Pipetman®-F

single-volume microliter pipettes

Fixed volumes from 0.1 µL to 10 mL

F-200 shown

RAININ

PIPETMAN®-F

single-volume microliter pipettes

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Technical Assistance: 800-543-4030

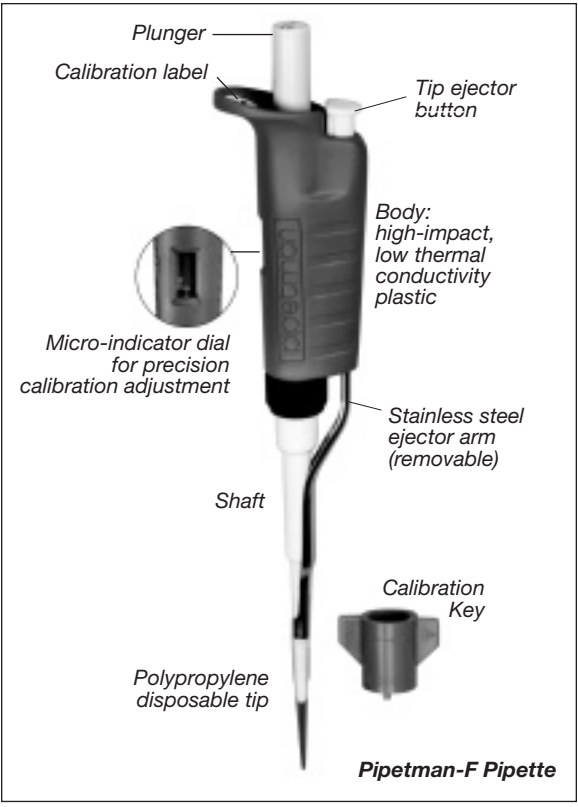
Call this toll free number for technical consultation and product information for Pipetman, other Rainin pipettes, and disposable tips.
Or use e-mail: tech.service@rainin.com

Description

Pipetman-F single-volume microliter pipettes are exceptionally accurate and highly reproducible when pipetting volumes from 0.1 µL to 10 mL, and offer simple calibration in the laboratory. Accurate compensation for variations in fluid viscosity and density can be performed with the Calibration Key provided with each unit.

Pipetman incorporates a highly polished stainless steel piston, patented polyethylene seal, and neoprene compression O-ring. No routine maintenance or lubrication is required for long, trouble-free service. The body is made of high-impact chemical-resistant plastic with low thermal conductivity. Pipetman may be held for prolonged periods without affecting sample volume reproducibility.

A stainless steel tip ejector is provided with all Pipetman models except F-1001 to F-10ML. The tip ejector permits safe, non-contact disposal of used tips.



Pipetman-F Pipette

Autoclaving

The shaft and tip ejector are autoclavable: 121°C, 1 bar, 15–20 minutes.

Operation

1. Attach a new disposable tip to the pipette shaft with sufficient force to make a positive seal.
F-1MIC ➔ F-10MIC use tips for volumes to 10 µL
F-1 ➔ F-200 use tips for volumes to 250 µL
F-201 ➔F-1000 use tips for volumes to 1000 µL
F-1001 ➔ F-5000 use tips for volumes to 5 mL
F-5001 ➔F-10ML use tips for volumes to 10 mL

2. Press the plunger to the FIRST STOP. This is the calibrated volume indicated on the plunger button.

3. Holding Pipetman upright, insert the tip into the sample to the proper immersion depth:
1 to 2 mm for F-1MIC ➔ F-10MIC, F-1 ➔ F-200
2 to 4 mm for F-201 ➔ F-1000
3 to 6 mm for F-1001 ➔ F-10ML

4. Allow the plunger button to return *slowly* to the up position. Never let it snap up! Wait a moment so that the full volume of sample is drawn into the tip.

5. Withdraw the tip from the sample. Carefully wipe any liquid from the outside of the tip with a lint-free tissue, taking care not to touch the tip orifice.

6. To dispense sample, touch the tip end against the side wall of the receiving vessel and press the plunger slowly to the FIRST STOP. Wait:
1 second* (F-1MIC ➔ F-10MIC, F-1 ➔ F-200)
1-2 secs* (F-201 ➔ F-1000)
2-3 secs* (F-1001 ➔ F-10ML) **Longer for viscous solutions.*

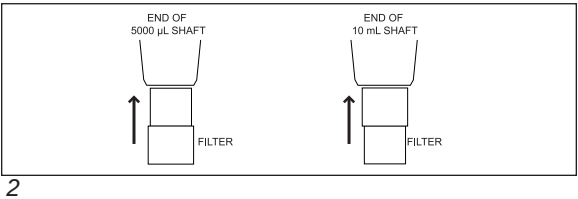
Then press the plunger to the SECOND STOP (bottom of stroke), expelling any residual liquid in the tip.

