

# EDP1™

## Electronic Pipette

10 pipettes for  
volume ranges  
from  
0.5 µL to 20 mL

200 µL EDP1 shown



# RAININ

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This device (EDP1) is intended for use only as an electronic pipette for pipetting liquids as described in this manual. It is not intended for any other use.

Note that pipette specifications and other information in this manual may be changed without prior notice.

"EDP1" and "EDP" are trademarks of Rainin Instrument, LLC. EDP1 Pipettes are manufactured under U.S. Patent No. 4,671,123; 4,779,467 and 4,905,526, and under the following national patents: Taiwan, NI-23042; Australia, AU 589891; France, FR 2559904; Europe: CH, DE, GB, IT, NL, EP 0152120 and EP 0428500; Canada, CA 1293709; Japan, JP 1807271; Germany, DE 3588071 and DE 3586289.

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EDP1 Electronic Pipettes use a motorized linear actuator to move the piston. The linear actuator, controlled by a miniature onboard computer, moves the piston the correct distance, at the correct speed, every time. Piston strokes are consistent and reproducible.

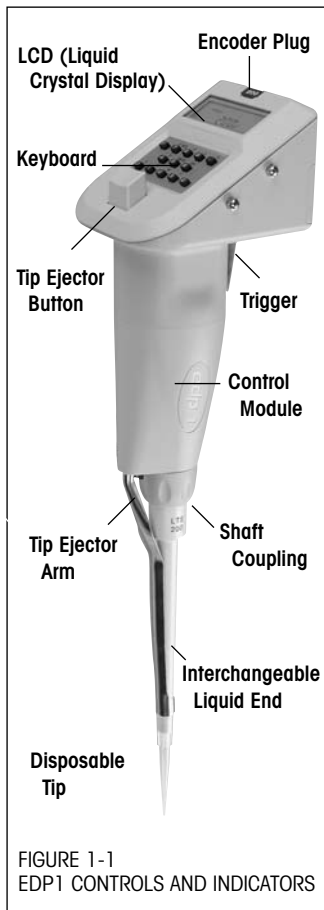
Each complete EDP1 pipette includes a control module, battery pack, a wall power supply, and a liquid end for the volume range ordered. The control module is the same for all volume ranges; an encoder plug informs the control module which liquid end is attached. For volumes up to 2000  $\mu\text{L}$ , interchangeable liquid ends with encoders can be purchased separately.

A stainless steel piston is moved by an electronic linear actuator. The piston displaces a column of air which picks up or dispenses liquid through a disposable polypropylene tip. This tip is the only part of the instrument that touches the liquid. A mechanical tip ejector allows tips on all volume pipettes to be ejected easily without hand contact, avoiding sample carryover and contamination.

You enter mode, volume, and speed settings into the EDP1 via a keyboard. Operational status and settings are shown on an easy-to-read display. Audible tones signal completion of piston strokes and error conditions. Pickup and dispense are performed by pressing the trigger.

Power can be supplied to the EDP1 pipette in either of two ways: with a cord attached to a wall power supply, or with a rechargeable Battery Pack for maximum convenience and freedom of movement.

With a fully-charged Battery Pack installed, the EDP1 will operate for more than 1000 full-stroke cycles before recharging is needed.



## Unpacking and Set-up

## 2

In addition to this manual, the EDP1 package should contain:

1. EDP1 Electronic Pipette
2. Battery Pack
3. Wall Power Supply
4. Performance Check Report/Warranty card

Before using your EDP1, inspect each component for damage sustained in transit. If you find damage, file a claim immediately with the shipping carrier. Save the shipping container until any damage claim is resolved and the instrument is checked and operates properly.

**WARRANTY**

Complete and return the Warranty Registration Card. EDP1 Electronic Pipettes carry a one year warranty against defects in materials and workmanship. Physical and chemical abuse are not covered. For information regarding the warranty or repair of any instrument, please call RAININ at 800-543-4030, e-mail: [pipets@rainin.com](mailto:pipets@rainin.com).

Outside the U.S.A., local warranty conditions may apply. Contact your RAININ distributor: see [www.rainin-global.com](http://www.rainin-global.com) or e-mail [global@rainin.com](mailto:global@rainin.com).

**NOTE: If the equipment is used in a manner not specified, the protection provided by the equipment may be impaired.**

**Warranty returns are only accepted with prior authorization.**

**SET-UP**

Connect the wall power supply to a power outlet matching the line voltage printed on the label. Then plug the cord from the power supply into the socket on the back of the control module.

The EDP1 pipette will execute its initialization routine. After about 5 seconds the instrument will be in PIPETTE mode and the display should be as shown in Figure 2-1. If not, refer to the Troubleshooting Guide in Section 11 of this manual.



FIGURE 2-1 DISPLAY AFTER INITIALIZATION SEQUENCE (E1-1000 SHOWN)

**NOTE: EDP1 can be used without a power cord when the Battery Pack is installed. However, before installing the Battery Pack, it is a good idea to test operation with the wall power supply, to see that the pipette works correctly.**

Your EDP1 pipette is now ready for use, but the Battery Pack is not yet installed. Install the Battery Pack into the control module as described in the following pages.

**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.

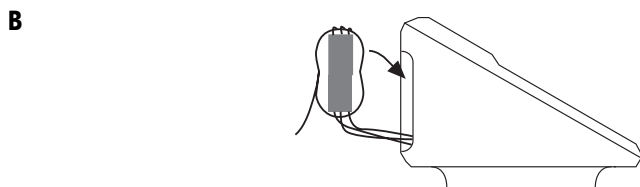
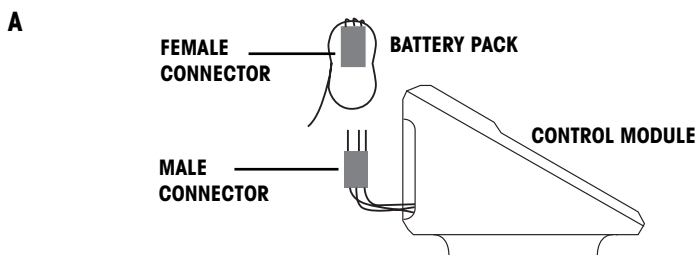
Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

## INSTALLING THE BATTERY PACK

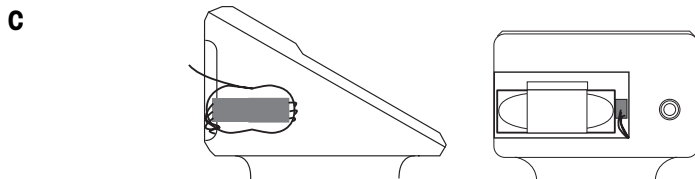
The Battery Pack compartment is at the rear of the control module. Slide the battery compartment cover left to remove it. Carefully pull the male connector clear, shown below.

Align the male and female connectors, noting the pin arrangement: one pin, space, two pins. Fasten the connectors together, but do not force them. Insert the Battery Pack into the control module as indicated on the label. Replace the compartment cover.

If the pipette does not initialize when the Battery pack is installed, but worked normally when connected to the wall power supply, the Battery Pack may have discharged in transit. See Appendix A – Charging the Battery Pack.



Connect the male connector to the female connector on the new battery pack, and rotate the battery pack into the control module as shown by the arrow.



Push the battery pack into the control module as far as possible, as shown at left. Push the wires to the right of the battery as shown at right. Replace the battery door and slide it closed.

FIGURE 2-2 INSTALLING THE BATTERY PACK

If you have any questions regarding this procedure, call Technical Support: 800-543-4030.

EDP1 can operate in five modes:

MODE	KEY	DESCRIPTION
P: PIPETTE	F 1	A single volume is picked up and dispensed.
M: MULTIPLE DISPENSE	F 2	A single volume is picked up and multiple volumes dispensed stepwise.
T: TITRATE	F 3	A single volume is picked up and partially dispensed under trigger control.
D: DILUTE	F 4	Diluent, an air gap, and sample are picked up separately and dispensed together.
MEAS: MEASURE	F 5	A sample is picked up under trigger control and its volume is displayed.

Table 3.1 – EDP1 Basic Operation

Modes are selected in EDP1 by pressing the **F** key and a number key as shown in the table above. The keyboard shows the name or initial of the mode. See Figure 3-2:

The instrument powers up in PIPETTE mode.  
You can change modes when:

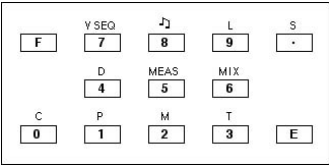


FIGURE 3-1 EDP1 KEYBOARD

1. The piston is in the HOME position and **KB** is displayed. (If necessary, press the FUNCTION key **F** and then **0** to clear the current operation and move the piston to HOME. **KB** should then appear on the display.)
2. The keyboard is not locked. (Press **F 9** to unlock.)

