



D08 Flow Control Vacuum Pump and Compressor Series

User Guide


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Hilintec

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About This Document

Purpose

This document is a description of the D08 flow control vacuum pump and compressor products in testing period, which is used to guide relevant technical personnel to initially understand the characteristics of the product.

Intended Audience

This document is intended for technical personnel. You should have a good understanding of your product and have a clear concept of the relevant parameters, specifications, and other information of the applications of the micro pump.

Keyword

Compact size, wide voltage power supply, stable flow rate, related parameters, wiring instructions

Change History

The change history accumulates each update of this document. The latest version of the document contains all the previous updates.

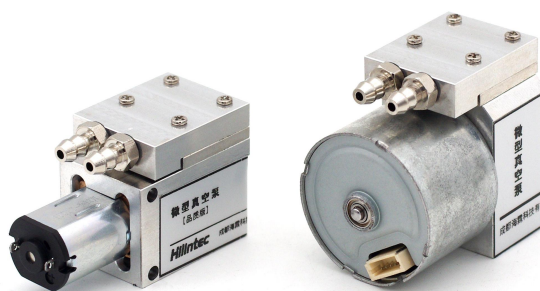
Issue	Date	Product Version	Issuer	Modification
01	2021-8	1.0	GZM	First official release.
01	2021-10	1.0	GZM	Added BDC parameters

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1 Characteristics



1.1 Compact Size

The overall size of the product(equipped with a brushless motor) is about $34.5 \times 21 \times 32.5\text{mm}$; the overall size of the product(equipped with a brushed motor) is $40 \times 17 \times 23.5\text{mm}$; it is suitable for applications that require a very small space of air pumps.

1.2 Multiple Motor Options

Two choices of brushed and brushless motors are provided to meet the different needs of costs and service lifetime;

The brushless motor uses 12V DC power supply; the brushed motor uses 3-5V DC power supply.

1.3 High Vacuum, Big Pressure

Under the premise of extremely compact size, it can achieve vacuum degree -49kPa and maximum positive pressure 88kPa ;

1.4 **Industrial-grade Reliability**

Whether pumps equipped with brushed motors or brushless motors, which have passed rigorous life tests and promise to meet industrial-grade reliability requirements under test conditions.

2 Functions

2. 1 Speed Control Function

For brushed motor version, The flow rate of the pump can be changed by adjusting the motor speed and changing the input voltage , For brushless motor version, The flow rate of the pump can be changed by adjusting the motor speed through PWM signal.

2. 2 Modular Hose Connector Options

Under the premise of a small volume, a replaceable connector is available, which can be equipped with copper or stainless steel hose connector and M3 internal thread connectors.

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Technical Specifications

3.1 Performance Specifications

(Standard atmospheric pressure 101kpa)

Model	Voltage (V DC)	Max. Load Current (mA)	Max Flowrate (L/min)		Max. Vacuum (-kPa)	Max. Pressure (kPa)
			Peak Flow	Average Flow		
Material Option A	Pump Head:Aluminum Alloy,Diaphragm/Valves:EPDM, Motor: BDC					
D08L-53-0610	5	≤210	≥110	≥95	≥49	≥88
Material Option B	Pump Head:Aluminum Alloy,Diaphragm/Valves:EPDM, Motor: BLDC					
D08L-23-0600	12	≤65	≥210	≥175	≥46	≥75

- Note:**
1. Operating voltage、input voltage changes will affect the load current
 2. Unless otherwise specified, the technical parameters are measured under the conditions of temperature 20°C and standard atmospheric pressure of 101kPa.
 3. The parameters in the table are measured at the maximum speed of the motor. When the motor speed changes, the pressure/vacuum level is basically unchanged.
 4. The peak flow rate in the table refers to the flow value measured with a rotameter, and the average flow rate is measured with a soap film flow-meter.

3.2 Configuration Options

Material option			
pump head	Reinforced nylon		
diaphragm	EPDM		
one-way valve	EPDM		
motor	BLDC	BDC	
Connector Option			
Connector type	default copper hose connector	304 stainless steel hose connector	

