

中文版 | English



VITLAB®

瓶口分液器

VITLAB®

genius²

操作手册 (中文版)

Operating Manual (Simplified Chinese)



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安全符号

设备上的符号

	一般警告符号
	请遵照操作手册操作
	请佩戴护目镜
	请佩戴防护手套
	请穿防护服

首次使用本仪器之前,请确保
仔细冲洗本仪器或弃用前几
次排液的样品。

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1. 安全说明

请仔细阅读以下内容！

本仪器有时可能会与危险物质、操作和设备搭配使用。本手册并未提及与本仪器用于上述应用相关的所有潜在安全风险。本仪器的使用者有责任在使用前查阅并制定适当的安全和健康规范，并确定法规限制的适用性。

△ 请仔细阅读以下内容！

1. 每位使用者都必须在操作前阅读并理解本操作手册。
2. 请遵守一般危害预防说明和安全说明，例如，应穿戴防护服、护目镜和手套。
3. 请遵照试剂制造商提供的所有规格说明。
4. 分配易燃介质时，请务必要避免发生静电荷积聚现象，例如，请勿将易燃介质分配到塑料容器中；请勿用干布擦拭仪器。
5. 请严格遵守规定的使用限制和操作限制，仅将本仪器用于分液。请注意操作例外情况（见第 5 页）！如有任何疑问，请联系制造商或供应商。
6. 使用本仪器时，请始终确保不会危及使用者或任何其他人的安全。分液时，始终不得将排液管对着您本人或任何其他人。请避免液体飞溅。仅可使用合适的容器。
7. 排液管盖关闭时，切勿按下活塞。
8. 活塞腔内有试剂时，切勿拔出排液管。
9. 试剂会积聚在排液管的盖子内。因此，应定期清洁盖子。
10. 如果试剂瓶较小，以及使用加长分液管时，请使用试剂瓶架，以防其倾倒。
11. 移动安装在试剂瓶上的瓶口分液器时，永远不要只握住活塞套筒或阀门模块部分。活塞套筒破损或松动时，错误操作可能导致来自化学品的人身伤害（正确的移动方式见第 10 页图 3）。
12. 切勿用力按压本仪器。请平滑、轻柔地操作活塞，使其上下移动。
13. 仅可使用原始制造商的附件和备件。请勿尝试进行任何技术改动。请勿超出操作手册所述的范围进一步拆卸本仪器！
14. 使用前，请务必检查本仪器有无明显的损坏。如果存在潜在的故障迹象（如活塞难以移动、阀门卡住或泄漏），应立即停止分液。
请查阅本手册的“故障排除”部分（见第 27 页），必要时联系制造商。

2. 功能和使用限制

可使用VITLAB® genius²瓶口分液器直接分配试剂瓶中的液体，瓶口分液器的量程可以调节。

正确使用本仪器时，分配出的液体仅与以下高化学耐受性材料相接触：硼硅酸盐玻璃、Al₂O₃陶瓷、ETFE、FEP、PFA、PTFE、铂铱合金、PP（排液管管盖）。如果需要更高的化学耐受性，请使用ETFE/PTFE瓶口适配器（第24页“附件”）。

使用限制

本仪器用于分液,请遵守以下物理限制:

- 仪器和试剂的使用温度为+15°C至+40°C(59°F到104°F)
- 蒸气压力最高为600 mbar。超过300 mbar时应缓慢吸液,以防液体沸腾。
- 最高运动粘度500 mm²/s (动态粘度[mPas])
=运动粘度[mm²/s] × 密度[g/cm³])
- 密度:最高2.2 g/cm³

操作限制

液体形成沉积物后,可能会导致活塞难以移动或被卡住(如结晶溶液或浓碱性溶液)。如果活塞移动变缓或难以移动,应立即清洁本仪器(第18页)。

分配易燃介质时,请务必要避免发生静电荷积聚现象,例如,请勿将易燃介质分配到塑料容器中;请勿用干布擦拭仪器。

本仪器专为一般实验室应用而设计,并符合DIN EN ISO 8655等相关标准。使用者必须核对本仪器与特定应用(如痕量分析、食品行业等)的适配性。本仪器尚未获批用于食品、药品或化妆品的生产和管理等特定应用。

操作例外情况

分液器不得与以下材料搭配使用:

- 对Al₂O₃陶瓷、ETFE、FEP、PFA和PTFE具有腐蚀性的液体(如溶解后的叠氮化钠*)。
- 对硼硅酸盐玻璃具有腐蚀性的液体(如氢氟酸)
- 可被铂铱合金催化分解的液体(如H₂O₂)
- 硝酸(>60%)
- 四氢呋喃
- 三氟乙酸
- 易燃易爆液体(如二硫化碳)
- 混悬液(如活性炭混悬液)(因为固体颗粒可能会堵塞或损坏本仪器)
- 对PP(排液管管盖)具有腐蚀性的液体**

储存条件

本仪器和附件仅可在清洁后存放在阴凉干燥处。储存温度:-20 °C至+50 °C (-4 °F至122 °F)。

* 耐受溶解后的叠氮化钠最高浓度为0.1%。

** 需要使用化学耐受性更高的材料时,请使用ETFE/PTFE适配器(第24页“附件”)。

3. VITLAB® genius²的试剂耐受性表

VITLAB® genius²瓶口分液器的应用范围广泛, 可用于分配试剂瓶中的腐蚀性试剂, 包括H₃PO₄等浓酸、NaOH、KOH等碱液、盐溶液以及诸多有机溶剂。请注意操作例外情况和“应用范围”。

	试剂		试剂		试剂
O	乙醛	O	甲酚	O	甲酸甲酯
O	乙酸(≤96%)	O	枯烯(异丙苯)	O	甲基丙基甲酮
O	丙酮	O	环己酮	O	矿物油(机油)
O	乙腈	O	癸烷	O	氯乙酸(50%)
O	乙酰丙酮	O	1-癸醇	I	硝酸(≤60%*/**)
O	丙烯酸	O	乙二醇	O	硝基苯
O	丙烯腈	O	二苄醚	O	辛烷
O	己二酸	O	二氯苯	O	油酸
O	烯丙醇	O	二氯乙烷	O	草酸
I	氯化铝	O	二氯甲烷	I	高氯酸
O	氨基酸	O	二乙醇胺	O	石油
I	氨水(≤20%)	O	乙醚	O	苯酚
I	氯化铵	O	二乙胺	O	苯乙醇
I	氟化铵	O	1,2-二乙苯	O	苯基联胺
I	氢氧化铵(≤20%)	O	二甲基亚砜(DMSO)	I	磷酸(≤85%)
I	硫酸铵	O	二甲基苯胺	I	磷酸(85%) + 硫酸(98%), 1:1
O	乙酸戊酯	O	二甲基甲酰胺(DMF)	O	哌啶,
O	戊醇	O	1,4-二氧六烷	O	氮杂环己烷
O	氯戊烷	O	苯基醚	I	氯化钾
O	苯胺	O	乙醇	I	重铬酸钾
I	氯化钡	O	乙醇胺	I	氢氧化钾
O	苯甲醛	O	乙酸乙酯	I	高锰酸钾
O	苯	O	甲醛(≤40%)	O	丙醇
O	苯酰氯	O	甲酰胺	O	丙酸
O	苯甲醇	O	甲酸(≤100%)	O	丙二醇
O	苄基氯	O	汽油	O	环氧丙烷
O	苯甲胺	O	冰醋酸(100%)	O	吡啶, 氮杂苯
I	硼酸(≤10%)	O	甘油	O	丙酮酸
O	溴苯	O	乙二醇	O	水杨醛
O	溴苯	O	羟基乙酸(≤50%)	O	水杨酸
O	丁二醇	O	燃用油(柴油)	O	醋酸银
O	正丁醇	O	己烷	I	硝酸银
O	乙酸丁酯	O	己酸	O	醋酸钠
O	丁基甲醚	O	己醇	I	氯化钠
O	丁胺	I	盐酸(≤37%**)	I	重铬酸钠
O	丁酸	I	氢碘酸(≤57%**)	I	氟化钠

试剂	
I	碳酸钙
I	氯化钙
I	氢氧化钙
I	次氯酸钙
O	氯乙醛 ($\leq 45\%$)
O	氯乙酸
O	氯丙酮
O	氯苯
O	氯丁烷
O	氯萘
I	铬酸 ($\leq 50\%$)
I	铬酸洗液
I	硫酸铜

试剂	
I	碘/碘化钾溶液
O	异戊醇
O	异丁醇
O	异丙醇 (2-丙醇)
O	异丙醚
O	乳酸
I	氯化镁
I	氯化汞
O	甲醇
O	苯甲醚
O	苯甲酸甲酯
O	甲基丁基醚
O	甲基乙基酮

试剂	
I	氢氧化钠 ($\leq 30\%$)
I	次氯酸钠
I	硫酸 ($\leq 98\%$)
O	酒石酸
O	四甲基氢氧化铵
O	甲苯
O	松节油
O	尿素
O	二甲苯
I	氯化锌 ($\leq 10\%$)
I	硫酸锌 ($\leq 10\%$)

* 使用ETFE/PTFE瓶口适配器

** 使用干燥管

以上建议表明测试在发布前已完成。请始终遵守本仪器操作手册中的说明以及试剂制造商的规格说明。除了上述化学试剂外，本仪器还可用于分配各种有机和无机盐溶液（如生物缓冲液）、生物表面活性剂和细胞培养基。如需了解清单中未列出的试剂相关信息，请致电我们咨询。

O	有机溶液
I	无机溶液

4. 操作元件



5. 开箱组装

5.1 包装内的物品是否齐全？

确认您的包装中包含：

VITLAB® genius² 瓶口分液器与带安全导向阀的排液管、可伸缩吸液管、回流管、安装工具、瓶口适配器、校准证书和本操作手册

标称量程 (mL)	瓶口螺纹适配器 (PP)	吸液管长度 (mm)
1, 2, 5, 10	GL 25, GL 28/S 28, GL 32, GL 38, S 40	125-240
25, 50, 100	GL 32, GL 38, S 40	170-330

