

RAININ

Pipetting 360°

E-Man™ Hybrid™

Manual pipette with real-time display

Continuously-
Adjustable
Microliter
Pipette
with LCD



volume ranges
from
0.1 to 2000 μL

E-Man Hybrid
200 μL shown

METTLER TOLEDO

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Contents of Package

E-Man Hybrid as ordered	Sample tips
Instruction Manual	Rainin Test Report
Performance Assurance Brochure	

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

RAININ and LTS are registered trademarks and E-Man is a trademark of Rainin Instrument, LLC. E-Man Hybrid Pipette: U.S. Patent Nos. 5,614,153; 5,849,248. Other patents pending. LTS Tip/Shaft System: For use under U.S. Patent Nos. 6,168,761 B1; 6,171,553 B1; 6,568,288 B2; 6,737,023 B1; 6,745,636 B2; 6,967,004 B2

Introduction

Unique position sensing technology accurately monitors the piston position at all times during operation and, in real time, updates the LCD (liquid crystal display). The piston location relative to zero position describes the volume of liquid in the tip.

Position-sensing provides certain advantages to the pipette user. Functions that were previously only possible using an electronic pipette can be performed, such as titration, dilution, multidispensing, and measuring unknown volumes.

E-Man Hybrid also has the unique ability to warn of technique errors: for example, if the aspiration rate is too fast, this can be alerted to the operator.

Scheduled GLP service reminders can be displayed, and the user can program multiple offsets into the calibration curve. Real-time sensing allows true pipetting cycles to be counted.

Turning the plunger button is easy, as there are no geared dials with mechanical resistance, and the display is always visible from the normal operating position.



Figure 1 E-Man Hybrid Pipette

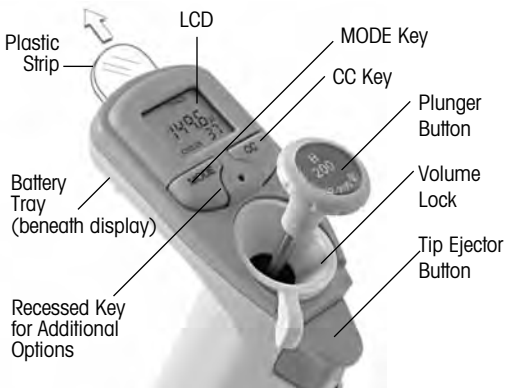


Figure 2 E-Man Hybrid Controls and Indicators

E-Man Hybrid has three display modes - PIPET, TRACK, TITRATE, and a cycle counter (CC), described on the following pages. Options: Pipette Technique Alert, GLP Service Reminder, and User Calibration, are described later in this manual.

E-Man Hybrid is a comfortable rugged pipette with built-in ergonomic features such as light plunger and tip-ejection forces, a tip-ejector shock absorber, and a comfortable contoured handle with fingerhook. The pipette will give many years of service with proper minimum care and maintenance.

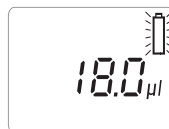
Battery Life

Power is supplied to the LCD by a 3v lithium watch-type battery in a sliding tray beneath the display. E-Man Hybrid is shipped with a plastic strip isolating the battery terminal, switching power off.

For operation, remove this strip by pulling straight out from the battery tray. The LCD briefly shows all segments, then the pipette software revision, then "PrES" appears. Remove this message by pressing the plunger through the 1ST STOP.



When the battery voltage goes below a predetermined threshold, the battery symbol turns on and flashes at a slow rate. This indicates the battery will need to be changed within a week or so. The battery will give up to two years' service before needing replacement.



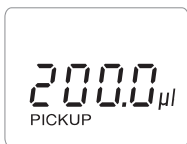
See page 17 for Battery replacement diagram.

Operation is not affected while the battery symbol is flashing. If the battery is not changed, eventually the display reads "dEAd" and then goes blank. Although the pipette will operate with a dead battery, the volume aspirated will be unknown.

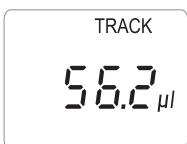
Display Modes and Cycle Count

Select display modes by pressing the MODE key sequentially. The CC key switches the Cycle Counter on or off.

