

Rainin Classic™

**continuously adjustable
digital microliter pipettes**

**8 models for volume
ranges from
0.1 μ L to 10 mL**

PR-2

PR-10

PR-20

PR-100

PR-200

PR-1000

PR-5000

PR-10ML

**Made in the USA by
Rainin Instrument, LLC**

Rainin Classic PR-200 shown



RAININ
®

Rainin Classic™

continuously adjustable digital pipettes

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Technical Assistance: 800-543-4030

Call this toll free number for technical consultation and product information for Rainin Classic, other Rainin pipettes, and disposable tips. E-mail: tech.service@rainin.com

Rainin Classic is made in the USA by Rainin Instrument, LLC.

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Prices and specifications are subject to change without notice.

Description

Eight models of the Rainin Classic continuously adjustable digital pipette cover the entire volume range from 0.1 μL to 10 mL.

Rainin Classic pipettes are not limited to fixed volume increments, e.g. 5 μL or 10 μL . They can be set to any volume in range, e.g. 6.6, 133.3, 377, 2228 μL .

Piston stroke is set by adjusting a micrometer coupled directly to a digital volume indicator, which reads in microliters. The digital volume indicator simplifies volume setting and virtually eliminates calculation errors.

All Rainin Classic models have a highly polished stainless steel piston, polyethylene/teflon seal and o-ring (except PR-10ML, which uses a grease seal). Rainin Classic requires no routine lubrication and will give years of trouble-free service.

A stainless steel tip ejector is provided with all models (except PR-5000 and PR-10ML) for safe disposal of used tips. The ejector has a quick-release mechanism; see page 9.

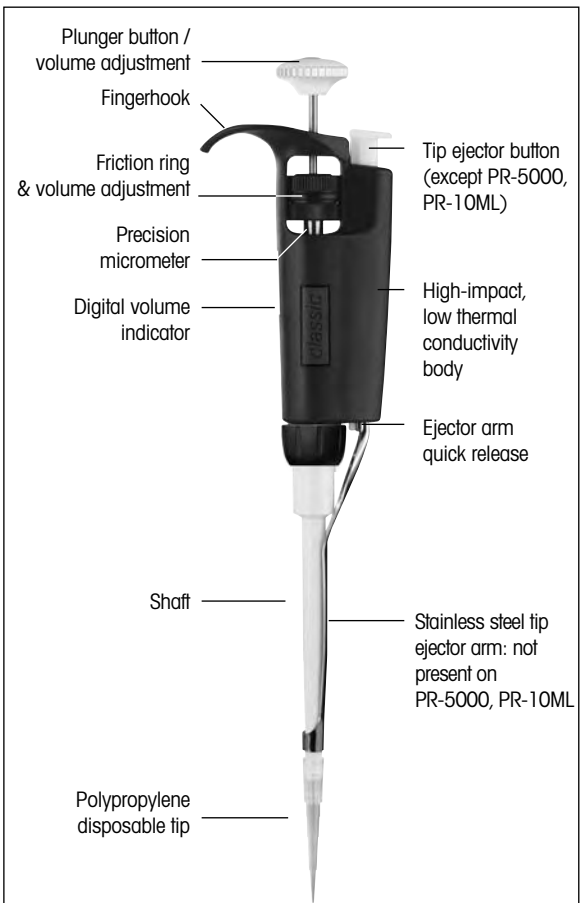


Figure 1 Rainin Classic PR-200

Contents

Rainin Classic as ordered

Sample tips

Instruction Manual

Rainin Test Report

Performance Assurance Brochure

If any item is missing call Customer Service: 800-472-4646.

Autoclaving

The shaft and tip ejector are autoclavable: 121°C, 1 atm, 15–20 minutes. (PR-5000, PR-10ML do not use tip ejectors.)

Volume Indicator

The volume indicator is read from top to bottom. Up to PR-200, black digits indicate microliters and red digits tenths and hundredths of microliters. For PR-1000 and PR-5000, red digits indicate milliliters and black digits microliters. For PR-10ML, black digits indicate milliliters and red digit tenths of a milliliter.