7. With the plunger fully depressed, withdraw Pipetman from the vessel carefully, sliding the tip along the wall of the vessel. Let the plunger return to the UP position.

8. Discard the tip by pressing the tip ejector button. Use a fresh tip for each sample to prevent sample carryover.

Filter, F-1001 → F-10ML

Models F-1001 ➔ F-10ML use a filter in the end of the shaft to help prevent liquid entering the shaft, particularly important with large volumes. If the filter gets wet, replace it. For F-1001 to 5000 insert the small diameter into the shaft; for F-5001 to 10ML the large diameter (see below). Part numbers are 6190-164 (pack of 100) and 6190-165 (pack of 1000).



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 tips from 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.

Precision Calibration

Pipetman-F can be calibrated in the laboratory for a specific solution, viscosity, or test. This feature is very useful for procedures requiring accurate calibration at extremes of temperature, e.g. in cold rooms.

Liquids that are extremely dense or viscous, or with a high vapor pressure, may not be suitable for air displacement pipetting. Microman® positive displacement pipettes are recommended for such liquids.

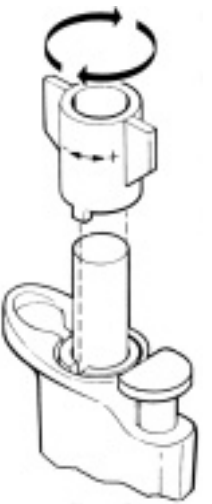
Each Pipetman is calibrated gravimetrically with distilled water prior to shipment, and a label on the pipette indicates calibration to the volume on the plunger button. The label shows the calibration setting and technician's initials. Extra labels are supplied for use when a Pipetman is recalibrated for specific solutions or temperature.

Recalibration Procedure: The suggested limit of calibration adjustment is one full turn of the Calibration Key in either direction,which equals:

±0.1 µL	F-1MIC → F-2MIC
±0.4 µL	F-3MIC → F-10MIC
± 1 µL	F-1 thru F-20
± 4 µL	F-21 thru F-100
± 10 µL	F-101 thru F-200
± 40 µL	F-201 thru F-1000
± 200 µL	F-1001 thru F-5000
± 400 µL	F-5001 thru F-10ML

Note: The indicator display is calibrated with 10 letters, A thru J. The interval between letters (1/10 full revolution) is marked with five subdivisions. The indicator display is read from left to right. For example, E.4 is a setting 4/10 of the distance from E to F.

Calibration adjustment is made by placing the Key over the plunger button, as illustrated, fitting the notches of the tool into the grooves of the calibration sleeve. Arrows on the tool indicate the positive and negative directions of adjustment. The amount of compensation required is determined empirically. The indicator display allows you to quickly make a coarse adjustment to the desired volume setting.



Note: In most cases it is possible to alter the volume dispensed by more than one full turn in the positive direction. If such an amount of adjustment is required, remember to readjust the same number of turns when returning to the original setting.

For example, when using an F-200 Pipetman to pipette a particular viscous solution, you determine gravimetrically that the volume delivered is 196.5 µL, and the indicator setting reads *F2*. Therefore, you wish to increase the volume dispensed by 3.5 µL. As each interval between characters (1/10 full turn) on the micro-indicator display corresponds to 1.0 µL for the F-200, you need to turn the calibration tool in a positive (+) direction 3.5 units. The micro-indicator should then read *B7*.

Check the new volume gravimetrically. If the volumes delivered are still not sufficiently close to 200 µL, make another slight adjustment depending on the direction of the error (to *B.5* or *B.9*, for example).

Be sure to change the tips between volume setting adjustment and to pre-rinse each fresh tip.

Record the new setting, the direction of the adjustment, and the particular solution (such as *+B7* in the example above). In this way you will have a record of the setting and direction of adjustment required for this liquid and will know to adjust in the **opposite** direction in order to return to the original setting (*F2* in the example) when your work with this solution is completed.

If you need to dedicate Pipetman-F for a particular solution only (oft-repeated tests), you may wish to retain the setting semi-permanently. Simply record the setting and a solution or test code on the supplied label and place it in the indentation at the top of the handle. Then you can tell at a glance that this pipette has been calibrated to dispense the desired volume of a particular solution.