PIPET MODE: Operation is exactly the same as in other manual pipettes. When setting volume, with the volume lock set to the unlocked position, the display shows the changing value. When the volume lock is moved to the locked position, the set volume is shown. When the piston is at the 1ST STOP position, the display reads PICKUP, as shown.



TRACK MODE: TRACK is shown in the display. The volume of sample in the tip is shown in real time.



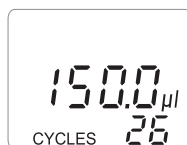
As the piston is depressed beyond the 1ST STOP position the display reads "bLo" to indicate the Blowout part of the stroke.



TITRATE MODE: TITRATE is shown in the display. The display shows the volume of sample dispensed from the tip in real time, as a negative number relative to the upper set volume (when the display shows 0.0).



CYCLE COUNTER: The CC key turns on or off the cycle counter, and clears the count. Cycle count is a visual reference of how many true pipetting cycles (depress plunger - aspirate, dispense - blowout - return) have occurred in the current pipetting session. CYCLES and the count number are shown in the display.



More detailed descriptions of the modes and cycle counter are included in the OPERATION section. E-Man Hybrid options are available by pressing a recessed button with the end of a disposable tip, see Options, page 10.

Sleep Mode

After 3 minutes of no activity the display will go to sleep to conserve battery life. To operate the pipette again simply touch any key or press the plunger button through the 1ST STOP. E-Man Hybrid remembers its display mode, the state of the cycle counter and the set volume from its last use. E-Man Hybrid will also wake up when the volume lock is moved to the unlocked position without pressing the plunger to the 1ST STOP.

If the volume lock was UNLOCKED when E-Man Hybrid went to sleep, changes to the upper set volume will not be registered until either the plunger button is pressed through the 1ST STOP and allowed to return to the set position, or, the volume lock is moved to the locked position.

Volume Lock

The volume lock lever prevents the set volume drifting during operation. When locked, the plunger button cannot be turned. Move the lever to the right to free the plunger button, noting that "UNLOCKED" is shown flashing on the display. This is a warning to the user to LOCK E-Man Hybrid before pipetting. If pipetting while unlocked, after two cycles "LOCh Err" appears.

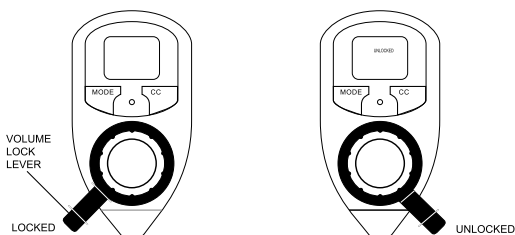


Figure 3 Volume Lock

Setting Volume

1. Turn the volume lock lever right as shown above so the volume setting mechanism is unlocked and free to turn.
2. Looking at the volume setting on the LCD, rotate the plunger button to change volume – counter-clockwise to increase, and clockwise to decrease volume. The volume display changes as you move the plunger button. Although not necessary for E-Man Hybrid, for consistency with other manual pipettes with mechanical volume setting, it is a good idea always to dial down to set the desired volume.
3. Stop when you reach the desired volume and move the volume lock back to the locked position, so E-Man Hybrid is ready for pipetting.

Volume ranges and increments are shown below:

E-Man Hybrid Model	Adjustable Range (μL)	Range (μL) Recommended	Increment (μL)
2 μL	0 to 2	0.1 to 2	0.002
10 μL	0 to 10	0.5 to 10	0.01
20 μL	0 to 20	2 to 20	0.02
100 μL	0 to 100	10 to 100	0.1
200 μL	0 to 200	20 to 200	0.2
300 μL	0 to 300	30 to 300	0.2
1000 μL	0 to 1,000	100 to 1000	1
2000 μL	0 to 2,000	200 to 2000	2

Tip Selection and Mounting

Always use RAININ tips with E-Man Hybrid pipettes; the pipettes are calibrated with RAININ tips, and performance to published specifications can only be guaranteed with RAININ tips.

To mount a tip, press E-Man Hybrid shaft into the end of the tip. The tip will seal properly on the shaft with minimal force — do not use more force than is required.

Tip Immersion Depth

The recommended depth for tip insertion into the sample for each E-Man Hybrid model is shown below.

