D30 Micro Vacuum Pump and Compressor Series

User Guide

Issue 01

Date 2026-03

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Chengdu Hilin Technology Co., Ltd.

Address:	No.3663 Section 2 Muhua Road Shuangliu District Chengdu Sichuan China 610000
Website:	http://www.mini-pump.com
Tel:	+86-28-62567958

About This Document

Purpose

This document is related to the D30 micro vacuum 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	2026-03-17	01	FJW	Official Launch

Contents

1 Characteristics

1.1 High Vacuum

The product weighs approximately 295g, with overall dimensions of approximately 73.5 x 37.5 x 69 mm. It can provide a negative pressure environment of up to 10 kPa.abs, equivalent to a relative vacuum of -91 kPa, achieving an extremely high vacuum level in a compact size.

1.2 Dual-purpose for positive and negative pressure

The product features a high positive pressure model suitable for operation in both positive and negative pressure ranges. It can provide a negative pressure environment with a relative vacuum of -91 kPa and a high positive pressure of up to 200 kPa. It is capable of operating at full load for extended periods within the above pressure range, meeting the requirements for continuous output of high pressure and high vacuum.

1.3 Corrosion Resistant

Optional third-generation corrosion-resistant materials: PTFE diaphragm and valve seals, and PVDF pump head, suitable for pumping highly corrosive gas media.

1.4 Pipe Fittings in Various Sizes

It is equipped with H4 hose barb connectors, PC6 quick-plug connectors, and Rp1/8 and NPSC 1/8 cylindrical female thread

options. Various types of quick-fit and ferrule connectors of different specifications can be installed on the female threads to meet a wider range of tubing connection requirements.

1.5 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

1.6 Nozzle Direction Freely Rotatable

Depending on the installation space requirements, the inlet and outlet nozzles of the pump body can be rotated 360° in four directions, providing more flexible tubing connection options.

2 Special Functions

2.1 Speed Control Function

Speed control and flow rate adjustment can be achieved by adjusting the PWM duty cycle.

2.2 Start and Stop Function

The product can be started and stopped via an enable control logic signal, making it suitable for applications requiring frequent start-stop operation.

2.3 Speed Feedback

The product provides a speed feedback signal that allows the pump's rotational speed to be monitored, facilitating operating condition monitoring and closed-loop control.

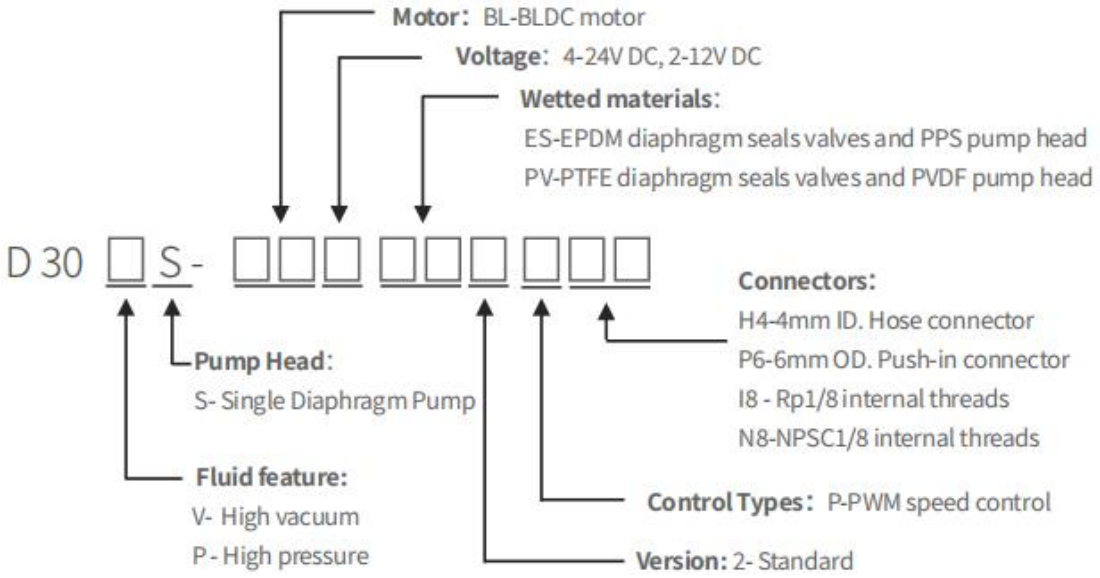
2.4 Protection Function

All products are equipped with stall protection, overcurrent protection, and reverse polarity protection, reducing or avoiding the risk of accidental damage caused by high loads, power supply system failures, or incorrect operation.