Pre-Rinsing Recommended

When pipetting some solutions (especially serum, protein-containing solutions, and organic solvents) a significant film may be retained on the inside of the wall of the tip, resulting in an error that may be 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 a second time and using this volume as the sample. Successive samples from this same tip will exhibit good reproducibility (low variance).

This procedure is recommended when critical reproducibility is required. In short, intertip and intratip variances will be minimized if pre-rinsing is practiced.

Reverse Mode Pipetting

Another method for reducing error due to film retention is reverse mode pipetting, where the sequence of operations in the pipetting process is reversed, as follows:

1. Mount a disposable tip on the pipette shaft.

2. Depress the pushbutton fully to the SECOND STOP.

3. Immerse the tip in liquid and return the pushbutton slowly to the full UP position. Pause a moment (more with viscous liquids) 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 receiving 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 the excess sample in the tip to the original sample container, if desired. Discard the used tip.

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).

If an air bubble enters the tip, dispense the sample to the original vessel, check tip immersion depth, and pipette more slowly. If an air bubble appears a second time, discard the tip and use a new one.

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

1. Never invert or lay Pipetman down if liquid is in the tip.
2. Pipette slowly, holding Pipetman < 20° from vertical.
3. Use Rainin aerosol-resistant tips, with an internal filter which acts as a barrier to aerosols and liquids.
4. For Pipetman Models F-1001 to F-10ML, use the special filters supplied.

Temperature Considerations

You can measure warm or cold liquids with good precision by using a consistent pipetting rhythm. A consistent rhythm will help to minimize any differences in heating or cooling effects within the pipette. Use a new disposable tip each time for best accuracy and precision when measuring samples with temperatures greatly different from ambient, and do not pre-rinse.

As with any air-displacement pipette, best results will be obtained if there is no delay between picking up the sample and dispensing it.

Acids and Corrosives

When pipetting concentrated acids or highly corrosive solutions it is recommended that Pipetman be disassembled after use and the piston, shaft, and seal assemblies inspected, cleaned if necessary, and reassembled.

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

Troubleshooting and Repairs

Pipetman pipettes provide exceptional performance and long-term service. Use these procedures in case of physical or chemical damage.

Sample Splash

In case of suspected accidental entry of liquids into the Pipetman mechanism:

1. Remove the tip ejector by pulling the plastic collar.
2. Unscrew the shaft coupling holding the shaft to the pipette body.
3. Holding Pipetman upside down, remove the shaft and inspect the seal assembly and piston for contamination. Clean with distilled water or IPA if contaminant is still wet and corrosion is evident. Dry with a lint-free tissue and reassemble after inspecting the interior of the shaft for contaminant.
4. If staining and/or corrosion of the piston is evident (due to previously dried sample material), do not use the instrument. Return to Rainin for service.

Note: Never grease any Pipetman components (with the exception of the grease seal on models F-5001 to 10ML prior to serial number N05803D.)

Leaks, Inaccuracy, Abnormal Stroke

Possible causes:

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 the shaft if necessary. If the shaft was dropped, remove it and the seal assembly to see if the piston is bent. If so, return the instrument for service.
3. **Ejector interferes with tips.** If there is no gap between the tip and the end of the ejector arm, then the tip ejector is loose. Refer to the photos for proper repositioning of the ejector arm.
4. **Worn seal and/or O-ring.** Dismantle your Pipetman as described in “Sample Splash”. Replace the seal and O-ring if necessary, referring to the appropriate exploded view on pages 10-11.
5. All models have a polyethylene seal and rubber O-ring. Replacement is easy – just pull off the old seal and O-ring and position the new seal and O-ring on the piston in the orientation shown in the exploded view. Reassemble Pipetman-F.

6. **Improper reassembly.** Remove the tip ejector and shaft. Check the position of the internal assemblies, especially the seal, against the illustrations.

Consult the Rainin publication *"Pipetman Care and Maintenance"* (AB-14) for more information. This free publication is available by calling 800-543-4030 or it can be downloaded in PDF format from Rainin's website:

http://www.rainin.com/pdf/ab14.pdf

Removing/Replacing Tip Ejector Arm

Tip Ejector Arm Removal

1. Press tip ejector button.
2. Pull arm from handle using ejector arm release collar.

Tip Ejector Arm Replacement

1. Press tip ejector button.
2. Hold Pipetman in one hand and the tip ejector arm in the other hand.
3. Align the plastic shaft at the end of the tip ejector with the rod inside the handle.
4. At the same time place the tip ejector opening over the end of the Pipetman shaft.
5. Push the plastic collar into the handle until the tip ejector is securely in place.