E-Man Hybrid	Volume Range	Immersion Depth
2 μL	0.1 - 2 μL	1-2 mm
10 μL	0.5 - 10 μL	1-2 mm
20 μL	2 - 20 μL	2 - 3 mm
100 μL	10 - 100 μL	2 - 3 mm
200 μL	20 - 200 μL	3 - 6 mm
300 μL	30 - 300 μL	3 - 6 mm
1000 μL	100 - 1000 μL	3 - 6 mm
2000 μL	200 - 2000 μL	3 - 6 mm

Tip immersion depth is critical. If these depths are exceeded, the volume measured may be inaccurate, possibly out of specification. Tip angle is also important. Hold the pipette within 20 degrees of vertical.

Operation

This section is divided into three sub-sections relating to the three display modes: PIPET, TRACK, and TITRATE, and a section on the CC option. Some information in the PIPET mode section will also apply to the other two modes.

PIPET Mode:

Before pipetting valuable samples, it is a good idea to practice aspirating and dispensing water before pipetting with actual samples.

1. Unlock the volume lock and set the desired volume as described on page 4. Move the volume lock lever back to the locked position to begin measurements. When locked, the volume display will not change, just like in a standard pipette
2. Attach a new RAININ tip by pressing the shaft into the tip with only sufficient force to make a good seal.
3. Press the plunger button to the first stop. The word PICKUP is shown on the display as an aid to locate the HOME position. Hold the plunger button in this position.



4. Holding the pipette vertically, place the tip into the sample to the proper depth (p. 5) and relax thumb pressure on the plunger. The light piston spring moves the piston upward, aspirating sample. Do not release the plunger button, or the piston may snap up, resulting in inaccurate measurement.
5. Pause briefly with the tip end still in the sample to ensure that the full volume of sample is drawn into the tip.
6. Withdraw the tip from the sample. If any liquid remains on the outside of the tip, wipe it carefully with 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 (PICKUP will appear on the LCD as you reach the 1ST STOP) to blowout (bottom of stroke.) Wait: 1 second for volumes to 300 μL , 1-2 seconds for 1000 μL and larger.
2. Still holding the plunger, withdraw the tip, sliding it along the wall of the vessel.
3. Release the plunger and 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.

TRACK Mode

Press the MODE key until TRACK is shown on the LCD. In TRACK mode the piston position relative to the zero point is displayed in real time, equivalent to the volume of sample present in the tip.



TRACK mode enables functionality previously unavailable on manual pipettes, such as measuring an unknown sample volume, dilution, and multidispensing.

Note: Accuracy and precision results for specialized operations such as Measuring, Dilute & Multidispense will depend greatly on the skills of the operator, especially when very small sample volumes are involved.

Measuring an unknown volume:

1. Set a desired maximum volume and attach a RAININ tip as described earlier. Press the plunger to the first stop and hold there. The set volume and PICKUP will show on the LCD.
2. Place the tip into the sample and relax thumb pressure on the plunger. The piston will move upward, aspirating sample. As the tip fills, the LCD shows the volume in the tip in real time, increasing as you release pressure on the plunger.
3. When you have measured the unknown volume, hold your thumb steady to stop aspiration. Read the volume on the LCD. Withdraw the tip slowly from the sample.

4. Dispense as desired. Touch the tip end against the side wall of the receiving vessel and press the plunger slowly, past the first stop (PICKUP will appear on the LCD as you reach the first stop). As the piston is depressed beyond the FIRST STOP position the display reads "bLo" to indicate the Blowout part of the stroke. Stop at the second stop
5. Release the plunger and discard the used tip.

Dilution:

1. Set a desired maximum volume and attach a RAININ tip as described earlier. Press the plunger to the 1ST STOP and hold there. The set volume and PICKUP will show on the LCD.
2. Place the tip into the diluent and relax thumb pressure on the plunger. The piston will move upward, aspirating diluent. As the tip fills, the LCD shows the real time volume in the tip, increasing as you release pressure on the plunger.
3. When you have aspirated the diluent into the tip, hold your thumb steady to stop aspiration. Observe the digital display and record the volume. Withdraw the tip slowly from the sample.
4. With the pipette tip clear of the diluent, release the thumb pressure slightly to aspirate a small volume of air to create an air gap. Record the new volume including the air gap.
5. Place the tip end into the sample and slightly release the thumb pressure to aspirate, then stop when you have aspirated the desired sample volume..
6. Dispense the sample, air gap and diluent all at once, touching the tip end against the side wall of the receiving vessel and pressing the plunger slowly, past the first stop; PICKUP will appear on the LCD as you reach the first stop. Or if you wish, place the tip in the liquid and move the plunger up and down several times to mix in the tip. As the piston is depressed beyond the FIRST STOP position the display reads "bLo" to indicate the Blowout part of the stroke. Stop at the second stop.
7. Release the plunger and discard the used tip.

