FOREACH 恒永达

SM Piston Pump
Specification Sheet

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1 Introduction

1.1 Overview

The HaloFlx-SM series is a compact, high-performance, long-lifespan, maintenance-free Piston pump specifically designed for precise liquid handling operations such as automated pipetting, dilution, and dispensing. The HaloFlx-SM series offers total volumes ranging from 50 μ L to 1mL, with pipetting ranges from 1 μL to 1 mL.

Compared to conventional Piston pumps, the HaloFlx-SM series micro Piston pumps require less space and produce lower noise, making them particularly suitable for integration into miniature automated instruments. A typical application is integrating the micro Piston pump onto an automated swing arm.

Various sizes and materials are available. All pumps can be customized according to OEM customer specific 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).
- Accuracy and precision comparable to traditional syringes; precise dosing of small volumes saves expensive reagents; Repeatability: 1.5% at 2% stroke, 0.5% at 100% stroke; Accuracy: 0.5% at 100% stroke.
- Multiple material options to suit different application scenarios and medium; Piston: Ceramic, Stainless Steel, PEEK; Seal: UHMWPE, optional light-shielding configuration.
- 28 linear stepper motor, 1.8°, bipolar, high speed, low noise, full stroke time at maximum speed ≤1s.
- Standard 1/4-28UNF threaded connection; other connections such as M6 optional.
- Three initial position optocoupler options.
- ABFT easy exhaust optional.
- Rich selection of tubing kits optional.
- Various specifications of sampling probes optional.
- Various specifications of solenoid valves and diaphragm pumps optional.
- Integrated driver ISC1000 (PN 449101) optional, control interface RS-232/RS-485/CAN.

Notes:

1: Medium is pure water, room 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

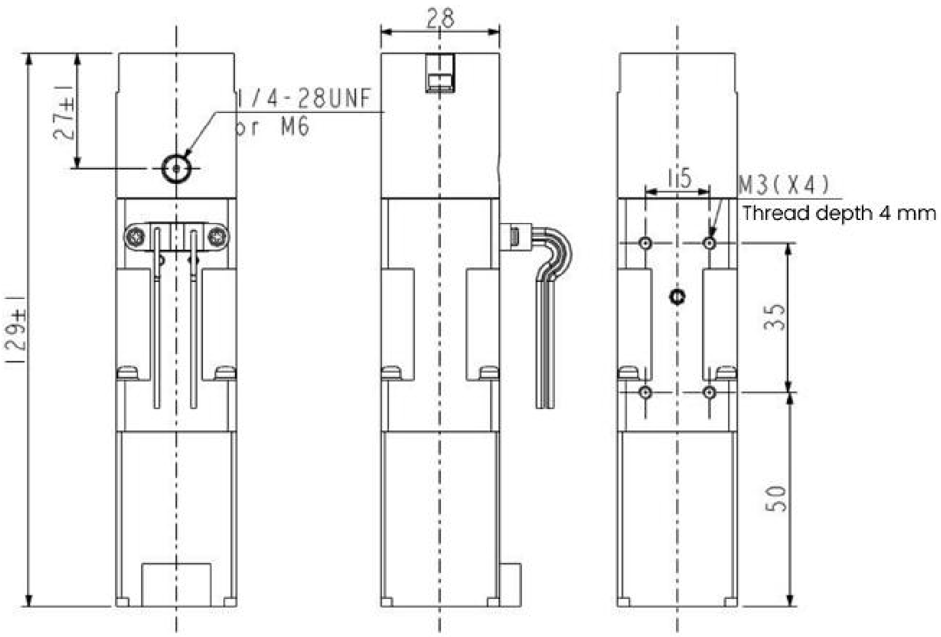

Figure 1 Conventional Cylindrical Pump Head Outline Dimensions

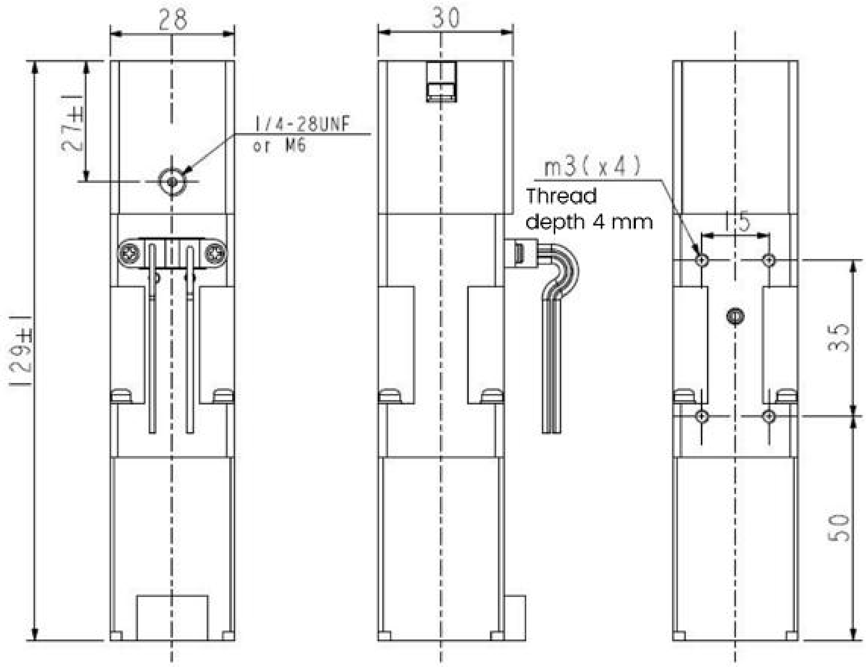

Figure 2 1mL Square Pump Head Outline Dimensions

3 Motor Configuration

3.1 2-Phase 4-wire Bipolar Motor (28 Motor)

