



C15 Flow Control Vacuum Pump series

# User Guide

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# About This Document

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## Purpose

This document is a description of the C15 flow control vacuum pump series in the test period, which is used to guide the relevant technical personnel to understand the product characteristics.

## 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, working status indicator, 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	2018-3	1.0	LT	First official release
02	2018-4	1.0	LT	Determine preliminary product model and parameters
03	2018-5	1.0	LT	Define product model, add circuit signals and connection instructions
04	2018-10	1.0	LT	Add product images and model of matching speed controllers
05	2018-11	1.0	LT	Add description of product version and speed feedback
06	2019-09	1.0	LYZ	Modify the document format
07	2019-12	1.0	FB	Update notes in section 3.1
08	2020-02	1.0	FB	Add model description; update outline drawing
09	2020-03	1.0	FB	Update definition of FG feedback signal
10	2020-04	1.0	FB	Update some descriptive terms
11	2020-06	1.0	FB	Update medium description

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# 1 Product Characteristics

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## 1.1 Compact Size

The product weighs about 50g and the overall size is about 50x29x36mm.

## 1.2 Working Status Indicator

The bottom case of the pump is made of the light-transmitting material ABS, which can directly reflect the working status of the pump through the indicator light.

## 1.3 Brushless Motor

This model is driven by brushless motors which have the advantages of long service life, low interference and high reliability.

## 1.4 Protections

Equipped with overheating protection, overload protection and reverse connection protection function to prevent accidental damage to the pump.

# 2 Special Features

## 2.1 Speed Control Feature

The flow can be changed by adjusting the motor speed of the pump (by adjusting the PWM duty cycle).

Or you can order from our company a special speed controller for micro pump (model: TS-G12) to regulate the speed.

## 2.2 Warning Feature

The color of the indicator light displayed on the transparent bottom case (as shown in Figure 2-1 and Figure 2-2) can feedback the working status of the pump:

1. It is normal when the blue light flashes regularly;
2. When the light remains red, it is abnormal, i.e. the motor runs too low;
3. When the red and blue lights flash alternately, it is abnormal, and at this time, the motor speed is low and unstable;
4. The indicator light is off when the positive and negative connections are reversed;
5. When the voltage is out of the working voltage range (3.2V~6V), the indicator light is off.



Figure 2-1 Normal working status



Figure 2-2 Abnormal working status



# 3 Technical Parameters

## 3.1 Key Parameters

Model	Rated Voltage (V DC)	Load Current (mA)	Flow (L/min)		Relative Vacuum (kpa)	Weight (g)
			Peak Flow (L/min)	Average Flow (L/min)		
C15L	5	≤240	≥1	≥0.56	≥36	≈50

- Note:**
1. Working voltage is 3.2V~6V, input voltage change will affect the load current;
  2. Unless otherwise specified, the technical parameters are measured under the conditions of temperature 25°C and standard atmospheric pressure of 101kPa. You can contact Hilintec to customize products with other specifications.
  3. The parameters in the table are measured at the maximum speed of the motor under rated voltage. When the motor speed changes, the 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 Description of Versions

Version Performance	Simplified Version	Standard Version	Premium Version
Life time	≥2500h	≥6000h	≥10000h
Noise	★	★★	★★★
Reliability	★	★★	★★★
Parameter Consistency	★	★★	★★★
Speed Feedback	None	FG signal feedback available	
Speed Controller	None	Compatible with TS-G12 type speed controller	

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

2. The noise data of the simplified version and the standard version are not specified. For the noise data of the premium version, please refer to the latest information.

### 3.3 Life-time Test Conditions

In a clean, non-corrosive laboratory, the pump carries a full load (the inlet is blocked and the outlet directly connected to the atmosphere), and operates continuously around the clock. The ambient temperature is 5°C ~ 33°C, which fluctuates with the climate; the relative humidity is 30% ~ 90%, which fluctuates with the climate.

### 3.4 Working Conditions

1. Environment: Permissible ambient temperature range of the pump is 0 °C ~ 50 °C , permissible relative humidity is ≤ 90%, no

condensation. The pump should not be exposed to the sun, and should work in a clean and ventilated environment.

2. Medium: Permissible gaseous media temperature range is 0 °C ~ 50 °C. The medium is allowed to be rich in water vapor, but cannot contain particles or oil mist.

3. Load: The inlet can be operated at full load (i.e. the inlet is completely blocked ), but the applied load cannot exceed the maximum vacuum of the pump; the outlet must be unobstructed.