Multidispense:

In TRACK mode, E-Man Hybrid allows you to accurately dispense several known volumes from a single pickup. When multidispensing you will need to calculate the total volume of sample for the separate aliquots you need PLUS an extra residual volume to ensure accuracy in the last aliquot. For example, if you want to dispense 6 aliquots of 25 µl each, you should pick up $6 \times 25 = 150 \mu\text{l} + 15 \mu\text{l}$, Total 165 µl.

1. Set a desired maximum volume (including the extra residual volume as described above) and attach a RAININ tip as described earlier. Press the plunger to the first stop and hold there. The set volume and PICKUP will show on the LCD.

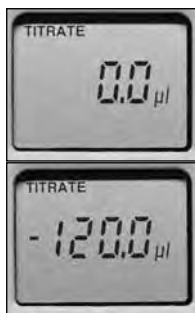
2. Place the tip into the sample and relax thumb pressure on the plunger. The piston will move upward, aspirating the sample. As the tip fills, the LCD shows the volume in the tip in real time, increasing as you release pressure on the plunger.
3. When you have aspirated all the sample into the tip, hold your thumb steady to stop aspiration. Withdraw the tip slowly from the sample.
4. Move the tip end to the first of the receiving wells and dispense the desired aliquot volume – in the example 25 μL – reading the display. Stop when the LCD shows you have dispensed the first aliquot, and move to the next well.
5. Continue in this fashion until all the aliquots have been dispensed. Then discard the extra residual volume which was included to ensure the last aliquot would be accurate.
6. Discard the used tip.

TITRATE Mode

Note: E-Man Hybrid is not intended to replace specialized titration equipment, and will give results to an accuracy of about 10%, depending on operator skill, especially using very small sample volumes.

Press the MODE key until TITRATE is shown on the LCD. In TITRATE mode the display first shows zero, as shown in the top image alongside.

As the plunger is depressed, the position sensor communicates to the LCD the piston position (or the volume dispensed from the tip) by reference to the zero volume, as a negative value, as shown in the lower image.



1. Set a desired maximum volume and attach a RAININ tip as described earlier. Press the plunger to the first stop and hold there. The word TITRATE, the set volume and PICKUP will show on the LCD.
2. Place the tip into the sample and relax thumb pressure on the plunger. The piston will move upward, aspirating sample into the tip. As the tip fills, the LCD shows the volume in the tip as a negative number in real time, decreasing in value as you release pressure on the plunger. When the tip is full the display reads zero as shown in the top image above.
3. To begin titration, depress the plunger slowly to control the volume dispensed. The LCD displays the accurate, real-time value for the volume dispensed.

4. Titrate the reagent as desired by pressing the plunger very slowly until you reach the titration point (e.g. pH change), recording the volume displayed on the LCD at that point.
5. Discard the remainder and eject the used tip.

CC Cycle Counter

E-Man Hybrid's cycle counter records the number of complete pipetting cycles which have occurred since the last time the count was zeroed. Maximum is 999 cycles; then the count rolls over to 0.

1. Press the CC key. CYCLES and the number of complete cycles are shown in the display, as shown here. If this is the first time CC key is pressed, or if the counter has been reset, the number reads 0.



2. With CC engaged, E-Man Hybrid will record and count each complete pipetting cycle:
 - a. press the plunger to the 1ST STOP
 - b. aspirate sample
 - c. dispense sample
 - d. press through blowout (cycle count added)
 - e. release plunger

The counter will not record incomplete cycles or mixing.

3. To switch off the cycle counter, press CC key again. This does not clear the count, but removes it from the display.
4. To clear the count and reset to zero:
 - a. with CYCLES showing: press and hold the CC key. The CYCLES display will momentarily go blank then return with the cycle count reset to zero.
 - b. with CYCLES already off: Press and hold the CC key until the count resets to zero.