3.3 Reliability Parameters

Models	D08L equipped with BLDC motor		
Versions	Simplified	Standard	Premium
Fully Loaded Lifetime (hrs)	12000 (Estimated lifetime)		
Unloaded Lifetime (hrs)	18000		
Motor Lifetime (hrs)	20000		
Lifetime test instructions:	Full-load life test conditions: block the exhaust port of the pump, and the suction port is directly connected to the atmosphere, so that the pump can operate continuously without stopping for 24 hours under the maximum vacuum condition;		
	No-load life test conditions : The pump suction port and exhaust hole are directly open to the atmosphere, so that the pump works under normal pressure for 24 hours without stopping and continuous operation;		
	Motor life test conditions: under good ventilation and heat dissipation conditions, the motor does not carry a load for 24 hours without stopping Continuous operation;		
	Environmental conditions for life test: In a clean, non-corrosive laboratory, the ambient temperature is 5~33℃ fluctuates with the climate, and the relative humidity of the environment is 50%~85%, fluctuates with the climate;		
	The source of the experimental data is from Hailin Technology Aging and life laboratory and supplier laboratory		

Working Conditions	
Environment	Permissible ambient temperature range of the simplified version products is 0℃～40℃, and the permissible ambient temperature of the standard and premium versions is 0℃～50℃. The permissible relative humidity of all pumps in this series is ≤90%, no condensation. The pump should not be exposed to the sun, and should work in a clean and ventilated environment.
Medium	Permissible gaseous media temperature range is 0℃～50℃. The medium is allowed to contain water vapor, but cannot contain particles or oil mist.
Load	The inlet/outlet can be operated at full load (i.e. completely block the inlet/outlet), but the applied load cannot exceed the maximum vacuum of the pump; the outlet must keep unobstructed.
Corrosion	The materials of the wetted parts: nozzle, pump head, diaphragm, one-way valve (See Configuration Options for component materials), The above materials have a certain degree of corrosion resistance. Please further judge the resistance to the medium according to the wetted materials

3.4 Versions Description

Version Performance	Simplified Version	Standard Version	Premium Version
Lifetime	★★	★★★	★★★★★
Noise	★	★★	★★★★
Reliability	★	★★	★★★★
Parameter Consistency	★	★★	★★★★

Note: 1.The more ★, the better performance of this item.

2. The quantity★ is for reference only, so that readers can understand the differences between versions.

3.5 List of Models Combination for Sale

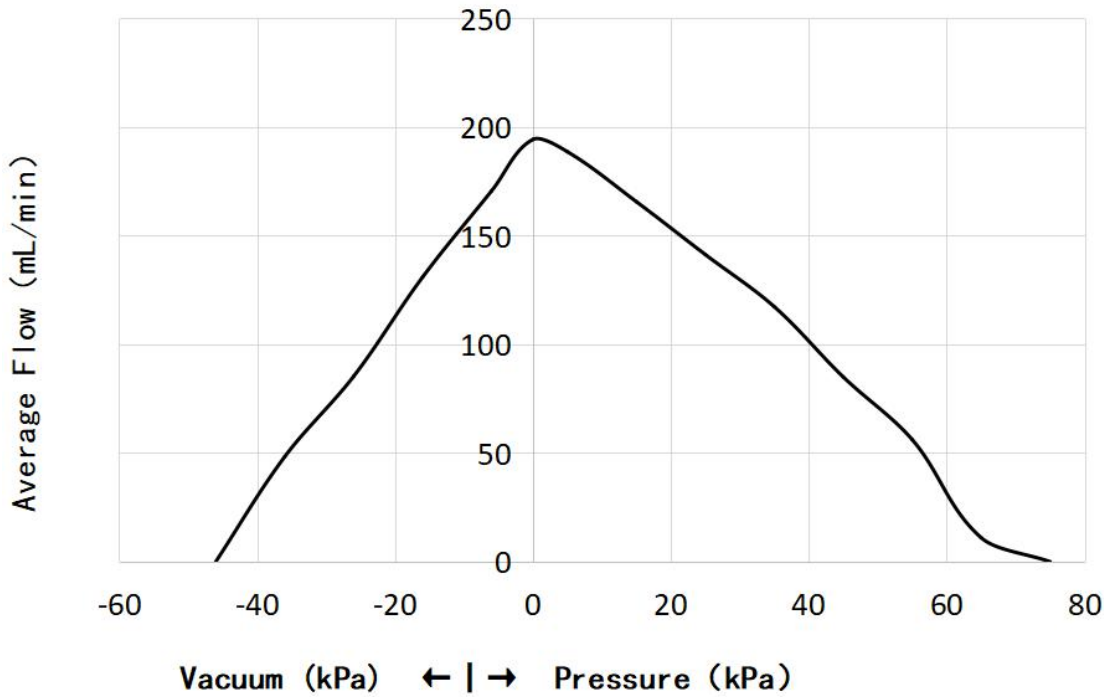
Version Type	Simplified Version	Standard Version	Premium Version
D08L equipped with BLDC motor	/	/	√
D08L equipped with BDC motor	/	/	√

