WJY Micro Vacuum Liquid Pump Series

User Guide

Issue	10
Date	2022-08-04

Copyright © Chengdu Hilin Technology Co., Ltd.

Copyright © Chengdu Hilin Technology Co., Ltd. 2020. All rights reserved.

No part of this document may be reproduced or transmitted in any form or by any means without prior written consent of Chengdu Hilin Technology Co., Ltd.

Trademarks and Permissions

Hilintec is a trademark of Chengdu Hilin Technology Co., Ltd.

All other trademarks and trade names mentioned in this document are the property of their respective holders.

Notice

The purchased products, services and features are stipulated by the contract made between Chengdu Hilin Technology Co., Ltd. and the customer. All or part of the products, services and features described in this document may not be within the purchase scope or the usage scope. Unless otherwise specified in the contract, all statements, information, and recommendations in this document are provided "AS IS" without warranties, guarantees or representations of any kind, either express or implied.

The information in this document is subject to change without notice. Every effort has been made in the preparation of this document to ensure accuracy of the contents, but all statements, information, and recommendations in this document do not constitute a warranty of any kind, express or implied.

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 WJY micro vacuum liquid pump 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

Air-liquid dual use,long service lifetime, protection function, key parameters, operation instructions

Copyright © Chengdu Hilin Technology Co., Ltd.

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	Modification
01	20200511	1.0	First official release
02	20200604	1.0	Updated product photos
03	20201209	1.0	Added WJY4006A parameter，Updated wetted material and optional connector
04	20210304	1.0	Revised WJY4006A parameter，Added the description of frequency speed control
05	20210423	1.0	Added reliability parameter
06	20210513	1.0	Modified the description of speed control signals
07	20211208	1.0	Revised the type of inside thread connector
08	20220415	1.0	Revised WJY4006 material
09	20220518	1.0	Revised the wiring instructions and replace HD Dimensions
10	20220804	1.0	Revised reliability parameters

Copyright © Chengdu Hilin Technology Co., Ltd.

Contents

About This Document I

Change History II

Contents III

1 Characteristics 1

1.1 Gas-liquid Dual Purpose 1

1.2 Long lifespan,Low interference 1

1.3 Speed Control Function ..... 错误！未定义书签。

1.4 State Memory Function ..... 错误！未定义书签。

1.5 Protections 2

1.6 Maintenance Free,Pollution-free Transmission 2

1.7 Good Corrosion Resistance ..... 错误！未定义书签。

1.8 Unlimited Installation ..... 错误！未定义书签。

1.9 Optional pump chamber material ..... 错误！未定义书签。

1.10 Optional connector ..... 错误！未定义书签。

2 Technical Specifications 1

2.1 Key Specifications 1

2.2 Reliability Parameters 2

2.3 Suction/Pressure Height Parameters 1

2.4 Versions Description 1

2.5 Type Description 2

2.6 Working Conditions 2

2.7 Pump Materials 3

2.8 Filtering Problem 3

2.9 Noise and Silencer 3

2.10 Tube diameter 3

Copyright © Chengdu Hilin Technology Co., Ltd.

3 Electrical Connection 4
3.1 Basic type 4
3.2 Speed Control type 6
3.3 Description of Motor Starting Current 8
4 Cautions 9
5 Dimensions 10
6 Appearance 11

Copyright © Chengdu Hilin Technology Co., Ltd.

1 Characteristics

1.1 Gas-liquid Dual Purpose

Liquid-gas dual-use, can be used as a liquid pump or a vacuum pump, can also be used to transfer gas-liquid mixed media; dry-run and self-priming

1.2 Long Lifespan,Low Interference

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

1.3 Speed Control Function

Control the start and stop, adjust the speed and flow through the input frequency signal. (Note: This function is only for speed control type.)

Copyright © Chengdu Hilin Technology Co., Ltd.

1.4 State Memory Function

When the pump is stopped due to abnormal power failure, the pump will continue to run according to the state and speed of the last power-off when the power supply is recovered. (Note: This function can only work on the speed control type)

1.5 Protections

Equipped with overheating protection, overload protection(except the basic type), which to the greatest extent prevents accidental damage to the pump.

1.6 Maintenance Free,Pollution-free Transmission

There is no need to add lubricating oil and maintenance, and it does not pollute the medium.

1.7 Good Corrosion Resistance

The materials of the wetted parts: reinforced nylon and EPDM rubber, PP connector,Or nickel-plated copper connector, or stainless steel connector.

1.8 Unlimited Installation

It can be installed in any direction

1.9 Optional pump chamber material

If water flow rate of more than 3 liters/min, the standard pump cavity is reinforced nylon, and other materials can be selected: aluminum or 304 stainless steel

1.10 Optional connector

With Rc1/8 internal thread interface, default PP hose connector, optional other types of connector. (See 2.9 Supporting Pipe Diameter in Chapter 2 for details)

Copyright © Chengdu Hilin Technology Co., Ltd.

2 Technical Specifications

2.1 Key Specifications

Model	Voltage (V DC)	As a Vacuum Pump			As a Liquid Pump		Weight (g)
		Load current (mA)	Average Flow Rate (L/min)	Relative Vacuum (-kPa)	Load current (mA)	Free Flow Rate (Pure Water) (L/min)	
WJY1802A/T	24	≤500	≥1.6	≥18	≤550	≥2	≈550
WJY2703A/T	24	≤520	≥2.4	≥27	≤620	≥3	
WJY4006A/T	24	≤800	≥4	≥33	≤1800	≥6	550～1000

Note: 1. The input voltage requires 24V±10%.

