sartorius

Proline® pipette

User Manual
Bedienungsanleitung
Mode d'emploi
Manual Usuario
Instruzioni d'impiego
Инструкция пользователя

Proline® pipette

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Obs: Manual på svenska kan du ladda ner på adressen www.sartorius.com

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1. Intended use

Proline pipette is intended to be used in liquid handling applications for dispensing liquids in total volume range from 0,1 µl to 5 ml. It is recommended to use Optifit Tips or SafetySpace™ Filter tips to ensure the best compatibility and performance with Sartorius pipettes.

This liquid handling device is designed and manufactured to be used as general purpose laboratory equipment. Before operating it is recommended to read the user manual, which contains useful information e.g. for good pipetting practice.

2. Product description

Your new Proline hand-held pipette is a general purpose pipette, for the accurate and precise sampling and dispensing of liquid volumes. All Proline pipettes operate on the basis of the air displacement principle and use disposable tips.

The range of Sartorius Proline pipettes cover a volume range from 0.1 µl to 5 ml.

2.1. Sartorius Proline adjustable volume pipettes

Single channel pipettes:

Cat. No.	Volume Range/µl	Increment / µl	Tip/ µl	Safe-Cone Filters 50 pcs/bag	
				Standard	Plus
720010	0.1-2.5	0.05	10	-	-
720015	0.5-10	0.1	10, 200	-	-
720080	2-20	0.5	200	721008	721018
720025	5-50	0.5	200, 350	721008	721018
720050	10-100	1	200, 350	721007	721017
720070	20-200	1	200, 350	721007	721017
720060	100-1000	5	1000	721006	721016
720110	1000-5000	50	5000	721005	721015

Multichannel pipettes:

Cat. No.	Volume Range/ µl	Increment / µl	Tip/ µl	Safe-Cone Filters 50 pcs/bag Standard
720210	8-ch 0.50-10	01	10	-
720220	8-ch 5-50	0.5	200, 350	721014
720240	8-ch 50-300	5	350	721014
720310	12-ch 5-10	0.1	10	-
720320	12-ch 5-50	0.5	200, 350	721014
720340	12-ch 50-300	5	350	721014

2.2. Sartorius Proline fixed volume pipettes

Single channel pipettes:

Cat. No.	Volume Range/µl	Tip/ µl	Safe-Cone Filters 50 pcs/bag	
			Standard	Plus
722001	5	10, 200	-	-
722004	10	10, 200	-	-
722010	20	200, 350	721008	721018
722015	25	200, 350	721008	721018
722020	50	200, 350	721008	721018
722025	100	200, 350	721007	721017
722030	200	200, 350	721007	721017
722035	250	1000	721006	721016
722040	500	1000	721006	721016
722045	1000	1000	721006	721016
722050	2000	5000	721005	721015
722055	5000	5000	721005	721015

2.3. Sartorius pipette tips

Sartorius pipette tips are recommended for use with Proline® Plus pipettes. The use of fully compatible tips will ensure the maximal pipetting accuracy and precision, and thereby guarantee the performance specifications given for the pipette. Sartorius tips are made of pure virgin polypropylene and manufactured in protected clean room conditions.

Sartorius offers a full range of standard Optifit, and SafetySpace™ Filter tips. Sartorius non-filter tips are available in trays, bulk packages and space-saving refill systems. Sartorius non-filtered tips and trays are autoclavable at 121°C (252F),

20 min, 1 bar (15 p.s.i). All Single Tray Racks and clean Refill Packs are certified RNase, DNase and endotoxin-free.

For more information, please go to www.sartorius.com or contact your local Sartorius support.

3. Unpacking

The pipette package contains the following items:

1. Pipette
2. Calibration/Opening tool
3. Grease
4. Instructions for use
5. Pipette holder
6. Tip
7. Filters (pipettes > 10 µl)
8. Performance certificate according to ISO 8655-6

4. Installing the pipette holder

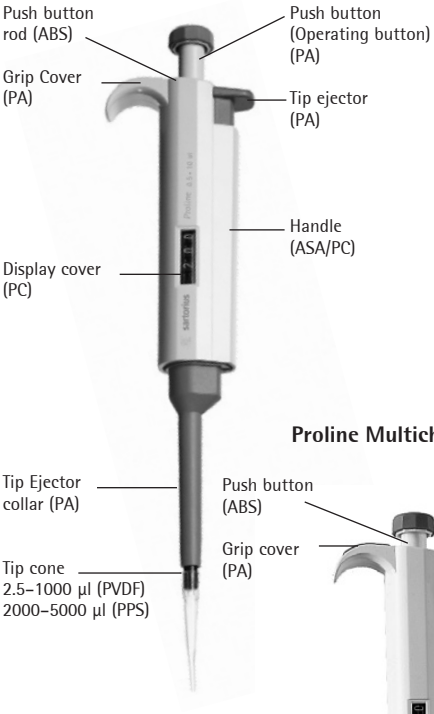
For convenience and safety always keep the pipette vertically on its own holder when not in use. When installing the holder, please follow the instructions below:

1. Clean the shelf surface with ethanol.
2. Remove the protective paper from the adhesive tape
3. Install the holder as described.
   (Make sure the holder is pressed against the edge of the shelf.)
4. Place the pipette onto the holder.

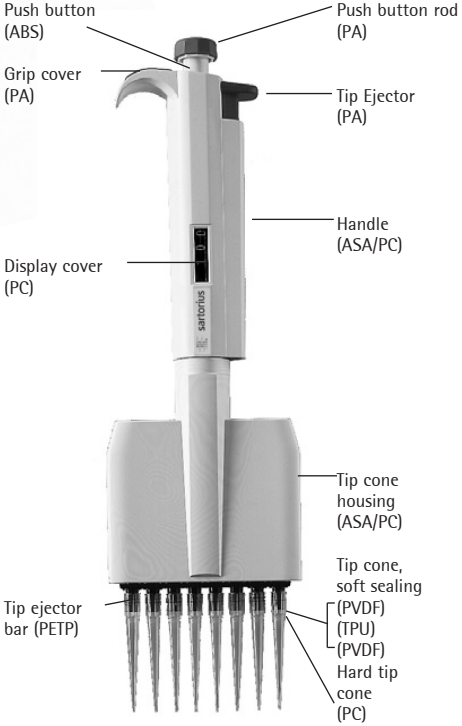
NOTE: An ergonomic, convenient carousel stand for 6 Proline pipettes is also available (Cat. No.725600).

5. Pipette Materials

Proline Single Channel



Proline Multichannel



6. Operating the pipette

6.1. Volume setting

The volume of the pipette is clearly shown through the handle display window. The delivery volume (variable volume pipettes only) is set by turning the operating button clockwise or anticlockwise. When setting the volume, please make sure that:

1. The desired delivery volume clicks into place.
2. The digits are completely visible in the display window.
3. The selected volume is within the pipette's specified range.

Do not turn the operating button outside the volume range because it may jam the mechanism and damage the pipette.

6.2. Sealing and ejecting tips

Sartorius tips are recommended for use with Proline pipettes. Before fitting a tip ensure that the pipette tip cone is clean. Press the tip on the cone of the pipette firmly to ensure an airtight seal. The seal is tight when a visible sealing ring forms between the tip and the black tip cone.

Each pipette is fitted with a tip ejector to help eliminate the safety hazards associated with contamination. The tip ejector needs to be pressed firmly downwards to ensure proper tip ejection. Make sure that the tip is disposed of into a suitable waste container.

6.3. Two-in-one pipettes

The Proline fixed volume pipettes 5 and 10 µl, and variable volume pipettes 0.5-10 µl can be used with both 10 µl and 200 µl tips. The pipettes are supplied with two ejector collars and are factory fitted with the ejector suitable for 10 µl tips. When using 200 µl tips, please change the ejector collar by following the instructions below:

1. Push the tip ejector down (1.).
2. Push the opening tool pin between the ejector bar and ejector collar to release the locking mechanism (2.).
3. Pull the ejector collar off (3.).
4. Install the ejector collar by pushing the collar locking pin into the ejector bar hole, keeping the tip ejector pushed down.

5. Release the tip ejector and test that it runs smoothly.

6.4. Protective filters

The new tip cones of Sartorius pipettes (>10 µl) allow the use of a exchangeable filter as an option. The filter prevents liquids and aerosols from entering the pipette. Two types of filters are available: a Safe-Cone Filter Standard and a Safe-Cone Filter Plus (see cat.no. in Chapter 2.1). Plus filters block the passage of liquids completely. The filters do not affect the calibration of the pipette.

NOTE: Change the filter on the tip cone regularly (after 50-250 pipettings).

