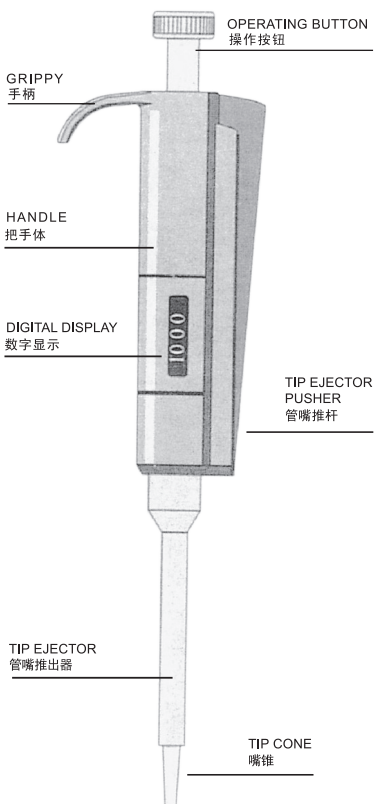


PIPETTE COLOUR

INSTRUCTIONS FOR USE

可调试移液器使用说明书



ENGLISH

PRODUCT DESCRIPTION	3
PIPETTE OPERATION	4
PIPETTING TECHNIQUES	4
MAINTENANCE	7
CALIBRATION	8
PACKAGE	11
TROUBLE SHOOTING	11
FIGURES	19
SPARE PARTS	23

中文

产品简介	12
移液器操作	12
移液技术	13
保养	14
校准	15
包装	17
故障排除	18
示意图	19
产品零部件	23

PRODUCT DESCRIPTION

The PIPETTE is a continuously adjustable, general purpose micropipette for sampling and dispensing accurate liquid volumes.

It operates on an air displacement principle (i.e. an air interface) and uses detachable, disposable tips.

The adjusted delivery volume is displayed digitally on a readout window in the handle.

PIPETTE covers a volume range of 0,5-5000 μ l with seven different models.

Order No.	Volume Range		
72141031	0,5 μ l	to	10 μ l
72141041	2 μ l	to	20 μ l
72141051	5 μ l	to	50 μ l
72141061	10 μ l	to	100 μ l
72141071	20 μ l	to	200 μ l
72141081	100 μ l	to	1000 μ l
72141101	1ml	to	5ml

RAW MATERIALS

The PIPETTE is made of mechanically durable and chemically resistant materials.

DESCRIPTION OF TIPS

Finntips are recommended for use with the PIPETTE

They are made of natural coloured polypropylene, generally regarded as the only contamination free material suitable for tips.

Finntips are also autoclavable (121 $^{\circ}$ C).

Following accessories are useful with handling of pipettes and pipetting of reagents:

Stand

66031001

DIGITAL DISPLAY (Fig.1)

The adjusted delivery volume is clearly indicated by a digital display on the pipette handle.

PIPETTE OPERATION

SETTING THE DELIVERY VOLUME (Fig.2)

1. The delivery volume is set using the operating button on the top of the pipette.

To increase the delivery volume turn the operating button anticlockwise. To decrease turn it clockwise.

2. Ensure that the desired delivery volume clicks into place and that the digits for the volume are completely visible on the handle display.

3. Do not set volumes outside of the pipette's specified volume range! Using excessive force to turn the push button outside the range may jam the mechanism and eventually cause defects.

TIP EJECTION (Fig.3)

Each pipette is fitted with a tip ejector system to eliminate the risk of contamination.

The tip ejector system consists of a tip ejector plunger, spring, spring support and tip ejector bushing.

Direct the pipette towards a suitable waste receptacle and press the tip ejector plunger with your thumb thus disposing the tip safely.

PIPETTING TECHNIQUES

FIGURES 4-7:

A = READY POSITION

B = FIRST STOP

C = SECOND STOP

The operation of the pipette is controlled by the operating button. For the best possible accuracy:

Push and release the button slowly at all times, particularly when working with liquids that have a high viscosity. Never allow the operating button to snap back. Ensure that a clean tip is firmly pushed on to the tip cone of the pipette and there are no foreign particles in the tip itself.

Wet the newly attached tip with the solution being pipetted before any actual pipetting takes place.

This is done by filling and emptying the tip 2-3 times.

Hold the pipette vertically during the liquid intake with the "Grippy" resting on the index finger.

The temperature of the tip and pipette should be equalized to that of the solution.

FORWARD TECHNIQUE (Fig.4)

Fill a clean reagent reservoir with the liquid to be dispensed.

1. Depress the operating button to the first stop.
2. Dip the tip under the surface of the liquid in the reservoir about 1cm deep and slowly release the operating button. Withdraw the tip from the liquid touching it against the edge of the reservoir to remove excess liquid.
3. Deliver the liquid by gently depressing the operating button to the first stop. After a delay of about one second, continue to depress the operating button all the way down to the second stop. This action will empty the tip.
4. Release the operating button to the ready position.

