

Product Manual

EPC-300 Series Pressure Controller



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【Version】

Version	Date	Update Notes
V0.90	2025/04/15	Create Document
V1.00	2025/10/28	Release Version
V1.01	2025/11/7	Add Communication Protocol Appendix
V1.02	2025/12/22	Add Naming Rule
V1.03	2026/1/23	Revised Explanation of Flow Capacity

【Information before use】

- Please be sure to carefully read and understand this manual before use ;
The company reserves the right not to be held liable for any losses or personal injuries resulting from failure to operate the product in accordance with this manual ;
- Please keep this manual in a safe place for future reference during installation, maintenance, and troubleshooting ;
- During operation, please carefully read all information marked with WARNING and CAUTION symbols.

【Warning】

- ! This product is suitable for use with flammable and explosive gases, but is not suitable for use in a flammable or explosive environment ;
- ! Hazardous Gas Usage: When this product is used with hazardous gases, appropriate safety precautions must be taken ;
- ! Confirm that the gas being used will not chemically react with the sealing materials;
- ! Gas Line Leak Check: During installation of this product, please inspect all gas line connections to ensure there are no gas leaks;
- ! Do not exceed the maximum operating pressure of this product (refer to the manual for the maximum operating pressure);
- ! Do not open the product housing, replace components, or modify the product;
- ! This product is not suitable for use with liquid media.

【Caution】

- ✓ This product is ready for use upon startup, no preheating needed;
- ✓ The product's operating pressure is consistent with the product parameters;
- ✓ Ensure the gas flow direction matches the arrow marking;
- ✓ Ensure that the signal type used matches the product's signal specifications;

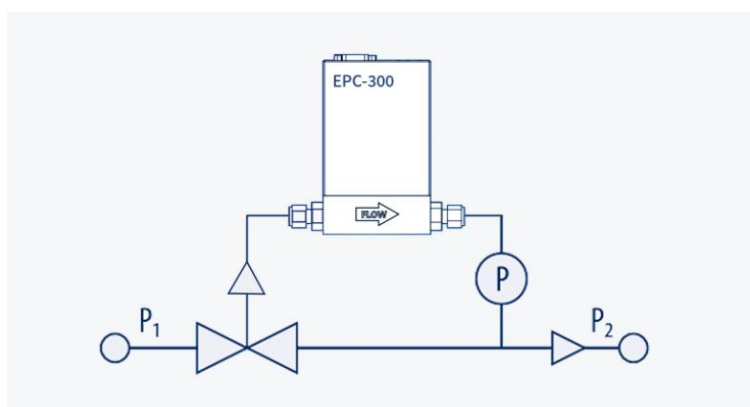
1. Product Introduction

The pressure controller EPC integrates a high-precision pressure sensor and an electromagnetic proportional control valve, enabling fast and precise measurement and control of gas pressure. The EPC - 300 series supports RS485 / 0-5 V / 4-20 mA communication, and can realize fully automatic pressure reduction and back pressure control. It is widely used in fields such as petroleum & petrochemical, biomedicine, instrumentation, environmental protection, and vacuum technology.

2. Overview of Principles

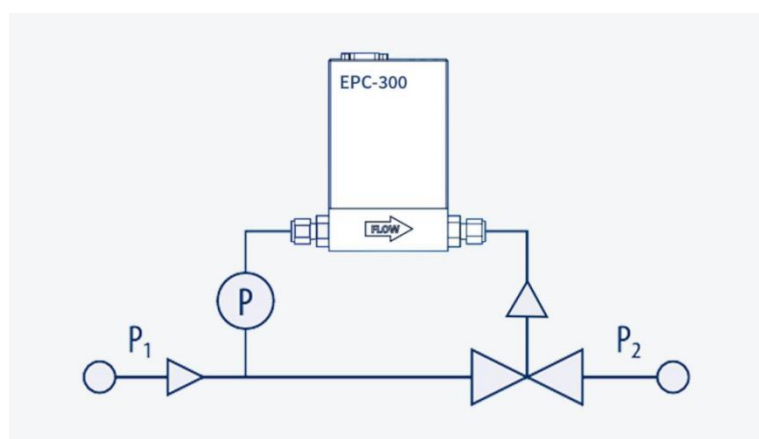
2.1 Pressure-Reducing Controller

The pressure sensor of a pressure reducing controller is located downstream of the proportional valve, and can be used to control the pressure at the outlet or downstream side of the EPC pressure controller.