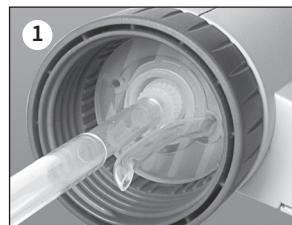
5.2 组装

警告！

请穿戴防护服、护目镜和手套！请遵守所有安全说明以及使用限制和操作限制（第 4-5 页）。

1. 安装吸液管/回流管

根据瓶子高度调节可伸缩吸液管的长度，并将其连接好。小心地将吸液管置于中央位置，并将其连接好，以免损坏管口。此外，还必须安装回流管，插入时回流管开口朝外（图 1）。



2. 将本仪器安装到瓶子上并对齐

将本仪器 (GL 45 螺纹) 拧到试剂瓶上，然后将排液管与试剂瓶标签对齐。同时旋转阀块与排液管，即可对齐 (图2)。为避免倾倒，小瓶应使用试剂瓶架固定。



5.2 组装 (续)

注：

如果是其他螺纹尺寸的试剂瓶，请选择合适的适配器。

本仪器随附的适配器采用 PP 制成，仅可用于对 PP 无腐蚀性的介质。也可以使用 ETFE/PTFE 瓶口适配器（第 24 页“附件”）。使用者须检查 ETFE/PTFE 瓶适配器的适用性。

警告！

接触本仪器或试剂瓶时，请始终佩戴防护手套，尤其是在处理危险液体时。

若该仪器已安装于试剂瓶上，移动时应始终按图 3 中所示的姿势持握该仪器！

3



6. 排气

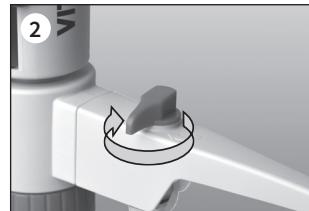
警告！

请穿戴防护服、护目镜和手套！盖上排液管管盖时，切勿按下活塞！
请避免试剂飞溅！液体可能会积聚在排液管管盖中。为避免液体飞溅，请缓慢分液。请遵守所有安全说明以及使用限制和操作限制（第 4-5 页）。



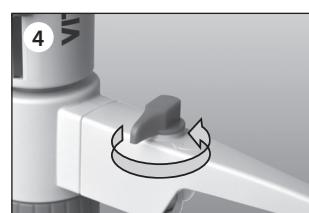
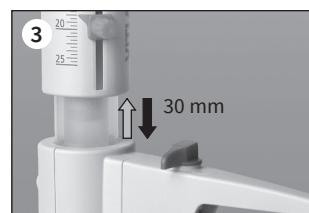
注：

首次使用本仪器之前，请确保仔细冲洗本仪器并弃用前几段样品。
请避免液体飞溅。



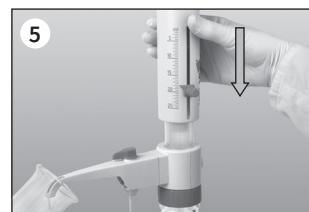
6.1. 带安全导向阀的仪器

1. 旋转并同时向下拉动排液管管盖，取下盖子，打开排液管（图 1）。
2. 将阀门转至“回流”位置（图 2）。
3. 排气时，将活塞轻柔向上拉动约 30 mm，然后迅速向下按，直至到达下止点。重复此操作步骤，直至活塞腔中不再有气泡（图 3）。
4. 将阀门转至“分液”位置（图 4）。
5. 为避免排气时液体飞溅，将排液管抵在合适的接收容器内壁上，然后进行分液以对排液管进行排气，直至排液管内无气泡。擦去排液管上剩余的液滴（图 5）。



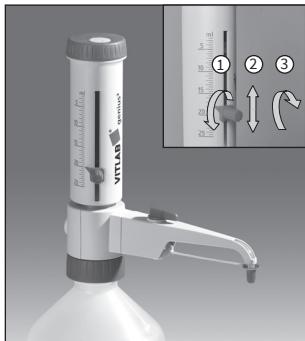
6.2. 不带安全导向阀的仪器

1. 旋转并同时向下拉动排液管管盖，取下盖子，然后打开排液管（见图 1 “带安全导向阀的仪器”）。
2. 排气时，将活塞向上拉动约 30 mm，然后迅速向下按，直至到达下止点。重复此操作步骤，直至活塞腔中不再有气泡（图 3）。



7. 分液

7.1. 设置体积



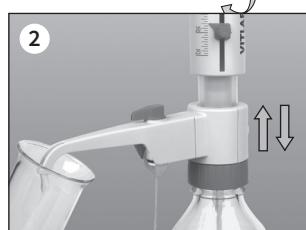
将量程调节旋钮拧松 $\frac{3}{4}$ 圈 (1)，
将指针调至所需的体积 (2)，
然后重新拧紧量程调节旋钮 (3)。

7.2. 分液

警告！

请穿戴防护服、护目镜和手套！盖上排液管管盖时，切勿按下活塞！
请避免试剂飞溅！液体可能会积聚在排液管管盖中。为避免液体飞溅，请缓慢分液。请遵守所有安全说明以及使用限制和操作限制（第 4-5 页）。

1. 取下排液管的管盖（图 1）。
2. 使用带安全导向阀的仪器时，将阀门旋至“分液”位置。
3. 将排液管口抵在合适的接收容器内壁上。
4. 轻轻提起活塞，直至达到上止点，然后用最小的力缓慢而稳定地按下活塞，直至达到下止点（图 2）。
5. 沿接收容器内壁揩拭排液管。
6. 盖上排液管，同时扭转并向上按盖子（图 3）。



注意！

使用活塞后，一定要将其向下按至下止点。

8. 附件

VITLAB® genius² 瓶口分液器可选配以下附件：

8.1 带安全导向阀的加长分液管

连续分液时，可将加长分液管用于 VITLAB® genius² 瓶口分液器（第 26 页“附件”）。仅当容量超过 2 mL 且活塞缓慢移动到上止点和下止点时，才能达到本仪器规定的准确度和偏差系数。

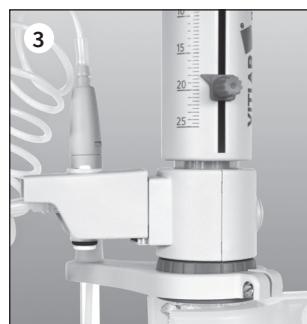
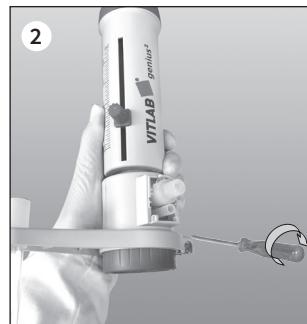
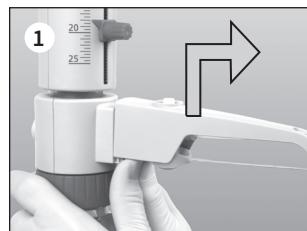
盘管的最大拉伸长度为 800 mm。整个盘管必须呈规则的环状，且不得扭曲。

相关操作例外情况是指所用相应仪器的操作例外情况（第 5 页）。

1. 卸下原先的排液管。
2. 相关操作例外情况是指所用相应仪器的操作例外情况。
3. 将排液管外壳一直向上滑动，然后轻轻上下移动，将其向前拉（图 1）。
4. 从阀块底部推动加长分液管支架（图 2），然后将其紧固。因此，安装时本仪器不得安装在瓶子上。然后，安装接收管。
5. 将加长分液管安装到阀门上，直至达到止动点（图 3）。
6. 将加长分液管向下滑（图 4）。
7. 将阀杆置于“回流”位置并用力将其压入。

注：

使用试剂瓶架（第 26 页“附件”）。



警告！

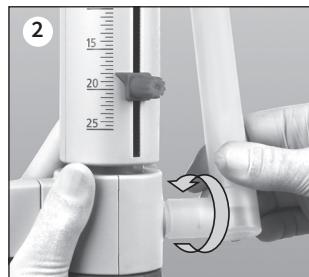
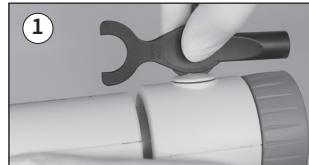
加长分液管不得有明显的损坏（如扭结或类似情况）。每次使用时，请仔细检查分液管！分配腐蚀性液体时，除了常规的预防措施外，还应采取安全措施。建议使用防护罩。必须用试剂瓶架支撑瓶子。为避免试剂从分液管中飞溅出来，请始终紧握分液管手柄，并在使用后将分液管放入接收管中。清洁时，请仔细冲洗分液管。切勿拆卸！

8.2 干燥管

对于对湿度和 CO₂ 敏感的介质，可能需要使用干燥管，管内装有合适的吸收剂（需单独购买）（第 26 页“附件”）。

组装

1. 使用安装工具拧开排气帽（图 1）。
2. 将装有吸收剂的干燥管拧入（图 2）。
3. 将 PTFE 密封圈套在瓶口螺纹上（图 3），然后将本仪器拧到瓶子上。



注：

必要时，用 PTFE 胶带密封干燥管、瓶子和 / 或瓶口适配器的螺纹。

8.3 阀块密封圈

对于高挥发性介质，建议使用 PTFE 密封圈（见第 25 页“附件”）和 PTFE 胶带密封阀块与瓶子之间的接口。

组装

- 将 PTFE 密封圈套在瓶口螺纹上或旋入的适配器上（图 3），然后将本仪器拧到瓶子上。



8.4 带 Luer 锥形接头的通气塞 (用于微型滤器)

对于无菌介质，建议使用带 Luer 锥形接头的通气塞，以连接微型滤器。这样可以减少置换空气造成的污染（见第 26 页“附件”）。

组装

1. 拧下通气塞（见图 1 “组装干燥管”）。
2. 拧入带 Luer 锥形接头的通气塞（图 4）。
3. 将 PTFE 密封圈套在瓶口螺纹上，然后将本仪器拧到瓶子上。
4. 将市售无菌滤器插入 Luer 锥形接头（图 5）。