PR-2	PR-10	PR-20	PR-100	PR-200	PR-1000	PR-5000	PR-10ML	
1	0	1	0	1	0	1	0	Black Digits Red Digits
2	7	2	7	2	7	2	7	
5	5	5	5	5	5	5	5	
1.25 µL	7.5 µL	12.5 µL	75 µL	125 µL	0.75 mL	1.25 mL	7.5 mL	

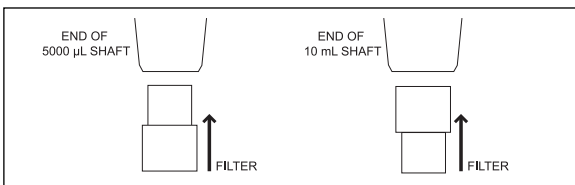
Sample values, volume ranges, and smallest increments for each Rainin Classic model are shown below:

Model	Range (µL)		Smallest Increment µL
	Adjustable	Recommended	
PR-2	0 to 2	0.1 to 2	0.002
PR-10	0 to 10	0.5 to 10	0.02
PR-20	0 to 20	2 to 20	0.02
PR-100	0 to 100	10 to 100	0.2
PR-200	0 to 200	20 to 200	0.2
PR-1000	0 to 1,000	100 to 1,000	2.0
PR-5000	0 to 5,000	500 to 5,000	2.0
PR-10ML	0 to 10 mL	1 mL to 10 mL	20.0

Safety Filter, PR-5000 and PR-10ML

Models PR-5000 and PR-10ML use a safety filter in the shaft to help prevent liquid entering the shaft and contacting the piston, if the plunger snaps up during aspiration. This is particularly important using large volumes. If the filter gets wet, replace it.

For PR-5000 insert the small diameter into the shaft; for PR-10ML insert the large diameter into the shaft. Part numbers: 6190-164 (pack of 100) and 6190-165 (pack of 1000).



Operation

1. Turn the plunger button or the volume adjustment knob 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.
2. ALWAYS dial down to the desired volume. This prevents mechanical backlash from affecting accuracy. If you pass the desired setting, turn the dial $\frac{1}{3}$ revolution higher than desired and dial down to reset the volume. The friction ring prevents unintentional volume changes.
3. Attach a new disposable tip to the pipette shaft. Press into the tip with only enough force to make a positive airtight seal.
4. Press the plunger to the **FIRST STOP**. This part of the stroke is the volume displayed on the indicator.
5. Holding Rainin Classic vertically, immerse the tip into the sample to the proper depth; see table on page 4.
6. Allow the pushbutton to return slowly to the **UP** position. Never let it snap up! See Figure 2A below.
7. Pause briefly to ensure that the full volume of sample is drawn into the tip.
8. Withdraw the tip from the sample liquid. If any liquid remains on the outside of the tip, wipe it carefully with a lint-free tissue, avoiding the tip orifice.
9. To dispense sample, touch the tip end against the side wall of the receiving vessel and depress the plunger slowly to the first stop. See Figure 2B.

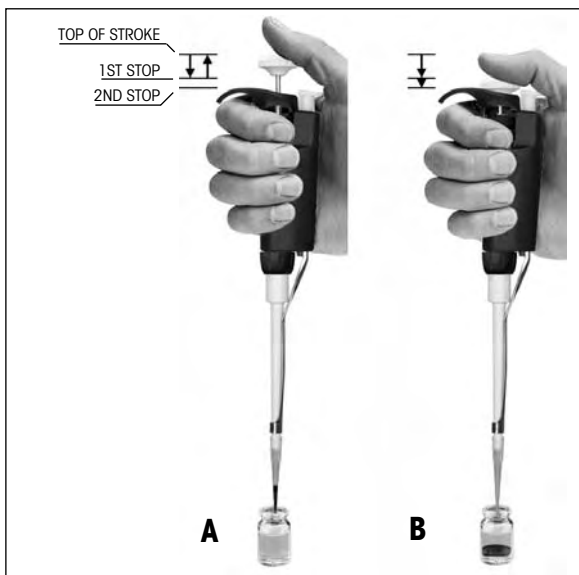


Figure 2 Operating Rainin Classic

Wait 1 second: PR-2, PR-10, PR-20, PR-100, PR-200
1-2 secs: PR-1000, 2-3 secs: PR-5000, PR-10ML
(Longer for viscous solutions).