To change modes press **F** then the appropriate number key. For example, to open TITRATE mode press **F 3**. For MULTIPLE DISPENSE mode, press **F 2**.

The EDP1 pipette has been designed to be easy to use whether you are right- or left-handed. The balance, weight, comfortable “feel”, and light touch of EDP1 make it ideal for continuous use.

Hold EDP1 loosely in either hand – you do not need to grip the pipette tightly during operation. Operate the trigger with your index finger and the tip ejector button with your thumb. Because there is no need for thumb pressure during pick up, dispense, and blowout, operator fatigue and the risk of repetitive strain injury are greatly reduced compared to manual pipettes.

**AUTO SHUT-OFF**

The EDP1 pipette shuts itself off automatically if none of the keys or the trigger are pressed for three minutes. If the display is blank and the trigger does not work while power is supplied, EDP1 is shut off. Press any of the top row keys or **E** to turn on the instrument.

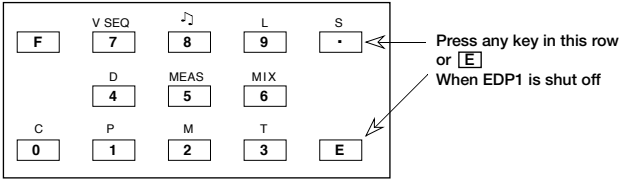


FIGURE 3-2 RESUMING OPERATION AFTER AUTO SHUT-OFF

EDP1 remembers current operational settings when “shut-off”, and will resume operation at the same point and with the same settings as when last used, as long as power to the instrument has not been interrupted.

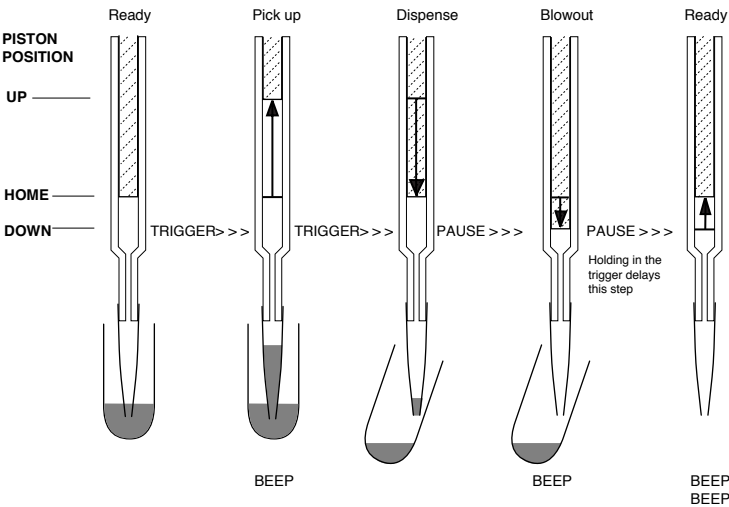
The AUTO SHUT OFF feature is provided to extend the life of the Battery Pack.

**BASIC OPERATION**

The examples used in this manual show the display for E-1000 (EDP1 with 1000  $\mu$ L nominal volume). Your instrument will operate in the same way, but volumes shown will be different if your pipette has a different nominal volume.

Attach a disposable tip by pressing the liquid end shaft firmly into the tip. Use water as your sample until you are familiar with the EDP1 pipette.

**QUICK REFERENCE: PIPETTE MODE**



## PIPETTE MODE **F 1**

When power is supplied, EDP1 executes a five-second initialization sequence and opens in PIPETTE mode. The display will show the nominal volume.

### SETTINGS

Press number keys then the **E** (Enter) key to change the volume. The display will flash on and off. If you make a mistake, set a new volume then press **E**.

### OPERATION



1. Press and release the trigger\* to pick up the displayed volume. You will hear a “beep” at the end of the piston stroke. See diagram on previous page.
2. Press and release the trigger again to dispense the liquid.

The piston moves to HOME, then rapidly executes a blowout stroke. You will hear a beep at the end of the blowout. After a one-second delay the piston returns to HOME ready for the next pickup. This is signalled by two beeps\*\*.

The one-second delay is to give you time to remove the tip from the dispense vessel before the piston returns to HOME position. You can extend the delay by holding in the trigger as the sample is dispensed.

When EDP1 is in any other mode, open PIPETTE mode as follows:

**a.** Press **F 0**. This action will clear the current operation and move the piston to HOME position. **KB** will show on the display, indicating the piston is HOME. (Check that the keyboard is not locked. If locked, press **F 9** to unlock it.)

**b.** Press **F 1** to open PIPETTE mode.

The display will show the nominal volume unless you have previously set a volume in PIPETTE mode. (In all modes, any previously entered volume is remembered by EDP1 as long as power is supplied continuously.)

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\* Holding in the trigger postpones the next step in all modes except TITRATE, MEASURE, and MIX.

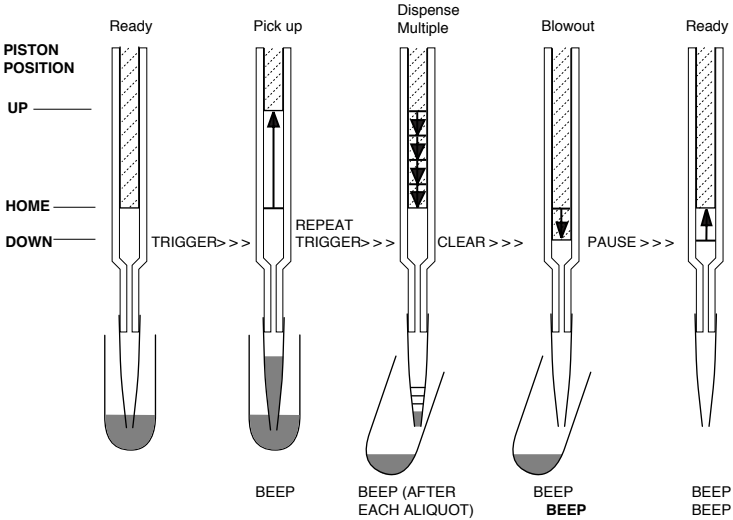
\*\* Each piston stroke is signalled by a short beep when the tone generator is turned on.

End-of-stroke beeps will not be included in the following descriptions.

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**QUICK REFERENCE:    MULTIPLE DISPENSE MODE**



**MULTIPLE DISPENSE MODE    F 2**

Make sure the piston is at the HOME position (**KB** shows on display) and the keyboard is not locked. Open MULTIPLE DISPENSE mode by pressing **F 2** .

PICKUP    MULTI

KB    1000µl

MULTIPLE DISPENSE NOMINAL VOLUME

**SETTINGS**

- 1. The nominal pickup volume (or previously stored value) is displayed. Press **E** to check or change the dispense volume.
- 2. Press number keys to set or change the dispense volume. While pressing keys, the entry flashes until **E** is pressed. See DISPENSE VOLUME, below.
- 3. The instrument calculates and flashes the largest number of whole aliquots which will divide into the nominal volume. You can accept this aliquot number by pressing **E** , or you can change to a smaller number by pressing number keys, then **E**.

MULTI    DISPENSE

KB    235µl

DISPENSE VOLUME

MULTI

KB    4

NUMBER OF ALIQUOTS (FLASHING)

- The instrument calculates and displays the volume needed to pick up all aliquots.

TOTAL PICKUP VOLUME

PICKUP MULTI

KB

*940*  $\mu\text{l}$

## OPERATION

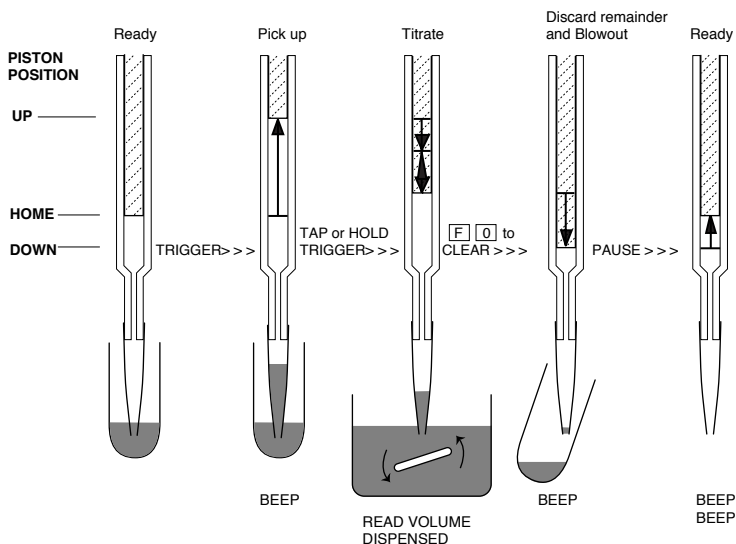
- Press and release the trigger to pick up the displayed volume.
- Press and release the trigger again to dispense the first aliquot. Continue pressing and releasing the trigger until all aliquots are dispensed. The word CLEAR will appear on the display.
- Press **0** to clear the instrument, discarding the residual volume left in the tip.

