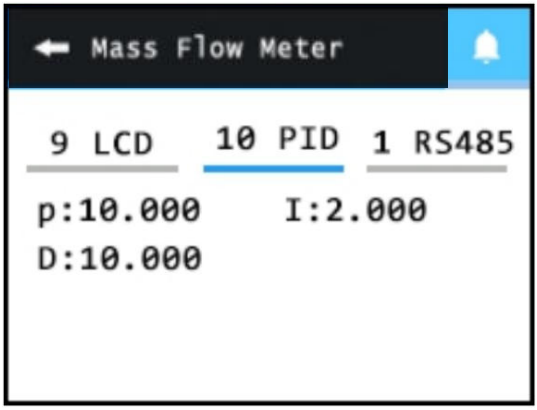
-

» Increase P gain in 10% increments, then decrease D gain in small amounts to fine-tune.

» Increase the P gain in 10% increments, then increase the I gain for fine tuning.

9.2 PID Adjustment of Controller

(1) Select the “ 10 PID” tab on the setting interface.

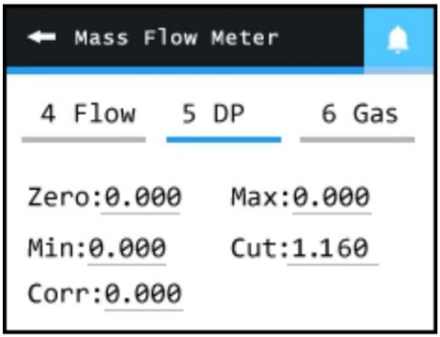


(2) Click "P", "I" or "D" to set the parameters.

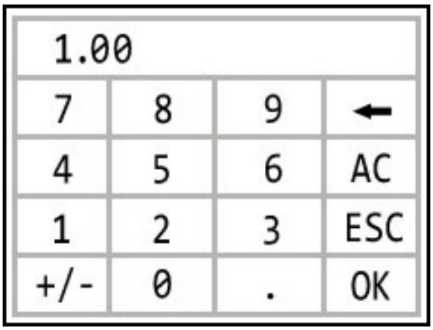
Note: The size of PID parameter setting depends on the specific situation of the control object on the one hand and experience on the other.

10. Flow coefficient setting

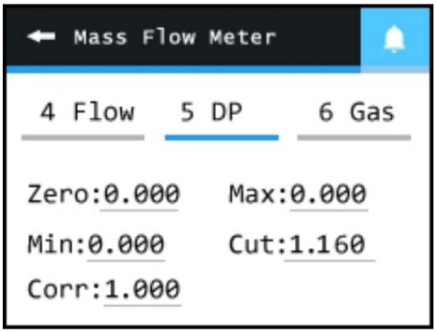
(1) Select the “ 5 DP” option card on the setup screen.



(2) Click “ Corr” to enter the input interface.



(3) After entering the data, click "OK" to save the data and return to the "5 DP" tab.



Note: For the flow coefficients of various media, please refer to the appendix at the end of this manual.

11. Zeroing the flow controller

11.1 The significance of zeroing the flow controller

Zeroing ensures that the flow controller provides the most accurate measurement possible. This function provides the flow controller with a good zero reference for flow measurement.

Things to note when adjusting zero:

For manual zeroing, follow these steps:

1. Usually, when giving the controller a zero set point, it is necessary to ensure that there is no medium flow through the device in the pipeline and to ensure that the zero is set when the fluid is full.
2. In the absence of flow, flow zeroing should be performed at the expected process pressure.
3. Absolute pressure zeroing must be completed when the controller is in full contact with the atmosphere. (If this function is selected)

When to zero:

1. After the initial installation of the equipment.
2. After installing the controller in a different location.
3. After dropping or hitting the flow controller.

For zeroing on devices with a zero knob:

Please use a flat-blade screwdriver to perform rotational zero adjustment through the zero adjustment hole on the left side of the device.

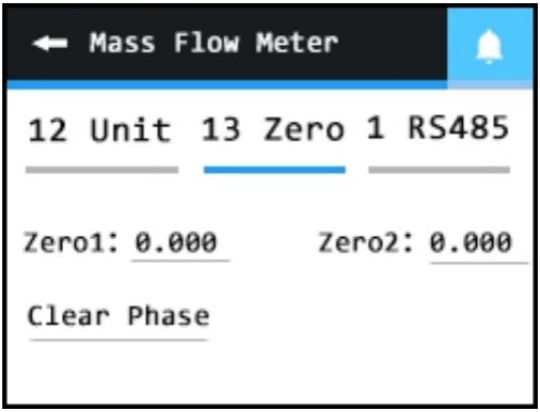
Rotate the zero point clockwise for positive adjustment; rotate the zero point clockwise for negative adjustment.

For zeroing on devices with a zero button:

Zero adjustment is performed by pressing the zero adjustment button on the top of the device for more than 5 seconds and then releasing it.

11.2 Zeroing the flow controller

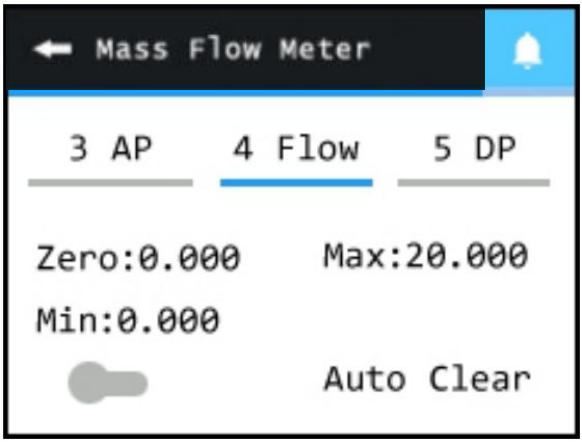
(1) Select the “ 13 Zero” tab on the settings screen.



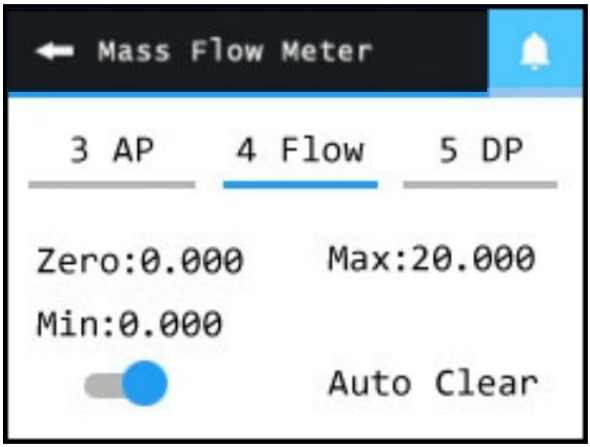
(2) Click “ Clear Phase” and select “ save” to clear the zero flow.

12. Automatic zero setting

(1) Select the "4 Flow" tab on the setting interface and click "Auto Clear".
If you stop automatic clearing, the following screen will be displayed:

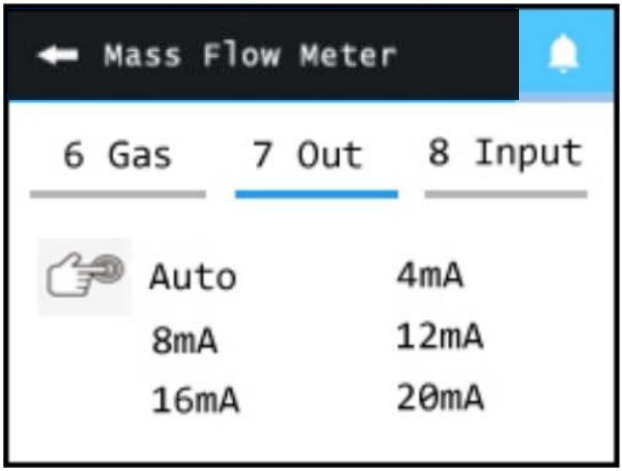


(2) If automatic clearing starts, the following screen will be displayed



13. Controller current loop output test

(1) Select the "7 Out" tab on the settings screen.



(2) If "Auto" is selected, the output current will be the current corresponding to the actual flow rate;
If you select other values, the output current will be the selected value.

14. Common display unit selection

(1) Select the "12 Unit" tab on the setting interface.

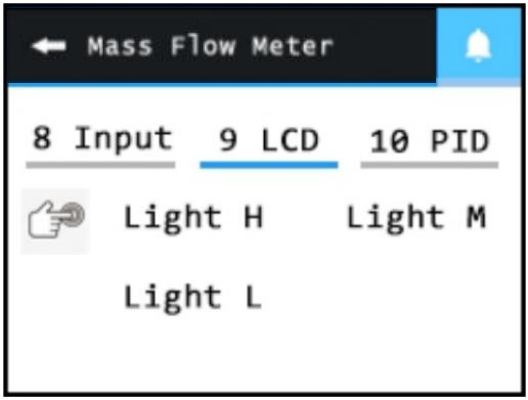
(2) “↑” means turning the page up, and “↓” means turning the page down;

You can directly click to select the display unit.

You can also select the display unit by clicking the number between "↑" and "↓".

15. Display screen brightness adjustment

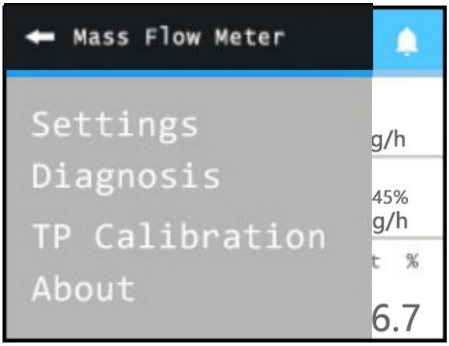
(1) Select the “ 9 LCD” tab on the settings screen.



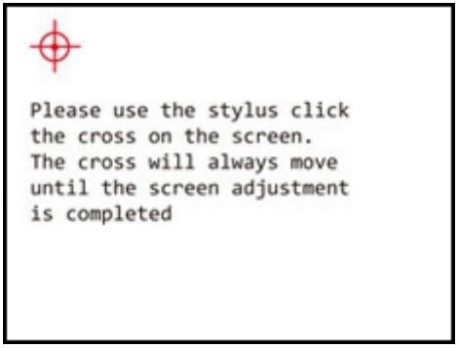
(2) Click different options to adjust the screen brightness to high, medium, or low.

16. Calibration of the display touch screen

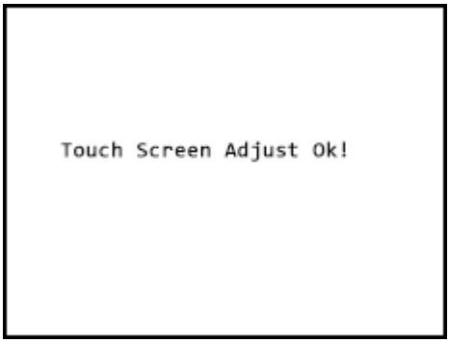
(1) Click the “ TP Calibration” submenu in the drop-down menu.



(2) Click the “ red dots” on the screen one by one to complete the calibration.



(3) Complete calibration.