Note: If the battery is removed when there is existing cycle count data, the counter is reset to the last stored multiple of 256 below the actual count when the battery is replaced, i.e. if the cycle count was 245, it is reset to zero. If the cycle count was 519, it is reset to 512. For Total Cycles Count since manufacture, see additional options.

Options

E-Man Hybrid's options can be accessed by lightly pressing the unmarked OPTIONS button recessed between the MODE and CC keys with the end of a tip or a straightened paperclip. The OPTIONS key is shown by the arrow.



When the OPTIONS key is pressed, the first of the options is displayed. The MODE key is used to scroll through the options, and the CC key is used to switch options on or off.

Scrolling with the MODE key, the sequence of E-Man Hybrid's options is:

1. GLP Service Reminder (GLPx, where x is a number 0 (off), or 1 to 4 (service interval) + no. of days before next service)
2. Total Cycles Count (since manufacture)
3. Pipette Techniques Alert (ALeR = on or off)
4. User Calibration (UCAL): - - - , on, or off.
5. User Calibration settings (UCAL SET)
6. User Calibration clear (UCAL CLr – if data exists)
7. (or 6) Return to previous display mode for normal operation.

GLP Service Reminder

Because E-Man Hybrid keeps track of time, the software can remind the user that GLP calibration service is approaching, due, or overdue. This function is set OFF in new pipettes and is invoked when E-Man Hybrid is sent to RAININ Service. The service center can set one of four service intervals. The display counts down the number of days left before the next scheduled service:

Service interval	LCD	Counts down from
1 year (364 days)	GLP1	364
6 months (182 days)	GLP2	182
4 months (121 days)	GLP3	121
3 months (91 days)	GLP4	91
Off	GLP0	
n/a		

The display alongside shows a pipette with a 3 month service interval selected and 90 days remaining before the next scheduled service.



When the next service is due within 30 days, a message is displayed each time the pipette wakes from sleep mode. The message flashes "CAL dUe" followed by in "xx dAY" (xx = number of days left) a few times before reverting to the normal display.

When the service is due, the display flashes "CAL dUE" a few times before reverting to the normal display.

If the service becomes overdue, the number of days overdue (up to 99) is flashed with a minus sign in front.

Leave GLP Service interval and scroll to Total Cycles Count by pressing the MODE key.

Total Cycles Count

E-Man Hybrid keeps track of the total pipetting cycles since manufacture, shown in the LCD. If the total cycles count is less than 999, it will show in the bottom right corner.

For larger numbers the volume display is also used, as seen here.

This example shows a total cycle count of 10,727.



If the battery is removed, E-Man Hybrid "remembers" the total cycle count in increments of 256. So in this example, if the battery is now removed, the total cycle count will change to 10,496 when the battery is reinserted (the next-lowest multiple of 256), and counting will restart at 10,497.

Leave Total Cycles Count and scroll to User Calibration by pressing the MODE key.

Pipette Techniques Alert

Because E-Man Hybrid includes position-sensing technology and an LCD, it can provide helpful information when technique errors, such as an insufficient pause at the PICKUP position, are sensed. In the event of such an alert, the LCD displays "bAd", indicating the type of alert.

Turn the Alert on or off by pressing the CC key when in Alert option. With Alert turned on:

Technique Error during Pipetting	LCD shows
Insufficient pause at Pickup point	bAd PIC
Pickup started away from Pickup point	bAd PIC
Plunger is not returned to set volume	bAd PIC
Dispense stroke not completed	bAd dSP

Pipetting Technique Alert works in forward mode only, and not in TRACK or TITRATE modes. Leave the Alert option and scroll to GLP Service option by pressing the MODE key. (You can also leave Options altogether by pressing the plunger button or moving the volume lock to the unlocked position and back.)

User Calibration

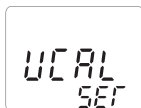
E-Man Hybrid allows the user to place multiple offsets into the calibration curve as opposed to a single offset as in other manual pipettes. User Calibration allows corrections at up to 50 points on the curve, and can be turned off and on as desired for different samples. This manual describes setting a single-point calibration offset.

