

EA Piston Pump Specification Sheet



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1 Introduction

1.1 Overview

The HaloFlx-EA series is a compact, high-performance, long-lifespan, maintenance-free piston pump specifically designed for precision liquid handling operations such as automated pipetting, dilution, and dispensing. The HaloFlx-EA series offers capacities ranging from 50µL to 20mL, with pipetting ranges from 2µL to 20 mL.

Based on positive displacement piston technology, extensive testing indicates that the HaloFlx-EA series is expected to have a lifespan of five million cycles, with repeatability not exceeding 1.5% for strokes as low as 2%. Compared to traditional syringes, the HaloFlx-EA series saves downtime and maintenance because it does not require routine preventive maintenance such as cleaning and nut tightening. By selecting the seal flushing option, the lifespan of the HaloFlx-EA series can be extended even further, especially when used with highly corrosive or crystallization-prone liquids.

Various sizes and materials are available. All pumps can be customized according to OEM customer requirements.

1.2 Features

- Compact design, small form factor, easy integration.
- Long lifespan, 5 million cycles(Note 1), over 15 times that of traditional glass/PTFE syringes, silicone-free seals.
- Maintenance-free(Note 2).
- Piston: Ceramic; Seal: UHMWPE, optional light-shielding configuration.
- 42 linear stepper motor, 1.8°, bipolar, high-speed, low-noise, full stroke time at maximum speed $\leq 1s$.
- Standard 1/4-28UNF threaded connection, other threaded connections such as M6 optional.
- Three initial position optocoupler optional.
- ABFT Easy Exhaust optional.
- Rich selection of tubing kits optional.
- Various specifications of sampling probes optional.
- Various specifications of solenoid valves, diaphragm pumps optional.
- Motor closed-loop control Optocoupler encoder optional.
- Integrated driver ISC1000 (PN 449101) optional, control interfaces RS-232/RS-485/CAN.

Notes:

1:Medium is pure water, normal temperature, back pressure 50kPa.

2:When the medium is a saline solution, necessary protection and maintenance procedures should be designed considering crystallization factors.

Foreach Warranty

Please refer to our General Terms of Sale (GTS)

2 Appearance and Dimensions

The 2D drawings show dimensions with the default motor configuration. Total height may vary slightly with different motor configurations.