If necessary, change the tip and continue with the pipetting.

REVERSE TECHNIQUE (Fig.5)

The reverse technique is suitable for dispensing liquids having high viscosity or a tendency to foam easily. The technique is also recommended for dispensing very small volumes.

Fill a clean reagent reservoir with the liquid to be dispensed.

1. Depress the operating button all the way down to the second stop.
2. Dip the tip under the surface of the liquid in the reservoir about 1cm deep and slowly release the operating button. This action will fill the tip. Withdraw the tip from the liquid touching it against the edge of the reservoir to remove excess liquid.
3. Deliver the preset volume by gently depressing the operating button to the first stop.

ENGLISH

Hold the operating button at the first stop. Some liquid will remain in the tip and should not be included in the delivery.

4. The remaining liquid is either discarded with the tip or pipetted back into the container.

REPETITIVE TECHNIQUE (Fig.6)

The repetitive technique offers a rapid and simple procedure for repeated delivery of the same volume.

Fill a clean reagent reservoir with the liquid to be dispensed.

1. Depress the operating button all the way down to the second stop.

2. Dip the tip under the surface of the liquid in the reservoir about 1cm deep and slowly release the operating button. This action will fill the tip. Withdraw the tip from the liquid touching against the edge of the reservoir to remove excess liquid.

3. Deliver the preset volume by gently depressing the operating button to the first stop. Hold the operating button at the first stop. Some liquid will remain in the tip and should not be included in the delivery.

4. Continue pipetting by repeating the steps 2 and 3.

PIPETTING WHOLE BLOOD (Fig.7)

(e.g. deproteinization in blood glucose determination)

Use forward technique procedures 1 and 2 to fill the tip with blood.

Wipe the tip carefully with a dry clean tissue.

1. Immerse the tip into the reagent and depress the push button to the first stop, making sure the tip is well below the surface.

2. Release the push button slowly to the ready position.

The tip has been filled with reagent. Do not lift the tip out of the solution.

3. Depress the push button to the first stop and release slowly.

Keep repeating this procedure until the interior wall of the tip is clear.

4. Finally, depress the push button all the way to the second stop to completely empty the tip.

MAINTENANCE

When the PIPETTE is not in use make sure it is safely stored in a vertical position. We recommend PIPETTE stand for this purpose.

SHORT TERM CHECKING

The pipette should be checked at the beginning of each day for dust and dirt on the outside surfaces of the pipette. Particular attention should be paid to the tip cone. No other solvents except 70% ethanol should be used for cleaning the pipette.

LONG TERM MAINTENANCE

0,5-1000 µl (Fig.8)

If the pipette is used daily it should be checked at least twice a year. The servicing procedure starts with disassembly of the pipette.

1. Depress the tip ejector pusher.
2. Insert the tooth of the service tool into the opening at the base of the tip ejector pusher.
3. Pull away the tip ejector shaft and tip ejector pusher.
4. Remove the tip cone by turning it counter clock wise with the service tool.
5. Pull out the piston.
6. Remove the O-ring from the tip cone. In model 5-50 µl the O-ring is located deep inside the tip cone. It can be removed by using the thin end of the piston.
- In model 0,5-10 µl the O-rings cannot be changed. We recommend to regrease the piston only.
7. Clean the piston, the piston spring and the O-ring with a dry napless cloth.
8. Check the cylinder for foreign particles.
9. Grease the cleaned parts with lubricant provided in the package.
10. Reassemble the parts.

1-5 ml (Fig.9)

1. Insert the tooth of the service tool into the opening at the base of the tip ejector pusher.
2. Pull away the tip ejector and tip ejector pusher.
3. Remove the cover.
4. Remove the cylinder by pressing with maintenance pliers.

ENGLISH

5. Pull out the piston.
6. Remove the O-ring from the piston.
7. Clean the piston, the piston spring and the O-ring with a dry napless cloth.
8. Check the cylinder for foreign particles.
9. Grease the cleaned parts with lubricant provided in the package.
10. Reassemble the parts.
11. Check the calibration according to instructions.

CALIBRATION

All PIPETTE are factory calibrated and adjusted to give the volumes as specified with distilled or deionized water. Normally, the pipettes do not need adjustment, but they are constructed to permit recalibration and adjustment for liquids of different temperature and viscosity.

DEVICE REQUIREMENTS AND TEST CONDITIONS

An analytical balance must be used. The scale graduation value of the balance should be chosen according to the selected test volume of the pipette.

Volume range	readable graduation
---------------------	----------------------------

under 10 μl	0.001 mg
10-100 μl	0.01 mg
above 100 μl	0.1 mg

Test liquid: Water, distilled or deionized, "grade 3" water conforming ISO 3696. Tests are done in a draft-free room at a constant ($\pm 0.5^\circ\text{C}$) temperature of water, pipette and air between 20°C to 25°C . The relative humidity must be above 55%. Especially with volumes under 50 μl the air humidity should be as high as possible to reduce the effect of evaporation loss. Special accessories, such as the evaporation trap, are recommended.