Then press the plunger to the SECOND STOP (bottom of stroke), expelling any residual liquid in the tip.

10. With the plunger fully pressed, withdraw the pipette from the vessel carefully, with the tip against the vessel wall.
11. Allow the plunger to return to the up position.
12. Discard the tip by depressing the tip ejector button. A fresh tip 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 in this manual.

Rainin cannot accept responsibility for poor performance resulting from the use of tips by other manufacturers. 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 tip insertion into the sample for each Rainin Classic model is shown in the table below.

<u>Model</u>	<u>Immersion Depth</u>
2 - 10 μ L	1 - 2 mm
20 - 100 μ L	2 - 3 mm
200 - 1000 μ L	3 - 6 mm
5000 μ L, 10 mL	6 - 10 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 significantly contribute 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 ($< 20^\circ$ from vertical).

Prevent liquids from being drawn into the 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 the pipette down if liquid is in the tip.
3. Pipette slowly, holding the pipette $< 20^\circ$ from vertical.
4. For PR-5000 and PR-10ML, always use the special safety filters supplied. Part numbers: 6190-164 (pack of 100) and 6190-165 (pack of 1000).

Pre-Rinsing Recommended

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; the operating sequence is reversed:

1. Mount a disposable tip on the pipette shaft.
2. Press the pushbutton fully to the **SECOND STOP**.
3. Immerse the tip in liquid and return the plunger slowly to the full up position. Wait a moment for the liquid column to reach equilibrium in the tip.
4. Wipe any excess liquid from the outside of the tip without touching the orifice.
5. To dispense, rest the end of the tip against the vessel wall and press the plunger to the **FIRST STOP** only. Hold at the **FIRST STOP** for a few seconds – 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

Rainin Classic lets you 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 determined empirically.

E.g., if pipetting 10 μL of CsCl solution, you determine that the volume delivered is actually 8.5 μL (average of 5 samples). Try increasing 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 Rainin Pos-D 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 a new tip 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 the sample and dispensing it.

If working in a cold room, allow the pipette to stabilize at ambient temperature before operation.

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

Storage

Rainin Classic is a precision instrument and should be treated with the level of care appropriate for laboratory instrumentation. Several hangers are available to hold Rainin Classic securely when not in use: shown in the Accessories Section, page 11.

HU-M3: Magnetic Hang-Ups
CR-7: Carousel

HU-S3: Shelf Hang-Ups
GR-3: Clear Pipet Stand

Troubleshooting and Repairs

Rainin Classic pipettes give excellent performance and long-term service. Use these procedures in the case of physical or chemical damage. Note that PR-2 and PR-10 models have small, fragile components that can be broken or misplaced.

Sample Splash (liquid inside the mechanism)

1. Remove the tip ejector, if fitted (see page 9).
2. Unscrew the shaft coupling nut holding the shaft to the body.
3. Remove the shaft and inspect the seal assembly and piston for contamination. The piston should be shiny and free of corrosion. Clean with distilled water or isopropyl alcohol. Dry with a lint-free tissue and reassemble after inspecting the interior of the shaft for contaminants.
4. If staining and/or corrosion of the piston is evident, do not use the pipette. Return to Rainin for service (see p. 8).

Never grease any Rainin Classic components. The only exception: Model PR-10ML uses a grease seal.

Leaks, Inaccurate Sampling

1. **Loosened shaft.** Tighten coupling by hand.
2. **Split or cracked shaft.** Remove the tip ejector and inspect the shaft for fracture or split end. Replace if necessary. If the shaft was dropped, remove it and the seal assembly to see if the piston is bent. If so, you should return the instrument: call 800-543-4030 for assistance.
3. **Worn seal and/or o-ring.** Dismantle as described in "Sample Splash". Replace the seal and o-ring, referring to the drawing on page 12 or 13. All models (except PR-10ML) use a polyethylene/teflon seal and o-ring. Pull off the old seal and o-ring, position the new seal and o-ring on the piston as shown in the drawing, and reassemble the pipette.
4. **Bent plunger / damaged friction ring.** Call 800-543-4030.
5. **Improper reassembly.** Remove the tip ejector and shaft. Check the position of the internal assemblies, especially the seal, against the illustrations.