4. Digital communication of flow controller

Connecting your controller to a computer allows you to transfer and log the data it produces. The controller communicates digitally using a real or virtual COM port on the computer via its communication connector and cable. This section of the manual describes how to operate the controller using commands.

1. Establish serial communication

After connecting the flow controller using the communication cable, you need to establish serial communication through a real or virtual COM port on the computer or PLC .

- If you have connected a device to the serial port, make a note of its COM port number. This can be found in the Windows Device Manager.
- If you connect your device to your computer using a USB cable, in most cases the computer will recognize your USB-to-serial device as a virtual COM port. If not, install your USB device driver and note the COM port number in Windows Device Manager.

Equipment communication address

The Device ID is an identifier that the computer uses to distinguish the Flow Controller from other digital devices when connected to a network. Using numbers 1-128, you can connect up to 128 devices to the computer at the same time through a single COM port. This is called polling mode.

Baud rate

Baud rate is the speed at which digital devices transmit information. The default baud rate for the Flow Controller is 115200 baud (bits per second). If your computer or software uses a different baud rate, you must change the baud rate on the Flow Controller so that the two match. You may still need to restart the software after your baud rate change takes effect.

2. Digital communication protocol

Physical layer: RS485/232

Communication protocol: MODBUS protocol

Transmission format: 8-bit data, 1 stop bit, no check, RTU mode.

Baud rate: 115200bps

Note: All floating point numbers in this protocol are single-precision floating point numbers that comply with IEEE standards. The byte order is 3412.

The following takes device address 1 as an example to explain the format of each function command:

2.1 Read instantaneous flow

(The value is a floating point number starting from device register address 16)

PC sends command: TX:01 03 00 10 00 02 C5 CE

Device Address	Read Command	Initial Address		Read Register Quantity		CRC	
		High	Low	High	Low	Low	High
01	03	00	10	00	02	C5	CE

PC receives the response: RX:01 03 04 XX XX XX XX XX XX

(Note: XX is the value that changes according to the actual value read)

Device Address	Read Command	Upload Bytes	The actual value read				CRC	
			Low		High		Low	High
01	03	04	XX	XX	XX	XX	XX	XX

2.2 Set flow rate

(valid in digital control mode, the value is a floating point number starting from device register address 106, and the measurement unit is the default unit)

PC sends command: TX:01 10 00 6A 00 02 04 XX XX XX XX XX

(Note: XX is a value that changes according to the actual value)

Device Address	Write command	Initial Address		Read Register Quantity		Number of bytes written	Setting Value				CRC	
		High	Low	High	Low		Low		High		Low	High
01	10	00	6A	00	02	04	XX	XX	XX	XX	XX	XX

2.3 Accumulated flow

(The value is a floating point number starting from device register address 26, and the measurement unit is the default unit)

(1) Read the accumulated flow

PC sends command: TX:01 03 00 1A 00 02 E5 CC

Device Address	Read Command	Initial Address		Read Register Quantity		CRC	
		High	Low	High	Low	Low	High
01	03	00	1A	00	02	E5	CC

PC receives the response: RX:01 03 04 XX XX XX XX XX XX

(Note: XX is the value that changes according to the actual value read)

Device Address	Read Command	Upload Bytes	The actual value read				CRC	
			Low		High		Low	High
01	03	04	XX	XX	XX	XX	XX	XX

(2) Accumulated flow is cleared

(Writing a floating point number 0 will clear the accumulated flow)

PC sends command:TX:01 10 00 1C 00 02 04 00 00 00 00 F2 F6

Device Address	Write command	Initial Address		Read Register Quantity		Number of bytes written	Setting Value				CRC	
		High	Low	High	Low		Low		High		Low	High
01	10	00	1C	00	02	04	00	00	00	00	F2	F6

2.4 Modify the device communication address

(The value is a floating point number starting from device register address 120)

PC sends command:TX:01 10 00 78 00 02 04 XX XX XX XX XX XX

(Note: XX is a value that changes according to the actual value)

Device Address	Write command	Initial Address		Read Register Quantity		Number of bytes written	Floating point number 26				CRC	
		High	Low	High	Low		Low		High		Low	High
01	10	00	78	00	02	04	XX	XX	XX	XX	XX	XX

2.5 Zero point setting

(The value is a floating point number starting from the device register address 118. Writing 0 means setting the zero point, and writing 1 means canceling the zero point.)

(1) Set zero point

Note: When setting the zero point, the actual flow rate in the pipeline must be zero to perform the zero point setting operation.

PC sends command: TX:01 10 00 76 00 02 04 00 00 00 00 74 A1

Device Address	Write command	Initial Address		Read Register Quantity		Number of bytes written	Setting Value				CRC	
		High	Low	High	Low		Low		High		Low	High
01	10	00	76	00	02	04	00	00	00	00	74	A1

(2) Cancel zero point

PC sends command:：TX:01 10 00 76 00 02 04 3F 80 00 00 79 5D

Device Address	Write command	Initial Address		Read Register Quantity		Number of bytes written	Setting Value				CRC	
		High	Low	High	Low		Low		High		Low	High
01	10	00	76	00	02	04	3F	80	00	00	79	5D

2.6 Setting the control communication mode

A floating point number starting from address 116 represents the control mode (27 analog mode, 28 digital mode, default 27).

Note: When writing a value, writing 25 is analog mode, and writing 26 is digital mode. The system will automatically add 2.

(1) Set the control mode to digital control mode

PC sends command: TX:01 10 00 74 00 02 04 00 00 41 D0 C4 B4

Device Address	Write command	Initial Address		Read Register Quantity		Number of bytes written	Floating point number 26				CRC	
		High	Low	High	Low		Low		High		Low	High
01	10	00	74	00	02	04	00	00	41	D0	C4	B4

(2) Set the control mode to analog control mode

PC sends command: TX:01 10 00 74 00 02 04 00 00 41 C8 C4 BE

Device Address	Write command	Initial Address		Read Register Quantity		Number of bytes written	Floating point number 25				CRC	
		High	Low	High	Low		Low		High		Low	High
01	10	00	74	00	02	04	00	00	41	C8	C4	BE

2.7 Set up batch function

(non-standard configuration, please refer to the actual function when ordering)

(Valid in digital control mode, the value is a floating point number starting from device register address 122, and the measurement unit is the default unit)

PC sends command：TX:01 10 00 80 00 02 04 (XX XX XX XX) XX XX

(Note: This function is limited to devices equipped with batch function)

Device Address	Write command	Initial Address		Read Register Quantity		Number of bytes written	Setting Value				CRC	
		High	Low	High	Low		Low		High		Low	High
01	10	00	80	00	02	04	XX	XX	XX	XX	XX	XX

2.8 Switching gas coefficient (non-standard configuration, please refer to the actual function when ordering)

(Valid in digital control mode, the value is a floating point number starting from device register address 114, and the measurement unit is the default unit)

PC sends command：TX:01 10 00 72 00 02 04 XX XX XX XX XX XX

(Note: XX is a value that changes according to the actual value)

Device Address	Write command	Initial Address		Read Register Quantity		Number of bytes written	Setting Value				CRC	
		High	Low	High	Low		Low		High		Low	High
01	10	00	72	00	02	04	XX	XX	XX	XX	XX	XX

5. Troubleshooting the flow controller

1. General Use

Problem: My controller display does not turn on or is weak.

Solution: Check the power and ground connections. Refer to the technical specifications to make sure your model has the proper power supply.

Problem: My controller does not set flow via the touch display buttons.

Solution: The flow controller communication control mode needs to be set to Digital mode.

Problem: How often do I need to calibrate my mass flow controller device?

Solution: We recommend calibration once a year.

Problem: The controller device was dropped. Does it still work? Does it need to be recalibrated?

Solution: If it turns on and responds normally, it is probably OK. It may or may not need to be recalibrated. Compare it to a known good flow standard device. If it checks out OK, continue to use it, but please let us know about the drop at the next annual calibration so we can check it out.

2. More Uses

Problem: Real-time flow readings will not stabilize.

Solution: Flow controllers are very fast, so they can detect small changes in flow that other flow devices may miss. This sensitivity helps detect problems with the pump or flow controller. If the readings fluctuate widely, you can check the fluid pressure to see if it is within the pressure and differential pressure range required by the controller.

Problem: My flow reading is negative.

Solution: Set the setpoint to zero and see if the flow returns to zero after 1-2 seconds. A negative flow reading in the absence of flow may indicate a bad zero. Re-zero after ensuring that there is no flow and the controller is full.

Problem: If I tip the controller unit over, will it work? Will the measurement still be accurate?

Solution: Yes, the measurement will be accurate. The flow controller internally compensates for any changes in orientation, so you can use it on its side, back or upside down. If there is a zero deviation after changing the mounting orientation, the unit should be re-zeroed.

Problem: Can I put the controller on a vibration device? Will the measurement still be accurate?

Solution: No, the result will be inaccurate. The Biosflow 6100 series flow controllers work by the oscillation of the fluid flowing through the internal pipes. If the resonance is too large, it will affect

Problem: My controller does not match the measurement of another meter I have.

Solution: Check that the calibration temperature and pressure reference values ??of the two devices are consistent, and also check that the fluid type selection of the devices is consistent.

Problem: My flow reading does not change when the flow rate changes.

Solution: If the flow reading does not change regardless of the actual flow rate, the flow sensor may be damaged. Please contact Biosflow for troubleshooting.

Problem: Can I use the Grylls controller device for other fluids?

Solution: Yes. Your flow controller is designed to handle a variety of different fluids. It can measure a variety of different types of fluids.

If the fluid you need to measure is not in the list of gases in the appendix after this article, please contact Biosflow to provide the density, viscosity and other characteristics of the fluid and then calculate it.

Note: Corrosive fluids need to be stated separately when ordering. Conventional products cannot be used to measure and control corrosive fluids.

6. Maintenance and Recalibration

1. Cleaning

If the fluid is clean and free of impurities, your flow controller does not require regular cleaning. If necessary, use a soft dry cloth to clean the outside of the device.

If you suspect debris or other foreign matter has entered your device, do not disassemble the unit to clean it, this will void the meter warranty. Contact Biosflow for cleaning.

2. Recalibration

The recommended recalibration cycle is once a year. A label located on the back of the unit lists the most recent calibration date. Contact Biosflow if recalibration is required.

3. Replacement accessories

Please contact Grylls to order accessories needed for your equipment and for replacements for any accessories. Please contact Grylls to repair, recalibrate or recycle this product.

