D50 Dual Pump Head Diaphragm Pump Series

User Guide

Issue 01

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About This Document

Purpose

This document is related to the D50 dual pump head pump and compressor products,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

PWM speed control, 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	2025-06	01	YCL	Official Launch

Contents

1 Characteristics

1.1 High Vacuum

The D50VB high-vacuum model in this series delivers a maximum vacuum of 3kPa.abs (-98 kPa relative vacuum), meeting demands across a wide pressure range.

1.2 Large Flow Rate

The product features a flow rate of 22L/min with speed adjustment capability.

1.3 Pipe Fittings in Various Sizes

Equipped with PC6/PC8 push-in quick connector, H4/H8 hose connector, plus Rp1/8 and NPSC1/8 internal thread options to accommodate diverse piping connection requirements.

1.4 Stable and Reliable Pressure Output and Gas Transmission

Designed for high-reliability applications that operate 24/7, with stable high negative pressure output and gas transmission capabilities

2 Special Functions

2.1 Speed Control Function

Flow rate can be adjusted by varying the motor speed. Models equipped with brushless motors enable precise RPM control through PWM duty cycle modulation.

2.2 Start and Stop Function

Brushless motor-equipped models feature on/off control via trigger signal, making them ideal for applications requiring frequent start-stop cycles.

2.3 Speed Feedback

Brushless motor-equipped models provide speed feedback signals for real-time RPM monitoring, enabling operational supervision and closed-loop control.

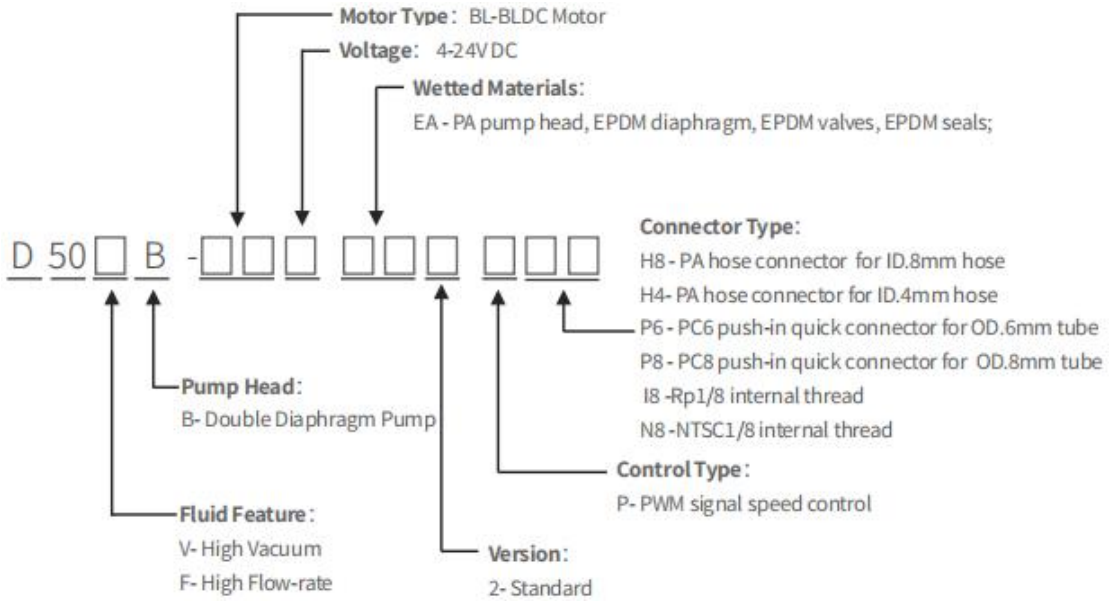
2.4 Protection Function

All brushless motor models come standard with stall protection, over-current protection, and reverse-connection protection to prevent pump damage from overloads, power system faults, or improper operation.

3 Product Model Description

3.1 Brief Description of Model Naming

This pump series comes standard with brushless motors, available in two configurations based on inlet/outlet port connections: the D50VB high-vacuum series model and the D50FB high-flow parallel model.