Unit:mm

2.1 EA-50 μ L

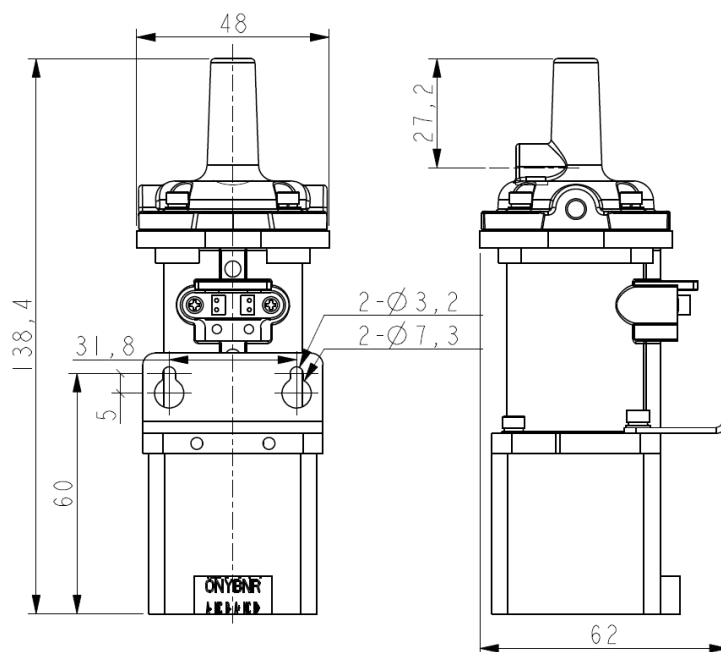


Figure 1 EA-50 μ L Outline Dimensions

2.2 EA-0100 μ L

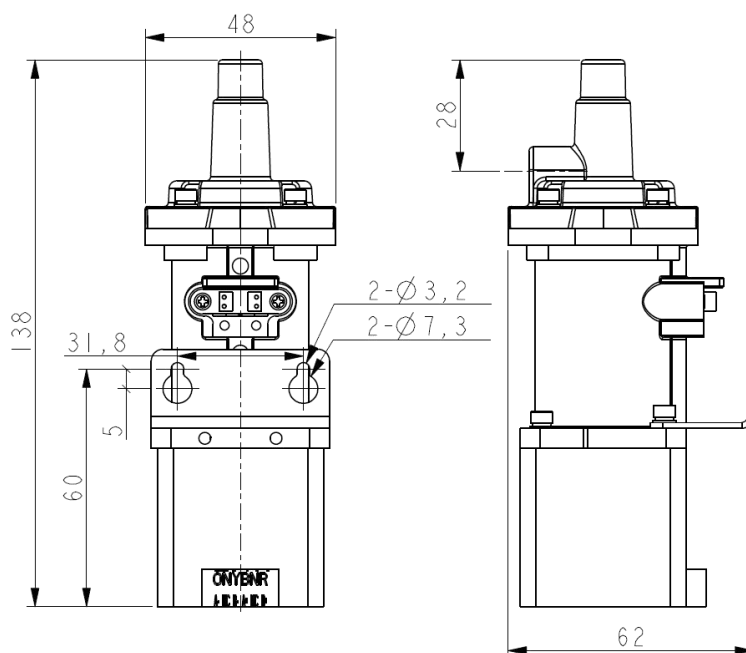


Figure 2 EA-0100 μ L Outline Dimensions

2.3 EA-0250 μ L

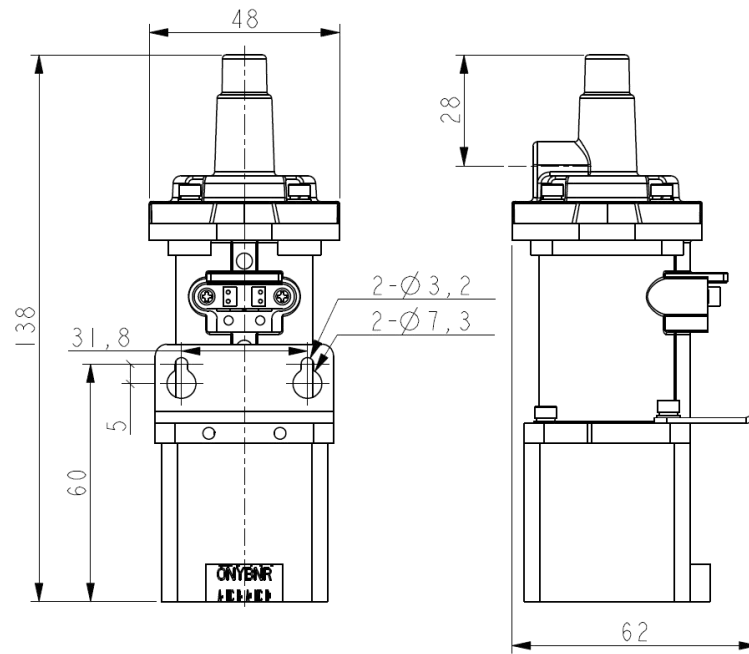


Figure 3 EA-0250 μ L Outline Dimensions

2.4 EA-0500 μ L