2. Different types of products have slightly different weights;

3. Unless otherwise specified, the technical parameters are measured under the conditions of temperature 20℃ and standard atmospheric pressure of 101kPa.

4. 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.

5. As a vacuum pump, the average flow rate in the table is the flow rate value measured with a soap film flow-meter. as a liquid pump, the flow rate is measured with a measuring cup.

Copyright © Chengdu Hilin Technology Co., Ltd.

2.2 Reliability Parameters

Model	Lifetime(Hrs)	Simplified Version	Standard Version	Premium Version
WJY1802A/T WJY2703A/T WJY4006A/T	Full-Load	3500	6000 （WJY4006 Under Testing ）	10000 （WJY4006 Under Testing）
	No-Load	8000	12000	18000
	Motor	10000	15000	20000

Product lifetime test instructions:

Full-load life test conditions: The water inlet is connected with a hose connector and immersed under the tap water surface, so that the pump can work continuously for 24 hours without stopping .

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

Copyright © Chengdu Hilin Technology Co., Ltd.

2.3 Suction/Pressure Height Parameters

Model	Max. Suction Height **H1** (m)	Flow Rate@ Max. Suction Height (mL/min)	Max. Pressure Height **H2** (m)	Flow Rate@ Max. Pressure Height (mL/min)
WJY1802A/T	1.8	＞1500	7	＞800
WJY2703A/T	2.7	＞1600	7	＞1500
WJY4006A/T	3	＞3200	10	＞1700

Note: 1. The suction height of WJY4006A/T is 3m, the flow rate is 2.5L/min with 6*10 silicone tube, the flow rate is 3.2L/min with 7*13 silicone tube.

2. The pressure height of WJY4006A/T is 10m, the flow rate is 1.3L/min with 6*10 silicone tube, the flow rate is 1.7L/min with 7*13 silicone tube.

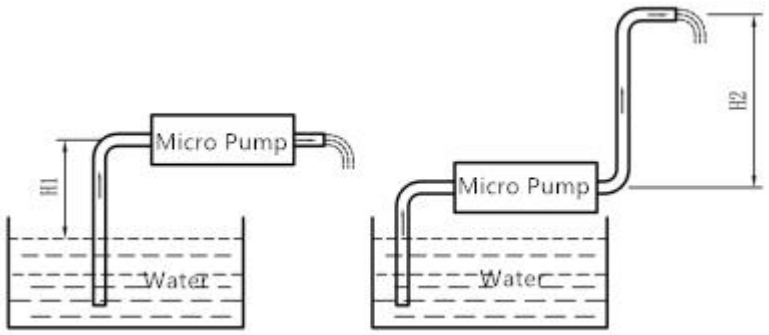


Figure 2-1 Suction/Pressure Height Schematic

Note: 1. The medium is clean water, and all the tubes are made of silicone hoses.

2. The definition of the maximum suction height H1 and the maximum pressure height H2 is shown in Figure 2-1

3. When test H1, the length of the suction tube is about H1+200mm; the length of the pressure tube is about 100mm. When test H2, the length of the suction tube is about 100mm; the length of the pressure tube is about H2+200mm.

4. This data is subject to change without notice.

Copyright © Chengdu Hilin Technology Co., Ltd.

2.4 Versions Description

According to different parts quality and quality control requirements, it is divided into three versions: simplified version, standard version, and premium version; the performance of different versions is different, and the differences are as follows:

Performance \ Version			Simplified version	Standard version	Premium version
Configuration	Motor quality		BLDC ★	BLDC ★★	BLDC ★★★★
	Diaphragm performance		★	★★	★★★★
	Bearing performance		★	★★	★★★★
	EMC		▲▲▲▲	▲▲▲	▲
	Speed control function		YES	YES	YES
	Speed feedback signal		NO	NO	NO
	Overload protection		NO	YES	YES
	Frequent start and stop parameters	Lifespan	＞ 100,000times	＞ 600,000times	＞1,500,000times
		Test Conditions	Run 60sec Stop 60sec	Run 30sec Stop 30sec	Run 15sec Stop 15sec
			24hours continuously run and full-load work		

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

2. The less ▲, the lower EMC of this item

2.5 Type Description

Type	Function and configuration
Basic type（code：A）	Equipped with working condition indicator. No speed control and speed feedback function.
Speed control type（code：T）	Equipped with working condition indicator. Adjust the speed and flow rate through the input frequency signal. No speed feedback.

Copyright © Chengdu Hilin Technology Co., Ltd.

2.6 Working Conditions

Environment: This series of products can be divided into three types according to the working environment temperature: low temperature environment type, normal temperature environment type and high temperature environment type. If not specified, it is the normal temperature environment type. Low temperature environment type and high temperature environment type need to be customized. Such as WJY1802A (high temperature environment type).