Setting a Single-point Calibration Offset

Suppose you wish to offset the pipette to compensate for a solution with higher density than water. Repeated weighings indicate that the volume setting on a 20 μL pipette needs to be offset by 1 microliter. Set E-Man Hybrid to the desired volume to be offset, in this case 20 μL .

Press the Options key with the end of a tip. Scroll through the MODES until "UCAL - - -" is shown on the display. ("UCAL - - -" is shown when there are no existing user calibration settings. If user calibration has already been set, the display will read "UCAL on" or "UCAL off".)

1. Press the MODE key to set user calibration. The symbol for "SET" will flash on and off.
2. Press the CC key to toggle between Inc (increase) and dEc (decrease). To Increase the offset, the display appears as shown here, with a set volume of 20 μL . "U-CAL" also shows in the display.
3. Now use the MODE key to scroll through the increasing values. The display will flash while you are increasing values. Set the actual volume dispensed, in this case 19.0, and press the Options key with the tip end to "enter" the value.
4. When the offset is entered, "donE" appears on the display briefly, then the pipette is returned to the previous display mode. If the plunger is moved during any of the above steps the calibration procedure is aborted and the pipette returns to normal operation.
5. Once set, the display shows the offset value instead of the original set value. "U-CAL" is shown with " μL " flashing as reminders that User Calibration has been switched on.
6. This single-point offset of 1 μL is carried through the volume range of the pipette.



The above procedure simply adds a single offset. More points can be added to get better calibration over the entire range of the pipette.

Turning Calibration on/off

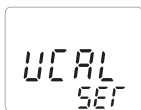
The User Calibration offset can be turned on and off as desired. Simply go to the Options menu by pressing the Options key with the end of a tip. Then scroll through the Options using the MODE key. When you reach User Calibration, toggle this function on or off with the CC key. If User Calibration is on, and you have set an offset value, you will see the display set volume change after you switch User Calibration off.

Setting a New Offset or Clearing an Existing Offset

Go to the Options menu by pressing the Options key with the end of a tip. Then scroll through the Options using the MODE key. With the display reading "UCAL on"—

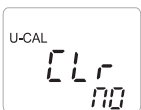
To set a new offset:

Press the MODE key. The "SET" symbol will flash and you should proceed as described in steps 1-4 on the previous page.

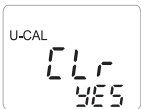


To clear an existing offset:

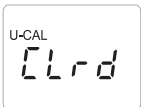
1. Press the MODE key until "UCAL Clr" shows. Then press the CC key. The pipette displays the confirmation screen, at right, reading "U-CAL, Clr, no".



2. Press and hold the CC key for a long press if you wish to clear the offset. The display shows "YES". Note: the CC key must be held for a long press to clear the offset.



When done, the display shows "U-CAL Clrd" briefly before reverting to the previous display mode.



Standard Pipetting Guidelines

E-Man Hybrid pipettes incorporate several new features which enhance pipetting consistency. You should also 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 table on page 5.
5. Pipette vertically, or within 20° of vertical.
6. Don't invert or lay E-Man Hybrid flat with liquid in the tip.

Pre-Rinsing

Some solutions may leave a film on the inside tip wall. This film remains relatively constant in successive pipettings with the same tip, so excellent precision can be obtained by refilling the tip and using the refilled volume as the sample. Successive samples from this same tip will exhibit good reproducibility.

Reverse Mode Pipetting

In reverse mode pipetting the operating sequence is reversed. TRACK mode will not show true volume picked up.

1. Mount a disposable tip on the pipette shaft.
2. Press the plunger button fully to the 2ND STOP.
3. Immerse the tip in liquid and allow the button to return slowly to the fully 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 1ST 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 by blowing it out, if desired. Discard the used tip.

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. Equilibrate pipette, tips and liquid to the same temperature before pipetting.

Autoclaving

Autoclavable parts of E-Man Hybrid are the shaft, shaft coupling, and the tip ejector: 121°C, 1 bar, 15-20 minutes; dry cycle 110°C for 10 minutes. Do not autoclave the complete pipette or any parts other than listed here.

Tip Ejector Arm Removal

Press in the quick-release tabs on the ejector arm and slide the ejector down. To replace the ejector arm insert the shaft through the large opening, align the top with the tip ejector pushrod, and push until the ejector arm snaps in place.



