

Eldex

**Eldex®
Universal Fraction Collector
Operator's Manual**

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INTRODUCTION

The Eldex Universal Fraction Collector

The Eldex Universal Fraction Collector is a simple and reliable instrument designed for the collection of chromatographic fractions. Fractions may be collected on a time-interval (either minutes or seconds) or on a drop-counting (with optional drop counter head) basis.

The unit accommodates five different collection racks (racks are ordered separately) and accepts tubes ranging from 13 x 100 mm (9mL) up to 50 x 200 mm (75 mL). Special racks allow the use of standard RIA vials (20 mL). Ultra-micro collections can be made on a circle of filter paper which can be supported on any rack. The available racks are listed in the Appendix.

The collection racks are rotated by a simple, patented mechanism which advances the delivery tube as the rack rotates. Collection positions are identified by a photoelectric sensor which reads a code on the bottom of each rack.

Collection intervals (selectable as minutes, seconds, or drops) from 1 to 999 are set on a three digit thumbwheel switch. The “countdown” to zero is displayed on an LED readout. When the countdown reaches zero, the rack is shifted to the next collection position. At the end of the run, the fraction collector shuts off automatically. Any sample still being fed is diverted by an overflow funnel through the hollow central shaft to a collection tube to a waste reservoir or drain.

About This Manual

Section II of this manual describes the unpacking, location, and initial installation of the Fraction Collector. Section III covers routine operation, while Section IV deals with routine maintenance and troubleshooting.

A Guided Tour of the Eldex Universal Fraction Collector

The Eldex Universal Fraction Collector consists of a single unit. The base of the unit contains the power supply, drive motor, and electronics. Timing controls are located on the front panel, while electronic and power connections are located on the rear panel. The collector rack rests on drive and support rollers on top of the base unit. Liquid flowing after sample collection has finished is diverted through a drain tube emerging from the bottom of the unit (except for the U-160 rack, which has no drain position).

As you look at the front panel of the Fraction Collector (Figure 1.1), you will see:

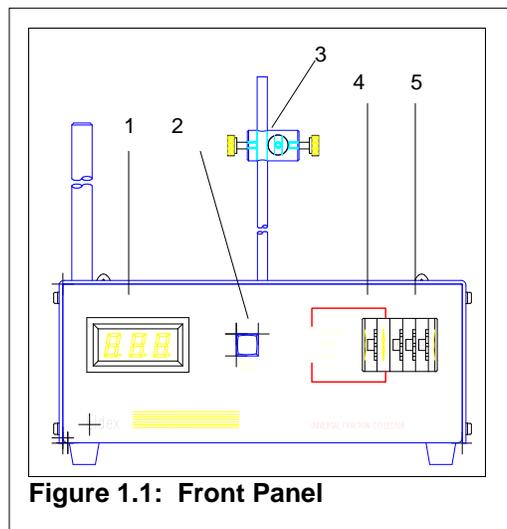


Figure 1.1: Front Panel

- 1. Countdown Display.** This three-digit LED display shows the number of units remaining in the current collection period. The display flashes when collection is complete and the rack has stopped at the last position.
- 2. Advance/Reset Switch.** Press this switch to advance the collection rack to the next position and reset the countdown timer/counter.
- 3. Tubing Guide.** Locates the outlet tubing from your column above the collection position. The Tubing Guide is mounted on a 1/4" rod attached to the carriage arm (see back panel).
- 4. Mode Selection Switch.** This thumbwheel switch selects the timing units (0 = seconds, 1 = minutes, 2 = drops (the drops setting requires the optional drop counter head for operation)).
- 5. Interval Selection Switch.** This thumbwheel switch selects the collection interval from 0 to 999 seconds, minutes or drops (as set on the Mode Selection Switch).

The rear panel of the Fraction Collector (Figure 1.2) provides access to:

1. Power Switch. Turns power to the unit ON (press the upper part of the switch, indicated by 1) or OFF (press the lower part of the switch, indicated by 0).

2. Power Connection. Accepts a standard 3-conductor modular power cord.

3. Fuse Holder.

4. Voltage Indicator. White pin shows in window indicating current operating voltage setting.

5. Carriage Arm. The Tubing Guide (or optional Drop Counter) is attached to a 1/4" rod mounted in this arm.

6. External Connection:

Marker. Provides a signal (+5 volts for 30 milliseconds; 5mA maximum current) when the fraction collector advances to the next position. This terminal may be connected to a strip chart recorder input, for example, to provide a record of collector changes.