3 Product Model Description

3.1 Brief Description of Model Naming

This series of pumps is the standard version equipped with a brushless motor.



Example 1: D30 high vacuum single-head air pump, DC brushless motor, 12V power supply. Material combination: EPDM diaphragm, EPDM valve plate, PPS pump head. Standard version, PWM speed control, 4mm inner diameter hose barb connector.

4 Technical Specifications

4.1 Key Specifications

Model	Rated voltage(VDC)	Max current (A)	Peak flow(L/min)	Average flow (L/min)	Rel. Vacuum (-kPa)	Output Pressure(kPa)	Weight (g)
EA material	BL brushless motor;Check valve & seals: EPDM ;Pump head: Reinforced nylon						
D30VS-BL2	12	≤0.5	≥5.5	≥3.5	≥91	Max.50	≈295
D30VS-BL4	24	≤0.3	≥5.5	≥3.5	≥91	Max.50	
D30PS-BL2	12	≤0.65	≥5.5	≥3.5	≥70	≥250	
D30PS-BL4	24	≤0.40	≥5.5	≥3.5	≥70	≥250	
PV material	BL brushless motor;Check valve & seals: PTFE ;Pump head: PVDF						
D30VS-BL2	12						
D30VS-BL4	24						

Note: 1. The input voltage of the DC motor must not exceed the rated voltage.

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

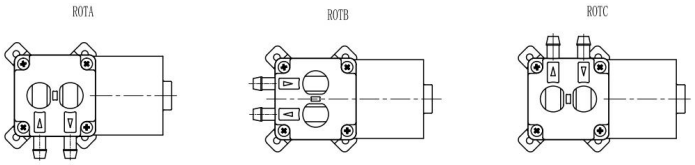
3.Unless otherwise specified, the technical parameters were measured under conditions of 20° C and standard atmospheric pressure (101 kPa).

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.

6.These specifications are from the engineering prototype stage and may be revised with product iteration and updates.

4.2 Configuration Options

<table>
<tr><th>Material option</th><th>Default</th><th colspan="3">Optional Items</th></tr>
<tr><td>Pump head</td><td>PPS</td><td colspan="3">PVDF</td></tr>
<tr><td>Diaphragm</td><td>EPDM</td><td colspan="3">PTFE</td></tr>
<tr><td>One-way valve</td><td>EPDM</td><td colspan="3">PTFE</td></tr>
<tr><th>Motor option</th><th>Standard version</th><th colspan="3"></th></tr>
<tr><td>Motor type</td><td>BL Brushless motor</td><td colspan="3"></td></tr>
<tr><td>Rated Voltage</td><td>12V/24V DC</td><td colspan="3"></td></tr>
<tr><th>Connector option</th><th>Default</th><th colspan="3">Optional Items</th></tr>
<tr><td>Nozzle type</td><td>4mm inner diameter hose barb connector</td><td colspan="3">PC6 push-in quick connector
Rp1/8 internal thread
NPSC1/8 internal thread</td></tr>
<tr><td></td><td colspan="4">（For detailed connector introduction, see the following chapters）</td></tr>
<tr><th>Pump head option</th><th>Defalut</th><th colspan="3">Optional Items</th></tr>
<tr><td>Pump head orientation</td><td>Standard orientation</td><td>ROTA</td><td>ROTB</td><td>ROTC</td></tr>
<tr><td></td><td colspan="4"> 

ROTA: Rotate 90° clockwise based on the standard orientation of the nozzle;
ROTB: Rotate 180° clockwise based on the standard orientation of the nozzle;
ROTC: rotate 270° clockwise based on the standard orientation of the nozzle;
Selecting a non-standard orientation pump head may reduce the product's vacuum performance by 5-10 kPa.</td></tr>
</table>