CHECKING THE CALIBRATION

The pipette is checked with the maximum volume (nominal volume) and with the minimum volume or 10% of maximum volume, whichever is higher.

E.g. Finn timer 0.5-10 μl is tested at 10 μl and 1 μl . A new tip is first pre-wetted 3-5 times and a series of ten pipettings are done with both volumes.

A pipette is always adjusted for delivery (Ex) of the selected volume. Measuring volumes taken from balance is not allowed. If the calculated results are in the limits, the calibration of the pipette is correct.

Procedure:

1. Do 10 pipettings with the minimum volume.
2. Do 10 pipettings with the maximum volume.
3. Calculate the accuracy (A) and precision (cv) of both series.
4. Compare the results to the limits in the Table 1.

If the results are in the limits of Table 1, then the calibration of the pipette is correct. Otherwise the pipette must be adjusted and checked again.

Range	Voume	Accuracy		Precision	
	µl	µl	%	s.d*µl	cv%
0,5-10µl	10	±0.10	±1.0	0.08	0.8
	1	±0.035	±3.5	0.03	3.0
2-20µl	20	±0.18	±0.9	0.08	0.4
	2	±0.06	±3.00	0.04	2.0
5-50µl	50	±0.30	±0.6	0.15	0.3
	5	±0.15	±3.0	0.13	2.5
10-100µl	100	±0.8	±0.8	0.2	0.2
	10	±0.3	±3.00	0.1	1.0
20-200µl	200	±1.2	±0.6	0.4	0.2
	20	±0.6	±3.0	0.3	1.5
100-1000µl	1000	±5.0	±0.5	2.0	0.2
	100	±1.5	±1.5	0.6	0.6
1-5ml	5000	±25.0	±0.5	10.0	0.2
	1000	±15.0	±1.5	5.0	0.5

ADJUSTMENT (Fig.10)

Adjustment is done with the service tool.

1. Place the service tool into the openings of the calibration nut at the top of the handle.
2. Turn the service tool clockwise to increase, or counterclockwise to decrease the volume.
3. After adjustment check the calibration according to the instructions above.

FORMULAS FOR CALCULATING RESULTS

Conversion of mass to volume

$$V = (w + e) \times Z$$

v= volume (µl)

w = weight (mg)

e = evaporation loss (mg)

z = conversion factor for mg/ µl
conversion

ENGLISH

Evaporation loss can be significant with low volumes. To determine mass loss, dispense water to the weighing vessel, note the reading and start a stopwatch. See how much the reading decreases during 30 seconds (e.g. 6 mg = 0.2 mg/s). Compare this to the pipetting time from taring to reading. Typically pipetting time might be 10 seconds and the mass loss is 2 mg (10s x 0.2mg/s) in this example. If an evaporation trap or lid on the vessel is used the correction of evaporation is usually unnecessary. The factor Z is for converting the weight of the water to volume at test temperature and pressure. A typical value is 1.0032 μl /mg at 22°C and 95 kPa. See the conversion table on page 39.

Accuracy (systematic error)

Accuracy is the difference between the dispensed volume and the selected volume of a pipette.

$$A = \bar{V} - V_0$$

A = accuracy
 \bar{V} = mean volume
 V_0 = nominal volume

Accuracy can be expressed as a relative value:

$$A\% = 100\% \times A / V_0$$

Precision (random error)

Precision refers to the repeatability of the pipettings. It is expressed as standard deviation (s) or coefficient of variation (cv)

$$S = \sqrt{\frac{\sum_{i=1}^n (V_i - \bar{V})^2}{n-1}}$$

s = standard deviation

\bar{V} = mean volume

n = number of measurements

cv is the relative value of standard deviation.

$$cv = 100\% \times s / \bar{V}$$

CAUTION!

The PIPETTE is designed to allow easy in-lab service. If you, however, want to send the pipette to us or to our local representative for service, please, enclose a list of any infectious, radioactive or otherwise hazardous materials that have been pipetted. Also, please, note that the postal authorities in your country may limit the sending of contaminated material by mail.

PACKAGE

The PIPETTE is shipped in a custom made, cardboard package. The package contains the following items:

1. The pipette
2. Sample of Finntip
3. Identification Stickers
4. Instruction Manual

TROUBLE SHOOTING

The accompanying table is a guide to possible problems and their solutions.

Defect	Possible reason	Solution
Leakage	Tip incorrectly attached	Attach firmly
	Foreign bodies between tip and tip cone	Clean tip cones attach new tips
	Foreign bodies between the piston, the O-ring and the cylinder	Clean and grease O-ring and cylinder. Use grease
	Insufficient amount of grease on cylinder and O-ring	Grease accordingly
Inaccurate dispensing	O-ring damaged	Change the O-ring
	Incorrect operation	Follow instructions carefully
	Tip incorrectly attached	Attach firmly
Inaccurate dispensing with certain liquids	Calibration altered: caused e.g. by misuse	Recalibrate according to instructions
	Unsuitable calibration. High viscosity liquids may require recalibration.	Recalibrate with the liquids in question.

