

RAININ

Pipetting 360°

RAININ Classic™

PR-200-M8

continuously
adjustable
microliter
8-channel pipette

**METTLER TOLEDO**

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Technical Support: 800-543-4030

Call this toll-free number for technical consultation and product information for this and other RAININ pipettes, and tips.

Or use e-mail: tech.support@rainin.com

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PR-200-M8 pipettes are manufactured under U.S. Patent No: 4,779,467.

Other U.S. and international patents pending.

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Description

Rainin Classic PR-200-M8 is an eight-channel pipette for liquid measurement applications requiring the use of 96-well plates. PR-200-M8 features an eight-nozzle liquid end coupled to a Rainin Classic body.

Model PR-200-M8 is not limited to fixed volume increments such as 25 μL or 100 μL , but allows you to accurately set intermediate volumes, e.g. 29.8, 87.4, 101, 185.6 μL . This continuous adjustability is an important advantage, especially for research laboratory applications.

Model PR-200-M8 is a variable-stroke piston pipette. The stroke is set by adjusting a digital micrometer. A digital volume indicator coupled directly to the micrometer reads the volume setting in microliters. The volume indicator simplifies the volume-setting process and reduces chances of error in reading volumes.

Each nozzle contains its own piston and seal assembly. Piston seals are lubricated with silicone grease for low friction and long life. Precision-ground stainless steel pistons contribute to seal integrity and ensure accuracy and precision for each nozzle. Nozzle/piston assemblies are removable and can be individually replaced.

The comfort-contoured Rainin Classic body is made of high-impact chemical-resistant plastic. It has a low temperature coefficient, so the instrument may be held for prolonged periods without affecting sample volume reproducibility.

A piston push bar controlled by the operator's thumb moves the eight pistons during operation. Tips are easily ejected without hand contact by a cam-actuated tip ejector. The 8-channel liquid end can be rotated to any angle for operator comfort.

Volume Setting

The volume indicator consists of three number dials and is read from top to bottom. The three digits indicate the volume selected in whole microliters. The volume set on the dial is the volume for each channel.

You can set intermediate volumes using the vernier marks between the digits. Model PR-200-M8 operates in the volume range from 20 to 200 μL ; the smallest incremental setting is 0.2 μL .