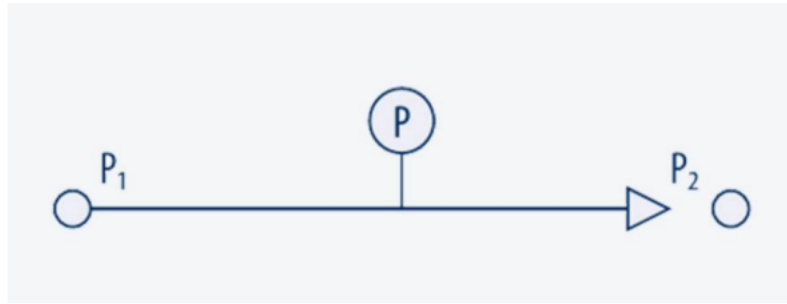
2.2 Back-Pressure Controller

The pressure sensor of a back-pressure controller is located upstream of the proportional valve and can be used to control the pressure upstream of an EPC pressure controller.



2.3 Pressure Transmitter

When the controller's valve is set to the fully open position (Open command), the product no longer performs pressure control for the upstream and downstream sides; at this point, it functions equivalently to a pressure transmitter.



3. Product Features

- Supports multiple communication interfaces, including RS485, 0-5V, and 4-20mA;
- It can control pressure up to 10MPa and is unaffected by temperature and pressure changes;
- It features a built-in, independently developed High-P proportional valve, characterized by rapid response and stable control; it can achieve fully automated control of pressure reduction or back pressure.

4 Specifications

Selection Table (Partial). For other pressure ranges, please contact Biosflow.

Model	Type	Max pressure	Control range
EPC-310-P	Pressure-reducing controller	1MPa	2%~100% F.S
EPC-330-P	Pressure-reducing controller	5MPa	2%~100% F.S
EPC-350-P	Pressure-reducing controller	10MPa	2%~100% F.S
EPC-310-B	Back-pressure Controller	1MPa	2%~100% F.S
EPC-330-B	Back-pressure Controller	5MPa	2%~100% F.S
EPC-350-B	Back-pressure Controller	10MPa	2%~100% F.S

Note: The default pressure value is gauge pressure; if absolute pressure is required, please consult with our sales team.

MODEL SELECTION GUIDE

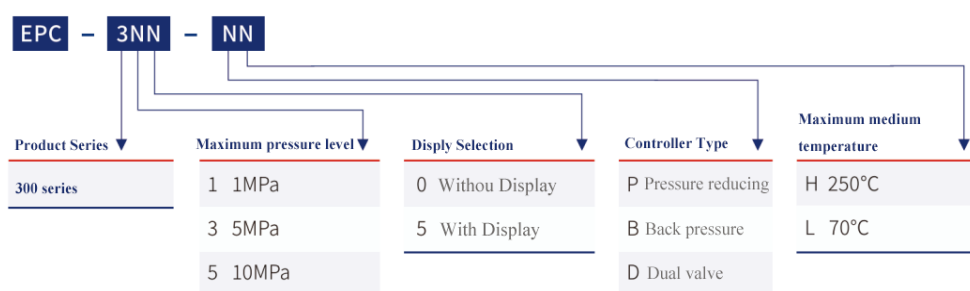


Figure 1: Naming Rule

4.1 Performance Specifications

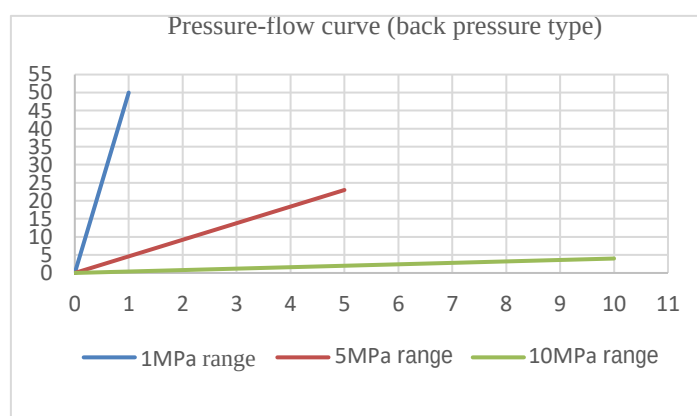
Item	Specification
Control Accuracy	< $\pm 1\%$ F.S
Repeatability	$\pm 0.1\%$ F.S

Control stability	$\pm 0.1\%$ F.S	Measurement conditions: 1 L/min N2 @5MPa
Sensor response time	<100 ms	
Operating temperature	-10~50°C	
Medium temperature	-10~70°C	
Leakage rate	<1x10 ⁻⁹ atm. cc/sec He	

4.2 Flow capacity

The flow capacity of a pressure controller refers to the maximum flow rate of the product at a certain pressure/differential pressure.

