

**Pipet-Lite™ XLS+™**

Manual Pipettes with RFID

Single-channel



Multichannel



Adjustable Spacer



# Pipet-Lite™ XLS and XLS+ Manual Pipettes with RFID

- **Single channel models with LTS or with universal-fit shafts**
- **Multichannel models with LTS**
- **Adjustable spacer multichannel models with LTS**
- **RFID enabled, all models**

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## Contents of box

- Pipette model as ordered
- CD containing this manual and trial RFID software
- Sample Tips
- Conformance Certificate / Warranty Card

If any item is missing please call 800-4-RAININ (800-472-4646) in the US, or contact your local MT office or distributor.

Rainin, Pipet-Lite, XLS, LTS, LiteTouch, Hang-Ups are trademarks of Rainin Instrument, LLC. Pipet-Lite pipettes are manufactured under U.S. Patent Nos. 5,614,153; 5,700,959; and 5,849,248. For use under U.S. patents 6,168,761 B1; 6,171,553 B1; and D426,643.

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## 1.1 Introduction

Rainin's Pipet-Lite XLS and XLS+ family is continually being upgraded with new features to further improve ergonomics while maintaining high accuracy and performance. The pipette is available in several versions, outlined below; this manual will describe all models.

### Single-channel

11 models for volumes from 0.1  $\mu\text{L}$  to 20 mL

### Multichannel

12 models for volumes from 1  $\mu\text{L}$  to 1200  $\mu\text{L}$ , including 8 and 12 channels

### Adjustable-spacer

5 models for volumes from 5  $\mu\text{L}$  to 1200  $\mu\text{L}$  including 6 and 8 channels, with nozzle spacing adjustable from 9-19 or 9-14 mm.

Spring forces are reduced even further over previous models. With a contoured handle with fingerhook, the pipette is designed for maximum comfort and enhanced performance.

New enhancements for Pipet-Lite XLS+ single channel include low stiction\* seals for incredibly smooth operation and a tough high-density polymer tip ejector that is corrosion free and easy to release in one smooth action.

Pipet-Lite XLS+ multichannels are enhanced with low stiction seals and are up to 35% lighter than the previous model with even lower plunger forces.

In models with LTS™ shafts (L-model single channels, all multichannels and adjustable spacers), the patented LTS LiteTouch™ Tip Ejection System reduces tip ejection forces by up to 85% in the single-channel L models, and provides absolutely consistent sample pickup across all channels in multichannel models, as well as reducing tip ejection force.

Finally, all models contain an RFID tag (radio-frequency identification) for facilitating calibration management when using the optional RFID reader and Lab-X™ Direct Pipette-Scan™ software. Using the RFID is described after the single-channel section.

\*stiction = static friction



Figure 1: Pipet-Lite XLS+

## 1.2 Setting Volume

1. Turn the volume lock lever to the “unlock” position so the volume setting mechanism is unlocked and free to turn. See left image in Figure 2.



Figure 2: Volume Lock Control

2. With the mechanism unlocked, orient the pipette so you are looking at the volume indicator, then rotate the plunger button to change volume – counter-clockwise to increase, and clockwise to decrease volume.

2 $\mu$ l	10 $\mu$ l	20 $\mu$ l	100 $\mu$ l	200 $\mu$ l	300 $\mu$ l	1000 $\mu$ l	2000 $\mu$ l	5000 $\mu$ l	10 ml	20 ml
1	0	1	0	1	2	0	1	4	0	1
2	7	2	7	2	2	7	2	2	7	2
5	5	5	5	5	5	5	5	5	5	5
1.25 $\mu$ l	7.5 $\mu$ l	12.5 $\mu$ l	75 $\mu$ l	125 $\mu$ l	225 $\mu$ l	0.75 ml	1.25 ml	4.25 ml	7.5 ml	12.5 ml

Figure 3: Volume Indicator by Pipette Model

Read the volume indicator from the top down:

2–20  $\mu$ L: Black digits indicates  $\mu$ L. Red digits – tenths, hundredths of  $\mu$ L.

100–300  $\mu$ l: All digits black –  $\mu$ L.

1000–5000  $\mu$ L: red digit – mL. Black digits– tenths, hundredths of mL.

10 mL and 20 mL: Red digit – mL. Black digits – tenths of mL.

3. To eliminate errors due to mechanical backlash: when setting the desired volume, first turn the knob 1/3 turn above the desired volume. Then turn the knob slowly clockwise until the desired volume is displayed. Always dial down to the desired volume.
4. Turn the volume lock to the “lock” position (Fig. 2 above) to prevent changes to the volume setting. Some volumes for the 200  $\mu$ L model are shown in Figure 4.

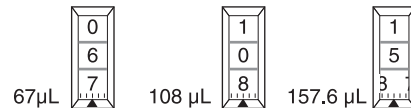


Figure 4: Example volumes

Volume ranges and increments for each model are shown below:

### Single-Channel

Volume	Adjustable Range $\mu\text{L}$	Recommended Range $\mu\text{L}$	Increment $\mu\text{L}$
2 $\mu\text{L}$	0 to 2	0.1 to 2	0.002
10 $\mu\text{L}$	0 to 10	0.5 to 10	0.02
20 $\mu\text{L}$	0 to 20	2 to 20	0.02
100 $\mu\text{L}$	0 to 100	10 to 100	0.2
200 $\mu\text{L}$	0 to 200	20 to 200	0.2
300 $\mu\text{L}$	0 to 300	20 to 300	0.5
1000 $\mu\text{L}$	0 to 1000	100 to 1000	2.0
2000 $\mu\text{L}$	0 to 2000	200 to 2000	2.0
5000 $\mu\text{L}$	0 to 5000	500 to 5000	5.0
10 mL	0 to 10 mL	1 mL to 10 mL	20.0
20 mL	0 to 20 mL	2 mL to 20 mL	20.0

### Multichannel and Adjustable-Spacers

Volume	Adjustable Range $\mu\text{L}$	Recommended Range $\mu\text{L}$	Increment $\mu\text{L}$
10 $\mu\text{L}$	0 to 10	0.5 to 10	0.02
20 $\mu\text{L}$	0 to 20	2 to 20	0.02
50 $\mu\text{L}$	0 to 50	5 to 50	0.05
100 $\mu\text{L}$	0 to 100	10 to 100	0.2
200 $\mu\text{L}$	0 to 200	20 to 200	0.2
300 $\mu\text{L}$	0 to 300	20 to 300	0.5
1200 $\mu\text{L}$	0 to 1200	100 to 1200	2.0

### Filter

The 5000  $\mu\text{L}$ , 10 mL, and 20 mL pipettes use a filter in the end of the shaft to help prevent liquid entering the shaft and contaminating the piston, should the plunger snap up during aspiration. Using a filter is recommended when pipetting large volumes. Replace the filter if it gets wet.