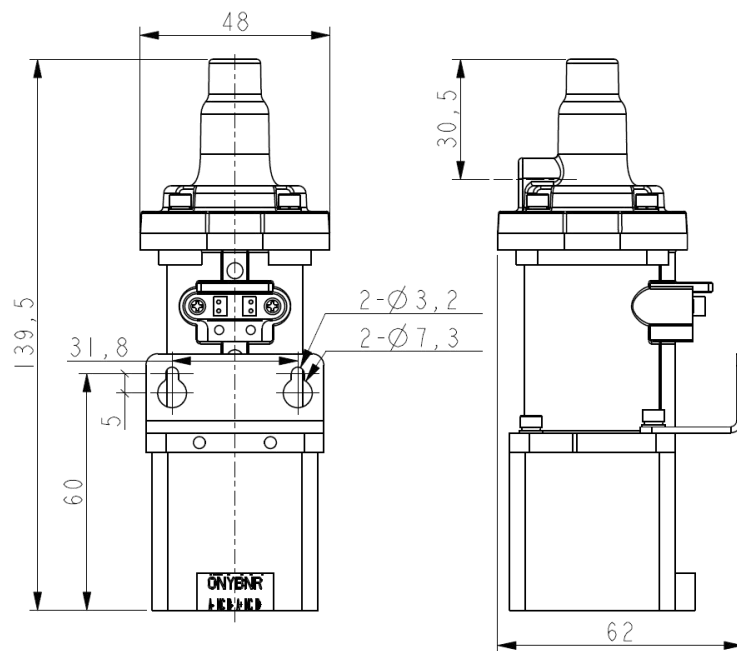


Figure 4 EA-0500 μ L Outline Dimensions

2.5 EA-1mL

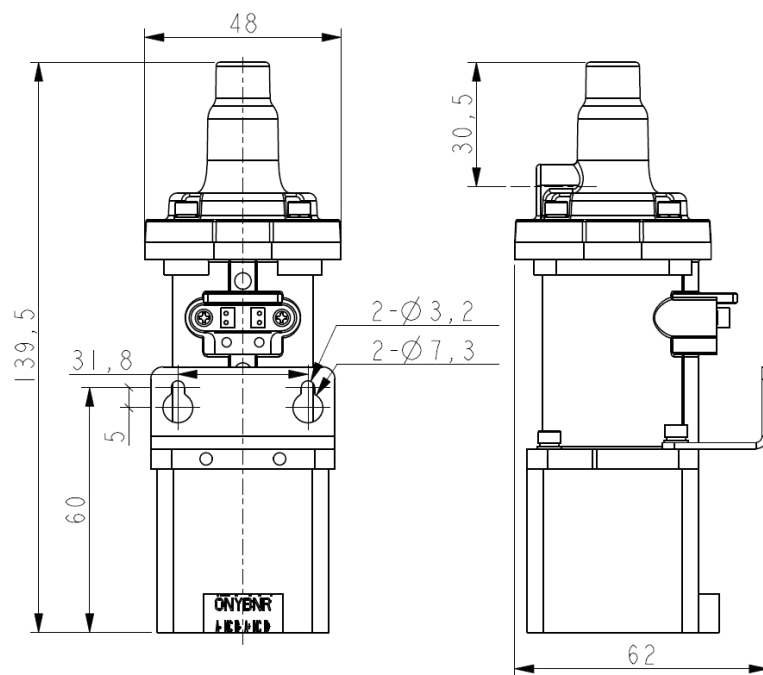


Figure 5 EA-1mL Outline Dimensions

2.6 EA-2.5mL

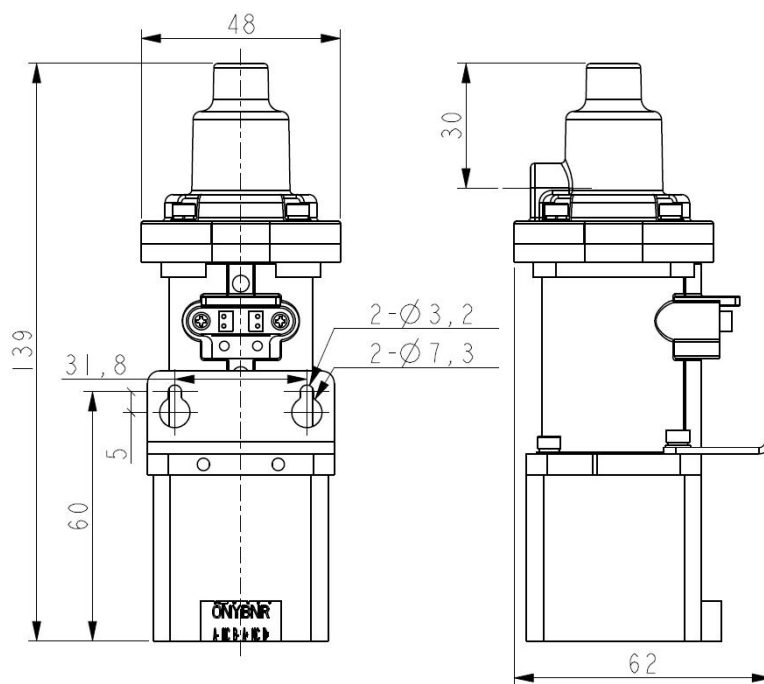


Figure 6 EA-2.5mL Outline Dimensions

2.7 EA-5mL

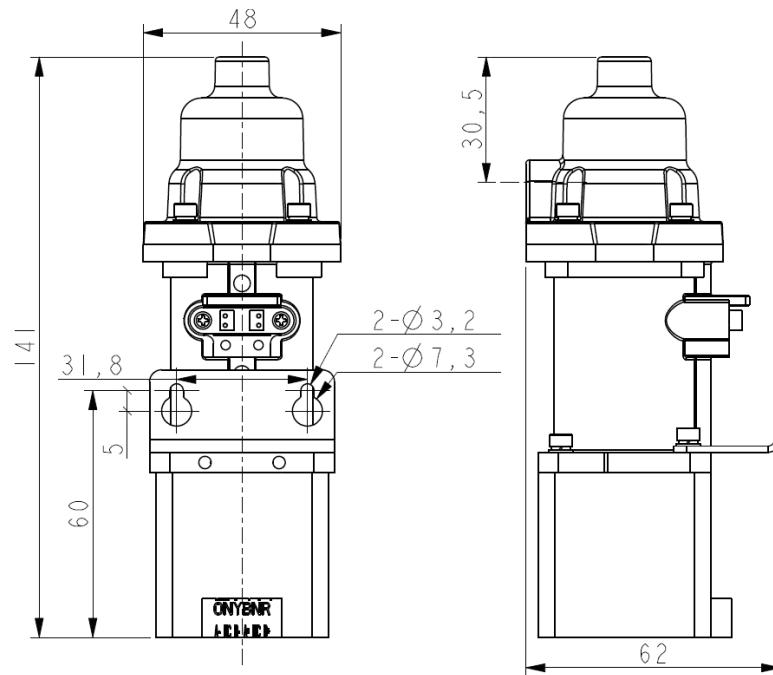


