

PLT unit

Pipette Leak Testing Unit

操作手册 · Operating Manual



EG-Konformitätserklärung

EC-Conformity Declaration

Das bezeichnete Gerät entspricht den einschlägigen Anforderungen der aufgeführten EG-Richtlinien und Normen. Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung trägt der Hersteller. Bei einer nicht mit uns abgestimmten Änderung des Gerätes verliert die Erklärung ihre Gültigkeit.

The device named below fulfills the relevant fundamental requirements of the EC directives and standards listed. This declaration of conformity is issued under the sole responsibility of the manufacturer. In case of unauthorized modifications to the device, the declaration becomes invalid.

Gerätebezeichnung / Device name: PLT unit inkl. Netzteil
PTL unit incl. charging adapter adapter

Gerätetyp / Device type: alle baugleichen Varianten
all constructional identical variants

Hersteller / Manufacturer: BRAND GMBH + CO KG

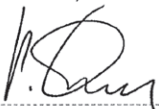
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97877 Wertheim · Germany

Der oben beschriebene Gegenstand der Erklärung erfüllt die einschlägigen Harmonisierungsrechtsvorschriften der Union: The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:		Harmonisierte Normen: Harmonized standards:
RoHS II	2011/65/EU: 2011/06	EN 50581: 2012

Weitere berücksichtigte Richtlinien: Other considered directives:		Harmonisierte Normen: Harmonized standards:
EMV EMC	2014/30/EU: 2014/02	EN 61326-1:2013
Niederspannung LVD	2014/35/EU: 2014/02	DIN EN 60950-1:2006 (2nd Edition) A11:2009; A1:2010; A12:2011 + A2:2013; EN 61010-1:2010

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Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Harmonisierungsvorschriften,
beinhaltet jedoch keine Zusicherung von Eigenschaften.

This document declares the accordance with the named harmonized regulations, but does NOT assure specific properties.

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这台仪器可能会与有害的材料，操作或设备一起使用。本手册不可能提示这些应用中所有的潜在安全风险。使用者有责任在使用前咨询并进行恰当的安全与健康练习，并决定规章限制的适用性。

请仔细阅读下面的提示!

1. 在使用前每位使用者必须阅读并理解本操作手册，并在使用时遵循本手册相关指导。
2. 遵循有害防护与安全指导的通用规章；比如，穿着防护服，佩戴防护镜与手套。
当操作具有感染性或者有危害的样品时，须遵守所有适用规章并采取预防措施。
3. 绝不可以有爆炸危险的环境中使用本仪器。
4. 本仪器仅可用于遵循空气活塞原理的移液器的泄漏测试。请遵守“操作限制”（参见第5页）！如有疑问，请联系厂方或者经销商。
5. 请确保操作方式不会伤害使用者或者其他人员。
6. 当测试安装了吸头的空气活塞移液器时，仅使用新吸头。
7. 绝对不可野蛮操作此仪器！
8. 仅使用原厂附件与配件。请勿试图对本仪器进行任何技术改造。
9. 只有授权的服务人员可能对本仪器提供维修或服务。
10. 使用前请检查仪器有无可见损伤。如果仪器在操作时有潜在的故障迹象，请立即停止操作。咨询本手册的“故障诊断”（参见31页），有必要的话请联系供应商。
11. AC电源适配器须避免潮湿，且仅可用于本仪器。

警告！

不当使用本仪器或电池（短路、机械损伤、过热等），可能导致电池爆炸。

BRAND 的检漏仪是一款压力变化测量设备，用于检测空气活塞移液器的泄漏率。静态与动态测试可以定位泄漏位置。推荐进行动态测试。

测试在装有吸头（测试移液器/吸头间与移液器整个系统）以及无吸头（测试移液器本身）情况下都可进行。泄漏率与移液器的体积损失直接相关。泄漏率 Q_L 为单位时间内泄漏的物质（质量）。

泄漏率为气体在泄漏时气体的pV值与一定时间的比值。pV值是一定量的气体在当时的温度下压力与体积的乘积。对于理想气体，在给定温度下pV值是物质量或者气体质量的衡量标准。泄漏率与气体类型，绝对压力，压力差以及温度有关。

对于测试移液器，hPa ml/s是泄漏率QL的合适单位。在空气压力为1000 hPa的条件下1 hPa ml/s的泄漏率意为着体积损失率为1 μ l/s。

提示：

监测计量仪器时泄漏测试不能作为重力法测试的替代方法。本仪器可作为两次校准之间的日常安全保障。

CE 标志

此认证标志表明产品符合EEC指令并按照相应规定进行测试。

使用限制

在下列条件内本仪器可以提供针对空气活塞式移液器的快速而简便的检漏测试：

- 操作温度15 °C 至 35 °C
- 相对湿度最高至80%
- 使用海拔最高2000 m
- 储存温度0 °C 至 50 °C

重要！

当仪器被置于一个新的环境中或者经过运输，温度与大气湿度的显著变化可能会影响测试。为了避免错误提示，PLT检漏仪必需在使用前置于测试实验室2个小时以上以适应环境！

操作限制

用户需自行确认拓展应用的兼容性。

切勿使用本仪器吸取液体！

避免侵蚀性蒸汽（腐蚀性风险）！更多信息敬请咨询。

非真空用中空容器绝不可以抽真空，因为容器可能爆裂！

电池规格

检漏仪：

输入：DC 6.5 V= 800 mA

AC 电源适配器：

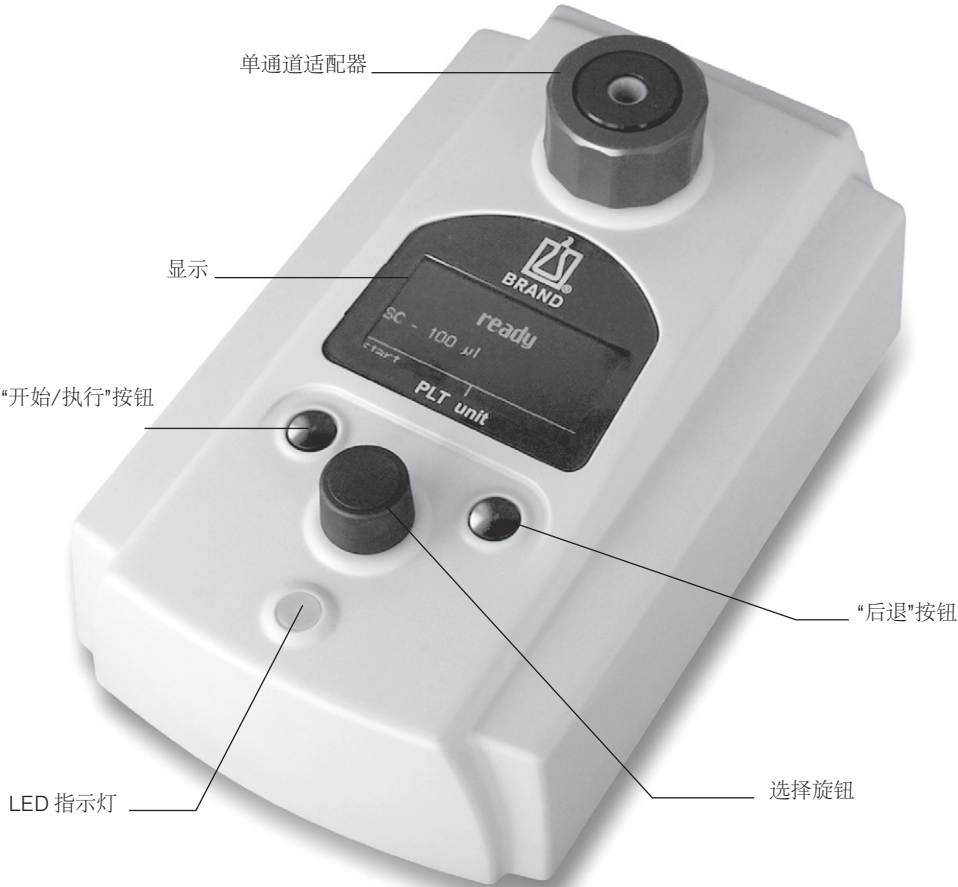
输入：AC 100 V - 240 V, 50/60 Hz, 0,5 A

输出：DC 6,5 V= 800 mA

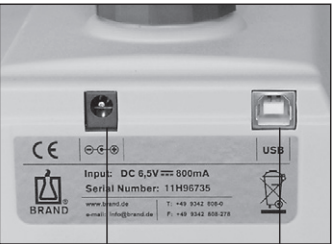
保护等级：IP20

操作原件

根据国际标准ISO 8655，空气活塞移液器应该定期检查。
BRAND出品的PLT (Pipette Leak Testing unit) 检漏仪提供了作为两次校准之间的安全保障。



"后退"按钮



AC电源适配器插孔

USB端口

"后退"按钮

长按或短按"后退"按钮的功能是不同的。短按会退回上级子菜单。长按会直接退回开始菜单的"准备就绪(Ready)"界面。

选择旋钮

在许多情况下，按左侧的"开始/执行"按钮与按中央的选择旋钮都可执行确认选择的功能。为了前后一致，在本操作手册中均使用左侧的"开始/执行"按钮进行确认操作。

开机

所有的组件都在包装内吗？

包装内包含PLT检漏仪，测试装有吸头或没有吸头的空气活塞移液器的适配器各一个，2个空栓塞，3个用于移液器适配器的PE滤芯，一个AC电源适配器，一份质量证书，以及本操作手册。

做什么

怎么做

按键

屏幕显示

1. 连接AC电源适配器

请仅使用原装的AC电源适配器！

仪器的AC电源适配器与适配器插座必需保持自由可及并在任何时候都远离电网。

将AC电源适配器插入仪器背面的插孔，无需按仪器的任何按钮。



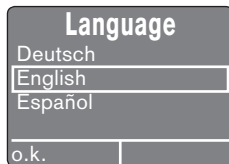
AC电源适配器连接之后，显示屏显示软件版面与创建日期，以及BRAND的标志。

第一次启动，3秒之后显示“语言（Language）”指示。



2. 选择语言

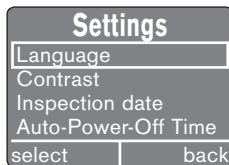
转动选择旋钮选择语言



3. 确认语言

按左侧“OK”确认按钮。“设置（Setting）”菜单会以选择的语言出现。

“后退（back）”按钮可前往主菜单。



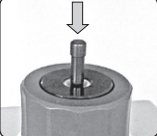
提示：

开机之后，既可选择执行自检（8页）或直接开始移液器测试（12页）。

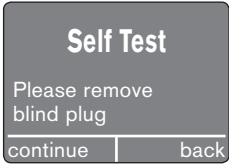
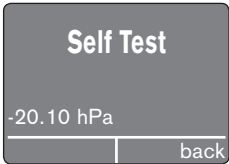
执行自检

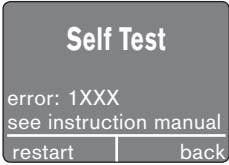
自检可确定BRAND PLT检漏仪自身是否存在泄漏。有两种不同的测试。快速测试只需2分钟，应该每天都执行。完整测试持续12分钟。包含了额外的针对内置气缸的分别测试，应该每周执行。