7. Pipetting techniques

1. Make sure that the pipette, tips and the liquid are at the same temperature.
2. Make sure that the tip is firmly attached to the tip cone.
3. Hold the pipette vertically when aspirating the liquid and place the tip only a few millimetres into the liquid.
4. Prerinse the tip before aspirating the liquid by filling and emptying the tip 5 times. This is important especially when dispensing liquids which have a viscosity and density different from water.
5. Always control the operating button movements with the thumb to ensure consistency.

7.1. Forward pipetting

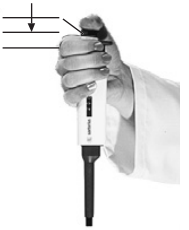
This technique employs the blow-out function ensuring complete delivery of the liquid.

1. Depress the operating button to the first stop.
2. Place the tip(s) just under the surface of the liquid (2-3 mm) and smoothly release the operating button up to the starting position. Carefully withdraw the tip from the liquid, touching against the edge of the container to remove excess.
3. Liquid is dispensed by gently depressing the operating button to the first stop. After a short delay continue to depress the operating button to the second stop (= blow-out). This

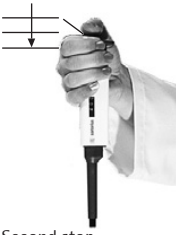
Starting position

procedure will empty the tip(s) and ensure accurate delivery.

4. Release the operating button to the starting position. If necessary change the tip(s) and continue pipetting.



First stop



Second stop

7.2. Reverse pipetting

A selected volume plus an excess is aspirated into the tip. The delivery is done without blow-out, and so the excess volume remains in the tip. The reverse technique is recommended for high viscosity, biological or foaming liquids, or very small volumes of liquid.

1. Depress the operating button all the way to the second stop. Place the tip(s) just under the surface of the liquid (2-3 mm) and smoothly release the operating button up to the starting position.
2. Withdraw the tip(s) from the liquid touching against the edge of the container to remove excess.
3. Deliver the preset volume by smoothly depressing the operating button to the first stop. Hold the operating button at the first stop. The liquid that remains in the tip(s) should not be included in the delivery.
4. The remaining liquid should now be discarded with the tip(s) or delivered back into the container vessel.

NOTE: If reverse pipetting technique is used the pipette might need recalibration.

8. Storage

When not in use it is recommended that your Proline pipette is stored in a vertical position. See Installing the pipette holder (Chapter 4).

9. Testing the performance and recalibration

It is recommended to check the performance of your pipettes regularly (e.g. every 3 months) and always after in-house maintenance. However, the user should establish a regular testing routine for their pipettes with regard to accuracy

requirements of the application, frequency of use, number of operators using the pipette, nature of the liquid dispensed and the acceptable maximum permissible errors established by the user. (ISO 8655-1.)

9.1. Testing the performance

Performance testing should take place in a draught-free room at 15 – 30°C, constant to +/- 0.5°C and humidity above 50%. The pipette, tips and the test water should have stood in the test room a sufficient time (at least 2 hours) to reach equilibrium with the room conditions. Use distilled or deionised water (grade 3, ISO 3696). Use an analytical balance with a readability of 0.01 mgs. (ISO 8655-6.)

Weighing

1. Adjust the desired test volume V_s.
2. Carefully fit the tip onto the tip cone.
3. Fill the tip with test water and expel to waste five times to reach a humidity equilibrium in the dead air volume.
4. Replace the tip. Pre-wet the tip by filling it once with test water and expel to waste.
5. Aspirate the test water, immersing the tip only 2-3 mm below the surface of the water. Keep the pipette vertical.
6. Withdraw the pipette vertically and touch the tip against the inside wall of the test water container.
7. Pipette the water into the weighing vessel, touching the tip against the inside wall of the vessel just above the liquid surface at an angle of 30° to 45°. Withdraw the pipette by drawing the tip 8-10 mm along the inner wall of the weighing vessel.
8. Read the weight in mgs (m_i).
9. Repeat the test cycle until 10 measurements have been recorded.
10. Convert the recorded masses (m_i) to volumes (V_i)
    $V_i = m_i Z$ Z = correction factor (Table 1)
11. Calculate the mean volume ($\bar{V}$) delivered:
    $\bar{V} = (\sum V_i)/10$
12. For conformity evaluation calculate the systematic error e_s of the measurement:

    in µl: $e_s = \bar{V} - V_s$ V_s = selected test volume

    or in %: $e_s = 100 (\bar{V} - V_s)/V_s$
13. For conformity evaluation calculate the random error of the measurement:

as standard deviation $s = \sqrt{\frac{\sum(V_i - \overline{V})^2}{n - 1}}$

n = number of measurement (10)

or as coefficient of variation $CV = 100s/\overline{V}$

14. Compare the systematic error (inaccuracy) and random error (imprecision) with the values in the performance specifications - (p. 88) or the specifications of your own laboratory.
    If the results fall within the specifications, the pipette is ready for use. Otherwise check both systematic and random errors and, when necessary, proceed to the recalibration procedure (Chapter 9.2).