3.6 Pump Materials

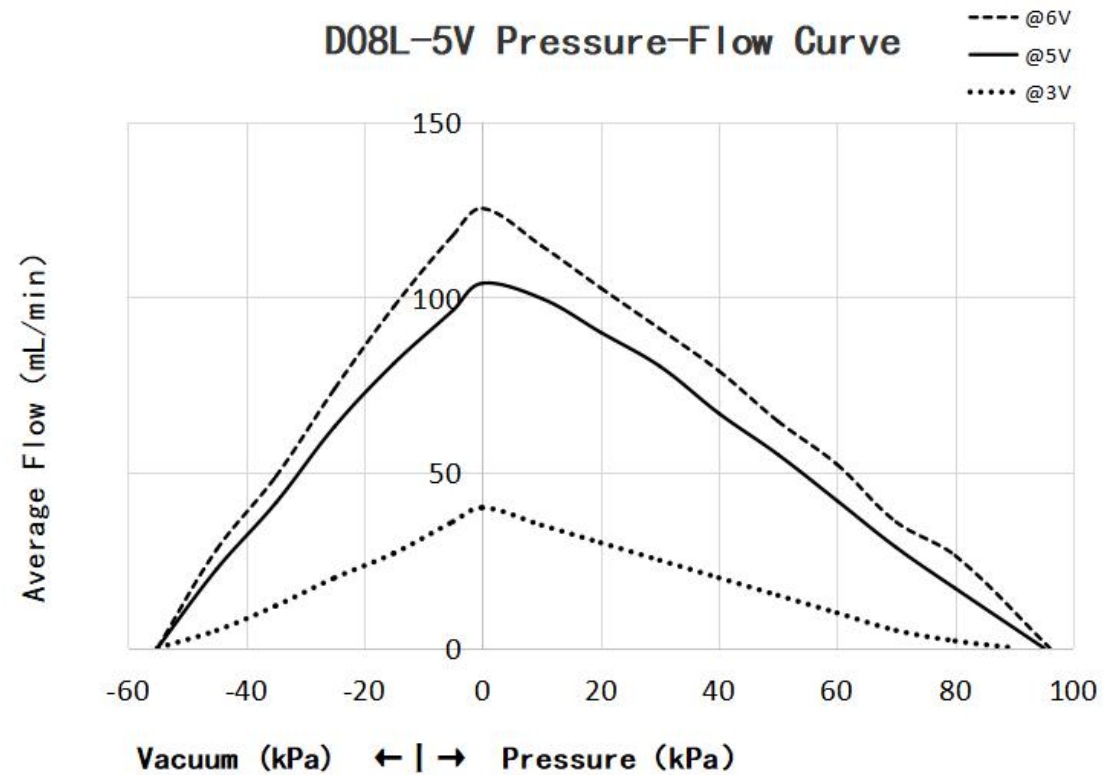
The materials of the wetted parts: LY12 aluminum alloy, EPDM rubber and copper. Please check the tolerance of the medium according to the wetted material. (For special needs, you can customize stainless steel head and stainless steel pneumatic connectors.