After the dispense volume is entered, EDP1 calculates the pickup volume:

**Pickup Volume = (Number of Aliquots x Dispense Volume) + Residual Volume**

When the calculated volume is picked up, the piston slightly overshoots and then returns to its proper pickup position, to ensure accuracy of the first aliquot dispensed. To ensure that the last aliquot will be accurate, the fixed residual volume remains in the tip after all aliquots have been dispensed and must be discarded by pressing **0** before making the next pickup stroke.

## QUICK REFERENCE: TITRATE MODE



## TITRATE MODE F 3

Make sure the piston is at the HOME position (**KB** shows on display) and the keyboard is not locked.

Open TITRATE mode by pressing **F 3** .

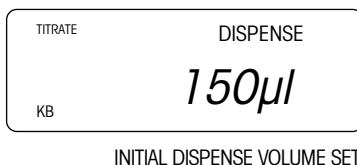


## SETTINGS

1. The display shows the nominal pickup volume. To change the pickup volume, enter a new initial pickup volume with the number keys and press **E** .



2. To set an initial dispense volume, press number keys then press **E** . (To set an initial dispense volume without changing the initial pickup volume, press **E** first. Enter the volume with number keys. Then press **E** again.)



## OPERATION

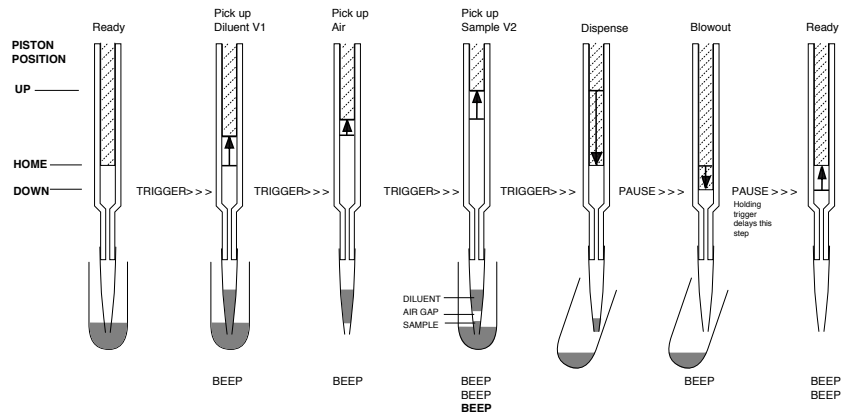
1. Press and release the trigger to pick up the initial volume.
2. To begin titration, press and hold the trigger to dispense liquid first slowly, then at an increasing rate. The longer the trigger is held, the faster the liquid is dispensed. Release and hold in the trigger again to restart dispensing at the slowest rate. To dispense one increment at a time, tap the trigger.
3. When the desired endpoint is reached, read and record the dispensed volume from the display. Then clear the instrument by pressing **F 0** . This will discard the remainder in the tip and return EDP1 to its starting position.

If the entire volume is titrated, press the **0** key when the beep sounds and the display reads **"CLEAR"**. This action will execute the blowout stroke and empty the residual volume from the tip.

In TITRATE mode, a small residual volume is left in the tip after the entire volume has been titrated. The residual volume ensures that the volume titrated is accurate.

**The residual volume is not part of the titrated volume and must be discarded by pressing F 0 .**

**QUICK REFERENCE: DILUTE MODE**



**DILUTE MODE F 4**

Make sure the piston is at the HOME position (**KB** shows on display) and the keyboard is not locked. Press **F 4** to open DILUTE mode. The display will show the default diluent volume, which is 90% of nominal volume. (The default sample volume is 10% of nominal volume, for 10:1 dilution.)

**SETTINGS**

- 1. Set the diluent volume ( $V_1$ ) by pressing number keys then **E**.

DILUTE

$V_1$

KB 500µl

DILUENT VOLUME

- 2. Set the sample volume ( $V_2$ ) in the same way.

DILUTE

$V_2$

KB 100µl

SAMPLE VOLUME

**OPERATION**

- 1. Press and release the trigger to pick up the diluent.

PICKUP

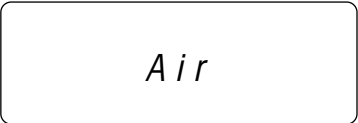
DILUTE

$V_1$

KB 500µl

PICK UP DILUENT VOLUME

2. Press and release the trigger to pick up an air gap\*.



3. Press and release the trigger a third time to pick up the sample.



4. A three-part tone sounds, indicating that diluent and sample are separated by the air gap, ready to be dispensed. Press and release the trigger to dispense diluent and sample.

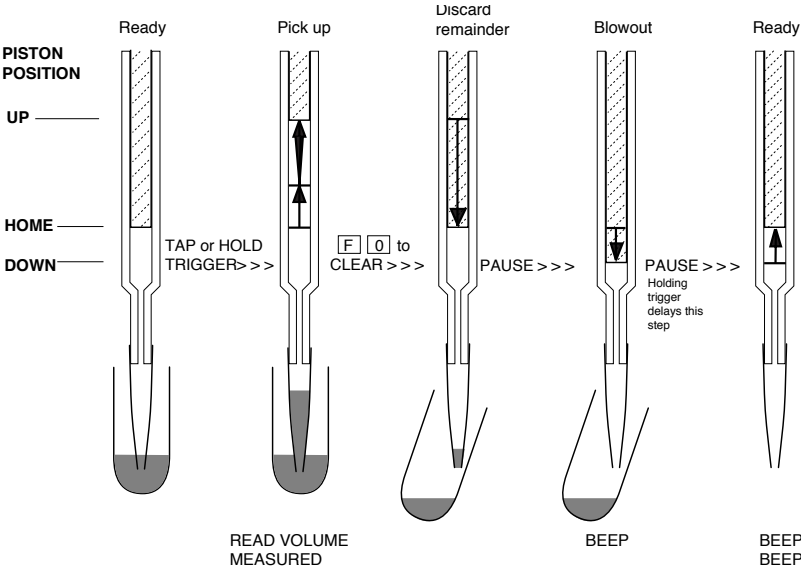


DISPENSE DILUENT AND SAMPLE TOGETHER

5. The display shows the diluent volume, ready for the next cycle.

\* When using DILUTE mode with the 5 mL, 10mL, and 20 mL EDP1 models, the air gap will probably rise through the diluent and allow diluent and sample to mix in the sample reservoir. To avoid this, you can use VOLUME SEQUENCING in DILUTE mode. Then set a smaller air gap, or no gap, as desired. See Section 6 — Advanced Operation: VOLUME SEQUENCING.

## QUICK REFERENCE: MEASURE MODE



### NOTES:

1. An initial pickup volume can be set.
2. Piston direction can be changed by pressing 0, even while the trigger is pressed.
3. At full stroke (or at zero) the trigger must be released.  
Then either press F 0 to clear the pipette, or press the trigger again to reverse piston direction.

# MEASURE MODE F 5

Make sure the piston is at the HOME position (**KB** shows on display) and the keyboard is not locked. Press **F 5** to open MEASURE mode.

## SETTINGS

The display reads "Opl" (or any previously entered initial pickup volume). You can enter an initial pickup volume if you wish by pressing number keys then **E**.

## OPERATION

1. Press and hold the trigger to pick up. Pickup speed increases until it reaches the maximum. Release the trigger and press it again to restart at the slowest rate. To pick up one increment at a time, tap the trigger. (Any initial pickup volume is picked up at the first trigger press. Hold the trigger in to continue measurement.)

When the desired volume of liquid has been picked up, ensure the lower level of the liquid is flush with the tip orifice (no air has been included) and read the volume on the display.

The piston direction can be reversed at any time by pressing **0**. (This is useful if an air bubble is picked up; pressing **0** reverses the flow, expelling the bubble. Pressing **0** again reverses flow and continues measurement.) The display always shows the current volume in the tip as well as the piston direction, either PICKUP or DISPENSE.

2. At full- or zero-scale, the display reads "**CLEAR**" and the trigger must be released.

Press the trigger again to reverse direction automatically. (The pipette may be cleared and the tip contents dispensed by pressing **F 0**; this is useful if the volume of liquid to be picked up exceeds the full-scale volume of the instrument.)

# Optional Settings

4

## tone generator control F 8

A tone generator in the EDP1 signals operational status or error conditions as follows:

Status	Tone sound	Tone description
Initialization	BEEP-BEEP	Two short beeps
Key press	BIP	One very short beep
End of pickup stroke	BEEP	One short beep
End of dispense stroke	BEEP	One short beep (lower tone)
Piston at HOME	BEEP-BEEP	Two short beeps
End of pickup in DILUTE mode	BEEP-BEEP-BEEP	Two short, one long beep
Error condition/Low battery*	DEE-DAH-DEE-DAH	Higher warble

\* Works even when tone generator is OFF

Tones are automatically switched on when the instrument is powered up. To switch off the tones, press **F 8**. Pressing **F 8** again turns the tone generator back on.