Advance. Shorting this connection to ground (or providing a TTL active low signal) advances the collection rack to the next position and resets the countdown timer/counter. This is exactly equivalent to pressing the Advance/Reset Switch on the front panel.

Ground. This is the return side of the Marker and/or Advance connections.

7. Drop Counter Jack. Accepts connector from the optional Drop Counter head.

8. Column Support Rod.

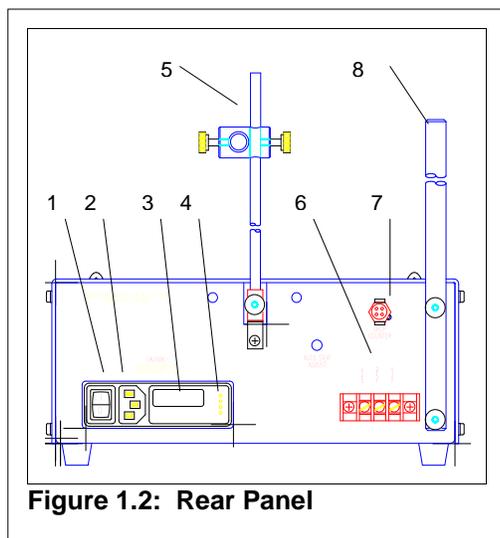


Figure 1.2: Rear Panel

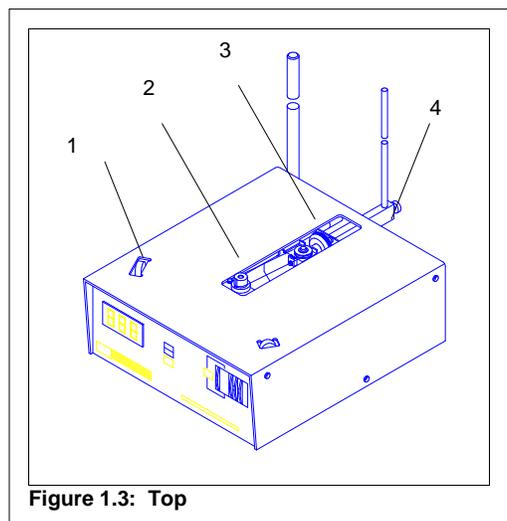


Figure 1.3: Top

The top of the Fraction Collector (shown in Figure 1.3 with the collector rack removed) contains:

1. Collector Rack Support Rollers.

2. Capstan Key.

3. Collector Rack Drive Roller.

4. Carriage Arm.

Specifications

Electrical: 1/8 A @ 120V 50/60Hz or 1/16 A @ 240V 50/60Hz

Fuses: 1/8 A slo-blo @ 120V or two 1/16 A slo-blo @ 240V

Dimensions (w x d x h): 10.25" x 16" x 11" (26cm x 40.5cm x 28cm)

Weight: 11 lbs. (5 kg)

Fractions: up to 200 (depending on rack).

Volume per fraction: up to 75 mL (depending on rack).

Operating Temperature: 4°C to 35°C

INSTALLATION

What You Will Need

Initial installation of the Eldex Universal Fraction Collector is straightforward. In addition to the Base Unit itself, you will need:

One or more collection racks of appropriate size to fit your tubes and sample volumes. These racks are not provided with the Fraction Collector Base Unit and are ordered separately. Collection racks are available to accommodate from 50 to 200 tubes or vials ranging in volume from 9 mL to 75 mL. Consult the Appendix for a list of available racks and their part numbers.

If you will be counting drops for sample collection, you will need the optional drop counter head. This is not provided with the Base Unit and is ordered separately. Consult the Appendix for the part number.

A 0.050 inch Allen wrench (provided with the Base Unit) used to change or install the capstan collar.

A medium-size “Phillips” screwdriver used to assemble the collection racks.

If you will be changing the operating voltage setting, you will also need:

A small flat-blade screwdriver used to remove the fuse holder/voltage selector cover.

A pair of long-nose pliers used to pull out the voltage selector card.

If you will be installing collection racks other than the U-136, you will also need:

A long, “Phillips” screwdriver used to adjust the auto-stop switch.