快速测试

做什么	怎么做	按键	屏幕显示
1. 唤醒主菜单 (Main Menu)	主菜单 (Main Menu) 可通过按或转动选择旋钮唤醒。		Main Menu Pipette Type Self Test Switch OFF Settings... select back
2. 设置自检(Self Test)	旋转选择旋钮选定“自检 (Self Test)”		Main Menu Pipette Type Self Test Switch OFF Settings... select back
3. 确认自检(Self Test)	按“执行”按钮。调出“自检 (Self-Test)”子菜单。选择框显示最近执行的测试。		Self Test Quick Test Full Test select back
4. 选择快速测试 (Quick Test)	转动选择旋钮选择“快速测试 (Quick Test)”		Self Test Quick Test Full Test select back
5. 确认快速测试 (Quick Test)	按“开始/执行”按钮。调出“开始菜单 (Start Menu)”界面		Self Test Please insert blind plug start back
6. 密封整个系统	将附赠的空检塞稳妥地插入适配器 (针对多通道适配器，需密封所有4个通道)。		

做什么	怎么做	按键	屏幕显示
7. 开始快速测试 Quick Test	按“开始/执行”按钮。五个部件——传感器，泵，阀门，滤芯以及检测仓会依次检测。显示的进度条代表测试状态。测试时LED指示灯会交替闪烁红色与绿色。		 (压力值仅做示例)

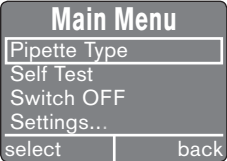
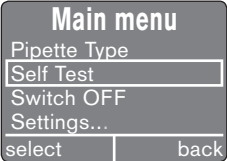
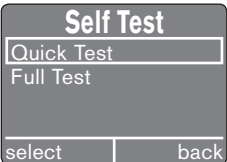
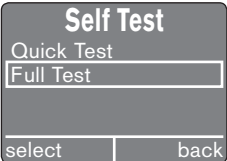
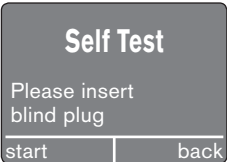
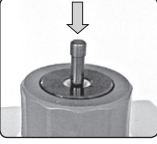
8. 系统通气	部件测试之后，显示屏显示移去空检塞(blind plug)的提示。		
	移去塞子，按“执行”按钮。系统重新通气并显示当前检测仓的气压。		 (压力值仅做示例)

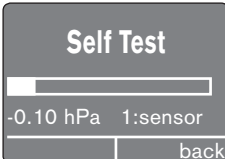
9. 结束自检(Self Test)	系统重新通气之后，显示自动改变并指示仪器是否通过测试。如有错误发生，系统会停止测试步骤,显示错误代码（参见32页），并且系统重新通气。		
	测试可通过按“开始/执行”按钮重复执行。“后退”按钮可直接退回主菜单（Main Menu）。	 绿色 红色	

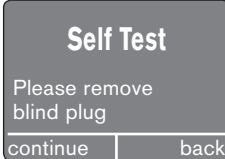
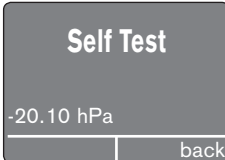
执行自检

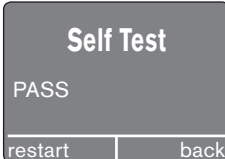
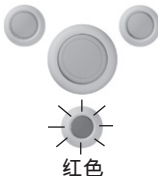
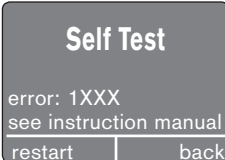
自检可确定BRAND PLT检漏仪自身是否存在泄漏。有两种不同的测试。快速测试只需2分钟，应该每天都执行。完整测试持续12分钟。包含了额外的针对内置气缸的分别测试，应该每周执行。

完整测试

做什么	怎么做	按键	屏幕显示
1. 唤醒主菜单 (Main Menu)	主菜单 (Main Menu) 可通过按或转动选择旋钮唤醒。		
2. 设置自检(Self Test)	旋转选择旋钮选定"自检 (Self Test)"		
3. 确认自检(Self Test)	按"执行"按钮。调出"自检 (Self Test)"子菜单。选择框显示最近执行的测试。		
4. 选择完整测试 (Full Test)	转动选择旋钮选择"完整测试 (Full Test)"		
5. 确认完整测试 (Full Test)	按"开始/执行"按钮。调出"开始菜单 (Start Menu)"界面		
6. 密封整个系统	将附赠的空检塞稳妥地插入适配器 (针对多通道适配器, 需密封所有4个通道)。		

做什么	怎么做	按键	屏幕显示
7. 开始完整测试 (Full Test)	按"开始/执行"按钮。 六个部件——传感器，泵， 阀门，滤芯以，检测仓与 气缸会依次检测。显示的进 度条代表测试状态。测试时 LED指示灯会交替闪烁红色 与绿色。		 Self Test -0.10 hPa 1:sensor back (压力值仅做示例)

8. 系统通气	部件测试之后，显示屏显 示移去空检塞(blind plug)的 提示。		 Self Test Please remove blind plug continue back
	移去塞子，按"执行"按钮。 系统重新通气并显示当前检 测仓的气压。		 Self Test -20.10 hPa back (压力值仅做示例)

9. 结束自检 (Self Test)	系统重新通气之后，显示自 动改变并指示仪器是否通过 测试。如有错误发生，系统 会停止测试步骤，显示错误代 码 (参见32页)，并且系统 重新通气。		 Self Test PASS restart back
	测试可通过按"开始/执行" 按钮重复执行。"后退"按钮 可直接退回主菜单 (Main Menu)。		 Self Test error: 1XXX see instruction manual restart back

测试准备

测试之前，用户需决定执行动态还是静态测试。

动态还是静态测试？

使用**动态测试**，除了可以检测静态泄漏外，用户还能确定是否是活塞的问题（污染，刮伤）造成的泄漏。

测试中，完全地并且均匀地按下移液器移液按钮2-3次。可以识别与活塞移动有关的问题。

5 ml 与 10 ml 移液器按钮按压完成地相对较慢。

在对移液器进行动态测试时，开始时活塞位置应该在顶部，最后也需回到那个位置。

相反，在**静态测试**时，不按压移液器移液按钮，也就是说，活塞并不移动。

在测试移液器时，用户可将活塞置于最高位置或者于第一个停顿。

活塞移动时发生的泄漏在这种情况下无法检测得到。

我们推荐执行动态检测。

带或不带吸头测试？

无论安装与不安装吸头，测试都可进行。

我们推荐使用新吸头进行测试，这样整个移液器系统都能测试。

当鉴定出泄漏，可以去除吸头重复测试以确定泄漏是否发生吸头锥/吸头安装区域。为了适配不安装吸头的测试，必需更换适配器（参见14页）。

测试中间请稳定地握持移液器。



测试单通道或者多通道移液器

更换适配器

总共有三个适配器可用

适配器 1: 仪器预装，
用于测试最高量程至10 ml，安装有吸头的单道移液器。



适配器 2: 随包装附赠，用于测试不带吸头的单通道移液器。



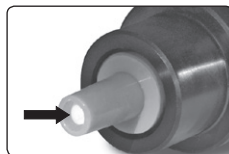
适配器 3: 可单独选购，用于测试带或不带吸头的多通道移液器，4个通道可以同时测试。4通道适配器可用于4通道，8通道或者12通道移液器。

当检测到泄漏时，三个通道可以用塞子封闭。泄漏通道可用后续的单通道测试确定。

测试多通道移液器时，切断仪器时吸头可留在适配器上。这些吸头可以手动拔出或者插在适配器上留供下次测试。

**重要!**

为了保护仪器防止湿气或污染，硅胶适配器底部包含有一个随时可更换的PE滤芯。



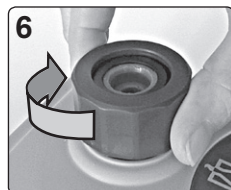
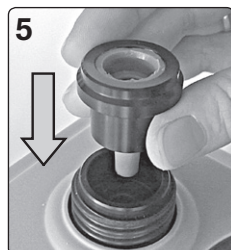
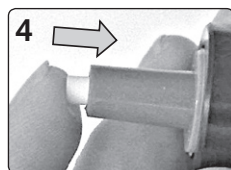
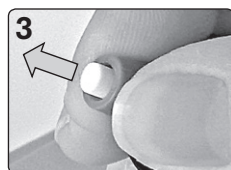
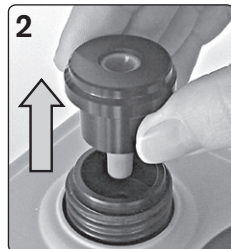
测试准备

更换适配器与滤芯

1. 旋开适配器锁紧螺帽。
2. 移去移液器适配器。
3. 如果PE滤芯被湿气或者污染堵塞，则必须更换。在这种情况下，小心地从硅胶适配器底部抽出PE滤芯。
4. 插入一个新滤芯。
5. 将适合的移液器适配器插入适配器接口（如图，图中为2号适配器用于不带吸头的移液器）
6. 将锁紧螺帽向下拧紧。
7. 更换适配器后，执行快速测试(Quick Test)。

提示:

4通道适配器由一个适配器与一个整合的锁紧螺帽组成。整个装置可以更换。



例如: 100 μ l 空气活塞式移液器，动态测试

请在测试之前调整移液器到额定容积。安装一个全新未使用的一次性吸头。然后将带有吸头的移液器插入已经选定并安装的适配器1 (参见14页)。

做什么	怎么做	按键	屏幕显示
1. 唤醒主菜单 (Main Menu)	主菜单 (Main Menu) 可通过按或转动选择旋钮唤醒。		Main Menu Pipette Type Self Test Switch OFF Settings... selectback
2. 选择移液器类型 (Pipette Type)	转动选择旋钮选择“移液器类型 (Pipette Type)”		Main Menu Pipette Type Self Test Switch OFF Settings... selectback
3. 确认移液器类型 (Pipette Type)	按“执行”按钮。“通道 (Channels)”子菜单被调出。		Channels Single Channel Multichannel selectback
4. 选择单通道 (Single Channel) 移液器	转动选择旋钮选择“单通道 (Single Channel)”移液器。		Channels Single Channel Multichannel selectback
5. 确认单通道(Single Channel)移液器	按“执行”按钮。“标称量程 (Nominal Volume)”子菜单被调出。		Nominal Volume 25 μl 50 μl 100 μl 200 μl selectback
6. 选择移液器量程	转动选择旋钮选择“100 μ l”量程		Nominal Volume 25 μl 50 μl 100 μl 200 μl selectback

下一页继续

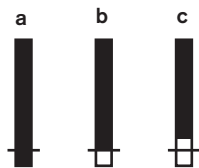
测试单通道移液器 (继续)

做什么	怎么做	按键	屏幕显示
7. 确认移液器量程	按"开始/执行"按钮。"开始(Start)"界面被调出。		ready SC – 100 µl start
8. 开始测试	按"开始/执行"按钮。 测试开始，测试压力设置 (进行中.....)		Test preparing... restartback
按压移液器移液按钮2-3次	预备期即将结束前，LED灯闪1次红灯与1次绿灯，然后出现进度条并且系统自动开始测试。此时，均匀地按压移液器移液按钮2-3次。测试结束前活塞必需回到起始位置！进度条显示剩余时间与当前获得的真空度。LED指示灯闪烁橙色等。		Test 4s -121.21 hPa restartback (压力值仅做示例)
9. 结束测试	测试结束后，显示屏显示泄漏率，以确定移液器整个系统是否通过测试。 可以按"开始/执行"按钮重复测试。转动选择旋钮可以直接回到主菜单 (Main Menu)。	 绿色  红色	PASS SC – 100 µl Q_L: 0.04 hPa*ml/s start (泄漏率仅做示例) FAIL SC – 100 µl Q_L: 4.6 hPa*ml/s start (泄漏率仅做示例)

提示:

泄漏的体积可以使用29页的关联表进行估计。

屏幕显示的垂直柱状条的含义？



柱状条上加了一条标记。这代表着阈值。相当于量程的公差范围的 $\frac{1}{4}$ 。

- 柱状条完全充满至底部：移液器密封良好按照 ISO 8655-2 标准。
- 柱状条仅从顶部填充至阈值附近区域：我们建议进行重力法测试。
- 柱状条仅填充至远高于阈值的一个点：移液器泄漏。应该进行重力法测试，如果有必要，移液器应当检修。