NOTE: Systemic error (inaccuracy) is the difference between the dispensed volume and the selected test volume. Random error (imprecision) is the scatter of the dispensed volumes around the mean of the dispensed volume. (ISO 8655-1.)

NOTE: Sartorius specifications are achieved in strictly controlled conditions (ISO 8655-6). The user should establish own specifications based on the field of use and the accuracy requirements placed on the pipette (ISO8655-1).

Table 1

Z-values (µl/mg):

Temp. (°C)	Air Pressure (kPa)			
	95	100	101.3	105
20.0	1.0028	1.0028	1.0029	1.0029
20.5	1.0029	1.0029	1.0030	1.0030
21.0	1.0030	1.0031	1.0031	1.0031
21.5	1.0031	1.0032	1.0032	1.0032
22.0	1.0032	1.0033	1.0033	1.0033
22.5	1.0033	1.0034	1.0034	1.0034
23.0	1.0034	1.0035	1.0035	1.0036
23.5	1.0036	1.0036	1.0036	1.0037

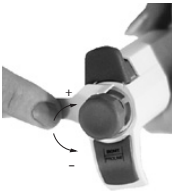
NOTE: This method is based on ISO 8655.

9.2. Recalibration procedure

1. Place the calibration tool into the holes of the calibration adjustment lock (under the operating button).
2. Turn the adjustment lock anticlockwise to decrease and clockwise to increase the volume.
3. Repeat Performance test (Chapter 9.1.) procedure from step 1 until the pipetting results are correct.

10. Maintenance

To maintain the best results from your pipette each unit should be checked every day for cleanliness. Particular attention should be paid to the tip cone(s).



Proline pipettes have been designed for easy in-house service. However, Sartorius also provides complete repair and recalibration service including a service report and performance certificate(s). Please return your pipette to your local representative for repair or performance test/ recalibration. Before returning please make sure that it is free from all contamination. Please advise our Service Representative of any hazardous materials which may have been used with your pipette.

NOTE: Check the performance of your pipette regularly e.g. every 3 months and always after in-house service or maintenance.

10.1. Daily cleaning of the outer surface of the pipette

Your Proline pipette should be checked every day for cleanliness. To clean and decontaminate the outer surface of your pipette use ethanol (70%), isopropanol (60%) or a mild detergent and a soft lint-free cloth.

Gently clean the surface of the pipette with moistened cloth and wipe dry. Pay special attention to the tip cone. Change the tip cone filter if needed.

10.2. In-house maintenance

1. Hold down the tip ejector.
2. Place the tooth of the opening tool between the tip ejector and the tip ejector collar to release the locking mechanism.
3. Carefully release the tip ejector and remove the tip ejector collar.
4. Place the wrench end of the opening tool over the tip cone, turning it anticlockwise. Do not use any other tools. The 5 ml tip cone is removed by turning it anticlockwise without any tools.
5. Remove the tip cone, piston, and spring. Remove the filter if fitted.
6. Clean the tip ejector collar, the tip cone holder, the tip cone (cylinder) and the piston with ethanol (70%), isopropanol (60%) or mild detergent and soft lint-free cloth.
7. Clean the interior of the tip ejector collar and the tip cone (cylinder) with a cotton swab.
8. Before replacing the tip cone it is recommended to grease the piston and O-ring slightly by using the silicone grease provided.
9. After reassembling press the operating button several times to ensure that the grease has spread evenly.
10. Check the pipette calibration.

NOTE: On models 720010, 720015, 722001 and 722004 (10 µl pipettes) the O-ring cannot be accessed for maintenance.

NOTE: Excessive use of grease may jam the piston.