### 3.5 Materials

1. The materials of the wetted parts: reinforced nylon and EPDM rubber and both have certain corrosion resistance. Please check the chemical resistance and compatibility of the medium according to the wetted materials.

2. The pump body is made of reinforced nylon for plastic parts, EPDM for elastomer parts and light-transmitting ABS for bottom case.

### 3.6 Parameter Curve

Vacuum degree-flow curve, there are individual differences between different micro pumps. This curve is a statistical value, only used as a technical reference for users to confirm the working point. The "flow" mentioned in this section refers to the "average flow".

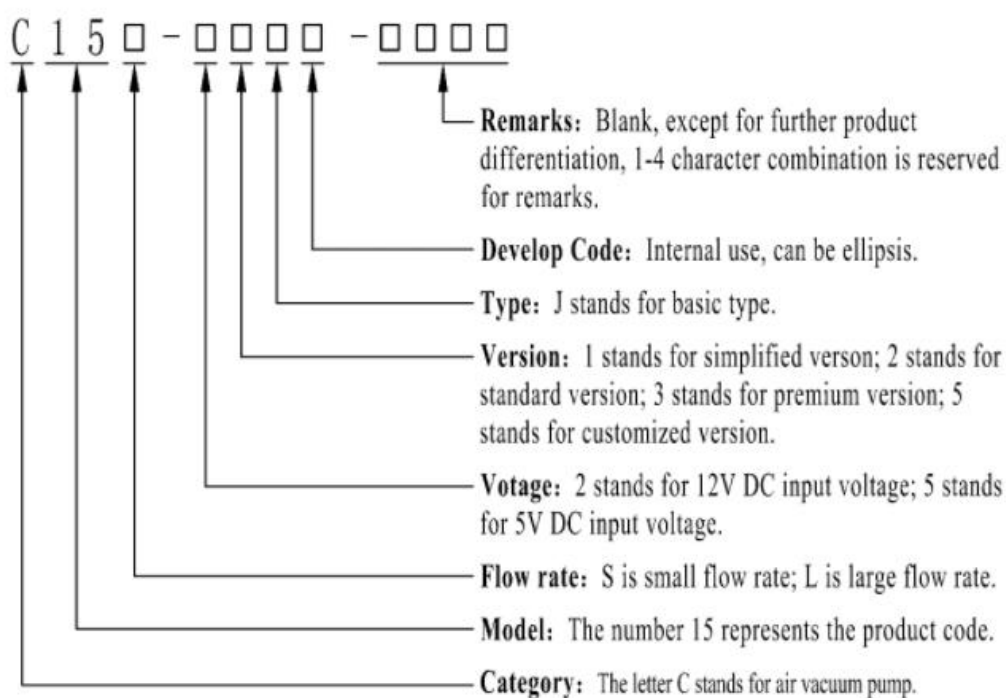
(to be updated.....)

- Note:**
1. The maximum average flow rate in the curve will be slightly lower than the nominal value, which is due to the resistance of the test pipeline components, which leads to the attenuation of the flow;
  2. The value of this curve is for reference only, not as a basis for product acceptance.

# 4 Product Model Description

## 4.1 Brief Description of Model Naming

This series of pumps are mainly: basic type.



**Note:** If the remarks starts with a letter, it means a special custom function. For example, letter "GJ" means customized high-temperature medium function, and "GH", means customized high-temperature environment function. If it starts with a number, it means other information.

Example 1: C15L-51J (C15L pump, simplified version, 5V voltage, basic type)

# 5 Electrical Connection

The Electrical Connection is used for connecting the external power supply and signal wires of this product. The definition of the wires is distinguished by color.

## 5.1 Definition of Signals

This is a product with basic functions. There are 3 wires. The wiring and usage instructions are as follows.