如果有泄漏怎么办？

如果动态测试显示有泄漏存在，用户可尝试进行进一步测试定位泄漏的位置：

- 下一步应进行静态测试。

不移动移液器活塞。如果此时移液器密封良好，说明活塞上有刮伤。

- 不安装吸头进行动态测试。

这种情况请使用适配器2。如果此时移液器密封良好，那么很可能是由于使用了不合适的吸头。

一些量程后面的字母代表什么含义？

在量程选择时一些量程后面的字母含义为：

y = 黄色（移液器使用黄色吸头）

c = 透明吸头

n = nano-cap 吸头

soft = 在测试5 ml与10 ml移液器时，在进行动态测试时由于真空与摩擦，活塞可能不能走完从底部到顶部的整个行程，而仍旧堵在仪器中间。在这种情况下，选择“5 ml 温和（soft）或者10 ml 温和（soft）”测试模式。

关于测试持续时间的提示

在开机后第一次测试时，相对较大体积的空气需要被泵出，然后仪器需要一定的时间稳定（放松）。频繁地从大量程移液器切换到小量程移液器会导致需要更长的测试时间，因为测试压力需要重置多次。

通常测试量程至1000 μ l的移液器需要的时间为5 s，但对于10 ml的移液器可能需要20 s。

测试多通道移液器

例如：200 µl 8通道空气活塞移液器，动态测试

请在测试之前调整移液器到额定容积。安装全新未使用的一次性吸头，然后将带有吸头的4个通道插入已经选定并安装的适配器3（参见14页）。

做什么	怎么做	按键	屏幕显示
1. 唤醒主菜单 (Main Menu)	主菜单 (Main Menu) 可通过按或转动选择旋钮唤醒。		Main Menu Pipette Type Self Test Switch OFF Settings... selectback
2. 选择移液器类型 (Pipette Type)	转动选择旋钮选择"移液器类型 (Pipette Type)"		Main Menu Pipette Type Self Test Switch OFF Settings... selectback
3. 确认移液器类型 (Pipette Type)	按"执行"按钮。"通道 (Channels)"子菜单被调出。		Channels Single Channel Multichannel selectback
4. 选择多通道 (Multichannel) 移液器	转动选择旋钮选择"多通道 (Multichannel)"移液器。		Channels Single Channel Multichannel selectback
5. 确认多通道 (Multichannel) 移液器	按"执行"按钮。"标称量程 (Nominal Volume)"子菜单被调出。		Nominal Volume 50 µl 100 µl 200 µl 250 µl selectback
6. 选择移液器量程	转动选择旋钮选择"200 µl"量程		Nominal Volume 50 µl 100 µl 200 µl 250 µl selectback

做什么	怎么做	按键	屏幕显示
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7. 确认移液器量程

按"开始/执行"按钮。"开始(Start)"界面被调出。

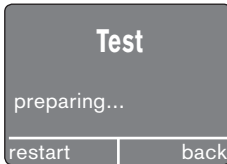




8. 开始测试

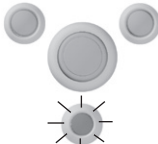
按"开始/执行"按钮。
测试开始，测试压力设置(进行中.....)



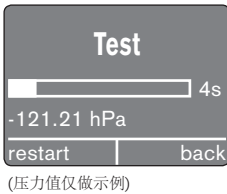


按压移液器移液按钮2-3次

预备期即将结束前，LED灯闪1次红灯与1次绿灯，然后出现进度条并且系统自动开始测试。此时，均匀地按压移液器移液按钮2-3次。测试结束前活塞必需回到起始位置！进度条显示剩余时间与当前获得的真空度。LED指示灯闪烁橙色等。



橙色

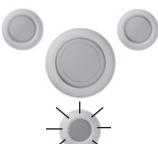


(压力值仅做示例)

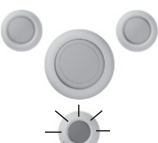
9. 结束测试

测试结束后，显示屏显示泄漏率，以确定移液器整个系统是否通过测试。

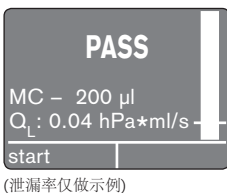
可以按"开始/执行"按钮重复测试。转动选择旋钮可以直接回到主菜单 (Main Menu)。



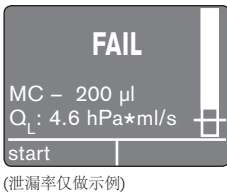
绿色



红色



(泄漏率仅做示例)



(泄漏率仅做示例)

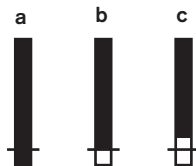
提示：
泄漏的体积可以使用29页的关联表进行估计。

测试多通道移液器

屏幕显示的垂直柱状条的含义？

柱状条上加了一条标记。这代表着阈值。相当于量程的容差范围的 $\frac{1}{4}$ 。

- 柱状条完全充满至底部：移液器密封良好。
- 柱状条仅从顶部填充至阈值附近区域：我们建议进行重力法测试。
- 柱状条仅填充至远高于阈值的一个点：移液器泄漏。应该进行重力法测试，如果有必要，移液器应当检修。



果有泄漏怎么办？

如果动态测试显示有泄漏存在，用户可尝试进行进一步测试定位泄漏的位置：

- 下一步应进行静态测试。
不移动移液器活塞。Ist das Gerät jetzt dicht, kann das ein Hinweis sein auf:
 - Kratzer am Kolben
 - defekte Kolbendichtung
 - ungeeignetes Silikonfett
- 不安装吸头进行动态测试。
不安装吸头进行动态测试。
Sollte das Gerät jetzt dicht sein, können die möglichen Ursachen sein:
 - ungeeignete Spitzen
 - defekter Spitzenaufnahmekonus
- Bei Prüfung einer Mehrkanalpipette: 使用附赠的盖子关闭3个通道，测试单个通道以确认泄漏位置。在这里选择“单通道single-channel”移液器类型。

Achtung:

Bei Verwendung von Pipetten, deren Kolben **mit** Silikonfett eingefettet sind, darf **ausschließlich** das vom Hersteller empfohlene Fett verwendet werden!

Bei Verwendung von Pipetten, deren Kolben **ohne** Silikonfett betrieben werden, dürfen diese **niemals** eingefettet werden, da irreversible Schäden entstehen können!

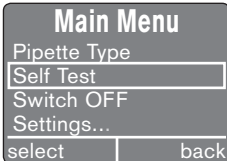
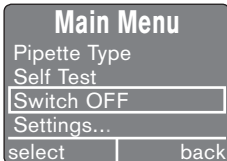
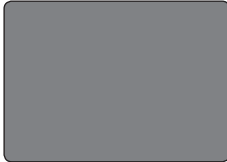
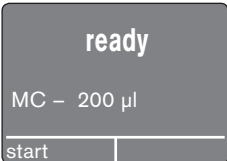
Bitte Hinweise in der entsprechenden Gebrauchsanleitung beachten.

关于测试持续时间的提示

在开机后第一次测试时，相对较大体积的空气需要被泵出，然后仪器需要一定的时间稳定（放松）。频繁地从大量程移液器切换到小量程移液器会导致需要更长的测试时间，因为测试压力需要重置多次。

通常测试量程至500 μl 的移液器需要的时间为5 s，但对于1250 μl 的移液器可能需要10 s。

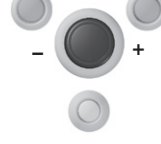
激活状态的PLT检漏仪可以随时关闭，与自动关机时间设定无关（参见25页）。

做什么	怎么做	按键	屏幕显示
1. 唤醒主菜单 (Main Menu)	主菜单 (Main Menu) 可通过按或转动选择旋钮唤醒。		
2. 选择关闭仪器	转动选择旋钮选定“关机 (Switch OFF)”。		
3. 关机	按左侧“执行”按钮确认关机。		
再次打开仪器	按任何按钮可再次打开仪器。 开始，已设定的维护日期会在屏幕上显示几秒钟。 然后自动切换至前一次测试移液器规格的“准备就绪 (ready)”指示界面。		 

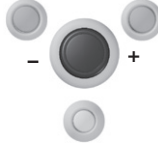
在“设置 (Settings)”子菜单，有下列项目可以供选择：语言(Language)，对比(Contrast)，维护日期(Maintenance date),关机时间(shut-off time),压力单位 (Pressure Units), 以及工厂默认(Factory Defaults)。

做什么	怎么做	按键	屏幕显示
1. 在主菜单(Main Menu)选择“设置(Settings)”选项。	按选择旋钮唤醒主菜单(Main Menu),然后转动其调至“设置(Settings)”选项。		Main Menu Pipette Type Self Test Switch OFF Settings... selectback
2. 确认设置(Settings)选项	按“执行”按钮调出“设置(Settings)”子菜单。		Settings Language Contrast Inspection date Auto-Power-Off Time selectback
3. 选择语言(Language)选项	转动选择旋钮选择 “语言(Language)”选项。		Settings Language Contrast Inspection date Auto-Power-Off Time selectback
4. 调出语言(Language)菜单。	按“执行”按钮，调出“语言(Language)”子菜单。转动选择旋钮选定语言。		Language Deutsch English Español o.k.back
5. 确认语言	按“执行”按钮。选择语言后自动回到“设置(Settings)”子菜单。 “后退”按钮可直接退回主菜单 (Main Menu)。		Settings Language Contrast Inspection date Auto-Power-Off Time selectback

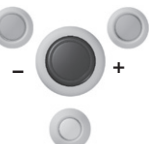
显示器的色密度可以互动调节。

做什么	怎么做	按键	屏幕显示
1. 在主菜单(Main Menu)选择"设置(Settings)"选项。	按选择旋钮唤醒主菜单(Main Menu),然后转动其调至"设置(Settings)"选项。		Main Menu Pipette Type Self Test Switch OFF Settings... select back
2. 确认设置(Settings)选项	按"执行"按钮调出"设置(Settings)"子菜单。		Settings Language Contrast Inspection date Auto-Power-Off Time select back
3. 选择对比(Contrast)选项	转动选择旋钮选择"对比(Contrast)"选项。		Settings Language Contrast Inspection date Auto-Power-Off Time select back
4. 调出对比(Contrast)菜单	按"执行"按钮，调出"对比(Contrast)"子菜单。		Contrast  50 o.k. back
5. 设置对比(Contrast)	转动选择旋钮，设置值可从"10"至"100"。		Contrast  76 o.k. back
6. 确认对比(Contrast)设置	按“执行”按钮。确认对比(Contrast) 设置后自动回到"设置(Settings)"子菜单。 "后退"按钮可直接退回主菜单 (Main Menu)。		Settings Language Contrast Inspection date Auto-Power-Off Time select back