For pressure-reducing EPC, if the airflow demand at the outlet exceeds the flow capacity at that pressure, the outlet pressure will not reach the target pressure. For back-pressure EPC, if the gas in put at the inlet exceeds the flow capacity at that pressure, the inlet pressure will be higher than the target pressure. Biosflow pressure controllers are available in three pressure ratings: 1MPa, 5MPa, and 10MPa. Typical flow capacity curves for pressure-reducing and back-pressure products are given below. (Horizontal axis: pressure; Vertical axis: flow rate)



Note: Full-scale pressure and flow capacity can be customized. Please consult Biosflow for details.

The figure above shows the pressure-maximum flow curve of a back-pressure type pressure controller. The measurement conditions are: the outlet is atmospheric pressure (venting), and the inlet is the set back pressure target value.

Figure 2: Back pressure type

The figure below shows the pressure-maximum flow rate curve of a pressure-reducing type pressure controller. The measurement conditions are: the inlet is fixed at full scale pressure + 0.4 MPa, and the outlet is the set pressure reduction target value.

The horizontal axis represents pressure, in MPa; the vertical axis represents flow rate, in L/min.

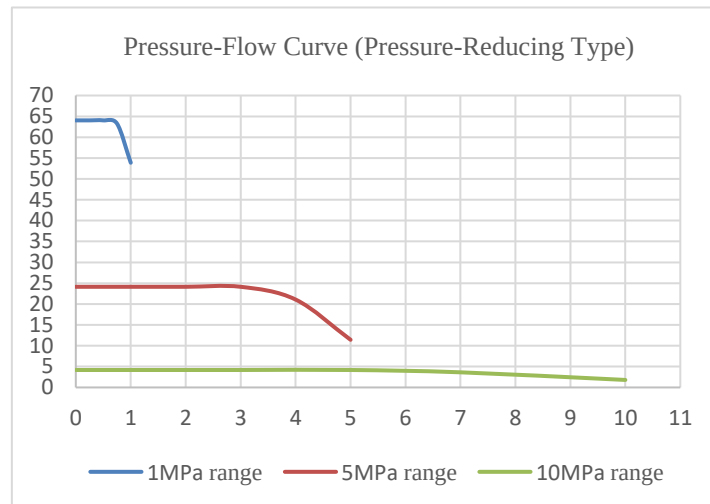


Figure 3: Pressure-Reducing Type

4.3 Electrical Parameters

Item	Parameters
Power Supply	+15~24 V dc
Typical Power Consumption	5W
Analog Communication	0~5 V / 4~20mA
Digital Communication	RS-485 (Modbus RTU Protocol)
Electrical Interface	9-pin D-connector (male)

4.4 Mechanical Parameters

Item	Description
Valve Type	Normally Closed
Base Material	316L Stainless Steel
Seal Material	FKM,EPDM,NBR
Gas Port Connection	American /National Standard Ferrule or VCR Fitting
Protection level	IP40