Example 1: D50VB-BL4EA2PH8 (D50 high-vacuum dual-head air pump, 24V brushless DC motor, material combination: EPDM diaphragm, EPDM valves, reinforced nylon pump head, standard version, PWM speed control, 8mm ID hose connector)

Example 2: D50FB-BL4EA2PH8 (D50 high-flow dual-head air pump, 24V brushless DC motor, material configuration: EPDM diaphragm, EPDM valves, reinforced nylon pump head, standard version, PWM speed control, 8mm ID hose connector)

4 Technical Specifications

4.1 Key Specifications

Model	Rated voltage(VDC)	Max current (A)	Rel. Vacuum(-kPa)	Output Pressure(kPa)	Average flow (L/min)	Peak flow(L/min)	Weight (g)
EA material	BL brushless motor;Check valve & seals: EPDM ;Pump head: Reinforced nylon						
D50VB-BL4	24	≤1.2	≥98	Max.50	≥9	≥13	1.1
D50FB-BL4	24	≤1.2	≥88	Max.50	≥17	≥22	1.1

Note: 1. Motor input voltage must not exceed rated voltage ±10%.

2. The parameters in the table were measured at the rated voltage and maximum motor speed.

3. Unless otherwise specified, the technical parameters were measured under conditions of 20° C and standard atmospheric pressure (101 kPa).

4. The average flow rate in the table was measured using a soap film flowmeter, while the peak flow rate was measured with a glass rotameter.

5. Max. 50 indicates the maximum allowable operating pressure. Exceeding this pressure will shorten the product's lifespan.

4.2 Configuration Options

Material option	Default	
Pump head	Reinforced nylon	
Diaphragm	EPDM	
One-way valve	EPDM	
Motor option	**Default**	
Motor type	BL Brushless motor	
Rated Voltage	24V DC	
Connector option	**Default**	**Optional Items**
Nozzle type	8mm ID hose connector	D50FB comes standard with 8mm ID hose connector only. D50VB model offers optional fittings for various connection types.
	（For detailed connector introduction, see the following chapters）	

4.3 Reliability Parameters

Models	D50 Dual Head Pump
Versions	Standard Version
Fully Loaded Lifetime（hrs）	7500*
Unloaded Lifetime（hrs）	10000*
Motor Lifetime（hrs）	15000*

Lifetime test instructions:	Full-load life test conditions: Block the inlet completely, connect the outlet to the atmosphere, and run the pump continuously for 24 hours without shutdown.
	No-load life test condition: The air inlet and outlet are connected to the atmosphere, and the pump operates continuously for 24 hours without stopping.
	Motor life test conditions: Under good ventilation and heat dissipation conditions, the motor runs continuously for 24 hours without load
	Life test environment conditions: in a clean and corrosion-free laboratory, the ambient temperature is 5~33℃, fluctuating with the climate, the relative humidity is 50%~85%, fluctuating with the climate
	* Represents the design target parameters, the actual life is under testing.
	The source of the experimental data is from Hilin Technology Aging and life laboratory and supplier laboratory

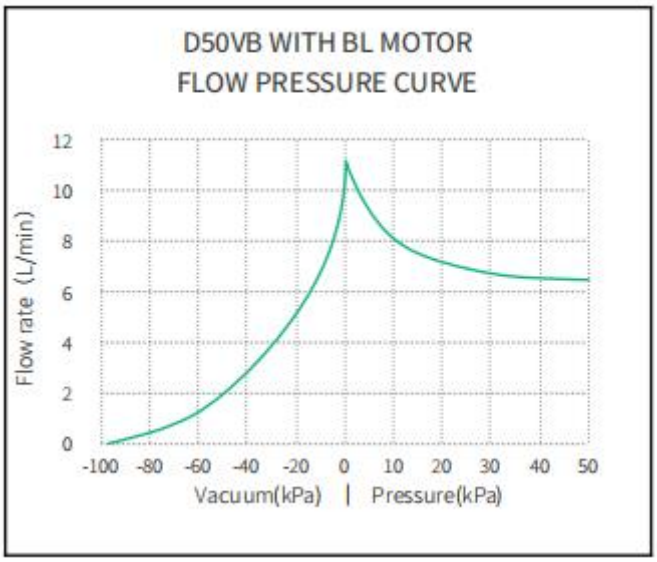
Working Conditions	
Environment	The ambient temperature is 0℃~50℃. It is not suitable to be exposed to the sun outdoors. You should work in a clean and ventilated environment.
Medium	The medium is gas at 0° C to 40° C; the extracted gas may contain water vapor but no solid particles. Oil mist ingestion is prohibited.
Load	The load applied to the inlet must not exceed the pump's maximum vacuum level, and the outlet must remain unloaded.