7. List of common medium coefficients and common gas properties

1. List of common gas coefficients

S/N	Gas	SHC(cal/g℃)	Density(g/l 0℃)	Gas Corr
001	Air	0.24	1.293	1.006
002	Ar	0.125	1.7837	1.415
003	AsH_3	0.1168	3.478	0.673
004	BBr_3	0.0647	11.18	0.378
005	BCl_3	0.1217	5.227	0.43
006	BF3	0.1779	3.025	0.508
007	B_2H_6	0.502	1.235	0.441
008	CCl_4	0.1297	6.86	0.307
009	CF_4	0.1659	3.9636	0.42
010	CH_4	0.5318	0.715	0.719
011	C_2H_2	0.4049	1.162	0.581
012	C_2H_4	0.3658	1.251	0.598
013	C_2H_6	0.4241	1.342	0.481
014	C_3H_4	0.3633	1.787	0.421
015	C_3H_6	0.3659	1.877	0.398
016	C_3H_8	0.399	1.967	0.348
017	C_4H_6	0.3515	2.413	0.322
018	C_4H_8	0.3723	2.503	0.294
019	C_4H_{10}	0.413	2.593	0.255
020	C_5H_{12}	0.3916	3.219	0.217

021	CH_3OH	0.3277	1.43	0.584
022	C_2H_6O	0.3398	2.055	0.392
023	$C_2H_3Cl_3$	0.1654	5.95	0.278
024	CO	0.2488	1.25	1
025	CO_2	0.2017	1.964	0.737
026	C_2N_2	0.2608	2.322	0.452
027	Cl_2	0.1145	3.163	0.858
028	D_2	1.7325	0.1798	0.998
029	F_2	0.197	1.695	0.931
030	$GeCl_4$	0.1072	9.565	0.267
031	GeH_4	0.1405	3.418	0.569
032	H_2	3.4224	0.0899	1.01
033	HBr	0.0861	3.61	1
034	HCl	0.1911	1.627	1
035	HF	0.3482	0.893	1
036	HI	0.0545	5.707	0.999
037	H_2S	0.2278	1.52	0.844
038	He	1.2418	0.1786	1.415
039	Kr	0.0593	3.739	1.415
040	N_2	0.2468	1.25	1
041	Ne	0.2464	0.9	1.415
042	NH_3	0.5005	0.76	0.719
043	NO	0.2378	1.339	0.976

044	NO_2	0.1923	2.052	0.741
045	N_2O	0.2098	1.964	0.709
046	O_2	0.2196	1.427	0.992
047	PCl_3	0.1247	6.127	0.358
048	PH_3	0.261	1.517	0.691
049	PF_5	0.1611	5.62	0.302
050	$POCl_3$	0.1324	6.845	0.302
051	$SiCl_4$	0.127	7.5847	0.284
052	SiF_4	0.1692	4.643	0.348
053	SiH_4	0.3189	1.433	0.599
054	SiH_2Cl_2	0.1472	4.506	0.412
055	$SiHCl_3$	0.1332	6.043	0.34
056	SF_6	0.1588	6.516	0.264
057	SO_2	0.1489	2.858	0.687
058	$TiCl_4$	0.1572	8.465	0.206
059	WF_6	0.0956	13.29	0.215
060	Xe	0.0397	5.858	1.415

2. List of common gas properties

Non-corrosive pure gas			25°C			0°C		
No.	Name	Full Name	Absolute Viscosity*	Density** 14.696 PSIA	Compressibility 14.696 PSIA	Absolute Viscosity	Density 14.696 PSIA	Compressibility 14.696 PSIA
1	C2H2	Acetylene	104.44800	1.07200	0.9928000	97.374	1.1728	0.9905
2	Air	Air	184.89890	1.18402	0.9996967	172.574	1.2930	0.9994
3	Ar	Argon	226.23990	1.63387	0.9993656	210.167	1.7840	0.9991
4	i-C4H 10	Isobutane	74.97846	2.44028	0.9735331	68.759	2.6887	0.9645
5	n-C4H10	n-Butane	74.05358	2.44930	0.9699493	67.690	2.7037	0.9591
6	CO 2	carbon dioxide	149.31840	1.80798	0.9949545	137.107	1.9768	0.9933
7	CO	Carbon monoxide	176.49330	1.14530	0.9996406	165.151	1.2505	0.9993
8	D2	Deuterium	126.59836	0.16455	1.0005970	119.196	0.1796	1.0006
9	C2H6	Ethane	93.54117	1.23846	0.9923987	86.129	1.3550	0.9901
10	C2H4	Ethylene	103.18390	1.15329	0.9942550	94.697	1.2611	0.9925
11	He	Helium	198.45610	0.16353	1.0004720	186.945	0.1785	1.0005

12	H2	Hydrogen	89.15355	0.08235	1.0005940	83.969	0.0899	1.0006
13	Kr	Krypton	251.32490	3.43229	0.9979266	232.193	3.7490	0.9972
14	CH4	Methane	110.75950	0.65688	0.9982472	102.550	0.7175	0.9976
15	Ne	Neon	311.12640	0.82442	1.0004810	293.822	0.8999	1.0005
16	N2	Nitrogen	178.04740	1.14525	0.9998016	166.287	1.2504	0.9995
17	N20	Nitrous oxide	148.41240	1.80888	0.9945327	136.310	1.9779	0.9928
18	02	Oxygen	205.50210	1.30879	0.9993530	191.433	1.4290	0.9990
19	C3H8	Propane	81.46309	1.83204	0.9838054	74.692	2.0105	0.9785
20	SF6	Sulfur hexafluoride	153.53200	6.03832	0.9886681	140.890	6.6162	0.9849
21	Xe	Xenon	229.84830	5.39502	0.9947117	212.157	5.8980	0.9932

Corrosive pure gas*			25℃			0℃		
No.	Name	Full Name	Absolute Viscosity*	Density** 14.696 PSIA	Compressibility 14.696 PSIA	Absolute Viscosity	Density 14.696 PSIA	Compressibility 14.696 PSIA
1	NH3	Ammonia	100.92580	0.70352	0.9894555	91.930	0.7715	0.9848612
2	1 Butene	Butene	81.62541	2.35906	0.9721251	74.354	2.6036	0.9614456
3	cButene	Cis-2-Butene	79.96139	2.36608	0.9692405	Liquid	Liquid	Liquid
4	iButene	Isobutylene	80.84175	2.35897	0.9721626	73.640	2.6038	0.9613501
5	tButene	Trans-Butene	80.28018	2.36596	0.9692902	Liquid	Liquid	Liquid
6	COS	Carbonyl sulfide	124.09600	2.48322	0.9888443	113.127	2.7202	0.985328
7	CI2	Chlorine	134.56600	2.93506	0.9874470	125.464	3.1635	0.98407
8	CH30CH 3	Dimethyl ether	90.99451	1.91822	0.9816453	82.865	2.1090	0.9745473
9	H2S	Hydrogen sulfide (H2S)	123.86890	1.40376	0.9923556	112.982	1.5361	0.9898858
10	NF3	NF3 (Nitrogen trifluoride)	175.42500	2.91339	0.9963859	162.426	3.1840	0.9951506
11	NO	NO (Nitric oxide)	190.05950	1.22672	0.9997970	176.754	1.3394	0.9995317
12	C3H6	Propylene	85.59895	1.74509	0.9856064	78.129	1.9139	0.9809373
13	SiH4	Silane(SiH4)	115.94400	1.32003	0.9945000	107.053	1.4433	0.99282
14	S02	Sulfur dioxide	127.83100	2.66427	0.9828407	116.717	2.9312	0.9750866
*Corrosive gases must be specified when ordering equipment. Conventional equipment cannot be used for corrosive gases								

Refrigerant			25°C			0°C		
No.	Name	Full Name	Absolute Viscosity*	Density** 14.696 PSIA	Compressibility 14.696 PSIA	Absolute Viscosity	Density 14.696 PSIA	Compressibility 14.696 PSIA
15	R-11	Trichloroflu oromethane	101.60480	5.82358	0.9641448	Liquid	Liquid	Liquid
16	R-115	Chloropenta fluoroethane	125.14780	6.43293	0.9814628	114.891	7.0666	0.9752287
17	R-116	Hexafluo roethane	137.81730	5.70097	0.9895011	126.635	6.2458	0.9858448
18	R-124	Chlorotettra fluoroethane	115.93110	5.72821	0.9738286	105.808	6.3175	0.963807
19	R-125	Pentachlo roethane	129.61740	4.98169	0.9847599	118.793	5.4689	0.979137
20	R-134A	Tetrafluor oethane	118.18820	4.25784	0.9794810	108.311	4.6863	0.9713825
21	R-14	Carbon tetrafluoride	172.44680	3.61084	0.9962553	159.688	3.9467	0.9948964
22	R142B	Chlorodiflu oroethane	104.20190	4.21632	0.9742264	95.092	4.6509	0.9640371
23	R-143A	Trifluoroethane	110.86600	3.49451	0.9830011	101.344	3.8394	0.9765755
24	R-152A	Difluoroethane	100.81320	2.75903	0.9785245	91.952	3.0377	0.9701025
25	R-22	NO (Nitric oxide)	190.05950	1.22672	0.9997970	176.754	1.3394	0.9995317
26	R-23	Propylene	85.59895	1.74509	0.9856064	78.129	1.9139	0.9809373
27	R-32	Silane (SiH4)	115.94400	1.32003	0.9945000	107.053	1.4433	0.99282

28	RC-318	Sulfur dioxide	127.83100	2.66427	0.9828407	116.717	2.9312	0.9750866
29	R-404A	44% R-125/4% R-134A/ 52% R-143A	120.30982	4.18002	0.98336342	111.584	4.5932	0.9770889
30	R-407C	23% R-32/25% R-125/ 52% R-143A	123.55369	3.95268	0.9826672	112.698	4.3427	0.9762849
31	R-410A	50% R-32/50% R-125	130.24384	3.56538	0.9861780	122.417	3.9118	0.9811061
32	R-507A	50% R-125/50% R-143A	121.18202	4.23867	0.9838805	112.445	4.6573	0.9774207
*Refrigerant gases are only available in custom corrosion-resistant equipment.								