	（For detailed function introduction, see the following chapters）

4.3 Reliability Parameters

Models	D30
Versions	Standard Version
Fully Loaded Lifetime（hrs）	8000*
Unloaded Lifetime（hrs）	10000*
Motor Lifetime（hrs）	12000*
Lifetime test instructions:	Full-load life test conditions: D30VS: Inlet completely sealed, outlet open to atmosphere, the pump operates continuously for 24 hours without stopping. D30PS: Outlet completely sealed, inlet open to atmosphere, the pump operates continuously for 24 hours without stopping.
	No-load life test condition: inlet and outlet both open to atmosphere, the pump operates continuously for 24 hours without stopping.
	Motor life test conditions: under good ventilation and heat dissipation, 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℃~40℃. 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

Pump's head	Option feature
Standard Orientation	The standard pump head orientation provides the most compact product dimensions.
Alternate Orientations	Custom orientations are available to meet specific installation requirements. Refer to "Installation Guide" for details. Note: Selecting non-standard orientations may reduce maximum vacuum performance.
Connector identification	**Option feature**
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.
P6 push-in connector	PC6 push-in connector is suitable for PU and other rigid plastic air pipes with an outer diameter of 6mm.

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.

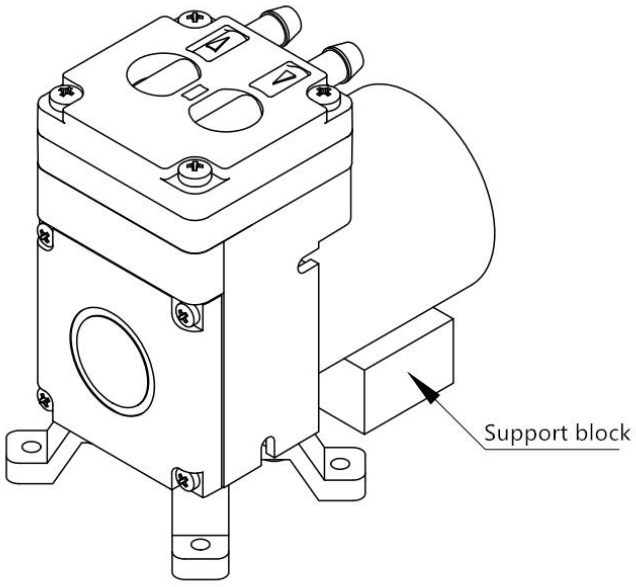
2. This curve is a statistical value and is only used as a technical reference for users to determine the power supply system. It is not used as acceptance data

5 Installation Instructions

5.1 Installation and fixation of pump body

This product comes with anti-vibration mounts attached to the pump upon delivery. To reduce noise and vibration during pump operation, we recommend using ST3.0 self-tapping screws to install the anti-vibration mounts onto the pump body, and then fasten the pump to the equipment chassis or panel through the anti-vibration mounts. Each anti-vibration mount has one Ø3mm mounting through-hole, which can be installed using screws with an outer diameter no larger than 3mm.

When the anti-vibration mounts are installed, please attach the rubber support block with adhesive backing (the non-adhesive side against the motor) underneath the motor as follows:



When special circumstances require installation without the anti-vibration mounts, you may remove the anti-vibration feet and

install the pump directly using the four mounting holes on the bottom of the pump body. In this case, ST3.0 self-tapping screws should be used, and the thread length of the screw should be L ≤ 5 + δ (where δ is the mounting plate thickness).

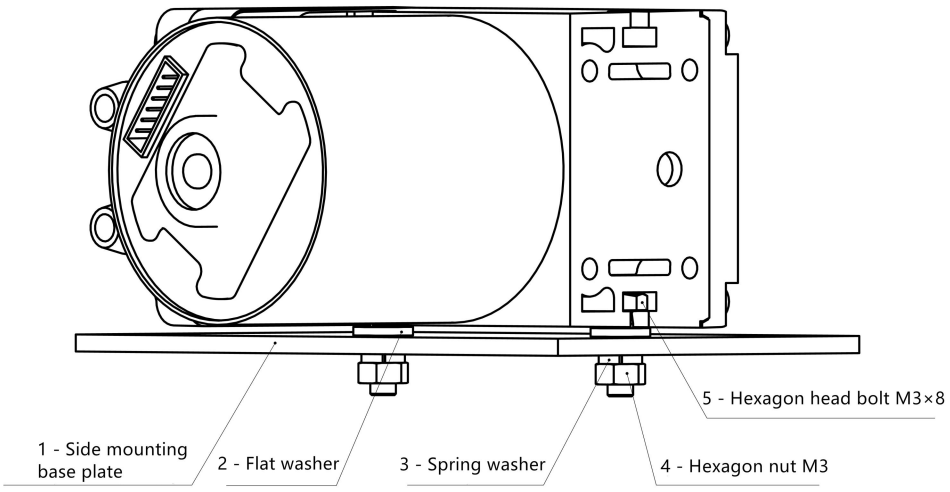
Example:

When the mounting plate thickness δ = 2mm, the self-tapping screw thread length should be chosen as L ≤ 7mm.