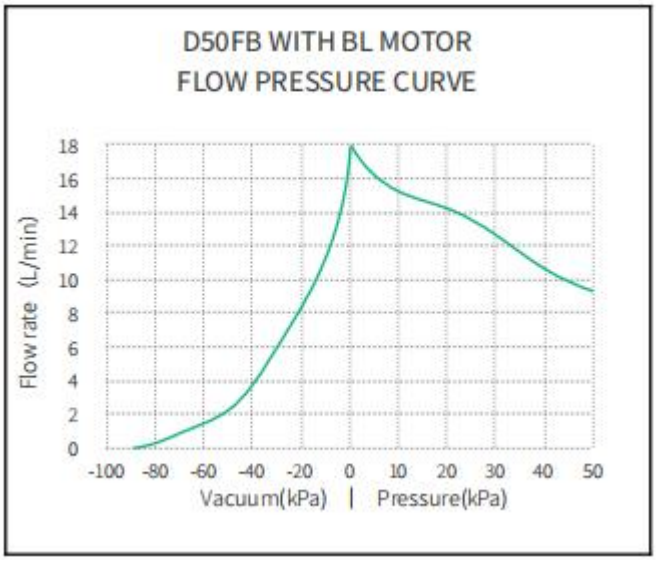
4.4 Options of Modular Pneumatic Connectors and Pump's Head

Connector identification	D50VB Option feature
P8 push-in connector	PC8 push-in connector is suitable for PU and other rigid plastic air pipes with an outer diameter of 8mm.
P6 push-in connector	PC6 push-in connector is suitable for PU and other rigid plastic air pipes with an outer diameter of 6mm.
H8 hose connector	It is suitable for hose connector with an inner diameter of 7-8mm. It is suitable for soft air pipes such as silicone hoses. Please pay attention to pressure limits and safe use.
H4 hose connector	It is suitable for hose connector with an inner diameter of 4-5mm.Please pay attention to pressure limits and safe use.
I8 internal thread connector	National standard Rp1/8 cylindrical internal thread, customers can install the air nozzle or adapter that suits their own requirements.
N8 internal thread connector	US standard NPSC1/8 parallel internal thread; customers may install their preferred NPT1/8 pneumatic nozzles or adapters.

Connector identification	D50FB Option feature
H8 hose connector	Compatible with 7-8mm ID hose connector, suitable for soft tubing like silicone tubes.

4.5 Pressure-Flow Curve

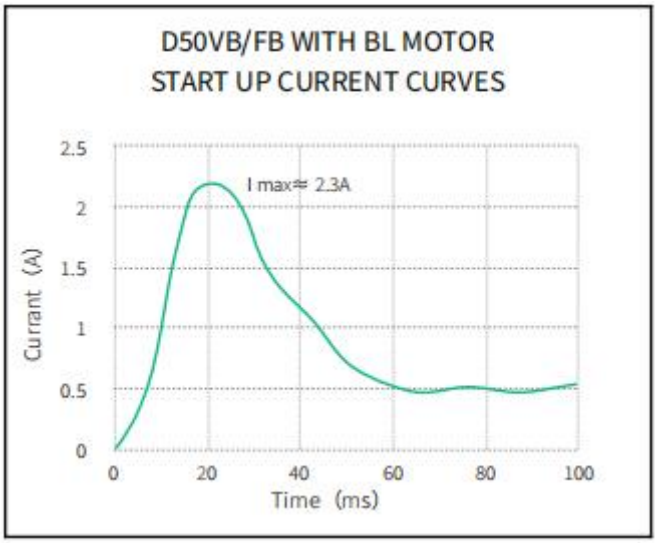




Note: 1. Due to individual differences between different micro pumps and different test pipelines having different effects on measured parameters, this curve is a statistical value;

2. The values of this curve are only for the technical reference of the user to confirm the working point and are not used as a basis for product acceptance.