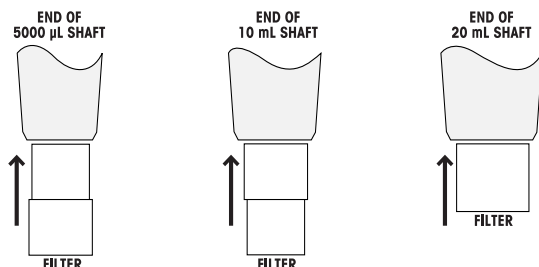


Figure 5: Filter orientation

The 5000  $\mu\text{L}$  and 10 mL pipettes use the same filter, as shown in the diagram above:

5000  $\mu\text{L}$ : small diameter into the shaft.

10 mL: large diameter into the shaft.

Filter part numbers are

6190-164

17001944 (pack of 100) and

6190-165

17001945 (pack of 1000).

The filter for the 20 mL model is a cylinder.

Part numbers:

6190-221

17001951 (pack of 100),

6190-222

17001952 (pack of 500).

### 1.3 Tip Selection and Mounting

Rainin pipettes and tips are designed together as a pipetting system, both in LTS and traditional versions. All Rainin tips are BioClean and totally inert, so you can be assured of the best pipetting results.

Rainin pipettes are calibrated with Rainin tips, and performance to published specifications can only be guaranteed when Rainin tips are used.

To mount a tip, press the pipette shaft into the end of the tip with light force. With both LTS and traditional versions, the tip will seal properly on the shaft with minimal force — do not use more force than is required.

### 1.4 Tip Immersion Depth

The recommended depth for tip insertion into the sample for each model is shown below.

Nominal Volume	Volume Range	Immersion Depth
2 $\mu$ L	0.1 - 2 $\mu$ L	1-2 mm
10 $\mu$ L	0.5 - 10 $\mu$ L	1-2 mm
20 $\mu$ L	2 - 20 $\mu$ L	2 - 3 mm
100 $\mu$ L	10 - 100 $\mu$ L	2 - 3 mm
200 $\mu$ L	20 - 200 $\mu$ L	3 - 6 mm
300 $\mu$ L	20 - 300 $\mu$ L	3 - 6 mm
1000 $\mu$ L	100 - 1000 $\mu$ L	3 - 6 mm
2000 $\mu$ L	200 - 2000 $\mu$ L	3 - 6 mm
5000 $\mu$ L	500 - 5000 $\mu$ L	6 - 10 mm
10 mL	1 mL - 10 mL	6 - 10 mm
20 mL	2 mL - 20 mL	6 - 10 mm

Tip immersion depth is critical and should not be exceeded, or the volume measured may be inaccurate, possibly out of specification. The tip angle is also important – the pipette should always be used in a position within 20 degrees of vertical. See Figure 6 below.

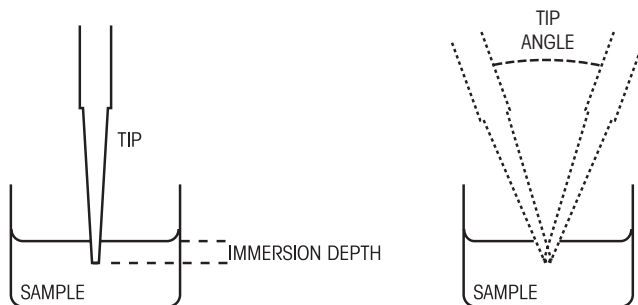


Figure 6: Tip Immersion Depth and Tip Angle

## 1.5 Operation

Before pipetting valuable samples, it is good to practice aspirating and dispensing water.

1. Set the desired volume as described on page 4.
2. Attach a new Rainin tip. Press the shaft into the tip with sufficient force to make a good seal.
3. Press the plunger button to the first stop, and hold it in this position. See the diagram below for a depiction of the first and second stops.

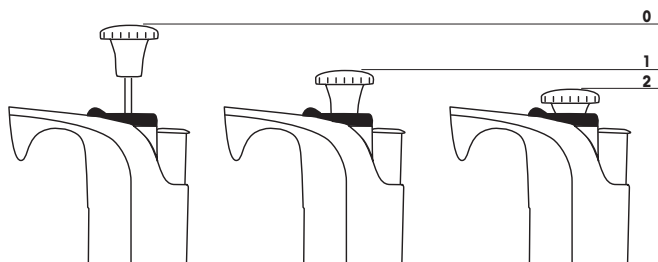


Figure 7: Neutral position (0), First stop (1), and Second stop (2)

### Aspiration:

1. Holding the pipette vertically (or within 20° of vertical), place the tip into the sample to the proper depth and relax your thumb pressure on the plunger. The light piston spring will move the piston upward, aspirating sample. Do not let go of the plunger button, or the piston may snap up quickly, resulting in inaccurate measurement.
2. Pause for about 1 second (longer for macro-volume pipettes) to ensure that the full volume of sample is drawn into the tip.
3. Withdraw the tip from the sample. If any liquid remains on the outside of the tip, touch it off carefully onto a lint-free tissue, taking care not to touch the tip orifice.

### Dispensing:

1. Touch the tip end against the side wall of the receiving vessel and press the plunger slowly, past the first stop, to the second stop, or blowout (bottom of stroke.)  
Wait: 1 second for 2-300  $\mu\text{L}$  volumes, 1-2 seconds for 1000  $\mu\text{L}$  and larger.  
(For viscous solutions pause before blowout.)
2. Still holding the plunger, withdraw the tip, sliding it along the wall of the vessel. Release the plunger.
3. Press the tip ejector button lightly to discard the tip. Use a new tip for each sample to prevent carry-over. Repeat for the next pipetting cycle.