3.1.1 Electrical Characteristics

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

2-Phase 4-wire Bipolar Motor Electrical Specifications		
Specification	Parameter	Remarks
Rated Current	0.67 A/Phase	--
Number of Phases	2 Phase, Bipolar	4-wire
Winding Resistance	7.2Ω±10%	25℃
Winding Inductance	5.1mH±20%	1kHz
Static Angle Error	±0.09°/MAX	1 (Excluding hysteresis error)
Step Angle	1.8°	--

3.1.2 Pin Connection

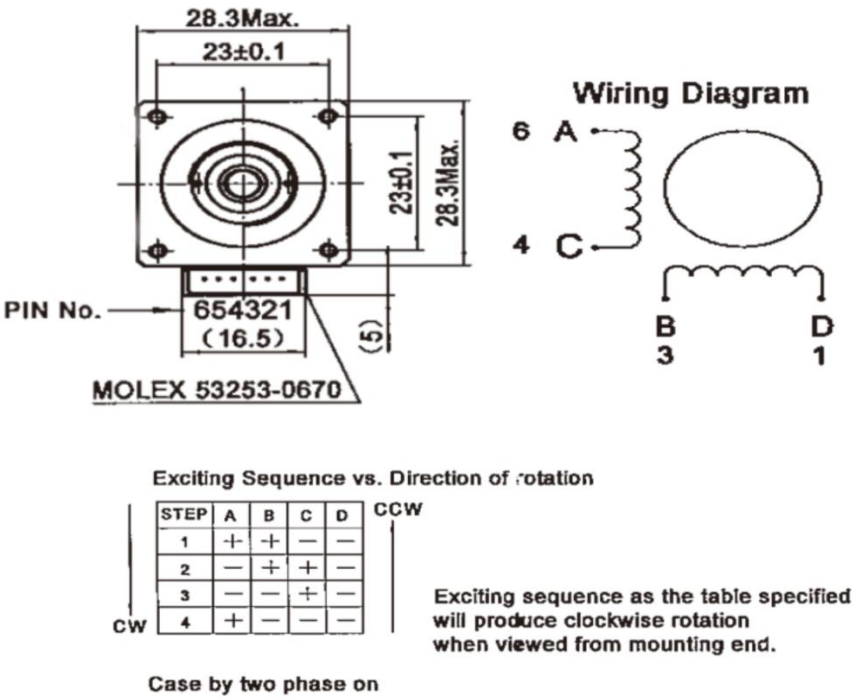

Figure 3 2-Phase 4-wire Bipolar Motor Pin Connection

Wire End Connector

Plug: MOLEX 51065-0600 Terminal: MOLEX 50212-8000

4 Optocoupler Configuration

4.1 3-wire Optocoupler

4.1.1 Electrical Characteristics

Table 2 3-wire Optocoupler Electrical Specifications

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

Table 3 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	10kΩ
Note: R_L is the recommended value for V_{CC}=5V DC.	

4.1.2 Pin Connection

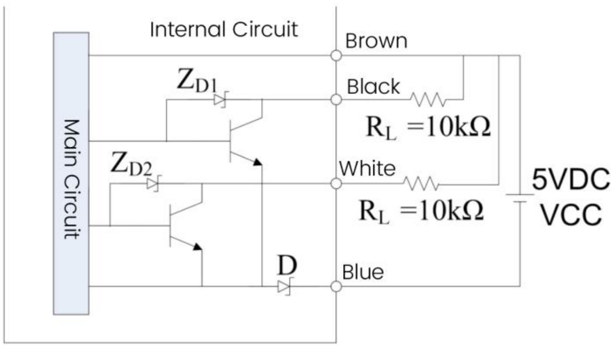

Figure 4 3-wire Optocoupler Pin Connection

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.

4.2 4-wire Optocoupler

4.2.1 Electrical&Optical Characteristics

Table 4 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 5 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 6 4-wire Optocoupler Typical Application

4-wire Optocoupler Typical Application	
Specification	Parameter
Current Limiting Resistor R_f	150~200Ω
Pull-up Resistor R_L	10kΩ
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 Rf such that 20mA < I_F < 25mA.	