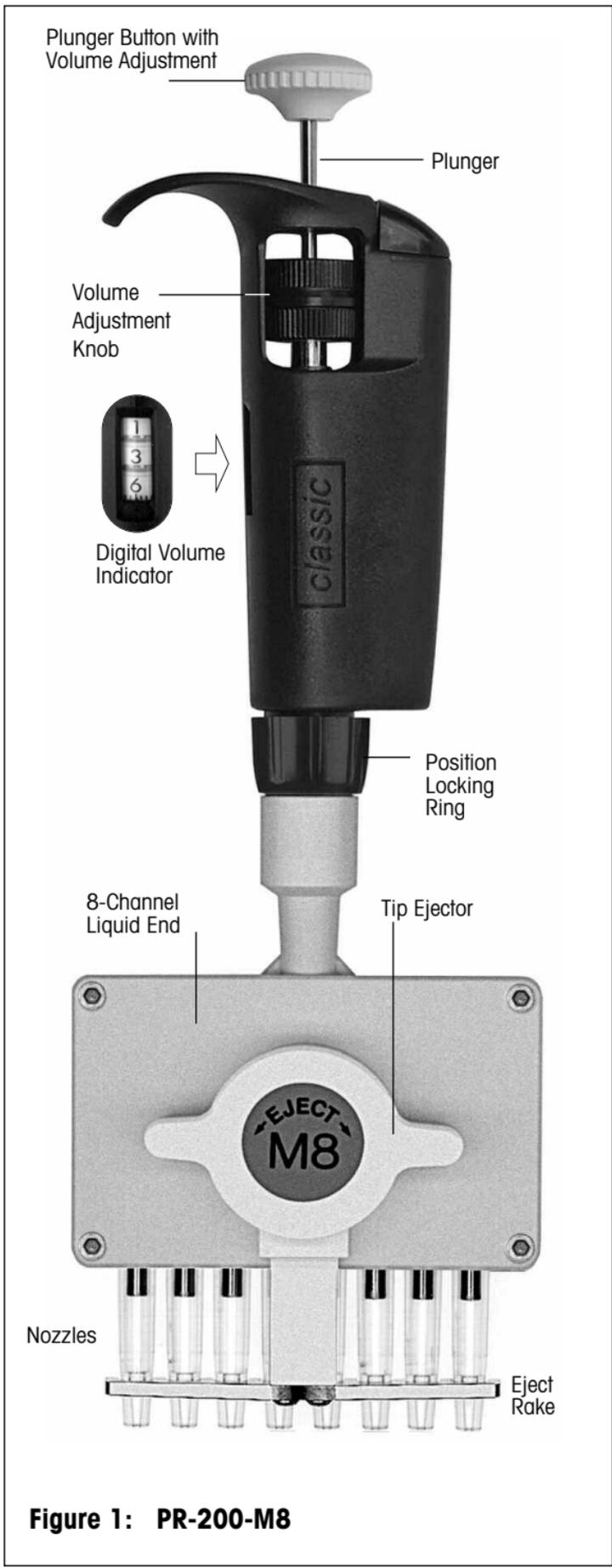
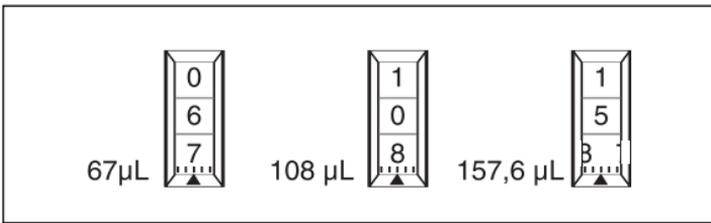


Figure 1: PR-200-M8

Various volume settings for Rainin Classic Model PR-200-M8 are shown below:



Performance Specifications

Accuracy and precision specifications for Rainin Classic PR-200-M8 are defined in this manual as follows:

Accuracy is the closeness of a measured volume to the true volume as specified by the volume setting of the pipette. Also known as "mean error".

Precision is the scatter of individual measurements around the mean of a large number of replicate measurements of the same volume. Also known as "standard deviation".

Specifications for precision are generally tighter than for accuracy. In most experiments, where sample measurements are compared to standards, the precision specification will determine the accuracy of results as long as both samples and standards are measured with the same instrument.

Each Rainin Classic is factory calibrated and carefully checked gravimetrically before shipment using distilled water and an analytical balance. Water temperature and ambient conditions are stabilized at $21.5^{\circ}\text{C} \pm 1^{\circ}\text{C}$.

Volumetric corrections are made for both the density of water and evaporation, where applicable. Consult the RAININ publication "Procedure for Evaluating Accuracy and Precision of Rainin Pipettes" (AB-15) for further information. For a free copy call 800-543-4030 or you can download it from the RAININ website in PDF format: <http://www.rainin.com/pdf/ab15.pdf>

When used in accordance with the pipetting procedures in this manual and with RAININ tips, the Model PR-200-M8 will perform to these specifications:

Volume μL	Increment μL	Accuracy (mean error)		Precision (repeatability)	
		Relative (%)	Absolute $\mu\text{L}(\pm)$	Relative (%)	Absolute $\mu\text{L}(\pm)$
20	0.2	2.5	0.5	1.25	0.25
50		1.0	0.5	0.5	0.25
100		1.0	1.0	0.5	0.5
200		1.0	2.0	0.5	1.0

Operation

Volume can be set either with the volume adjustment knob, or by turning the plunger button.

Volume Adjustment using Plunger Button

- 1a. Hold PR-200-M8 in one hand. With thumb and forefinger, turn the plunger button counterclockwise until the volume indicator is $\frac{1}{3}$ revolution above the desired setting, then turn slowly clockwise until the desired volume shows on the indicator.