Among standard screw specifications, screws with thread lengths of 4.5mm, 6.5mm, and 9.5mm are available. It is recommended to choose the longer screw. (In practice, lengths of 6mm, 8mm, and 10mm are also available.)

5.2 Side installation and fixation of pump body

This product has side mounting bolt positions on the pump body, allowing the pump to be installed horizontally using side-mounted hexagon head bolts. When side mounting is selected, you can install it through the two side mounting holes using the accessories provided with the pump (M3 hex nuts and M3x8 hex head bolts), as shown in the figure below.



In this case, the thread length of the M3 hex head bolt should be L ≥ 6 + δ (where δ is the mounting plate thickness).

Example:

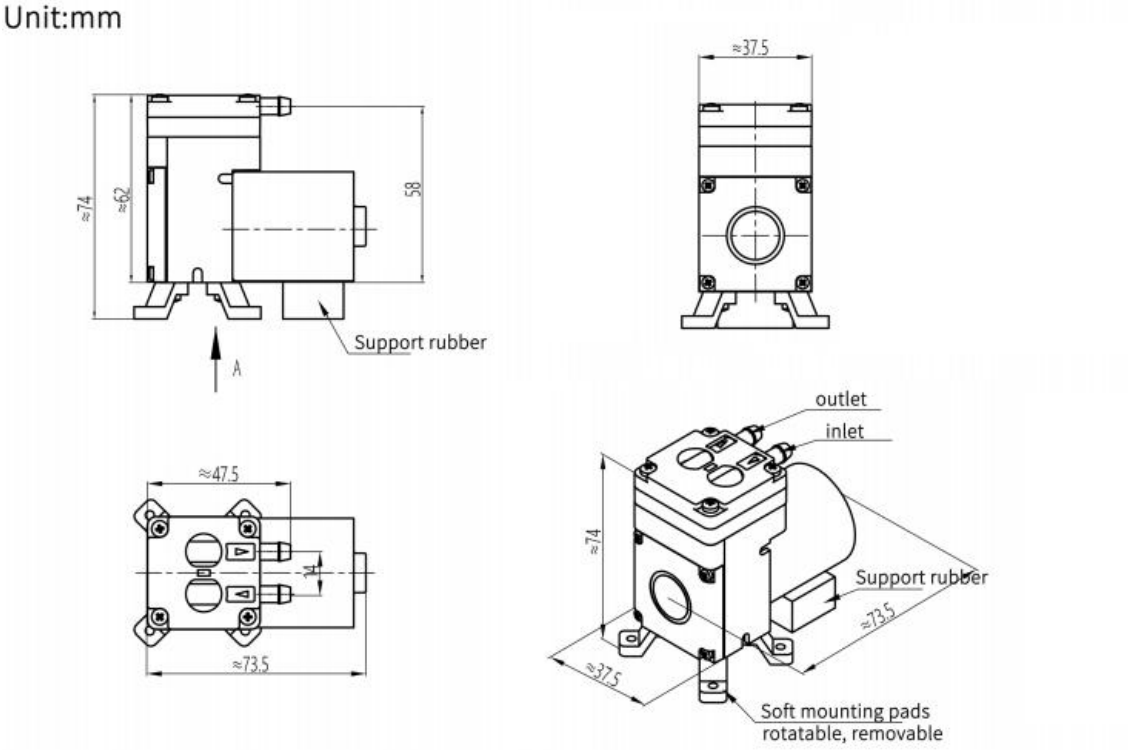
When the mounting plate thickness δ = 2mm, the bolt thread length should be chosen as L ≥ 8mm.