Type	Permissible medium temperature range	Cautions
low temperature environment（standard version,premium version）	-10℃～50℃	It is forbidden to contain solid particles such as ice particles in the medium!
normal temperature environment（simplified version ）	0℃～40℃	
normal temperature environment（standard version、premium version ）	0℃～50℃	
high temperature environment（standard version、premium version）	0℃～55℃	

1. 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.

2. Medium: The permissible gas medium is allowed to be rich in water vapor, but cannot contain particles. The permissible liquid medium cannot contain particles.

Copyright © Chengdu Hilin Technology Co., Ltd.

This series of products are divided into two types: normal temperature medium type and high temperature medium type according to the medium temperature that can be tolerated. If not specified, it is the normal temperature medium type. The high temperature medium type needs to be customized and specified, such as WJY1802A (high temperature medium type).

Type	Permissible medium temperature range	Cautions
normal temperature medium（simplified version,standard version,premium version）	0℃～50℃	It is forbidden to contain solid particles such as ice particles in the medium!
high temperature medium（standard version、premium version）	0℃～60℃（water） 0℃～100℃（air）	

When pumping high-temperature water, the space is crowded out due to the precipitation of gas in the water, which will reduce the suction flow.

3.Load: As a air pump,the suction port and exhaust port can run with full load (ie completely block the inlet and outlet), But the applied load pressure must be between the pump's maximum vacuum and maximum output pressure,as a liquid pump,the inlet can run at full load (completely blocked), and the outlet must keep unblocked.

The Pressure Height shall not exceed 10m. Pump outlet pressure shall not exceed 140kPa when the pump downstream has throttling element. Otherwise, a pressure relief valve should be installed on the outlet pipe and the pressure should not exceed 140kPa.

2.7 Pump Materials

1.WJY1802A/T、WJY2703A/T：The materials of the wetted parts: fiber reinforced nylon, EPDM rubber,PP connector,Or nickel-plated copper connector, or stainless steel connector.

Copyright © Chengdu Hilin Technology Co., Ltd.

2.WJY4006A/T:The materials of the wetted parts: fiber reinforced nylon(Optional aluminum, 304 stainless steel),EPDM rubber,PP connector,Or nickel-plated copper connector, or stainless steel connector.

3. The material of the plastic parts of the pump body is fiber reinforced nylon, and the material of the shock absorb foot is PVC.

2.8 Filtering problem

When the pump works for a period of time, the solid impurities contained in the pump cavity, which will destroy the air tightness of the pump and reduce the flow rate and vacuum degree. A filter must be installed at the pump inlet. the gas that we generally think is very clean which still contains dust impurities, and it also needs to be filtered to ensure the normal operation of the precision air-tight components inside the pump. After the filter is used for a period of time, the resistance increases due to the adhesion of impurities, which makes the flow rate and vacuum degree of the system decrease significantly, and the filter should be replaced immediately. Filter life depends on the cleanliness of the media.

2.9 Noise and Silencer

Choose high-end pump, less noise. When there is a large air flow through the pump, the noise is louder, and the noise will be reduced when the pumping is close to a vacuum. Connecting the silencer to the piping system will have a certain effect. According to the specific conditions of the pipeline system, the noise reduction effect is different.

2.10 Tube diameter

1、With Rp1/8 internal thread connector (material: fiber reinforced nylon), the following connectors and other connectors can be installed:

(1) Default PP hose connector,It is recommended to connect with 6-7mm silicone hose;

(2) Optional stainless steel connector, it is recommended to match with 6-7mm diameter silicone hose;

(3) Optional Nickel plated copper POC6 (with 6mm outer diameter hard pipe) and POC8 (with 8mm outer diameter hard pipe for pumps with water flow rate of more than 3 L/min) are selected as

Copyright © Chengdu Hilin Technology Co., Ltd.

cu-plated nickel outer round quick-insert joints, which are preferred over stainless steel outer hexagonal quick-insert joints; Preferred than stainless steel hexagonal push-in quick connector

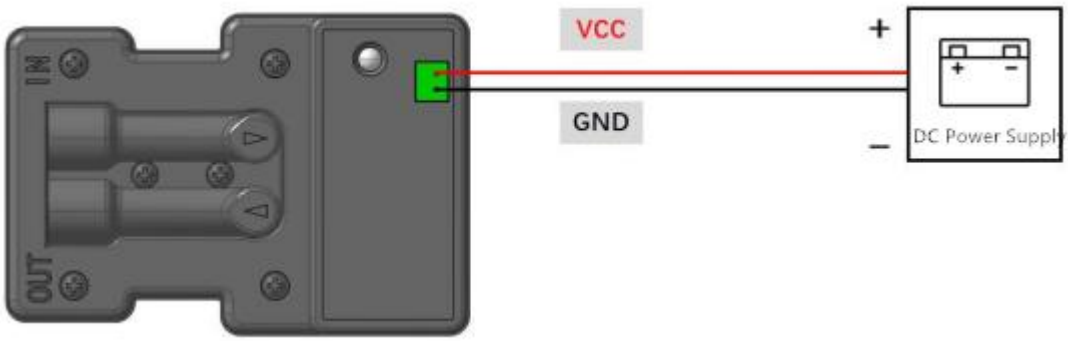
(4) Optional304 stainless steel hexagonal push-inquick connector (can be used with 6mm outer diameter hard pipe) and PC8 (for the pump with water flow of more than 3 L/min, can be used with 8mm outer diameter hard pipe).