## KEYBOARD LOCK CONTROL **F 9**

The EDP1 keyboard can be locked if desired. This feature is for protection. Locking the keyboard prevents unwanted volume or mode changes when the EDP1 is used for the same task over an extended period.

To lock the keyboard, press **F 9** when the keyboard is active (when **KB** is displayed). Press **F 9** again to unlock the keyboard. When the keyboard is locked, all keystrokes are ignored except **F 0** (clear), **F 8** (tone generator control), and **F 9** (keyboard lock/unlock). The trigger operates whether the keyboard is locked or unlocked.

## Setting Speed

5

### PROGRAMMABLE SPEED **F •**

You can program the pickup and dispense speed of the EDP1 pipette to accommodate almost any liquid, including moderately dense or viscous liquids.

The default speed setting for EDP1 pipettes is 8\*. This fast setting is optimized for liquids with similar physical properties to water. However, you may wish to set a higher speed for even faster operation or a slower speed for more dense or viscous liquids.

To reset the speed, press **F •** (decimal point) then press a number between 0 and 9, then press **E**. The display reverts to show volume after speed has been set. The table below shows cycle component times for available speed settings.

**Table 5.1 – EDP1 Programmable Speeds**

Speed Setting	Full-Scale Pickup	Full-Scale Dispense	Delay before Blowout	Blowout duration	Dwell Time (constant)
9	1.3 sec.	1.3 sec.	0.0 sec.	0.13 sec.	1.0 sec.
8	1.3 sec.	1.3 sec.	0.5 sec.	0.13 sec.	1.0 sec.
7	1.3 sec.	1.3 sec.	1.0 sec.	0.13 sec.	1.0 sec.
6	2.2 sec.	2.2 sec.	0.5 sec.	0.22 sec.	1.0 sec.
5	2.2 sec.	2.2 sec.	1.0 sec.	0.22 sec.	1.0 sec.
4	2.2 sec.	2.2 sec.	1.5 sec.	0.22 sec.	1.0 sec.
3	2.2 sec.	2.2 sec.	2.0 sec.	0.22 sec.	1.0 sec.
2	4.4 sec.	4.4 sec.	0.5 sec.	0.44 sec.	1.0 sec.
1	4.4 sec.	4.4 sec.	1.0 sec.	0.44 sec.	1.0 sec.
0	4.4 sec.	4.4 sec.	2.0 sec.	0.44 sec.	1.0 sec.

This table does not apply to trigger-controlled actions in TITRATE and MEASURE modes.

\* Default speed setting for EDP1 10 mL, 20 mL models is 5. Speed range is 0 – 6.

Table 6.1 – EDP1 Advanced Functions

FUNCTION	KEY	DESCRIPTION	APPLICABLE MODE
MIX	F 6	Mixes by repeated up-and-down piston motion while trigger is held in	P – PIPETTE D – DILUTE
VOLUME SEQUENCING	F 7	PIPETTE: up to 12 distinct volumes can be picked up and dispensed sequentially.  MULTIPLE DISPENSE: up to 12 distinct volumes can be dispensed sequentially from a single pickup volume.  DILUTE: up to 12 distinct volumes can be picked up sequentially and dispensed together.	P – PIPETTE  M – MULTIPLE DISPENSE  D – DILUTE

**MIX F 6** Available in PIPETTE and DILUTE modes only.

## SETTINGS

1. Open the MIX function by pressing **F 6** .
2. The display prompts you for a mix volume\*. Enter this volume and press **E** .



MIX VOLUME ENTERED

## OPERATION

**IN PIPETTE MODE:** 1. Press and release the trigger to aspirate the pickup volume. Press the trigger again to dispense.

**IN DILUTE MODE:** 1. Press and release the trigger to pick up the diluent. Press and release the trigger to pick up an air gap, and again to pick up the sample. When the three-part tone sounds, press the trigger once more to dispense diluent and sample together.

\* The mix volume may be larger than the pickup or diluent/sample volumes.



2. Hold the trigger (either during or after the dispense stroke) to start mixing. Mixing will continue as long as the trigger is held in. The display alternates between PICKUP and DISPENSE while mixing is in progress.



MIXING IN PROGRESS; MIX VOLUME ALTERNATELY PICKED UP AND DISPENSED

3. Release the trigger. Mixing stops and a normal blowout stroke occurs. The display shows the pickup or diluent volume, ready for another cycle.

4. To close the MIX function press **F 6** .

**VOLUME SEQUENCING F 7** in PIPETTE, MULTIPLE DISPENSE, and DILUTE modes.

#### **VOLUME SEQUENCING: PIPETTE MODE**

In PIPETTE mode, up to twelve distinct volumes can be picked up and dispensed sequentially with VOLUME SEQUENCING.

When using this function, you are not restricted to the fixed sequence: by pressing the **F 0** keys you can go back and repeat the previous volume, or by pressing **E** you can skip over the next volume. The sequencing cycle can be started at any point. Open the VOLUME SEQUENCING function by pressing **F 7** .

#### **SETTINGS**

Display flashes "0µl" (or the volume last set). Set the first pickup / dispense volume (V1) by pressing number keys followed by **E** . Continue setting sequential pickup/dispense volumes. Press **0 E** to end the sequence. If you enter all twelve volumes, you do not have to press **0** to end the sequence. Sequential volumes are numbered as follows: V<sub>1-9</sub>, then V<sub>A</sub> (10), V<sub>b</sub> (11), & V<sub>C</sub> (12).

#### **OPERATION**

1. Press and release the trigger to pick up the current volume.



FIRST VOLUME PICKED UP

2. Press and release the trigger to dispense the current volume.



1ST VOLUME DISPENSED

3. Press and release the trigger to pick up the next sequential volume.



2ND VOLUME PICKED UP

4. Press and release the trigger to dispense the next sequential volume. Continue in this way until all volumes are picked up and dispensed.
5. After the last volume in the sequence is dispensed, the first volume is displayed again, ready for pickup.
6. To close the VOLUME SEQUENCING function, press **F 7**.

## **VOLUME SEQUENCING: MULTIPLE DISPENSE MODE**

In MULTIPLE DISPENSE mode with VOLUME SEQUENCING, up to 12 distinct volumes can be dispensed sequentially from one pickup volume. Open the VOLUME SEQUENCING feature by pressing **F 7**.

### **SETTINGS**

1. The display flashes "0µl" (or the volume last set). Enter the first volume (V1) with the number keys and press **E**.
2. The display flashes "0µl" again, prompting you for the next volume. Enter the second volume (V2) and continue in the same way for each entry, finishing each entry with **E** and the last entry with **0 E**. Sequential volumes are numbered as follows: V<sub>1-9</sub>, then V<sub>A (10)</sub>, V<sub>b (11)</sub>, & V<sub>C (12)</sub>.
3. The EDP1 pipette calculates and displays the number of cycles, or the largest number of times the sum of the volumes will divide into the nominal volume of the instrument. Accept the number of cycles by pressing **E**, or set a smaller number and press **E**. (Setting a larger number will sound an error alarm.)

### **OPERATION**

1. The display will show the volume to be picked up; press and release the trigger to pick up that volume.

2. Press and release the trigger again to dispense the first sequential volume. Press and release the trigger again to dispense the second sequential volume, and so on.
3. After all sequential volumes in the first cycle have been dispensed, press the trigger to begin the second cycle. Continue until all cycles are complete.
4. The display will read **"CLEAR"** after the last dispense volume in the last cycle. Press **0** to clear the instrument.
5. To close the VOLUME SEQUENCING function, press **F 7**.

## **VOLUME SEQUENCING: DILUTE MODE**

In DILUTE mode with VOLUME SEQUENCING, up to twelve distinct volumes can be picked up sequentially and dispensed together. Open VOLUME SEQUENCING by pressing **F 7**.

### **SETTINGS**

1. Display flashes "0µl" (or volume last set). Press number keys then **E** to set the first sequential volume (V1).
2. Display flashes "0µl" (or volume last set). Press number keys followed by **E** to set the next volume (V2). Sequential volumes are numbered as follows:  $V_{1-9}$ , then  $V_{A(10)}$ ,  $V_{b(11)}$ , &  $V_{C(12)}$ .
3. Continue in this way until all volumes are set. Press **0 E** to end the sequence.

### **OPERATION**

1. The display shows the first pickup volume. Press and release the trigger to pick up the first volume (V1).
2. Press and release the trigger again to pick up the next volume (V2). Air gaps are not automatically added when VOLUME SEQUENCING. If you wish, air gaps can be set as volume entries.\*
3. Continue in this way until all volumes are picked up.
4. A three-part tone sounds. Press the trigger to dispense the total volume all at once.
5. The display shows the first pickup volume again. Press and release the trigger to pick up volume V1 and restart the cycle.
6. To close the VOLUME SEQUENCING function, press **F 7**.