9. 误差极限

误差极限与本仪器上显示的标称量程 (= 最大体积) 有关, 是本仪器和蒸馏水在环境温度 (20 °C) 下达到平衡时得出的。按照 DIN EN ISO 8655-6 标准, 在仪器完全充满液体, 且均匀、平稳分液的情况下进行测试。



误差极限

标称量程 (mL)	A* ≤ ± %	μL	CV* ≤ %	μL
2	0.5	10	0.1	2
5	0.5	25	0.1	5
10	0.5	50	0.1	10
25	0.5	125	0.1	25
50	0.5	250	0.1	50
100	0.5	500	0.1	100

部份体积

A 和 CV 的百分比值是相对于标示量程 (V_N) 得出的, 且必须根据部份体积 (V_T) 换算 A 和 CV 的百分比值。

$$A_T = \frac{V_N}{V_T} A_N$$

例如	体积	A* ≤ ± %	μL	CV* ≤ %	μL
V_N	25.0	0.5	125	0.1	25
$V_T = 50\% N$	12.5	1.0	125	0.2	25
$V_T = 10\% N$	2.5	5.0	125	1.0	25

*A = 准确度, CV = 偏差系数

注:

满足 DIN EN ISO 8655-5 中的误差极限, 并有显著余量。根据误差极限的总和 ($EL = A + 2 \times CV$) 计算得出单次测量的最大误差 (例如, 对于 25 mL 规格, 测量值为: $125 \mu\text{L} + 2 \times 25 \mu\text{L} = 175 \mu\text{L}$)。

10. 检查体积（校准）

根据使用情况，建议每 3-12 个月对本仪器进行一次衡量法测试。应根据个人需求调整该时间间隔。可联系生产商获取完整的测试程序文件 (SOP)。此外，您也可以按照更短的时间间隔进行功能测试，例如，将标称体积的液体分配到测试容量瓶中。

根据 DIN EN ISO 8655-6 (测量条件见第 15 页 “误差极限”) 进行体积的衡量法测试如下：

1. 仪器准备

清洁仪器 (第 18-19 页 “清洁”)，注入蒸馏水，然后小心对其进行排气。

2. 检查体积

- a) 建议在 3 个体积点 (100%、50%、10%) 用蒸馏水进行 10 次分液操作。
- b) 吸液时，轻轻拉起活塞，直至达到设定体积的上止点。

c) 排液时，缓慢而平稳地按下活塞，请勿用蛮力，直至达到下止点。

d) 擦拭排液管的管口。

e) 在分析天平上称量分液量。(请遵照天平制造商的操作手册操作)。

f) 计算分液体积。Z 因子的确定考虑了温度和空气浮力。

标称体积 V_N 的计算

x_i = 称量结果

n = 称量次数

Z = 校正因子

(例如，在 20°C、1013 hPa 条件下为 1.0029 μL/mg)

平均值

$$\bar{x} = \frac{\sum x_i}{n}$$

准确度

$$A\% = \frac{\bar{V} - V_N}{V_N} \cdot 100$$

平均体积

$$\bar{V} = \bar{x} \cdot Z$$

偏差系数

$$CV\% = \frac{100 s}{\bar{V}}$$

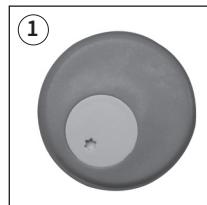
标准差

$$s = Z \cdot \sqrt{\frac{\sum (x_i - \bar{x})^2}{n-1}}$$

11. 调整体积

长期使用之后，可能需要对本仪器进行调整。

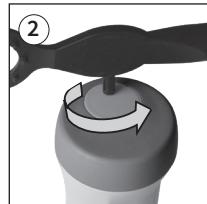
- 例如，在标称量程下进行校准（见第 16 页）。
- 计算平均体积（称量结果）（见第 16 页）。
- 调整本仪器（以达到计算的平均体积）。
- 调整后，必需进行进一步的校准，以确认调整适当。



示例：

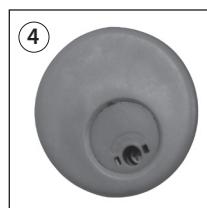
对于标称量程为 10.00 mL 的 10 mL 仪器，采用衡量法核对得出的实际值为 9.90 mL。

1. 将安装工具的插销插入校准板的盖子，然后旋转，拆下校准盖（图 2）。弃用校准盖。
2. 将安装工具的插销插入调整螺纹（图 3），并向左旋转增加分液量，或向右旋转减少分液量（例如，实际值为 9.97 mL 时，向左旋转约 1/2 圈）。
3. 红色圆盘表示调整过的仪器（图 4）。



调整范围

标称量程	调整体积最大值 +/-	旋转一圈相当于
2 mL	12 µL	~ 16 µL
5 mL	30 µL	~ 40 µL
10 mL	60 µL	~ 80 µL
25 mL	150 µL	~ 130 µL
50 mL	300 µL	~ 265 µL
100 mL	600 µL	~ 400 µL



12. 清洁

在下列情况下，必须清洁本仪器，以确保操作正确：

- 活塞难以移动时立即清洁
- 高温灭菌前
- 更换试剂前
- 更换阀门前
- 长期存放前
- 使用会形成沉积物的液体（如结晶性液体）时定期清洁
- 拆卸本仪器前
- 液体可能会积聚在排液管管盖中时应定期清洁

警告！

活塞套筒、阀门、可伸缩吸液管和排液管中含有试剂！活塞腔内有液体时，切勿拔出排液管。请勿将阀门和排液管口对着身体。请穿戴防护服、护目镜和适当的手套！

为了正确清洁和清除有液体流经部件中的任何沉积物，在使用适当的清洗液冲洗后，请始终将活塞从活塞套筒中完全抽出。必要时，也可在超声波清洗设备中清洗部件。

1. 将本仪器拧在一个空瓶上，通过分液将其中的液体完全排空（图 1），必须分别在“分液”和“回流”两种设置下排空本仪器。
2. 将本仪器拧到装有适当清洁剂（如去离子水）的瓶子上，通过完全充满再排空的方式冲洗本仪器数次。



3. 拆卸活塞。

注：

活塞和活塞套筒相互匹配，不得与其他仪器的活塞互换！

牢牢握住外壳，向左旋转活塞座，将其完全拧下（图 1）。小心拉出活塞（图 2）。拆下外壳

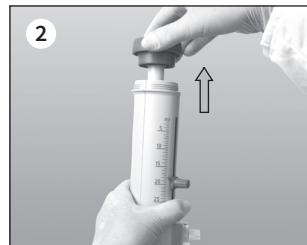


4. 清洁活塞和活塞套筒（图 3）。

必要时，小心清除玻璃套筒边缘的沉积物。

5. 用去离子水冲洗活塞和活塞套筒，并仔细将其擦干。

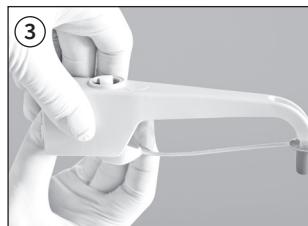
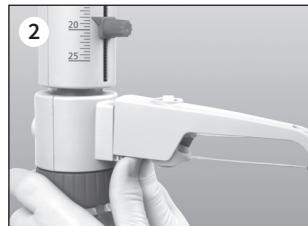
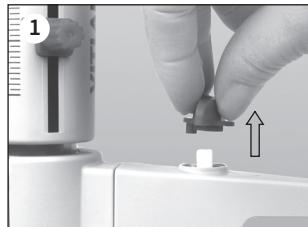
6. 擦干后，重新组装外壳和排液管，然后将活塞一边轻柔地旋转一边缓慢、完全地插入活塞套筒中，再重新组装本仪器。



13. 更换排液管/阀门

13.1 更换排液管

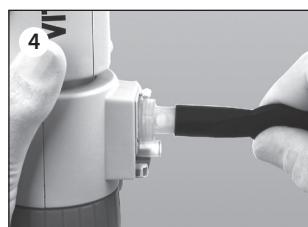
1. 应将仪器的安全导向阀设置为“回流”然后向上拉动阀杆，以将其取下（图 1）。
2. 将排液管外壳一直向上滑动，然后轻轻上下移动，将其向前拉（图 2）。
3. 握住新排液管的联接件，向上拉动外壳（图 3）。将外壳推入阀块，直到到达止动点。
4. 将排液管外壳一直向下滑。
5. 将阀杆安装到“回流”位置，然后将其按紧。



13.2 更换阀门

13.2.1 排液阀

1. 拆除排液管后（见上文“更换排液管”），使用安装工具拧下排液阀（图 1）。
2. 先手动拧入新的排液阀，然后用安装工具将其紧固（螺纹不可见为止）（图 5）。



注意！

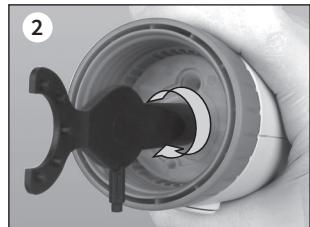
请务必按照仪器的类型和尺寸安装阀门！（见第 23 页“订购信息”）



13.2 更换阀门

13.2.2 进液阀

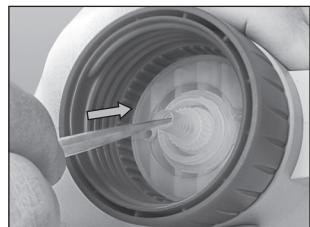
1. 拉出回流管和可伸缩吸液管（图 1）。
2. 使用安装工具拧下进液阀（图 2）。
3. 先手动拧上新的进液阀，然后再用安装工具将其紧固。



注：

如果仪器不能吸液，并且向上拉活塞时明显会感受到一些弹性阻力，则可能是因为阀球被卡住。

在这种情况下，可使用较小的压力，如使用 200 μL 塑料移液器吸头（见侧面图）松动阀球。



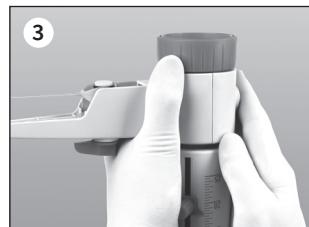
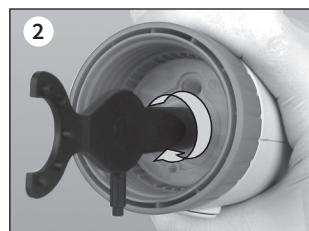
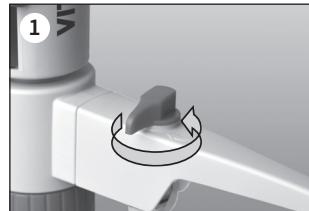
14. 高温灭菌

根据DIN EN 285标准,本仪器可在121°C (250 °F)、2 bar条件下进行高温灭菌,保持时间为至少15分钟。

高温灭菌前准备

1. 高温灭菌前,必须仔细清洁本仪器(见第18-19页“清洁”)。
2. 打开排液管的管盖,带安全导向阀的设备需将安全导向阀阀门调至“分液”位置。
3. 检查进液阀是否牢固锁紧(图2)。
4. 为确保蒸汽通畅无阻,并防止进液阀的阀球被卡住,将活塞按压至上止点,倒置瓶口分液器,并用手轻轻敲击外壳(图3)。

然后将仪器水平放置在高温灭菌器中。请确保要避免仪器与高温灭菌器中的金属表面相接触!