Welding shielding gas		25°C			0°C		
No.	Mixed gas composition	Absolute Viscosity*	Density** 14.696PSIA	Compressibility 14.696 PSIA	Absolute Viscosity	Density 14.696 PSIA	Compressibility 14.696 PSIA
1	2% CO 2 / 98% Ar	224.71480	1.63727	0.9993165	208.673	1.7877	0.998993
2	8% CO 2 / 92% Ar	220.13520	1.64749	0.9991624	204.199	1.7989	0.9987964
3	10% CO2 / 90% Ar	218.60260	1.65091	0.9991086	202.706	1.8027	0.9987278
4	15% CO2 / 85% Ar	214.74960	1.65945	0.9989687	198.960	1.8121	0.9985493
5	20% CO2 / 80% Ar	210.86960	1.66800	0.9988210	195.198	1.8215	0.9983605
6	25% CO2 / 75% Ar	206.97630	1.67658	0.9986652	191.436	1.8309	0.9981609
7	50% CO2 / 50% Ar	187.53160	1.71972	0.9977484	172.843	1.8786	0.9969777
8	75% CO2 / 25% Ar	168.22500	1.76344	0.9965484	154.670	1.9271	0.995401
9	25% He/75% Ar	231.60563	1.26598	0.9996422	216.008	1.3814	0.9999341
10	50% He/50% Ar	236.15149	0.89829	0.9999188	220.464	0.9800	1.00039
11	75% He/25% Ar	234.68601	0.53081	1.0001954	216.937	0.5792	1.000571
12	90% He / 10% Ar	222.14566	0.31041	1.0003614	205.813	0.3388	1.00057
13	90% He / 7.5% Ar / 2.5% C02	214.97608	0.31460	1.0002511	201.175	0.3433	1.000556
14	StargonCS 90%Ar/ 8% CO2 / 2% 02	219.79340	1.64099	0.9991638	203.890	1.7918	0.998798

Bioreactor Gas		25°C			0°C		
No.	Mixed gas composition	Absolute Viscosity*	Density** 14.696PSIA	Compressibility 14.696 PSIA	Absolute Viscosity	Density 14.696 PSIA	Compressibility 14.696 PSIA
1	5% CH4 / 95% C02	148.46635	1.75026	0.9951191	136.268	1.9134	0.9935816
2	10% CH4 / 90% C02	147.54809	1.69254	0.9952838	135.383	1.8500	0.993893
3	15% CH4 / 85% C02	146.55859	1.63484	0.9954484	134.447	1.7867	0.9941932
4	20% CH4 / 80% C02	145.49238	1.57716	0.9956130	133.457	1.7235	0.994482
5	25%CH4/75%C02	144.34349	1.51950	0.9957777	132.407	1.6603	0.9947594
6	30%CH4/70%C02	143.10541	1.46186	0.9959423	131.290	1.5971	0.9950255
7	35%CH4/65%C02	141.77101	1.40424	0.9961069	130.102	1.5340	0.9952803
8	40% CH4 / 60% C02	140.33250	1.34664	0.9962716	128.834	1.4710	0.9955239
9	45% CH4/55% C02	138.78134	1.28905	0.9964362	127.478	1.4080	0.9957564
10	50% CH4 / 50% C02	137.10815	1.23149	0.9966009	126.025	1.3450	0.9959779
11	55% CH4 / 45% C02	135.30261	1.17394	0.9967655	124.462	1.2821	0.9961886
12	60% CH4 /40% C02	133.35338	1.11642	0.9969301	122.779	1.2193	0.9963885
13	65%CH4/35%C02	131.24791	1.05891	0.9970948	120.959	1.1564	0.9965779
14	70%CH4/30%C02	128.97238	1.00142	0.9972594	118.987	1.0936	0.9967567
15	75%CH4/25%C02	126.51146	0.94395	0.9974240	116.842	1.0309	0.9969251
16	80% CH4 / 20% C02	123.84817	0.88650	0.9975887	114.501	0.9681	0.9970832

17	85% CH4/15%C02	120.96360	0.82907	0.9977533	111.938	0.9054	0.9972309
18	90% CH4 /10% C02	117.83674	0.77166	0.9979179	109.119	0.8427	0.9973684
19	95% CH4 / 5% C02	114.44413	0.71426	0.9980826	106.005	0.7801	0.9974957

Breathing gas		25°C			0°C		
No.	Mixed gas composition	Absolute Viscosity*	Density** 14.696PSIA	Compressibility 14.696 PSIA	Absolute Viscosity	Density 14.696 PSIA	Compressibility 14.696 PSIA
1	32% 02 / 68% N2	186.86315	1.19757	0.9996580	174.925	1.3075	0.9993715
2	36% 02 / 64% N2	187.96313	1.20411	0.9996401	175.963	1.3147	0.9993508
3	40% 02 / 60% N2	189.06268	1.21065	0.9996222	176.993	1.3218	0.9993302
4	20% 02/80% He	217.88794	0.39237	1.0002482	204.175	0.4281	1.000593
5	21% 02/79% He	218.15984	0.40382	1.0002370	204.395	0.4406	1.000591
6	30% 02/70% He	219.24536	0.50683	1.0001363	205.140	0.5530	1.000565
7	40% 02/60% He	218.59913	0.62132	1.0000244	204.307	0.6779	1.000502
8	50% 02/50% He	216.95310	0.73583	0.9999125	202.592	0.8028	1.000401
9	60% 02/40% He	214.82626	0.85037	0.9998006	200.467	0.9278	1.000257
10	80% 02/20% He	210.11726	1.07952	0.9995768	195.872	1.1781	0.9998019
11	99% 02/1% He	205.72469	1.29731	0.9993642	191.646	1.4165	0.9990796
12	Oxygen-enriched air-40%02	189.42518	1.21429	0.9996177	177.396	1.3258	0.9993261
13	Oxygen-enriched air-60%02	194.79159	1.24578	0.9995295	182.261	1.3602	0.9992266
14	Oxygen-enriched air-80%02	200.15060	1.27727	0.9994412	186.937	1.3946	0.9991288
15	MetabolicExhalant (16% O2 / 78.04% N2 / 5% CO2 / 0.96% Ar)	180.95936	1.20909	0.9994833	170.051	1.3200	0.9992587

Fuel gas		25°C			0°C		
No.	Mixed gas composition	Absolute Viscosity*	Density** 14.696PSIA	Compressibility 14.696 PSIA	Absolute Viscosity	Density 14.696 PSIA	Compressibility 14.696 PSIA
1	40% H2 + 29% CO + 20% C02 + 11 % CH4	155.64744	0.79774	0.9989315	144.565	0.8704	0.9992763
2	64% H2 + 28% CO +1 % C02 + 7% CH4	151.98915	0.43715	1.0001064	142.249	0.4771	1.000263
3	70% H2 + 4% CO + 25% C02 + 1 % CH4	147.33686	0.56024	0.9991225	136.493	0.6111	0.9997559
4	83%H2+ 14%CO+3%CH4	133.63682	0.24825	1.0003901	125.388	0.2709	1.000509
5	93% CH4 / 3% C2H6 /1 % C3 H 8 / 2% N2 /1 % C02	111.77027	0.70709	0.9979255	103.189	0.7722	0.9973965
6	95% CH4 / 3% C2H6 /1 % N2 /1 % C02	111.55570	0.69061	0.9980544	103.027	0.7543	0.9974642
7	95.2% CH4 / 2.5% C2H6 / 0.2% C3H8 / 0.1 % C4H10/1.3% N2 / 0.7% C02	111.49608	0.68980	0.9980410	102.980	0.7534	0.9974725
8	50% H2 / 35% CH4/10% CO / 5% C2H4	123.68517	0.44281	0.9993603	115.045	0.6589	0.996387
9	75%H2 + 25%N2	141.72100	0.34787	1.0005210	133.088	0.3797	1.000511
10	66.67% H2/33.33%02	180.46190	0.49078	1.0001804	168.664	0.5356	1.000396
11	LPG 96.1 % C3H8 / 1.5% C2H6 / 0.4% C3H6 / 1.9% n-C4H 10	81.45829	1.83428	0.9836781	74.933	2.0128	0.9784565

12	LPG 85%C3H8 /10%C3H6/5%n-C4H10	81.41997	1.85378	0.9832927	74.934	2.0343	0.9780499

Laser Gas		25°C			0°C		
No.	Mixed gas composition	Absolute Viscosity*	Density** 14.696PSIA	Compressibility 14.696 PSIA	Absolute Viscosity	Density 14.696 PSIA	Compressibility 14.696 PSIA
1	4.5% CO2 / 13.5% N2 / 82% He	199.24300	0.36963	1.0001332	187.438	0.4033	1.000551
2	6% C02 /14% N2 / 80% He	197.87765	0.39910	1.0000471	186.670	0.4354	1.00053
3	7% C02 /14% N2 / 79% He	197.00519	0.41548	0.9999919	186.204	0.4533	1.000514
4	9% C02 /15% N2 / 76% He	195.06655	0.45805	0.9998749	184.835	0.4997	1.000478
5	9% Ne/ 91% He	224.68017	0.22301	1.0004728	211.756	0.2276	1.000516
6	9.4% CO2 / 19.25% N2 / 71.35% He	193.78311	0.50633	0.9998243	183.261	0.5523	1.000458

Concentrator gas		25°C			0°C		
No.	Mixed gas composition	Absolute Viscosity*	Density** 14.696PSIA	Compressibility 14.696 PSIA	Absolute Viscosity	Density 14.696 PSIA	Compressibility 14.696 PSIA
1	89% 02 / 7% N2 / 4% Ar	204.53313	1.31033	0.9993849	190.897	1.4307	0.9990695
2	93% 02 / 3% N2 / 4% Ar	205.62114	1.31687	0.9993670	191.795	1.4379	0.9990499
3	95% 02 /1 % N2 / 4% Ar	206.16497	1.32014	0.9993580	192.241	1.4414	0.99904

Flue gas		25°C			0°C		
No.	Mixed gas composition	Absolute Viscosity*	Density** 14.696PSIA	Compressibility 14.696 PSIA	Absolute Viscosity	Density 14.696 PSIA	Compressibility 14.696 PSIA
1	2.5% 02 / 10.8% C02 / 85.7% N2 / 1 % Ar	175.22575	1.22550	0.9992625	165.222	1.3379	0.9990842
2	2.9% 02 / 14% CO2 / 82.1 % N2 / 1 % Ar	174.18002	1.24729	0.9991056	164.501	1.3617	0.9989417
3	3.7% 02 / 15% CO2 / 80.3% N2 / 1 % Ar	174.02840	1.25520	0.9990536	164.426	1.3703	0.9988933
4	7% 02 / 12% CO2 / 80% N2 / 1 % Ar	175.95200	1.24078	0.9991842	166.012	1.3546	0.9990116
5	10% 02 / 9.5% CO2 / 79.5% N2 / 1 % Ar	177.65729	1.22918	0.9992919	167.401	1.3419	0.9991044
6	13% 02 / 7% CO2 / 79% N2 / 1 % Ar	179.39914	1.21759	0.9993996	168.799	1.3293	0.9991932

Chromatographic gases		25°C			0°C		
No.	Mixed gas composition	Absolute Viscosity*	Density** 14.696PSIA	Compressibility 14.696 PSIA	Absolute Viscosity	Density 14.696 PSIA	Compressibility 14.696 PSIA
1	5% CH4 / 95% Ar	223.91060	1.58505	0.9993265	207.988	1.7307	0.9990036
2	10% CH4 90% Ar	221.41810	1.53622	0.9992857	205.657	1.6774	0.99895

Ⅷ. List of common units for instrumentation

Flow Unit

Volume	Standard volume	Normal volume	Remark
uL/m	SuL/m	NuL/m	Microliters per minute
mL/s	SmL/s	NmL/s	Milliliters per second
mL/m	SmL/m	NmL/m	Milliliters per minute
mL/h	Sml/h	NmL/h	Milliliters per hour
L/s	SL/s	NL/s	Liters per second
LPM	SLPM	NLPM	Liters per minute
L/h	SL/h	NL/h	Liters per hour
US GPM			U.S. gallons per minute
US GPH			U.S. gallons per hour
CCS	SCCS	NCCS	Cubic centimeters per second
CCM	SCCM	NCCM	Cubic centimeters per minute
cm3/h	Scm3/h	Ncm3/h	Cubic centimeters per hour
m3/m	Sm3/m	Nm3/m	Cubic meters per minute
m3/h	Sm3/h	Nm3/h	Cubic meters per hour
m3/d	Sm3/d	Nm3/d	Cubic meters per day
in3/m	Sin3/m		Cubic inches per minute
CFM	SCFM		Cubic feet per minute
CFH	SCFH		Cubic feet per hour
CFD	SCFD		Cubic feet per day
	kSCFM		Thousands of cubic feet per minute