---

\* This is a good way to avoid the potential problem when using DILUTE mode with the 5 mL, 10mL, and 20 mL EDP1 models — where the air gap can rise through the diluent, allowing diluent and sample to mix in the sample reservoir. You can set a smaller air gap which will stay in place between the diluent and sample, or no gap at all. See Section 3 — Basic Operation, DILUTE mode.

## Use RAININ tips

EDP1 pipettes are designed for use with RAININ-manufactured disposable tips. Specified performance of EDP1 pipettes is guaranteed only when RAININ disposable tips are used. RAININ cannot accept responsibility for damage to EDP1 pipettes or for poor performance resulting from the use of other than RAININ disposable tips.

RAININ molds its own disposable tips from premium-grade virgin polypropylene plastic in an advanced clean-room environment. Molds are inspected and maintained frequently to assure high-quality tip production. Samples from each lot of tips are inspected microscopically to assure that every lot meets these high standards. To order tips for EDP1 pipettes, please refer to the RAININ Pipetting Solutions Catalog or the current RAININ Product Update. Call 800-543-4030 for a free copy of these publications. You can also view or download a PDF version online: [http://www.rainin.com/lit\\_prodlit.asp](http://www.rainin.com/lit_prodlit.asp)

## Pipetting techniques

EDP1 pipettes are designed to deliver accurate and precise measurements under the following conditions:

1. The liquid pipetted is water or liquid with density, viscosity, and vapor pressure similar to water. The temperature of the room, the EDP1, and the liquid, are all in the range  $21.5^{\circ}\text{C} \pm 1^{\circ}\text{C}$ . The EDP1 pipette is kept vertical while pipetting or within  $20^{\circ}$  of vertical.
2. The end of the disposable tip is immersed beneath the sample surface as follows:
  - 2 to 3 mm – volumes up to 100  $\mu\text{L}$ .
  - 2 to 4 mm – volumes from 100  $\mu\text{L}$  to 1000  $\mu\text{L}$ .
  - 3 to 6 mm – volumes from 1000 - 5000  $\mu\text{L}$ .
  - 6 to 10 mm – volumes over 5000  $\mu\text{L}$ .
3. There is no significant adherence of liquid to the surfaces of the tip. (Each tip should be pre-rinsed twice before pipetting to assure the best reproducibility).
4. When dispensing, the tip is touched to the sidewall of the receiving vessel. At the end of each dispense cycle, the tip is moved along the wall to remove any excess sample from the outside of the tip. A consistent rhythm is maintained from sample to sample when pipetting.

Viscous liquids, such as serum or plasma, can be measured accurately with a slow speed. See Table 5.1 – Programmable Speeds. You can further improve accuracy with viscous solutions by using MULTIPLE DISPENSE mode with the number of aliquots set to 1 and using a slow speed. This method simulates "reverse-mode" pipetting in manual pipettes. In MULTIPLE DISPENSE mode, the volume picked up includes an extra residual volume and the volume of the dispensed aliquot is accurate.

You can measure warm or cold liquids with good precision by using a consistent pipetting rhythm. A consistent rhythm will help 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.

## REMOVING THE TIP EJECTOR

The tip ejector should be removed to change the liquid end on models up to 2000  $\mu\text{L}$  (see Section 9 below). It can also be removed if you wish to load and remove tips manually for pipetting into deep narrow vessels, especially on the larger-volume models. Three types of tip ejector are used and all are removed with minimum effort—do not use force.

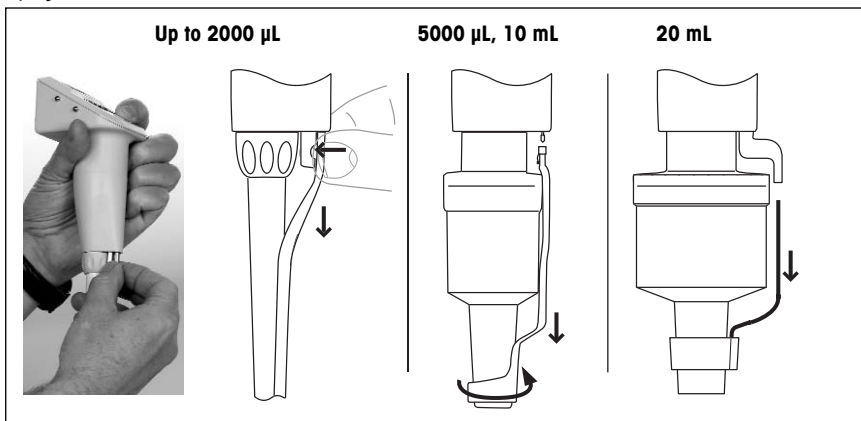


FIGURE 8-1 REMOVING THE TIP EJECTOR ARM

For models up to 2000  $\mu\text{L}$ , press in the quick-release tabs on the ejector arm and pull the ejector down. For 5000  $\mu\text{L}$  & 10 mL models, twist the end of the ejector arm and pull downward. For 20 mL models, pull the lower part of the tip ejector away from the upper part (do not remove the upper part).

To replace the ejector arm (after changing the liquid end) on all models except 20 mL, insert the shaft through the large opening, align the top with the tip ejector pushrod, and push until the ejector arm snaps in place. For 20 mL models, place the large opening over the shaft and align the rod in the lower part of the tip ejector with the hole in the upper part and press firmly.

## Changing Liquid Ends

## 9

The liquid ends for models up to 2000  $\mu\text{L}$  are interchangeable. Liquid ends are not interchangeable on 5000  $\mu\text{L}$ , 10 mL and 20 mL models.

When changing a liquid end, you must also change the encoder plug on the control module, to signal the liquid end volume to the software. Both the encoder plug and the shaft are marked with the nominal volume. LTS shafts are used with encoder plugs marked LTS and the nominal volume. Traditional shafts are used with encoder plugs marked with the nominal volume only.

Before removing the liquid end, bring the piston to HOME by pressing **F 0**. The letters **KB** should appear on the display. If the keyboard is locked, unlock it (press **F 9**).

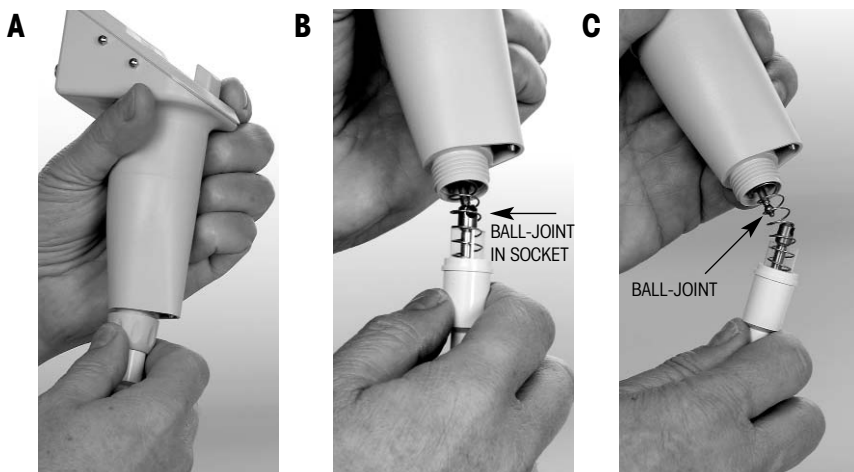


FIGURE 9-1 REMOVING THE LIQUID END (NOTE THE BALL-JOINT CONNECTION IN B & C)

## TO REMOVE THE LIQUID END

1. Referring to Figure 9-1A , loosen the shaft coupling by rotating it counter-clockwise.
2. When the shaft coupling is free of the threads, remove the shaft coupling. The motor shaft is connected to the piston assembly by a ball-joint. This ball-joint must be disconnected before proceeding, as follows:
  - a. pull the liquid end away from the control module enough to reveal the end of the motor shaft – see Figure 9-1B. The spring and clear plastic spring holder can be left in place; they will not interfere with this procedure.
  - b. angle the liquid end and ease the ball-joint out of the socket – see Figure 9-1C.
3. Remove the encoder plug from the control module (see Figure 9-2) and store it with its matching liquid end. Liquid measurements made with the EDP1 will be accurate and precise ONLY when the correct liquid end/encoder plug combination is used.



FIGURE 9-2 REMOVING THE ENCODER PLUG

**NOTE:** Before storage, disassemble the liquid end (see Section 10) and inspect for salts or residues. Clean the liquid end and store it with its encoder plug and tip ejector arm in the two tubes provided with the replacement liquid end.

Do not touch the underside of the plug; skin oils can contaminate it, causing poor electrical contact and erratic performance. The plug can be cleaned with isopropanol.