Default PP hose connector. Other connectors can be customized on demand

Copyright © Chengdu Hilin Technology Co., Ltd.

3 Electrical Connection

3.1 Basic type



Motor Wire	connection method	Remark
Red	Positive pole of power supply. +24V(±10%)	If the positive and negative terminals are reversed, the motor will not be burned, but the pump does not work!
Black	Negative pole of power supply	

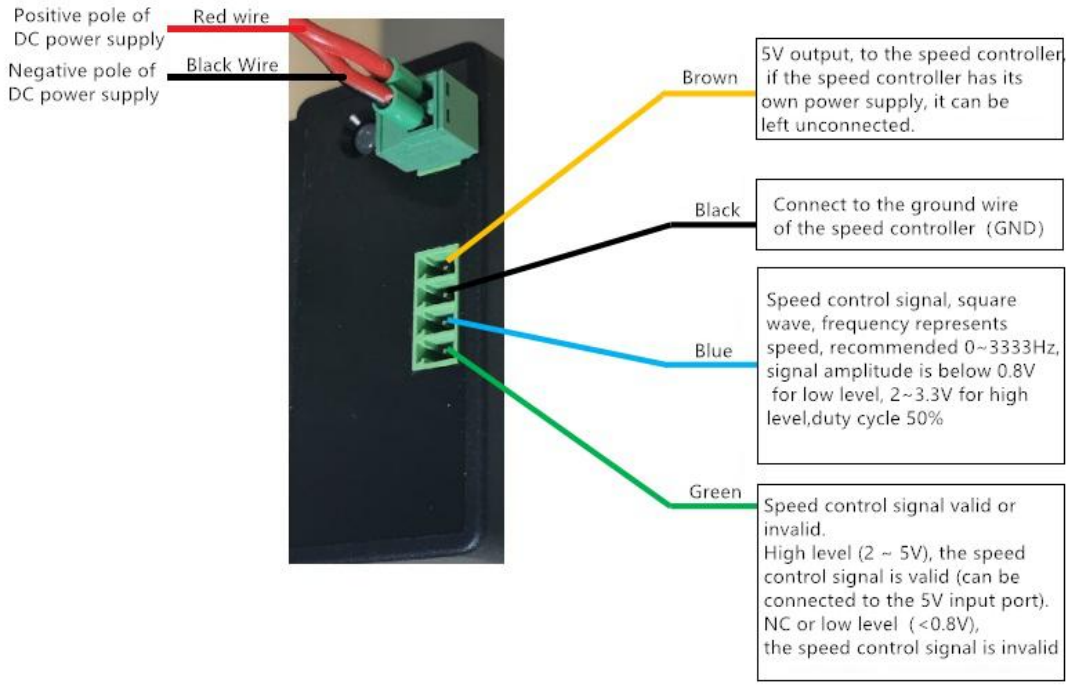
1. Warning: Hot swap is prohibited! It is strictly forbidden to connect or disconnect the motor wire while the power is on! All connection or disconnection must be carried out with the power supply completely cut off! Otherwise it will burn the motor!

Copyright © Chengdu Hilin Technology Co., Ltd.

3.2 Speed control type

The 2Pin red wire is connected to the positive pole of the DC power supply, and the black wire is connected to the negative pole of the power supply.

The 4Pin speed control port (from top to bottom) is the same as below photo.



Note: The line color in the above picture may be different from the actual line color. Connect the lines in the order of the above picture.

Equipped with a working indicator light, the working status of the pump can be feed back through the color change of the indicator light:

Green light flashing: the pump is running normally (non-speed control state)

Blue light keeps on: The pump is in the state of speed control.

Red light keeps on: fault, including voltage overrun, abnormal feedback from the circuit board receiving motor, etc.

Copyright © Chengdu Hilin Technology Co., Ltd.

Interface Definition of Frequency Control Type

S.N	Wire	Signal Definition	Description
2Pin Terminals	1 Red	24V Power input	Rated Voltage 24V±10%。
	2 Black	Power ground	Connected to the negative pole of the power supply
4Pin Terminals	1 Brown	5V Voltage input	5V output, to the speed controller,if the speed controller has its own power supply, it can be left unconnected.
	2 Black	Ground	Connect to the ground wire of the speed controller（GND）
	3 Blue	Frequency Speed Control 2V≤high level≤3.3V 0≤low level<0.8V Note: The maximum input voltage cannot exceed 3.3V, otherwise the micro pump may be permanently damaged.	Input square wave, the recommended amplitude value is 3.3V, the duty ratio 50%, Frequency speed control range 833Hz-3333Hz corresponds to 833-3333rpm, when100Hz<frequency<833Hz, it runs at the minimum speed, when frequency >3333Hz,it runs at the maximum motor speed, and when the frequency ≤ 100Hz, the pump stops running.
	4 Green	Enable signal 0V≤low level≤0.8V 2V≤high level≤3.5V	Speed control signal valid or invalid. High level (2 ~ 5V), the speed control signal is valid (can be connected to the 5V input port). NC or low level（<0.8V), the speed control signal is invalid, the pump will run at the speed when it was stopped last time.

We will equip with a signal line, the customer can connect his own signal line to it.