Volume Adjustment using Volume Adjustment Knob

- 1b. Hold PR-200-M8 in one hand. With the other hand, turn the volume adjustment knob counterclockwise so the volume indicator is $\frac{1}{3}$ revolution above the desired setting, then turn slowly clockwise until the desired volume shows on the indicator.

ALWAYS DIAL DOWN TO THE DESIRED VOLUME.

2. Mount new disposable tips by pressing down on the tip rack. Use a back-and-forth and side-to-side rocking motion to ensure tips are securely attached. Press firmly to ensure a positive airtight seal.
3. Depress the plunger to the **FIRST STOP**. This part of the stroke is the calibrated volume displayed on the digital volume indicator.
4. Holding Rainin Classic vertically, insert the tips into the samples to the proper immersion depth, 2–4 mm.
5. Allow the plunger to return slowly to the **UP** position. **NEVER LET IT SNAP UP!**
6. Wait a moment to ensure that the full volume of sample is drawn into each tip.
7. Withdraw the tips from the wells. Should any liquid remain on the outside of the tips, wipe carefully with a lint-free tissue, taking care not to touch the tip orifices.
8. To dispense sample, touch the tip ends against the side walls of the receiving wells and depress the plunger slowly to the **FIRST STOP**.

Wait 1 second (longer for viscous solutions). Then press the plunger to the **SECOND STOP** (bottom of stroke), expelling any residual liquid in the tips.

9. With the plunger fully depressed, withdraw the instrument carefully, with the tips sliding along the walls of the wells.
10. Allow the plunger to return to the **UP** position.
11. Discard the tips by twisting the winged tip ejector knob. Fresh tips should be used for each sample to prevent sample carryover.

Tip Selection

- Tips must seal properly on the shaft to assure an air-tight seal and avoid leaks or poor accuracy.
- Tips must be soft and flexible so that the shaft is not scratched or worn prematurely.
- Tips must be free from microscopic flash and particulates. Flash gives poor precision and accuracy.
- The tip orifice must be the correct size, and orifice size and geometry must be consistent from tip to tip. Otherwise, accuracy and precision will be affected.
- Interior and exterior surfaces must be clear, smooth, and hydrophobic to avoid retention of liquid. Too much retention results in poor accuracy and reproducibility.

Specified performance is guaranteed only when RAININ disposable tips are used as recommended. RAININ cannot accept responsibility for poor performance resulting from the use of other manufacturers' tips.

RAININ tips are molded from premium-grade virgin polypropylene plastic. Samples from each lot of tips are inspected microscopically to ensure that every lot meets RAININ's high standards.

Tip Immersion Depth

The recommended depth for insertion of the tips into the sample for Rainin Classic PR-200-M8 is 2–4 mm.

Tip immersion depth is important. If exceeded, the volume measured will be inaccurate, possibly out of specification. Tip angle is also important. Hold the pipette vertically, or within 20 degrees of vertical.

Pipetting Guidelines & Precautions

Consistency in all aspects of pipetting procedure will contribute significantly to optimum reproducibility. Use a:

1. Consistent pickup/dispense rhythm while pipetting.
2. Consistent speed and smoothness when you press and release the pushbutton.
3. Consistent pushbutton pressure at the first stop.
4. Consistent immersion depth.
5. Minimal angle (< 20° from vertical).

Prevent liquids from being drawn into the Rainin Classic shaft by taking the following precautions:

1. Use RAININ aerosol-resistant tips, with an internal filter which acts as a barrier to aerosols and liquids.
2. Never invert or lay Rainin Classic down if liquid is in the tip.
3. Pipette slowly, holding Rainin Classic $< 20^\circ$ from vertical.

If an air bubble is noted in any of the tips during intake, dispense the sample to the original vessel, check the tip immersion depth (2–4 mm), and pipette more slowly. If a bubble appears again, eject the tips and use a new set.