## REINSTALLING THE LIQUID END

**CAUTION:** Always attach the replacement liquid end **BEFORE** inserting the encoder plug.

1. The replacement liquid end is supplied in a clear plastic tube together with a second tube holding the matching tip ejector and encoder plug. Make sure you have all three components. The spring and spring guide extend from the liquid end as shown in Figure 9-3A. It is a good idea to pull back the spring and spring guide so that the ball-joint and socket connection area is clear, to help in reattaching the ball-joint to the piston shaft.

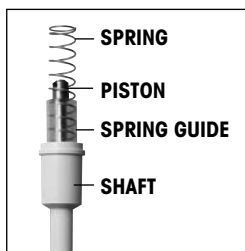


FIGURE 9-3A REPLACING THE LIQUID END (1)

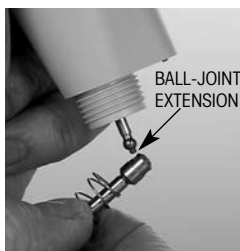


FIGURE 9-3B REPLACING THE LIQUID END (2)



FIGURE 9-3C REPLACING THE LIQUID END (3)

2. Bring the liquid end and the control module together so that the ball-joint aligns with the socket in the top of the piston shaft as shown in Figure 9-3B. Note the extension at the end of the ball-joint – see arrow.
3. Carefully connect the ball-joint on the motor drive into the socket on the piston shaft. You may need to maneuver the small extension downward to fully engage the two pieces, shown connected in Figure 9-3C. Once the angle is correct, the ball and socket will join together easily. **DO NOT USE FORCE.** Once the joint is made straighten the liquid end and control module then release the spring and spring guide.
4. Hold the liquid end and control module together and thread the shaft coupling onto the control module. Ensure the threads engage properly, and hand-tighten the shaft coupling onto the control module.
5. Take the replacement encoder plug. Make sure the labels on the plug and liquid end match.
6. Align the encoder plug with its slot in the head of the control module (avoid touching the bottom of the plug) and insert the plug squarely – see Figure 9-4. If power is supplied to the EDP1 and the keyboard is unlocked, the initialization sequence begins when the encoder plug is in place.
7. After the initialization sequence, look at the display. The EDP1 pipette should be in PIPETTE mode with the display reading PICKUP. The nominal volume of the liquid end is also displayed, as shown in Figure 9-5. (If your display does not show the proper nominal volume, check that the correct encoder plug is installed.)



FIGURE 9-4 REPLACING THE ENCODER PLUG



FIGURE 9-5  
DISPLAY AFTER INITIALIZATION SEQUENCE  
(E1-1000 SHOWN)

EDP1 pipettes are designed to need very little maintenance and should give years of trouble-free service if treated with proper care and the operating recommendations in this manual are followed. Also see: RAININ Publication AB-15, Procedure for Evaluating Accuracy and Precision of RAININ Pipettes, available on the Rainin website at <http://www.rainin.com/pdf/ab15.pdf>

The following rules should be strictly observed to keep the mechanism dry and clean.

1. Never allow liquid to enter the shaft where it can contact the piston or seal.
2. Never pick up liquid without a disposable tip attached.
3. Never invert EDP1 or lay it on its side with liquid in the tip. Always hold it upright.
4. Never use solvents to clean EDP1. Instead, use a lint-free wipe dampened with water to clean the instrument. Keep the keyboard and encoder plug dry.

## SEALING

Periodically each liquid end should be tested to ensure proper sealing, as follows:

1. Set the nominal volume and attach a disposable tip.
2. Pick up the full volume of water.
3. Hold the instrument upright and observe the tip for 30 to 45 seconds.

There should be no leaks from the tip or droplet formation at the tip orifice. If leakage does occur, sealing between the tip and the shaft may not be airtight.

## SHAFT AND TIP SEALING

Use only RAININ disposable pipette tips. These tips mate exactly with the EDP1 liquid end shaft to form airtight sealing, necessary for air-displacement pipettes to operate.

## PISTON SEALING

Sealing between the piston and the inside surface of the shaft is performed by a PTFE seal and a Buna O-ring. The PTFE seal extends through the O-ring, and only the PTFE seal makes contact with the piston. The O-ring compresses the PTFE seal against the piston to maintain proper sealing even after moderate wear, and also provides stationary sealing between the PTFE seal and the shaft. Figure 10.1 shows a detailed view of the liquid end, with each component separated for clarity.

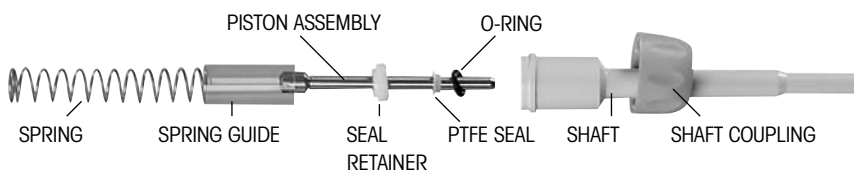


FIGURE 10-1 DETAIL VIEW OF EDP1 LIQUID END (200  $\mu$ L SHOWN)



A close-up detail of the 200  $\mu$ L piston seal assembly is shown in Figure 10-2: the seal retainer can appear very different in other models.

Periodically you should dismantle the liquid end for inspection and cleaning, as follows:

1. Remove the liquid end from the control module as described in Section 9. Do not remove the encoder plug for this procedure.
2. Pull the piston assembly out of the liquid end. The PTFE seal and o-ring should stay attached to the piston. If they remain in the liquid end, invert the liquid end and gently tap it on the bench until the seal assembly drops out.
3. Inspect the piston, PTFE seal and o-ring, seal retainer, and inside of the shaft for any dirt and particulate contamination. Do not dismantle the piston assembly any further.
4. Remove any contamination by soaking and rinsing the piston assembly with distilled water or alcohol. The piston surface should have a high-gloss finish. If the finish is dull, scratched, or pitted, the PTFE seal may wear very rapidly, and the complete piston assembly should be replaced.
5. Blow the assembly dry with clean dry compressed nitrogen, or dry it with a very soft lint-free wipe. To avoid scoring the piston, do not use rough material such as a paper towel.

**CAUTION: Never apply grease to the piston or seal assembly (except on the 5 mL, 10 mL, and 20 mL models, which use a grease seal). For EDP1 pipettes with nominal volumes below 5 mL, any grease or lubricant may alter the effective diameter of the piston and cause liquid measurement errors.**

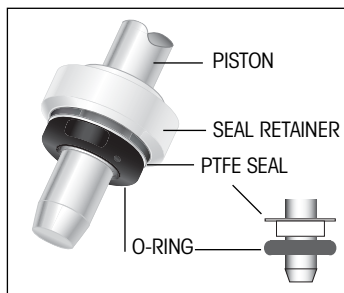


FIGURE 10-2 PISTON SEAL ASSEMBLY  
(200  $\mu$ L SHOWN)

## REASSEMBLY

1. Make sure the PTFE seal and o-ring are properly positioned on the piston.
2. Follow the procedure in Section 9 to replace the liquid end.
3. Attach a disposable tip, and test for proper sealing as described in the first part of this chapter.

## AUTOCCLAVING

The autoclavable parts of EDP1 are the shaft and the tip ejector\*: at a temperature of 121°C, pressure of 1 bar, for a maximum duration of 15-20 minutes.

**DO NOT AUTOCLAVE THE COMPLETE PIPETTE OR ANY PARTS OTHER THAN THE SHAFT AND THE TIP EJECTOR.**

**\* DO NOT AUTOCLAVE THE TIP EJECTOR ON THE 20 mL MODEL**

**Table 11-1 Troubleshooting**

Symptom	Possible Cause	Suggested Remedy*
Inaccurate liquid measurement or leaks	Bad seal between disposable tip and liquid end	Use RAININ disposable tips
	Damaged shaft end	Replace shaft.
	Inadequate seal on piston assembly	Check, clean, or replace piston seal.
"Lob" on display, warbling alarm	Insufficient charge in Battery Pack	Recharge Battery Pack; see Appendix B.
Blank display, no alarm	EDP1 is shut off	Press any top row key or <b>E</b> to turn on instrument.
	Depleted Battery Pack	Recharge Battery Pack; see Appendix B.
	Wall power supply disconnected (when not using Battery Pack)	Reconnect cord to EDP1 pipette.
Display reads "Err", warbling alarm	Illegal volume entered (will not be accepted)	Enter legal volume.
Keyboard will not accept entries, "KB locked" on LCD	Keyboard locked	Unlock keyboard by pressing <b>F 9</b> .

\* If the suggested remedy does not correct the problem, contact RAININ at 800-543-4030.

If anything confusing happens during operation of the EDP1 pipette, it can sometimes be remedied by pressing **F 0** (unless the display is flashing, indicating an entry must be completed). Pressing **F 0** returns the piston to HOME and activates the keyboard.

