

SMTP Pipetting Pump

Specification Sheet



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1 Introduction

1.1 SMTP0

1.1.1 Overview

SMTP0 air displacement pipetting pump.

Prevents cross-contamination during sample transfer and reagent dispensing.

1.1.2 Features

Tubeless, no priming required.

High precision, stable operation.

Lightweight, compact, maintenance-free.

1.2 SMTP1

1.2.1 Overview

SMTP1 automatic tip ejection air displacement pipetting pump (ADP).

Prevents cross-contamination during sample transfer and reagent dispensing.

Integrated tip presence detection (TPON/OFF) and tip ejection (ADTP).

1.2.2 Features

Tubeless, no priming required.

High precision, stable operation.

Lightweight, compact, maintenance-free.

1.3 SMTP2

1.3.1 Overview

Programmable automatic air displacement pipetting pump (ADTP).

Prevents cross-contamination during sample transfer and reagent dispensing.

Integrated tip presence detection (TPON/OFF), tip ejection (ADTP).

Integrated automatic liquid level detection (LLD) and tip blockage detection (TPBD).

1.3.2 Features

Tubeless, no priming required.

High precision, stable operation.

Lightweight, compact, maintenance-free.

Multiple liquid detection methods: pressure, capacitance, hybrid.

Real-time aspiration/dispensing pressure and tip blockage monitoring (TPBD).

Operate standalone or cascade up to 16 pumps.

LED indicator for status feedback.

Optional protective cover and disposable tips.

1.4 SMTP4

1.4.1 Overview

SMTP4 air-displacement pipetting pump.

Prevents cross-contamination during sample transfer and reagent dispensing.

Integrated automatic tip ejection function.

1.4.2 Features

Tubeless, priming-free.

High precision, stable operation.

Lightweight, compact, maintenance-free.

1.5 SMTP Series Comparison

Table 1 SMTP Series Comparison

SMTP Series Comparison				
Series	SMTP0	SMTP1	SMTP2	SMTP4
Cost	Low	Medium	High	Medium
Communication Mode	None	None	RS232/RS485/CAN	None
Tip Adapter	Optional	Standard	Standard	Standard
ADTP (Auto Tip Ejection)	Not Applicable	Standard	Standard	Standard
PLLD (Pressure Liquid Level Detection)	Not Applicable	Not Applicable	Standard	Not Applicable
CLLD (Capacitive Liquid Level Detection)	Not Applicable	Not Applicable	Standard	Not Applicable
Pressure LLD Interface	Standard	Standard	Not Applicable	Not Applicable
MMP (Motor Drive)	Not Applicable	Not Applicable	Standard	Not Applicable
Capacity 50µL	Optional	Optional	Not Applicable	Standard
Capacity 100µL	Optional	Optional	Not Applicable	Standard
Capacity 250µL	Optional	Optional	Not Applicable	Standard
Capacity 500µL	Optional	Optional	Not Applicable	Standard
Capacity 1000µL	Optional	Optional	Standard	Standard

Foreach Warranty

Please refer to our General Terms of Sale (GTS)