Pre-Rinsing

Some solutions (e.g. serum, protein-containing solutions, and organic solvents) can leave a film on the inside tip wall, resulting in an error larger than the tolerance specified. Since this film remains relatively constant in successive pipettings with the same tip, excellent precision may be obtained by refilling the tip and using the refilled volume as the sample. Successive samples from this same tip will exhibit good reproducibility (low variance).

Reverse Mode Pipetting

Another way of reducing error due to film retention is reverse mode pipetting, where the operating sequence is reversed:

1. Mount disposable tips on the pipette nozzles.
2. Press the pushbutton fully to the **SECOND STOP**.
3. Immerse the tips in liquid and return the plunger slowly to the full up position. Wait a moment for the liquid column to reach equilibrium in each tip.
4. Wipe any excess liquid from the outside of the tips without touching the orifice.
5. To dispense, rest the end of the tips against the vessel wall and press the plunger to the **FIRST STOP**. Hold this position a few seconds, or long enough for the liquid column to reach equilibrium again.
6. Remove the tip from the receiving vessel without blowing out the remaining liquid.
7. Return excess sample in the tip to the original sample container, if desired. Discard the used tip.

Pipetting Liquids of Varying Density

You can compensate for solutions of density much different from water, by setting the volume slightly higher or lower than that required.

The compensation amount must be found empirically: When pipetting 10 μL of CsCl solution, you determine that the volume delivered is actually 8.5 μL . Try changing the volume setting to 11.8 μL and repeat the measurements. If the volumes delivered are still not close enough to 10 μL , make another slight volume adjustment until the measurements are as desired.

Very dense liquids may not be suitable for air displacement pipetting. Use positive displacement pipettes for these liquids.

Temperature Considerations

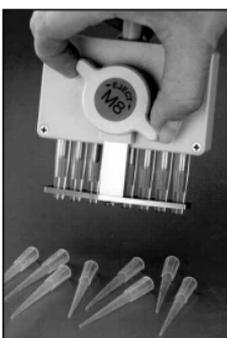
Warm or cold liquids can be measured with good precision by using a consistent pipetting rhythm. This will help minimize any differences in heating or cooling effects within the pipette. Use new tips each time for best accuracy and precision when measuring samples with temperatures greatly different from ambient, and do not pre-rinse. You will get best results if there is no delay between picking up samples and dispensing them.

Acids and Corrosives

After pipetting concentrated acids or highly corrosive solutions you should disassemble Rainin Classic and inspect and clean (if necessary) the piston, shaft, and seal assemblies.

Extensive contact with corrosive fumes may corrode the pistons in the nozzles. This will result in premature seal wear and may require refinishing or replacement of the piston. Exposure of components to corrosive fumes can be reduced by using aerosol-resistant tips. These tips have an internal filter which acts as an aerosol barrier.

Tip Ejector



Rainin Classic PR-200-M8 has a cam-actuated tip ejector which consists of an eject rake moving under action of a double cam. The cam is activated by turning the winged tip ejector knob 45° in either direction then releasing the knob. A bearing follows the cam and decreases friction to provide smooth, efficient removal of all eight tips.

Figure 2: Cam-actuated Tip Ejector

CAUTION:

Do not take the ejector mechanism apart. Fasteners on the inside of the mechanism have been permanently secured. If disassembled, reassembly will be impossible.

Rotating the Liquid End

The 8-channel liquid end can be rotated to any angle. Loosen the position locking ring slightly. Holding the Rainin Classic body in one hand, rotate the liquid end to a convenient angle with the other hand. Tighten the locking ring enough to hold the liquid end in the new position.

Maintenance

PR-200-M8 pipettes are constructed ruggedly and provide exceptional performance and long-term trouble-free service, provided that proper care is exercised and proper pipetting techniques are followed.

The 50 μL and 100 μL calibration marks on RAININ tips can be used for a quick visual check of pipetting performance. Aspirate the appropriate volume in each channel. The meniscus of the sample in each tip should be at the calibration mark. If any loss of pipetting performance is evident the probable cause is either a poor seal between a nozzle and tip or a poor piston seal.