注:

在仪器冷却至室温(冷却时间约为2小时)之前,请勿重新组装仪器。
每次高温灭菌后,检查所有部件有无变形或损坏。必要时,进行更换。
使用者有责任确保高温灭菌的有效性。

15. 订购信息



VITLAB® genius² 瓶口分液器，可调量程

量程 (mL)	分刻度 (mL)	A* ± %	CV* ± %	VITLAB® genius ² 货号
0.2 - 2.0	0.05	0.5	0.1	C4600821
0.5 - 5.0	0.10	0.5	0.1	C4600831
1.0 - 10.0	0.20	0.5	0.1	C4600841
2.5 - 25.0	0.50	0.5	0.1	C4600851
5.0 - 50.0	1.00	0.5	0.1	C4600861
10.0 - 100.0	1.00	0.5	0.1	C4600871

注：

随附项目见第9页。

16. 附件和备件

除非另有说明，包装单位的数量都是 1。

瓶口适配器

PP 或 ETFE/PTFE。ETFE/PTFE 适配器的化学耐受性更高。

外螺纹	瓶口螺纹/磨口规格	材质	货号
GL 32	GL 25	PP	704325
GL 32	GL 28/ S 28	PP	704328
GL 32	GL 30	PP	704330
GL 32	GL 45	PP	704345
GL 45	GL 32	PP	704396
GL 45	GL 35	PP	704431
GL 45	GL 38	PP	704397
GL 45	S* 40	PP	704343
GL 45	S* 50	PP	704350
GL 45	S* 54	PP	704430
GL 45	S* 60	PP	704348
GL 32	GL 25	ETFE	704375
GL 32	GL 28/ S 28	ETFE	704378
GL 32	GL 45	ETFE	704395
GL 45	GL 32	ETFE	704398
GL 45	GL 38	ETFE	704399
GL 45	S* 40	PTFE	704391
GL 32	NS 19/26	PP	704419
GL 32	NS 24/29	PP	704424
GL 32	NS 29/32	P	704429



* 锯齿螺纹

VITLAB® genius² 排液管

描述	标称量程 (mL)	长度	货号
适用于 VITLAB® genius ²	2/5/10 25/50/100	105	VT003.1678102
		135	VT003.1678106



进液阀
阀门:PFA/Boro 3.3/
陶瓷



排液阀
PFA/Boro 3.3/ 陶瓷
/ 铂铱 / 合金。



对应量程	货号
2/5/10 mL	6734
25/50/100 mL	6735

容量	货号
2 mL	6749
5/10 mL	6727
25/50/100 mL	6728

可伸缩吸液管
FEP. 可根据不同的瓶子
高度进行调整。



回流管
FEP.

货号 6747



标称量程 (mL)	外径 Ø mm	长度	货号
2/5/10	6	70-140	708210
		125-240	708212
		195-350	708214
		250-480	708216
25/50/100	7,6	170-330	708218
		250-480	708220

阀块密封圈
PTFE, 用于高度挥发性
介质。

货号 704495



排液管管盖
带紧固件, PP, 红色。



校准、安装工具

货号 76748



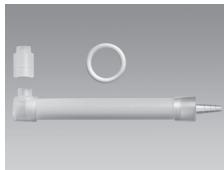
容量	货号
2/5/10 mL	VT003.1676018
25/50/100 mL	VT003.1676019

加长分液管
带安全导向阀, PTFE,
带盘管, 长度 800 mm,
带安全手柄。



干燥管(不含干燥剂)
包含 PTFE 密封圈
(PTFE)。

货号 707930



标称量程 (mL)	分液管		货号
	外径Ø mm	内径Ø mm	
2/5/10	3	2	VT003.1678132*
25/50/100	4.5	3	VT003.1678134*

*不适用于氢氟酸

试剂瓶架
PP, 325 mm,
底板
220 x 160 mm.

货号 704275



Luer 通气塞
(用于微型滤器)
PP, 含 PTFE 密封圈。

货号 704495



17. 故障排除

问题	可能的原因	纠正措施
难以移动活塞，或活塞被卡住	有结晶体形成、脏污	立即停止分液。通过转动的方式旋松活塞，但请勿将其拆下。执行所有清洁说明（第 18-19 页）。
无法进液	量程被调节为最低	将量程设置为所需的体积（见第 12 页）。
	进液阀被卡住	从阀块上拧下进液阀，对其进行清洁，必要时更换进液阀。如果阀球被卡住，使用 200 µL 移液器吸头松开阀球（见第 21 页）。如有必要，更换进液阀。
无法分液	排液阀被卡住	从阀块上拧下排液阀，对其进行清洁，必要时更换排液阀（见第 20 页）。使用 200 µL 液器吸头松开卡住的阀球。
排液管或带安全导向阀的排液管安装不到位	排液阀拧得不够深	用安装工具紧固排液阀，直到其到达止动点，且螺纹不可见为止。
仪器内有气泡	过快吸入蒸气压较高的试剂	缓慢吸入试剂。
	阀门螺纹连接处松动	使用安装工具紧固阀门。
	未对仪器进行排气	对仪器进行排气（见第 11 页）。
吸液管松动或损坏	吸液管松动或损坏	牢固安装吸液管。必要时，从吸液管上端剪掉约 1 cm，然后重新连接，或更换吸液管。
	阀门连接不牢固或损坏	清洁步骤（见第 18-19 页）。使用安装工具紧固阀门。
分液体积过小	吸液管松动或损坏	清洁步骤（见第 18-19 页）。牢固安装吸液管。必要时，从吸液管上端剪掉约 1 cm，然后重新连接，或更换吸液管（见第 20 页）。
	进液阀松动或损坏	清洁步骤（见第 18-19 页）。使用安装工具紧固阀门。必要时，更换进液阀。
仪器和瓶子之间有液体泄漏	回流管未连接	连接回流管（见第 9 页图 1）。
	在没有密封圈的情况下对挥发性试剂进行分液	安装密封圈（见第 14 页）。
	对湿度或 CO ₂ 敏感的介质	安装阀块密封圈（见第 14 页），并使用装有适当吸收剂的干燥管（见第 14 页）。

18. 维修

18.1. 返厂维修

注意！

未经许可运输危险品会违反法律规定。

- 请仔细对本仪器进行清洁和消毒。
- 邮寄时必须始终包括对故障类型和所用介质的准确描述。如果缺少与所用介质相关的信息，本仪器将无法维修。
- 运输风险和费用由寄件人承担。
- 请填写“无健康危害声明”，并将本仪器寄给制造商或供应商。
请向供应商或制造商索要该表格。

18.2. 校准服务

ISO 9001 和 GLP 指南要求，应定期检查容量仪器。建议每 3-12 个月检查一次体积。具体时间间隔视仪器的具体要求而定。对于频繁使用或与腐蚀性介质搭配使用的仪器，时间间隔应更短。可联系生产商获取完整的测试程序文件（SOP）。

19. 保修

对于因不当搬运、使用、保养、操作或擅自维修仪器而造成的后果，或因正常磨损（如活塞、密封件、阀门等易损件）和玻璃破损以及未遵守操作手册的说明而造成的后果，我方不承担任何责任。对于因执行操作手册未说明的任何操作或使用非原装备件造成的损坏，我方不承担任何责任。

20. 处置



在处置仪器时，请遵守相关的国家处置规定。

如有技术改动，恕不另行通知。
我方对印刷或排版错误不承担任何责任。

C1695117/0724-1

中文版 | English



VITLAB®

瓶口分液器

VITLAB®

genius²

操作手册 (英文版)

Operating Manual (English)



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Safety symbols

Symbol on Device	EN
	General warning sign
	Observe the operating manual
	Use eye protection
	Use hand protection
	Use protective clothing

Before using the instrument for the first time,
ensure it is rinsed carefully or discard the first
few samples dispensed.

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1. 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.
3. Observe all specifications provided by reagent manufacturers.
4. When dispensing inflammable media, make sure to avoid the buildup of static charge, e.g., do not dispense into plastic vessels; do not wipe instruments with a dry cloth.
5. Use the instrument only for dispensing liquids, with strict regard to the defined limitations of use and operating limitations. Observe operating exclusions (see page 5)! If in doubt, contact the manufacturer or supplier.
6. Always use the instrument in such a way that neither the user nor any other person is endangered. When dispensing, the discharge tube must always point away from you or any other person. Avoid splashes. Only use suitable vessels.
7. Never press down the piston when the closure cap is attached.
8. Never remove the discharge tube while the dispensing cylinder is filled.
9. Reagents can accumulate in the closure cap of the discharge tube. Thus, the closure cap should be cleaned regularly.
10. For small bottles, and when using the flexible discharge tube, use a bottle stand to prevent tipping over.
11. Never carry the mounted instrument by the cylinder sleeve or the valve block. Breakage or loosening of the cylinder may also lead to personal injury from chemicals (see page 10, Fig. 3).
12. Never use force on the instrument. Use smooth gentle movements to operate the piston upwards and downwards.
13. Use only original manufacturer's accessories and spare parts. Do not attempt to make any technical alterations. Do not dismantle the instrument any further than is described in the operating manual!
14. Always check the instrument for visible damage before use. If there is a sign of a potential malfunction (e.g., piston difficult to move, sticking valves or leakage), immediately stop dispensing. Consult the 'Troubleshooting' section of this manual (see page 27), and contact the manufacturer if needed.