Density Units

Mark	Remark
g/cm³	grams/cubic centimeter
kg/m³	kilogram/cubic meter

Pressure Unit

Absolute pressure/ atmospheric pressure	Gauge	remark
PaA	PaG	pascal
hPaA	hPaG	hectopascal
kPaA	kPaG	kilopascal
MPaA	MPaG	MPa
mbarA	mbarG	millibar
barA	barG	bar
g/cm2A	g/cm2G	grams per square centimeter
kg/cmA	kg/cmG	kilogram force per square centimeter
PSIA	PSIG	pound s force per square inch
PSFA	PSFG	pounds per square foot
mTorrA	mTorrG	millitorr
torrA	torrG	torr
mmHgA	mmHgG	mm of mercury at 0 degrees Celsius
inHgA	inHgG	inches of mercury at 0 degrees Celsius
mmH2OA	mmH2OG	millimeters of water column at 4 degrees Celsius
mmH2OA	mmH2OG	millimeters of water column at 60 degrees Celsius
cmH2OA	cmH2OG	centimeter water column at 4 degrees Celsius
cmH2OA	cmH2OG	Centimeters of water column at 60 degrees Celsius
inH2OA	inH2OG	inches of water column at 4 degrees Celsius
inH2OA	inH2OG	Inches of water column at 60 degrees Celsius
atm		Atmospheric pressure

Viscosity unit

logo	remark
cP	centipoise
P	poise
mPa.s	millipascals per second
Pa.s	pascals per second

1P (poise) = 100cp (centipoise) = 100MPa. s (millipascals per second)
1Pa. s (pascals per second) =1000MPa. s (millipascals per second)

Mass flow unit

logo	remark
mg/s	milligrams per second
mg/m	milligrams per minute
g/s	grams per second
g/m	grams per minute
g/h	grams per hour
kg/m	kilograms per minute
kg/h	kilograms per hour
oz/s	ounces per second
oz/m	ounces per minute
lb/m	pounds per minute
lb/h	pounds per hour

Temperature unit

logo	remark
℃	degrees celsius
°F	degrees fahrenheit
K	Kelvin
°R	Rankin's d egree

Time unit

logo	remark
h:m:s	The displayed value is hour: minute: second
ms	millisecond
s	second
m	minute
hour	hour
day	day

Biosflow 6100 Series Coriolis Mass Flow Controllers Technical Specifications

100g/h-5kg/h；1kg/h-100kg/h；10kg/h-300kg/h-600kg/h Stand ard parameters (For options, please contact Biosflow)

Sensor and control capabilities	
Mass flow accuracy	**Liquid:**±0.2% /±0.6% of reading or ±0.05% /±0.2% of full scale, whichever is greater **Gas:**±0.5%/±1% of reading or ±0.05%±0.2% of full scale, whichever is greater
Repeatability	±0.05% of reading or ±0.025% of full scale, whichever is greater
Control range	1%–100% /2%–100%of full scale
Density accuracy[1]	<±5 kg/m^3
Temperature accuracy[2]	±0.5°C
Measurable density range	10–2,000 kg/m^3
Viscosity range	0–500 cP Consult Grylls for higher viscosity options
Zero stability	±0.05% of full scale (included in mass flow accuracy)
Temperature sensitivity[3]	Mass flow zero shift: ±0.01% of full scale per °C from tare temperature Mass flow span shift: ±0.005% of reading per °C from 25°C
Valve Type	Normally Closed
Typical response time	100g/h-5kg/h<100 ms 1kg/h-600kg/h<200 ms
Typical control time[4]	100g/h-5kg/h<200 ms 1kg/h-600kg/h<300 ms

1. Density readings and density accuracy are independent of mass flow readings and mass flow accuracy.
2. Temperature readings and temperature accuracy are independent of mass flow readings and mass flow accuracy.
3. When the mass flow rate is 40 g/h and less, the zero drift of the mass flow rate is ±0.025% of the full scale per degree Celsius.
4. The control response time is related to the valve selection. The above data is based on the SPV01 standard valve.

Operating conditions	
Operating temperature range	Ambient: 0–70°C Fluid:−20–70°C Consult Grylls for higher or lower temperature options
Protection level	IP40 or IP65
Wetted material	316L stainless steel, FKM & FFKM standard; EPDM or PCTFE optional Consult Grylls for additional wetted materials options
Maximum withstand pressure (static pressure)	435 psi(g)/30bar(g)；optional:Max1450psi(g)100bar(g)
Working pressure difference (inlet to outlet)	72.5psi(d)/5bar(d)；optional:Max145psi(d)10bar(d)
Installation location[5]	Any position, attitude sensitivity negligible
Leak rate	<2×10-9SCCSHe

5. External shock or vibration should be avoided.

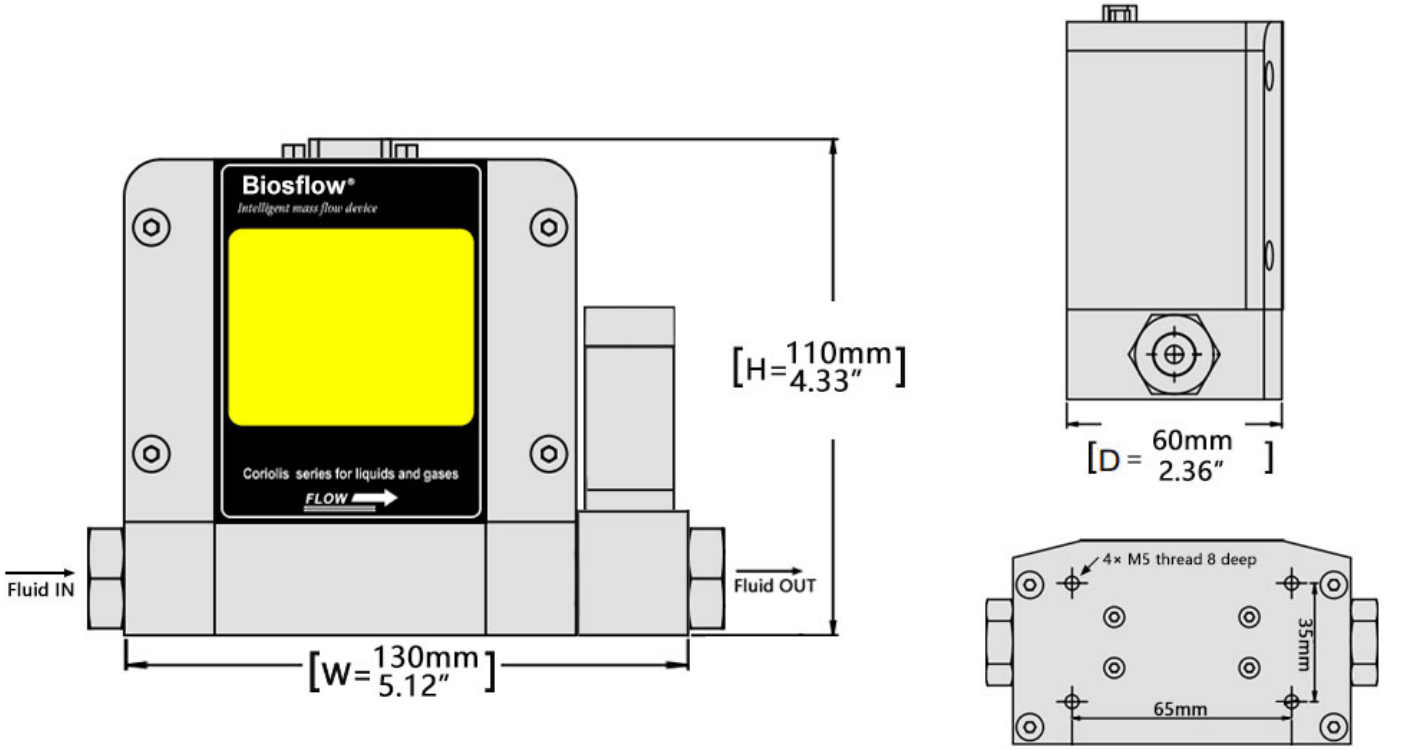
Electrical Communications	
Multi-function display touch screen	Display Mass Flow, Density, Temperature, Cumulative flow and Flow set point
Digital options	DB9,USB-C; RS-232 or RS-485;DB15 or M12 optional Modbus RTU; Profibus,EtherCAT, EtherNet/IP optional
Analog options	0–5 Vdc, 1-5Vdc,0–10 Vdc, 4–20 mA
Power supply requirements	Powered through DB-9 or DB15 100g/h-5kg/h:8W,24 Vdc/±15Vdc optional 1kg/h-100kg/h-600kg/h:9W,24 Vdc/±15Vdc optional

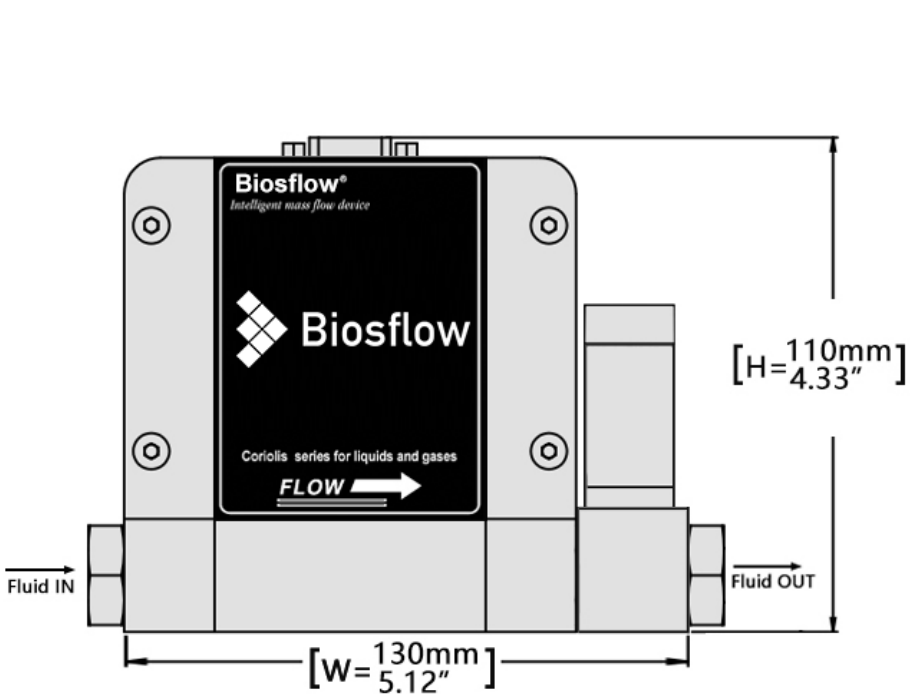
Other specific technical parameters					
Full scale flow range	Process connection type	Recommended inlet filter	Nominal pressure drop (water)	Maximum withstand voltage (PSIA)	Mounting Thread
100g/h-5kg/h	compression type or face seal couplings. φ6、8、10、12 optional.	2μ	≤15 PSID	435/1450	4× M5 thread 8 deep
1kg/h-100kg/h		40μ	≤15 PSID	435/1450	4× M5 thread 10 deep
10kg/h-600kg/h		120μ	300-600kg/h ≥ 45-75PSID	435/1450	4× M5 thread 10 deep