4.5 Dimensions (mm) and Weight (kg)

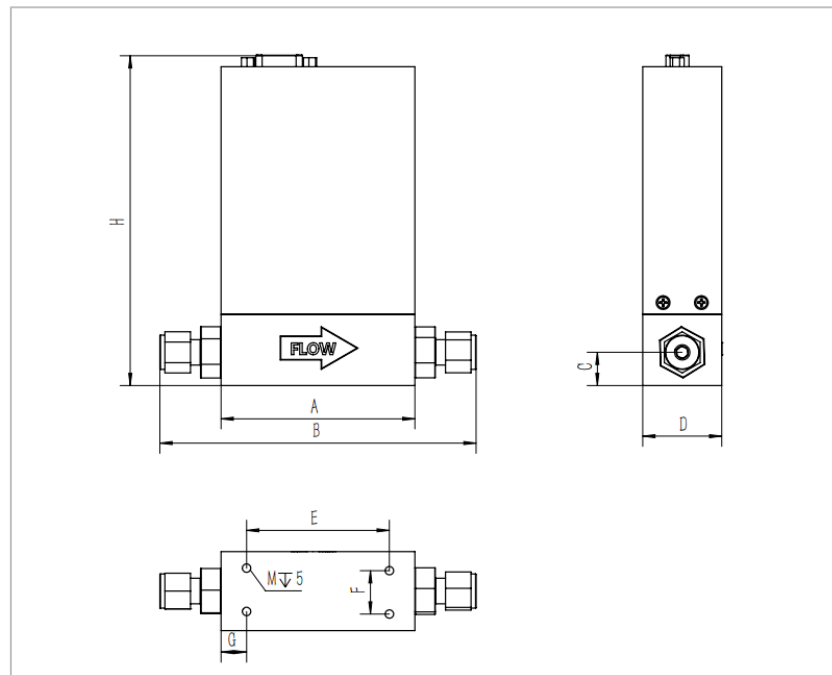


Figure 4 Dimension Drawing

Model	A	B	C	D	H	E	F	G	M	Weight
EPC-3xx	76	124	13	36	125	56	16	10	M4	0.95

Table 1 Model Size &Weight Corresponding Table

5. Electrical Connection

5.1 Analog Communication Connection Method

Analog communication uses external power and signals

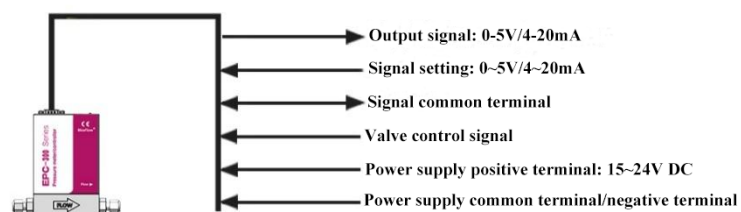


Figure 5 External Communication

Analog communication uses a control unit

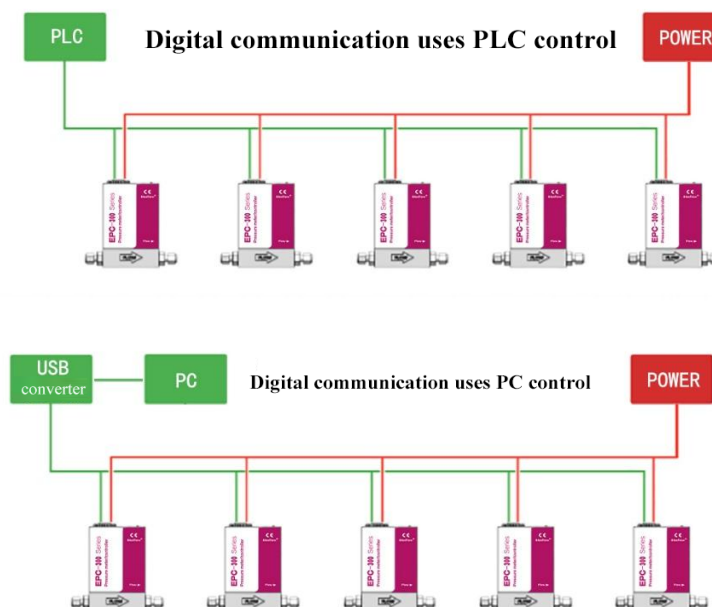


Figure 6 Connected to the Pressure Control Unit

Pin No	Signal name
1	Chassis ground
2	Power supply positive[15~24V DC]
3	Input and output signal common terminal
4	Flow feedback signal output
5	Negative power supply (power common terminal)
6	setting signal input
Note: DB9 Male connector, other pins are not connected.	

Table 2: DB9 Analog Communication Electrical Connection Pin Correspondence Table

5.2 Digital Communication Connection Method



Pin No	Signal name
--------	-------------

1	Chassis Ground
2	Power Positive [15~24V DC]
3	RS485 B-
7	Power Negative (Power Common Terminal)
9	RS485 A+
Note: DB9 Male connector. All other pins are not connected	

Table 3 DB9 Digital Communication Electrical Connection Pin Assignment

6. Install and use

6.1 Installation direction

Before installation, please verify that the product specifications align with the actual site conditions. The product can be installed at any angle; while it is factory-calibrated for horizontal installation by default, it may also be installed in other orientations with negligible loss of accuracy. The product features an airflow direction arrow, which must be correctly aligned when connecting it to the piping system.