2. Functions and Limitations of Use

With the VITLAB® simplex² and genius² bottle-top dispensers, liquids can be dispensed directly from the supply bottle. Available in variable and fixed models.

When the instrument is correctly used, the dispensed liquid comes into contact with only the following chemically resistant materials: Borosilicate glass, Al₂O₃-ceramic, ETFE, FEP, PFA, PTFE, platinum- iridium, PP (closure cap). If a higher chemical resistance is required, please use a ETFE/PTFE bottle adapter ('Accessories', pages 24).

Limitations of Use

This instrument is designed for dispensing liquids, observing the following physical limits:

- use temperature from +15 °C to +40 °C (from 59 °F to 104 °F) of instrument and reagent
- vapor pressure up to max. 600 mbar. Aspirate slowly above 300 mbar, in order to prevent the liquid from boiling.
- kinematic viscosity up to 500 mm²/s (dynamic viscosity [mPas] = kinematic viscosity [mm²/s] x density [g/cm³])
- Density up to 2.2 g/cm³

Operating Limitations

Liquids, which form deposits may make the piston difficult to move or may cause jamming (e.g., crystallizing solutions or concentrated alkaline solutions). If the piston movement becomes sluggish or stiff, the instrument should be cleaned immediately (page 18).

When dispensing inflammable media, make sure to avoid to buildup of static charge, e.g., do not dispense into plastic vessels; do not wipe instruments with a dry cloth.

The instrument is designed for general laboratory applications and complies with the relevant standards, e.g. DIN EN ISO 8655. Compatibility of the instrument for a specific application (e.g., trace material analysis, food sector etc.) must be checked by the user. Approvals for specific applications, e.g. for production and administration of food, pharmaceuticals or cosmetics are not available.

Operating Exclusions

Dispenser never use with:

- liquids attacking Al₂O₃-ceramic, ETFE, FEP, PFA and PTFE (e.g., dissolved sodium azide*)
- liquids attacking borosilicate glass (e.g., hydrofluoric acid)
- liquids which are decomposed catalytically by platinum-iridium (e.g., H₂O₂)
- nitric acid > 60%
- tetrahydrofuran
- trifluoroacetic acid
- explosive liquids (e.g., carbon disulfide)
- suspensions (e.g., of charcoal) as solid particles may clog or damage the instrument
- liquids attacking PP (closure cap)**

Storage Conditions

Store the instrument and accessories only in cleaned condition in a cool and dry place. Storage temperature: from -20 °C to +50 °C (from -4 °F to 122 °F).

* Dissolved sodium azide permitted up to a concentration of max. 0.1%.

** When stronger chemical resistance is needed, use the ETFE/PTFE adapter ('Accessories', page 24).

3. Recommended Application Range for VITLAB® genius²

The dispenser VITLAB® genius² broad range of application permits bottle dispensing of aggressive reagents, including concentrated acids such as H₃PO₄, bases like NaOH, KOH, saline solutions, as well as many organic solvents. Please observe the Operating Exclusions and the 'Application Range'.

Reagent	Reagent	Reagent
O Acetaldehyde	O m-Cresol	O Methyl formate
O Acetic acid, ≤ 96 %	O Cumene (isopropylbenzene)	O Methyl propyl ketone
O Acetone	O Cyclohexanone	O Mineral oil (motor oil)
O Acetonitrile	O Decane	O Monochloroacetic acid, 50%
O Acetylacetone	O 1-Decanol	I Nitric acid, ≤ 60%*/ **
O Acrylic acid	O Di(ethylene glycol)	O Nitrobenzene
O Acrylonitrile	O Dibenzyl ether	O Octane
O Adipic acid	O Dichlorobenzene	O Oleic acid
O Allyl alcohol	O Dichloroethane	O Oxalic acid
I Aluminium chloride	O Dichloromethane	I Perchloric acid
O Amino acids	O Diethanolamine	O Petroleum
I Ammonia solution, ≤ 20 %	O Diethyl ether	O Phenol
I Ammonium chloride	O Diethylamine	O Phenylethanol
I Ammonium fluoride	O 1,2 Diethylbenzene	O Phenylhydrazine
I Ammonium hydroxide, ≤ 20 %	O Dimethyl sulphoxide (DMSO)	I Phosphoric acid, ≤ 85%
I Ammonium sulphate	O Dimethylaniline	I Phosphoric acid, 85% + sulphuric acid, 98%, 1:1
O Amyl acetate	O Dimethylformamide (DMF)	O Piperidine
O Amyl alcohol (pentanol)	O 1,4 Dioxane	I Potassium chloride
O Amyl chloride (chloropentane)	O Diphenyl ether	I Potassium dichromate
O Aniline	O Ethanol	I Potassium hydroxide
I Barium chloride	O Ethanolamine	I Potassium permanganate
O Benzaldehyde	O Ethyl acetate	O Propanol
O Benzene	O Formaldehyde, ≤ 40 %	O Propionic acid
O Benzoyl chloride	O Formamide	O Propylene glycol (propanediol)
O Benzyl alcohol	O Formic acid, ≤ 100 %	O Propylene oxide
O Benzyl chloride	O Gasoline	O Pyridine
O Benzylamine	O Glacial acetic acid (acetic acid), 100 %	O Pyruvic acid
I Boric acid, ≤ 10 %	O Glycerine	O Salicylaldehyde
O Bromobenzene	O Glycol (ethylene glycol)	O Salicylic acid
O Bromonaphthalene	O Glycolic acid, ≤ 50%	O Silver acetate
O Butanediol	O Heating oil (Diesel oil)	I Silver nitrate
O 1-Butanol	O Hexane	O Sodium acetate
O n-Butyl acetate	O Hexanoic acid	I Sodium chloride
O Butyl methyl ether	O Hexanol	I Sodium dichromate
O Butylamine	I Hydrochloric acid, ≤ 37%**	I Sodium fluoride
O Butyric acid	I Hydroiodic acid, ≤ 57 %**	

Reagent	
I	Calcium carbonate
I	Calcium chloride
I	Calcium hydroxide
I	Calcium hypochlorite
O	Chloroacetaldehyde, ≤ 45 %
O	Chloroacetic acid
O	Chloroacetone
O	Chlorobenzene
O	Chlorobutane
O	Chloronaphthalene
I	Chromic acid, ≤ 50 %
I	Chromic-sulphuric acid
I	Copper sulphate

Reagent	
I	Iodine / potassium iodide solution
O	Isoamyl alcohol
O	Isobutanol
O	Isopropanol (2-propanol)
O	Isopropyl ether
O	Lactic acid
I	Magnesium chloride
I	Mercury chloride
O	Methanol
O	Methoxybenzene
O	Methyl benzoate
O	Methyl butyl ether
O	Methyl ethyl ketone

Reagent	
I	Sodium hydroxide, ≤ 30 %
I	Sodium hypochlorite
I	Sulphuric acid, ≤ 98 %
O	Tartaric acid
O	Tetramethylammonium hydroxide
O	Toluene
O	Turpentine
O	Urea
O	Xylene
I	Zinc chloride, ≤ 10 %
I	Zinc sulphate, ≤ 10 %

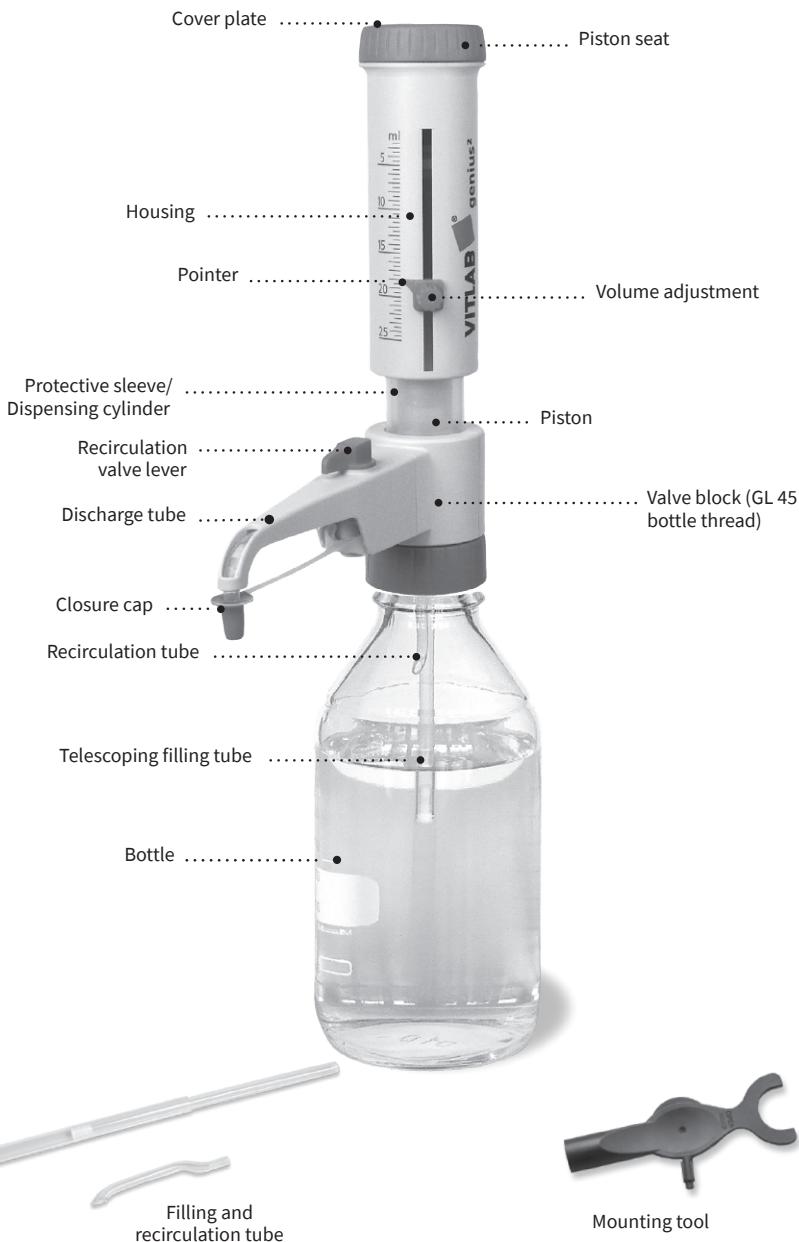
* use ETFE/PTFE bottle adapter

** use drying tube

The above recommendations reflect testing completed prior to publication. Always follow instructions in the operating manual of the instrument as well as the reagent manufacturer's specifications. In addition to these chemicals, a variety of organic and inorganic saline solutions (e.g., biological buffers), biological detergents and media for cell culture can be dispensed. Please call us if you need information on chemicals that are not named in the list. Status as of: 10/15

O	Organic solutions
I	Inorganic solutions

4. Operating Elements



5. First Steps

5.1 Is everything in the package?

Confirm that your package includes:

Bottle-top dispenser VITLAB® genius² with discharge tube with recirculation valve, telescoping filling tube, recirculation tube, mounting tool, bottle adapters, a calibration certificate and this operating manual.