中文

产品简介

彩色移液器（彩色可调式移液器）是一种连续可调的通用微量移液器，适用于液体的精确取样和转移。

彩色移液器是采用空气置换原理（即空气界面置换）。利用可拆卸一次应用的管嘴转移液体。已设定的移液量可在把手柄的读数窗上显示。

彩色移液器有七种规格，适应移液范围为0.5 μ l~5ml。

移液器 代码	量程范围	刻度增量
72141031	0.5-10 μ l	0.1 μ l
72141041	2-20 μ l	0.5 μ l
72141051	5-50 μ l	0.5 μ l
72141061	10-100 μ l	1 μ l
72141071	20-200 μ l	1 μ l
72141081	100-1000 μ l	5 μ l
72141101	1-5ml	5 μ l

原材料

彩色移液器采用高机械强度和抗化学腐蚀材料制成。

管嘴

建议该可调式移液器使用我公司的管嘴。用天然色彩的聚丙烯制成，聚丙烯是公认的适合管嘴的唯一一种无污染材料。

能经受热压温度为121 $^{\circ}$ C。

下列附件对移液器和转移试剂是一种有用的器具：

移液器支架 66031001

数字显示（图1）

移液器的移液量在移液把柄上可清楚的显示。

移液器的操作

设定移液量（图2）

1. 转动液液器顶部的按钮进行移液量的设定。反时针方向转动按钮可增加移液量。顺时针方向转动按钮则减少移液量。
2. 确认所要求的移液量调整到位并完全在把手体数字显示窗内的可见位置。
3. 不能将设定的移液量超出该移液器标定的移液范围！过度用力试图把按钮转至额定范围之外将造成机械件卡死，最终导致移液器损坏。

管嘴推顶（图3）

每支移液器都具有管嘴推顶装置可排除受污染的危险。

管嘴推顶装置由推杆，支撑弹簧以及管嘴推顶构件组成。

操作时先把移液管正对着废液接收容器，然后用大拇指按住管嘴推顶杆向下压，则可安全退除管嘴。

移液技术

图4 ~ 图7

A = 起点位置

B = 第一停点位置

C = 第二停点位置

移液器的操作由操作按钮进行控制。为得到最好的使用精度，应注意：

按下按钮或松开按钮的操作必须循序渐进，尤其是作处理高黏度液体时更应如此，决不允许让操作按钮急速弹回。移液前应确保洁净的管嘴牢固地装进移液器的管嘴嘴锥并且管嘴内无外来颗粒。在移液前先将溶液吸入新装的管嘴，然后排空、吸入反复2~3次后进行实际操作。

用移液管吸入液体时应注意垂直握住移液器，把手柄靠在食指上。

当移液器和管嘴的温度与溶液温度相一致时再进行操作。

前进法（图4）

在洁净的试剂容器中注入待转移的溶液。

1. 将按钮压至第一停点位置。
 2. 将移液器管嘴置于液面以下 1 厘米深度并慢慢松开按钮，待管嘴吸入溶液后，将管嘴撤出液面并斜贴在试剂瓶壁上淌走多余的液体。
 3. 轻轻压下操作按钮至第一停点位置。约一秒钟后继续将操作按钮向下压至第二停点，此作用是排尽管嘴内的溶液。
 4. 松开按钮使之返回按钮起点位置。
- 需要时，可更换管嘴继续移液操作。

倒退法（图5）

倒退法适用于高黏度液体或易起泡沫液体的移液，此方法也推荐用于极微量液体的转移。在洁净的试剂容器中注入待转移的溶液。

1. 将按钮下压至第二停点。
2. 将移液管嘴置于试剂液面以下 1 厘米深处，然后缓慢松开按钮吸液。待管嘴吸满液体后，将管嘴撤出液面并斜贴在试剂瓶壁上淌走多余的液体。

中文

3. 轻轻压下按钮至第一停点位置，放出预设定的液体。将操作按钮保持在第一停点位置，使少量不包括在移液量内的液体仍留在管嘴内。
4. 剩余在管嘴内的液体随管嘴一起废弃或者移至原容器中。

重复移液法（图6）

重复移液法提供了快速、简单地重复转移相同容量的液体。

在洁净的试剂容器中注入待转移的溶液。

1. 将操作按钮下压至第二停点位置。
2. 将移液管嘴置于试剂液面以下1厘米处，然后缓慢松开操作按钮。该操作可以将液体吸入管嘴。待操作按钮回至起点位置后，把管嘴撤出液面并贴在试剂瓶壁上淌走多余的液体。
3. 轻轻压下按钮至第一停点位置，放出预设定的液体。将操作按钮保持在第一停点位置，使少量不包括在移液量内的液体仍留在管嘴内。
4. 重复步骤2和步骤3继续移液操作，可重复转移相同容量的液体。