2 Appearance and Dimensions

Unit:mm

2.1 SMTP0

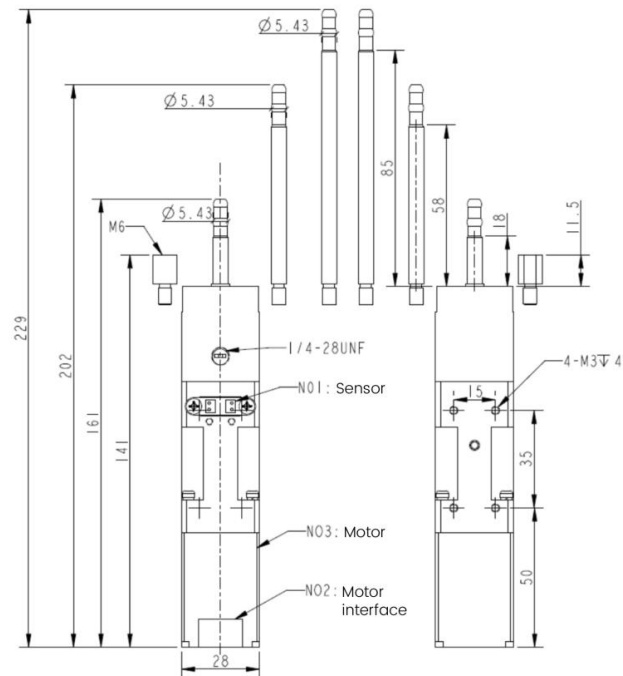


Figure 1 SMTP0 Outline Dimensions

2.2 SMTP1

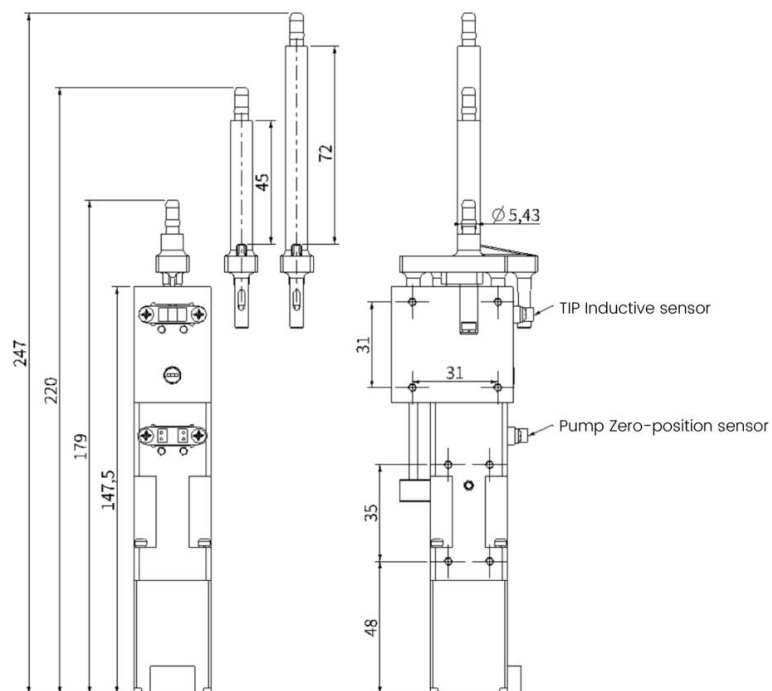


Figure 2 SMTP1 Outline Dimensions

2.3 SMTP2

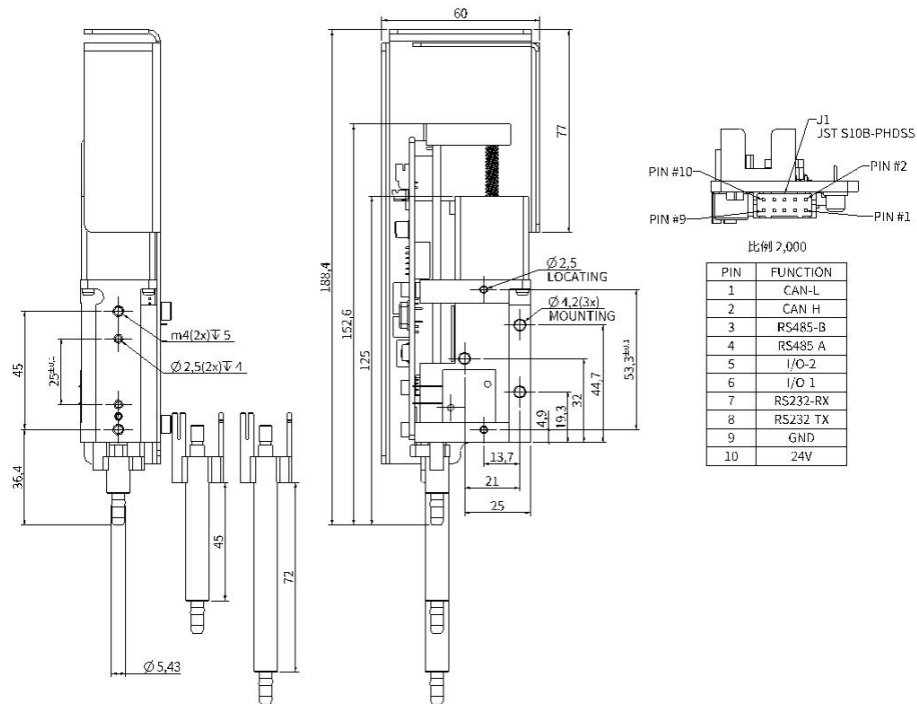


Figure 3 SMTP2 Outline Dimensions

2.4 SMTP4

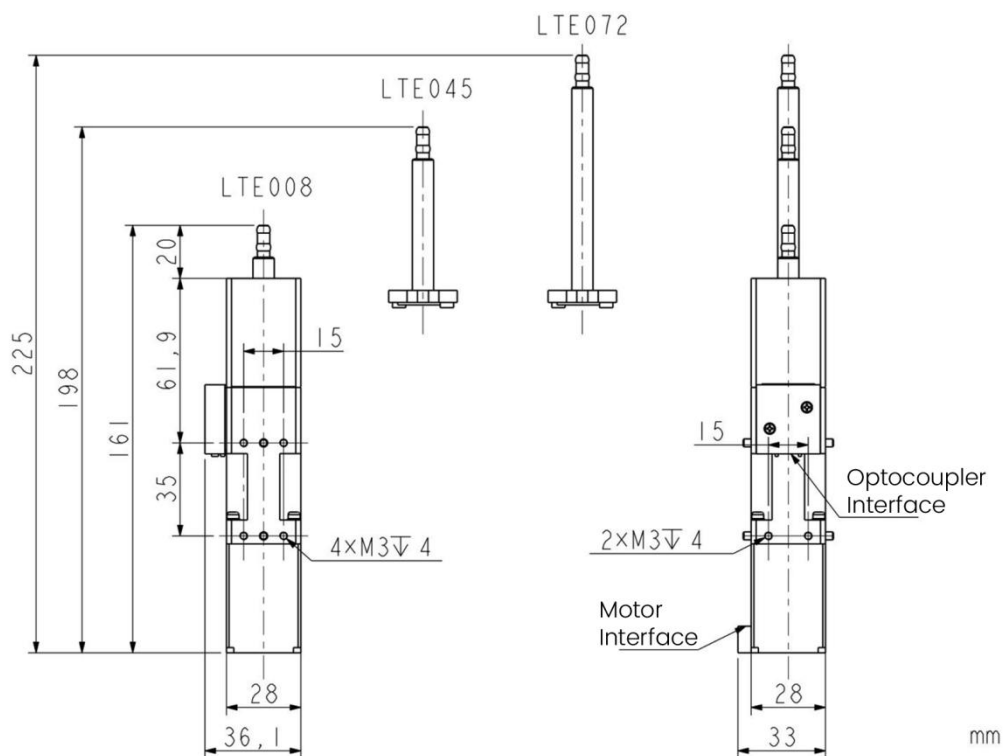


Figure 4 SMTP4 Outline Dimensions

3 Motor Information

Table 2 SMTP0/SMTP1/SMTP4(Note1) Motor Information

SMTP0/SMTP1/SMTP4(Note 1) Motor Information			
Project	Value	Unit	Remarks
Drive Voltage	24	V	DC
Rated Current	0.67	A	Per Phase
Number of Phases	2	Phase	/
Winding Resistance	7.2±10%	Ω	/
Winding Inductance	5.1±20%	mH	/
Static Angle Error	±0.09	/	Max