Nominal volume, mL	Adapters for bottle thread, PP	Filling tube Length, mm
1, 2, 5, 10	GL 25, GL 28/S 28, GL 32, GL 38, S 40	125-240
25, 50, 100	GL 32, GL 38, S 40	170-330

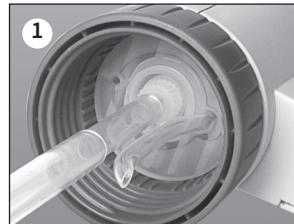
5.2 Assembly

Warning!

Wear protective clothing, eye protection and gloves! Follow all safety instructions and observe limitations of use and operating limitations (page 4-5).

1. Mounting the filling tube/ recirculation tube

Adjust the length of the telescoping filling tube to the bottle height and attach it. Center and attach the filling tube carefully to avoid damaging the nozzle. The recirculation tube must also be installed. Insert it with the opening pointing outward (Fig. 1).



2. Mounting the instrument on a bottle and alignment

Screw the instrument (GL 45 threads) onto the reagent bottle, and then align the discharge tube with the bottle label. This is done by rotating the valve block with the discharge tube (Fig. 2).

To avoid tipping over, use a bottle stand for small bottles.



5.2 Assembly (continued)

Note:

For bottles with other thread sizes, select a suitable adapter.
The adapters supplied with the instrument are made of polypropylene (PP), and can only be used for media which do not attack PP.

Alternatively ETFE/PTFE bottle adapters can be used ('Accessories', page 24). The suitability of ETFE/PTFE bottle adapters must be checked by the user.

Warning!

Always wear protective gloves when touching the instrument or the bottle, especially when using dangerous liquids.
When mounted to a reagent bottle, always carry the instrument as shown in figure 3!



6. Priming

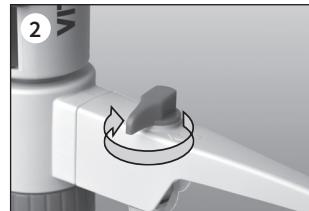
Warning!

Wear protective clothing, eye protection and gloves! Never press down the piston when the closure cap is put on! Avoid splashing the reagent! Liquid may accumulate in the closure cap. To avoid splashes dispense slowly. Follow all safety instructions and observe limitations of use and operating limitations (page 4-5).



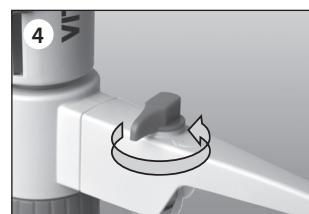
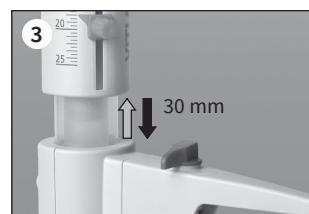
Note:

Before using the instrument for the first time, ensure it is rinsed carefully and discard the first few samples dispensed. Avoid splashes.



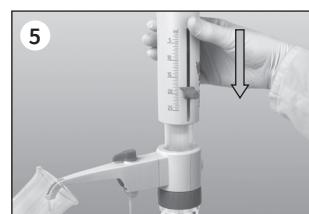
6.1. Instruments with recirculation valve

1. Twist and simultaneously pull down the closure cap to remove it and open the discharge tube (Fig. 1).
2. Set valve to 'Recirculate' (Fig. 2).
3. For priming gently pull up the piston approx. 30 mm and push it down rapidly until the lower stop. Repeat this work step until there are no more air bubbles in the cylinder (Fig. 3).
4. Turn valve to 'Dispense' (Fig. 4).
5. To avoid splashes when priming, hold the discharge tube on the inner wall of a suitable receiving vessel and dispense liquid to prime the discharge tube until it is bubble-free. Wipe away any remaining drops from the discharge tube (Fig. 5).



6.2. Instruments without recirculation valve

1. Twist and simultaneously pull down the closure cap to remove it and open the discharge tube (see 'instrument with recirculation valve', Fig. 1).
To avoid splashes, hold discharge tube orifice on the inner wall of a suitable receiving vessel.
2. For priming pull up the piston approx. 30 mm and push it down rapidly until the lower stop. Repeat this work step until there are no more air bubbles in the cylinder (Fig. 3).



7. Dispensing

7.1. Setting the volume



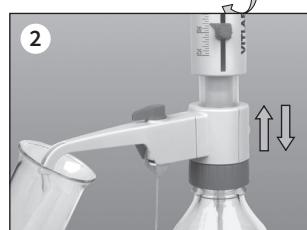
Variable: Loosen the volume selector thumb screw $\frac{3}{4}$ turn (1), set the pointer to the desired volume (2) and then retighten the volume thumb screw (3).

7.2. Dispensing

Warning!

Wear protective clothing, eye protection and gloves! Never press down the piston when the closure cap is put on! Avoid splashing the reagent! Liquid may accumulate in the closure cap. To avoid splashes dispense slowly. Follow all safety instructions and observe limitations of use and operating limitations (page 4-5).

1. Remove closure cap of the discharge tube (Fig. 1).
2. When using instruments equipped with the recirculation valve, turn the valve to 'Dispensing'.
3. Hold the discharge tube orifice on the inner wall of a suitable receiving vessel.
4. Gently lift the piston until the upper stop and then depress piston slowly and steadily with minimal force until the lower stop (Fig. 2).
5. Wipe off the discharge tube against the inner wall of the receiving vessel.
6. Close discharge tube with the closure cap while twisting and simultaneously pulling it upwards (Fig. 3).



Caution!

After using the piston, always press it down to the lower stop.

8. Accessories

For dispenser VITLAB® genius² the following optional accessories are available:

8.1 Flexible discharge tube with recirculation valve

For serial dispensing the flexible discharge tube can be used for the bottle-top dispenser VITLAB® genius² ('Accessories', page 26). The specified accuracy and coefficient of variation of the instrument is only obtained for volumes > 2 mL and by gently approaching the upper and lower stops.

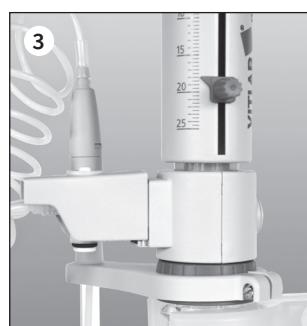
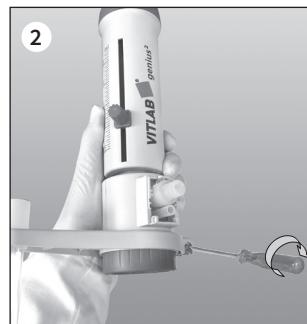
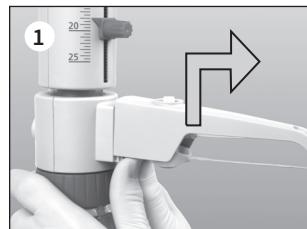
The coil of the tubing can be stretched to a length of the 800 mm max. The entire coil must lie in regular loops and must not be twisted.

The applicable operating exclusions are those for the corresponding instrument used (page 5).

1. Remove installed discharge tube.
2. The applicable operating exclusions are those for the corresponding instrument used.
3. Slide the discharge tube housing all the way up, then pull it forward with gentle up and down motions (Fig. 1).
4. Push the flexible discharge tube holder from the bottom of the valve block (Fig. 2) and tighten it. For this, the instrument must not be mounted on the bottle. Install the receiver tube.
5. Slide the flexible discharge tube housing into the valve block up to the stop (Fig. 3).
6. Slide the discharge tube housing all the way down (Fig. 4).
7. Place valve lever in position 'Recirculate'o and press in firmly.

Note:

Use a bottle stand ('Accessories', page 26).



Warning!

There should be no visible damage to the discharge tube (e.g. kinks or the like). Each time you are going to use the tubing, examine it carefully! To dispense aggressive liquids, you should take safety measures in addition to the normal precautions. We recommend use of a protective shield. The bottle must be supported using a bottle stand. To help avoid reagent splashing from the tube, always grip the tube firmly by the handle and replace into the holder after use. For cleaning rinse the tube carefully. Do not dismantle!

8.2 Drying tube

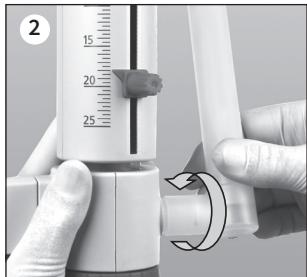
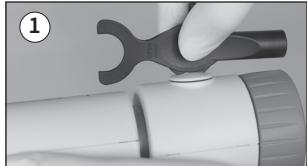
Use of a drying tube, filled with a suitable absorbent (purchased separately), might be necessary for moisture- and CO₂- sensitive media ('Accessories', page 26).