全血移液法（图7）

（例如：应用于血糖测试中等脱蛋白质步骤）

用前进法步骤1和步骤2使管嘴吸入血液。

用干净的干燥薄棉纸细心将管嘴外的血液擦净。

1. 将管嘴浸入试剂，然后按下按钮至第一停点位置，操作时应确认管嘴浸入液面之下。
2. 缓慢松开按钮，使按钮回到起点位置，此时管嘴已吸入试剂。
操作时注意不可让管嘴离开液面。
3. 按下按钮至第一停点位置，然后慢慢松开按钮。重复此项操作直至管嘴内壁液体放干净为止。
4. 最后，压下按钮至第二停点把管嘴内的液体彻底排尽

保养

当移液器不用时应竖直搁置。为此，我们推荐彩色可调式移液器支架供使用。

短期检查

每天工作前应检查移液器外表面是否有灰尘和污物，特别需注意移液器嘴锥处。除使用70%的酒精溶液外不应用其它溶剂清洁移涂器。

长期保养

0.5~1000 μ l（图8）

如果移液器是每天使用的，则每年至少检查两次。维修程序从移液器拆卸开始。

1. 按下管嘴推顶杆

2. 将配置维修工具的尖齿端插入管嘴推顶杆底部的槽穴中。
3. 拔出管嘴推杆轴套和管嘴推顶杆。
4. 用配置的维修工具反时针方向转动嘴锥开拆下。
5. 拔出柱塞杆。
6. 从嘴锥杆上拆下O型圈。规格5~50 μ l的移液器，有两个O型圈位于嘴锥杆内的深处，可用柱塞杆的细端拆下这两个O型圈。规格0.5~10 μ l的移液器中的O型圈不能被更换，建议对柱塞杆涂少许润滑脂即可。
7. 用干燥的无绒布清洁柱塞杆、柱塞弹簧和O型圈。
8. 检查柱塞体是否有外来尘粒。
9. 给擦净的零件涂上产品包装内所附的润滑脂。
10. 将各零件重新组装成移液器。

1~5ml (图 9)

1. 将配置维修工具的尖齿端嵌入管嘴推顶杆底部的槽穴中。
2. 拔出管嘴推杆轴套和管嘴推顶杆。
3. 移出外壳圈
4. 按下卡钳并移出柱塞体。
5. 拔出活塞。
6. 从活塞中取出O型圈。
7. 用干燥无绒布清洁活塞、活塞弹簧和O型圈。
8. 检查活塞体是否有外来尘粒。
9. 给擦净的零件涂上产品包装内所附的润滑脂。
10. 将各零件重新组装成移液器。
11. 根据提示检查校准情况。

校准

所有移液器均已用指定的蒸馏水或去离子水进行了测试和调整，通常移液器使用时不需要再调整。但该产品的构造可对不同温度和黏度的液体进行重新校准。

校准设施和测试环境

校准必需用分析天平，该天平刻度容量值的等级应根据选定移液器所要求的测试容量相匹配：

容量范围	刻度示值
10 μ l 以下	0.001mg
10-100 μ l	0.01mg
100 μ l 以上	0.1mg

测试液体：水，符合 ISO3696 等级为 3 的蒸馏水或去离子水。

测试应在无通风的房间，水温恒定在 $\pm 0.5^{\circ}\text{C}$ ，移液器和空气温度在 $20^{\circ}\text{C} \sim 25^{\circ}\text{C}$ 之间，相对湿度必需在55%以上。特别是当移液量在50 μ l

中文

以下其空气温度应越高越好以减少蒸发损失的影响，推荐使用特殊附件诸如蒸发圈套。

检查校准

检查移液器的最大（标定容量）和最小容量值或最大值的10%。

例如：彩色移液器 0.5 ~ 10 µl 是在10微升和1微升点进行测试。 首先将新换管嘴预湿 3 ~ 5 次，然后对两个容量进行各十次移液测试。

当分析天平的测定值在选择移液容量允许值之外就需继续进行调整。 如果计算结果在限定范围内，移液器的核准即为正确。

校准步骤

1. 对最小容量移液十次。
2. 对最大容量移液十次。
3. 计算两组的精确度（A）和准确度（CV）。
4. 将计算结果比较表1的限定值。

若结果在表1限定值范围内，移液器的校准为正确。反之移液器必须再进行调整和校验。

范围	容量 µl	准确度 µl	准确度 %	精确度 s.d*µl	精确度 cv%
0,5-10µl	10	±0.10	±1.0	0.08	0.8
	1	±0.035	±3.5	0.03	3.0
2-20µl	20	±0.18	±0.9	0.08	0.4
	2	±0.06	±3.00	0.04	2.0
5-50µl	50	±0.30	±0.6	0.15	0.3
	5	±0.15	±3.0	0.13	2.5
10-100µl	100	±0.8	±0.8	0.2	0.2
	10	±0.3	±3.00	0.1	1.0
20-200µl	200	±1.2	±0.6	0.4	0.2
	20	±0.6	±3.0	0.3	1.5
100-1000µl	1000	±5.0	±0.5	2.0	0.2
	100	±1.5	±1.5	0.6	0.6
1-5ml	5000	±25.0	±0.5	10.0	0.2
	1000	±15.0	±1.5	5.0	0.5