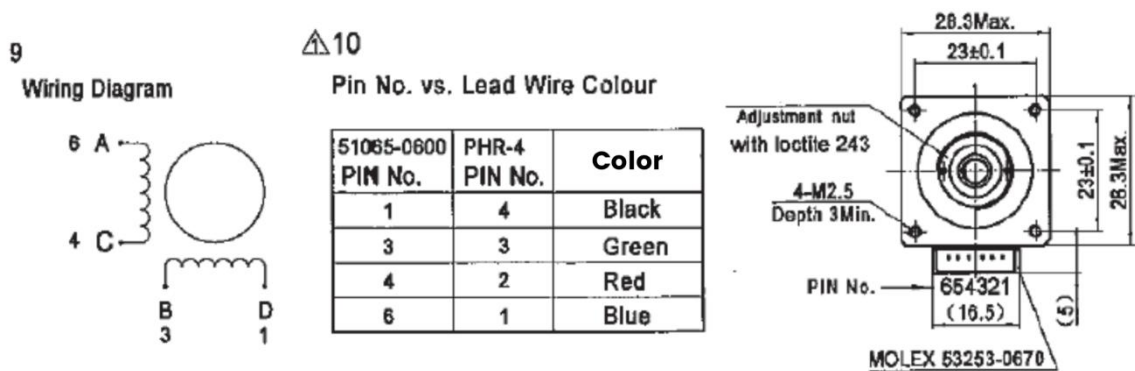


Figure 5 SMTP0/SMTP1/SMTP4 Wiring Diagram

Note:

The SMTP2 is an integrated component of the board. All control functions, including those for the motor, are performed internally by the board's system. As this functionality does not require customer intervention, the corresponding control interfaces are not provided for external access.

4 Sensor Information

4.1 SMTP0/SMTP1

Table 3 SMTP0/SMTP1 Sensor Electrical Parameters

SMTP0/SMTP1 Sensor Electrical Parameters			
Item		Symbol	Specification
Input Side	Forward Current	I_F	50mA
	Supply Voltage	V_R	5V
Output Side	Collector-Input Voltage	V_{CEO}	30V
	Input-Collector Voltage	V_{ECO}	5V
	Collector Current	I_C	20mA

Table 4 SMTP0/SMTP1 Electrical-Optical Characteristics

SMTP0/SMTP1 Electrical-Optical Characteristics			
Item		Symbol	Specification
Input Side	Forward Voltage	V_F	Typ: 1.2V, Max: 1.5V
Output Side	Collector-Input Saturation Voltage	$V_{CE(sat)}$	Max: 0.5V

Table 5 SMTP0/SMTP1 Typical Application

SMTP0/SMTP1 Typical Application	
Item	Recommended Value
Current-limiting Resistor R_f	150~200 Ω
Pull-up Resistor R_L	10k Ω

Note: R_f and R_L recommendations for $V_{CC}=5V_{DC}$. Not included on adapter board; must be connected by customer. For other power voltages, design R_f to ensure $20mA < I_F < 25mA$.

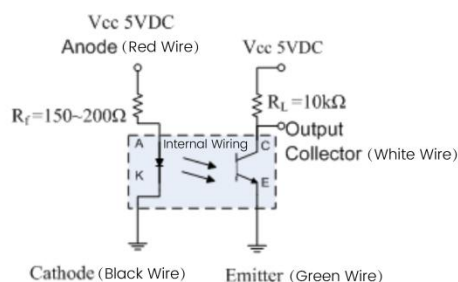


Figure 6 SMTP0/SMTP1 Typical Application

Wiring Instructions:

Red: Connect to power supply positive (+), must connect current-limiting resistor.

Black: Connect to power supply negative (-).

White: Signal output wire. Open-collector output. Pulled high when blocked, low when unblocked.

Green: Connect to logic power supply negative (-).

4.2 SMTP4

Table 6 SMTP4 Sensor Electrical Parameters

SMTP4 Sensor Electrical Parameters			
Item		Symbol	Specification
Input Side	Forward Current	I_F	50mA
	Supply Voltage	V_R	5V
Output Side	Collector-Input Voltage	V_{CEO}	30V
	Input-Collector Voltage	V_{ECO}	5V
	Collector Current	I_C	20mA

Table 7 SMTP4 Electrical-Optical Characteristics

SMTP4 Electrical-Optical Characteristics			
Item		Symbol	Specification
Input Side	Forward Voltage	V_F	Typ: 1.23V, Max: 1.6V
Output Side	Collector-Input Saturation Voltage	$V_{CE(Sat)}$	Max: 0.4V

Table 8 SMTP4 Typical Application

SMTP4 Typical Application	
Item	Recommended Value
Current-limiting Resistor R_f	150~200 Ω
Pull-up Resistor R_L	10k Ω
Note: R_f , R_L are recommended values for $V_{CC}=5V_{DC}$. They are not included on the adapter board and must be connected by the customer. If the customer uses a different supply voltage, R_f must be designed such that $20mA < I_F < 25mA$.	