4.2.2 Pin Connection

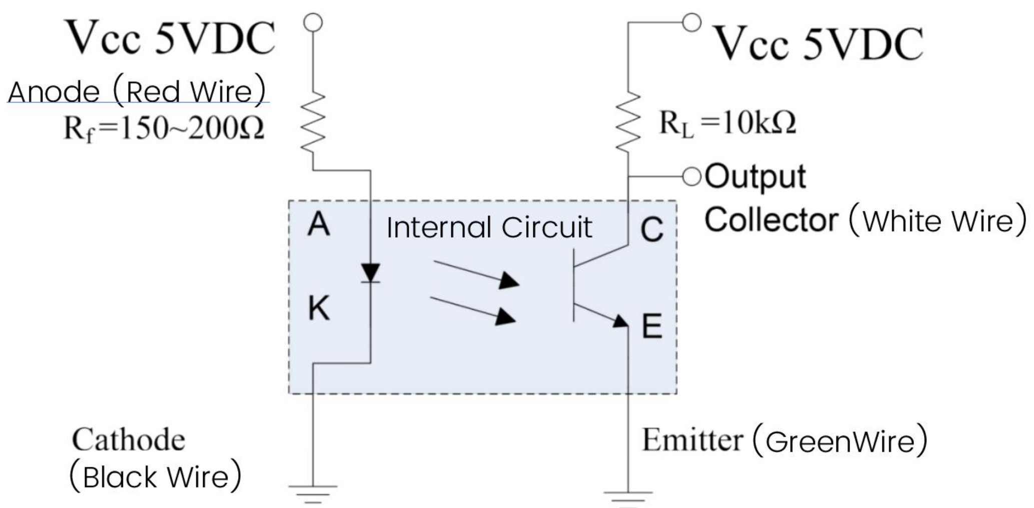

Figure 5 4-wire Optocoupler Pin Connection

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.

4.3 5-wire Optocoupler

4.3.1 Electrical&Optical Characteristics

Table 7 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 8 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 9 5-wire Optocoupler Typical Application

5-wire Optocoupler Typical Application	
Specification	Parameter
Current Limiting Resistor R_f	150~200Ω
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. RL is built-in.	

4.3.2 Pin Connection

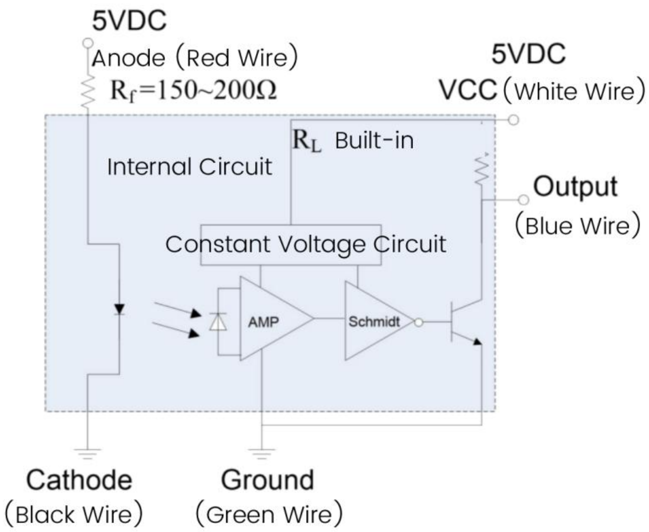

Figure 6 5-wire Optocoupler Pin Connection

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 photoelectric 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.

5 Specifications

5.1 Basic Capacities

Table 10 Basic Capacities

Basic Capacities			
Capacity(μL)	Resolution(Note3)(μL/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

Note:

3: Resolution=Capacity/Full Stroke Steps; For example, current range 100 μL, full stroke steps 4000 steps, resolution = 100/4000=0.025μL/Step.

5.2 Basic Specifications

Table 11 Specifications

Specifications		
Specification	Unit	Parameter
Pump Type	--	Piston Type
Piston	--	Ceramic
Threaded Connection	mm	4xM3-15X35
Backlash(Note4)(Retraction Error)	N/A	2 x 1/4-28UNF or 2 x M6, Flat Bottom Port
Accuracy (at full stroke)	%	≤1.0%
Repeatability(at full stroke)	%	≤0.5%
Accuracy (at 2% stroke) (Note5)	%	≤0.5%
Repeatability (at 2% stroke) (Note6)	%	≤2.0%
Threaded Connection	%	≤1.5%
Lifespan(Note1)	Cycles	5,000,000
Fluid Pressure(Note5)	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: For more pressure options, consult your local agents and suppliers.

5.3 Options

Initial position photoelectric sensor optional: 3/4/5 wire or none.

Pump head material optional: PMMA, PSU, PPS, POM, PEEK.

Pump head type optional: Transparent, Light-shielded.

Full stroke steps optional: Standard specification is 2000 steps, other specifications can be customized.

ABFT easy exhaust optional.

Rich selection of tubing kits optional: Tubing assemblies, connectors.

Various specifications of sampling probes optional.

Various specifications of solenoid valves and diaphragm pumps optional.

Integrated driver ISC1000 optional, control interface RS-232/RS-485/CAN.

6 Appendices

6.1 Appendix : Tables and Figures