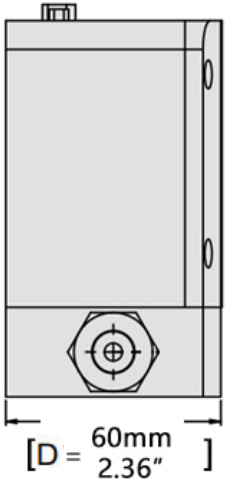
Dimensions

Full-scale mass flow controller[6]	Mechanical Dimensions[7]	weight	Process connection[8]
8110series 100g/h-5kg/h	4.33"H x 5.12"W x 2.36"D	About 1kg	3、6、8mm Bite type fittings/VCR
8120series 1kg/h-100kg/h	5.51"H x 7.17"W x 3.15"D	About 1.2kg	6、8、10mm Bite type fittings/VCR
8130series 10kg/h-600kg/h	5.51"H x 7.17"W x 3.15"D	About 1.5kg	10、12 mm Bite type fittings/VCR

6. For more ranges and low pressure drop mass flow controllers, please contact Biosflow.
7. Product dimensions and other parameter values are shown in the drawings.
8. The internal threads of the gas circuit are compatible with accessories such as surface seals, quick-connect fittings and ferrule fittings. VCR and other fittings can also be provided according to user requirements.


Biosflow®
Intelligent mass flow device
Coriolis series for liquids and gases
FLOW
Fluid IN
Fluid OUT
[H=110mm 4.33″]
[W=130mm 5.12″]
[D= 60mm 2.36″]
4× M5 thread 8 deep
35mm
65mm


Biosflow®
Intelligent mass flow device
Biosflow
Coriolis series for liquids and gases
FLOW
Fluid IN
Fluid OUT
[H=110mm 4.33"]
[W=130mm 5.12"]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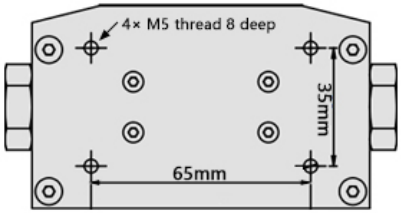
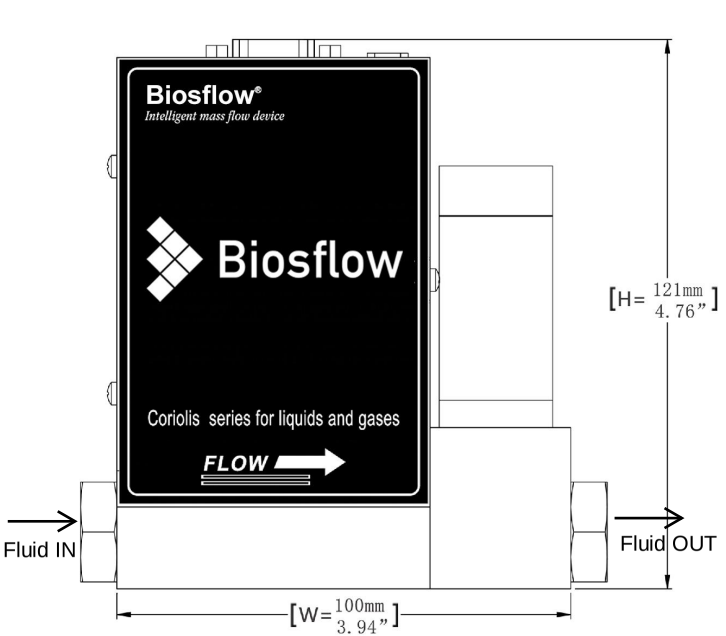
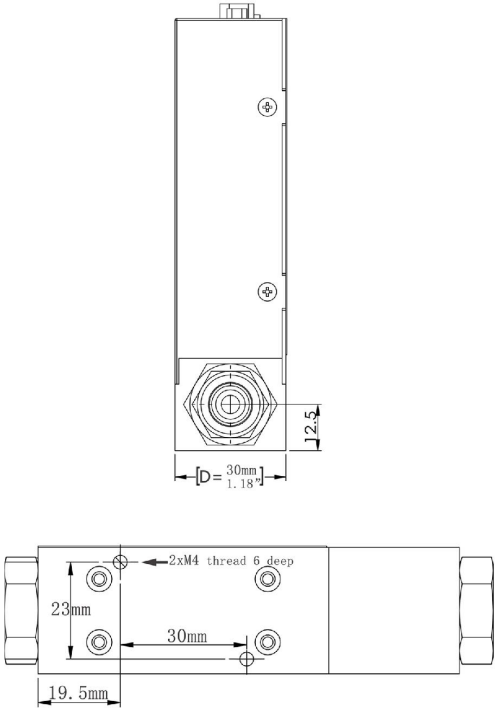
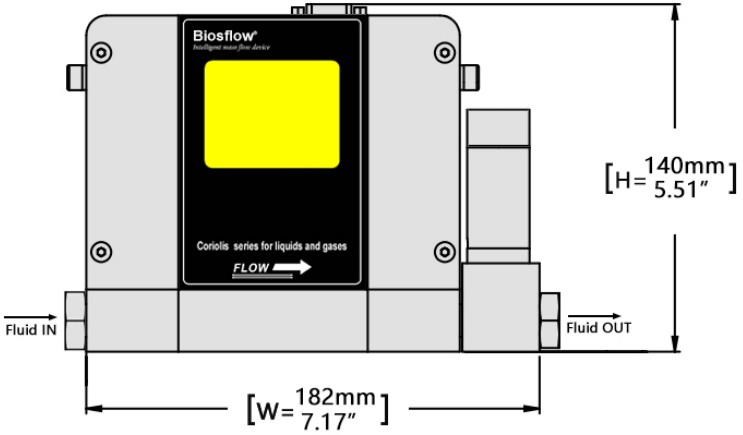
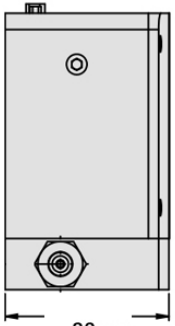

4× M5 thread 8 deep
35mm
65mm


Biosflow®
Intelligent mass flow device
Biosflow
Coriolis series for liquids and gases
FLOW
Fluid IN
Fluid OUT
[H= 121mm / 4.76”]
[W= 100mm / 3.94”]


12.5
[D= 30mm / 1.18”]
2xM4 thread 6 deep
23mm
30mm
19.5mm


Biosflow
Coriolis series for liquids and gases
FLOW
Fluid IN
Fluid OUT
[H= 140mm 5.51"]
[W= 182mm 7.17"]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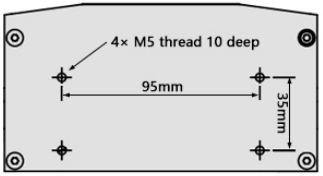
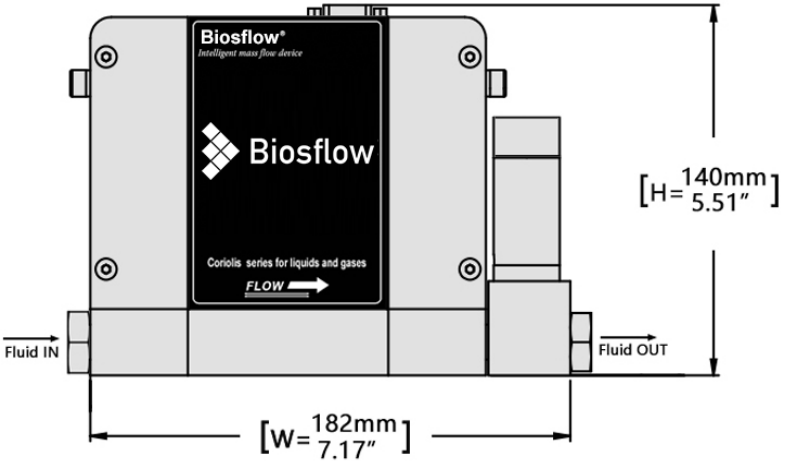
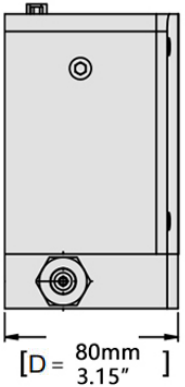
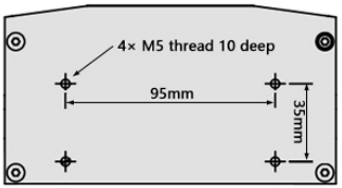
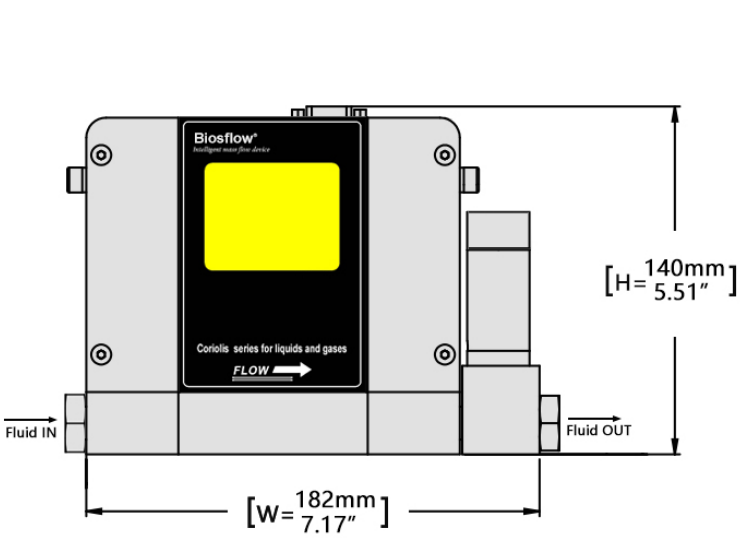
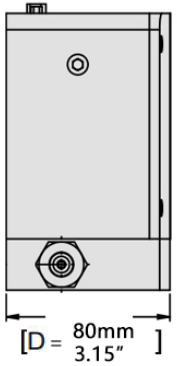

4× M5 thread 10 deep
95mm
35mm


Biosflow®
Intelligent mass flow device
Biosflow
Coriolis series for liquids and gases
FLOW
Fluid IN
Fluid OUT
[H= 140mm 5.51″]
[W= 182mm 7.17″]


[D = 80mm 3.15″]