调整

用维修工具进行调整

1. 将维修工具套进位于把手顶部外置的调整螺母槽穴中。
2. 顺时针方向转动调整螺母以增加容量，反时针方向转动调整螺母以减少容量。
3. 根据上面列出数据在调整后查对校准结果。

计算公式

量比转换

$$V = (w + e) \times z$$

V = 容量 (ml)

W = 重量 (mg)

E = 蒸发损失 (mg)

Z = 毫克 和微升 的转换系数值

蒸发损失对较低的容量时有意义。测定总量损失是通过将液体分配到一个称重容器，注意读数并开始用秒表计时。观察在30秒内读数的减少值（例如：6毫克=0.2毫克/秒）。比较相应的从称重到读数之间的移液时间。通常移液时间大致10秒钟，根据以上举例问题损失是 2

毫克（10秒 × 0.2毫克 / 秒）。如果该容器使用蒸发圈套或盖，则没有必要对蒸发值进行修正。Z 是在测试温度和压力下对液体重量转换到容量值的系数。在22°C和95 KPa时的典型值是1.0032微升 / 毫克。见39页的转换表。

准确度（系统误差）

准确度是移液量和移液器选定量两者间的误差值。

$$A = \bar{V} - V_0$$

A = 准确度

\bar{V} = 平均容量

V_0 = 名义容量

精确度可用相对值表示：

$$A\% = 100\% \times A / V_0$$

精确度（随机误差）

精确度（CV）反映了移液的重复性误差。它表示标准偏差或变异系数。

$$S = \sqrt{\frac{\sum_{i=1}^n (V_i - \bar{V})^2}{n-1}}$$

s = 标准偏差

\bar{v} = 平均容量

n = 测定次数

$$cv = 100\% \times s / \bar{v}$$

包装

移液器用定制的纸版包装盒包装后发运，包装盒内装有下列材料：

1. 移液器
2. 管嘴试样
3. 识别标签
4. 使用说明书

故障排除

下表列出可能出现的故障及其解决方法。

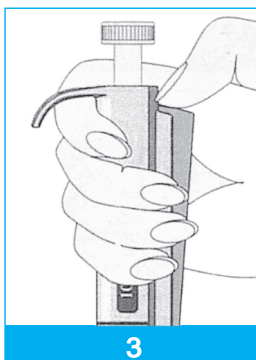
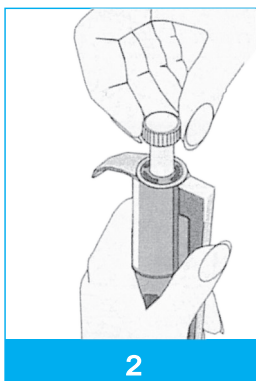
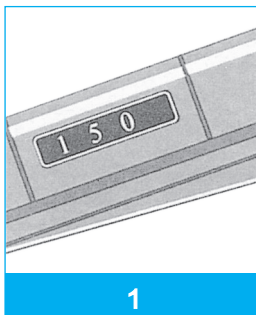
故障	可能起因	解决方法
漏液	管嘴安装不当	牢牢装紧
	管嘴与咀锥之间有外来物	清洗咀锥并换上新管嘴
	柱塞、O 型圈与柱塞杆之间有外来物	清洗并给 O 型圈和柱塞杆涂上润滑油
	柱塞杆以及 O 型圈上的润滑脂量不足	适当涂润滑脂
	O 型圈已损坏	更换 O 型圈
移液量不精确	操作不正确	认真按照说明书规定步骤操作
	管嘴安装不当。	装紧管嘴
	校准被改变；使用不当引起	根据使用说明书重新校准
某些液体转移量不准确	校准不当 高黏度液体的移液可能需要重新校准	用出现问题的液体重新进行校准

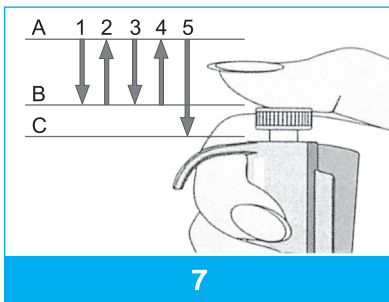
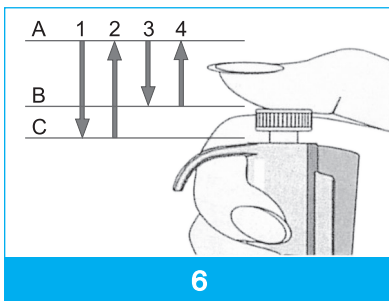
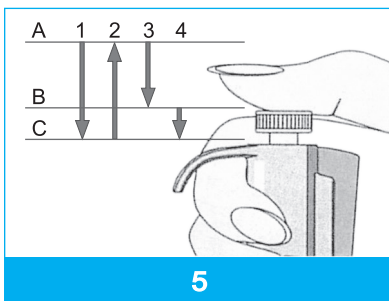
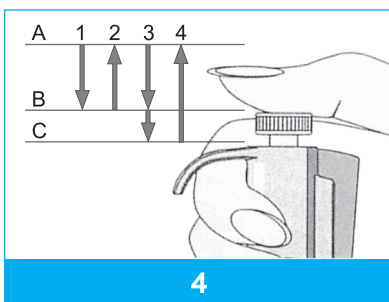
彩色移液器的设计能使用户在实验室里方便的维修。但若用户还希望将移液器送往本公司或本公司在当地代理机构维修，则请附上曾经使用该移液器转移具有传染性或放射性物料或其他危险品的物料清单。