6.2 Usage Precautions

- If the gas contains large particulate matter, a filter should be installed—if necessary—to prevent contamination of the internal flow path.
- The inlet gas must be compatible with the internal sealing materials; do not exceed the specified maximum operating pressure and temperature.
- If using gases that are prone to liquefaction or crystallization, a check valve should be installed at the product outlet to prevent backflow from damaging the equipment.
- When using non-clean gases, it is recommended to purge the system with nitrogen or clean compressed air.
- Calibration and maintenance of the product must be performed by professionally trained technicians; please consult your sales representative.

7. Function operation

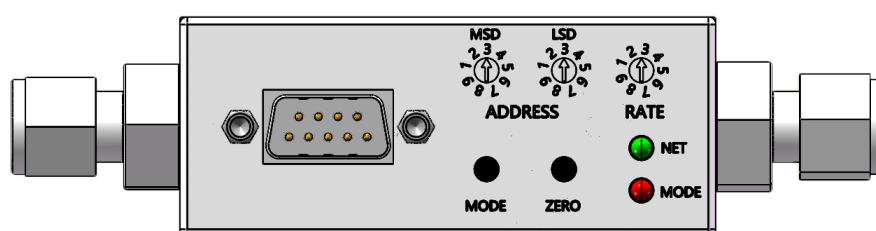


Figure 7 Top Peripheral Schematic

7.1 Peripheral Description

- Button ZERO: Device Zero Adjustment ;
- Button MODE: Switch between Digital and Analog Communication ;
- Dual-color LED-MODE: Digital/Analog communication indication. Blue – Digital communication; Green – Analog communication ;
- Dual-color LED-NET: Communication abnormality /fault indication ;
- Knob ADDRESS-MSD: Set the tens digit of the communication address ;
- Knob ADDRESS-LSD: Set the units digit of the communication address ;
- Knob RATE&CHECK: Set communication baud rate and parity bit.

7.2 Device Zero Adjustment

- Before performing zero adjustment, evacuate residual gas inside the MFC and ensure no gas leakage
- Press and hold the ZERO button for about 3 seconds, release when the NET indicator flashes red at high frequency, Zero adjustment is completed when the flashing stops.

7.3 Communication Mode Switching

- Tap the MODE button to switch the communication mode ;
- MODE-LED indication: Digital communication (blue), Analog communication (green) ;
- Only one of digital communication or analog communication can be enabled at the same time.

7.4 Communication Address Setting

- Rotate the ADDRESS knob to the specified number ;
- Communication address, MSD = tens digit, LSD = units digit, Communication address = MSD * 10 + LSD, Range: 1 ~ 99.

7.5 Communication Baud Rate Setting

- Rotate the RATE&CHECK knob to the specified number ;
- The corresponding relationship between digits and baud rate is shown in the table below :

Knob Digit	0	1	2	3	4	5	6	7	8	9
Baud rate (bps)	9600	9600	19200	38400	9600	19200	38400	9600	19200	38400
Verify	NONE	NONE	NONE	NONE	ODD	ODD	ODD	EVEN	EVEN	EVEN

7.6 NET-LED Indicator Status Description

LED Indicator Status	Status Description
NET – Off	Communication failure or flow setting signal is zero
NET – Green steady on	The flow setting signal is valid
NET – Red high-frequency flashing	Performing device zeroing
NET – Red flashing 1 time/s	Sensor abnormality
NET – Red flashing 2 times/s	Gas source abnormality

8. Troubleshooting

8.1 Device cannot communicate

- Incorrect electrical connections ;
- Correspondence addresses are incorrect or conflicting ;
- The communication format or communication protocol is incorrect.

8.2 The device has no gas output and the feedback signal is zero

- Incorrect gas source or air flow direction ;
- The control signal mode is inconsistent with the use signal;
- Incorrect electrical connection of power supply or setting signal;
- Circuit board or sensor failure.