4× M5 thread 10 deep
95mm
35mm


Biosflow
Coriolis series for liquids and gases
FLOW
Fluid IN
Fluid OUT
[H= 140mm 5.51″]
[W= 182mm 7.17″]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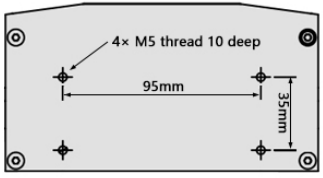
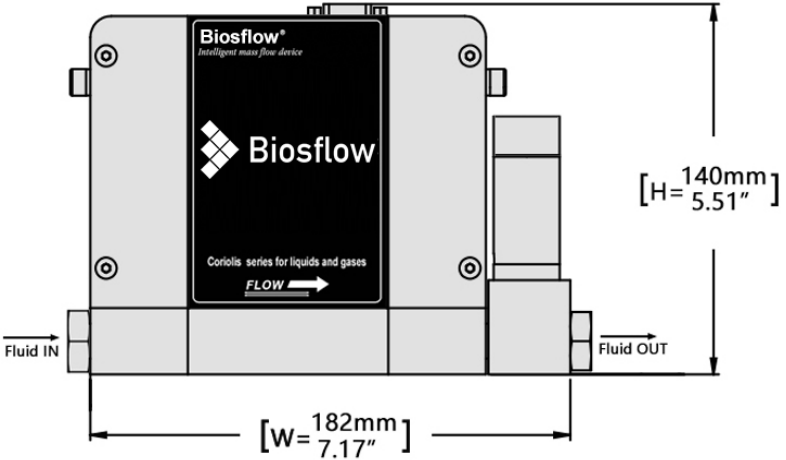
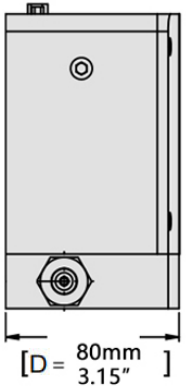

4× M5 thread 10 deep
95mm
35mm


Biosflow®
Intelligent mass flow device
Biosflow
Coriolis series for liquids and gases
FLOW
Fluid IN
Fluid OUT
[H= 140mm 5.51"]
[W= 182mm 7.17"]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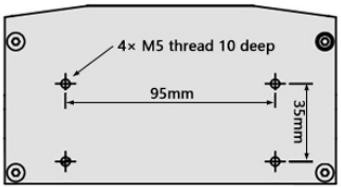

4× M5 thread 10 deep
95mm
35mm

Biosflow 6100 Series Coriolis Mass Flow Meter Technical Specifications

100g/h-5kg/h ;1kg/h-100kg/h ;10kg/h-300kg/h-600kg/h Standard parameters (For options, please contact Biosflow)

Sensor and control performance	
Mass flow accuracy	**Liquid:**±0.2% /±0.6% of reading or ±0.05% /±0.2% of full scale, whichever is greater **Gas:**±0.5%/±1% of reading or ±0.05%±0.2% of full scale, whichever is greater
Repeatability	±0.05% of reading or ±0.025% of full scale, whichever is greater
Control range	0.5%–100% /1%–100%of full scale
Density accuracy[1]	<±5 kg/m^3
Temperature accuracy[2]	±0.5°C
Measurable density range	10–2,000 kg/m^3
Viscosity range	0–500 cP Consult Grylls for higher viscosity options
Zero stability	±0.05% of full scale (included in mass flow accuracy)
Temperature sensitivity[3]	Mass flow zero shift: ±0.01% of full scale per °C from tare temperature Mass flow span shift: ±0.005% of reading per °C from 25°C
Valve Type	No valve
Typical response time	100g/h-5kg/h<100 ms 1kg/h-600kg/h<200 ms

1. Density readings and density accuracy are independent of mass flow readings and mass flow accuracy.
2. Temperature readings and temperature accuracy are independent of mass flow readings and mass flow accuracy.
3. When the mass flow rate is 40 g/h and less, the zero drift of the mass flow rate is ±0.025% of the full scale per degree Celsius.

Operating conditions	
Operating temperature range	**Ambient:** 0–70°C **Fluid:**−20–70°C Consult Grylls for higher or lower temperature options
Protection level	IP40 or IP65
Wetted material	316L stainless steel, FKM & FFKM standard; EPDM or PCTFE optional Consult Grylls for additional wetted materials options
Maximum withstand pressure (static pressure)	435 psi(g)/30bar(g)；optional:Max1450psi(g)100bar(g)
Installation location[4]	Any position, attitude sensitivity negligible
Leak Rate	<2×10-9SCCSHe

4. External shock or vibration should be avoided.

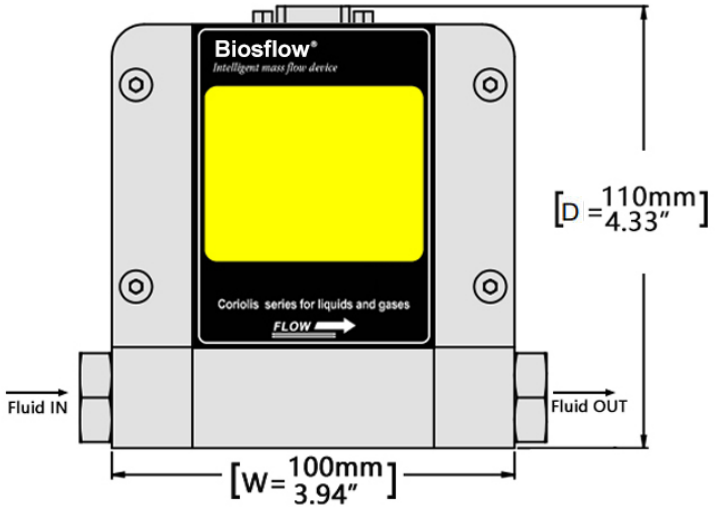
Electrical Communications	
Multi-function display touch screen	Display Mass Flow, Density, Temperature, Cumulative flow
Digital options	DB9,USB-C; RS-232 or RS-485;DB15 or M12 optional Modbus RTU; Profibus,EtherCAT, EtherNet/IP optional
Analog options	0–5 Vdc, 1-5Vdc,0–10 Vdc, 4–20 mA
Power supply requirements	Powered through DB-9 or DB15 100g/h-5kg/h:5W，24 Vdc/±15Vdc optional 1kg/h-100kg/h-600kg/h:6W，24 Vdc/±15Vdc optional

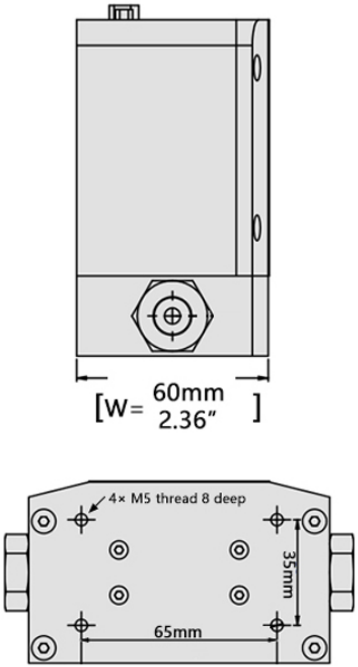
Other specific technical parameters					
Full scale flow range	Process connection type	Recommended inlet filter	Nominal pressure drop (water)	Maximum withstand voltage (PSIA)	Mounting Thread
100g/h-5kg/h	compression type or face seal couplings. φ6、8、10、12 optional.	3μ	≤8 PSID	435/1450	4× M5 thread 8 deep
1kg/h-100kg/h		50μ	≤8 PSID	435/1450	4× M5 thread 10 deep
10kg/h-600kg/h		140μ	300-600kg/h ≥ 30PSID	435/1450	4× M5 thread 10 deep

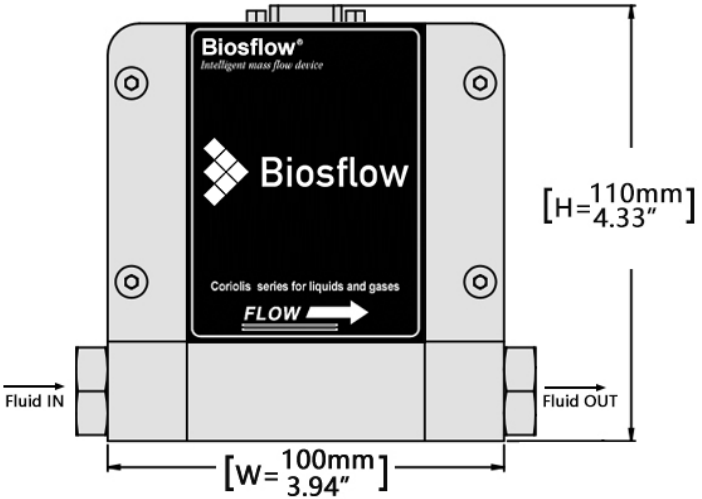
Dimensions

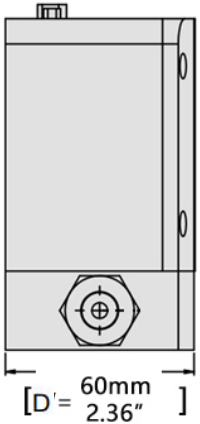
Full-scale mass flow controller[5]	Mechanical Dimensions[6]	weight	Process connection[7]
8111series 100g/h-5kg/h	4.33"H x 3.94"W x 2.36"D	About 0.9kg	3、6、8mm Bite type fittings/VCR
8121series 1kg/h-100kg/h	5.51"H x 5.91"W x 3.15"D	About 1.0kg	6、8、10mm Bite type fittings/VCR
8131series 10kg/h-600kg/h	5.51"H x 5.91"W x 3.15"D	About 1.3kg	10、12 mm Bite type fittings/VCR

5. For more ranges and low pressure drop mass flow meters, please contact Biosflow.
6. Product dimensions and other parameter values are shown in the drawings.
7. The internal threads of the gas circuit are compatible with accessories such as surface seals, quick-connect fittings and ferrule fittings. VCR and other fittings can also be provided according to user requirements.