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

Canada: 6419 Northam Drive, Mississauga, ONT L4V 1J2

Tel. 866-823-4022, Fax 866-758-3991

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.

Removing / Replacing Tip Ejector Arm

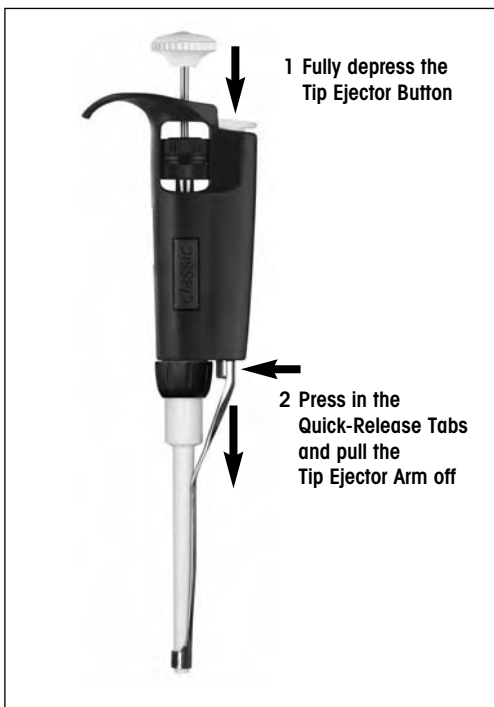


Figure 3 Removing the Tip Ejector Arm

Removing the Tip Ejector Arm:

1. Press and hold the tip ejector button fully down.
2. With the other hand, press in the quick-release tabs on the tip ejector arm and pull the tip ejector arm straight down.

Replacing the Tip Ejector Arm:

1. Press and hold the tip ejector button fully down.
2. Hold Rainin Classic in one hand and the tip ejector arm in the other hand.
3. Insert the end of the shaft through the large opening in the tip ejector arm.
4. Align the top end of the tip ejector arm with the pushrod inside the handle and push the tip ejector arm into the handle until the tip ejector arm snaps in place.
5. Make sure that tips fit securely on the shaft.

Performance Specifications

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 Pipette Accuracy and Precision" (AB-15) for further information, or download a copy from the RAININ website:

<http://www.rainin.com/pdf/ab15.pdf>

When used in accordance with the pipetting procedures in this manual and with Rainin tips, Rainin Classic pipettes will perform to the following specifications.

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

Model	Volume μL	Increment μL	Accuracy		Precision	
			%	$\mu\text{L} (\pm)$	%	$\mu\text{L} (\leq)$
PR-2	0.2	0.002	12	0.024	6	0.012
	1.0		2.7	0.027	1.3	0.013
	2.0		1.5	0.030	0.7	0.014
PR-10	1	0.02	2.5	0.025	1.2	0.012
	5		1.5	0.075	0.6	0.03
	10		1	0.1	0.4	0.04
PR-20	2	0.02	7.5	0.15	2	0.04
	5		3	0.15	0.9	0.045
	10		1.5	0.15	0.5	0.05
	20		1	0.2	0.3	0.06
PR-100	10	0.2	3.5	0.35	1	0.1
	50		0.8	0.4	0.24	0.12
	100		0.8	0.8	0.15	0.15
PR-200	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
PR-1000	100	2	3	3	0.6	0.6
	500		0.8	4	0.2	1
	1000		0.8	8	0.15	1.5
PR-5000	500	2	2.4	12	0.6	3
	2500		0.6	15	0.2	5
	5000		0.6	30	0.16	8
PR-10ML	1mL	20	5	50	0.6	6
	5mL		1	50	0.2	10
	10mL		0.6	60	0.16	16

Specifications are subject to change without notice.