8.3 The setting signal is inconsistent with the feedback signal

- Abnormal gas source pressure;
- The setting signal is inconsistent with the actual input signal ;

9. Product Guarantee and Service

9.1 Warranty Description

- ✓ The warranty period for new products is one year after leaving the factory ;
- ✓ The product warranty period after repair is 90 days ;
- ✓ During the warranty period, repairs due to product quality problems are free of charge. Repair fees for products beyond the warranty period are charged according to the company's standards ;
- ✓ If toxic or corrosive gases, or other contaminants are used in the product, please completely remove all residues and contaminants before maintenance, and notify your company personnel accordingly. 1

9.2 Not covered by warranty

1. Product failures caused by the following reasons are not covered under warranty .
2. Mechanical failures caused by product dropping or external impact ;
3. Damage to internal electronic components caused by incorrect electrical connections ;
4. Degradation of sealing materials caused by inconsistency between the gas used and the equipment parameters ;
5. Damage caused by gas pressure exceeding the equipment rating;
6. Blockage of precision internal components caused by unclean gas containing particles or other contaminants;
7. Blockage of the gas flow path caused by gas crystallization as a result of failure to purge promptly after using easily crystallized gas;
7. Unauthorized disassembly or modification of the product without the company' s permission.

9.3 Product Service

Our company provides free product operation instructions and technical support.

10. Contact Us

Biosflow (Zhengzhou) Electronic Technology Co., Ltd., specializes in the R&D and manufacturing of fluid measurement and control products. Our products are widely utilized across diverse sectors, including biopharmaceuticals, petrochemicals, new energy, semiconductors, scientific instrumentation, and high-end industrial applications. Upholding our core values of " Pragmatism, Innovation, Collaboration, and Enduring Excellence," we are dedicated to ensuring stable and efficient fluid measurement and control, providing our global partners with high-quality products and industry-specific solutions.

➤ Main Products

1. Gas Flow Controller



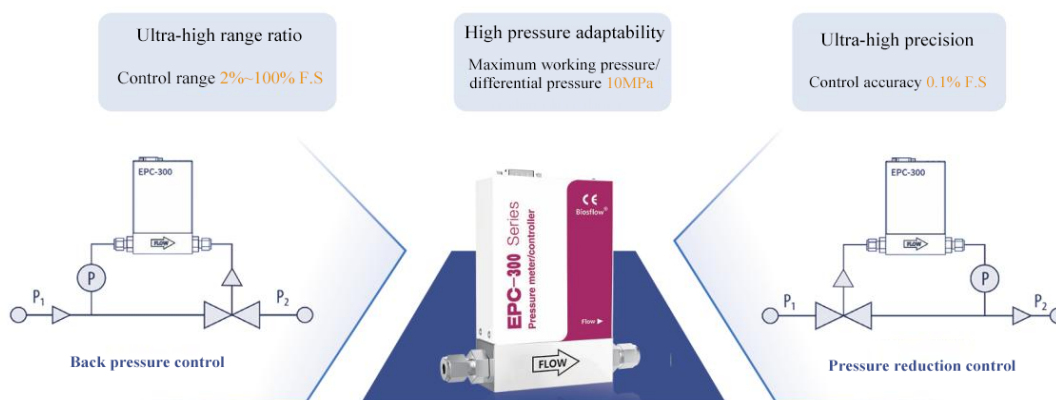
■ Gas Mass Flow Meters & Controllers (Thermal)

At the core of thermal gas mass flow controllers (MFC) and mass flow meters (MFM) lies the capillary thermal differential principle. Featuring a stable and reliable sensor design, these devices are widely utilized for the precise measurement and control of gas mass flow. These products are characterized by their resistance to corrosive gases, high operating pressure and differential pressure capabilities, excellent repeatability, and high accuracy.

■ Gas Mass Flow Meters & Controllers (Differential Pressure)

At the core of differential pressure-based Gas Mass Flow Controllers (MFC) and Mass Flow Meters (MFM) lies the principle of laminar flow differential pressure. As gas flows through a laminar flow channel, a pressure differential is generated between the upstream and downstream points; this differential pressure signal can then be converted into a flow signal using Poiseuille's Law. This product is characterized by rapid response, high accuracy, excellent repeatability, and a wide measurement range.