Figure 4 Removing the Tip Ejector Arm

Troubleshooting and Repairs

Warning:

When removing the shaft from the pipette body, make sure the spring, seal and o-ring do not fall off the piston, especially on the smaller models.

Sample Splash (liquid inside the mechanism)

1. Remove the tip ejector arm. Also refer to the appropriate drawing on page 18 or 19.
2. On pipettes up to 1000 μL , unscrew the shaft coupling (B) and remove the shaft (C). For 2000 μL , unscrew the shaft.
3. 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 any contamination.
4. If piston corrosion or staining is evident, do not use the instrument.

In the US, call 800-543-4030 for Technical Support.

In other countries, please use the number on the back page.

Leaks, Inaccuracy, Abnormal Stroke

1. Loose shaft. Tighten coupling by hand.
2. Split or cracked shaft. Remove the tip ejector and inspect the shaft. Replace the shaft if necessary. If the shaft was dropped, remove it to see if the piston is bent. If so, return the instrument for service.
3. Worn seal and / or o-ring. All models up to 2000 μL incorporate a polyethylene seal and o-ring. Examine the seal and o-ring, replacing them as necessary. Pull off the old seal and o-ring, position the new seal and o-ring on the piston assembly as shown in the drawings on pages 18-19, and reassemble the pipette.

Note: It is NOT necessary to recalibrate E-Man Hybrid after changing seals, o-rings, or shafts.

4. Do not lubricate any components. E-Man Hybrid uses a dry sealing system.

Service, Calibration and Repair

RAININ Pipette Repair and Calibration facilities:

It is recommended to use only genuine RAININ replacement parts such as seals, o-rings, 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 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.

In the US, call 800-543-4030 for service. Or visit the web: www.rainin.com/service.asp.

Service is also available outside the US.

See the RAININ website home page, www.rainin.com, and click on the link "Customers outside North America".

METTLER TOLEDO Pipette Repair and Calibration facilities or authorized RAININ distributors who provide service can be found by following this link and specifying the country or geographical region.

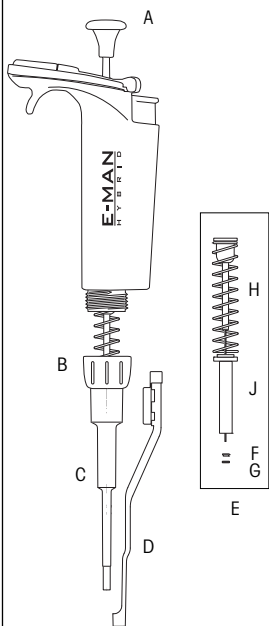
Contact Technical Support at 800-543-4030 for further information.

Acids and Corrosives

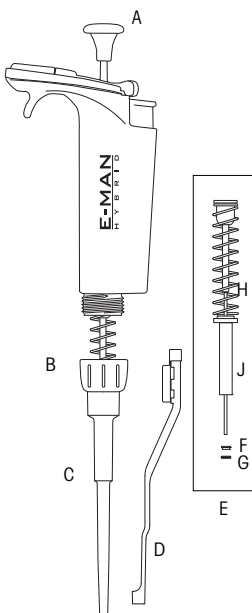
After pipetting concentrated acids or highly corrosive solutions, disassemble E-Man Hybrid liquid end and inspect and clean the piston assembly, shaft, and seal with distilled water. Dry all components thoroughly and reassemble.