PLT检漏仪何时送回BRAND或授权维修服务商检测的时间间隔可以单独设置。这个间隔在每次仪器打开时会显示。

做什么	怎么做	按键	屏幕显示
1. 在主菜单(Main Menu)选择"设置(Settings)"选项。	按选择旋钮唤醒主菜单(Main Menu),然后转动其调至"设置(Settings)"选项。		Main Menu Pipette Type Self Test Switch OFF Settings... selectback
2. 确认设置(Settings)选项	按"执行"按钮调出"设置(Settings)"子菜单。		Settings Language Contrast Inspection date Auto-Power-Off Time selectback
3. 选择检视日期(Inspection date)选项	转动选择旋钮选择"检视日期(Inspection date)"选项。		Settings Language Contrast Inspection date Auto-Power-Off Time selectback
4. 调出检视日期(Inspection date)菜单	按"执行"按钮。前一次设定的维护时间会显示在屏幕上。		Inspection date 1 - Apr - 2016 o.k.back
5. 设置检视日期(Inspection date)	旋转选择旋钮按年 (Year), 月 (Month), 日(Day) 的顺序选择调整区域。按当日日期 (today's date) 退回"设置 (Settings) 子菜单")。转动选择旋钮改变选择框框选的位置。		Inspection date 1 - Apr - 2017 o.k.select
6. 设置检视日期(Inspection date)设置	按“执行”按钮。确认检视日期 (Inspection date) 设置后自动回到"设置 (Settings)"子菜单。 "后退"按钮可直接退回主菜单 (Main Menu)。		Settings Pipette Type Self Test Switch OFF Settings... selectback

PLT检漏仪的自动关机时间可以按分钟单独设置，从“关闭（OFF）”至30分钟。

做什么	怎么做	按键	屏幕显示
1. 在主菜单(Main Menu)选择"设置(Settings)"选项。	按选择旋钮唤醒主菜单(Main Menu),然后转动其调至"设置 (Settings)"选项。		Main Menu Pipette Type Self Test Switch OFF Settings... selectback
2. 确认设置(Settings)选项	按"执行"按钮调出"设置(Settings)"子菜单。		Settings Language Contrast Inspection date Auto-Power-Off Time selectback
3. 选择自动关机时间(Auto-Power-Off Time)选项	转动选择旋钮选择"自动关机时间 (Auto-Power-Off Time)"选项。		Settings Contrast Inspection date Auto-Power-Off Time Pressure Unit selectback
4. 唤醒自动关机时间(Auto-Power-Off Time)	按"执行"按钮。前一次的自动关机时间 (Auto-Power-Off Time) 设定会显示在屏幕上。		Auto-Power-Off Time 3 min o.k.back
5. 设置自动关机时间(Auto-Power-Off Time)	自动关机时间 (Auto-Power-Off Time) 可从"关闭 (OFF)"设至30分钟。		Auto-Power-Off Time 15 min o.k.back
6. 确认自动关机时间(Auto-Power-Off Time)设置	按"执行"按钮。确认自动关机时间 (Auto-Power-Off Time) 设置后自动回到"设置(Settings)"子菜单。 "后退"按钮可直接退回主菜单 (Main Menu)。		Settings Contrast Inspection date Auto-Power-Off Time Pressure Unit selectback

做什么	怎么做	按键	屏幕显示
1. 在主菜单(Main Menu)选择"设置(Settings)"选项。	按选择旋钮唤醒主菜单(Main Menu),然后转动其调至"设置(Settings)"选项。		Main Menu Pipette Type Self Test Switch OFF Settings... select back
2. 确认设置(Settings)选项	按"执行"按钮调出"设置(Settings)"子菜单。		Settings Contrast Inspection date Auto-Power-Off Time Pressure Unit select back
3. 选择压力单位(Pressure Unit)选项	转动选择旋钮选择"压力单位(Pressure Unit)"选项。		Settings Inspection date Auto-Power-Off Time Pressure Unit Factory Settings select back
4. 调出压力单位(Pressure Unit)菜单	按"执行"按钮。当前的压力单位 (Pressure Unit) 设定会显示在屏幕上。		Pressure Unit hPa o.k. back
5. 设置压力单位(Pressure Unit)	通过旋转选择旋钮设定压力单位 (Pressure Unit) 为hPa, mbar或者Torr。		Pressure Unit mbar o.k. back
6. 确认压力单位(Pressure Unit)	按"执行"按钮。确认压力单位 (Pressure Unit) 设置后自动回到"设置 (Settings)"子菜单。 "后退"按钮可直接退回主菜单 (Main Menu)。		Settings Inspection date Auto-Power-Off Time Pressure Unit Factory Settings select back

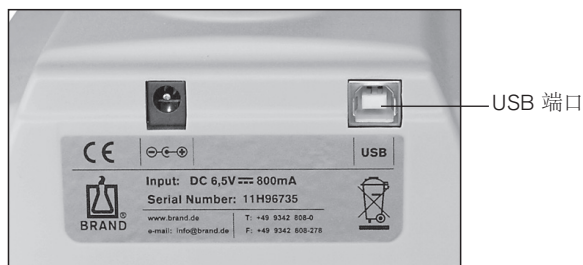
做什么	怎么做	按键	屏幕显示
1. 在主菜单(Main Menu)选择"设置(Settings)"选项。	按选择旋钮唤醒主菜单(Main Menu),然后转动其调至"设置(Settings)"选项。		Main Menu Pipette Type Self Test Switch OFF Settings... select back
2. 确认设置(Settings)选项	按"执行"按钮调出"设置(Settings)"子菜单。		Settings Inspection date Auto-Power-Off Time Pressure Unit Factory Settings select back
3. 选择工厂设置(Factory Settings)选项	转动选择旋钮选择"工厂设置(Factory Settings)"选项。		Settings Inspection date Auto-Power-Off Time Pressure Unit Factory Settings select back
4. 调出工厂设置(Factory Settings)菜单	按"执行"按钮。出现要求确认信息。		Factory Settings please confirm! o.k. back
5. 确认工厂设置(Factory Settings)	按"执行"按钮。屏幕切换到语言选择"英语(English)"界面。		Language Deutsch English Espanol o.k.
	按"执行"按钮。选择语言后自动回到"设置(Settings)"子菜单。 "后退"按钮可直接退回主菜单 (Main Menu)。		Settings Inspection date Auto-Power-Off Time Pressure Unit Factory Settings select back

固件升级

固件升级，即当增加额外移液器类型（新量程）时，可通过BRAND制作的CD完成。注册用户会收到自动通知。非注册用户在申请后可获得此升级。

安装

1. 将CD-ROM光盘放入光驱（“驱动器D”仅为示例）。
2. 按桌面上的开始栏，在运行项的命令栏输入“D:\setup.exe”安装固件升级。
3. 跟随屏幕指示进行。



Q_L 与体积损失的关系 (大约)

出现一定量的泄漏时，移液器在移液时的容积损失取决于多个因素；如吸头尖部口径，口径不同差异很大。

(测得的泄漏率的容差范围：± 20%)

测试移液器		泄漏率 Q_L	移液器体积损失 (大约)
通道	标称量程	[hPa*ml/s]	[μ l]
1-channel	1 μ l	4	0.05
1-channel	2 μ l	4	0.09
1-channel	2,5 μ l	6	0.13
1-channel	5 μ l y	12	0.1
1-channel	5 μ l	4	0.1
1-channel	10 μ l y	4	0.1
1-channel	10 μ l c/n	3	0.1
1-channel	20 μ l y	19	0.2
1-channel	20 μ l c	6	0.2
1-channel	25 μ l	16	0.5
1-channel	50 μ l	10	0.5
1-channel	100 μ l	14	0.8
1-channel	200 μ l	13	2
1-channel	250 μ l	13	4
1-channel	300 μ l	12	4
1-channel	500 μ l	10	4
1-channel	1000 μ l	12	8
1-channel	1250 μ l	26	16
1-channel	1500 μ l	36	16
1-channel	2000 μ l	40	16
1-channel	2500 μ l	66	40
1-channel	5 ml	52	40
1-channel	5 ml soft	21	41
1-channel	10 ml	39	60
1-channel	10 ml soft	20	61
4-channel	1 μ l	18	0.1
4-channel	2 μ l	19	0.2
4-channel	2,5 μ l	29	0.2
4-channel	5 μ l	22	0.2
4-channel	10 μ l	8	0.2
4-channel	20 μ l	10	0.4
4-channel	25 μ l	21	1
4-channel	50 μ l	13	1
4-channel	100 μ l	13	2
4-channel	200 μ l	14	3
4-channel	250 μ l	44	8
4-channel	300 μ l	47	8
4-channel	500 μ l	29	8
4-channel	1000 μ l	25	16
4-channel	1250 μ l	25	16

PLT 检漏仪(移液器泄漏检测仪)

包含一个测试带或不带吸头的空气活塞移液器的适配器，两个空检塞，3个适配器用PE滤芯，一个通用AC电源适配器与一份质量合格证书。

货号

7039 70

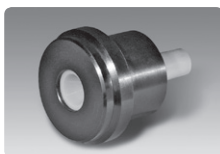


测试带吸头移液器用适配器

用于单通道移液器，包含1个空检塞。

货号

7039 75

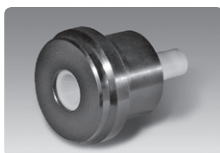


测试不带吸头移液器用适配器

用于单通道移液器，包含1个空检塞。

货号

7039 76



4通道移液器适配器

用于安装或不安装吸头的多通道移液器，包含4个空检塞。

货号

7039 77



移液器适配器滤芯

PE材质，10个/包。

货号

7039 78



通用AC电源适配器

输入: AC 100 V - 240 V, 50/60 Hz
输出: DC 6.5 V, 800 mA

货号

7039 79



PLTconnect 软件

记录测试信息。包装单元 1 件。

货号

7039 80



移液器测试中的错误

问题	错误显示	可能原因	对应操作
测试中断	Error Test cancelled: Leakage rate not measurable! back	适配器内没有插入移液器或者移液器插入不够紧 测试移液器完全泄漏 吸头与移液器套筒间没有密封 选择了错误的移液器类型 移液器适配器不密封。 移液器适配器松了 测试房间过于潮湿，适配器滤芯被堵。 对于5 ml或10 ml移液器：测试压力对于活塞弹簧过于强。抽气时活塞被向下拉拽。	将移液器插紧 移液器损坏，无法用此移器检测。送修移液器。 安装另一个吸头。检查移液器套筒是否有损坏。 在菜单中选择正确的移液器类型。 检查适配器有无污尘或者磨损，检查滤芯是否潮湿。清洁适配器并更换滤芯。执行自检。 拧紧锁紧螺帽。执行自检。 更换适配器滤芯，执行自检。(快速测试) 将移液器类型设为“5 ml温和 (soft)”或“10 ml温和 (soft)”模式。
测得泄漏率失真		潮湿或者PLT检漏仪内部泄漏。	执行自检（完整测试）。
PLT 检漏仪没有反应或反应异常。		软件错误，电子故障	断开电源连接。约5秒之后再次接通电源。

提示： 如果按照上述指导无法排除故障，请将仪器送修。

故障诊断

自检中的错误

Self test

error: 1XXX

see instruction manual

restartback

错误显示

错误编号	原因	对应操作
1000 1010	压力传感器故障	仪器送修。
1020	泵持续运行。	仪器送修。
1040 1050	抽气花费时间过长	检查盖子是否盖紧，检查适配器是否拧紧。如果都已安装稳妥，泵机故障。仪器送修。
1030 1060 1070 1080 1090	阀门故障	仪器送修。
1020	通过通气通道通气时耗时过长	仪器送修。
1150 1160	仪器泄漏	检查盖子，适配器座，适配器滤芯，如有必要进行更换。重复自检。如果故障没有解决，仪器送修。
1170	通过适配器通气耗时过长	如果盖着盖子，移去盖子。如果适配器滤芯有污染，更换滤芯。
1200	电子故障	仪器送修。

仪器送修

重要！ 未经同意运输有毒害的物品是违反联邦法律的。

- 请仔细完整地清洁仪器并去除污染。
- 必须附上故障与使用试剂的准确描述。If information regarding media used is missing, the instrument cannot be repaired.
- 运输费用与风险由发送者承担。

除美国与加拿大外：

- 填写"无健康危害申明"并发给您的供应商或生产商。向您的供应商或生产商索要此表格。此表格可在www.brand.de下载。

在美国与加拿大：

- 在寄回仪器之前联系BrandTech Scientific, Inc. 获取返修的授权号码。
- 仅接受寄回清洁的并去除污染的仪器，必须附上返修授权号码并粘贴在外包装显眼的位置，寄回返修授权号码对应的地址。

联系地址

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担保信息

我们不能承担由于不当拿取，使用，服务，操作或未授权的仪器维修产生的结果，我们同样不能承担由于正常易损件如活塞，密封垫圈，阀门的磨损或者玻璃破损而产生的结果，我们也不能承担由于不按照操作手册指导的操作而产生的结果。我们不能承担由于进行任何操作手册未描述的操作与使用或由于非原装配件的使用而产生的结果。

美国与加拿大

担保信息请看www.brandtech.com.