### Pipetting Guidelines

You should maintain:

1. Consistent pickup and dispense rhythm.
2. Consistent speed and smoothness when pipetting.
3. Consistent pressure on the plunger button at the first stop.
4. Consistent immersion depth. See Figure 6.
5. Pipette vertically, or within 20° of vertical.
6. Pre-rinse the tip twice by aspirating and dispensing sample before actual pickup.
7. Don't invert or lay the pipette flat with liquid in the tip.

More information on Good Pipetting Technique, including a Lab Poster, can be found on the Rainin and MT websites: [www.shoprainin.com](http://www.shoprainin.com) or [www.mt.com/gpp](http://www.mt.com/gpp).

## 1.6 Tip Ejector Arm Removal

Four types of tip ejector are used and all types can be removed with minimum effort – do not use force.

### For models up to 2000 $\mu\text{L}$

Metal tip ejector: press in the quick-release tabs on the ejector arm and pull the arm down.

Plastic tip ejector: grasp firmly on the ejector arm and pull down.

**For 5000  $\mu\text{L}$  & 10 mL models:** grasp the top of the ejector arm and pull out then down.

**For the 20 mL model:** pull off the lower part of the ejector arm; the upper part stays in place. (Replace by aligning the rod with the hole in the upper part and pressing firmly.)

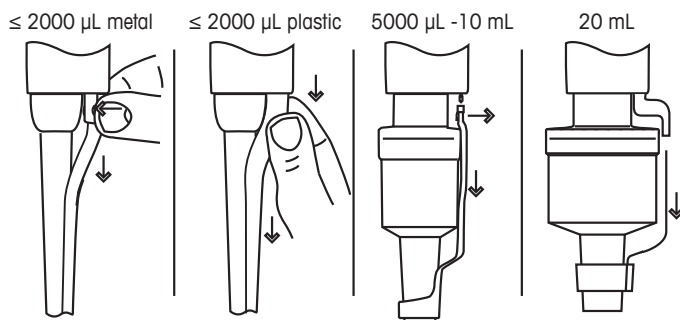


Figure 8: Removing Tip Ejector Arm

To replace the ejector arm (except 20 mL described above), insert the shaft through the large opening, align the top of the ejector arm with the tip ejector push-rod, and push the ejector arm firmly until it is securely in place.

## 1.7 Storage

After use, store the pipette in a clean safe place. Three types of hanger are available to hold your pipette conveniently when not in use.

CR-7: Free-standing carousel holds seven pipettes.

HU-M3: Set of three individual magnetic Hang-Ups™ for mounting on ferrous surfaces.

HU-S3: Three Hang-Ups attached to a clamp which fits onto a shelf

## 1.8 Care and Maintenance

**Caution: When pipetting, never allow liquid to enter the shaft, where it may contaminate the piston and seal. When removing the shaft from the pipette body, make sure the spring, seal and seal retainer do not fall off the piston, especially the smaller models, as they may be difficult to find!**

Your pipette is a sophisticated high precision lab instrument, and should be treated with appropriate care. The two biggest sources of damage occur with sample contamination inside the shaft, or with dropping the pipette. Filter tips and proper technique can mitigate the risk of sample contamination. Storing your pipette on appropriate hangers when not in use will reduce the chance of drops.

Sample contamination of the shaft, seals or piston can cause rough, sticky plunger movement. Eventually deposits on the piston can cause the seal to tear, leading to inaccurate results. Best practice for pipette maintenance is to regularly clean the pipette liquid end with the following procedure:



1. Remove tip ejector arm (See Tip ejector arm removal Figure 8).
2. On pipettes up to 1000  $\mu\text{L}$  unscrew the shaft coupling nut and remove shaft. For 2000  $\mu\text{L}$  unscrew the shaft. For pipettes  $>2000 \mu\text{L}$  unscrew the lower part of the shaft.
3. When you remove the piston assembly, note the order and placement of the seals, retainers, springs and o-rings on the piston assembly. XLS+ seals for models 100-2000  $\mu\text{L}$  are asymmetrical and must be inserted in the correct orientation (See figure 9). XLS+ seals for models 2-20  $\mu\text{L}$  are symmetrical and can be used in either orientation.
4. XLS+ seal sizes 1000-2000  $\mu\text{L}$  may remain inside the shaft when you remove the piston assembly; this is normal for this design. The seals may be removed from the shaft by inserting the large end of a tip into the shaft (See Figure 9) and hooking the seal over it.
5. To inspect and clean seals sized 100-300  $\mu\text{L}$ , remove them gently from their retainers by pushing them out from the back side, preferably with a non-sharp object like a pipette tip.
6. Inspect the seals, retainers, o-rings, shaft and piston for contamination. Clean with a lint-free cloth with either distilled water or isopropyl alcohol. Apply grease (part number 6200-524 17014531) sparingly by gently rubbing the seal or o-ring between the thumb and index finger, ideally using a clean powder-free examination glove. Apply a small amount of grease on the piston as well.  
Reassemble in the correct order and orientation.
7. If piston corrosion or staining is evident do not use the piston and have a METTLER TOLEDO Service representative assist with replacement of the piston.
8. The shaft, tip ejector and handle may also be cleaned using a damp cloth with distilled water, 10% bleach solution, isopropyl alcohol, or any commercially available instrument decontamination solution. Be sure to rinse off the cleaning agent with distilled water.

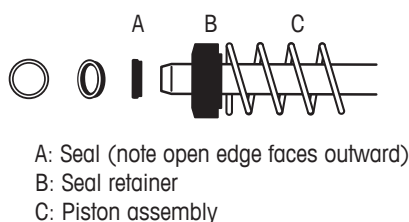


Figure 9A: Seal orientation,  
100, 200 and 300  $\mu\text{L}$

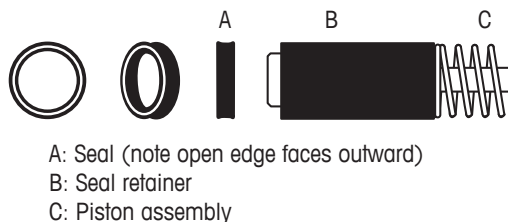


Figure 9B: Seal orientation,  
1000 and 2000  $\mu\text{L}$

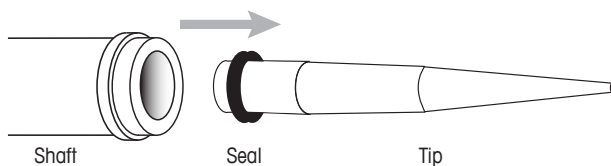


Figure 9C: Using the large end of a tip to remove 1000 or 2000  $\mu\text{L}$  XLS+ seal from the shaft

## 1.9 Autoclaving

Autoclaving of your pipettes to perform sterilization may be performed at 121°C, at 1 Bar, for 15-20 minutes, with the following restrictions and guidelines.