3. 7 Flow Rate Curve

D08L-12V Pressure-Flow Curve

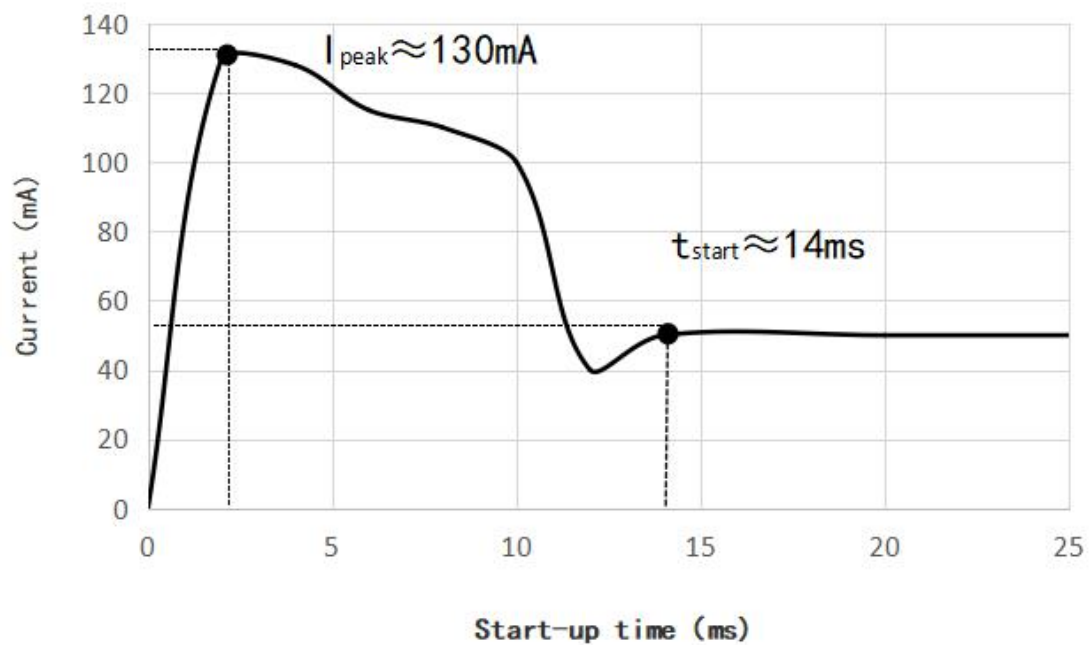


D08L-5V Pressure-Flow Curve

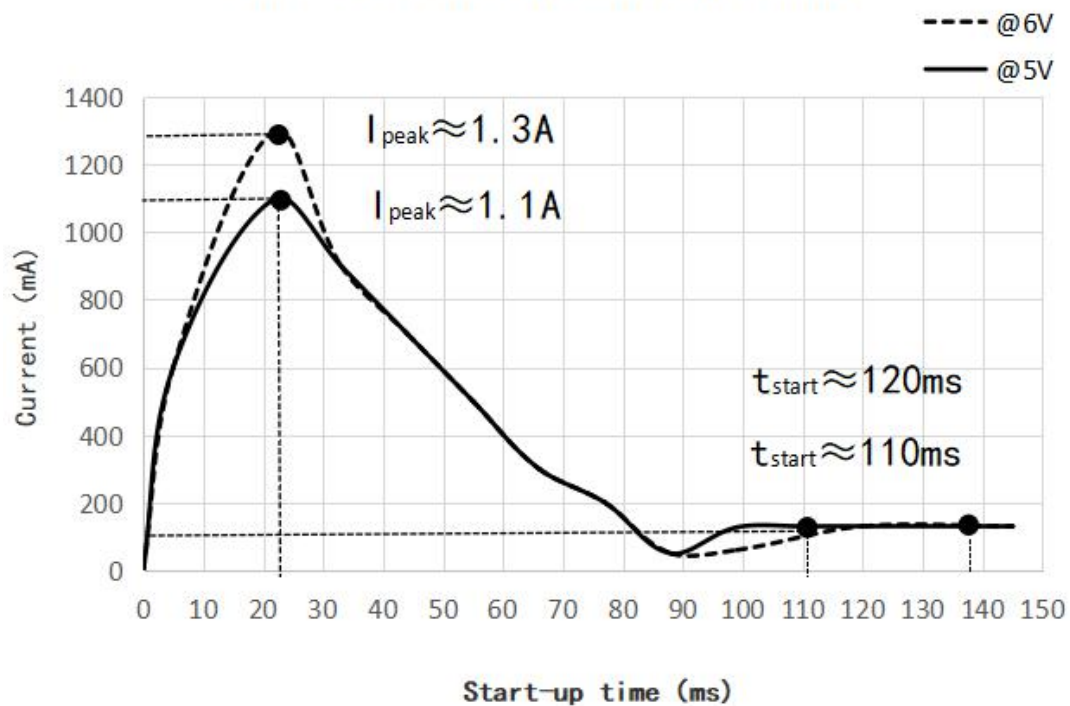


3.8 Starting Current

D08L-12V Starting Current Curve



D08L-5V Starting Current Curve

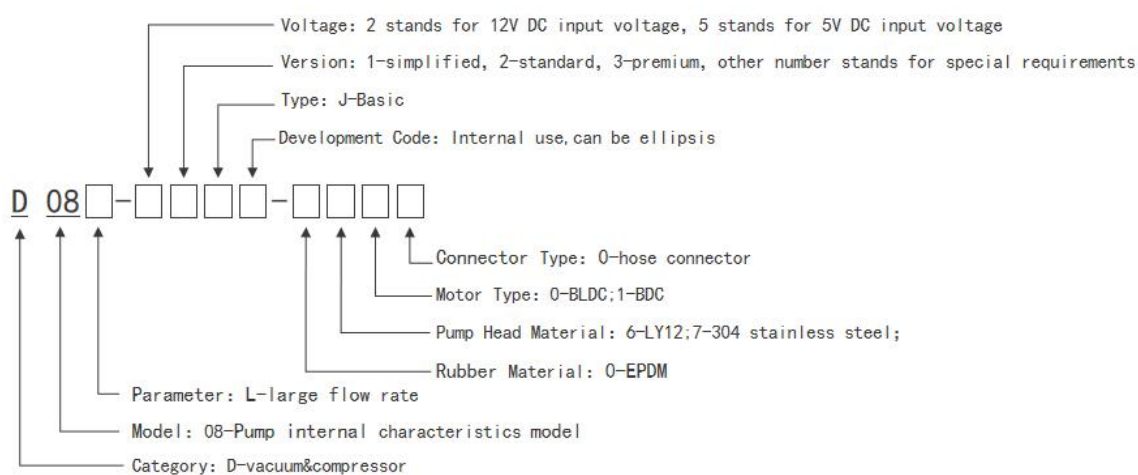


4

Product Model Description

4.1 Brief Description of Model Naming

This series of products are premium version.



Example1: D08L-51J-0610 (D08L pump, 5V voltage, basic simplified version, rubber material: EPDM, pump head material: LY12 aluminum alloy, brushed motor, connector type:hose connector)

5 Electrical Connection

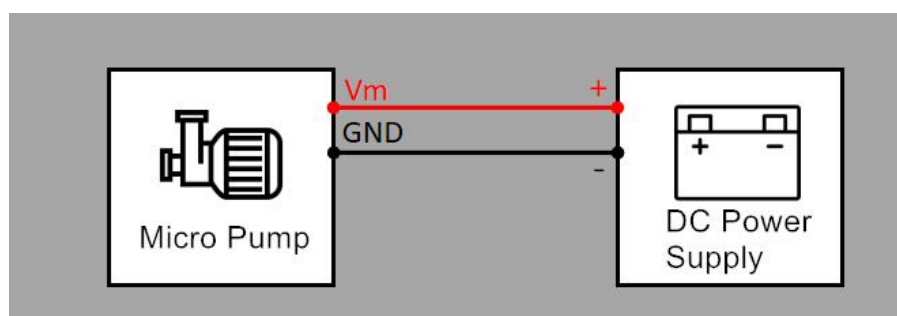