You can also reset the instrument by removing power, or removing and replacing the encoder plug. (The keyboard **MUST** be unlocked if you remove the encoder plug.) The pipette will restart and reinitialize. It will be in PIPETTE mode at its nominal volume after this sequence. This remedy should be used only as a last resort, since all stored information will be lost from the micro-computer and will need to be re-entered.

RAININ maintains service departments to correct any electro-mechanical problems with the EDP1 pipette, or problems resulting from physical or chemical damage. In the U.S.A. please contact Technical Service at 800-543-4030 for more information and assistance.

Outside the U.S.A. contact the RAININ distributor for your country. If you do not know the address, call International Customer Service at 001-510-564-1614, or send e-mail to [global@rainin.com](mailto:global@rainin.com).

RAININ distributors are also listed by country on the web: [www.rainin-global.com/list.html](http://www.rainin-global.com/list.html)

# Specifications

12

These manufacturer's specifications should be used as guidelines when establishing your own performance specification in accordance with ISO 8655.

EDP1 Model	Volume μL	Increment μL	Accuracy (Systematic Error)		Precision (Random Error)	
			%	μL (±)	%	μL (±)
10 μL	1	0.01	2.5	0.025	1.2	0.012
	5		1.5	0.075	0.6	0.03
	10		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	0.2
	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	0.3
	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	0.6	0.6
	500		0.8	4	0.2	1
	1000		0.8	8	0.15	1.5
2000 μL	200	2	3	6	0.6	1.2
	1000		0.8	8	0.2	2
	2000		0.8	16	0.12	2.4
5000 μL	500	10	2.4	12	0.6	3
	2500		0.6	15	0.2	5
	5000		0.6	30	0.16	8
10 mL	1 mL	10	5	50	0.6	6
	5 mL		1	50	0.2	10
	10 mL		0.8	80	0.16	16
20 mL	2 mL	20	5	100	0.6	12
	10 mL		1	100	0.2	20
	20 mL		0.8	160	0.16	32

Specifications are subject to change without notice, and apply to operation in PIPETTE mode.  
For ISO 8655 purposes, specifications can also be referred to as "Maximum Permissible Error".

## Electrical specifications

This device is intended for use only with the power sources with RAININ part numbers listed below. No other power sources may be used with this device.

Wall Power Supply Input:	6101-063	100-130 VAC 50-60 Hz (US/JAPAN)
	6100-064UX	210-260 VAC, 50-60 Hz (UK)
	6100-064EX	210-260 VAC, 50-60 Hz (EU)
Wall Power Supply Output:	All P/Ns	6 VDC 100 mA Regulated Nominal
RCS Wall Transformer Supply Input:	6101-049	100-130 VAC 50-60 Hz (US/JAPAN)
	6101-048UX	210-260 VAC, 50-60 Hz (UK)
	6101-048EX	210-260 VAC, 50-60 Hz (EU)
RCS Wall Transformer Supply Output:	All P/Ns	12 VAC 400 mA Regulated Nominal
Battery	6100-080 Ni-Cad	4.8 VDC Nominal 250 mAh Nominal

Explanation of symbols:

A - Ampere, Hz - Hertz, mAh - Milliamp Hour, VAC - Volts Alternating Current, VDC - Volts Direct Current

# Recharging the Battery Pack

A

Power is supplied to the EDP1 by either a wall power supply cord, or with a Battery Pack. A fully-charged Battery Pack will allow you to make up to 2000 full-stroke cycles before charging is needed, depending on the pipette volume range. If the Battery Pack discharges during operation, the EDP1 will sound a warning and the message "**Lob**" will be displayed. If this occurs, connect the EDP1 to a charger immediately after the current pipetting cycle. If you connect to the wall power supply, you can continue operation without interruption.

The Battery Pack can only be charged when installed in EDP1, in either of two ways:

## WALL POWER SUPPLY

Connect the wall power supply cord to the connector on the back of the control module. Connect the power supply to an AC power source with the correct line voltage as specified on the power supply. The wall power supply can recharge a completely discharged Battery Pack in about 14 hours.



FIGURE A-1  
CONNECTING  
WALL POWER  
SUPPLY

## RAPID CHARGE STAND

Connect the Rapid Charge Stand to a suitable AC power source with the correct voltage (see paragraph above). Place EDP1 on the stand so that the four contact pins engage the contact slots on the stand. The display reads "**F C**" (Fast Charge): functions are inoperative until EDP1 is removed from the stand. The Rapid Charge Stand can recharge a Battery Pack in about 90 minutes. Current is metered precisely, and the Battery Pack temperature continually monitored via a built-in sensor probe. When the Battery Pack is fully charged, the red charge indicator light on the Rapid Charge Stand goes out.



FIGURE A-2  
RAPID CHARGE  
STAND

For extended storage of the EDP1, the Battery Pack should be fully charged and removed from the instrument.

## ABOUT NICKEL-CADMIUM BATTERIES

The Battery Pack uses NiCad batteries, ideal for use in this application because they are rechargeable with a long service life. However, all NiCads can develop over time a "memory" or a propensity to seem fully charged at less than 100% of capacity. This is a gradual process unlikely to be noticed in normal usage. In the extreme, the unit could display "**Lob**" at increasingly frequent intervals after recharging for the requisite period.

To extend the life of the Battery Pack, fully drain the batteries from time to time. The low-battery alarm and the **Lob** display will alert you that it is time to recharge the batteries.

If you use a Rapid Charge Stand to rest the instrument, keep the Rapid Charge Stand unplugged until you need to recharge the batteries. (Recharging takes about 1-1/2 hours with the Rapid Charge Stand.)

EDP1 pipettes, parts and accessories can be ordered online 24/7 at [www.rainin.com](http://www.rainin.com), or by phone, mail, fax, or e-mail: **800-4-RAININ (800-472-4646)** e-mail: [pipets@rainin.com](mailto:pipets@rainin.com)

## Rainin Instrument, LLC.

7500 Edgewater Drive, Box 2160, Oakland, CA 94621-0060 • FAX 510-564-1617  
Rainin Road, Box 4026, Woburn, MA 01888-4026 • FAX: 781-938-1152  
See back page for other countries.

**Complete EDP1 Pipettes:** Includes one Control Module, one Wall Power Supply, and one Liquid End for the nominal volumes listed below.

Cat. No.	Description	
<b>LTS MODELS</b>	<b>TRADITIONAL MODELS</b>	
E1-10	SE1-10	EDP1 Electronic Pipette, 1-10 µL
E1-20	SE1-20	EDP1 Electronic Pipette, 2-20 µL
E1-100	SE1-100	EDP1 Electronic Pipette, 10-100 µL
E1-200	SE1-200	EDP1 Electronic Pipette, 20-200 µL
E1-300	SE1-300	EDP1 Electronic Pipette, 20-300 µL
E1-1000	SE1-1000	EDP1 Electronic Pipette, 100-1000 µL
E1-2000	SE1-2000	EDP1 Electronic Pipette, 200-2000 µL
E1-5000	SE1-5000	EDP1 Electronic Pipette, 500-5000 µL
E1-10ML	SE1-10ML	EDP1 Electronic Pipette, 1-10 mL
E1-20ML	n/a	EDP1 Electronic Pipette, 2-20 mL
<b>Control Module:</b>		
E1-CM	Control Module only, for all volumes	
<b>Interchangeable Liquid Ends:</b> (Each is supplied with matching Encoder Plug)		
<b>LTS MODELS</b>	<b>TRADITIONAL MODELS</b>	
E1-10LE	SE1-10LE	EDP1 Liquid End, 1-10 µL
E1-20LE	SE1-20LE	EDP1 Liquid End, 2-20 µL
E1-100LE	SE1-100LE	EDP1 Liquid End, 10-100 µL
E1-200LE	SE1-200LE	EDP1 Liquid End, 20-200 µL
E1-300LE	SE1-300LE	EDP1 Liquid End, 20-300 µL
E1-1000LE	SE1-1000LE	EDP1 Liquid End, 100-1000 µL
E1-2000LE	SE1-2000LE	EDP1 Liquid End, 200-2000 µL
<b>Replacement Battery Pack:</b>		
6100-080	Battery Pack for cordless operation. (Rechargeable by Wall Power Supply or Rapid Charge Stand.)	
<b>Rapid Charge Stand:</b>		
6101-049	Rapid Charge Stand for EDP1 Pipette, US/Japan	
6101-048UX	Rapid Charge Stand for EDP1 Pipette, UK	
6101-047EX	Rapid Charge Stand for EDP1 Pipette, Europe	
<b>Extra Wall Power Supply:</b>		
6100-063	Wall Power Supply, 100-130V, 50-60Hz, US/Japan	
6100-064UX	Wall Power Supply, 210-260V, 50-60Hz, UK	
6100-044EX	Wall Power Supply, 210-260V, 50-60Hz, Europe	