4.6 Starting Current Curve



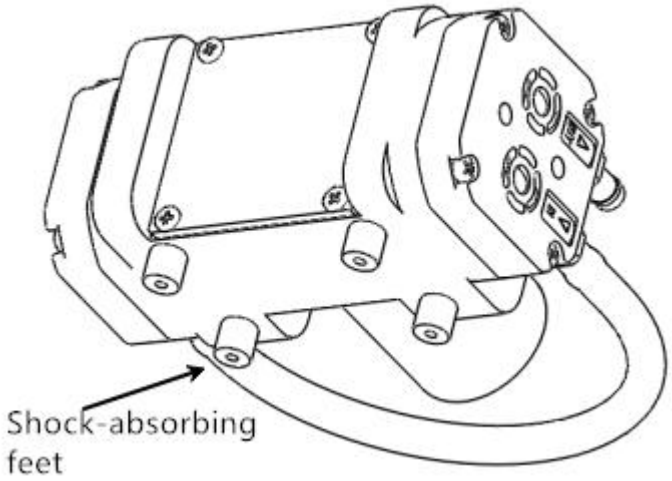
Note: 1. The starting current curve is measured under the condition that the inlet and the outlet are directly connected to the atmosphere. There are individual differences between different micro pumps.

2. This curve is a statistical value and is only used as a technical reference for users to determine the power supply system. It is not used as acceptance data

5 Installation Instructions

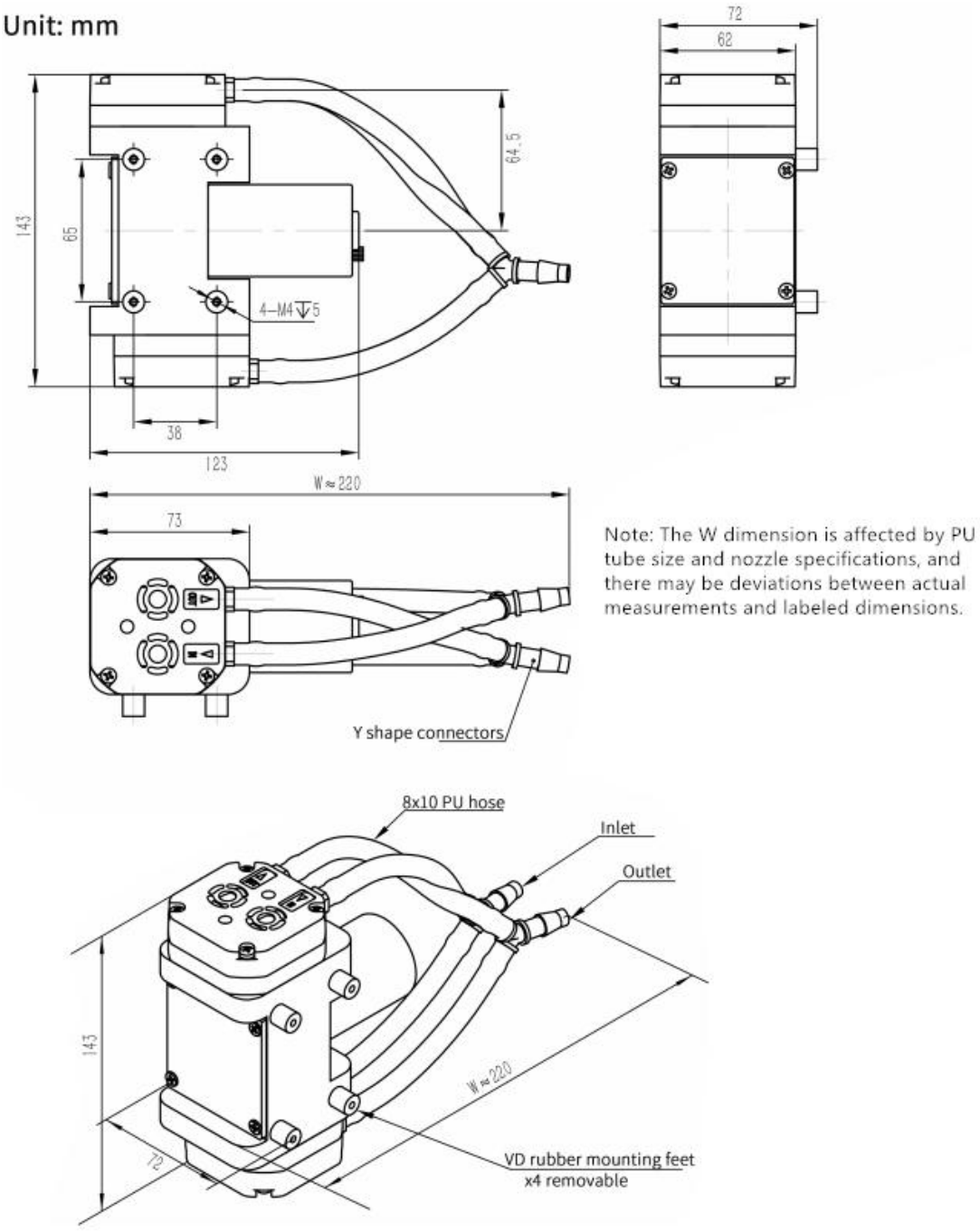
5.1 Installation and fixation of pump body