The Electrical Connection section introduces how to connect this product to an external power supply and the wiring instruction of signal wires. This product is equipped with standard connection wires at the factory, and the wire definitions are distinguished by colors.

5.1 Definition of Signals(D08 Equipped with BDC Motor)

There are 5 motor wires for this product. The wiring and usage instructions are as follows.

S.N.	Color	Function	Explanation	Remarks
1	Black	Negative pole of the power supply	GND	
2	Red	Positive pole of the power supply	DC5V	

5.2 Logic Wiring Diagram(D08 Equipped with BDC Motor)



5.3 Definition of Signals(D08 Equipped with BLDC Motor)

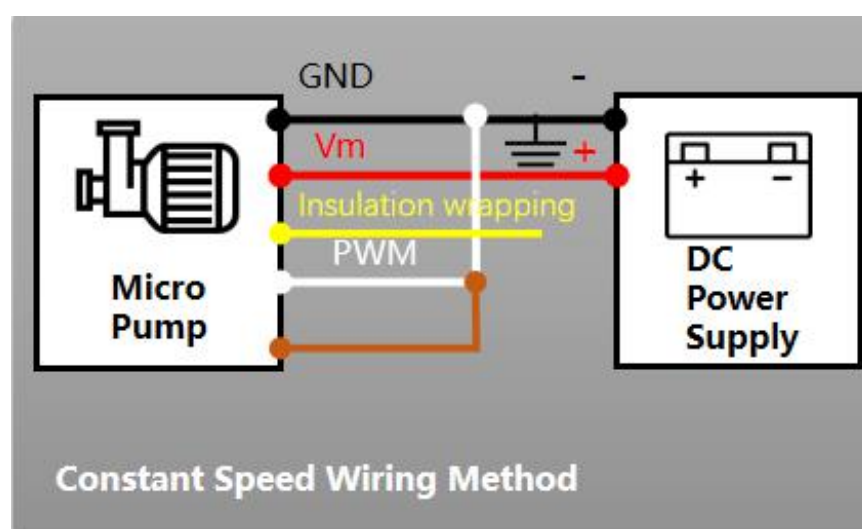
There are 5 motor wires for this product. The wiring and usage instructions are as follows.