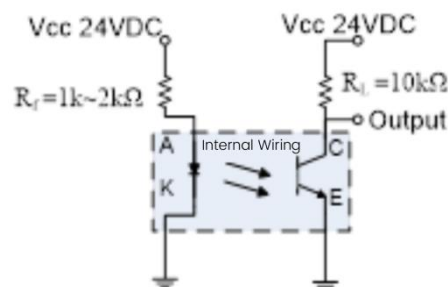


Figure 7 SMTP4 Typical Application

Wiring Instructions:

- ①A: LED anode, connect to positive power supply; must include current-limiting resistor R_f .
- ②K: LED cathode, connect to negative power supply.
- ③C: Transistor collector, signal output wire. Open-collector output: outputs high when obstructed, outputs low when unobstructed (requires pull-up resistor).
- ④E: Transistor emitter, connect to negative logic power supply.

5 Optocoupler Information

Table 9 SMTP4 Optocoupler Information

SMTP4 Optocoupler Information		
Item	Value	Remark
Connector Model	PHDR-08VS	JST
Terminal Model	SPHD-002T-P0.5	JST

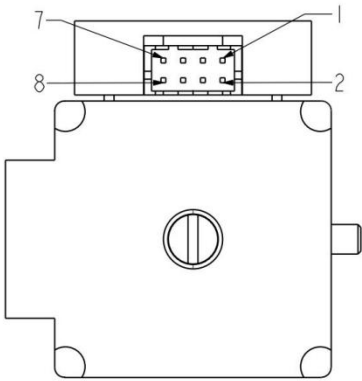


Figure 8 Optocoupler Interface Pin Sequence Diagram

Table 10 SMTP4 Optocoupler Interface

SMTP4 Optocoupler Interface		
	Interface No.	Signal Definition
Detection Optocoupler	1	E (Detection optocoupler)
	3	C (Detection optocoupler)
	5	A (Detection optocoupler)
	7	K (Detection optocoupler)
Position Optocoupler	2	E (Position optocoupler)
	4	C (Position optocoupler)
	6	A (Position optocoupler)
	8	K (Position optocoupler)

6 Specification

6.1 SMTP0

6.1.1 SMTP0 Specifications

Table 11 SMTP0 Specifications

SMTP0 Specifications					
Specification	Parameter				
Model	50μL	100μL	250μL	500μL	1000μL
Drive Design	4-wire Bipolar Stepping Screw Motor				
Motor Speed	1~3000 pps				
Dispensing Resolution	0.02μL/Step	0.05μL/Step	0.125μL/Step	0.25μL/Step	0.5μL/Step
Full-Stroke Steps	2000 Steps				
Noise	<60 dBA, Indoor Use Only				
Operating Temperature/Humidity	15°C to 40°C and 20% to 95% RH at 40°C, No Condensation				
Storage Temperature/Humidity	-20°C to 65°C and 30% to 85% RH, No Condensation				
Medium Temperature	15°C to 40°C				
Power Requirement	24VDC 500mA				
Dimensions (LxWxH)	6.30 x 1.48 x 1.48 in.				
Weight	300 g				

6.1.2 Pipetting Performance

Table 12 SMTP0 Pipetting Performance

SMTP0 Pipetting Performance				
Tip Size (μL)	Volume(Notel) (μL)	Dispensing Type	Accuracy	Precision
20	2	Single	≤5%	6%
20	5	Single	≤2.5%	1.5%
20	10	Single	≤1.5%	1%
50	5	Single	≤5%	2%
50	10	Single	≤3%	1%
50	50	Single	≤2%	0.75%
200	10	Single	≤5%	2%
200	50	Single	≤2%	0.75%
200	200	Single	≤1%	0.75%
1000	10	Single	≤7.5%	3.5%
1000	100	Single	≤2%	0.75%
1000	1000	Single	≤1%	0.75%
1000	100	Multiple	≤3%	2%

Note:

1: Volumes determined gravimetrically using high-precision balance under controlled conditions: Test temperature: 25 ±2 °C, RH: 50% ±5%, Liquid temperature: ambient ≤±0.5 °C; Balance: Shimadzu AUV120D.