Figure 7 EA-5mL Outline Dimensions

2.8 EA-10mL

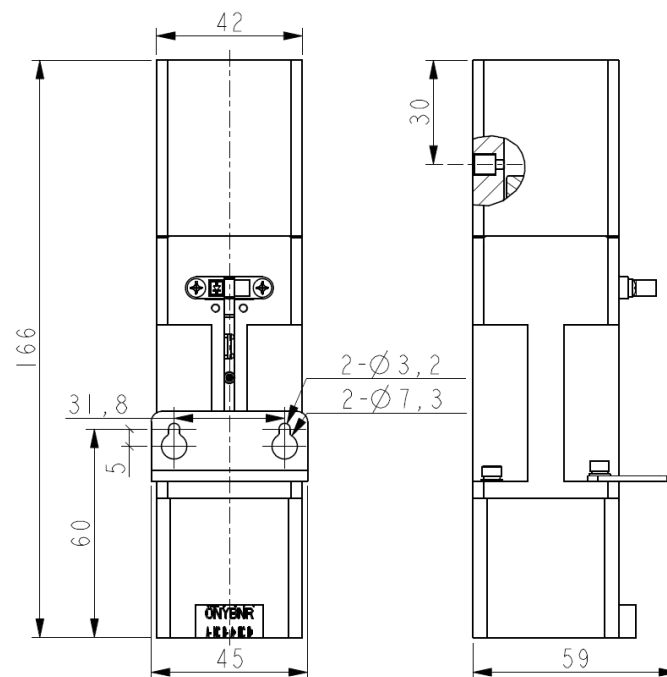


Figure 8 EA-10mL Outline Dimensions

2.9 EA-20mL

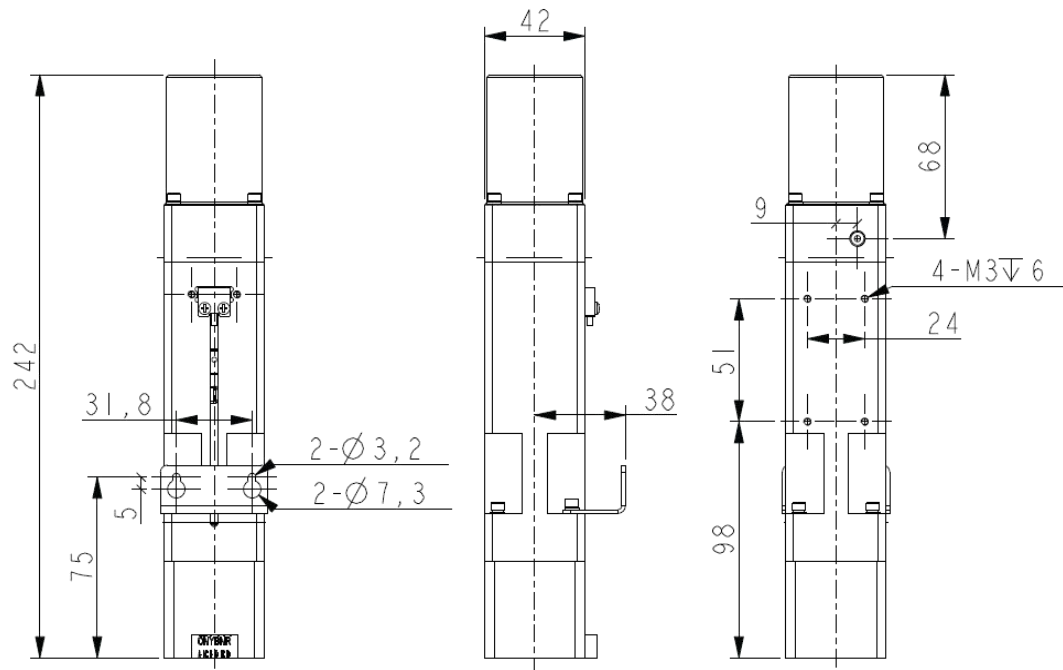


Figure 9 EA-20mL Outline Dimensions

3 Stroke Information

The schematic diagram of the pump's stroke distribution is as follows:

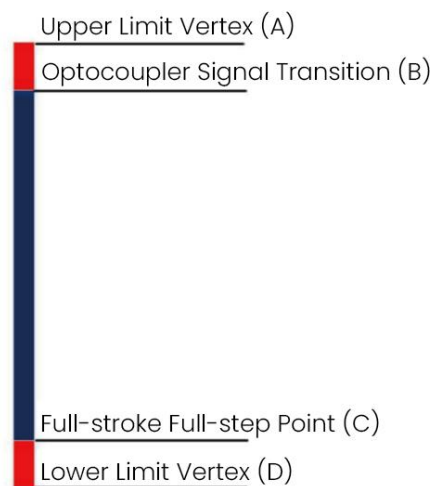


Figure 10 Pump Stroke Distribution

Description:

When the piston moves upward to point B, the optocoupler is in the blocked state; the AB distance $\geq 0.6\text{mm}$.

The BC interval is the selected full stroke integer steps (2000/2400/4000 Steps); the CD distance $\geq 1.3\text{mm}$.

The optocoupler is in the blocked state in the AB interval; the optocoupler is in the unblocked state in the BD interval.

For more options, please consult local agents and suppliers.

4 Motor Configuration

4.1 2-Phase 4-wire Bipolar Motor (42 Motor)

4.1.1 Electrical Characteristics

Table 1 2-Phase 4-wire Bipolar Motor Electrical Specifications

2-Phase 4-wire Bipolar Motor Electrical Parameters		
Specification	Parameter	Remarks
Rated Current	1.2 A/Phase	--
Number of Phases	2 Phase, Bipolar	4-wire
Winding Resistance	$1.9\Omega \pm 10\%$	25°C
Winding Inductance	$4.0\text{mH} \pm 20\%$	1kHz
Static Angle Error	$\pm 0.09^\circ/\text{MAX}$	1 (Excluding hysteresis error)
Step Angle	1.8°	--