## Replacement Parts (Refer to drawings opposite)

**A: Shaft Coupling**      **B: Shaft**      **C: Tip Ejector**      **D: Piston Assembly**      **E: Spring**  
**F: Spring Guide**      **G: Seal Retainer**      **H: Seal**      **J: O-ring**

### Parts for E3-Series 10 µL to 2000 µL:

	E1-10	E1-20	E1-100	E1-200	E1-300	E1-1000	E1-2000
A	6107-063	6107-063	6107-063	6107-063	6107-063	6107-063	n/a
B	6202-064	6202-065	6202-066	6202-067	6202-425	6202-068	6202-214
C	6202-071	6202-071	6202-073	6200-156	6202-419	6200-163	6200-168
D	6100-682	6100-683	6100-684	6100-685	6100-686	6100-687	6100-688
E	6200-195	6200-197	6200-197	6200-199	6200-199	6107-108	6107-109
F	6100-680	6100-680	6100-680	6100-680	6100-680	6100-680	6100-681
G	6200-196	6200-198	6200-201	6200-200	6200-416	6107-106	6107-107
H	6200-138	6200-143	6200-150	6200-154	6200-415	6200-161	6200-166
J	6200-139	6200-170	6200-151	6200-155	6200-414	6200-162	6200-167

### Parts for SE1-Series 10 µL to 1000 µL:

	SE1-10	SE1-20	SE1-100	SE1-200	SE1-300	SE1-1000	SE1-2000
A	6107-063	6107-063	6107-063	6107-063	6107-063	6107-063	n/a
B	6200-140	6200-145	6200-147	6200-157	6200-413	6200-160	6200-169
C	6200-133	6200-144	6200-148	6200-156	6200-419	6200-163	6200-168
D	6100-682	6100-683	6100-684	6100-685	6100-686	6100-687	6100-688
E	6200-195	6200-197	6200-197	6200-199	6200-199	6107-108	6107-109
F	6100-680	6100-680	6100-680	6100-680	6100-680	6100-680	6100-681
G	6200-196	6200-198	6200-201	6200-200	6200-416	6107-106	6107-107
H	6200-138	6200-143	6200-150	6200-154	6200-415	6200-161	6200-166
J	6200-139	6200-170	6200-151	6200-155	6200-414	6200-162	6200-167

### Parts for E1 and SE1 series 5000 µL to 10 mL:

**A: Piston Assembly**      **B: Piston o-ring**      **C: Cylinder**  
**D: Cylinder o-ring**      **E: Shaft**      **F: Tip Ejector Arm**

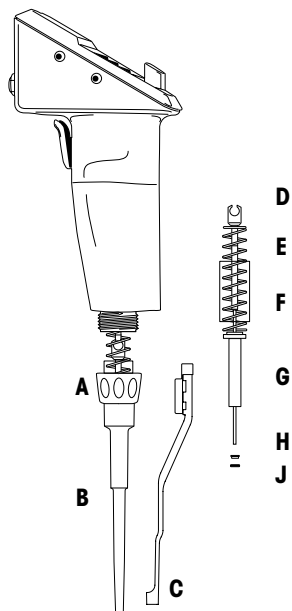
	5000 µL	10 mL	20 mL
A	6100-689	6100-690	6100-691
B	6107-112	6107-113	6202-299
C	6200-365	6200-371	6202-301
D	6200-364	6200-370	6202-300
E E1 series	6202-222	6202-223	6202-302
E SE1 series	6200-362	6200-368	n/a
F	6200-373	6200-374	6202-298

### Common parts for 5000 µL, 10 mL, and 20 mL E1 and SE1 series:

Tube of grease:	6100-555	
Filters for 5000 µL & 10 mL:	6190-164 (pkg of 100)	6190-165 (pkg of 1000)
Filters for 20 mL:	6190-221 (pkg of 100)	6190-222 (pkg of 500)

FIGURE B-1 (OPPOSITE PAGE): LINE DRAWINGS OF EDP1 MODELS SHOWING REPLACEMENT PARTS

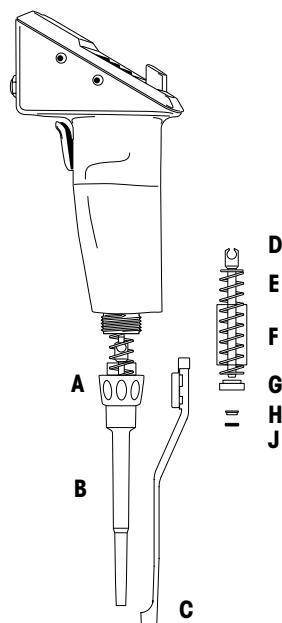
# EDP1 10 $\mu$ L and 20 $\mu$ L



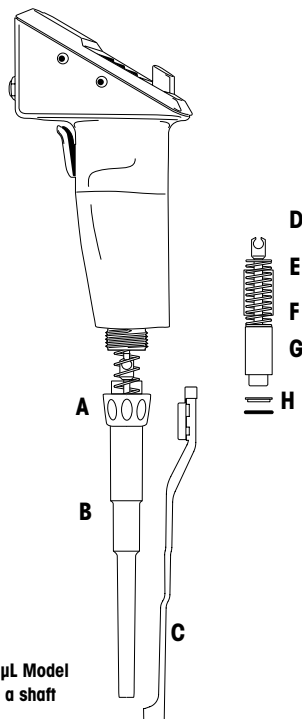
## Legend for EDP1 10 $\mu$ L to 2000 $\mu$ L Models

A: Shaft Coupling B: Shaft C: Tip Ejector  
D: Piston Assembly E: Spring F: Spring Guide  
G: Seal Retainer H: Seal J: O-ring

# EDP1 100 $\mu$ L, 200 $\mu$ L and 300 $\mu$ L



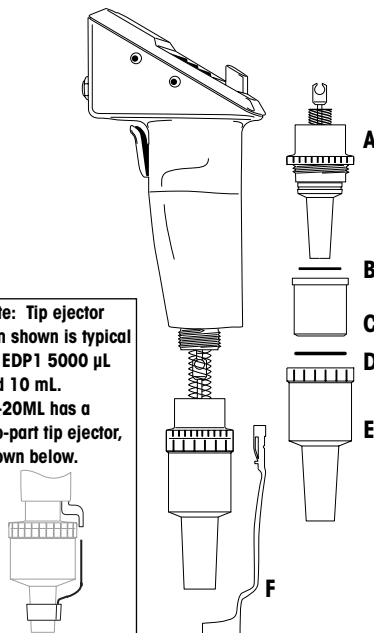
# EDP1 1000 $\mu$ L and 2000 $\mu$ L



Note: 2000  $\mu$ L Model does not use a shaft coupling

# EDP1 5000 $\mu$ L, 10 mL and 20 mL

Note: Tip ejector arm shown is typical for EDP1 5000  $\mu$ L and 10 mL. E1-20ML has a two-part tip ejector, shown below.



## Legend for EDP1 5000 $\mu$ L, 10 mL and 20 mL Models

A: Piston Assembly B: Piston o-ring C: Cylinder  
D: Cylinder o-ring E: Shaft F: Tip Ejector Arm

### 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  
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For other International Offices and Distributors: See [www.rainin-global.com](http://www.rainin-global.com)

E-mail: [global@rainin.com](mailto:global@rainin.com) Web: [www.rainin-global.com](http://www.rainin-global.com) (from outside the U.S.A.)

#### 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

**declares that the following product:**

**Product Name:** EDP1 Motorized Microliter Pipette

**Model Number:** EDP1

**Product Options:** Rapid Charge Stand, Wall Power Supply

**conforms to the following Product Specifications:**

**Safety:** EN61010-1:2001

**EMC:** FCC - 47 Part 15 Class A (Unintentional Signal Radiation)

IEC 61000-4-2, Edition 2.1 (2001) including Amds. 1&2 and EN 61000-4-2: Electrostatic Discharge Immunity Test

IEC 61000-4-3, (2002) and EN 61000-4-3: Radiated Radio-Frequency Electromagnetic Field Immunity Test

IEC 61000-4-4 (1995) + Amd. 1 (2000) & Amd.2 (2001 and EN 61000-4-4: Electrical Fast Transient / Burst Immunity Test

IEC 61000-4-5 (1995) + Amd. 1 (2000) and EN 61000-4-5: Surge Immunity Test

IEC 61000-4-6, Edition 2.0 (2003) and EN 61000-4-6: Immunity to Conducted Disturbances, Induced by Radio-Frequency Fields

IEC 61000-4-8, Edition 1.1 (2001) and EN 61000-4-8: Power Frequency Magnetic Field Immunity Test

IEC 61000-4-11 (1994) + Amd.1 (2000) and EN 61000-4-11: Voltage Dips, Short Interruptions and Voltage Variations Immunity Test

**Supplementary Information:**

**Responsible Signatory:** Jim Petrek, VP of R&D

**Date:** March, 2004

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

# RAININ

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**9920-313 Rev A**