S.N	Wire	Signal	Function	Definition of Signal	Remarks
1	Red	Vm	Positive pole of the power supply	+3.2V~+6V	The voltage is not allowed to exceed 6V, otherwise it will burn the motor.
2	Black	GND	Negative pole of the power supply,ground		
3	White	PWM	Pulse Width Modulation (PWM)	Pulse width modulation signal, active at low level $0V \leq \text{low level} \leq 0.8V$ Start $2V \leq \text{high level} \leq 5V$ Stop carrier-frequency range: 15kHz~25kHz	Select a fixed a value of frequency within the range of 15kHz~25kHz, and adjust the speed by changing the duty cycle
4	Yellow	FG	FG feedback signal	The motor speed feedback signal is a 3.3V pulse signal, and	Speed feedback function unavailable with the

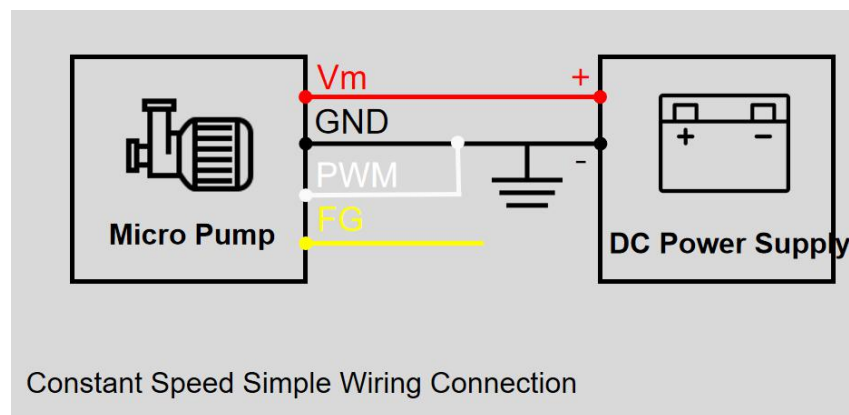
S.N	Wire	Signal	Function	Definition of Signal	Remarks
				the motor outputs 6 pulses per rotation.	simplified version and there is no such a wire.

**Note:** More wiring will be added with more functions to be added into the product, and this table will also be updated.

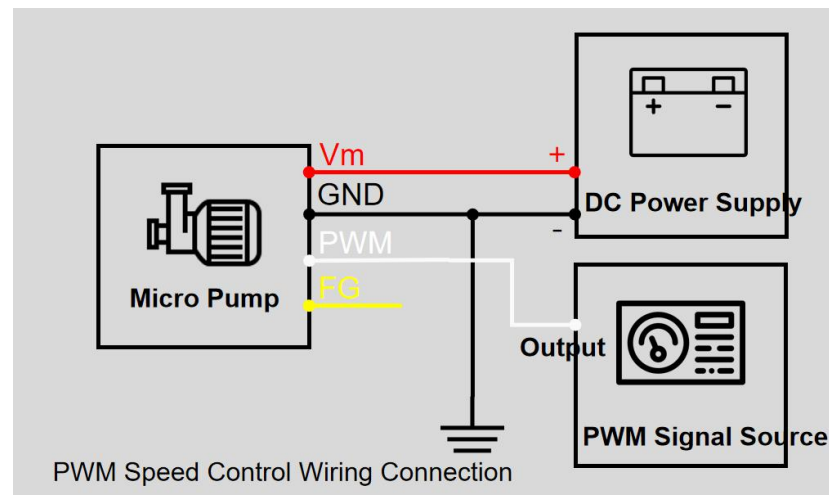
## 5.2 Logical Wiring Diagram

When the speed control function is not needed, the white connection wire PWM input signal and the black connection wire can be grounded together, the yellow wire must be insulated and wrapped, and the micro pump will work at the rated speed.

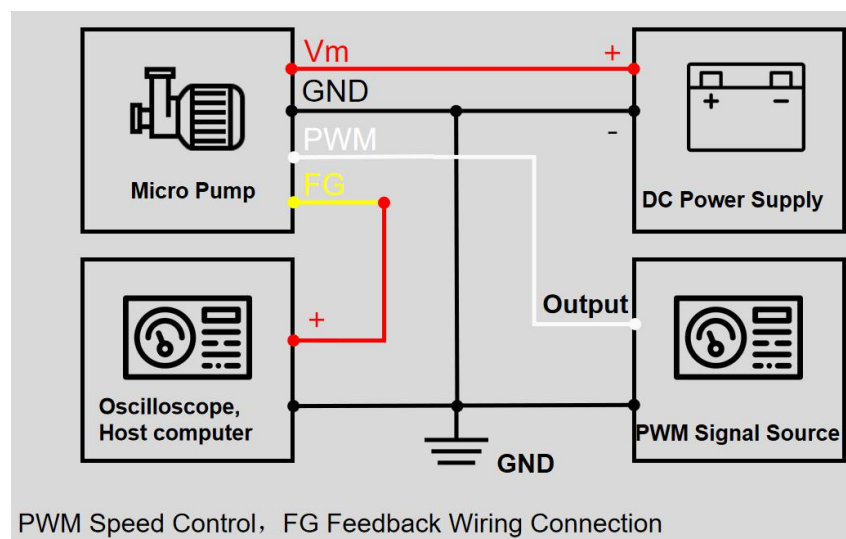
**Note:** The speed feedback function is unavailable with the simplified version so there is no yellow FG signal line.