4.1.2 Pin Connection

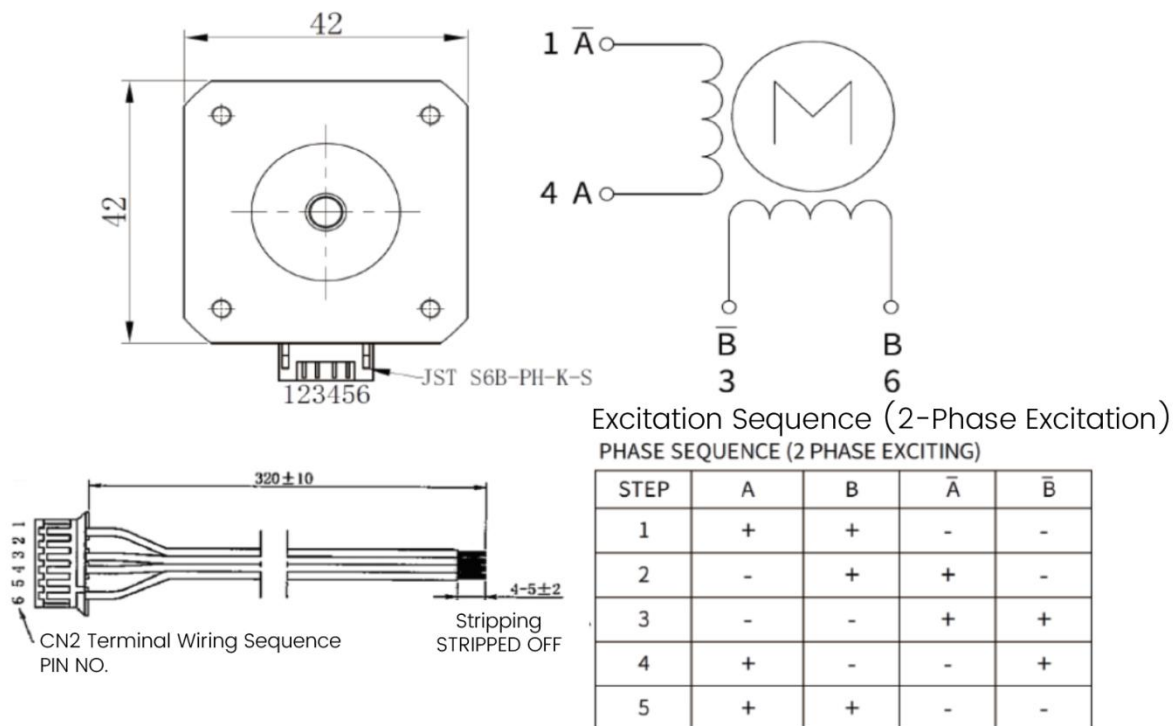


Figure 11 2-Phase 4-Wire Bipolar Pin Connection

Wire End Connector

Plug: PHR-6 Terminal: JST SPH-002T-P0.5S

4.2 2-Phase 6-Wire Unipolar Motor (42 Motor)

4.2.1 Electrical Characteristics

Table 2 2-Phase 6-Wire Unipolar Motor Electrical Specifications

2-Phase 6-Wire Unipolar Motor Electrical Parameters		
Specification	Parameter	Remarks
Rated Current	1.2 A/Phase	--
Number of Phases	2 Phase, Unipolar	6-wire
Winding Resistance	$3.1\Omega \pm 10\%$	25°C
Winding Inductance	$3.5\text{mH} \pm 20\%$	1kHz
Static Angle Error	$\pm 0.09^\circ/\text{MAX}$	1 (Excluding hysteresis error)
Step Angle	1.8°	--

4.2.2 Pin Connection

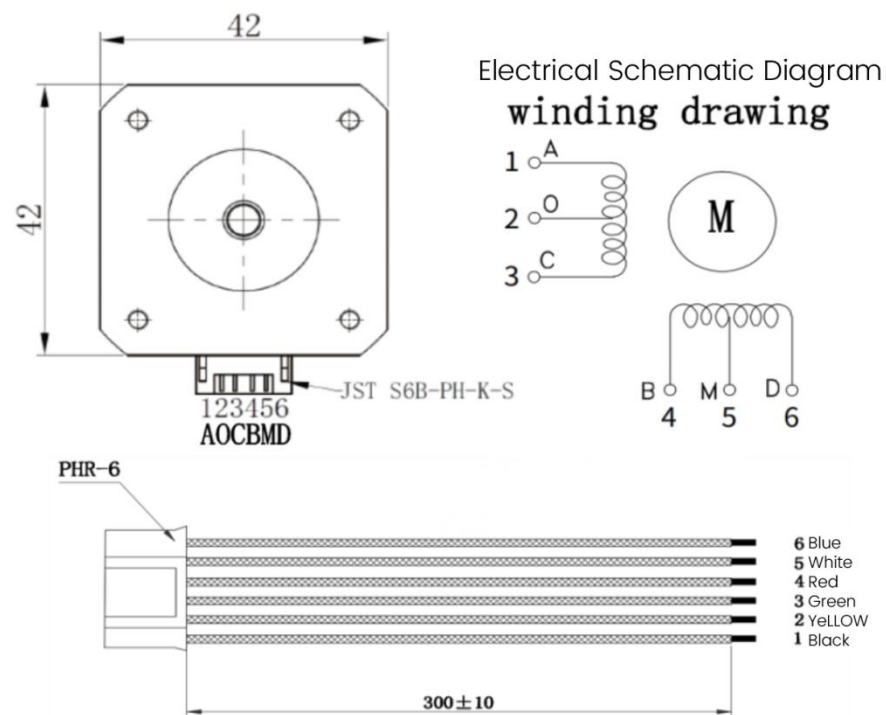


Figure 12 2-Phase 6-Wire Unipolar Motor Pin Connection

Wire End Connector

Plug: PHR-6 Terminal: JST SPH-002T-P0.5S

5 Optocoupler Configuration

5.1 3-wire Optocoupler

5.1.1 Electrical Characteristics

Table 3 3-wire Optocoupler Electrical Specifications

3-wire Optocoupler Electrical Parameters		
Specification		Parameter
Input Side	Forward Voltage	5~24V DC
	Supply Voltage	30V
	Collector Current	50mA

Table 4 3-wire Optocoupler Typical Application

3-wire Optocoupler Typical Application	
Specification	Parameter
Current Limiting Resistor R_f	No Current Limiting Resistor Required
Pull-up Resistor R_L	10k Ω
Note: R_L is the recommended value for $V_{CC}=5V$ DC.	