Warning: Hot swap is prohibited! It is strictly forbidden to connect or disconnect the motor wire while the power is on! All connection or disconnection must be carried out with the power supply completely cut off! Otherwise it will burn the motor!

Copyright © Chengdu Hilin Technology Co., Ltd.

3.3 Description of motor starting current

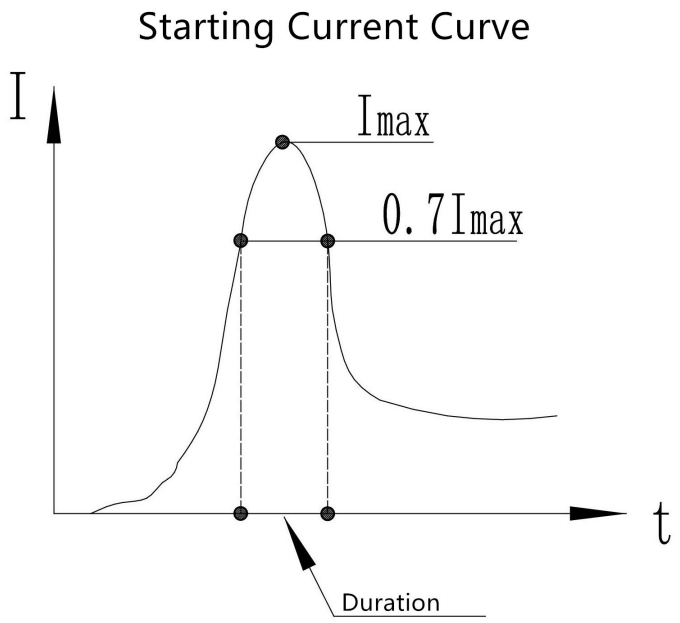


Figure 3-2 Starting Current Curve

Note: The maximum starting current of this series of pumps is 6A and the duration is 100ms.

The motor starting current is the maximum current generated when the motor is at rest and the rated voltage is suddenly turned on. This current is a basic parameter of the motor determined by the motor manufacturer.

When the motor is connected in use, other auxiliary circuits are connected at the same time, such as: speed regulation, control... etc., will produce additional surge current superimposed on the motor starting current, so that the starting current increases a lot.

Power supply: In view of the starting characteristics of this series of pumps, at least 24V, 2.7A (about 64.8W) power supply should be used!

Copyright © Chengdu Hilin Technology Co., Ltd.

4 Cautions

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

1. As a air pump,the suction port and exhaust port can run with full load (ie completely block the inlet and outlet),as a liquid pump,the inlet can run at full load (completely blocked), and the outlet can be temporarily blocked. prolonged block can damage the pump.

2. The Pressure Height shall not exceed 10m. or the pump downstream has throttling element,Pump outlet pressure shall not exceed 140kPa when . Otherwise, a pressure relief valve should be installed on the outlet pipe and the pressure should not exceed 140kPa.

3. This product has no waterproof, dust-proof, and explosion-proof functions and cannot be used in flammable and explosive environments!

4. Foreign matter must not fall into the hydraulic connectors, and there should be no solid particles in the medium, otherwise the micro pump will be damaged!

5. When this product is used to transfer harmful medium, it must be double-sealed to ensure personal safety!

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

7. Built-in precision control circuit, need to use high-quality DC power supply to power the pumps!

8. Hot swap is prohibited! It is strictly forbidden to connect or disconnect the motor wire while the power is on! All connection or disconnection must be carried out with the power supply completely cut

Copyright © Chengdu Hilin Technology Co., Ltd.