Another test: aspirate 200 μL of water, hold the instrument vertical and observe the tip ends for one minute. No leaking should occur.

RAININ disposable tips are recommended for an airtight fit between each nozzle and tip. The sealing surface of RAININ tips exactly matches PR-200-M8 nozzles.

The piston seal is designed to withstand extended wear; however, chemical damage to a piston or a scratched nozzle may impair the seal and cause leakage. If either situation occurs, the damaged nozzle assembly must be replaced, as described later in this section.

Periodic performance testing assures that all parts of the liquid measurement system – instrument, tips, and operator technique – are functioning properly. RAININ's publication "Procedure for Evaluating Accuracy and Precision of Rainin Pipettes" (AB-15) is recommended for performance verification. For a free copy call 800-543-4030 or download in PDF form from RAININ's website - <http://www.rainin.com/pdf/ab15.pdf>

Nozzle Removal and Replacement

Set the volume dials to 000. With a 1/16-inch hex key, remove the two screws from the back of the liquid end box. Then remove the four screws from the liquid end cover and lift off the lid. A liquid end with cover removed is shown in Figure 4.

Locate the damaged nozzle assembly and lift it out by grasping the nozzle body and pulling up. The nozzle body may slide off the piston. If this happens, remove the piston by pulling up.

When replacing a nozzle assembly in a station:

1. The clip on the end of the piston must fit into the piston bar slot.
2. The locating key on the nozzle body must engage the locating slot.

Position the replacement nozzle assembly directly above the vacant position. Push the clip into the piston bar slot. The clip will compress slightly as you press it into place. Then place the locating key in the locating slot. This should be a snug fit. All nozzles should line up evenly.

Replace the cover. Make certain the cover is flush with the box and that all nozzles are secured and in line. Replace and tighten the screws. Do not overtighten.

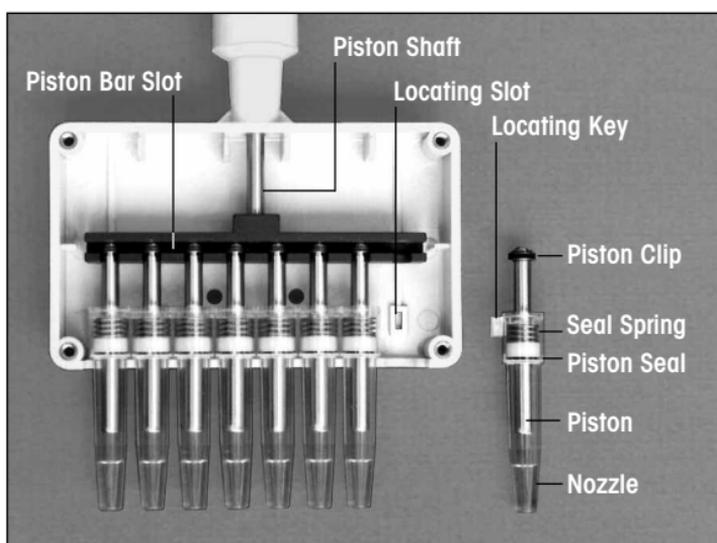


Figure 4: PR-200-M8 Liquid End

Troubleshooting and Repairs

Rainin Classic pipettes give excellent performance and long-term service. Use these procedures in the case of physical or chemical damage.

Sample Splash

If liquids get into the eight-channel liquid end:

1. See Nozzle Replacement (page 10) and remove the liquid end cover.
2. Inspect nozzles, seals and pistons for contamination. Clean with distilled water or IPA. Dry with a lint-free tissue. Regrease and reassemble after inspecting the interior of the liquid end for contaminant.
3. If staining and/or corrosion of pistons is evident (due to previously dried sample material), do not use the pipette. Return to RAININ for service (see page 12).