Deionized water with 0.1% NaCl, measured using standard conductive tip. New tip per pump cycle (aspirate/dispense). ≥10 points per volume/pipetting module. Volumes >20μL dispensed via jetting. Volumes ≤20μL dispensed with tip submerged. Results may vary with other liquids/environments.

6.2 SMTPI

6.2.1 SMTPI Specifications

Table 13 SMTPI Specifications

SMTPI Specifications					
Specification	Parameter				
Model	50µL	100µL	250µL	500µL	1000µL
Drive Design	4-wire Bipolar Stepping Screw Motor				
Motor Speed	1~3000 pps				
Dispensing Resolution	0.02µL/Step	0.05µL/Step	0.125µL/Step	0.25µL/Step	0.5µL/Step
Full-Stroke Steps	1000 Steps (Max 1200 steps)				
Pressure LLD Connection	1/4-28 UNF				
Communication (Motor Drive)	RS232, RS485 (only with optional ISC1000 motor drive)				
Noise	<60 dBA, Indoor Use Only				
Operating Temperature/Humidity	15°C to 40°C and 20% to 95% RH at 40°C, No Condensation				
Storage Temperature/Humidity	-20°C to 65°C and 30% to 85% RH, No Condensation				
Medium Temperature	15°C to 40°C				
Power Requirement	24VDC 500mA				
Dimensions (LxWxH)	7.05x 2.03x 1.11 in. [179x51.4 x28 mm]				
Weight	400 g				

6.2.2 Pipetting Performance

Table 14 SMTPI Pipetting Performance

SMTPI Pipetting Performance				
Tip Size (µL)	Volume (µL)	Dispensing Type	Accuracy	Precision
20	2	Single	≤5%	6%
20	5	Single	≤2.5%	1.5%
20	10	Single	≤1.5%	1%
50	5	Single	≤5%	2%
50	10	Single	≤3%	1%
50	50	Single	≤2%	0.75%
200	10	Single	≤5%	2%
200	50	Single	≤2%	0.75%
200	200	Single	≤1%	0.75%
1000	10	Single	≤7.5%	3.5%
1000	100	Single	≤2%	0.75%
1000	1000	Single	≤1%	0.75%
1000	100	Multiple	≤3%	2%

6.3 SMTP2

6.3.1 SMTP2 Specifications

Table 15 SMTP2 Specifications

SMTP2 Specifications	
Specification	Parameter
model	1000 μ L
Drive Design	4-wire Bipolar Stepping Screw Motor
Motor Speed	1-3000 pps
Liquid Level Detector (LLD)	Pressure (pLLD), Capacitance (cLLD), Hybrid (hLLD)
Dispensing Resolution	Standard Mode: 0.319 μ L/Step, 3143 Steps Full Stroke
	High-resolution Mode: 0.02 μ L/Microstep, 48000 Microsteps Full Stroke
Communication Interface	RS232, RS485, CAN
Noise	<60 dBA, Indoor Use Only
Operating Temperature/Humidity	15°C to 40°C and 20% to 95% RH at 40°C, No Condensation
Storage Temperature/Humidity	-20°C to 65°C and 30% to 85% RH, No Condensation
Medium Temperature	15°C to 40°C
Power Requirement	24VDC 500mA
Power Consumption	500 mA (Peak)
Cascading	Max. 16 Pumps Cascaded
Dimensions (HxWxD) (With Cover, Without Tip)	7.45 x 2.37 x 1.28 in. [189 x 60 x 32.5 mm]
Weight	300g

6.3.2 Pipetting Performance

Table 16 SMTP2 Pipetting Performance

SMTP2 Pipetting Performance				
Tip Size (μ L)	Volume (μ L)	Dispensing Type	Accuracy	Precision
20	2	Single	$\leq 5\%$	6%
20	5	Single	$\leq 2.5\%$	1.5%
20	10	Single	$\leq 1.5\%$	1%
50	5	Single	$\leq 5\%$	2%
50	10	Single	$\leq 3\%$	1%
50	50	Single	$\leq 2\%$	0.75%
200	10	Single	$\leq 5\%$	2%
200	50	Single	$\leq 2\%$	0.75%
200	200	Single	$\leq 1\%$	0.75%
1000	10	Single	$\leq 7.5\%$	3.5%
1000	100	Single	$\leq 2\%$	0.75%
1000	1000	Single	$\leq 1\%$	0.75%
1000	100	Multiple	$\leq 3\%$	2%