Assembly

1. Use mounting tool to unscrew the air vent cap (Fig. 1).
2. Screw the filled drying tube in (Fig. 2).
3. Place the PTFE sealing ring on the bottle thread (Fig. 3) and screw the instrument onto the bottle.

Note:

If necessary, seal the threads of the drying tube, the bottle and/or the bottle adapter with PTFE tape.



8.3 Sealing ring for valve block

For highly volatile media we recommend to seal the connection from valve bloc to bottle with the PTFE sealing ring (see 'Accessories', page 25) and PTFE tape.

Assembly

- Place the PTFE sealing ring on the bottle thread or the screwed-on adapter (Fig. 3) and screw the instrument onto the bottle.



8.4 Air vent cap for micro filter with Luer-cone

For sterile media we recommend the air vent cap with Luer-cone to attach a micro filter. This provides increased protection against contamination by displacement air (see 'Accessories', page 26).

Assembly

1. Unscrew the air vent cap (see 'Assembly Drying tube', Fig. 1).
2. Screw in the air vent cap with a Luer-cone (Fig. 1).
3. Place the PTFE sealing ring on the bottle thread and screw the instrument onto the bottle.
4. Insert a commercially available sterile filter into the Luer-cone (Fig. 2).



9. Error Limits

Error limits related to the nominal capacity (= maximum volume) indicated on the instrument, obtained when instrument and distilled water are equilibrated at ambient temperature (20 °C). Testing takes place according to /DIN EN ISO 8655-6 with a completely filled instrument and with uniform and smooth dispensing.

Error limits

Nominal volume ml	A* ≤ ± %	μL	CV* ≤ %	μL
2	0.5	10	0.1	2
5	0.5	25	0.1	5
10	0.5	50	0.1	10
25	0.5	125	0.1	25
50	0.5	250	0.1	50
100	0.5	500	0.1	100

Partial volume

The percentage values for A and CV are relative to the nominal volume (V_N) and must be converted for partial volumes (V_p).

$$A_T = \frac{V_N}{V_p} \rightarrow A_N$$

e.g.	Volume	A* ≤ ± %	μL	CV* ≤ %	μL
V_N	25.0	0.5	125	0.1	25
$V_T = 50\% N$	12.5	1.0	125	0.2	25
$V_T = 10\% N$	2.5	5.0	125	1.0	25

*A = Accuracy, CV = Coefficient of Variation

Note:

The error limits in DIN EN ISO 8655-5 are satisfied with a significant margin. The maximum error for a single measurement is calculated from the sum of error limits $EL = A + 2 \times CV$ (e.g., for the 25 mL size:
 $125 \mu L + 2 \times 25 \mu L = 175 \mu L$).



20 °C
Ex

10. Checking the Volume (Calibration)

Depending on use, we recommend that gravimetric testing of the instrument be carried out every 3-12 months. This time frame should be adjusted to correspond with individual requirements. The complete testing procedure (SOP) can be obtained from manufacturer. In addition, you can also perform a function test at shorter intervals, e.g. dispensing the nominal volume into a volumetric test flask.

Gravimetric volume testing according to DIN EN ISO 8655-6 (for measurement conditions, see 'Error Limits', page 15) is performed as follows:

1. Preparation of the instrument

Clean the instrument ('Cleaning', page 18- 19), fill it with distilled H₂O and then prime it carefully.

2. Check the volume

- a) 10 dispensing operations with distilled H₂O in 3 Volume ranges (100 %, 50 %, 10 %) are recommended.
- b) For filling pull up the piston gently until the upper stop of the volume set.

- c) For discharge depress piston slowly and steadily without force until the lower stop.
- d) Wipe off the tip of discharge tube.
- e) Weigh the dispensed quantity on an analytical balance. (Please follow the operating manual of the balance manufacturer.)
- f) Calculate the dispensed volume. The Z factor takes account of the temperature and air buoyancy.

Calculations for nominal volume V_N

x_i = results of weighings

n = number of weighings

Z = correction factor

(e.g., 1.0029 µL/mg at 20 °C, 1013 hPa)

Mean value

$$\bar{x} = \frac{\sum x_i}{n}$$

Accuracy

$$A\% = \frac{\bar{V} - V_N}{V_N} \cdot 100$$

Mean volume

$$\bar{V} = \bar{x} \cdot Z$$

Coefficient of variation

$$CV\% = \frac{100 s}{\bar{V}}$$

Standard deviation

$$s = Z \cdot \sqrt{\frac{\sum (x_i - \bar{x})^2}{n - 1}}$$

11. Adjustment

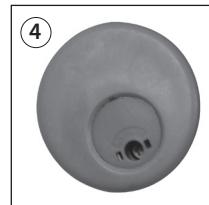
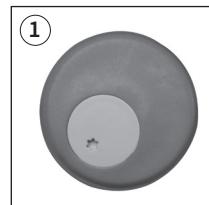
After a long period of usage an adjustment of the instrument might be necessary.

- Calibrate for example at nominal volume (see page 16).
- Calculate mean volume (result of weighing) (see page 16).
- Adjust the instrument (to the calculated mean volume).
- After the adjustment, further calibration is necessary to confirm appropriate adjustment

Example:

The gravimetric check gives an actual value of 9.90 mL for a 10 mL instrument set for a nominal volume of 10.00 mL.

1. Insert the pin of the mounting tool into the cover plate, and break it off with a rotating motion (Fig. 2). Discard the adjustment cover.
2. Insert the pin of the mounting tool into the adjustment screw (Fig. 3) and rotate to the left in order to increase the dispensing volume, or rotate to the right to decrease the dispensing volume (e.g. for an actual value of 9.97 ml, rotate approx. 1/2 turn to the left).
3. The change in the adjustment is indicated by a red disk (Fig. 4).



Adjustment range

Nominal volume	Variable/Fix max. +/-	One rotation corresponds to
2 mL	12 µL	~ 16 µL
5 mL	30 µL	~ 40 µL
10 mL	60 µL	~ 80 µL
25 mL	150 µL	~ 130 µL
50 mL	300 µL	~ 265 µL
100 mL	600 µL	~ 400 µL

12. Cleaning

The instrument must be cleaned in the following situations to assure correct operation:

- immediately when the piston is difficult to move
- prior to autoclaving
- before changing the reagent
- prior to long term storage
- prior to dismantling the instrument
- regularly when using liquids which form deposits
(e.g., crystallizing liquids)
- regularly when liquids accumulate in the closure cap

Warning!

The cylinder, valves, telescoping filling tube and discharge tube contain reagent! Never remove the discharge tube while the dispensing cylinder is filled. Point the valves and tube openings away from your body. Wear protective clothing, eye protection and appropriate hand protection.

For proper cleaning and removal of any deposits in the parts through which liquids pass, also always completely withdraw the piston from the cylinder after rinsing with a suitable cleaning solution. If necessary, the parts can also be cleaned in an ultrasonic bath.

1. Screw the instrument onto an empty bottle and empty it completely by dispensing (Fig. 1). If the instrument is equipped with a recirculation valve, it must be emptied in both the 'dispense' and 'recirculate' settings.
2. Screw the instrument onto a bottle filled with a suitable cleaning agent (e.g. deionized water) and rinse the instrument several times by completely filling and emptying it.



3. Disassembly of the piston.

Note:

The pistons and cylinders are individually matched, and should not be interchanged with piston from other instruments!

Hold the housing securely and unscrew the piston seat completely by turning it to the left (Fig. 1). Carefully pull out the piston (Fig. 2). Remove the housing.

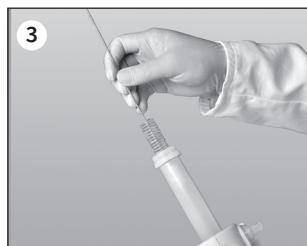
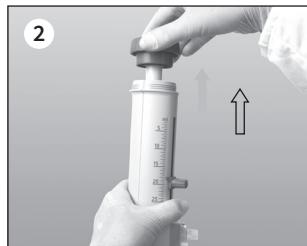


4. Clean piston and cylinder (Fig. 3).

If necessary carefully remove deposits at the edge of the glass cylinder.

5. Rinse the piston and cylinder with deionized water, and dry them carefully.

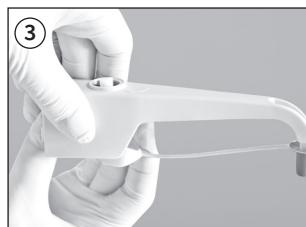
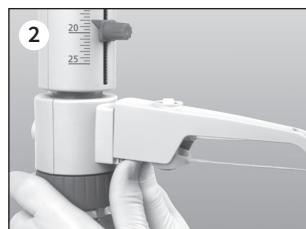
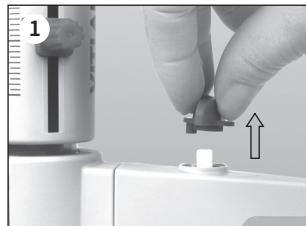
6. Reassemble the housing and discharge tube, then insert the piston slowly and completely into the cylinder while gently rotating it, and then reassemble the instrument.



13. Replacement

13.1 Replacing the discharge tube

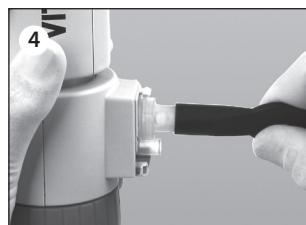
1. Instruments with a recirculating valve should be set to 'Recirculate', and the valve lever pulled upwards to remove (Fig. 1).
2. Slide the discharge tube housing all the way up, then pull it forward with gentle up and down motions (Fig. 2).
3. Hold coupling piece of the new discharge tube and pull housing up (Fig. 3). Push housing into the valve block until it meets the stop.
4. Slide the discharge tube housing all the way down.
5. For instruments with a recirculation valve, pull up the valve lever to the 'Recirculate' position, and press it in tightly.