丢弃

此处的标志说明储存的电池与电子设备在超出寿命之后不可以丢弃于生活用的垃圾箱（混合有生活垃圾）。

- 根据欧洲废弃电力或电子设备委员会（WEEE）于2003年1月27日的2002/96/EC指令，电子设备应该根据对应国家的法律进行处置。



涉及技术信息修改恕不另行通知。可能包含错误。

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Safety Instructions

This instrument may sometimes be used with hazardous materials, operations, and equipment. It is beyond the scope of this manual to address all of the potential safety risks associated with its use in such applications. It is the responsibility of the user of this instrument to consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

Please read the following carefully!

1. Every user must read and understand this operating manual before operation.
2. Follow general instructions for hazard prevention and safety instructions; e.g., wear protective clothing, eye protection and gloves.
When working with infectious or other hazardous samples, all appropriate regulations and precautions must be followed.
3. Never use the instrument in an atmosphere with a danger of explosion.
4. The instrument should only be used for the leak testing of pipettes that operate on the air displacement principle. Observe operating exclusions (s. page 37)! If in doubt, contact the manufacturer or supplier.
5. Always use the instrument in such a way that neither the user nor any other person is endangered.
6. When testing air displacement pipettes with mounted tips, employ only unused tips.
7. Never use force on the instrument!
8. Use only original manufacturer's accessories and spare parts. Do not attempt to make any technical alterations.
9. Only authorized service personnel may repair or service the instrument.
10. Always check the instrument for visible damage before use. If there is a sign of a potential malfunction, immediately stop the test. Consult the 'Troubleshooting' section of this manual (see page 63), and contact the manufacturer if needed.
11. The AC adapter has to be protected against moisture and must be used only for this instrument.

Warning!

Improper use of the instrument (short-circuit, mechanical damage, overheating etc.) may cause the explosion.

The BRAND leak testing instrument is a differential pressure measuring instrument for determining the leak rate of an air-displacement pipette. Static and dynamic testing permit the localization of leaks. Dynamic testing is preferable.

Testing is possible both with tips (for testing the instrument/tip interface and the entire system) and without tips (for testing the instrument). The leak rate is directly related to the volume loss of a pipette.

The leak rate Q_L is a measure of the quantity of material (mass) that flows through a leak per unit time.

The leak rate is the ratio of the pV value of a gas and the period of time during which the gas flows through the leak. The pV value is the product of the pressure and the volume of a certain quantity of a gas at the prevailing temperature. In ideal gases, the pV value at a given temperature is a measure of the quantity of material or the mass of the gas. The leak rate depends on the type of gas, absolute pressure, pressure difference, and temperature.

For the pipette test, hPa ml/s is a suitable unit for the leak rate Q_L . A leak rate of 1 hPa ml/s at an air pressure of 1000 hPa means a volume loss of 1 μ l/s.

Note:

The leak tester cannot substitute for gravimetric testing for the monitoring of measuring instruments. The instrument should be used to check pipettes on a daily basis as a safeguard for the periods between calibrations.

CE Marking

This sign certifies that the product meets the requirements of the EEC directive and has been tested according to the specified test methods.

Limitations of Use

The instrument offers a rapid and simple test of leakage in air-displacement pipettes within the following limitations:

- Operating temperature 15 °C to 35 °C
- Rel. Humidity max 80%
- For use at elevations up to 2000 m above sea level
- Storage temperature 0 °C to 50 °C

Important!

When the instrument is relocated to a new environment or even during transport, significant changes in the temperature and atmospheric humidity can affect the measurements.

To avoid error messages, the PLT unit must be allowed to acclimate in the testing laboratory for a period of 2 hours before use!

Operating Exclusions

Users themselves must check the suitability of the instrument for the intended application.

Do not use the instrument to aspirate liquids! Avoid aggressive vapors (corrosion hazard)! Further information available upon request.

Hollow vessels that are not specified for vacuum use should never be evacuated, since the vessel can burst!

AC adapter Specifications

PLT unit:

Input: DC 6.5 V = 800 mA

AC adapter:

Input: AC 100 V - 240 V, 50/60 Hz, 0,5 A

Output: DC 6,5 V = 800 mA

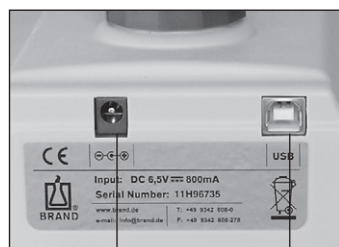
Protection class: IP20

Operating Elements

According to ISO 8655, air-displacement pipettes should be checked regularly. The BRAND PLT unit offers a safeguard for the periods between calibration intervals.



Back of the instrument



AC adapter
socket

USB port

"Back" button

The function of the "Back" button is varied by pressing for a short or long time. Pressing the button for a short time leads back to a sub-menu in the next higher level of the menu hierarchy. Pressing the button for a long time leads back directly to "Ready" on the Start Menu.

Select knob

In many cases, pressing the left "Start/Execute" button as well as the central knob can be used to confirm a selection. For consistency, the left "Start/Execute" button is used for confirmation in this Operating Manual.

Powering on the instrument

Is everything in the package?

The package contains the PLT unit, one adapter each for testing air-displacement pipettes with tips (mounted) or without tips, 2 blind plugs, 3 replacement PE filters for the pipette adapter, an AC adapter, a quality certificate, and this Operating Manual.

What to do?	How to do it	Keys to press	Display readout
-------------	--------------	---------------	-----------------

1. Connecting the AC adapter

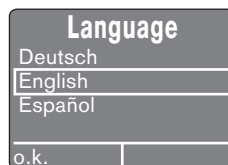
Use only the original AC adapter!

The instrument's AC adapter and AC adapter plug must be freely accessible, and separatable from the power grid at any time.



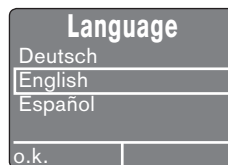
After the AC adapter is connected, the display shows the software version number, the creation date, and the BRAND logo.

During initial start-up, the display brings up the "Language" indicator after 3 sec.



2. Selecting the language

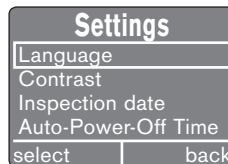
The language is selected by turning the select knob.



3. Confirming the language

Press the left "OK" button. The "Settings" menu appears in the language selected.

The "Back" button leads to the Main Menu.



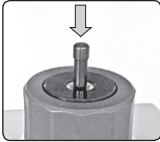
Note:

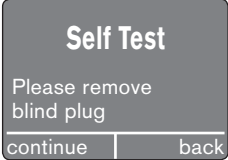
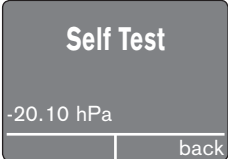
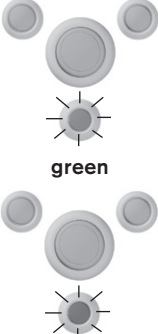
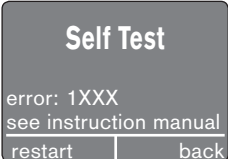
After start-up, one can select either to perform the self-test (page 40) or directly begin a pipette test (page 44).

Perform self-test

The self-test determines if there are any leaks in the BRAND PLT unit. Two different tests are available. The Quick Test lasts only about 2 minutes, and should be performed on a daily basis. The Full Test lasts about 12 minutes. It includes the additional differentiated testing of the internal tanks, and should be performed on a weekly basis.

Quick test

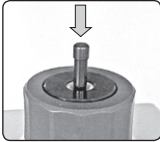
What to do?	How to do it	Keys to press	Display readout
1. Calling up the Main Menu	The Main Menu is called up by pressing or turning the select knob.		Main Menu Pipette Type Self Test Switch OFF Settings... select back
2. Setting up the Self Test	Set to "Self Test" by turning the select knob.		Main Menu Pipette Type Self Test Switch OFF Settings... select back
3. Confirming the Self Test	Press the "Execute" button. The "Self Test" submenu is called up. The last test to be performed appears enframed.		Self Test Quick Test Full Test select back
4. Selecting the Quick Test	Set to "Quick Test" by turning the select knob.		Self Test Quick Test Full Test select back
5. Confirming the Quick Test	Press the "Start/Execute" button. The "Start Menu" submenu is called up.		Self Test Please insert blind plug start back
6. Seal the system	Press the provided blind plug firmly into the adapter (for the multi-channel adapter, seal all 4 channels).		

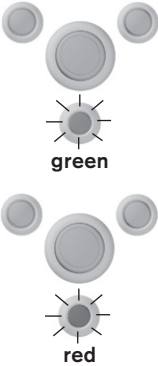
What to do?	How to do it	Keys to press	Display readout
7. Starting the Quick Test	Press the "Start/Execute" button. The five components - sensor, pump, valve, filter, and measurement chamber - are tested one after the next. The progress bar in the display indicates the test status. The LED indicator alternately blinks red and green during the test.		 (pressure value is only an example)
			
8. Aerating the system	Remove the plug and press the "Execute" button. The system is aerated and the indicator will show the current pressure in the measurement chamber.		 (pressure value is only an example)
			
9. Ending the Self Test	After aeration of the system, the display changes automatically and indicates whether the unit passed the test. In the case of an error, the system stops the procedure and indicates an error code (see page 64), and the system is aerated.	 green red	

Perform self test

The self test determines if there are any leaks in the BRAND PLT unit. Two different tests are available. The Quick Test lasts only about 2 minutes, and should be performed on a daily basis. The Full Test lasts about 12 minutes. It includes the additional differentiated testing of the internal tanks, and should be performed on a weekly basis.

Full test

What to do?	How to do it	Keys to press	Display readout
1. Calling up the Main Menu	The 'Main Menu' is called up by pressing or turning the select knob.		Main Menu Pipette Type Self Test Switch OFF Settings... select back
2. Setting up the Self Test	Set to 'Self Test' by turning the select knob.		Main Menu Pipette Type Self Test Switch OFF Settings... select back
3. Confirming the Self Test	Press the 'Execute' button. The 'Self Test' submenu is called up. The last test to be performed appears enframed.		Self Test Quick Test Full Test select back
4. Selecting the Full Test	Set to 'Selecting the Full Test' by turning the select knob.		Self Test Quick Test Full Test select back
5. Confirming the Full Test	Press the 'Start/Execute' button. The 'Start Menu' submenu is called up.		Self Test Please insert blind plug start back
6. Seal the system	Press the provided plug firmly into the adapter (for the multi-channel adapter, seal all 4 channels).		