6.4 SMTP4

6.4.1 SMTP4 Specifications

Table 17 SMTP4 Specifications

SMTP4 Specifications				
Specification	Parameter			
Model	100µL	250µL	500µL	1000µL
Drive Design	4-wire Bipolar Stepping Screw Motor			
Motor Speed	1-3000 pps			
Dispensing Resolution	0.05µL/step	0.125µL/step	0.25µL/step	0.5µL/step
Compatible Tips	Standard: TECAN tips; Customizable per client requirements.			
Tip Mounting Force	30N			
Full Stroke Steps	2000 Steps			
Tip Ejection Steps	550 Steps			
Tip Ejection Force	Tip ejection motor thrust >120N at speed 5r/s.			
Noise	<60 dBA, Indoor Use Only			
Operating Temperature/Humidity	15°C to 40°C and 20% to 95% RH at 40°C, No Condensation			
Storage Temperature/Humidity	-20°C to 65°C and 30% to 85% RH, No Condensation			
Medium Temperature	15°C to 40°C			
Power Requirement	24VDC			
Overall Dimensions	28 x 28 x 161 mm			
Weight	300g			

6.4.2 Pipetting Performance

Table 18 SMTP4 Pipetting Performance

SMTP4 Pipetting Performance			
Tip Size (µL)	Volume (µL)	Accuracy(ACC)	Precision(CV)
20	2	≤5%	6%
20	5	≤2.5%	1.5%
20	10	≤1.5%	1%
50	5	≤5%	2%
50	10	≤3%	1%
50	50	≤2%	0.75%
200	10	≤5%	2%
200	50	≤2%	0.75%
200	200	≤1%	0.75%
1000	10	≤7.5%	3.5%
1000	100	≤2%	0.75%
1000	1000	≤1%	0.75%

7 Selection Guide

Table 19 Selection List

SMTP Series Selection List			
Type	Range	Tip Adapter	Adapter Diameter
SMTP0	1=0050µL	0=LTE019 (19mm)	0=(Default)
	2=0100µL	1=LTE060 (60mm)	
	3=0250µL	2=LTE087 (87mm)	
	4=0500µL	3=LTEM6 (Adapter)	
	5=1000µL		
SMTP1	1=0050µL	0=LTE008 (08mm)	0=(Default)
	2=0100µL	1=LTE045 (45mm)	
	3=0250µL	2=LTE072 (72mm)	
	4=0500µL		
	5=1000µL		
SMTP2	5=1000µL	0=LTE008 (08mm)	0=(Default)
		1=LTE045 (45mm)	
		2=LTE072 (72mm)	
SMTP4	2=0100µL	0=LTE008 (08mm)	0=(Default)
	3=0250µL	1=LTE045 (45mm)	
	4=0500µL	2=LTE072 (72mm)	
	5=1000µL		

Selection Example:

SMTP0-510: SMTP0 series, 1000µL volume, tip adapter extension 60mm.

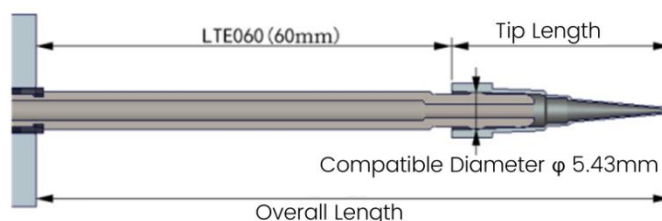


Figure 9 Adapter Diagram

SMTP0-530: SMTP0 series, 1000µL volume, tip adapter with M6 threaded interface.