13.2 Replacing valves

13.2.1 Discharge valve

1. After disassembling the discharge tube (see 'Replacing the discharge tube' above), use the mounting tool to unscrew the discharge valve (Fig. 1).
2. Screw in the new discharge valve first by hand, then tighten it securely with the mounting tool (the threads should no longer be visible) (Fig. 5).



Caution!

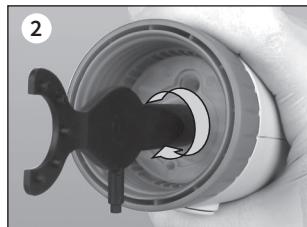
Always install the valve intended for the particular type and size of instrument! (see page 23 for 'ordering information').



13.2 Replacing the discharge tube

13.2.2 Filling valve

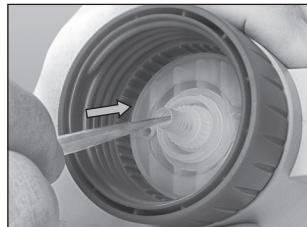
1. Pull out the recirculation tube and the telescoping filling tube (Fig. 1).
2. Use the mounting tool to unscrew the filling valve (Fig. 2).
3. Screw in the new filling valve first by hand and then tighten it with the mounting tool.



Note:

If the instrument does not fill up, and if some elastic resistance is evident when the piston is pulled upward, then it is possible that the ball valve is stuck.

In this case, loosen the ball valve using light pressure, for example, with a 200 µL plastic pipette tip (see the figure at the side).



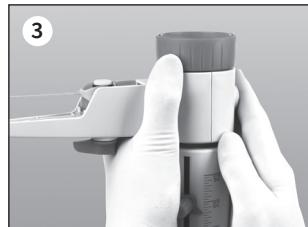
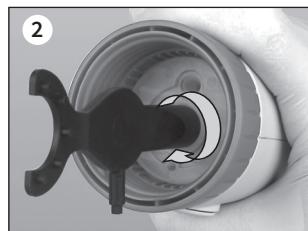
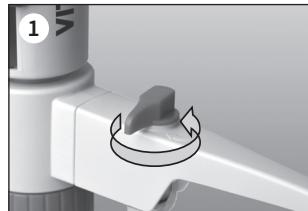
14. Autoclaving

The instrument can be autoclaved at 121 °C(250 °F), 2 bar with a hold time of at least 15 minutes according to DIN EN 285.

Preparation for autoclaving

1. The instrument must be carefully cleaned prior to autoclaving (see 'Cleaning', page 18-19).
2. Open the closure cap on the discharge tube, and for instruments with a recirculation valve, set the valve to 'Dispense'.
3. Check that the filling valve is securely seated (Fig. 2).
4. To ensure unhindered access for the steam and to prevent the ball valve in the filling valve from possibly becoming stuck, hold the instrument with the discharge piston pressed vertically downward, and gently tap against the casing with your hand (Fig. 3).

Then lay it horizontally in the autoclave. Be sure to avoid the instrument coming into contact with metal surfaces in the autoclave!



Note:

Do not reassemble the instrument until it has cooled down to room temperature (Cooling time approx. 2 hours).

After every autoclaving, inspect all parts for deformities or damage. If necessary, replace them.

It is the user's responsibility to ensure effective autoclaving.

15. Ordering Information



VITLAB® genius² Dispenser variable

Capacity ml	Subdivision ml	A* ± %	CV* ± %	VITLAB® genius ² Cat. No.
0.2 - 2.0	0.05	0.5	0.1	C4600821
0.5 - 5.0	0.10	0.5	0.1	C4600831
1.0 - 10.0	0.20	0.5	0.1	C4600841
2.5 - 25.0	0.50	0.5	0.1	C4600851
5.0 - 50.0	1.00	0.5	0.1	C4600861
10.0 - 100.0	1.00	0.5	0.1	C4600871

Note:

Items supplied see page 9.

16. Accessories and Spare Parts

The packaging unit is always 1 unless otherwise indicated!

Bottle adapters

PP or ETFE/PTFE. Adapters of ETFE/PTFE offer higher chemical resistance.

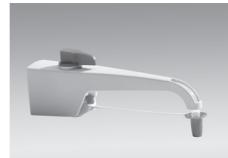
Outer thread	for bottle thread/ ground joint	Material	Cat. No.
GL 32	GL 25	PP	704325
GL 32	GL 28/ S 28	PP	704328
GL 32	GL 30	PP	704330
GL 32	GL 45	PP	704345
GL 45	GL 32	PP	704396
GL 45	GL 35	PP	704431
GL 45	GL 38	PP	704397
GL 45	S* 40	PP	704343
GL 45	S* 50	PP	704350
GL 45	S* 54	PP	704430
GL 45	S* 60	PP	704348
GL 32	GL 25	ETFE	704375
GL 32	GL 28/ S 28	ETFE	704378
GL 32	GL 45	ETFE	704395
GL 45	GL 32	ETFE	704398
GL 45	GL 38	ETFE	704399
GL 45	S* 40	PTFE	704391
GL 32	NS 19/26	PP	704419
GL 32	NS 24/29	PP	704424
GL 32	NS 29/32	P	704429



* buttress thread

Discharge tube for VITLAB® genius²

Description	Nominal volume mL	Length	Cat. No.
for VITLAB® genius ²	2/5/10	105	VT003.1678102
	25/50/100	135	VT003.1678106





Filling valve
Valve: PFA/Boro 3.3/
ceramic.



Discharge valve
PFA/Boro 3.3/ceramic/
platinum-iridium.

Volume	Cat. No.
2/5/10 mL	6734
25/50/100 mL	6735

Volume	Cat. No.
2 mL	6749
5/10 mL	6727
25/50/100 mL	6728



Telescoping filling
tubes
FEP. Adjusts to various
bottle heights.



Recirculation tube
FEP.
Cat. No. 6747

Nominal volume mL	Outer-Ø mm	Length	Cat. No.
2/5/10	6	70-140	708210
		125-240	708212
		195-350	708214
		250-480	708216
25/50/100	7,6	170-330	708218
		250-480	708220

Sealing ring for the
valve block
PTFE, for highly volatile
media.



Cat. No. 704495



Closure cap
with fastener, PP, red.

Calibrating-,
mounting tool



Cat. No. 76748

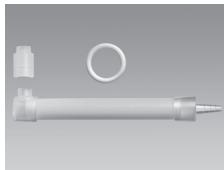
Volume	Cat. No.
2/5/10 mL	VT003.1676018
25/50/100 mL	VT003.1676019

Flexible discharge tubing with recirculation valve, PTFE, coiled, length 800 mm, with safety handle.



Drying tube (without drying agent) incl. PTFE-sealing ring (PTFE).

Cat. No. 707930



Nominal volume mL	Discharge tube Outer Ø mm	Inner Ø mm	Cat. No.
----------------------	---------------------------------	---------------	----------

2/5/10 3 2 VT003.1678132*

25/50/100 4.5 3 VT003.1678134*

*not suitable for hydrofluoric acid

Bottle Stand
PP, 325 mm,
base plate
220 x 160 mm.

Cat. No. 704275



Air vent cap for
micro filter with
Luer-cone
PP, air vent cap and
PTFE-sealing ring.

Cat. No. 704495



17. Troubleshooting

Problem	Possible cause	Corrective action
Piston moves with difficulty or is stuck	Formation of crystals, dirty	Stop dispensing immediately. Loosen piston with circular motion, but do not disassemble. Follow all cleaning instructions (page 18-19).
Filling not possible	Volume adjusted to minimum setting	Set to required volume (see page 12).
	Filling valve stuck	Unscrew the filling valve from the valve block, clean it, replace the filling valve if necessary. If the valve is stuck use a 200 µL pipette tip to loosen it (see page 21). If necessary, replace the filling valve with sealing washer.
Dispensing not possible	Discharge valve stuck	Unscrew the discharge valve from the valve block, clean it, replace the discharge valve, if necessary (see page 20), use a 200 µL plastic tip to loosen any ball valve that is stuck.
Discharge tube or discharge tube with recirculation valve cannot be mounted sufficiently	Discharge valve is not screwed in deeply enough	Tighten the discharge valve with the mounting tool until it meets the stop so that the threads are no longer visible.
Air bubbles in the instrument	Reagent with high vapor pressure has been drawn in too quickly	Slowly draw in reagent.
	Valve screw connections loose	Tighten the valves firmly with the mounting tool.
	The instrument has not been primed	Prime the instrument (see page 11).
	Filling tube is loose or damaged	Push the filling tube on firmly. If necessary cut off approx. 1 cm of tube at the upper end and re-connect it or replace filling tube.
	Valves not firmly connected or damaged	Cleaning procedure (see page 18-19). Tighten the valves using the mounting tool.
Dispensed volume is too low	Filling tube is loose or damaged	Cleaning procedure (see page 18-19). Push the filling tube on firmly. If necessary, cut off approx. 1 cm of the tube at the upper end and re-connect it or replace filling tube (see page 20).
	Filling valve is loose or damaged	Cleaning procedure (see page 18-19). Tighten the valves using the mounting tool. If necessary, replace filling valves.
Leaking liquid between Instrument and bottle	Recirculation tube not connected	Connect recirculation tube (see page 9, Fig. 1).
	Volatile reagent dispensed without sealing ring	Mount sealing ring (see page 14).
	moisture-sensitive or CO ₂ sensitive media	Mount the seal ring for the valve block (see page 14) and use a drying tube filled with suitable absorbent (see page 14).

18. Repairs

18.1. Return for repair

Caution!

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.
- Shipment is at the risk and the cost of the sender.
- 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.

18.2. Calibration Service

ISO 9001 and GLP-guidelines require regular examinations of your volumetric instruments. We recommend checking the volume every 3-12 months. The interval depends on the specific requirements on the instrument. For instruments frequently used or in use with aggressive media, the interval should be shorter. The complete testing procedure (SOP) can be obtained from manufacturer In addition.

19. Warranty

We shall not be liable for the consequences of improper handling, use, servicing, operation 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.

20. Disposal



For the disposal of instruments, please observe the relevant national disposal regulations.

Subject to technical modification without notice.
We will not be held responsible for printing or typographical errors.

C1695117/0724-1