This product comes with VD-type vibration-damping feet included. To reduce noise and vibration during pump operation, we recommend mounting the pump to the equipment chassis or panel using these damping feet. Each damping foot features one M4 mounting hole (5mm depth) and can be installed with M4 screws.

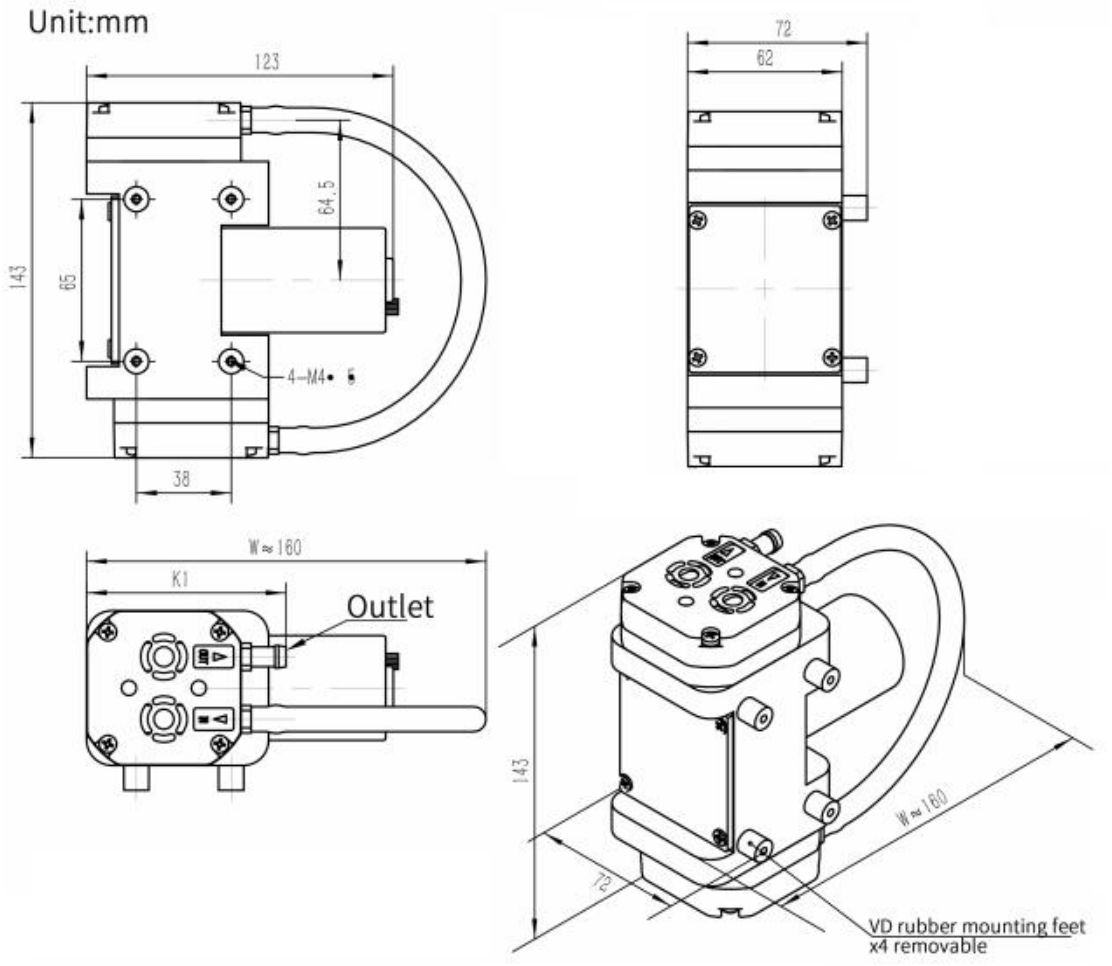


D50FB Dual-Head Pump Installation Dimensional Drawing

Unit: mm



D50VB Dual-Head Pump Installation Dimensional Drawing



Connector	K1 ≈	K2 ≈
I8/N8	62	73
PC8	81	92
PC6	75	86
H8	80	91
H4	79	90

Note:
1.Dimension K at the pump head is related to the nozzle type and installation dimensions. K1 and K2 differ due to varying positions of the dual pump heads.
2.Dimension W is affected by PU tube size and nozzle specifications, withpossible deviations between actual and labeled dimensions.

5.2 Pipe connection of push-in quick connector

When the D50VB is equipped with quick-connect pump heads, it is recommended to use PU tubes with an outer diameter of 6mm (PC6 quick-connect) or 8mm (PC8 quick-connect).