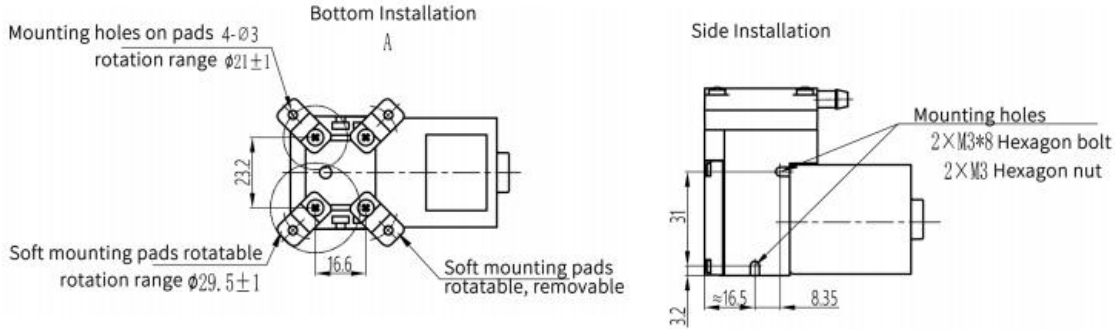
(Spring washer thickness + flat washer thickness + plate thickness + nut thickness = 0.9 + 0.5 + 2.4 + 2 = 5.8mm)

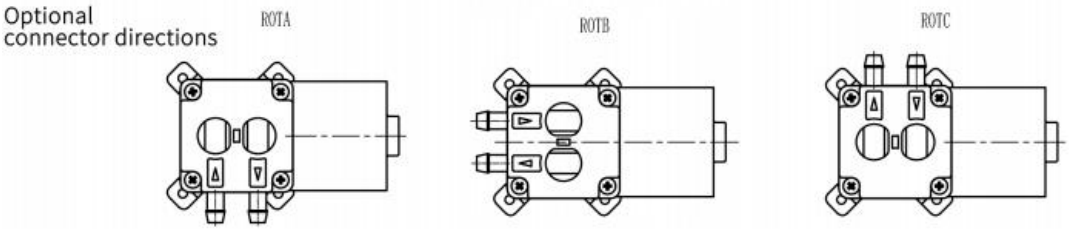
Among standard bolt specifications, screws with lengths of 8mm, 10mm, and 12mm are available. It is recommended to choose the longer screw.

Installation Dimension Drawing for D30 Series with BL Brushless Motor and H4 Barb Pump Head