When you need to use the PWM speed control function, you need to use a signal source that supports PWM signal output (unction signal generator, MCU, PLC and other controllers), connect the signal source output to the white PWM input wire, and connect the PWM signal source ground to the DC power ground. If you do not need to monitor the speed feedback signal, the FG signal line must be insulated and wrapped. The speed feedback function is unavailable with the simplified version so there is no yellow FG signal line.



When you need to use the PWM speed control function and obtain the FG feedback, you need to use a signal source that supports PWM signal output (function signal generator, MCU, PLC and other controllers) and an oscilloscope or host computer, and connect the signal source output to the white PWM input. Connect the PWM signal source ground to the DC power ground, connect the yellow FG feedback signal line to the oscilloscope probe or the host computer input, and connect the oscilloscope or host computer ground wire to the black ground wire. If the FG signal wire is not used, it must be insulated and wrapped. The speed feedback function is unavailable with the simplified version so there is no yellow FG signal line.



# 6 Cautions



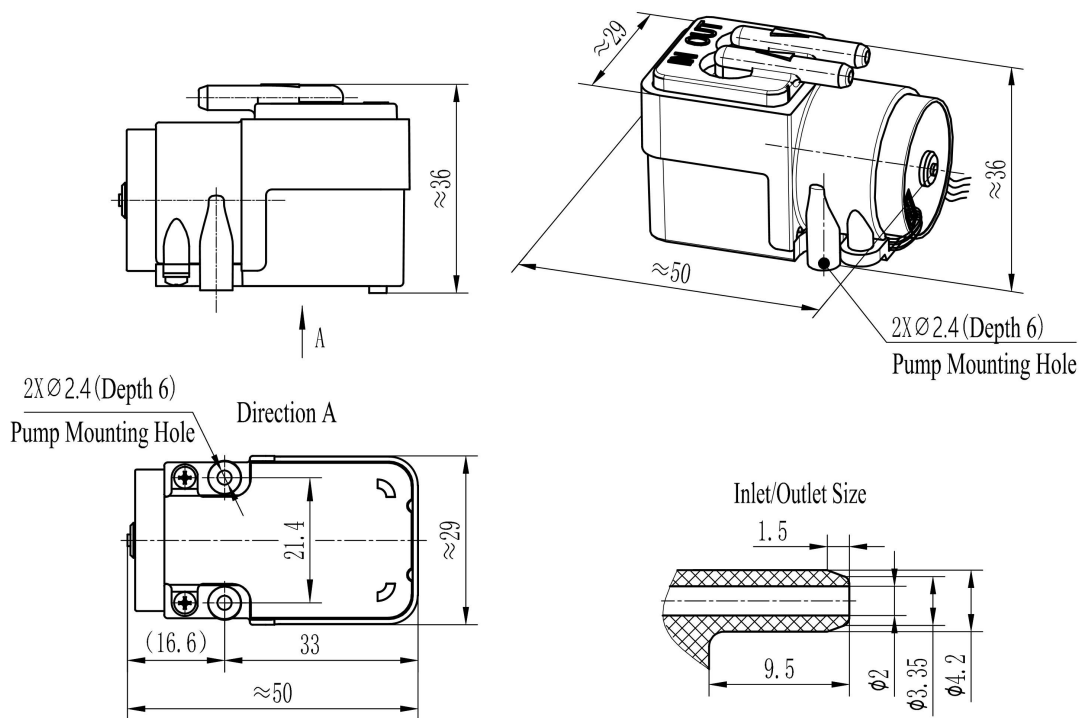
Please read the instructions in this chapter carefully and follow the instructions strictly before use.

- 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 pneumatic connectors, and there should be no solid particles in the medium, otherwise the micro pump will be damaged!**
- 3. The outlet must be kept unobstructed, otherwise the micro pump will be damaged!**
- 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 operate strictly in accordance with the instructions!!**



# 7 Dimensions

Overall Dimensions of C15 D15 S15 (Unit: mm)



# 8 Appearance