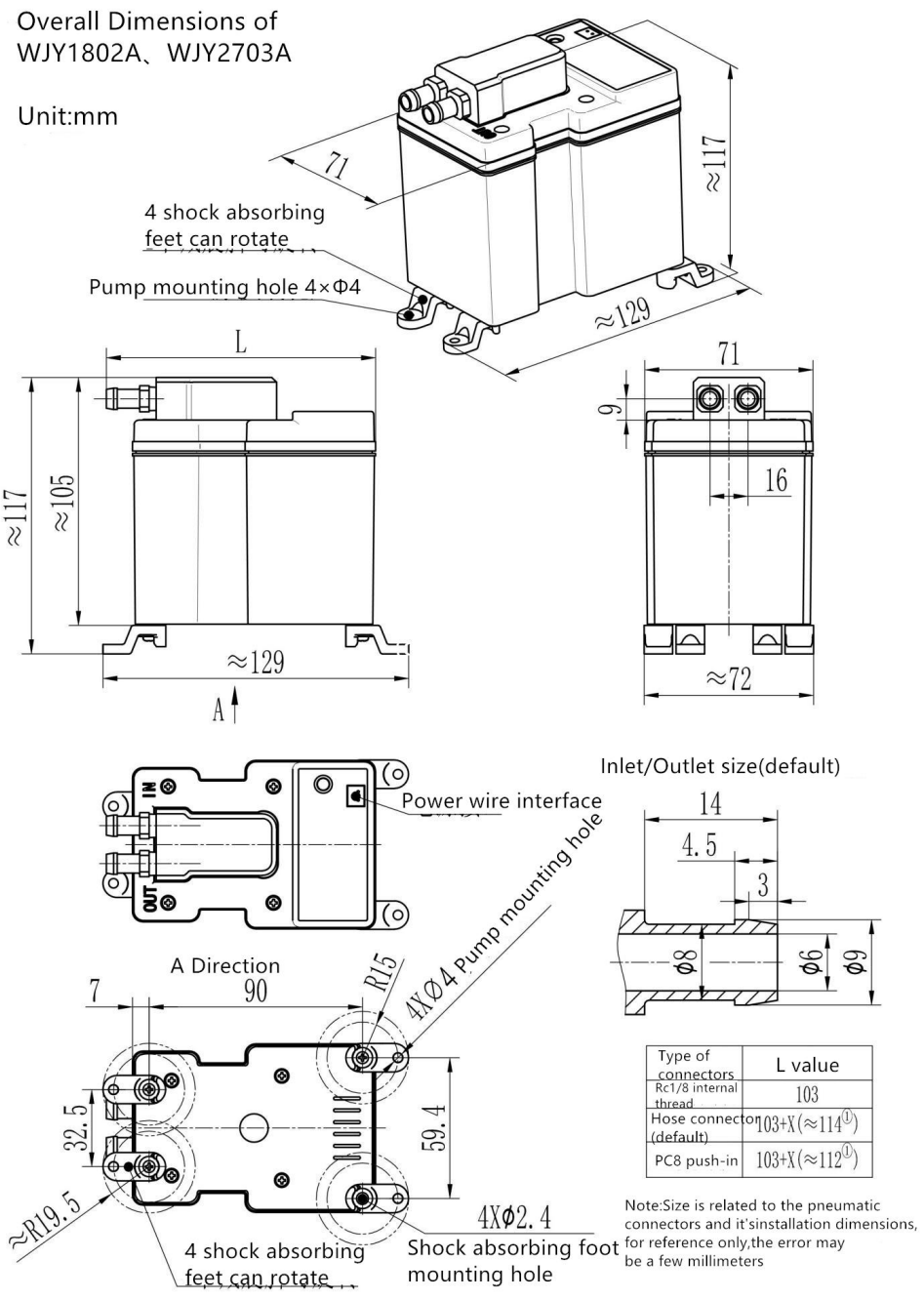
off! Otherwise it will burn the motor! Do not connect the positive and negative poles in reverse, otherwise the motor will be burned!

9. Users should take anti-static measures!

10. Please follow the instructions strictly!

Copyright © Chengdu Hilin Technology Co., Ltd.

5 Dimensions



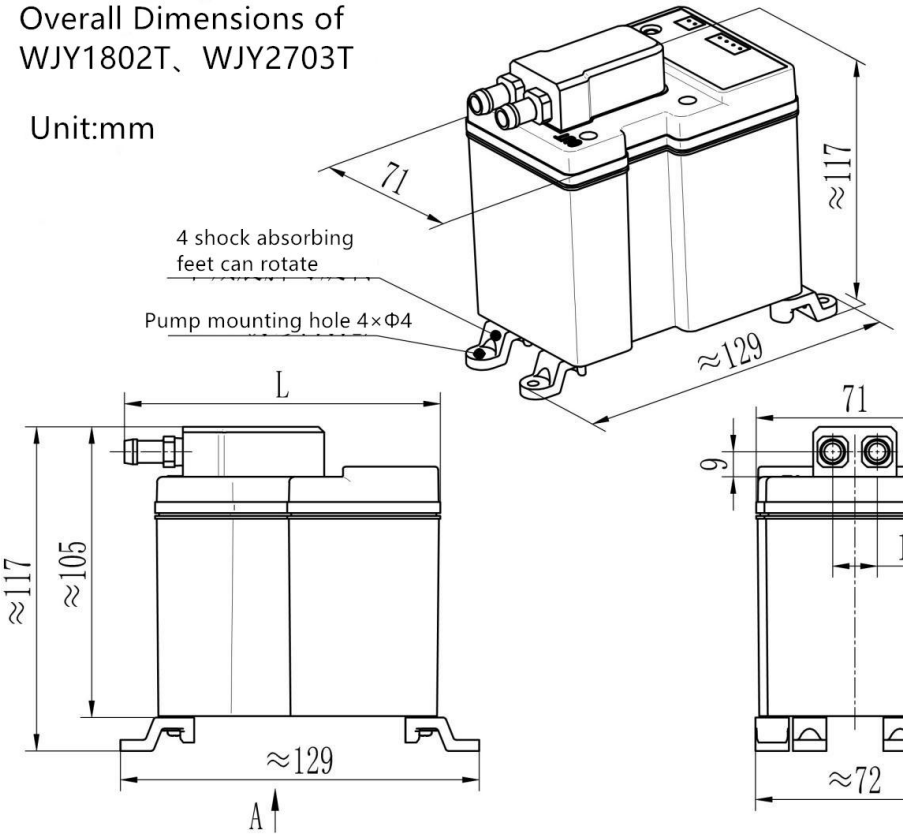
Type of connectors	L value
Rc1/8 internal thread	103
Hose connector (default)	103+X(≈114①)
PC8 push-in	103+X(≈112①)