Do not autoclave the entire pipette or any part not specifically identified in the table below.

Pipette line	Model Range	Autoclaveable parts
Pipet-Lite, Pipet-Lite XLS	All single channel models	Shaft and tip ejector
Pipet-Lite XLS+	Single channel models 2 - 2000 µL	Shaft, tip ejector, piston assembly, spring, seal, and seal retainer
Pipet-Lite, Pipet-Lite XLS, Pipet-Lite XLS+	All multichannels, adjustable spacers	None

The entire liquid end of Pipet-Lite XLS+ single channel pipettes may be removed and placed into the autoclave without disassembling individual parts. The liquid end includes the following: Shaft, tip ejector, piston assembly (with spring), seal and seal retainer. If you have upgraded the seals of an older Pipet Lite or Pipet Lite XLS to the new XLS+ seals (see section 1.10), you can now autoclave the entire liquid end of your pipette. If you are unsure of your model type see section 1.10.

If autoclaving more than one unit together, take care to reassemble your pipettes with all of their original parts. If you clean the XLS+ piston and seals before autoclaving then be sure to re-grease them afterwards (see Care and Maintenance).

See Care and Maintenance and Replacement Parts sections for more details on disassembling pipettes, and how to identify the different parts.

## 1.10 Upgrading your Pipette to XLS+

The XLS+ single channel line of pipettes is distinguished from earlier models by having a new lower stiction sealing system, a completely autoclaveable liquid end, and a durable, corrosion-free plastic tip ejector.

If you have a single channel Pipet-Lite or Pipet-Lite XLS pipette in the 2-2000 µL range, you can upgrade your liquid end to experience the superior benefits of XLS+.

You can differentiate an XLS+ pipette from the earlier XLS version in the following ways: an original XLS+ pipette will have a serial number beginning with C14 (or higher) but not A14 or B14. Also the RAININ logo on the silver badge is colored blue. All the XLS+ seals are black, and no o-rings are used, while the XLS seals are white, and o-rings sit below the seal on the piston.

You can upgrade your liquid end by ordering the seal replacement kit (see 1.13, Replacement Parts). The new XLS+ seals require grease part# 6200-524 17014531 (see 1.8, Care and Maintenance). For the 1000 and 2000 µL models, replacing the seal retainer requires specialized tools and handling to avoid damage to the piston. Please call technical support (800-543-4030 in the USA) or your local METTLER TOLEDO service provider.

## 1.11 Troubleshooting

Problem	Possible Cause	Suggested Remedy
Leaks, inaccuracy	Loose shaft	Tighten coupling nut by hand.
	Worn seal for pipette volumes $\leq 2000 \mu\text{L}$	Replace seal
	Worn o-ring or insufficient grease seal for pipette volumes $5000 \mu\text{L}$ , $10\text{mL}$ , $20 \text{mL}$	Replace o-ring and apply small amount of grease.
	Cracked or split shaft.	Replace shaft. Check piston is not bent. If bent, call Rainin service for a new piston. Call 800-543-4030 in the US.
Rough, jerky, or sticky plunger movement	Contamination inside mechanism.	Remove tip ejector arm, remove shaft and check piston and seal clean as described in Care and Maintenance section. If piston is permanently corroded or stained, call Rainin service for a new piston. Call 800-543-4030 in the US.
	Insufficient grease	Apply grease sparingly to seal or o-ring

When removing the shaft from the pipette body, make sure the spring, seal and o-ring do not detach from the piston, especially on the smaller models. Be careful not to bend the piston on these small models. Recalibration of Pipet-Lite XLS is only required when the piston is replaced.

## 1.12 Service, Calibration and Repair

It is recommended to use only genuine Rainin replacement parts such as seals, o-rings, retainers and shafts. It is NOT necessary to recalibrate the pipette after changing the seal, o-ring, or shaft. Recalibration of the pipette is only necessary when the piston is replaced, and should be done only by qualified factory-trained personnel in a Rainin approved facility.

For pipettes under warranty, please note that the warranty will be voided if the pipette has been damaged as a result of physical or chemical abuse, or if the pipette has been repaired or recalibrated by any service facility which is not authorized by Rainin. In the US, call 800-543-4030 for service. Service is also available outside the US. See [www.mt.com/rainin](http://www.mt.com/rainin) for more information.

### Acids and Corrosives

Extensive contact with corrosive fumes may result in premature seal wear and damage to the piston. Exposure of the internal components to corrosive aerosols and fumes may be reduced by using Rainin tips with aerosol barrier filters.

After using concentrated acids or corrosive solutions, you can disassemble Pipet-Lite XLS and inspect and clean the piston assembly, shaft and seal / o-ring with distilled water. Use extreme care on the  $2 \mu\text{L}$  and  $10 \mu\text{L}$  models to avoid damaging the small diameter piston, or losing small items such as seals. Dry all components thoroughly and reassemble.

## 1.13 Replacement Parts

The commonly-replaced parts are shown here for each volume range for Pipet-Lite XLS, single-channel LTS and universal-fit models.

The images in Figure 10 represent the 20, 200 and 1000 µL models (top) and the 10 mL model (bottom) – other models are similar.