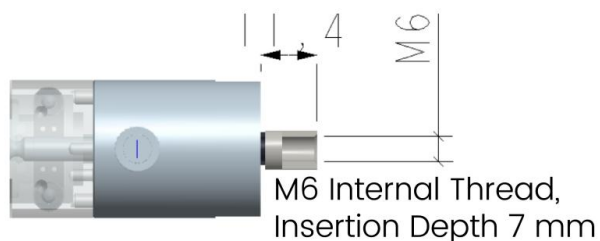


Figure 10 M6 Internal Thread Adapter

Note:

Total length must exceed reagent tube depth.
For optional tip adapters/tips, refer to SMTP Series Ordering Information.

8 Ordering Information

Table 20 Order List

Product Model Information List			
No.	Product Code	Model	Description
1	909001	SMTP0-100	Pipetting SMTP0-100 909001
2	909012	SMTP0-110	Pipetting SMTP0-110 909012
3	909024	SMTP0-120	Pipetting SMTP0-120 909024
4	909025	SMTP0-130	Pipetting SMTP0-130 909025
5	909002	SMTP0-200	Pipetting SMTP0-200 909002
6	909013	SMTP0-210	Pipetting SMTP0-210 909013
7	909026	SMTP0-220	Pipetting SMTP0-220 909026
8	909027	SMTP0-230	Pipetting SMTP0-230 909027
9	909003	SMTP0-300	Pipetting SMTP0-300 909003
10	909014	SMTP0-310	Pipetting SMTP0-310 909014
11	909022	SMTP0-320	Pipetting SMTP0-320 909022
12	909021	SMTP0-330	Pipetting SMTP0-330 909021
13	909004	SMTP0-400	Pipetting SMTP0-400 909004
14	909015	SMTP0-410	Pipetting SMTP0-410 909015
15	909028	SMTP0-420	Pipetting SMTP0-420 909028
16	909029	SMTP0-430	Pipetting SMTP0-430 909029
17	909005	SMTP0-500	Pipetting SMTP0-500 909005
18	909016	SMTP0-510	Pipetting SMTP0-510 909016
19	909030	SMTP0-520	Pipetting SMTP0-520 909030
20	909031	SMTP0-530	Pipetting SMTP0-530 909031
21	909006	SMTP1-100	Pipetting SMTP1-100 909006
22	909032	SMTP1-110	Pipetting SMTP1-110 909032
23	909033	SMTP1-120	Pipetting SMTP1-120 909033
24	909007	SMTP1-200	Pipetting SMTP1-200 909007
25	909034	SMTP1-210	Pipetting SMTP1-210 909034
26	909035	SMTP1-220	Pipetting SMTP1-220 909035
27	909008	SMTP1-300	Pipetting SMTP1-300 909008
28	909023	SMTP1-310	Pipetting SMTP1-310 909023
29	909019	SMTP1-320	Pipetting SMTP1-320 909019
30	909009	SMTP1-400	Pipetting SMTP1-400 909009
31	909036	SMTP1-410	Pipetting SMTP1-410 909036
32	909037	SMTP1-420	Pipetting SMTP1-420 909037
33	909010	SMTP1-500	Pipetting Pump SMTP1-500 909010
34	909017	SMTP1-510	Pipetting Pump SMTP1-510 909017
35	909038	SMTP1-520	Pipetting Pump SMTP1-520 909038
36	909011	SMTP2-500	Pipetting Pump SMTP2-500 909011
37	909018	SMTP2-510	Pipetting Pump SMTP2-510 909018
38	909020	SMTP2-520	Pipetting Pump SMTP2-520 909020
39	729003	SMTP2-CK	SMTP2 Protective Cover-side-mounted
40	729005	SMTP2-W	Power and Signal Cable Set, Lead Wire 200mm
41	729006	SMTP2-BK	SMTP2 Protective Cover-rear-mounted
42	909064	SMTP4 100 μ L	Pipetting Pump SMTP4 100 μ L 909064
43	909069	SMTP4 500 μ L	Pipetting Pump SMTP4 500 μ L 909069

44	909070	SMTP4-210	Pipetting Pump SMTP4-210 909070
45	909078	SMTP4-220	Pipetting Pump SMTP4-220 909078
46	909075	SMTP4-410	Pipetting Pump SMTP4-410 909075
47	909080	SMTP4-420	Pipetting Pump SMTP4-420 909080
48	909089	SMTP4-520	Pipetting Pump SMTP4-520 909089

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