Unit:mm

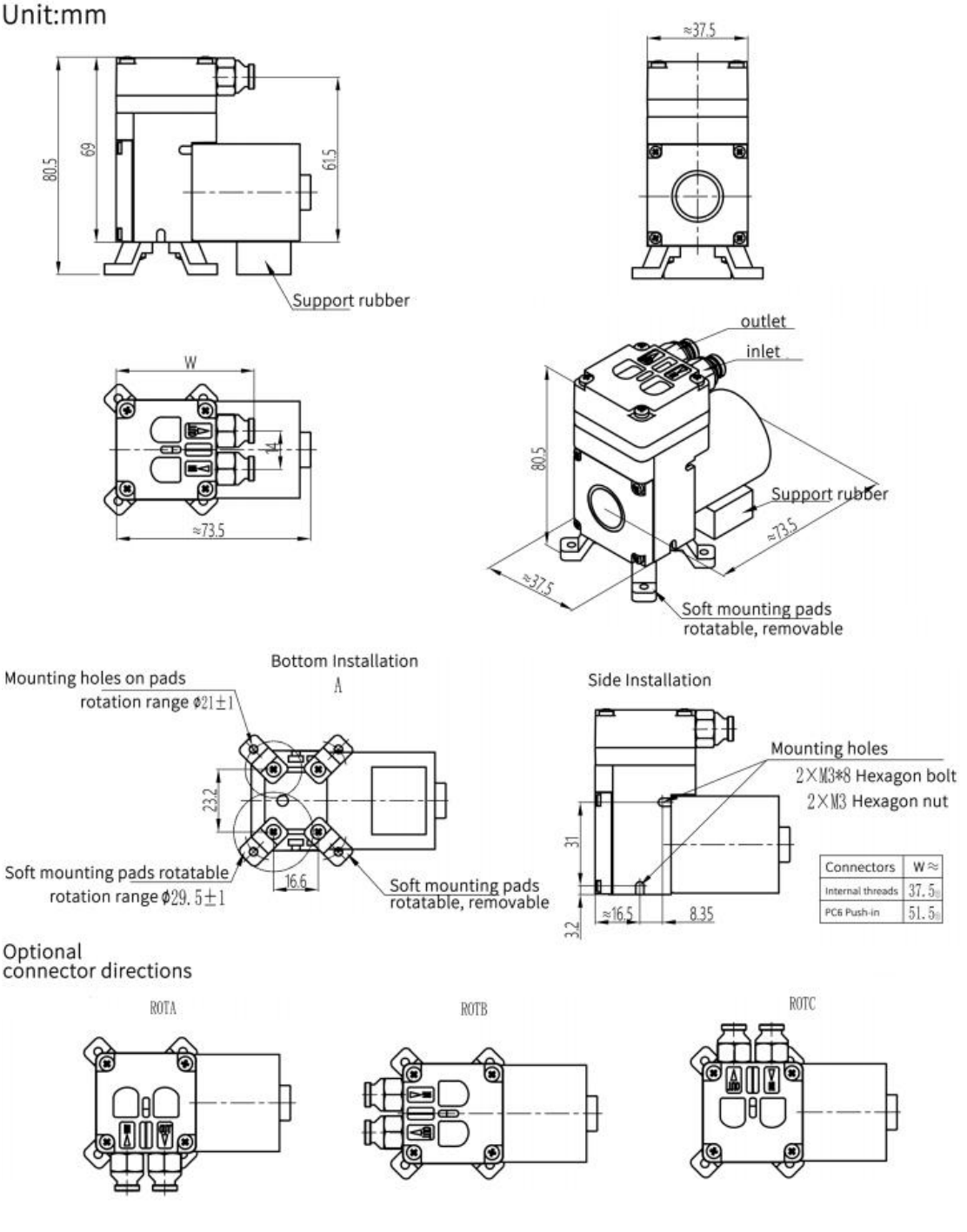






Installation Dimension Drawing for D30 Series with BL Brushless Motor and I8 Female Thread Pump Head

Unit:mm



5.3 Pipe connection of hose connector

When the H4 hose barb connector is selected, it can be used with flexible tubing having an inner diameter of 4 – 5mm and an outer diameter not exceeding 10mm.

5.4 Pipe connection of push-in quick connector

When a quick-connect fitting pump head is selected, it is recommended to use PU tubing with an outer diameter of 6mm (for PC6 quick-connect fittings). The PU tubing should be inserted vertically into the quick-connect fitting after pressing down the collet. After insertion, the PU tubing should not be bent near the quick-connect fitting, as this may cause air leakage after prolonged use. If the tubing needs to be bent, you may select a pump head with a different orientation or ensure a sufficiently large bending radius to avoid applying lateral force to the fitting.

5.5 Pipe connection of internal thread connector

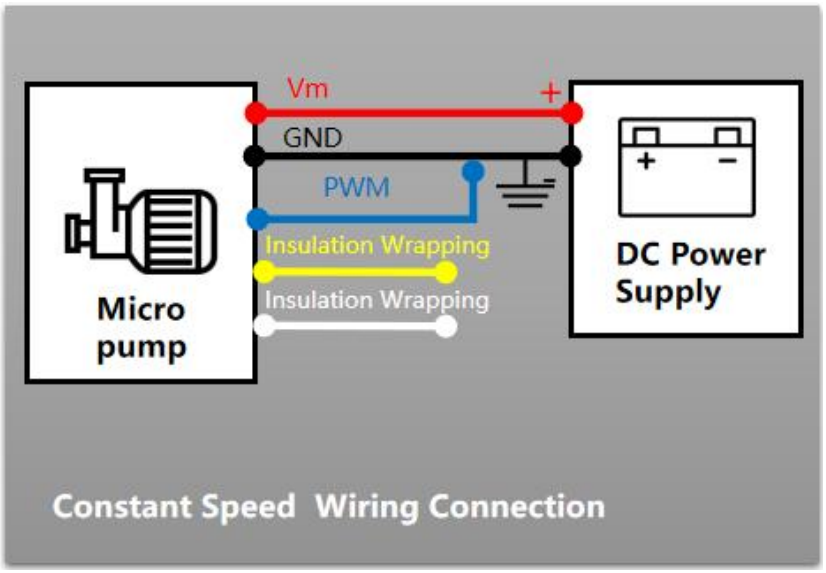
When a female threaded pump head is selected, customers should use a threaded fitting according to their specific requirements. The female thread is available in two specifications: Rp1/8 and NPSC1/8. Rp1/8 is the Chinese standard 1/8 cylindrical female thread, while NPSC1/8 is the American standard 1/8 cylindrical female thread (available as a custom option).