<b>XLS+ Models ≤2000 µL</b>	<b>Order #</b>	<b>Seal replace- ment kit<sup>1,3,5</sup></b>	<b>Order #</b>	<b>Shaft<sup>1</sup></b>	<b>Order #</b>	<b>Tip Ejector Metal<sup>1</sup></b>	<b>Order #</b>	<b>Tip Ejector Plastic<sup>2</sup></b>	<b>Order #</b>
L-2XLS+	17014393	6200-510	17014517	6202-063	17004866	6202-071	17005287	6200-517	17014524
L-10XLS+	17014388	6200-511	17014518	6202-064	17004862	6202-071	17005287	6200-517	17014524
L-20XLS+	17014392	6200-512	17014519	6202-065	17004861	6202-071	17005287	6200-517	17014524
L-100XLS+	17014384	6200-506	17014513	6202-066	17004859	6202-073	17005293	6200-518	17014525
L-200XLS+	17014391	6200-513	17014520	6202-067	17004860	6202-073	17005293	6200-518	17014525
L-300XLS+	17014405	6200-514	17014521	6202-425	17007551	6200-419	17007556	6200-519	17014526
L-1000XLS+ <sup>4</sup>	17014382	6200-515	17014522	6202-068	17004858	6202-074	17005294	6200-520	17014527
L-2000XLS+ <sup>4</sup>	17014390	6200-516	17014523	6202-214	17004856	6200-168	17005296	6200-521	17014528
SL-2XLS+	17014413	6200-510	17014517	6200-134	17004853	6200-133	17005292	6200-522	17014529
SL-10XLS+	17014409	6200-511	17014518	6200-140	17004845	6200-133	17005292	6200-522	17014529
SL-20XLS+	17014412	6200-512	17014519	6200-145	17004847	6200-144	17005288	6200-517	17014524
SL-100XLS+	17014408	6200-506	17014513	6200-147	17004848	6200-148	17005289	6200-523	17014530
SL-200XLS+	17014411	6200-513	17014520	6200-157	17004849	6200-156	17005291	6200-518	17014525
SL-300XLS+	17014414	6200-514	17014521	6200-413	17007554	6200-419	17007556	6200-519	17014526
SL-1000XLS+ <sup>4</sup>	17014407	6200-515	17014522	6200-160	17004850	6200-163	17005290	6200-520	17014529
SL-2000XLS+ <sup>4</sup>	17014410	6200-516	17014523	6200-169	17004846	6200-168	17005296	6200-521	17014530
Grease for all models ≤2000 µL:		6200-524	17014531						

<b>XLS Models ≥5000 µL</b>	<b>Order #</b>	<b>Piston O-Ring</b>	<b>Order #</b>	<b>Cylinder O-Ring</b>	<b>Order #</b>	<b>Shaft</b>	<b>Order #</b>	<b>Tip Ejector</b>	<b>Order #</b>
L-5000 XLS	17011790	6200-363	17003382	6200-364	17003477	6202-222	17004857	6200-373	17005297
L-10ML XLS	17011783	6200-369	17003383	6200-370	17003476	6202-223	17004855	6200-374	17005295
L-20ML XLS	17011788	6202-299	17003413	6202-300	17003478	6202-302	17004908	6202-298	17005308
SL-5000 XLS	17011801	6200-363	17003382	6200-364	17003477	6200-362	17004852	6200-373	17005297
SL-10ML XLS	17011795	6200-369	17003383	6200-370	17003476	6200-368	17004851	6200-374	17005295
Filters for 5 mL and 10 mL XLS models: 6190-164 17001944 (pack of 100). 6190-165 17001945 (pack of 1000)									
Filters for 20 mL XLS models: 6190-221 17001951 (pack of 100). 6190-222 17001952 (pack of 500)									

### Notes

1. Parts are back compatible with Pipet-Lite and Pipet-Lite XLS.
2. Parts are back compatible with Pipet-Lite XLS only.
3. XLS+ seals and retainers must be used together.
4. 1000 µL and 2000 µL Pipet-Lite and Pipet-Lite XLS models require service to upgrade to XLS+ seal retainers.
5. Seal replacement kit includes seal, seal retainer, and grease.