11. Troubleshooting

Symptom	Possible cause	Solution
Droplets left inside the tip	Unsuitable tip	Use original Sartorius tips
	Non-uniform wetting of the tip plastic	Attach new tip
Leakage or pipetted volume too small	Tip incorrectly attached	Attach firmly
	Unsuitable tip	Use original Sartorius tips
	Foreign particles between tip and cone	Clean the tip cone, attach new tip
	Instrument contaminated	Clean and grease O-ring and piston, clean the tip cone
	Insufficient amount of grease on piston and O-ring	Grease accordingly
	O-ring not correctly positioned or damaged	Change the O-ring
	Incorrect operation	Follow instructions carefully
	Calibration altered or unsuitable for the liquid	Recalibrate according to instructions
	Instrument damaged	Send for service
Push button jammed or moves erratically	Piston contaminated	Clean and grease O-ring and piston, clean the tip cone
	Penetration of solvent, vapours	Clean and grease O-ring and piston, clean the tip cone
Pipette blocked, aspirated volume too small	Liquid has penetrated tip cone and dried	Clean and grease O-ring and piston, clean the tip cone
Tip ejector jammed or moves erratically	Tip cone and/or ejector collar contaminated	Clean the tip cone and the ejector collar

12. Warranty information

The Proline pipettes are covered by warranty for 2 years against defects in materials and workmanship. Should your pipette fail to function at any time, please contact your local Sartorius representative.

ANY WARRANTY WILL, HOWEVER, BE DEEMED AS VOID IF FAULT IS FOUND TO HAVE BEEN CAUSED BY MALTREATMENT, MISUSE, UNAUTHORIZED MAINTENANCE OF SERVICE OR NEGLIGENCE OF REGULAR MAINTENANCE AND SERVICE, ACCIDENTAL DAMAGE, INCORRECT STORAGE OR USE OF THE PRODUCTS FOR OPERATIONS OUTSIDE THEIR SPECIFIED LIMITATIONS, OUTSIDE THEIR SPECIFICATIONS, CONTRARY TO THE INSTRUCTIONS GIVEN IN THIS MANUAL OR WITH OTHER THAN THE MANUFACTURER'S ORIGINAL TIPS.

Each pipette is tested before shipping by the manufacturer. The Sartorius Quality Assurance Procedure guarantees that the Sartorius Proline pipette you have purchased is ready for use.

Specifications

Proline Single Channel Adjustable Volume Pipette

Cat.No.	Volume range/µl	Volume µl	Inaccuracy %	Imprecision %
720005	0.1-2.5	2.50	2.50	2.00
		1.25	3.00	3.00
		0.25	12.00	6.00
720000	0.5-10	10	1.00	0.80
		5	1.50	1.50
		1	2.50	1.50
720080	2-20	20	0.90	0.40
		10	1.20	1.00
		2	3.00	2.00
720020	5-50	50	0.60	0.30
		25	0.90	0.60
		5	2.00	2.00
720050	10-100	100	0.80	0.20
		50	1.00	0.40
		10	3.00	1.00
720070	20-200	200	0.60	0.20
		100	0.80	0.30
		20	2.50	0.80
720060	100-1000	1000	0.60	0.20
		500	0.70	0.25
		100	2.00	0.70
720110	1-5	5	0.50	0.20
		2.5	0.60	0.30
		1	0.70	0.30

Proline Multichannel Adjustable Volume Pipettes

Cat.No.	Volume range/µl	Volume µl	Inaccuracy µl	Imprecision µl
720210	8-ch 0.5-10	10	1.50	1.50
		5	2.50	2.50
		1	4.00	4.00
720220	8-ch 5-50	50	1.00	0.50
		25	1.50	1.00
		5	3.00	2.00
720240	8-ch 50-300	300	0.70	0.25
		150	1.00	0.50
		50	1.50	0.80
720310	12-ch 0.5-10	10	1.50	1.50
		5	2.50	2.50
		1	4.00	4.00
720320	12-ch 5-50	50	1.00	0.50
		25	1.50	1.00
		5	3.00	2.00
720340	12-ch 50-300	300	0.70	0.25
		150	1.00	0.50
		50	1.50	0.80

Proline Fixed Volume Pipettes

Cat.No.	Volume range/µl	Volume µl	Inaccuracy µl	Imprecision µl
722001	5	5	1.30	1.20
722004	10	10	0.80	0.80
722010	20	20	0.60	0.50
722015	25	25	0.50	0.30
722020	50	50	0.50	0.30
722025	100	100	0.50	0.30
722030	200	200	0.40	0.20
722035	250	250	0.40	0.20
722040	500	500	0.30	0.20
722045	1000	1000	0.30	0.20
722050	2000	2000	0.30	0.15
722055	5000	5000	0.30	0.15

Liquid:	Distilled water (grade 3, ISO 3696)
Reference temperature:	22°C. constant to ± 0.5°C
Tested:	According to ISO 8655 using original Sartorius Optifit Tips

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