Press down the connector's retaining clip and insert the PU tube vertically into the quick-connect fitting. After insertion, do not bend the PU tube near the quick-connect fitting as this may cause air leakage during prolonged use. If bending is necessary, ensure a sufficiently large bending radius to avoid lateral force on the connection.

5.3 Pipe connection of internal thread connector

When the D50VB is equipped with internal threaded pump heads, customers should select nozzle adapters according to their requirements. The internal threads are available in two specifications: Rp1/8 (Chinese Standard 1/8 straight internal thread) and NPSC1/8 (American Standard 1/8 straight internal thread, requires customization).

5.4 Pipe connection of hose connector

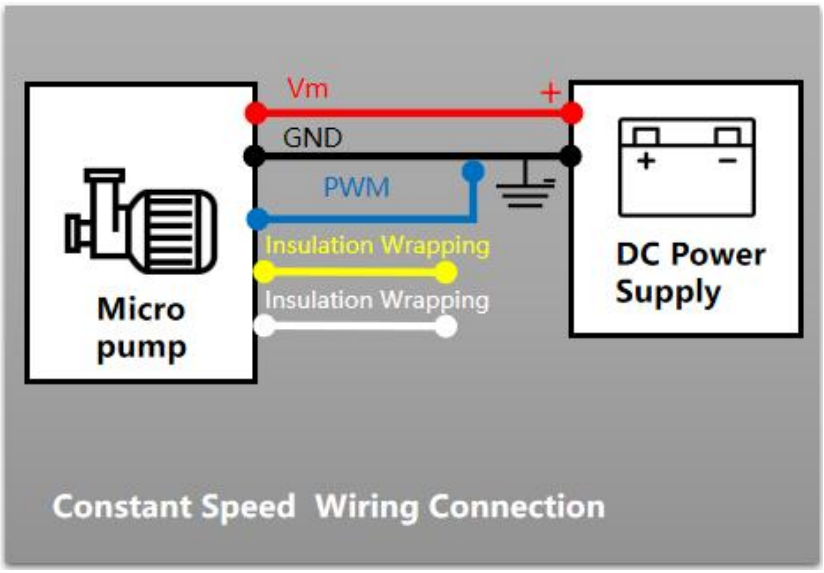
When selecting the H8 hose for D50VB or D50FB pumps, it can be used to install elastic hoses with 7-8mm inner diameter and outer diameter not exceeding 14mm. When selecting the H4 hose, it can be used to install elastic hoses with 4-5mm inner diameter and outer diameter not exceeding 10mm.