S.N.	Color	Function	Explanation	Remarks
1	Black	Negative pole of the power supply	GND	
2	Red	Positive pole of the power supply	DC12V ($\pm 10\%$)	
3	Yellow	FG feedback signal (motor speed feedback signal, pulse signal), the motor outputs 6 pulses per rotation	Output: $4V \leq \text{High Level}$ $\text{Low Level} \leq 0.6V$ The maximum rated current of the FG feedback signal is 3mA.	The internal of the motor is open-drain, which requires a pull-up externally. Voltage DC 5V, resistance 4.7k Ω .
4	White	Pulse Width Modulation (PWM)	Input: $0V \leq V_{IL} \leq 0.8V$ $2V \leq V_{IH} \leq 5V$ (15kHz~25kHz)	Use PWM to change the motor speed and adjust the flow. PWM input signal frequency range: 15kHz ~ 25kHz. This port cannot be used to control the start and stop of the pump.
5	Orange(or Gray)	Control the start and stop of the motor.	Input: Level Signal: $2V \leq \text{Stop} \leq 5V$ $0V \leq \text{Start} \leq 0.8V$	This signal line can be used to control the start and stop of the pump, especially for frequent start and stop. If the pump does not work for a long time, disconnect the red power cord.

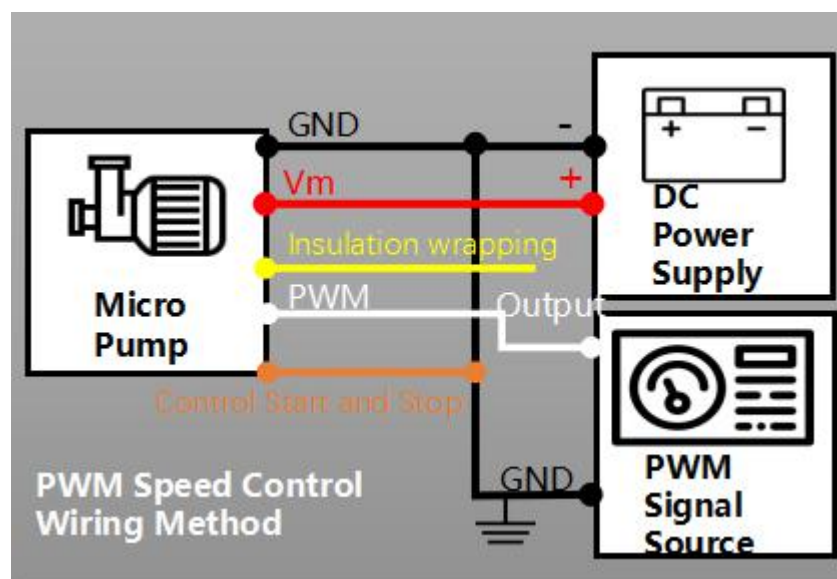
Note: If speed control and speed feedback are not needed, the red wire shall be connected to the positive pole of the power supply, and the black, white and orange wires connected to the negative pole of the power supply; the yellow wire shall be insulated and wrapped.

5. 4 Logic Wiring Diagram(D08 Equipped with BLDC Motor)

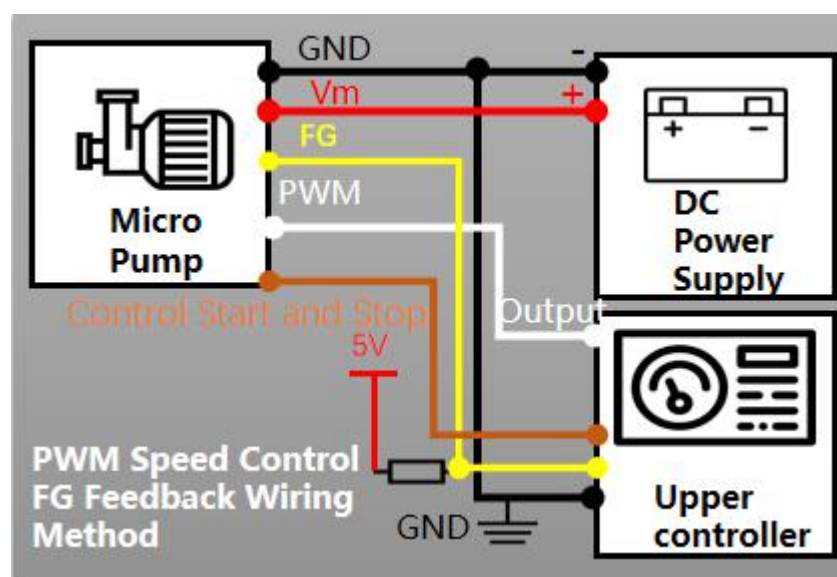
If speed control and speed feedback are not needed, the red wire shall be connected to the positive pole of the power supply, and the black, white and orange wires connected to the negative pole of the power supply; the yellow wire shall be insulated and wrapped and the pump will work at the rated speed.