5.1.2 Pin Connection

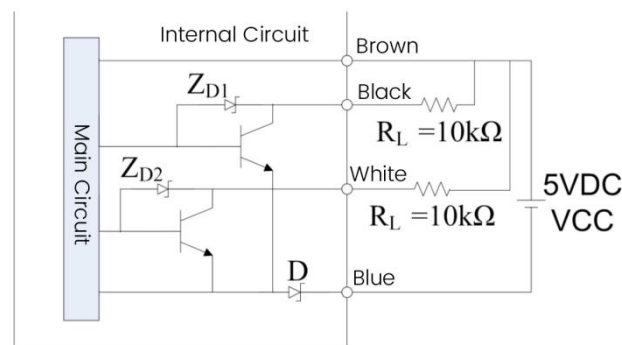


Figure 13 3-wire Optocoupler Pin Connection

Wiring Instructions:

- Brown wire: Select power supply voltage within DC 5~24V range, no current limiting resistor required.
- Blue wire: Connect to the negative terminal of the power supply.
- Black wire/White wire: Signal output lead. Connect to the positive terminal of the power supply via a pull-up resistor. If the white wire is selected for output, it is light-on high-level mode; if the black wire is selected for output, it is dark-on high-level mode.

5.2 4-wire Optocoupler

5.2.1 Electrical&Optical Characteristics

Table 5 4-wire Optocoupler Electrical Specifications

4-wire Optocoupler Electrical Parameters			
Specification		Symbol	Parameter
Input Side	DC Forward Current	I_F	50mA
	DC Reverse Voltage	V_R	5V
Output Side	Collector-Input Voltage	V_{CEO}	30V
	Input-Collector Voltage	V_{ECO}	5V
	Collector Current	I_C	20mA

Table 6 4-wire Optocoupler Electrical Optical Characteristics

4-wire Optocoupler Electrical Optical Characteristics			
Specification		Symbol	Parameter
Input Side	Forward Voltage	V_F	Standard 1.2V, Max 1.5V
Output Side	Collector-Input Saturation Voltage	$V_{CE(sat)}$	Max 0.5V

Table 7 4-wire Optocoupler Typical Application

4-wire Optocoupler Typical Application	
Specification	Parameter
Current Limiting Resistor R_f	150~200 Ω
Pull-up Resistor R_L	10k Ω
Note: R_f , R_L are recommended values for $V_{CC}=5V$ DC, must be connected by the customer. If the customer uses other power supply voltages, it is recommended to design the value of R_f such that $20mA < I_F < 25mA$.	

5.2.2 Pin Connection

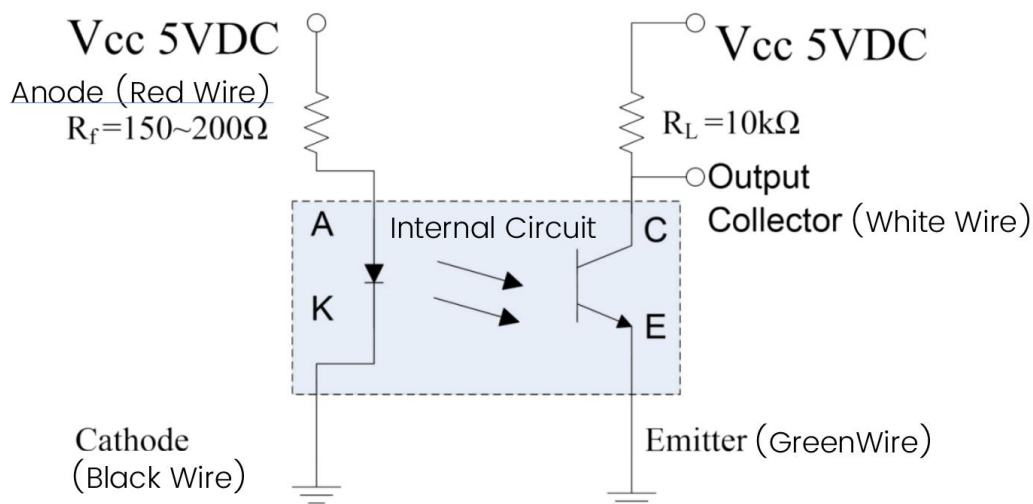


Figure 14 4-wire Optocoupler Pin Connection

Wiring Instructions:

- Red: Connect to the positive terminal of the power supply. A current limiting resistor must be used.
- Black: Connect to the negative terminal of the power supply.
- White: Signal output lead. Open-collector output. After connecting a pull-up resistor, blocked outputs high level, unblocked outputs low level.
- Green: Connect to the negative terminal of the logic power supply.