What to do?	How to do it	Keys to press	Display readout
7. Starting the Full Test	Press the 'Start/Execute' button. The six components - sensor, pump, valve, filter, measurement chamber, and the tanks - are tested one after the next. The progress bar in the display indicates the test status. The LED indicator alternately blinks red and green during the test.		Self Test -0.10 hPa 1:sensor back (pressure value is only an example)
8. Aerating the system	After completion of the component tests, the display shows a prompt to remove the plug.		Self Test Please remove blind plug continue back
	Remove the plug and press the 'Execute' button. The system is aerated and the indicator will show the current pressure.		Self Test -20.10 hPa back (pressure value is only an example)
9. Ending the Self Test	After aeration of the system, the display changes automatically and indicates whether the unit passed the test. In the case of an error, the system stops the procedure and indicates an error code (see page 64), and the system is aerated.		Self Test PASS restart back Self Test error: 1XXX see instruction manual restart back

Test preparation

Before the test, one must decide whether a dynamic or static test is to be performed.

Dynamic or static test?

With the **dynamic test**, in addition to the detection of static leaks, one can also determine whether a defective piston (contamination, scratches) has caused a leak.

During the measurement time, the pipette button must be pressed down completely and evenly 2-3 times. The associated piston movement allows errors to be recognized.

The button stroke is accomplished relatively slowly with 5 ml and 10 ml pipettes.

In the dynamic testing of pipettes, the piston should be in the upper position at the beginning, and should be brought back to that position at the end.

In the **static test**, by contrast, the pipette button is not pressed during the test procedure, i.e. the piston doesn't move. In power pipettes, one can position the piston in the uppermost location or at the 1st stop.

A leak that occurs during the piston stroke can thus not be determined at this point.

We recommend that the dynamic test be performed.

Test with or without pipette tip?

The test can take place with or without the pipette tip.

We recommend that the test be performed with a mounted, unused tip so that the entire pipette system is tested.

When a leak has been identified, the test can be repeated without a tip to determine whether the leak arises from the tip cone/tip coupling region. The adapter must be changed (see page 46) to be able to perform the test without the tip.

The pipette should be held firmly during the test.



Testing of single- or multi-channel pipettes

Changing the adapter

A total of 3 adapters are available

Adapter 1: already premounted,
for testing single-channel pipettes up to 10 ml
with a mounted pipette tip



Adapter 2: included in the delivery,
for testing single-channel pipettes without a pipette tip



Adapter 3: available separately (optional), for testing of multi-channel
pipettes with or without a pipette tip, wherein all 4 channels are
tested simultaneously. The 4-channel adapter can be used for
4-, 8- and 12-channel pipettes.

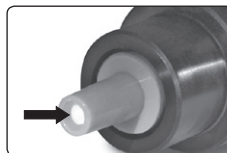


When a leak is detected, three channels can be closed with
plugs. The leaking channel can be determined through subse-
quent single-channel testing.

During multi-channel pipettes testing, the tips can be allowed
to remain in the adapter when the instrument is disconnected.
These can be removed simply by hand, or left inserted for the
next test.

Important!

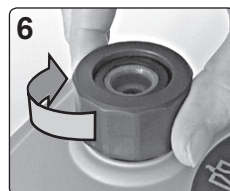
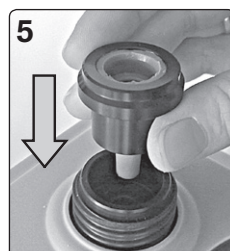
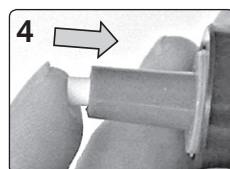
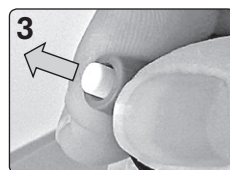
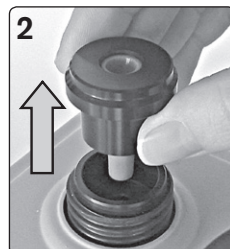
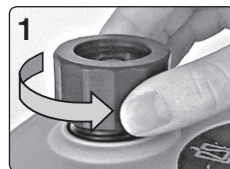
To protect the instrument from moisture and contamination, a readily change-
able PE filter is included in the bottom the silicone adapter.



Test preparation

Changing the adapter and filter

1. Unscrewing the adapter lock nut.
2. Remove the pipette adapter.
3. If the PE filter is clogged with moisture or contaminants, it must be changed. In this case, carefully withdraw the PE filter from the bottom end of the silicone adapter.
4. Insert a new filter.
5. Insert the selected pipette adapter into the adapter housing (in the figure, Adapter 2 for pipettes without tips).
6. Screw the lock nut down firmly.
7. After changing the adapter, perform the Quick Test.



Note:

The 4-channel adapter consists of an adapter with an integrated lock nut. The entire ensemble is exchanged.



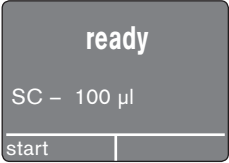
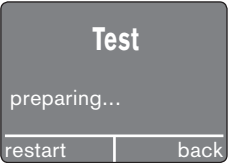
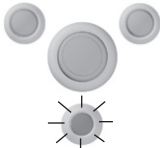
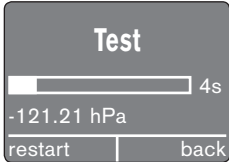
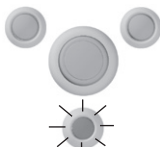
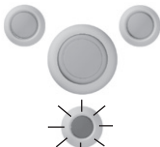
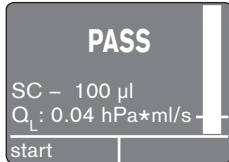
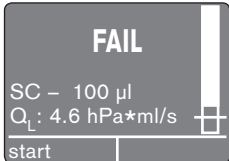
Example: 100 µl Air-displacement pipette, dynamic test

Before testing set pipette to nominal volume. Mount a new, unused, disposable tip, and insert the pipette with the tip in the previously selected and attached Adapter 1 (see page 46).

What to do?	How to do it	Keys to press	Display readout
1. Calling up the Main Menu	The 'Main Menu' is called up by pressing or turning the select knob.		Main Menu Pipette Type Self Test Switch OFF Settings... select back
2. Selecting the pipette type	Set to 'Pipette Type' by turning the select knob.		Main Menu Pipette Type Self Test Switch OFF Settings... select back
3. Confirming the pipette type	Press the 'Execute' button. The 'Channels' submenu is called up.		Channels Single Channel Multichannel select back
4. Selecting the single-channel pipette	Set to 'Single-Channel' by turning the select knob.		Channels Single Channel Multichannel select back
5. Confirming the single-channel pipette	Press the 'Execute' button. The 'Nominal Volume' submenu is called up.		Nominal Volume 25 µl 50 µl 100 µl 200 µl select back
6. Selecting the pipette volume	'100 µl' is selected by turning the select knob.		Nominal Volume 25 µl 50 µl 100 µl 200 µl select back

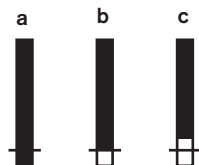
Continued on next page

Testing single-channel pipettes (cont.)

What to do?	How to do it	Keys to press	Display readout
7. Confirming the pipette volume	Press the 'Start/Execute' button. The 'Start' submenu is called up.		
8. Starting the test	Press the 'Start/Execute' button. The test is begun, and the test pressure is set (in progress...)		
Press the pipette button 2-3 times	Shortly before the end of the preparation period, the LED light shines 1 time red and 1 time green, then the progress bar appears and the system automatically starts the measurement. At this time, the pipette button is pressed down evenly 2-3 times. The piston must return the initial position before the measurement is finished! The progress bar graphic indicates the remaining time and the currently achieved vacuum. The LED indicator blinks orange.		 (pressure value is only an example)
9. Ending the test	After the test is finished, the display indicates the leak rate that was determined and whether the system passed the test. The test can be repeated by pressing the "Start/Execute" button. Turning the select knob leads directly to the Main Menu.	 	 (leak rate is only an example)  (leak rate is only an example)

Note:

The missing volume can be approximately determined using the correlation table on page 61.



What do the vertical progress bars in the display mean?

A mark is added to the progress bar. This indicates the threshold value. This corresponds to approx. $\frac{1}{4}$ of the volume tolerance according to ISO 8655-2.

- The progress bar is completely filled in to the bottom: The pipette is leak-tight.
- The progress bar is filled in from the top only down to the threshold value region: We recommend that a gravimetric test be performed.
- The progress bar is filled in to a point well above the threshold value: The pipette leaks. A gravimetric test should be performed, and if necessary the unit should be sent for repair.

What to do if there are leaks?

If a dynamic test indicates the presence of leaks, one can attempt to localize the source with further testing:

- A static test should be performed next.
The pipette button is not activated, and the piston is not moved. If the pipette is now leak-tight, this suggests there are scratches on the piston.
- The dynamic test should be performed without a tip.
Adapter 2 must be used in this case. If the pipette is now leak-proof, it is possible that an unsuitable tip was used.

What do the letters after some volumes mean?

The additional letters after some volumes during volume selection mean:

y = Yellow (instrument with yellow tips)

c = Clear tips

n = nano-cap tip

soft = During the testing of 5 ml and 10 ml pipettes, the piston might no longer move all the way back to top during the dynamic test, but might remain stuck in the instrument due to vacuum and friction. In this case, select the "5 ml soft" or "10 ml soft" test mode.

Note on duration of tests

In the first test after switching the instrument on, a relatively large volume must be pumped out, after which the instrument is given time to stabilize (relaxation). Regularly switching between large and small pipette types leads to longer test durations because the measurement pressure must be reset each time.

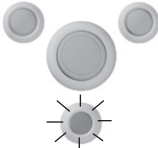
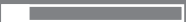
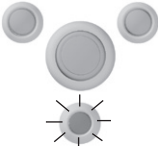
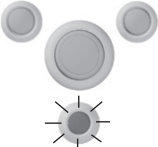
The measurement time for pipettes up to 1000 μ l is generally 5 s, while it can be 20 s for 10 ml instruments.

Testing multichannel pipettes

Example: 200 µl 8-channel air-displacement pipette, dynamic test

Before testing set pipette to nominal volume. Mount a new, unused, disposable tip, and insert four channels with tips in the previously selected and attached Adapter 3 (see page 46).

What to do?	How to do it	Keys to press	Display readout
1. Calling up the Main Menu	The ' Main Menu ' is called up by pressing or turning the select knob.		Main Menu Pipette Type Self Test Switch OFF Settings... select back
2. Selecting the pipette type	Set to ' Pipette Type ' by turning the select knob.		Main Menu Pipette Type Self Test Switch OFF Settings... select back
3. Confirming the pipette type	Press the 'Execute' button. The ' Channels ' submenu is called up.		Channels Single Channel Multichannel select back
4. Selecting the multichannel pipette	Set to ' Multichannel ' by turning the select knob.		Channels Single Channel Multichannel select back
5. Confirming the multichannel pipette	Press the 'Execute' button. The ' Nominal Volume ' submenu is called up.		Nominal Volume 50 µl 100 µl 200 µl 250 µl select back
6. Selecting the pipette volume	'200 µl' is selected by turning the select knob.		Nominal Volume 50 µl 100 µl 200 µl 250 µl select back

What to do?	How to do it	Keys to press	Display readout
7. Confirming the pipette volume	Press the 'Start/Execute' button. The ' Start ' submenu is called up.		ready MC – 200 µl start
8. Starting the test	Press the 'Start/Execute' button. The test is begun, and the test pressure is set (in progress...)		Test preparing... restart back
Press the pipette button 2-3 times	Shortly before the end of the preparation period, the LED light shines 1 time red and 1 time green, then the progress bar appears and the system automatically starts the measurement. At this time, the pipette button is pressed down evenly 2-3 times. The piston must return the initial position before the measurement is finished! The progress bar graphic indicates the remaining time and the currently achieved vacuum. The LED indicator blinks orange.		Test  4s -121.21 hPa restart back (pressure value is only an example) orange
9. Ending the test	After the test is finished, the display indicates the leak rate that was determined and whether the system passed the test. The 'Start/Execute' button can be used to repeat the test, or the test can be continued with the next 4 channels. Turning the select knob leads directly to the Main Menu.	 green  red	PASS MC – 200 µl Q_L: 0.04 hPa*ml/s start (leak rate is only an example) FAIL MC – 200 µl Q_L: 4.6 hPa*ml/s start (leak rate is only an example)

Note:

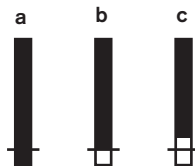
The missing volume can be approximately determined using the correlation table on page 61.