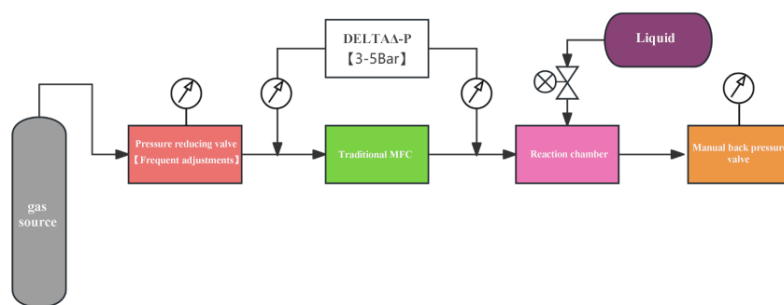
2.Digital Pressure Controller



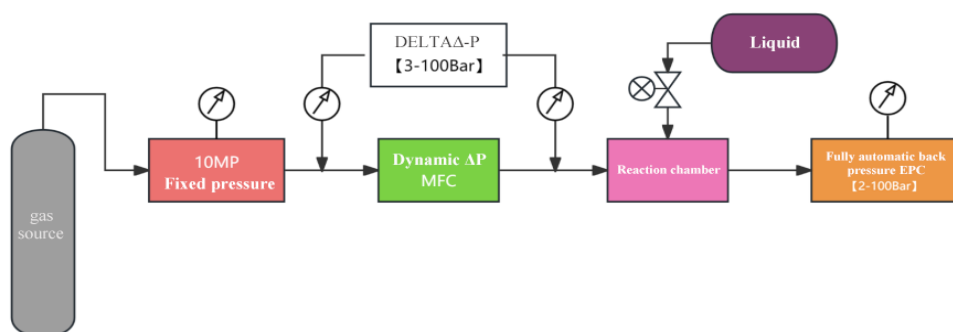
The core components of the pressure controller consist of a pressure sensor, a solenoid valve, and a microcontroller, enabling the automated process control of back-pressure regulation, pressure reduction, or bidirectional adjustment within pneumatic systems. Featuring a sophisticated internal design, this product delivers high-precision, stable, and reliable pressure measurement and control capabilities.

3.Fully Automated Flow/Pressure Process Control Solution

Traditional MFC do not support wide differential pressure ranges; consequently, when the target pressure at the process end changes or during gradual pressure buildup, frequent manual adjustment of back-pressure valves and pressure-reducing valves is often required. Such manual pressure regulation lacks precision and entails long response times, thereby compromising experimental efficiency.



By selecting a dynamic differential pressure MFC, you need only fix the inlet pressure while the back pressure remains independently adjustable at any time; when paired with a fully automatic back-pressure controller, this configuration enables fully automated process control of both flow and pressure.



For more products, please contact us or visit our official website.

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Appendix A Communication Protocol

11.1 Introduction to Communication

- Physical layer connection:RS-485;
- Standard Modbus-RTU Protocol;
- Factory default communication format:Baud rate:9600bps;Parity:None;Data bits:8bps;Stop bits:1bps;
- Factory default device address:1;
- All floating-point numbers in this protocol are single-precision floating-point numbers conforming to the IEEE 754 encoding standard;

11.2 Register Address Description

Table 4: Pressure Read/Write Memory Description

Register name	Register address	Register number	access type	Data element	Annotation
Communication test	0x01	1	Read only	U16	If the returned data is 0x0101, the communication test is successful.
Pressure Reading (Actual Value)	0x10	2	Read only	Float	Floating-point numbers are encoded according to the IEEE 754 standard, with the low byte preceding the high byte.
Pressure Reading (Percentage method)	0x16	1	Read only	U16	0-10000=0-100.00% ;
Set Pressure (Actual Value)	0x20	2	Read and write	Float	Floating-point numbers are encoded according to the IEEE 754 standard, with the least significant byte first and the most significant byte last. (Only one of the two flow rate setting methods may be selected.)
Set Pressure (Percentage method)	0x26	1	Read and write	U16	0-10000=0-100.00% ; (You can only choose one of the two traffic setting methods)

Table5:Communication Register Description

Register name	Register address	Register number	access type	Data element	Annotation
Communication address	0x30	1	Read only	U16	Address range1-99;
Communication baud rate	0x31	1	Read only	U16	Baud rate = sent value * 100; such as 96, corresponding baud rate is 9600 Bps.
Communication check bit	0x32	1	Read only	U16	0: No parity; 1: Odd parity; 2: Even parity.