Biosflow®
Intelligent mass flow device
Coriolis series for liquids and gases
FLOW
Fluid IN
Fluid OUT
[D = 110mm 4.33"]
[W = 100mm 3.94"]


[W = 60mm 2.36"]
4× M5 thread 8 deep
35mm
65mm


Biosflow®
Intelligent mass flow device
Biosflow
Coriolis series for liquids and gases
FLOW
Fluid IN
Fluid OUT
[H=110mm 4.33"]
[W=100mm 3.94"]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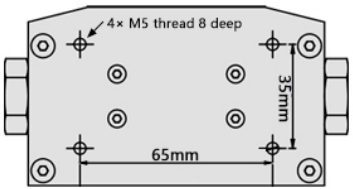
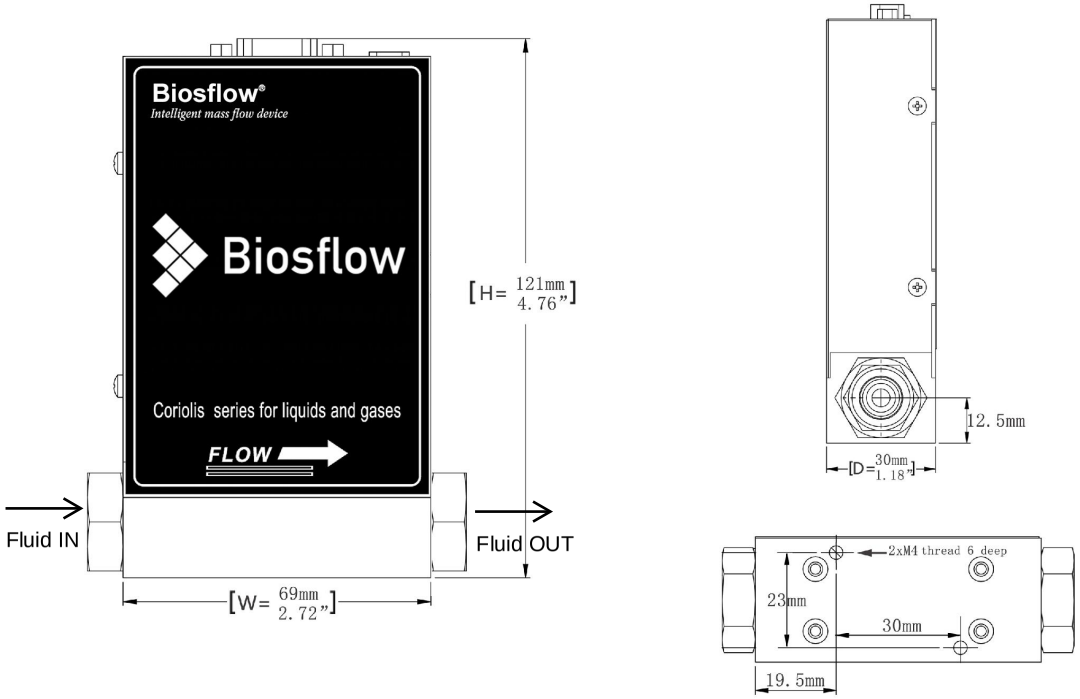
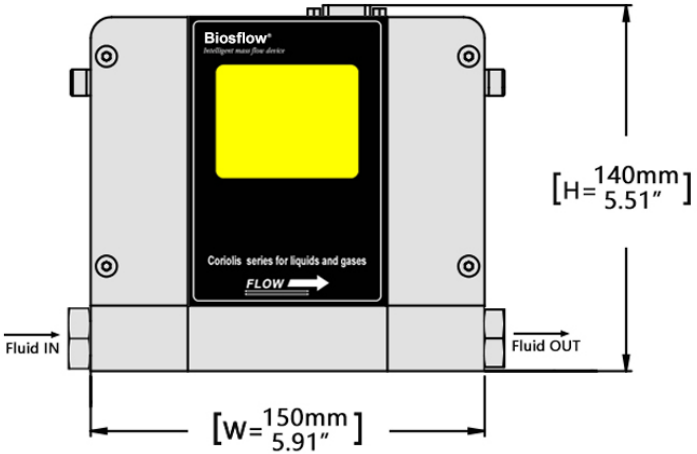
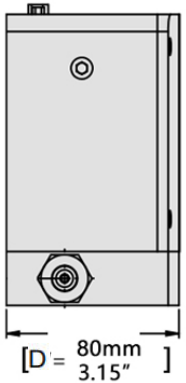
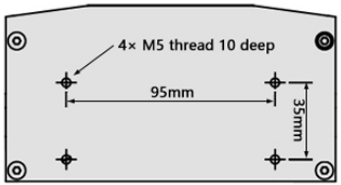
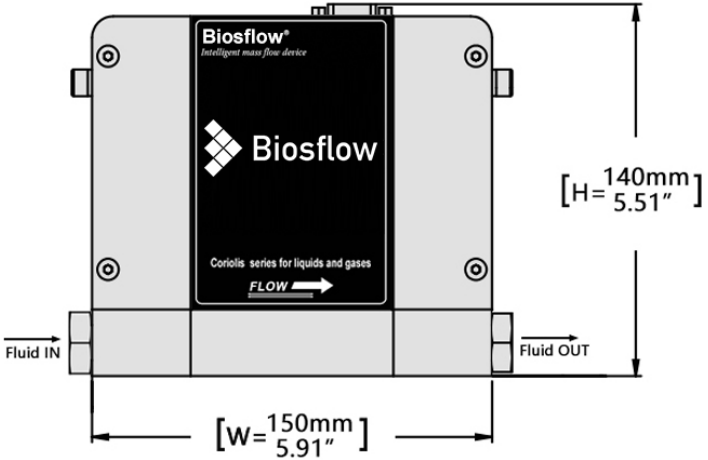

4× M5 thread 8 deep
35mm
65mm

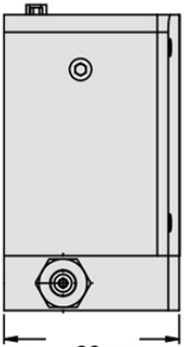

Biosflow®
Intelligent mass flow device
Biosflow
Coriolis series for liquids and gases
FLOW
[H= 121mm 4.76”]
Fluid IN
Fluid OUT
[W= 69mm 2.72”]
12.5mm
[D= 30mm 1.18”]
2xM4 thread 6 deep
23mm
30mm
19.5mm

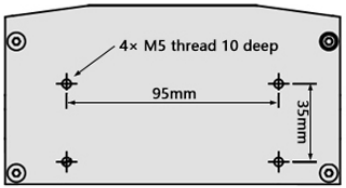

Biosflow
Coriolis series for liquids and gases
FLOW
Fluid IN
Fluid OUT
[H= 140mm 5.51″]
[W= 150mm 5.91″]

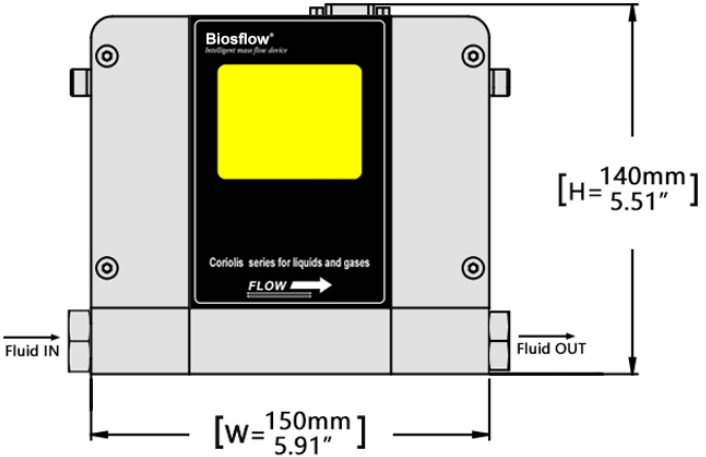

[D = 80mm 3.15″]

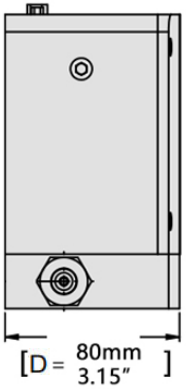

4× M5 thread 10 deep
95mm
35mm

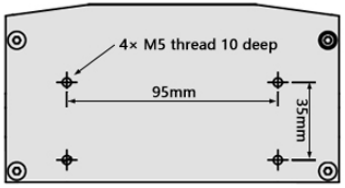

Biosflow®
Intelligent mass flow device
Biosflow
Coriolis series for liquids and gases
FLOW
Fluid IN
Fluid OUT
[H= 140mm 5.51″]
[W= 150mm 5.91″]

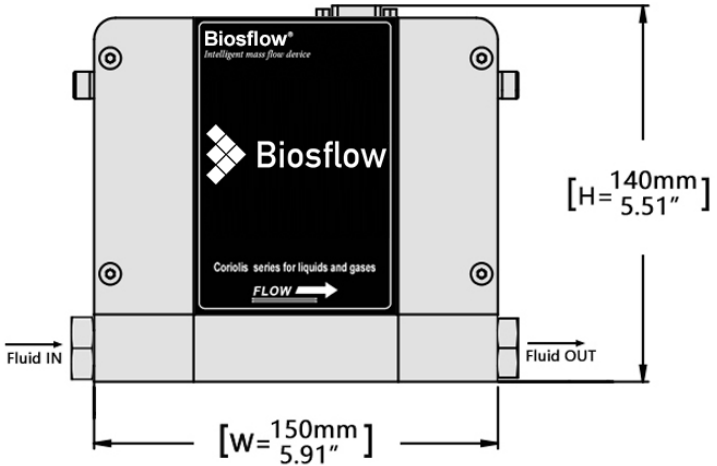

[D = 80mm 3.15″]

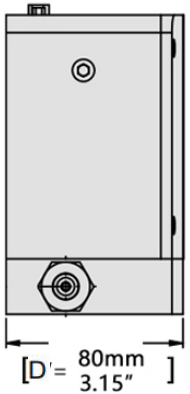

4× M5 thread 10 deep
95mm
35mm

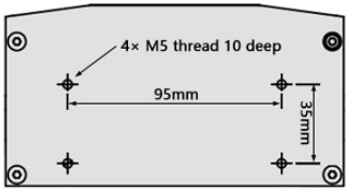

Biosflow
Coriolis series for liquids and gases
FLOW
Fluid IN
Fluid OUT
[H= 140mm 5.51"]
[W= 150mm 5.91"]


[D = 80mm 3.15"]


4× M5 thread 10 deep
95mm
35mm


Biosflow®
Intelligent mass flow device
Biosflow
Coriolis series for liquids and gases
FLOW
Fluid IN
Fluid OUT
[H=140mm 5.51″]
[W=150mm 5.91″]


[D=80mm 3.15″]


4× M5 thread 10 deep
95mm
35mm

X．After-sales service and product warranty

After-sales service

This product has been strictly tested and calibrated before leaving the factory. If any failure occurs during use, please contact the agent, distributor or Biosflow where you purchased it.

Product Warranty

1. Warranty Period

The free warranty period is 12 months after the product leaves our factory.

2. Warranty Scope

During the warranty period, if our product fails due to reasons that should be attributed to our company's responsibility,

our company will provide a replacement or repair it free of charge at our factory.

Damages caused by reasons that cannot be attributed to our company's responsibility, customer opportunity loss, lost profits, secondary disasters, accident compensation, damage other than our company's products and other compensation caused by our company's product failure are not covered by our company's warranty.

3. Out of warranty scope

Even within the warranty period, if the following reasons are met, it is out of warranty scope.

1) Failure caused by incorrect use, improper repair or modification.

(Including cases where the order specifications and conditions at the time of use are different)

2) Failure caused by dropping after purchase.

3) Failure caused by natural disasters such as fire, earthquake, flood, thunder, riot, war.

4) Failure caused by foreign matter mixed in the pipe.

5) Failures caused by special problems in combination with assembled devices.

6) Other cases where it is determined that our company is not responsible.

7) When this product is used on your company's machine (device), if your company's machine has the functions, structures, safety measures, etc. generally considered to have the industry, the damage should be avoidable.

Use or possession of the equipment after the expiration of the above warranty period will be deemed to be satisfactory to the user.

Biosflow does not warrant any experimental, non-standard, or under-development equipment.

Accessories are not covered by this warranty.

Note: Biosflow reserves the right to modify and improve the products described in this manual at any time without notice.