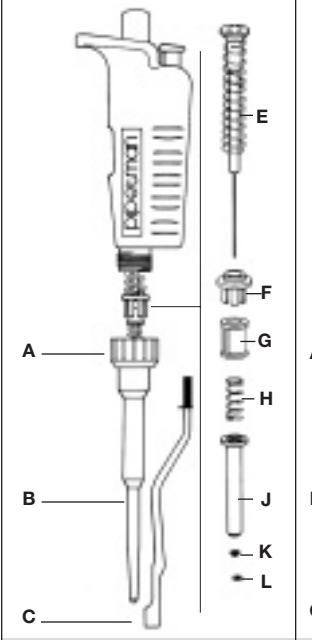
Replacement Parts

	Part	Model F-1MIC to F-2MIC	F-2.1MIC to F-10MIC	F-1 to F-20	F-21 to F-100	F-101 to F-200	F-201 to F-1000	F-1001 to F-5000	F-5001 to F-10ML
A	Shaft coupling	23654	23654	23654	23654	23654	23654	N/A	N/A
B	Shaft	44816	44819	23353	44602	23305	23371	23608	61263
C	Tip ejector	44829	44829	23657	44605	23658	23659	N/A	N/A
E	Large spring	300042	300042	300042	300004	300004	*	*	*
F	Large spring positioner	44214	44214	44214	44214	44214	*	*	*
G	Small spring positioner	23871	23871	23871	23871	23871	*	*	*
H	Small spring	300066	300066	300047	300047	300047	*	*	*
J	Seal assy holder	44817	44817	23354	44603	23306	*	*	*
K	Polyethylene seal	44815	44818	23359	44604	23350	23374	23118	61828
L	O-Ring	400071	400071	400013	400067	400001	400003	400006	400025
M	Filters (100)	N/A	N/A	N/A	N/A	N/A	N/A	6190-164	6190-164
	Filters (1000)	N/A	N/A	N/A	N/A	N/A	N/A	6190-165	6190-165

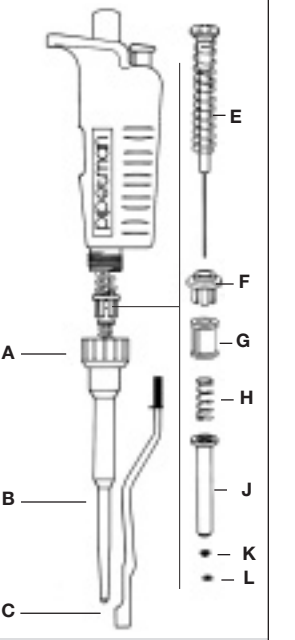
See drawings on pages 10-11.

* Part of one-piece piston assembly.
Recalibration is necessary following piston replacement.
Call 800-543-4030 for Technical Assistance.

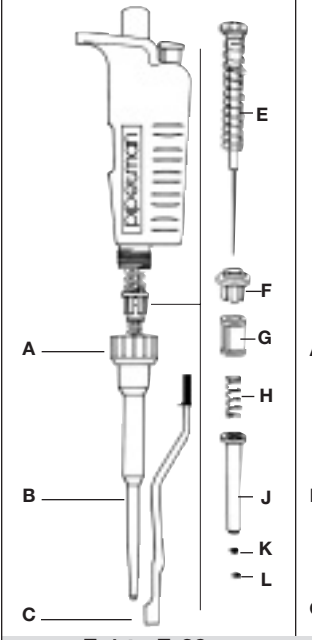
Replacement parts are manufactured by Gilson and Rainin.