Replacement Parts

Part	Model							
	PR-2	PR-10	PR-20	PR-100	PR-200	PR-1000	PR-5000	PR-10ML
A Plunger button	6191-329	6191-330	6191-331	6191-332	6191-333	6191-334	6191-335	6191-336
B Plunger rod	6191-198	6191-198	6191-198	6191-198	6191-198	6191-198	6191-198	6191-198
C Shaft coupling	6191-295	6191-295	6191-295	6191-295	6191-295	6191-295	n.a.	n.a.
D Shaft	44816	44819	23353	44602	23305	23371	6191-355	6192-016
E Tip ejector	6191-196	6191-196	6191-197	6200-148	6200-156	6200-163	n.a.	n.a.
F O-ring	400071	400071	400013	400067	400001	400003	400006	6192-015
G Seal	44815	44818	6191-298	6191-299	6191-300	6191-301	6191-302	n.a.
H Seal assy holder	44817	44817	23354	44603	23306	†	†	†
J Small spring	6191-303	6191-303	6191-303	6191-303	6191-303	†	†	†
K Small spring positioner	23871	23871	23871	23871	23871	†	†	†
L Large spring positioner	44214	44214	44214	44214	44214	†	†	†
M Large spring	6191-304	6191-304	6191-304	6191-305	6191-305	†	†	†
N Filters (100)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	6190-164	6190-164
N Filters (1000)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	6190-165	6190-165

† Part of one-piece piston assembly. Replacement will require recalibration.

Rainin is the only organization authorized to calibrate Rainin Classic pipettes.

Please call 800-662-7027 for information.

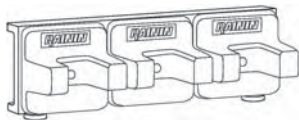
See replacement parts diagrams on page 12 and 13.

Accessories

Rainin Classic is a precision instrument and should be treated with the level of care appropriate for laboratory instrumentation. Several hangers are available to hold Rainin Classic in a clean, safe place when not in use.



HU-M3: Set of 3 magnetic Hang-Ups™ for mounting on ferrous surfaces. Includes adhesive disks.



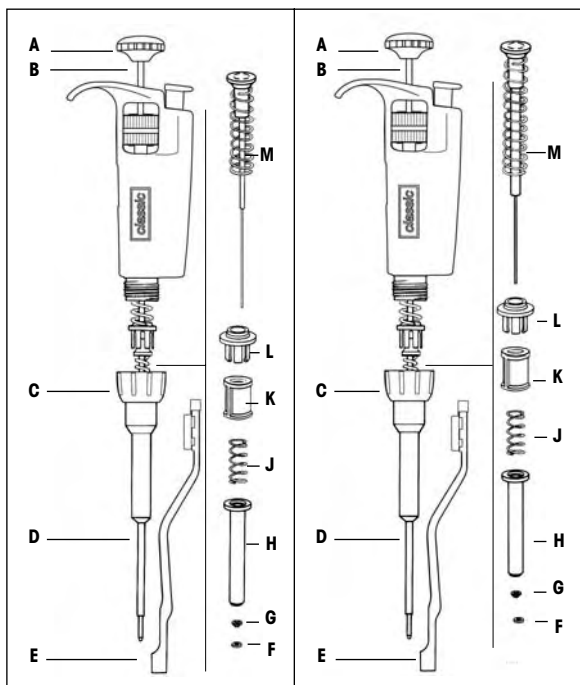
HU-S3: 3 Hang-Ups attached to a clamp which fits onto a shelf.



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

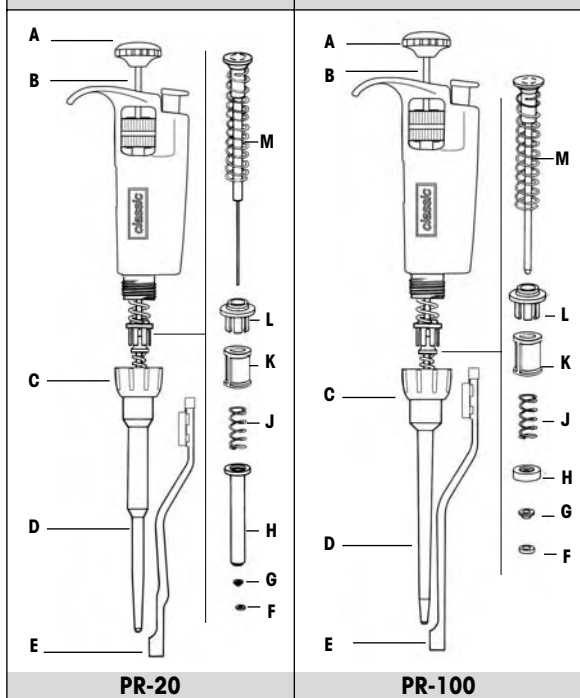


GR-3: Clear stand holds 3 Rainin pipettes.