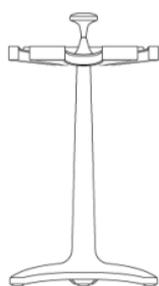
Leaks, inaccurate sampling:

1. **Cracked nozzle.** Remove the liquid end cover and inspect the nozzle assemblies. Replace if necessary.
2. **Insufficient lubrication.** Remove the liquid end cover. Lift out the affected nozzle, remove and lubricate the piston with a thin film of silicone grease. Reassemble.
3. **Worn piston seal.** Remove the liquid end cover and replace affected nozzle assemblies.
4. **Bent plunger.** Recalibration of the instrument will be necessary if the plunger is bent. Call 800-662-7027 for instructions for sending the instrument for service.
5. **Improper reassembly.** Remove the liquid end cover and check the position of the nozzle assemblies.
6. **Tips do not fit properly.** Use only RAININ disposable tips.

Storage

After use, store your Rainin Classic PR-200-M8 in a clean, safe place. Rainin Classic is a precision instrument and should be treated with the level of care appropriate for laboratory instrumentation. Various pipet stands are available to conveniently hold your Rainin Classic when not in use.

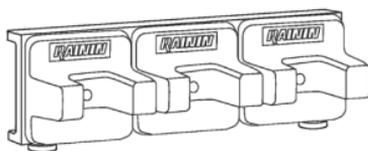
NOTE: Do not lay the instrument on its side with sample in the tips.



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



HU-M3: Set of three magnetic Hang-Ups for mounting on ferrous surfaces. Package includes adhesive disks for mounting on non-ferrous surfaces.



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

Figure 3: Accessories for PR-200-M8

Service, Calibration and Repair

RAININ Pipette Repair and Calibration facilities:

California:

7500 Edgewater Drive, Oakland CA 94621

Tel. 800-662-7027, Fax 510-564-1683

5955 Mira Mesa Blvd, Ste B, San Diego, CA 92121

Tel. 858-320-0443, Fax 858-320-0556

Massachusetts: Rainin Road, Woburn, MA 01801

Tel. 800-662-7027, Fax 781-935-7631

Japan: 4-1-11, Bunkyo-Ku, Tokyo 113-0033

Tel. (03) 5689-8311, Fax (03) 5689-2670

METTLER TOLEDO Pipette Repair and Calibration facilities:

Belgium: N.V. Mettler-Toledo s.a., B-1932 Zaventem

Tel. (02) 334 02 11, Fax (02) 334 03 34

Germany: Mettler-Toledo GmbH, D-35353 Giessen

Tel. (0641) 50 70, Fax (0641) 507 128

Denmark: Mettler-Toledo A/S, DK-2600 Glostrup

Tel. (43) 270 800, Fax (43) 270 828

Spain: Mettler-Toledo S.A.E., E-08038 Barcelona

Tel. (93) 223 76 00, Fax (93) 223 02 71

France: HTS – F-28000 Chartres

Tel. (02) 37 88 31 00, Fax (02) 37 88 31 09

Italy: Mettler-Toledo S.p.A., I-20026 Novate Milanese

Tel. (02) 333 321, Fax (02) 356 29 73

Netherlands: Mettler-Toledo B.V., NL-4004 JK Tiel

Tel. (0344) 63 83 63, Fax (0344) 63 83 90

Sweden: Mettler-Toledo AB, S-12008 Stockholm

Tel. (08) 702 50 00, Fax (08) 642 45 62

Service is also available in many other countries through authorized RAININ distributors. See www.rainin-global.com.

It is recommended to use only genuine RAININ replacement parts such as seals and shafts. It is NOT necessary to recalibrate the pipette after changing the seal 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 one of the above-mentioned facilities.

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.

Contact Technical Support at 800-543-4030 for further information.