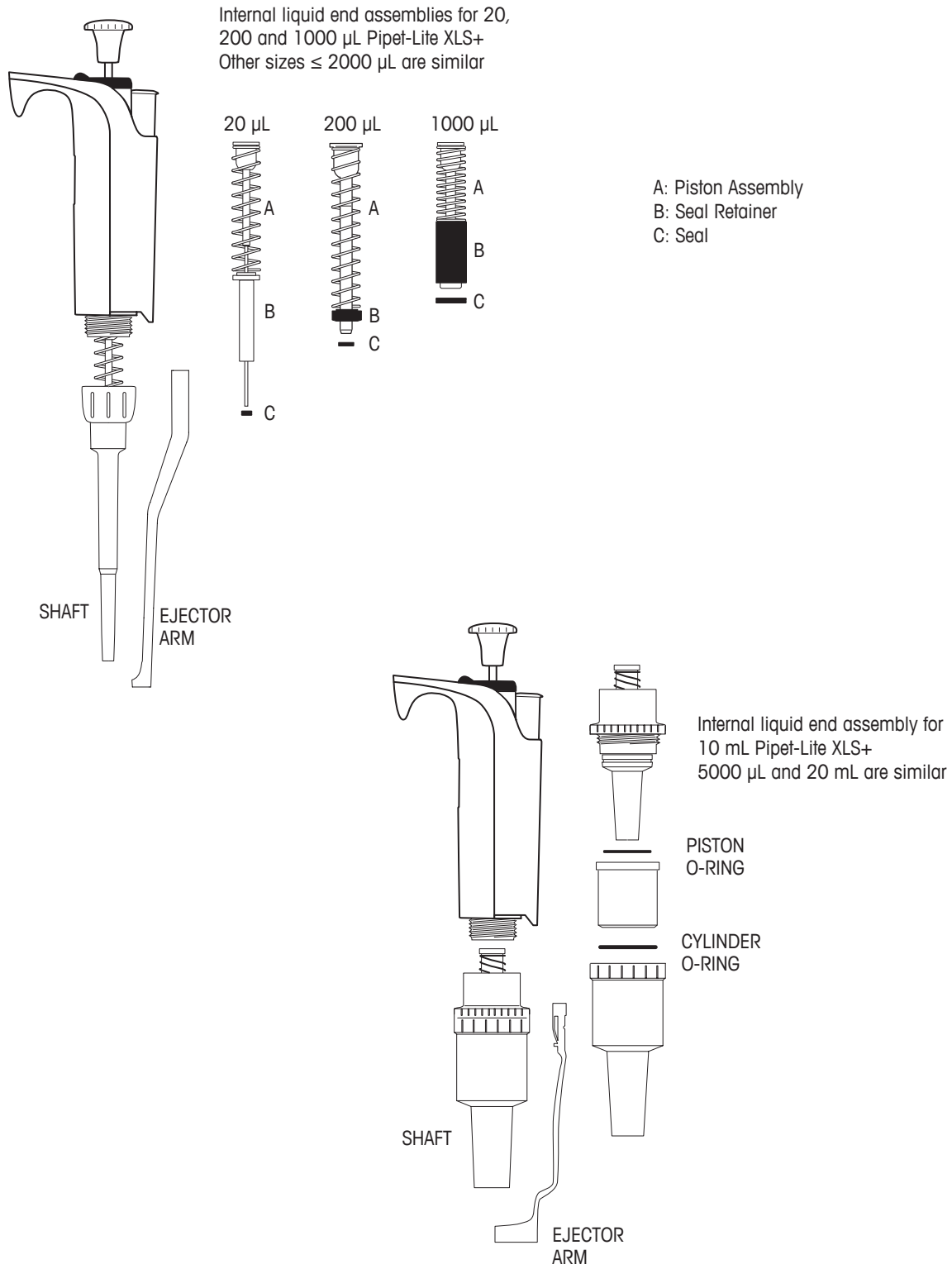


Figure 10: Common Replacement Parts  
Top < 2000 µL    Bottom > 5000 µL

## 2.1 RFID (Radio Frequency Identification Device)

All Pipet-Lite XLS models incorporate a passive RFID tag in the finger-hook, containing unique information about the pipette, including model type, serial number, RFID UID and service calibration information. The RFID tag can be wirelessly linked with optional reader and software to facilitate querying calibration tracking and service reminders. The RFID tag has negligible weight with no effect on precision or accuracy. It operates only when read by the RFID reader and the below-mentioned software.

### Optional Rainin RFID Reader

Rainin recommends a specific Rainin RFID reader that interfaces with a PC's USB port. Rainin does not recommend any other RFID reader. Using the Rainin RFID reader, information can be written to the Pipette's RFID tag in the same consistent way as it is read from the RFID tag. The Rainin RFID Reader can be used with any Rainin RFID enabled Pipet-Lite XLS; but needs appropriate software for it to work. The estimated range of operation of the RFID reader is up to 5 cm.

### How to read the Rainin RFID Reader LEDs (Light-emitting diodes)

LEDs	Description
Yellow & Green	Reader powers up in this state. Reverts to this state when application is stopped or a plug-in is disabled.
Yellow	Reader has detected a pipette. Keep pipette close to reader until LED changes to Green (or Red).
Green	When application first starts, Green LED indicates the device is ready. After all data is read from a pipette held close to the reader, Green LED lights up.
Red	Reader failed to read or write. Try scanning the pipet again, if not restart software.
Yellow & Red	Data written to the pipette does not compare with data read back from the pipette.

### Optional LabX™ Direct Pipette-Scan™ Software

Supplied on the same CD as this manual is a trial version of the Lab-X Direct Pipette-Scan software. A full version is also available for purchase. Supported PC Operating Systems: Microsoft Windows XP/Vista & Windows 7. Users can select any of the following languages: Chinese (Simplified), Czech, Danish, English, French, German, Hungarian, Italian, Japanese, Korean, Norwegian, Polish, Russian, Spanish, Swedish.

### Operation Overview

An optional RFID Kit is available for purchase from Rainin. The RFID Kit contains the Rainin recommended RFID reader and the LabX Direct Pipette-Scan software. Once the Rainin RFID reader is connected by USB to your PC, and the software is configured and running, operation is simple.

Simply place the head of the pipette in the recommended position as shown on the Rainin RFID reader, hold it steady for a few seconds to scan the pipette's RFID tag and read the pipette's information stored in its RFID tag into the software.



Figure 11  
Rainin RFID Reader

## Read-only fields from the Pipette's RFID-Tag

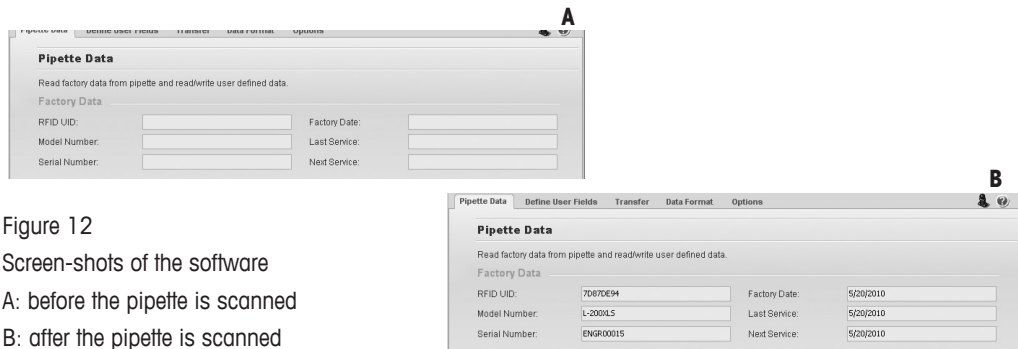


Figure 12

Screen-shots of the software

A: before the pipette is scanned

B: after the pipette is scanned

The software shows the read-only data fields programmed into each pipette's RFID tag before it leaves the factory. These fields can ONLY be modified by Rainin when the pipette is manufactured or updated when sent in for service. The read-only fields include the RFID UID, Model Number, Serial Number, Factory Date, Last Service Date and Next Service date. For QC or workflow purposes, multiple RFID enabled pipettes can be scanned sequentially.

### Writing Data to the RFID-Tag's custom fields

In addition there are writable fields available on each pipette's RFID tag that can be chosen by the users to customize their pipettes so as to standardize their unique workflow(s). Each customer is free to customize and/or standardize the software to suit their unique workflow(s). Any such writing operation requires the Rainin RFID reader and the LabX Direct Pipette-Scan software. Refer to the software help file for more instructions.