PR-2

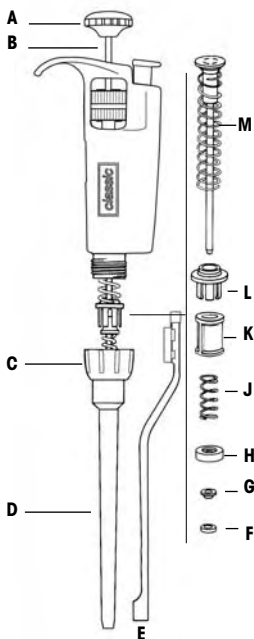
PR-10



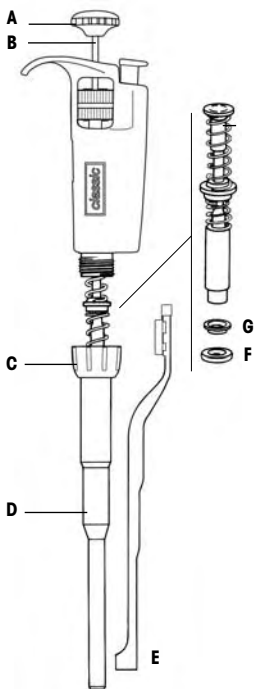
PR-20

PR-100

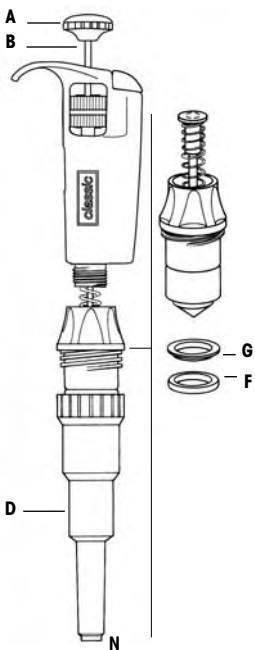
Part numbers are listed on page 11.



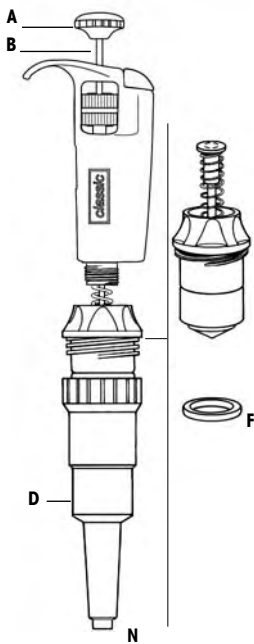
PR-200



PR-1000



PR-5000



PR-10ML

Limited Warranty

See the enclosed 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

Direct Order Line:

Phone: 800-472-4646
Fax: 510-564-1617
E-mail: pipets@rainin.com

Technical Information:

Phone: 800-543-4030
Fax: 510-564-1617
E-mail: tech.support@rainin.com

Pipette Service:

Phone: 800-662-7027
Fax: 510-564-1683
E-mail: service@rainin.com

Web: www.rainin.com (online ordering 24/7)

From outside the U.S.:

Main Office: 001-510-564-1600

RAININ Japan:

Phone: ++ 81 3 5689-8311
Fax: ++ 81 3 5689-2670

METTLER TOLEDO GmbH, Switzerland

Phone: ++41 1 944 45 45
Fax: ++41 1 944 45 10

Other International Offices and Distributors:

See www.rainin-global.com

E-mail: global@rainin.com (from outside the U.S.)

Web: www.rainin-global.com (from outside the U.S.)

RAININ

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