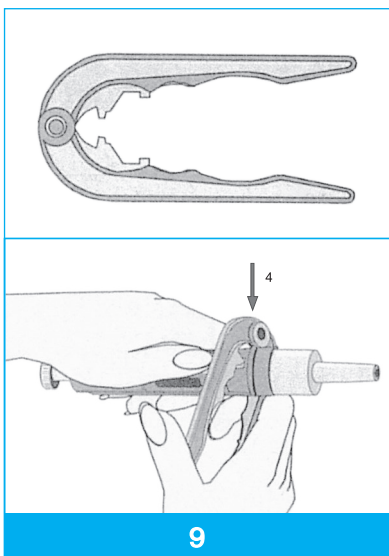
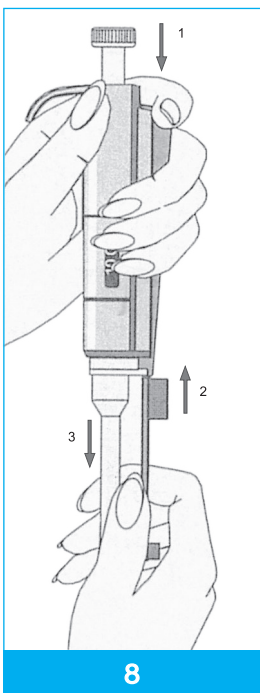
另请注意：贵国的邮政部门可能会限制邮寄受污染的物料。

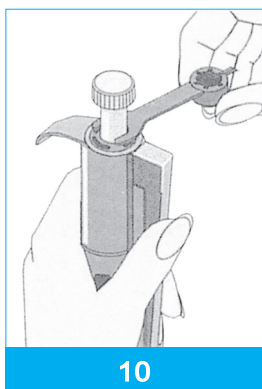
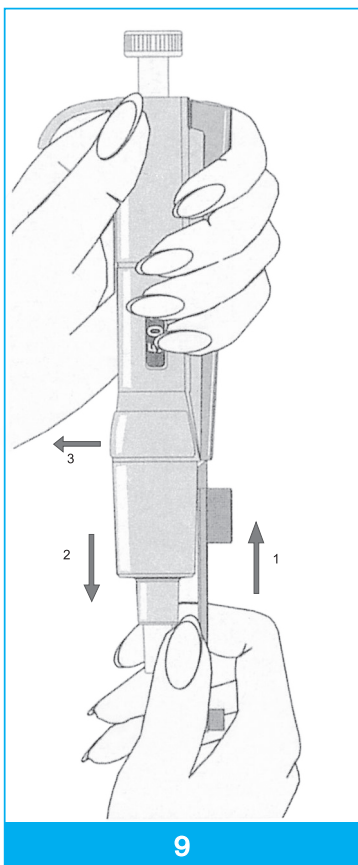
FIGURES