### What RFID / LabX Direct Pipette-Scan Software can do

The LabX Direct Pipette-Scan software is flexible to help you customize your workflow. Customers can standardize their departments on the new Pipet-Lite XLS pipettes and Rainin RFID reader with LabX Direct Pipette-Scan software system based workflow and calibration check system. This system helps simplify the work of Quality Compliance Specialists. It shortens the calibration check cycle, returning pipettes back to active lab use faster. In addition, data can also be written to the Pipette's RFID tag by configuring the custom fields in the LabX Direct Pipette-Scan software and advanced workflows can be defined for your custom settings.

### What RFID does not do:

- Does not protect against misplacement, theft, or provide pipette's location information
- Does not protect against erroneous data input
- Does not replace calibration stickers for businesses or displace QC professionals
- Does not validate your workflow. The validation of the workflow and CFR Part 11 regulatory compliance remains the responsibility of the customer.

### 3.1 Pipet-Lite XLS+ Multichannel Pipettes 8 and 12-channel models

#### Introduction

Pipet-Lite XLS+ multichannel pipettes are based on the Pipet-Lite XLS single-channel pipette and use the patented LTS LiteTouch Tip Ejection System.

Two versions of the Multichannel Pipet-Lite XLS+ are available: 8-channel and 12-channel. An 8-channel version is shown in Figure 12.

The 8- and 12-channel models are available in 6 volume ranges:

0.5 -10  $\mu\text{L}$

2-20  $\mu\text{L}$

5-50  $\mu\text{L}$

20-200  $\mu\text{L}$

20-300  $\mu\text{L}$

100-1200  $\mu\text{L}$

#### Tip Selection

Pipet-Lite XLS multichannel pipettes use Rainin LTS tips.

10-20  $\mu\text{L}$ : 20  $\mu\text{L}$  LTS tips

50-200  $\mu\text{L}$ : 250  $\mu\text{L}$  LTS tips

300  $\mu\text{L}$ : 300  $\mu\text{L}$  LTS tips

1200  $\mu\text{L}$ : 1200  $\mu\text{L}$  LTS tips (recommended) or

1000  $\mu\text{L}$  LTS tips – pick up 1200  $\mu\text{L}$  (except with filter)

LTS tips have a cylindrical cross-section with a well-defined seal ring, thin wall, and positive stop. They seal properly on the shaft and cannot be jammed or forced too far onto the shaft nozzles, and provide absolutely consistent sample pickup across all channels.



Figure 13: Pipet-Lite XLS+ Multichannel Pipette



### Mounting LTS Tips: 8- and 12-channel

Mounting racked LTS tips on L8 and L12 pipettes is simple. First align the shaft nozzles into the row of tips, holding the pipette at an angle. (Figure 13A). Position the pipette upright and press the nozzles into the tips until the “positive stop” is reached. (Figure 13B). The tips are now mounted with proper sealing. You do not need to hand-tighten, use heavy pressure, or “rock” the nozzles onto the tips to obtain a good seal.



Figure 14: Mounting racked LTS Tips

### Tip Immersion Depth

The recommended depth for tip insertion is shown in the table below.

Volume	Immersion Depth
10-50 $\mu\text{L}$	2 - 3 mm
200-1200 $\mu\text{L}$	3 - 6 mm

### Positioning the Liquid End Manifold

The liquid end manifold can be rotated to any angle for convenience when filling plates. You do not need to loosen the coupling nut.

## 4.1 Pipet-Lite XLS Adjustable Spacing Pipette 6 and 8-channel models

### Introduction

Pipet-Lite XLS Adjustable-Spacer multichannel pipettes are based on Pipet-Lite XLS single-channel pipettes, and operate in the same way.

Two versions of the Pipet-Lite XLS Adjustable-Spacer pipette are available: 6-channel (LA6) and 8-channel (LA8), with nozzle spacing adjustment ranges shown below:

6-channel	9 mm to approx. 19 mm
8-channel	9 mm to approx. 14 mm

6- and 8-channel versions are available in the volume ranges: 20-300  $\mu$ L and 100-1200  $\mu$ L.

8-channel versions are also available in the 5-50  $\mu$ L volume range.

### Spacing Controls and Indicators

Nozzle spacing is changed with the use of two knurled knobs on either end of the liquid end manifold: the LIMITER knob and the SPACING ADJUSTMENT knob, shown in Figure 14.

The LIMITER knob (marked with the nozzle spacing range) sets the desired maximum spacing within the pipette's spacing range. A vertical arrow at the top of the knob on the liquid end manifold is the set point, shown in Figure 15.

When you have set the maximum spacing with the LIMITER knob, turn the SPACING adjustment knob to open the nozzle spacing to the set value. A scale on the liquid end manifold gives a visual reference of the set spacing. Simply line up the leftmost nozzle with the scale on the manifold, as shown in Figure 15.



Figure 15: Pipet-Lite XLS Adjustable-Spacer Pipette

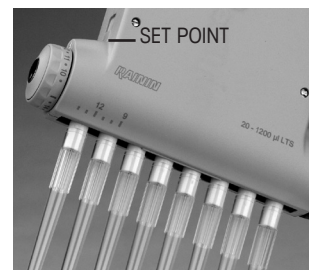


Figure 16: Liquid End Marks

The full range of adjustment for the eight-channel version is shown below in Figure 17. Nozzles are set to 9 mm spacing on the left and 14 mm spacing on the right.

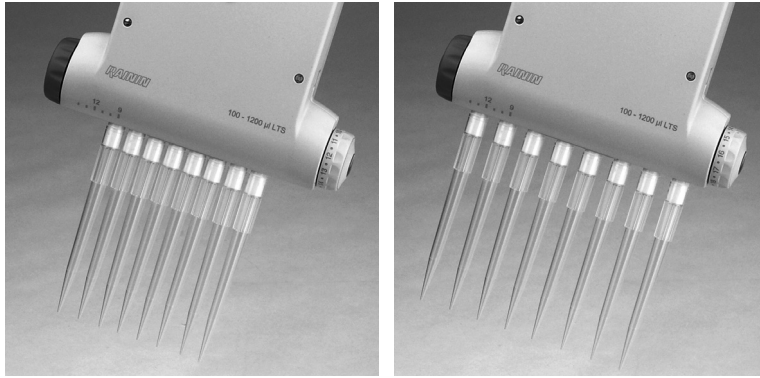


Figure 17: Nozzles: minimum spacing & maximum spacing

### Tip Selection

Pipet-Lite multichannel pipettes must use Rainin LTS tips.