5.3 5-wire Optocoupler

5.3.1 Electrical&Optical Characteristics

Table 8 5-wire Optocoupler Electrical Specifications

5-wire Optocoupler Electrical Parameters			
Specification		Symbol	Parameter
Input Side	DC Forward Current	I_F	50mA
	DC Reverse Voltage	V_R	5V
Output Side	Supply Voltage	V_{CC}	17V
	Output Current	I_o	16mA

Table 9 5-wire Optocoupler Electrical Optical Characteristics

5-wire Optocoupler Electrical Optical Characteristics			
Specification		Symbol	Parameter
Input Side	Forward Voltage	V_F	Standard 1.2V, Max 1.4V
Output Side	Collector-Input Saturation Voltage	$V_{CE(sat)}$	Max 0.4V

Table 10 5-wire Optocoupler Typical Application

5-wire Optocoupler Typical Application	
Specification	Parameter
Current Limiting Resistor R_f	150~200 Ω
Pull-up Resistor R_L	Built-in to optocoupler

Note: R_f is the recommended value for $V_{CC}=5V$ DC, must be connected by the customer. If the customer uses other power supply voltages, it is recommended to design the value of R_f such that $20mA < I_F < 25mA$. R_L is built-in.

5.3.2 Pin Connection

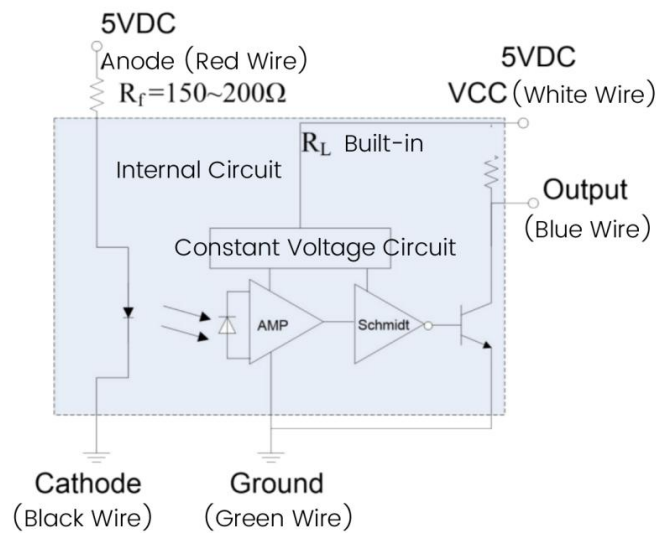


Figure 15 5-wire Optocoupler Pin Connection

Wiring Instructions:

- Red wire: Connect to the positive terminal of the power supply. A current limiting resistor must be used.
- Black wire: Connect to the negative terminal of the power supply.
- White wire: Logic power supply for the Optocoupler sensor output.
- Blue wire: Signal output lead. Blocked outputs low level, unblocked outputs high level.
- Green wire: Connect to the negative terminal of the logic power supply.

6 Specifications

6.1 Basic Capacities

Table 11 Basic Capacities

Basic Capacities			
Capacity(μ L)	Resolution(Note3) (μ L/Step)	Full Stroke Steps(Step)	Lead Screw Lead(mm)
0050	0.025	2000	1.27
0100	0.05	2000	1.27
0250	0.125	2000	1.27
0500	0.25	2000	1.27
1000	0.5	2000	1.27
2500	1.25	2000	1.42
5000	2.5	2000	1.27
10000	2.5	4000	1.27
20000	5	4000	2.54

Note:

3. Other resolutions available. Resolution=Capacity/Full Stroke Steps; For example, current range 100 μ L, full stroke steps 4000 steps, resolution = 100/4000=0.025 μ L/Step.

6.2 Basic Specifications

Table 12 Specifications

Specifications		
Specification	Unit	Parameter
Pump Type	--	Piston Type
Piston	--	Ceramic
Installation Dimensions	mm	2xM3x31.8 or 2xM3x42.8 or 4-M3(20mL)
Threaded Connection	N/A	2x1/4-28UNF or 2xM6
Backlash(Note4)(Retraction Error)	%	$\leq 1.0\%$
Accuracy (at full stroke)	%	$\leq 0.5\%$
Repeatability(at full stroke)	%	$\leq 0.5\%$
Accuracy (at 2% stroke)(Note5)	%	$\leq 2.0\%$
Repeatability (at 2% stroke)(Note6)	%	$\leq 1.5\%$
Fluid Pressure(Note7)	MPa	< 0.30

Notes:

4. Backlash compensation required in software for precise dosing.

5. Stepper precision stroke test method; i.e., evaluated by testing the accuracy of piston stroke.

6. Stepper precision stroke test method; i.e., evaluated by testing the accuracy of piston stroke.

7. For more pressure options, consult your local agents and suppliers.

7 Appendices

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