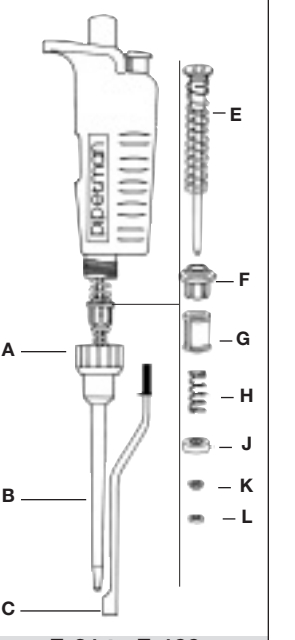
F-1MIC to F-2MIC



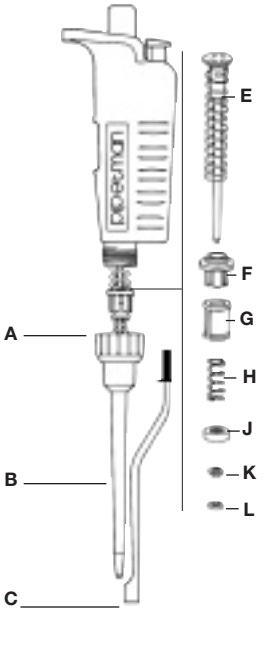
F-2.1MIC to F-10MIC



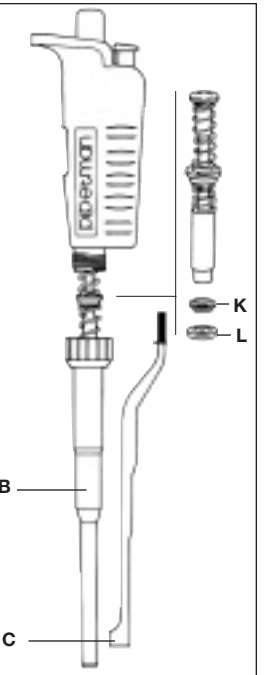
F-1 to F-20



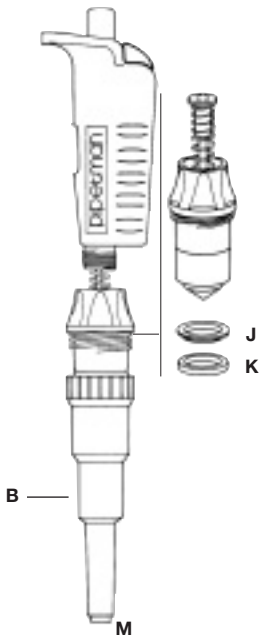
F-21 to F-100



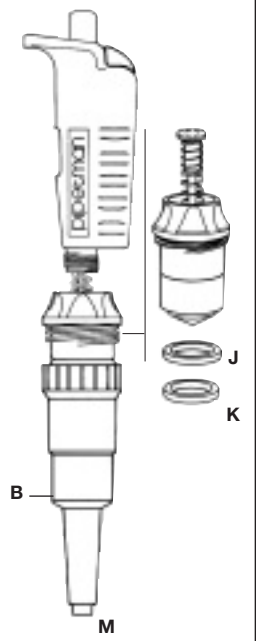
F-101 to F-200



F-201 to F-1000



F-1001 to F-5000



F-5001 to F-10ML

Performance Specifications

Each Pipetman is factory calibrated and carefully checked gravimetrically before shipment using distilled water and an analytical balance. When used in accordance with the pipetting procedure outlined in this manual and with Rainin tips, Pipetman will perform within the following tolerances:

Model	Accuracy (mean error)		Precision (repeatability)	
	Absolute µL (±)	Relative % (≤)	Absolute S.D. µL (±)	Relative % (≤)
F-2	0.15	7.50	0.03	1.50
F-5	0.15	3.00	0.04	0.80
F-10	0.15	1.50	0.05	0.50
F-20	0.20	1.00	0.06	0.30
F-25	0.25	1.00	0.07	0.30
F-50	0.40	0.80	0.15	0.30
F-100	0.80	0.80	0.25	0.25
F-200	1.60	0.80	0.30	0.15
F-250	3.00	1.50	0.75	0.30
F-300	3.50	1.40	0.75	0.25
F-400	3.60	1.20	0.80	0.20
F-500	4.00	0.80	1.00	0.20
F-1000	8.00	0.80	1.30	0.13

Specifications for models not listed are available from Technical Service, 800-543-4030.

Service, Calibration and Repair

Rainin maintains its own Pipette Repair and Calibration facilities in the following locations:

Rainin Service Center
Rainin Road, Woburn, MA 01801, USA
Tel: 800-662-7027 Fax: 781-935-7631

Rainin Service Center
7500 Edgewater Drive, Oakland, CA 94621, USA
Tel: 800-662-7027

Replacement parts are manufactured by Gilson and Rainin. It is recommended to use only these replacement parts, which are available in the U.S. only from Rainin.

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 only be done by qualified factory-trained personnel in the appropriate facility.

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

Technical Information:

Phone: 800-543-4030
Fax: 781-938-1152
E-mail: tech.service@rainin.com

Pipette Service:

Phone: 800-662-7027
Fax: 781-935-7631
E-mail: service@rainin.com

Direct Order Line:

Phone: 800-472-4646
Fax: 781-938-1152
E-mail: pipets@rainin.com

Web: www.rainin.com

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