6 Electrical Connection

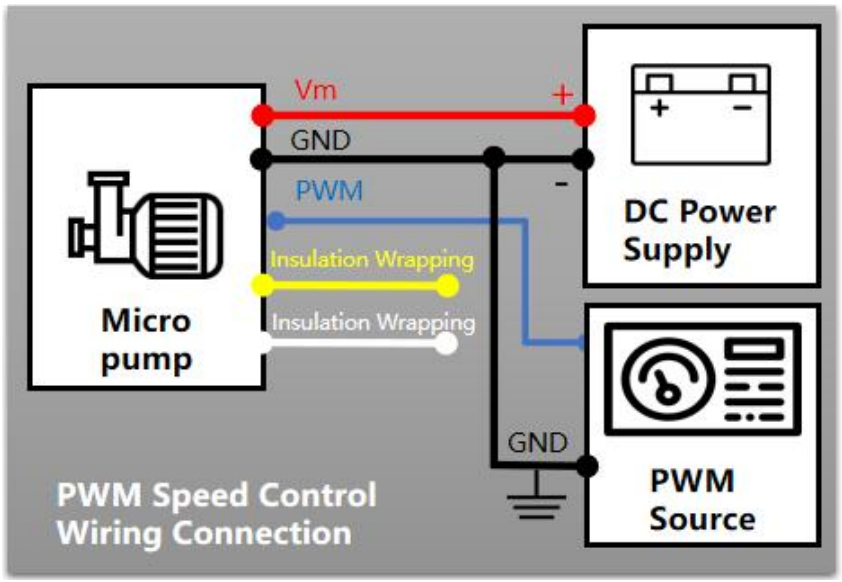
The wiring instructions provide the connection guidelines for external power supply and signal cables of this product. The product comes standard with connecting cables, which are differentiated by color. Before reading this section, please verify the specific model of the D50 product, as well as the type and voltage of the configured motor.

6.1 Wiring of D50 DC brushless motor

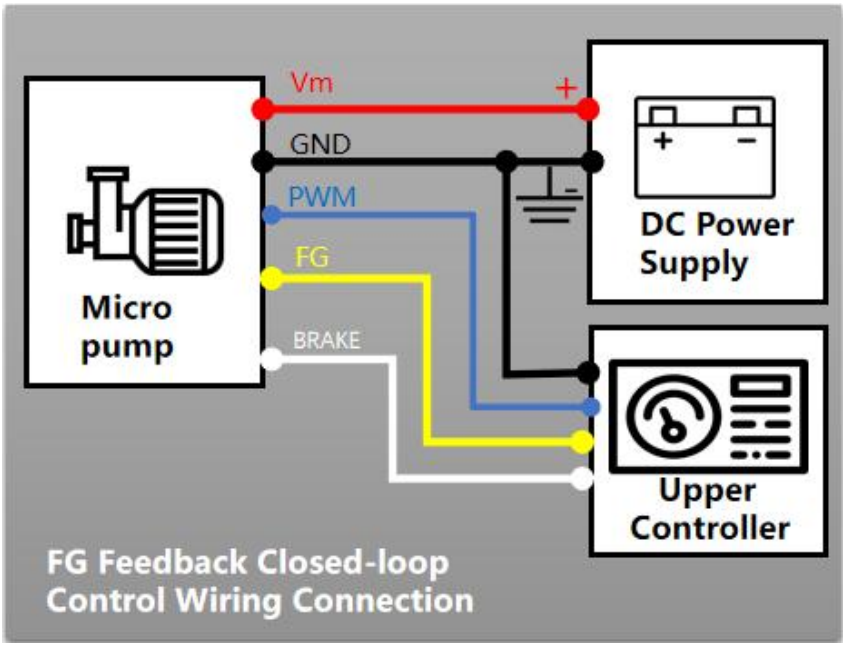
If speed adjustment and speed feedback are not required, connect the red wire to the positive power terminal, and the black and blue wires to the negative power terminal. Insulate and wrap the yellow and white wires—the pump will operate at rated speed..



When using the PWM speed control function, a signal source capable of PWM output (such as a function generator, MCU, PLC, or other controller) is required. Connect the signal source output to the blue PWM input wire, and link the PWM signal ground to the DC power ground. Insulate and wrap the yellow and white wires.