Table6: Description of Other Registers

Register name	Register address	Register number	access type	Data element	Annotation
Valve Control	0x2A	1	Read and write	U16	0: Normal control; 2: Cleaning (full power open).Execute this operation only if cleaning function is required; default is normal control state.

Communication Mode	0x2D	1	Read and write	U16	1: RS485 communication; 2: Analog communication.
Device Zero Calibration	0x41	1	Write Only	U16	Send 0xf0 to perform automatic (ensure no gas passes through before executing this operation).
Warning Code	0x61	1	Read Only	U16	See Appendix 1: Warning Code Table for details.
Calibration Range	0x87	2	Read Only	Float	Floating-point number is encoded in IEEE 754 format, low byte first, high byte last.

11.3 Core Register Examples

Note: The example data type is hexadecimal (16-bit)

11.3.1 Read actual pressure value (default unit: bar).

The host sends data:

Device address	Function code	Starting address high	Starting address low	High register count	Low register count	CRC high	CRC low
01	03	00	10	00	02	C5	CE

Device returns data: (when the returned pressure is 10 bar)

Device address	Function code	Byte Count	Date1high	Date1low	Date2high	Date2low	CRC high	CRC low
01	03	04	00	00	41	20	CB	BB

11.3.2 Read Pressure Percentage (0~10000=0~100.00%)

Host sends data :

Device address	Function code	Starting address high	Starting address low	High register count	Low register count	CRC high	CRC low
01	03	00	16	00	01	65	CE

Device returns data: (when the returned pressure is 100% of full scale)

Device address	Function code	Byte Count	Date high	Date low	CRC high	CRC low
01	03	02	27	10	A2	78

11.3.3 Set the actual pressure value (default unit: bar).

Note: Only one of the two options can be selected with Example4.

Host sends data: (Set pressure: 10 bar.)

Device address	Function code	Register Address High	Register address Low	High register count	Low register count	Byte Count	Date 1high	Date 1low	Date 2high	Date 2low	CRC high	CRC low
01	10	00	20	00	02	04	00	00	41	20	C0	3F

Device returns data:

Device address	Function code	Register Address High	Register address Low	High register count	Low register count	CRC high	CRC low
01	10	00	20	00	02	40	02

11.3.4 Set Pressure Percentage (0~10000=0~100.00%)

Note: Only one of the two options can be selected with Example3.

Host sends data: (Set pressure to 100% of full scale)

Device address	Function code	Register Address High	Register Address Low	High register count	Low register count	Byte Count	Date high	Date low	CRC high	CRC low
01	10	00	26	00	01	02	27	10	BB	6A

Device returns data:

Device address	Function Code	Register Address High	Register Address Low	High register count	Low register count	CRC high	CRC low
01	10	00	26	00	01	E0	02

11.3.5 Read Communication Address

Host sends data:(Example:Read communication address=1)

Device address	Function Code	Register Address High	Register Address Low	High register count	Low register count	CRC high	CRC low
01	03	00	30	00	01	84	05

Device returns data:

Device address	Function Code	Byte Count	Date high	Date low	CRC high	CRC low
01	03	02	00	01	79	84

11.3.6 Read Communication Baud Rate (bps=Read Data*100)

Host sends data:(Example:Read baud rate=9600,read data=96*100)

Device address	Function Code	Register Address High	Register Address Low	High register count	Low register count	CRC high	CRC low
01	03	00	31	00	01	D5	C5

Device returns data:

Device address	Function Code	Byte Count	Date high	Date low	CRC high	CRC low
01	03	02	00	60	B8	C6

11.3.7 Read Communication Parity (0:No Parity;1:Odd Parity;2:Even Parity)

Host sends data:(Example:Read parity=No Parity)

Device address	Function Code	Register Address High	Register Address Low	High register count	Low register count	CRC high	CRC low
01	03	00	32	00	01	25	C5

Device returns data:

Device address	Function Code	Byte Count	Date high	Date low	CRC high	CRC low
01	03	02	00	00	B8	44

11.3.8 Fault Code List

Fault Code	Fault Analysis	Troubleshooting
01	Sensor abnormality	Zero adjustment after preheating with no gas flow

02	Air source abnormality	Check the air source pressure
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Table7 Fault Warning Code List