数字显示



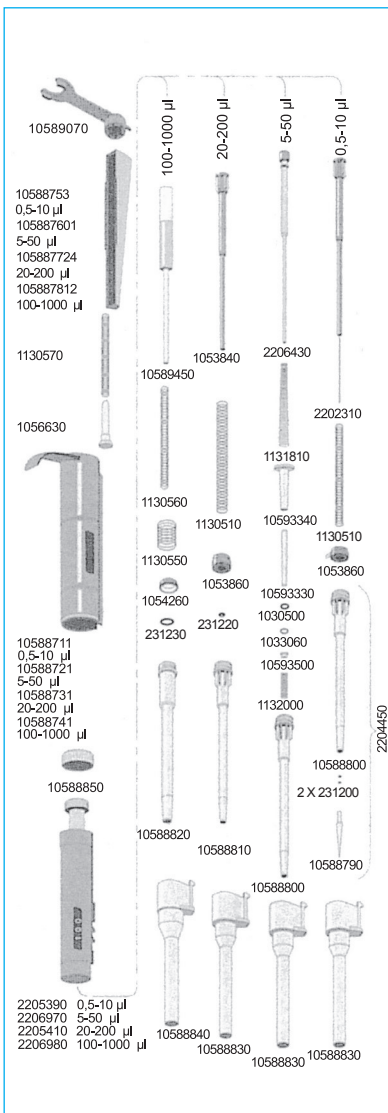






SPARE PARTS

产品零部件



1-5 ml



10589070

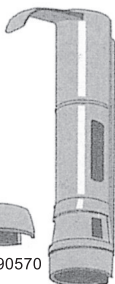


10589592

1130570



1056630



10590551



10590570



10588850

2205500



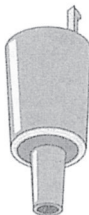
1030230



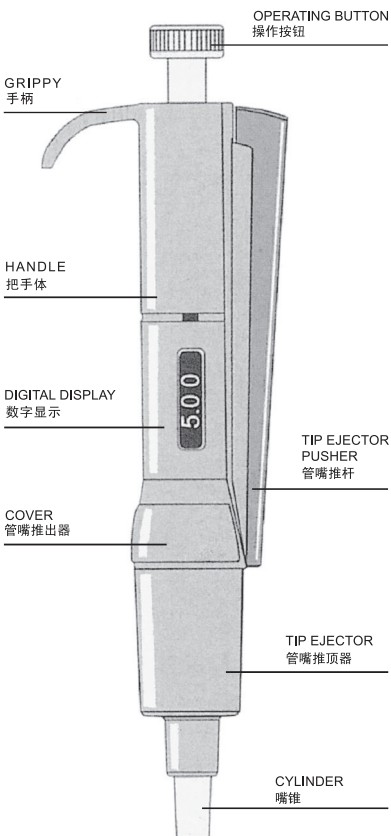
2205490



10590540



10590590



CONVERSION TABLE

Value of the conversion factor Z (µl / mg), as a function of temperature and pressure,for distilled water.

转换表

转换系数值 Z (µl/mg), 作为蒸馏水温度和压力的函数。

Temperature °C	Air Pressure hPA(mbar)					
	800	853	907	960	1013	1067
15	1.0018	1.0018	1.0019	1.0019	1.0020	1.0020
15.5	1.0018	1.0018	1.0019	1.0020	1.0020	1.0021
16	1.0019	1.0020	1.0020	1.0021	1.0021	1.0022
16.5	1.0020	1.0020	1.0021	1.0022	1.0022	1.0023
17	1.0021	1.0021	1.0022	1.0022	1.0023	1.0023
17.5	1.0022	1.0022	1.0023	1.0023	1.0024	1.0024
18	1.0022	1.0023	1.0024	1.0024	1.0025	1.0025
18.5	1.0023	1.0024	1.0025	1.0025	1.0026	1.0026
19	1.0024	1.0025	1.0025	1.0026	1.0027	1.0027
19.5	1.0025	1.0026	1.0026	1.0027	1.0028	1.0028
20	1.0026	1.0027	1.0027	1.0028	1.0029	1.0029
20.5	1.0027	1.0028	1.0028	1.0029	1.0030	1.0030
21	1.0028	1.0029	1.0030	1.0030	1.0031	1.0031
21.5	1.0030	1.0030	1.0031	1.0031	1.0032	1.0032
22	1.0031	1.0031	1.0032	1.0032	1.0033	1.0033
22.5	1.0032	1.0032	1.0033	1.0033	1.0034	1.0035
23	1.0033	1.0033	1.0034	1.0035	1.0035	1.0036
23.5	1.0034	1.0035	1.0035	1.0036	1.0036	1.0037
24	1.0035	1.0036	1.0036	1.0037	1.0038	1.0038
24.5	1.0037	1.0037	1.0038	1.0038	1.0039	1.0039
25	1.0038	1.0038	1.0039	1.0039	1.0040	1.0041
25.5	1.0039	1.0040	1.0040	1.0041	1.0041	1.0042
26	1.0040	1.0041	1.0042	1.0042	1.0043	1.0043
26.5	1.0042	1.0042	1.0043	1.0043	1.0044	1.0045
27	1.0043	1.0044	1.0044	1.0045	1.0045	1.0046
27.5	1.0044	1.0045	1.0046	1.0046	1.0047	1.0047
28	1.0046	1.0046	1.0047	1.0048	1.0048	1.0049
28.5	1.0047	1.0048	1.0048	1.0049	1.0050	1.0050
29	1.0049	1.0049	1.0050	1.0050	1.0051	1.0052
29.5	1.0050	1.0051	1.0051	1.0052	1.0052	1.0053
30	1.0052	1.0052	1.0053	1.0053	1.0054	1.0055

TIP ORDERING INFORMATION

管嘴订购目录

Code	Finntip	Volume	Cty
62021016	10	0.1-10 μ l	1000/bag
62021022	200	5-200 μ l	1000/bag
62021033	350	5-350 μ l	1000/bag
62021042	1000	100-1000 μ l	500/bag
62121052	5ml	1-5ml	100/bag
62421063	10ml	1-10ml	100/bag



10



200



350



1000



5 ml



10 ml

TIPS, 管嘴 ,CONES