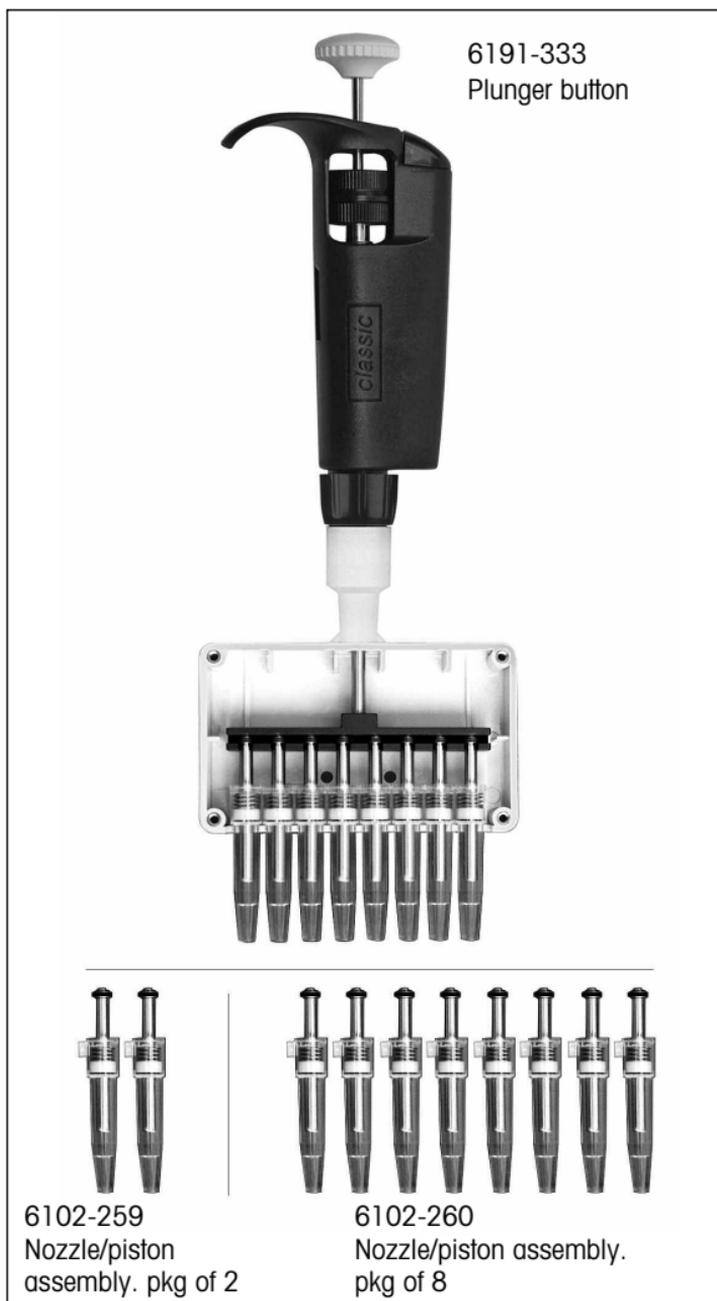
Replacement Parts

Description	Part Number
Nozzle/piston assembly, package of 2	6102-259
Nozzle/piston assembly, package of 8	6102-260
Nozzles w/ grease, package of 8	6102-266
Silicone grease	1600-038
Plunger button	6191-333

For all other inquiries, or to obtain RAININ publications, please contact Technical Service at

800-543-4030, or visit the RAININ website at the URL:

<http://www.rainin.com>



Limited Warranty

See the Limited Warranty and Limitations of Liability Statement. Please complete and return the Warranty Registration Card on receipt of your pipette.

RAININ pipettes are calibrated with RAININ tips. To assure excellent reproducibility and performance, use only RAININ tips as recommended in this manual. Specified performance is guaranteed only when RAININ tips are used.

Contacting RAININ**Technical Information:**

T: 800-543-4030 F: 510-564-1617 tech.support@rainin.com

Pipette Service:

T: 800-662-7027 F: 781-935-7631 service@rainin.com

Direct Order Line:

T: 800-472-4646 F: 510-564-1617 pipets@rainin.com

RAININ website: www.rainin.com

From outside North America: T: +1-510-564-1600
global@rainin.com (from outside the U.S.)

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METTLER TOLEDO website: www.mt.com/rainin

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