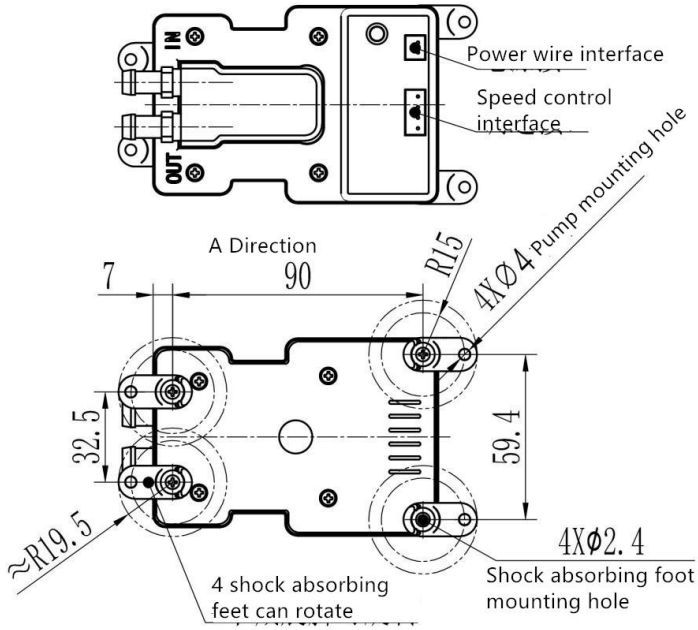
Note:Size is related to the pneumatic connectors and it'sinstallation dimensions, for reference only,the error may be a few millimeters

Copyright © Chengdu Hilin Technology Co., Ltd.

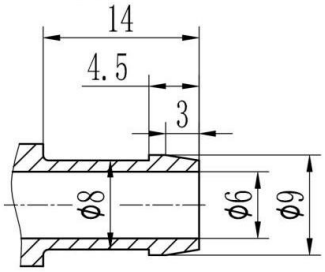
Overall Dimensions of
WJY1802T、WJY2703T

Unit:mm





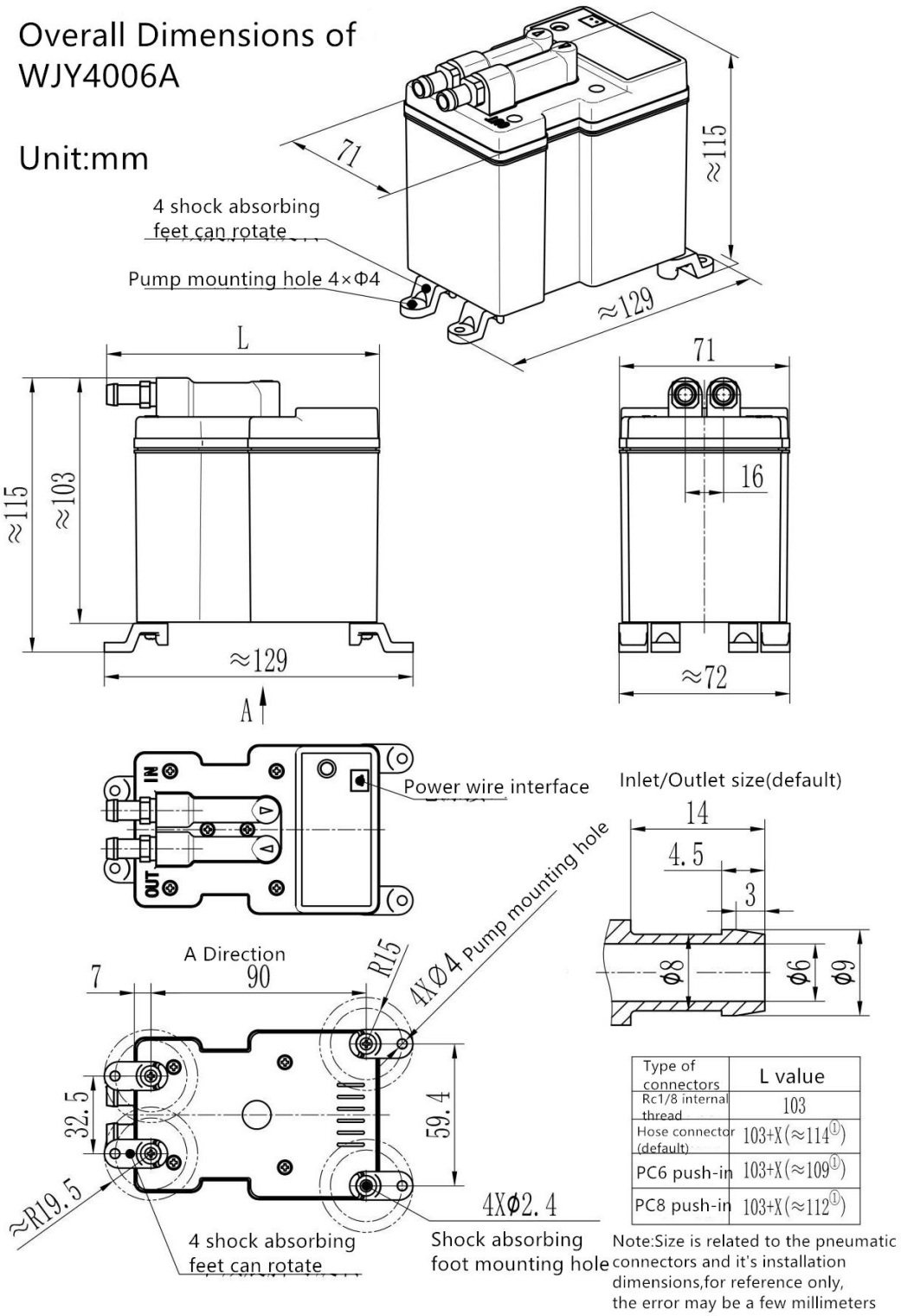
Inlet/Outlet size(default)