Testing multichannel pipettes

What do the vertical progress bars in the display mean?

A mark is added to the progress bar. This indicates the threshold value. This corresponds to approx. $\frac{1}{4}$ of the volume tolerance.

- The progress bar is completely filled in to the bottom: The instrument is leak-tight.
- The progress bar is filled in from the top only down to the threshold value region: We recommend that a gravimetric test be performed.
- The progress bar is filled in to a point well above the threshold value: The instrument leaks. A gravimetric test should be performed, and if necessary the unit should be sent for repair.



What to do if there are leaks?

If a dynamic test indicates the presence of leaks, one can attempt to localize the source with further testing:

- A static test should be performed next.
The pipette button is not activated, and the piston is not moved.
If the pipette is now leak-tight, this suggests:
 - scratches on the piston
 - defective piston seal
 - unsuitable silicone oil
- The dynamic test should be performed without a tip.
Adapter 3 can be reused for this.
If the pipette is now leak-proof, it is possible that:
 - unsuitable tip
 - defective tip cone
- Testing a multichannel pipette: Close 3 channels with the caps provided, and test the individual channels to localize the leak. Select the "single-channel" pipette type for this.

Attention:

When using pipettes in which the pistons are greased **with** silicone grease, **only** the manufacturer's recommended grease should be used!

When using pipettes in which the pistons are operated **without** silicone grease, these should **never** be lubricated since irreversible damage might then occur!

Please refer to the corresponding instruction manual.

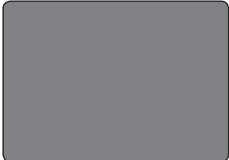
Note on duration of tests

In the first test after switching the instrument on, a relatively large volume must be pumped out, after which the instrument is given time to stabilize (relaxation). Regularly switching between large and small pipette types leads to longer test durations because the measurement pressure must be reset each time.

The measurement time for pipettes up to 500 μl is generally 5 s, while it can be 10 s for a volume of 1250 μl .

Switch the instrument off

The active PLT unit can be switched off at any time, independent of the shut-off time set (see page 57).

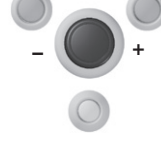
What to do?	How to do it	Keys to press	Display readout
1. Calling up the Main Menu	The ' Main Menu ' is called up by pressing the select knob.		Main Menu Pipette Type Self Test Switch OFF Settings... select back
2. Selecting instrument off	Set to ' Instrument OFF ' by turning the select knob.		Main Menu Pipette Type Self Test Switch OFF Settings... select back
3. Switch the instrument off	Press the left ' Execute ' button to switch the instrument off.		
Turning the instrument on again	Pressing any button turns the instrument on again. At first, the display shows the scheduled maintenance date for a few seconds Then it switches automatically to the 'Ready' indicator with the previously tested pipette.		Inspection date 1-Apr-2019 ready MC – 200 µl start

Selecting the language

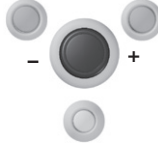
In the 'Settings' submenu, the following subitems can be selected: Language, contrast, maintenance date, shut-off time, pressure units, and factory defaults.

What to do?	How to do it	Keys to press	Display readout
1. Selecting 'Settings' in the Main Menu	Call up the 'Main Menu' by pressing the select knob, and turn it to select 'Settings'.		Main Menu Pipette Type Self Test Switch OFF Settings... select back
2. Confirming the settings	Press the 'Execute' button. The 'Settings' submenu is called up.		Settings Language Contrast Inspection date Auto-Power-Off Time select back
3. Selecting the language	Set to 'Language' by turning the select knob.		Settings Language Contrast Inspection date Auto-Power-Off Time select back
4. Calling up the Language Menu	Press the 'Execute' button. The 'Language' menu is called up. The language is selected by turning the select knob.		Language Deutsch English Español o.k. back
5. Confirming the language	Press the 'Execute' button. The 'Settings' menu appears in the language selected. The 'Back' button leads to the Main Menu.		Settings Language Contrast Inspection date Auto-Power-Off Time select back

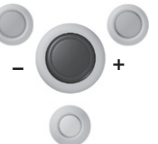
The color intensity of the indicator can be changed interactively.

What to do?	How to do it	Keys to press	Display readout
1. Selecting 'Settings' in the Main Menu	Call up the 'Main Menu' by pressing the select knob, and turn it to select 'Settings'.		Main Menu Pipette Type Self Test Switch OFF Settings... select back
2. Confirming the settings	Press the 'Execute' button. The 'Settings' submenu is called up.		Settings Language Contrast Inspection date Auto-Power-Off Time select back
3. Selecting the contrast	Set to 'Contrast' by turning the select knob.		Settings Language Contrast Inspection date Auto-Power-Off Time select back
4. Calling up the contrast	Press the 'Execute' button. The 'Contrast' menu is called up.		Contrast  50 o.k. back
5. Setting the contrast	Set this from '10' to '100' by turning the select knob.		Contrast  76 o.k. back
6. Confirming the contrast	Press the 'Execute' button. The 'Settings' menu reappears. The 'Back' button leads to the Main Menu.		Settings Language Contrast Inspection date Auto-Power-Off Time select back

The interval for when the PLT unit should be sent to BRAND or an authorized repair shop for testing can be set individually. This interval is displayed each time the unit is switched on.

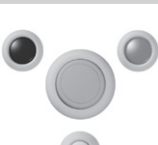
What to do?	How to do it	Keys to press	Display readout
1. Selecting 'Settings' in the Main Menu	Call up the 'Main Menu' by pressing the select knob, and turn it to select 'Settings'.		Main Menu Pipette Type Self Test Switch OFF Settings... select back
2. Confirming the settings	Press the 'Execute' button. The 'Settings' submenu is called up.		Settings Language Contrast Inspection date Auto-Power-Off Time select back
3. Selecting the inspection date	Set to 'Inspection date' by turning the select knob.		Settings Language Contrast Inspection date Auto-Power-Off Time select back
4. Calling up the inspection date	Press the 'Execute' button. The previously set maintenance date is displayed.		Inspection date 1 - Apr - 2016 o.k. back
5. Setting the inspection date	Turning the select knob changes the selection field in the series Year, Month, and Day. (Pressing today's date leads back to 'Settings'). Turning the select knob changes which position is enframed.		Inspection date 1 - Apr - 2017 o.k. select
6. Confirming the inspection date	Press the 'Execute' button. The indicator returns automatically to the 'Settings' menu. The 'Back' button leads to the Main Menu.		Settings Pipette Type Self Test Switch OFF Settings... select back

The auto-power-off time of the PLT unit can be set individually by minutes from 'OFF' to 30 min.

What to do?	How to do it	Keys to press	Display readout
1. Selecting 'Settings' in the Main Menu	Call up the 'Main Menu' by pressing or turning the select knob, and turn it to select 'Settings'.		Main Menu Pipette Type Self Test Switch OFF Settings... select back
2. Confirming the settings	The 'Settings' submenu is called up by pressing the 'Execute' button.		Settings Language Contrast Inspection date Auto-Power-Off Time select back
3. Selecting the auto-power-off time	Set to 'Auto-Power-Off time' by turning the select knob.		Settings Contrast Inspection date Auto-Power-Off Time Pressure Unit select back
4. Calling up the auto-power-off time	Press the 'Execute' button. The previously set auto-power-off time is displayed.		Auto-Power-Off Time 3 min o.k. back
5. Setting the auto-power-off time	The auto-power-off time can be set from 'OFF' to 30 min.		Auto-Power-Off Time 15 min o.k. back
6. Confirming the auto-power-off time	Press the 'Execute' button. The indicator returns automatically to the 'Settings' menu. The 'Back' button leads to the Main Menu.		Settings Contrast Inspection date Auto-Power-Off Time Pressure Unit select back

Selecting the pressure unit

Adjustments

What to do?	How to do it	Keys to press	Display readout
1. Selecting 'Settings' in the Main Menu	Call up the 'Main Menu' by pressing or turning the select knob, and turn it to select 'Settings'.		Main Menu Pipette Type Self Test Switch OFF Settings... select back
2. Confirming the settings	Press the 'Execute' button. The 'Settings' submenu is called up.		Settings Contrast Inspection date Auto-Power-Off Time Pressure Unit select back
3. Selecting the pressure unit	Set to 'Pressure unit' by turning the select knob.		Settings Inspection date Auto-Power-Off Time Pressure Unit Factory Settings select back
4. Calling up the pressure units	Press the left 'Execute' button. The currently set pressure units appear.		Pressure Unit hPa o.k. back
5. Setting the pressure units	The pressure units can be set by turning the select knob to hPa, mbar, or Torr.		Pressure Unit mbar o.k. back
6. Confirming the pressure units	Press the 'Execute' button. The indicator returns automatically to the 'Settings' menu. The 'Back' button leads to the Main Menu.		Settings Inspection date Auto-Power-Off Time Pressure Unit Factory Settings select back

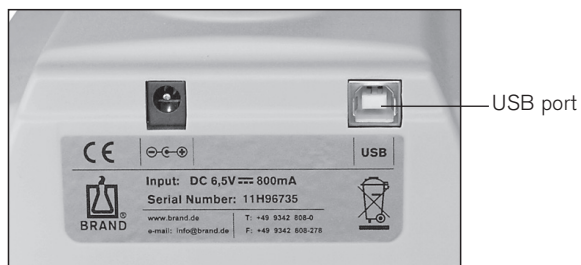
What to do?	How to do it	Keys to press	Display readout
1. Selecting 'Settings' in the Main Menu	Call up the 'Main Menu' by pressing the select knob, and turn it to select 'Settings'.		Main Menu Pipette Type Self Test Switch OFF Settings... select back
2. Confirming the settings	Press the 'Execute' button. The 'Settings' submenu is called up.		Settings Inspection date Auto-Power-Off Time Pressure Unit Factory Settings select back
3. Selecting the factory settings	Set to 'Factory Settings' by turning the select knob.		Settings Inspection date Auto-Power-Off Time Pressure Unit Factory Settings select back
4. Calling up the factory settings	Press the 'Execute' button. The confirmation prompt appears.		Factory Settings please confirm! o.k. back
5. Confirming the factory settings	Press the 'Execute' button. The indicator changes to the language selection of 'English'.		Language Deutsch English Español o.k.
	After selecting and confirming the language, the indicator changes back automatically to the 'Settings' menu. The 'Back' button leads to the Main Menu		Settings Inspection date Auto-Power-Off Time Pressure Unit Factory Settings select back

Firmware update

Firmware updates, e.g. when an additional pipette type (new volume) is to be included, are made available by BRAND on CD. Registered users are informed automatically. Unregistered users will receive this update upon request.

Installation

1. Place the CD-ROM in the drive (Drive "D" is used in this example).
2. Click on 'Start' on the desktop, and enter 'D:\setup.exe' in the 'Execute' command field to install the firmware update.
3. Follow the instructions on the screen.



Relationship of Q_L to volume loss (approx.)

With a leak of a given magnitude, the volume loss of the pipette during pipetting depends on various factors, e.g., the tip opening. Due to this it can vary significantly.