When PWM speed control, BRAKE start/stop control, and monitoring pump operation via FG signal (or implementing feedback control) are required, a host controller (such as an MCU, PLC, or computer-based controller) supporting PWM signal output, FG signal input, and start/stop control must be used. Connect the signal source output to the blue PWM input wire, and link the PWM signal ground to the DC power ground. Then connect the yellow FG feedback signal output wire to the FG signal input terminal of the host controller, and wire the white BRAKE start/stop control to the controller.



6.2 Brushless DC motor signal definition

There are 5 leads for the motor. The wiring and usage instructions are shown in the following table.

S.N.	Wire	Name	Function	Signal Definition	Others
1	Red	Vm	Positive pole	BL4：DC8~26V	24V motor, the voltage must not exceed the maximum voltage range, otherwise the motor will be burned out.
2	Black	GND	Negative pole,Ground	Ground	
3	Blue	PWM	Pulse Width Modulation (PWM)	Input: 0V≤Start≤0.5V 2V≤Stop≤5V	The motor speed and flow rate can be adjusted by changing the PWM duty cycle. The PWM input signal frequency range is 10kHz to 30kHz, with a recommended amplitude of 5V and a DC bias voltage of 2.5V.
4	Yellow	FG	FG feedback signal	The pulse output is a 5V square wave signal, and the FG feedback signal has a maximum rated current of 2mA.	BL DC brushless motor: Outputs 6 pulses per revolution.
5	White	BRAKE	Control motor start and stop.	Input: 2.0V≤Start≤5.0V 0V≤Stop≤0.5V	This signal wire can be used to control pump start/stop and supports frequent operation. Leave floating for default running mode.

7 Cautions

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

1. Only technicians with appropriate training qualifications are permitted to perform installation, operation, testing, and maintenance of the pump!

2.This product has no waterproof, dustproof, or explosion-proof capabilities and must not be used in flammable or explosive environments!

3.Operate the product strictly within the environmental, medium temperature, gas, and electrical parameters specified in this document. Exceeding these limits may cause damage and safety hazards!

4.Before pumping any medium, evaluate the chemical compatibility and corrosion resistance of the medium with the pump head, piston, check valves, and sealing materials!

5.Keep electrical cables away from heat sources and ensure proper insulation protection for all connectors and wiring!

6.Supporting piping components and containers must have sufficient strength to ensure personal safety!

7.For safety reasons, our company does not accept returned products that have pumped toxic, hazardous, or corrosive substances unless they have undergone complete decontamination. If repair is required, please sign a decontamination declaration and contact us in advance!

8.Unauthorized disassembly or repair without factory guidance may damage the product and void the warranty!

8 Customer Repair Declaration of Harmlessness

In order to protect the personal and environmental safety of our employees, logistics company personnel and related personnel in the whole society, please check the toxic, harmful, corrosive, biohazardous and radioactive materials before sending the repaired and returned products back to Hailin Technology. Products containing hazardous media and other hazardous media should be thoroughly cleaned and detoxified, and this detoxification statement should be included with the pump. Otherwise, our company will refuse to carry out further repairs on the above products.

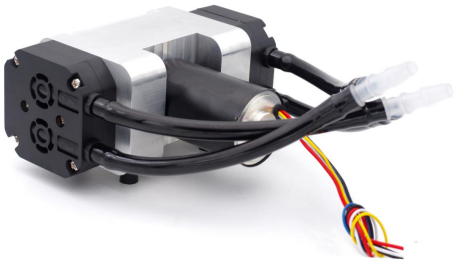
Item	Content
Model	
S.N number	
List of medium components that have been extracted	
Statement content	This repair/replacement product has been thoroughly cleaned and decontaminated, and does not contain potentially corrosive, radioactive, biohazardous or other toxic and harmful hazardous components, and is not harmful to the personal safety of the carrier, maintenance personnel and other related handling personnel. Security does not pose a risk.

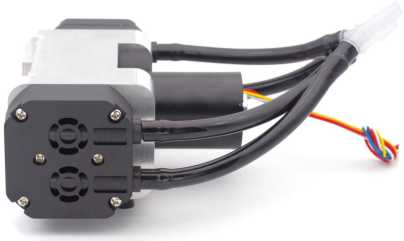
Company Stamp

Signature/Date

9 Appearance

D50FB Dual-Head Pump with BLDC Motor





D50VB Dual-Head Pump with BLDC Motor