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

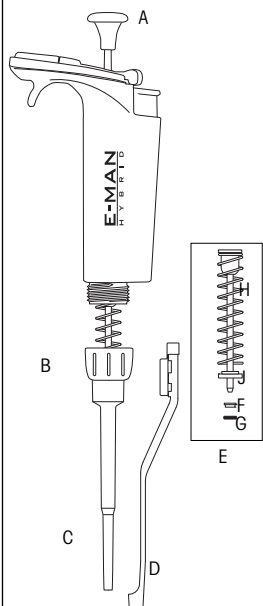
E-Man Hybrid 2 & 10 µL



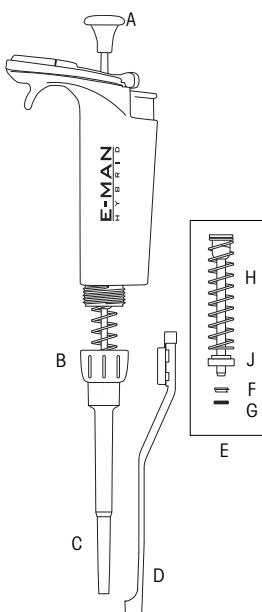
E-Man Hybrid 20 µL



E-Man Hybrid 100 µL



E-Man Hybrid 200 & 300 µL



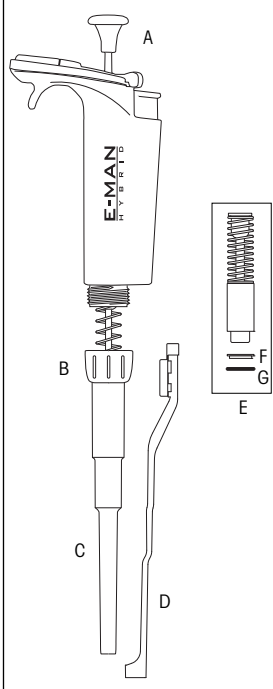
Legend for E-Man Hybrid 2 µL to 2000 µL Models

A - Plunger Button
D - Tip Ejector
G - O-ring

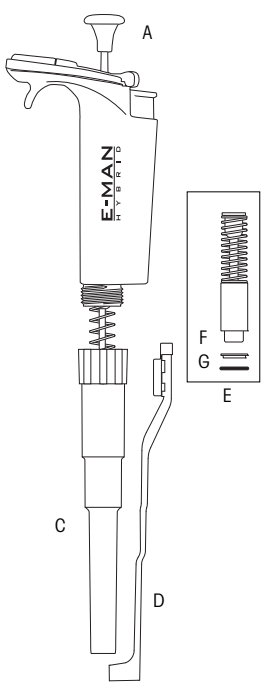
B - Shaft Coupling
E - Piston Assembly
H - Stroke Spring

C - Shaft
F - Seal
J - Seal Retainer

E-Man Hybrid 1000 μ L



E-Man Hybrid 2000 μ L



Specifications

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

Specifications						
Model	Volume μL	Increment μL	Accuracy		Precision	
			%	$\mu\text{L} (\pm)$	%	$\mu\text{L} (\leq)$
2 μL	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 μL	1.0	0.01	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 μL	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
100 μL	10	0.1	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 μL	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 μL	30	0.2	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 μL	100	1	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
2000 μL	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

Specifications are subject to change without prior notice

E-Man Storage

After use, store the pipette in a clean safe place. E-Man Hybrid is a precision instrument and should be treated with the level of care appropriate for laboratory instrumentation.

Three types of hanger are available to hold your E-Man Hybrid 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.

**EC Declaration of Conformity
according to ISO/IEC Guide 22 and EN45014**

Manufacturer's Name: Rainin Instrument, LLC.

Manufacturer's Address: 7500 Edgewater Drive, Oakland,
CA,94621, USA

declares that the following product:

Product Name: E-Man Hybrid Microliter Pipette

Model Number: E-Man Hybrid

conforms to the following Product Specifications:

Safety: EN 61010-1: 2001 (2nd Edition)

EMC: FCC - Part 15 Class A
**EN 61326 04: 1997 + A1 06: 1998 +
A2: 2001 + A3: 2003 (Emissions)**
EN55011:1998 + A1:1999,
CISPR 11:2003, Edition 4.1:2004,
Class A (Class A Radiated Emissions)

**EN 61326 04: 1997 + A1 06: 1998 +
A2: 2001 +A3: 2003 (Immunity)**
IEC 61000-4-2 Edition 1.2 (2001):
Electrostatic Discharge Immunity Test
IEC 61000-4-3:2002: Radiated Radio-
Frequency Electromagnetic
Field Immunity Test

Supplementary Information:

Responsible Signatory: Jim Petrek, VP, R & D

Date: August 2007

This Declaration of Conformity applies only to products which
have the CE mark attached.

WARNING:

This equipment generates and uses radio frequency energy and if not installed and used properly, i.e. in strict accordance with the instruction manual, may cause harmful interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment.

Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

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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