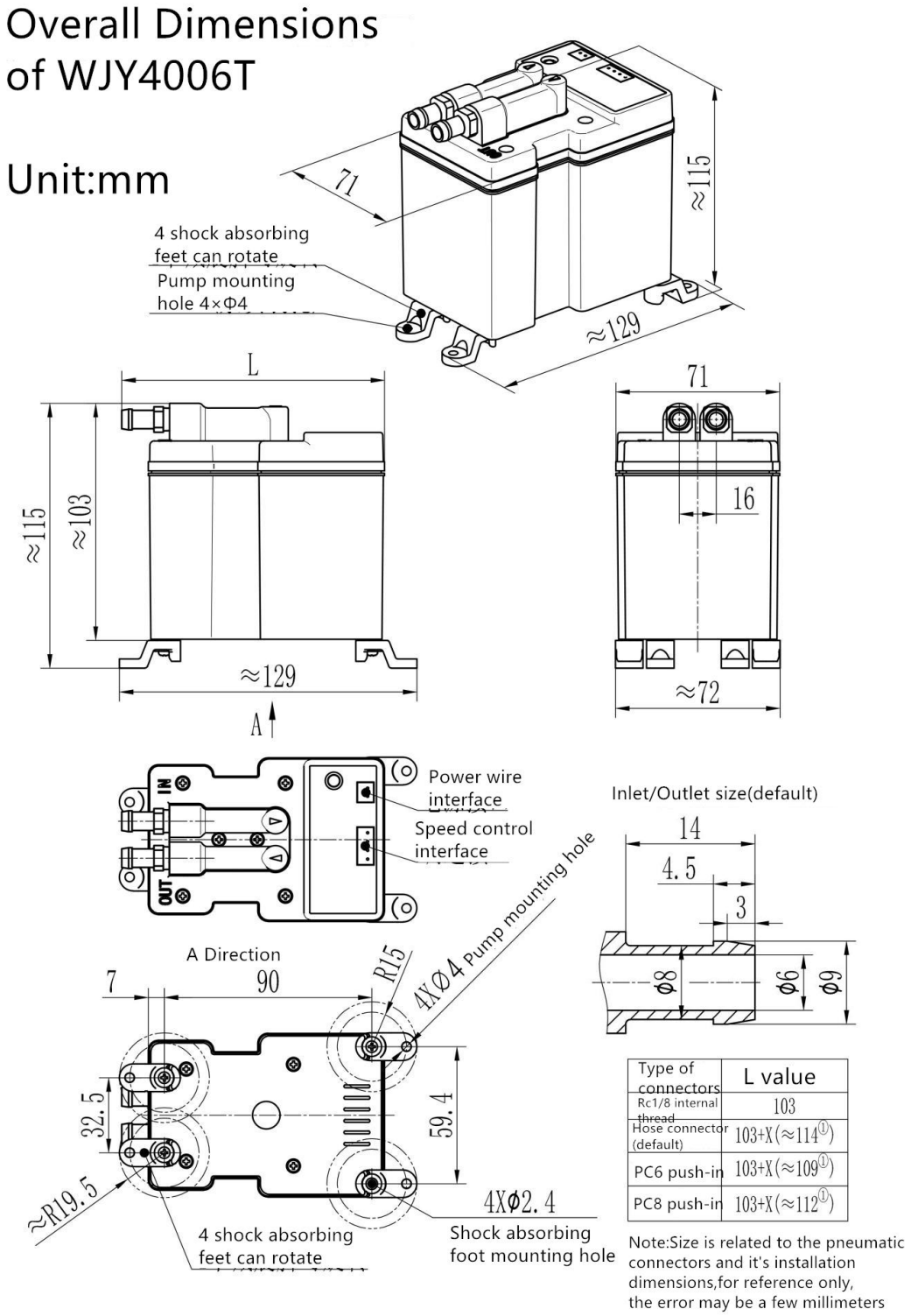
Type of connectors	L value
Rc1/8 internal thread	103
Hose connector (default)	103+X(≈114①)
PC8 push-in	103+X(≈112①)

Note:Size is related to the pneumatic connectors and it's installation dimensions,for reference only, the error may be a few millimeters

Copyright © Chengdu Hilin Technology Co., Ltd.



Copyright © Chengdu Hilin Technology Co., Ltd.



Installation instructions:

The mounting holes are self-tapping screw holes, not suitable for repeated tightening and disassembly, otherwise the installation will be loose and unreliable.

Copyright © Chengdu Hilin Technology Co., Ltd.

6 Appearance

WJY1802A、WJY2703A

Copyright © Chengdu Hilin Technology Co., Ltd.

WJY4006A

Note: The product in the picture is a polycarbonate pump head. If you choose an aluminum or stainless steel pump head, the appearance and material will be different!

Copyright © Chengdu Hilin Technology Co., Ltd.