6 Electrical Connection

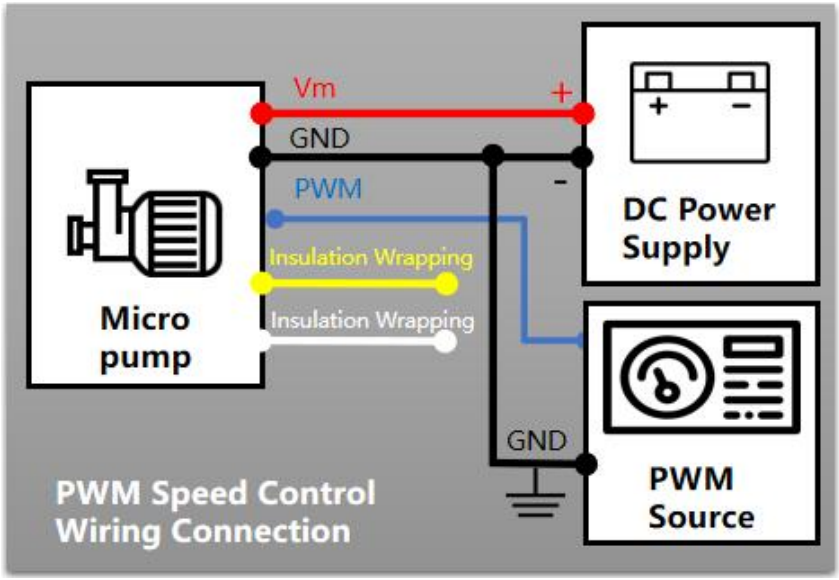
The wiring instructions provide guidance on connecting the external power supply and signal cables for this product. This product comes standard with a connection cable from the factory, and the cable functions are distinguished by color. Before reading this section, please verify the motor voltage of the D30 product configuration.

6.1 Wiring of the motor

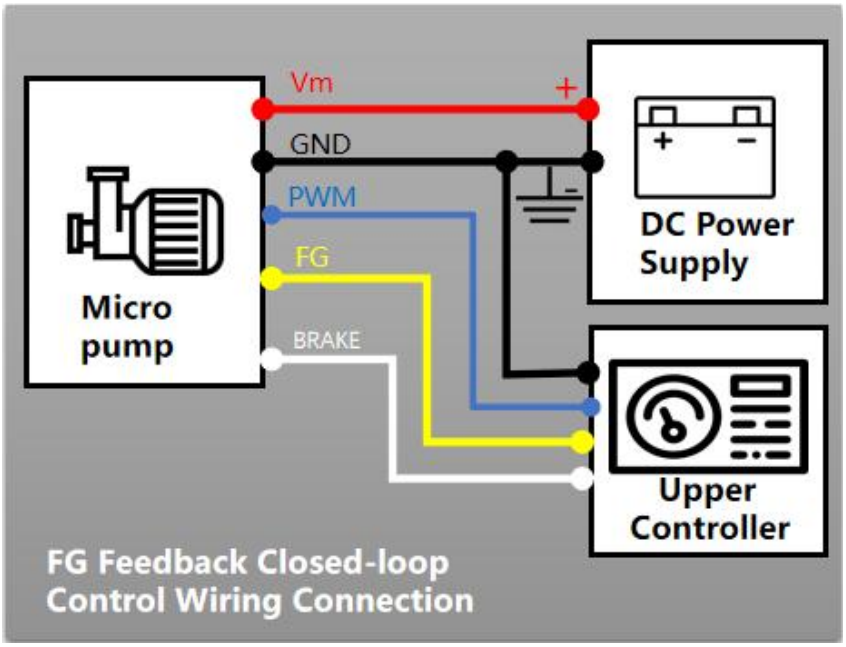
If speed adjustment and speed feedback are not required, connect the red wire to the positive power terminal, and the black and blue wires to the negative power terminal. Insulate and wrap the yellow and white wires—the pump will operate at rated speed..



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	BL2：DC8~14V BL4：DC8~26V	For 12V/24V motors, 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: 2.5V≤Start≤5.0V 0V≤Stop≤2.2V	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

D30 with BL Brushless Motor and H4 Barb Connector

D30 with BL Brushless Motor and PC6 Quick-Connect Fitting