(Tolerance for the measured leak rate: $\pm 20\%$)

Pipette tested		Leak rate Q_L	Pipette volume loss (approx.)
Channels	Nominal volume	[hPa*ml/s]	[μ l]
1-channel	1 μ l	4	0.05
1-channel	2 μ l	4	0.09
1-channel	2,5 μ l	6	0.13
1-channel	5 μ l y	12	0.1
1-channel	5 μ l	4	0.1
1-channel	10 μ l y	4	0.1
1-channel	10 μ l c/n	3	0.1
1-channel	20 μ l y	19	0.2
1-channel	20 μ l c	6	0.2
1-channel	25 μ l	16	0.5
1-channel	50 μ l	10	0.5
1-channel	100 μ l	14	0.8
1-channel	200 μ l	13	2
1-channel	250 μ l	13	4
1-channel	300 μ l	12	4
1-channel	500 μ l	10	4
1-channel	1000 μ l	12	8
1-channel	1250 μ l	26	16
1-channel	1500 μ l	36	16
1-channel	2000 μ l	40	16
1-channel	2500 μ l	66	40
1-channel	5 ml	52	40
1-channel	5 ml soft	21	41
1-channel	10 ml	39	60
1-channel	10 ml soft	20	61
4-channel	1 μ l	18	0.1
4-channel	2 μ l	19	0.2
4-channel	2,5 μ l	29	0.2
4-channel	5 μ l	22	0.2
4-channel	10 μ l	8	0.2
4-channel	20 μ l	10	0.4
4-channel	25 μ l	21	1
4-channel	50 μ l	13	1
4-channel	100 μ l	13	2
4-channel	200 μ l	14	3
4-channel	250 μ l	44	8
4-channel	300 μ l	47	8
4-channel	500 μ l	29	8
4-channel	1000 μ l	25	16
4-channel	1250 μ l	25	16

PLT unit (Pipet Leak Testing Unit)

Including one adapter each for testing air-displacement pipettes with tip (mounted) and without tip, 2 blind plugs, 3 replacement PE filters for the pipette adapters, a universal AC adapter, and a quality certificate.

Cat. No.

7039 70

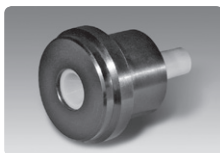


Pipette adapter for testing with tips

for single-channel pipettes, including 1 blind plug

Cat. No.

7039 75

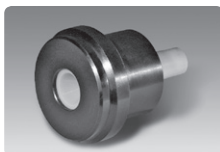


Pipette adapter for testing without tips

for single-channel pipettes, including 1 blind plug

Cat. No.

7039 76



4-Channel pipette adapter

for testing multi-channel pipettes with and without tips, including 4 blind plugs

Cat. No.

7039 77



Filters for the pipette adapter

PE, package of 10

Cat. No.

7039 78



Universal AC adapter

Input: AC 100 V - 240 V, 50/60 Hz

Output: DC 6.5 V, 800 mA

Cat. No.

7039 79



PLTconnect software

For the documentation of examinations.
Pack of 1.

Cat. No.

7039 80



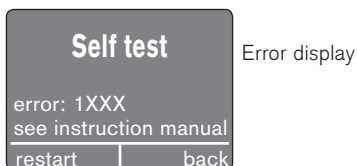
Errors during pipette tests

Problem	Error display	Possible cause	Corrective action
Test interruption	Error Test cancelled: Leakage rate not measurable! back	No pipette in adapter, or not inserted firmly enough Tested pipette is completely leaky Tip does not seal onto shaft Wrong pipette type adjusted Pipette adapter not leak-tight Pipette adapter is loose Moisture in the measurement room, adapter filter is clogged. with 5 ml and 10 ml pipettes: Measurement pressure too strong for the piston spring. Piston drawn downward when pumping down.	Insert pipette firmly enough Pipette is defective, and cannot be tested with this testing instrument. Send the pipette out for repair. Insert another tip Check shaft for damage Select correct pipette type in the menu. Check adapter for lint or abrasion, and check filter for moisture. Clean adapter and exchange filter. Perform self-test. Tighten the lock nut firmly. Perform self-test Exchange adapter filter, perform self-test. (Quick Test) Set the pipette type to '5ml soft' or '10 ml soft'.
Measure leak rate implausible		Moisture or leaks in the PLT unit	Perform self-test (Full Test).
PLT doesn't react at all, or behaves unusually.		Software error, electrical malfunction	Disconnect all cables from the instrument. Re-connect the power cable after approx. 5 seconds.

Note: If the error cannot be resolved by the measures described, send the instrument out for repair.

Troubleshooting

Error during the self-test



Error number	Cause	Corrective action
1000 1010	Pressure sensor is defective	Send the instrument out for repair.
1020	Pump running continuously	Send the instrument out for repair.
1040 1050	Pumping down takes too long	Check whether the caps are firmly attached, and that the adapter is firmly screwed in. If they already are, then the pump is defective. Send the instrument out for repair.
1030 1060 1070 1080 1090	Defective valve	Send the instrument out for repair.
1020	Aeration through the aeration channel takes too long	Send the instrument out for repair.
1150 1160	Instrument leaks	Check the caps, adapter seating, and adapter filter, and replace if necessary. Repeat the self-test. If the error is not resolved, send the instrument out for repair.
1170	Aeration through the adapter takes too long	Remove the cap if this hasn't been done. If the adapter filter is contaminated, replace the filter.
1200	Electronic defect	Send the instrument out for repair.

Return for repair

Important! Transporting of hazardous materials without a permit is a violation of federal law.

- Clean and decontaminate the instrument carefully.
- It is essential always to include an exact description of the type of malfunction and the media used. If information regarding media used is missing, the instrument cannot be repaired. If information regarding media used is missing, the instrument cannot be repaired.
- Shipment is at the risk and the cost of the sender.

Outside the U.S. and Canada:

- Complete the "Declaration on Absence of Health Hazards" and send the instrument to the manufacturer or supplier. Ask your supplier or manufacturer for the form. The form can also be downloaded from www.brand.de.

In the U.S. and Canada:

- Contact BrandTech Scientific, Inc. and obtain authorization for the return **before** sending your instrument for service.
- Return only cleaned and decontaminated instruments, with the Return Authorization Number prominently displayed on the outside of the package to the address provided with the Return Authorization Number.

Contact addresses

BRAND GMBH + CO KG

Otto-Schott-Straße 25
97877 Wertheim (Germany)

Tel.: +49 9342 808-0
Fax: +49 9342 808-98000
E-Mail: info@brand.de
www.brand.de

USA and Canada:

BrandTech® Scientific, Inc.
11 Bokum Road
Essex, CT 06426-1506 (USA)
Tel.: +1-860-767 2562
Fax: +1-860-767 2563
www.brandtech.com

India:

BRAND Scientific Equipment Pvt. Ltd.
303, 3rd Floor, 'C' Wing, Delphi
Hiranandani Business Park, Powai
Mumbai - 400 076 (India)
Tel.: +91 22 42957790
Fax: +91 22 42957791
E-Mail: info@brand.co.in
www.brand.co.in

China:

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Guangqi Culture Plaza
Room 506, Building B
No. 2899, Xietu Road
Shanghai 200030 (P.R. China)
Tel.: +86 21 6422 2318
Fax: +86 21 6422 2268
E-Mail: info@brand.cn.com
www.brand.cn.com

Warranty

We shall not be liable for the consequences of improper handling, use, servicing, operating or unauthorized repairs of the instrument or the consequences of normal wear and tear especially of wearing parts such as pistons, seals, valves and the breakage of glass as well as the failure to follow the instructions of the operating manual. We are not liable for damage resulting from any actions not described in the operating manual or if non-original spare parts or components have been used.

U.S. and Canada:

Information for warranty please see www.brandtech.com.

Disposal

The adjoining symbol means that storage batteries and electronic devices must be disposed of separately from household trash (mixed municipal waste) at the end of their service life.

- According to the Directive 2002/96/EC of the European Parliament and of the Council on Waste Electrical and Electronic Equipment (WEEE) of 27 January 2003, electronic equipment requires disposal according to the relevant national disposal regulations.



Subject to technical modification without notice. Errors excepted.

DECLARATION OF CONFORMITY – China RoHS 2



BRAND GMBH + CO KG has made reasonable efforts to ensure that hazardous materials and substances may not be used in BRAND products.

In order to determine the concentration of hazardous substances in all homogeneous materials of the subassemblies, a "Product Conformity Assessment" (PCA) procedure was performed. As defined in GB/T 26572 the "Maximum Concentration Value" limits (MCV) apply to these restricted substances:

• Lead (Pb):	0.1%
• Mercury (Hg):	0.1%
• Cadmium (Cd):	0.01%
• Hexavalent chromium (Cr(+VI)):	0.1%
• Polybrominated biphenyls (PBB):	0.1%
• Polybrominated diphenyl ether (PBDE):	0.1%

Environmental Friendly Use Period (EFUP)

EFUP defines the period in years during which the hazardous substances contained in electrical and electronic products will not leak or mutate under normal operating conditions. During normal use by the user such electrical and electronic products will not result in serious environmental pollution, cause serious bodily injury or damage to the user's assets.

The environmental Friendly Use Period for BRAND instruments is 40 years.



此表格是按照SJ/T 11364-2014中规定所制定的。
This table is created according to SJ/T 11364-2014.

MATERIAL CONTENT DECLARATION FOR BRAND PRODUCTS							
有毒有害物质或元素 Hazardous substances							
部件名称 Part name	铅 Pb	汞 Hg	镉 Cd	六价铬 Cr(+VI)	多溴联苯 PBB	多溴二 苯醚 PBDE	环保期限标识 EFUP
包装 / Packaging	O	O	O	O	O	O	
塑料外壳 / 组件 Plastic housing / parts	O	O	O	O	O	O	
电池 / Battery	O	O	O	O	O	O	
玻璃 / Glass	O	O	O	O	O	O	
电子电气组件 Electrical and electronic parts	X	X	X	O	O	O	
金属外壳 / 组件 Metal housing / parts	X	O	O	O	O	O	
电机 / Motor	X	O	O	O	O	O	
配件 / Accessories	X	O	O	O	O	O	

注释: 此表格适用于所有产品。以上列出的元件或组件不一定都属于所附产品的组成。

Note: Table applies to all products. Some of the components or parts listed above may not be part of the enclosed product.

- O: 表示该有毒有害物质在该部件所有均质材料中的含量均在GB/T 26572规定的限量要求以下。
- O: Indicates that the above mentioned hazardous substance contained in all homogeneous materials of the part is below the required limit as defined in GB/T 26572.
- X: 表示该有毒有害物质至少在该部件某一均质材料中的含量超出GB/T 26572规定的限量要求。
- X: Indicates that the above mentioned hazardous substance contained in at least one of the homogeneous materials of this part is above the required limit as defined in GB/T 26572.

除上表所示信息外, 还需声明的是, 这些部件并非是有意图用铅 (Pb), 汞 (Hg), 铬 (Cd), 六价铬 (Cr(+VI)), 多溴联苯 (PBB) 或多溴二苯醚 (PBDE) 来制造的。

Apart from the disclosures in the above table, the subassemblies are not intentionally manufactured or formulated with lead (Pb), mercury (Hg), cadmium (Cd), hexavalent chromium (Cr+VI), polybrominated biphenyls (PBB), and polybrominated diphenyl ethers (PBDE).

Products manufactured by BRAND may enter into further devices or can be used together with other appliances. With these third party products and appliances in particular, please note the EFUP labeled on these products. BRAND will not take responsibility for the EFUP of those products and appliances.

Place, date: Wertheim, 25/02/2019

Hans-Walter Kern

(Managing Director
Logistics and Production)

i.A.

Josef Pfohl

(Quality Management)



普兰德® (上海) 贸易有限公司

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