When you need to use the PWM speed control function, you need to use a signal source that supports PWM signal output (function signal generator, MCU, PLC, etc.), connect the signal source output to the white PWM input cable, and connect the PWM signal source ground to the ground of the DC power supply and wrap the yellow wire with insulation.



When you need to use the PWM speed control function and monitor the pump operation or perform feedback control through the FG signal, you need to use an upper controller (MCU, PLC, host computer, etc.) that supports PWM signal output, FG signal input and start-stop control. Connect the signal source output to the white PWM input wire, and connect the PWM signal source ground to the DC power ground. The yellow FG feedback signal needs to pass a $4.7k\ \Omega$ resistor before connecting to DC 5V for a pull-up, and then connect to the FG signal input terminal of the upper controller; if using our matching micro-pump speed controller, no additional pull-up is required.



6

Cautions



Please read the instructions in this chapter carefully and follow the instructions strictly before use.

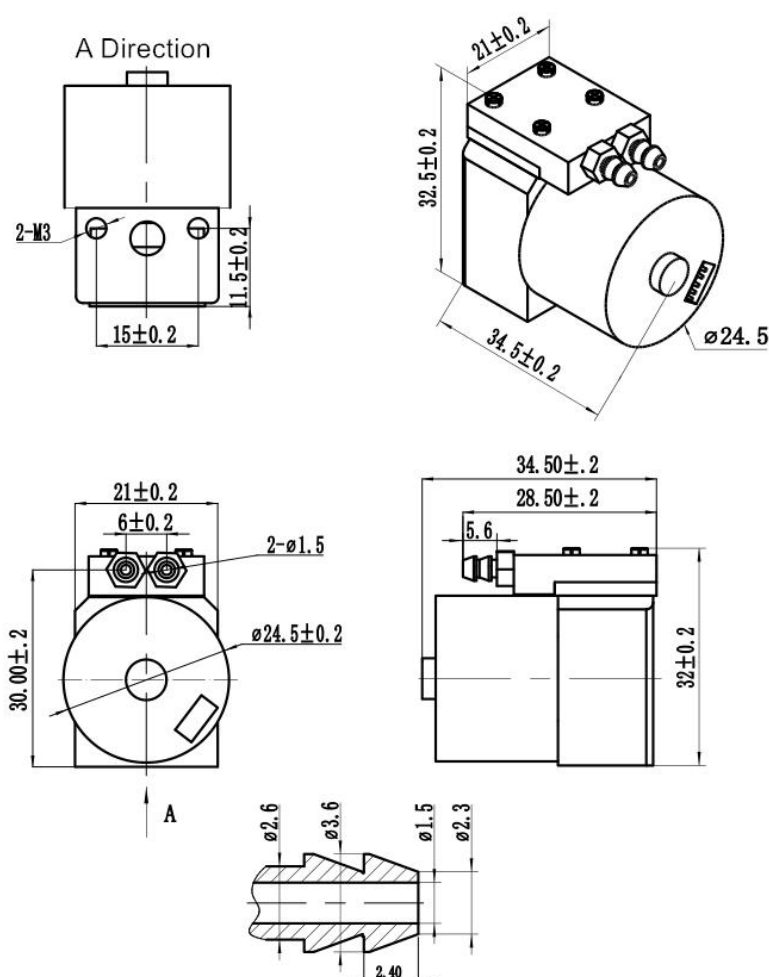
- 1. This product has no waterproof, dust-proof, and explosion-proof functions and cannot be used in flammable and explosive environments!**
- 2. Foreign matter must not fall into the connectors, and there should be no solid particles in the medium, otherwise the micro pump will be damaged!**
- 3. Do not disassemble it privately, otherwise it will damage the micro pump**
- 4. When this product is used to transfer harmful medium, it must be double-sealed to ensure personal safety!**
- 5. The matching piping components and containers must have sufficient strength to ensure personal safety!**
- 6. Please follow the user guide instructions strictly!**

7 Dimensions

Overall Dimensions of D08L(Equipped with BLDC Motor)