LA8-50: use 250  $\mu$ L LTS tips

LA6-300 and LA8-300: use 300  $\mu$ L LTS tips

LA6-1200 and LA8-1200: use 1200  $\mu$ L LTS tips (recommended) or 1000  $\mu$ L LTS tips – picks up 1200  $\mu$ L (except tips with filters)

LTS tips have a cylindrical cross-section with a well-defined seal ring, thin wall, and positive stop. They seal properly on the LTS nozzles and cannot be jammed or forced too far onto the nozzles.

### Mounting LTS Tips

Mounting racked LTS tips onto LA6 and LA8 pipettes is simple.

Set the nozzle spacing to 9 mm (same as the spacing for racked tips) by rotating the dark grey SPACING ADJUSTMENT knob fully clockwise.

Align the nozzles into the row of tips, holding the pipette at a slight angle. (Figure 17 left).

Rotate the pipette upright and press the nozzles into the tips until the “positive stop” is reached.

The tips are now mounted with proper sealing. You do not need to hand-tighten, use heavy pressure, or “rock” the nozzles onto the tips to obtain a good seal. Withdraw the tips from the tip rack. (Figure 17 right)

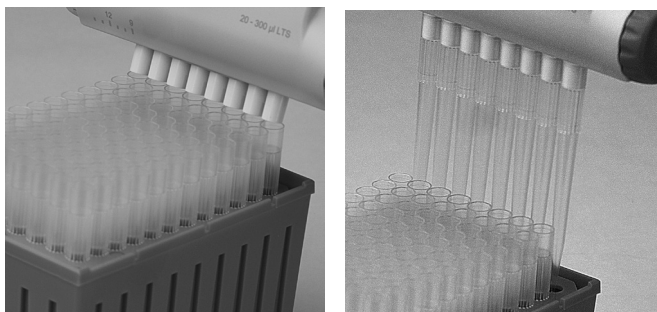


Figure 18: Mounting LTS Tips

**Setting the Nozzle Spacing**

With tips mounted on the nozzles, and before you begin to aspirate sample:

- If you know the spacing for the receiving wells or test-tube block, set this value on the LIMITER knob.
- If you do not know the spacing, hold the pipette so that the tip ends are above the centers of the wells or test-tube block into which you will dispense. Look at the scale on the liquid end manifold, and note where the marked nozzle aligns. Set this value on the LIMITER knob.
- If you accidentally over-extend the spacing, you can click the LIMITER knob to smaller values, stopping when the tip ends are aligned over the centers of the wells/test tubes.

Once the LIMITER knob has been set, spacing the nozzles properly is simple.

Just pick up sample, set the nozzle spacing by moving the SPACING ADJUSTMENT knob until it stops at the value set by the LIMITER knob, and dispense into the wells or test-tube block.

**Tip Immersion Depth**

Recommended depth for tip insertion for each Pipet-Lite XLS adjustable-nozzle model:

LA8-50: 2–3 mm

LA6-300, LA8-300, LA6-1200, LA8-1200: 3–6 mm

Operate the pipette within 20 degrees of vertical.

**Tip Ejection**

Simply press on the tip ejector button. All tips are ejected cleanly with minimal pressure on the thumb because of the progressive eject design built in to the liquid end manifold.

**Positioning the Liquid End Manifold**

The liquid end manifold can be rotated to any angle for convenience. You do not need to loosen the coupling nut.

## 5.1 Specifications – All Models

These manufacturer's specifications should be used as guidelines when establishing your own performance specification.

Model	Volume	Increment	Accuracy		Precision	
	$\mu\text{L}$		%	$\mu\text{L} (\pm)$	%	$\mu\text{L} (\leq)$
2 $\mu\text{L}$	0.2	0.002	12.0	0.024	6.0	0.012
	1.0		2.7	0.027	1.3	0.013
	2.0		1.5	0.030	0.7	0.014
10 $\mu\text{L}$	1.0	0.02	2.5	0.025	1.2	0.012
	5.0		1.5	0.075	0.6	0.03
	10.0		1.0	0.1	0.4	0.04
20 $\mu\text{L}$	2	0.02	7.5	0.15	2.0	0.04
	10		1.5	0.15	0.5	0.05
	20		1.0	0.2	0.3	0.06
* 50 $\mu\text{L}$	5	0.05	3.5	0.18	1.5	0.075
	25		1.2	0.3	0.4	0.1
	50		0.8	0.4	0.2	0.1
100 $\mu\text{L}$	10	0.2	3.5	0.35	1.0	0.1
	50		0.8	0.4	0.24	0.12
	100		0.8	0.8	0.15	0.15
200 $\mu\text{L}$	20	0.2	2.5	0.5	1.0	0.2
	100		0.8	0.8	0.25	0.25
	200		0.8	1.6	0.15	0.3
300 $\mu\text{L}$	30	0.5	2.5	0.75	1.0	0.3
	150		0.8	1.2	0.25	0.375
	300		0.8	2.4	0.15	0.45
1000 $\mu\text{L}$	100	2	3.0	3.0	0.6	0.6
	500		0.8	4.0	0.2	1.0
	1000		0.8	8.0	0.15	1.5
* 1200 $\mu\text{L}$	100	2	3.6	3.6	0.6	0.6
	600		0.8	4.8	0.2	1.2
	1200		0.8	9.6	0.15	1.8
2000 $\mu\text{L}$	200	2	3.0	6.0	0.6	1.2
	1000		0.8	8.0	0.2	2.0
	2000		0.8	16.0	0.12	2.4
5000 $\mu\text{L}$	500	5	2.4	12.0	0.6	3.0
	2500		0.6	15.0	0.2	5.0
	5000		0.6	30.0	0.16	8.0
10 mL	1 mL	20	5.0	50.0	0.6	6.0
	5 mL		1.0	50.0	0.2	10.0
	10 mL		0.6	60.0	0.16	16.0
20 mL	2 mL	20	5.0	100.0	0.6	12.0
	10 mL		1.0	100.0	0.2	20.0
	20 mL		0.6	120.0	0.16	32.0

Specifications are subject to change without notice.

\* Multichannel models only in these volume ranges

[www.rainin.com](http://www.rainin.com)

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Printed in USA 9920-386 (EN) Rev G  
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