Unit:mm

Weight:60g



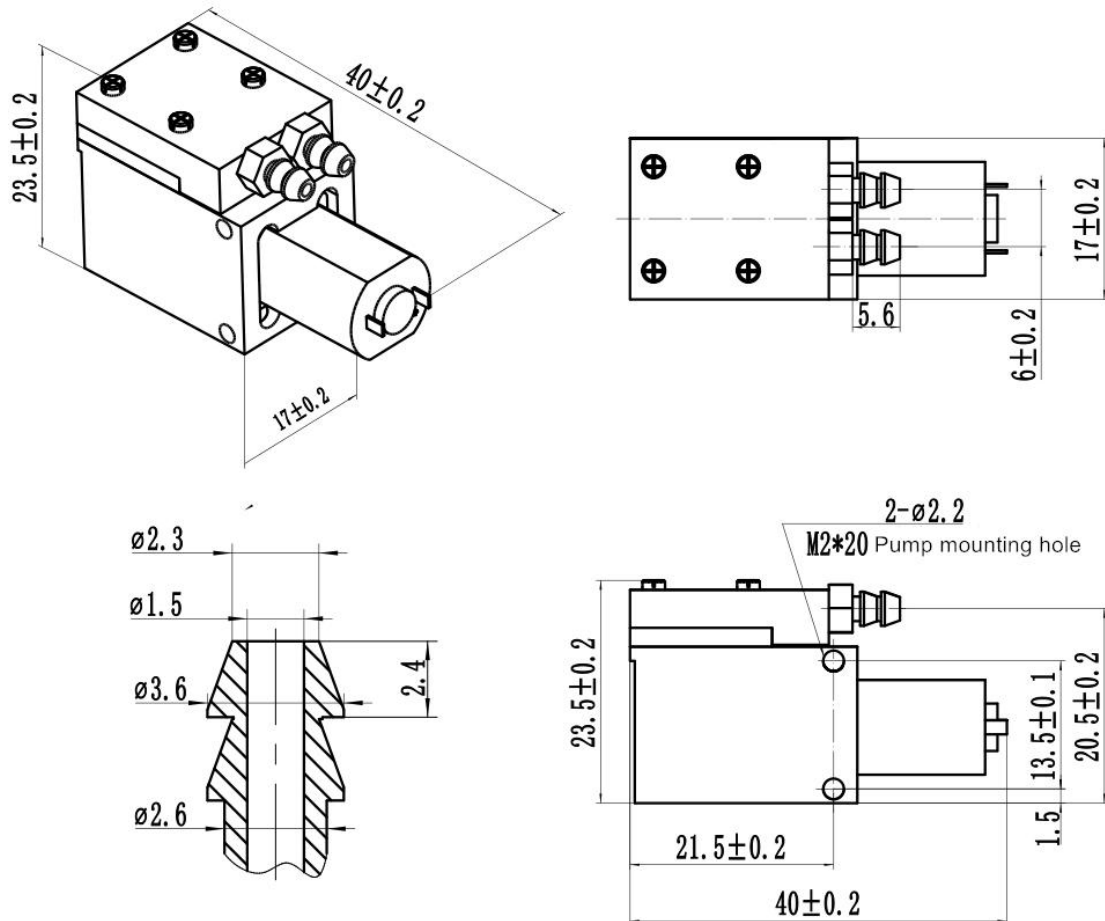
Installation instructions:

1. The screws on the pump cannot be removed, otherwise it will damage the pump;
2. The mounting holes are M3*5 threaded holes., Do not remove and disassemble them repeatedly, otherwise it will cause loose and unreliable installation.

Overall Dimensions of D08L(Equipped with BDC Motor)

Unit:mm

Weight:35g



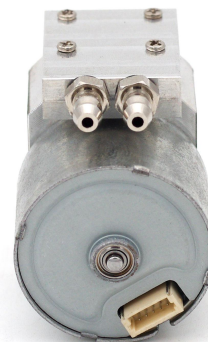
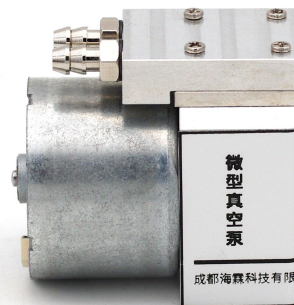
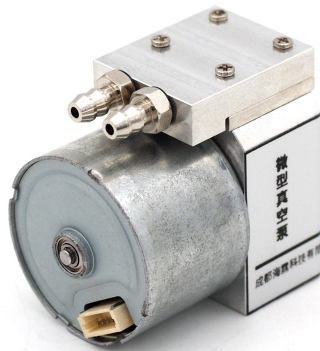
Installation instructions:

1. The screws on the pump cannot be removed, otherwise it will damage the pump;
2. M2*20 mounting holes., Do not remove and disassemble them repeatedly, otherwise it will cause loose and unreliable installation.

8

Appearance

D08L Equipped with BLDC Motor



D08L Equipped with BDC Motor