Unpacking

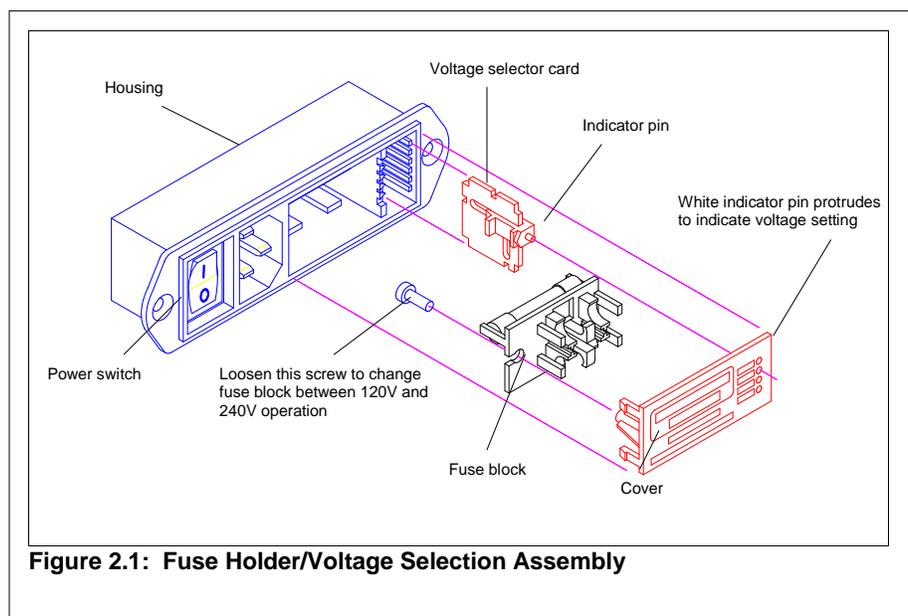
Carefully examine and open the shipping container. If there is any sign of damage to the container or the contents, contact the shipping company immediately. Remove the accessories and the Fraction Collector. Do not discard any packing material. A complete list of accessories included is provided in the Appendix. If any part is missing, contact Eldex immediately.

Location

The Fraction Collector should be placed on a clean, horizontal surface for assembly and installation. A power outlet of the appropriate line voltage should be located nearby. In addition, provision should be made to connect plastic tubing to the overflow drain outlet from the center shaft of the base unit and route the tubing to a suitable waste container or drain.

The fraction collector may be operated at temperatures ranging from normal ambient down to 4°C.

Voltage Selection and Fuse Installation



Before connecting the unit to line power, you should check to be sure that the unit is properly set for your operating voltage.

Look at the right side of the fuse holder access plate on the rear panel. A series of four vertical holes indicates four possible operating voltages: 100, 120, 220, or 240VAC. The Universal Fraction Collector can be configured to operate only at 120 or 240 volts. The white pin protruding from one of the holes indicates the voltage setting. If the voltage is correctly set for your power line, you may skip the following section on setting the voltage.

Adjusting the Operating Voltage and Fuses

If the power line has been connected, disconnect it now!

Insert the blade of a small screwdriver into the slot on the left side of the fuse cover and pry the cover loose. The fuse block is mounted on the inner side of the plate.

Fuse

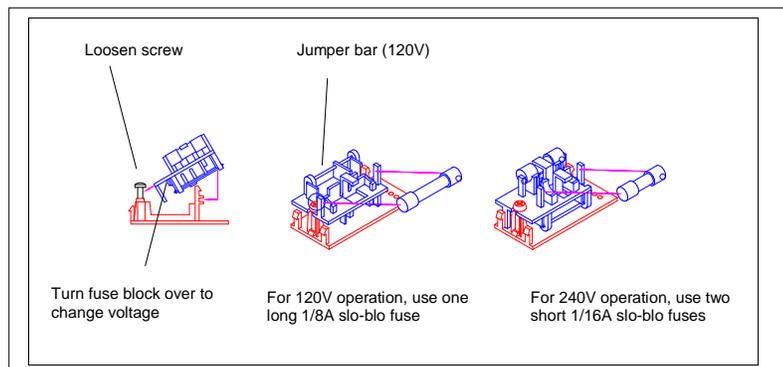


Figure 2.2: Selecting/Changing Fuses

If you will be operating at 120V, you should use a 1/8 A slo-blo long (1.25" long x 0.25" diameter) fuse (this is the normal configuration as shipped from the factory). If you will be operating at 240V, you should use two short (20 mm long x 5.2 mm diameter) 1/16 A slo-blo fuses. To change fuses, loosen the retaining screw holding the fuse block to the cover. Turn the fuse block over so that the jumper bar faces the cover, then re-tighten the retaining screw.

Voltage Setting

Use a pair of long-nose pliers to pull the voltage selector card straight out of the housing. With the indicator pin pointing straight up, orient the card so that the desired operating voltage is readable at the bottom of the card. Re-insert the card into the housing with the printed side of the card facing the power connector, and with the pin facing out. Replace the cover and verify that the indicator pin shows the correct voltage. Finally, reconnect the power cord.

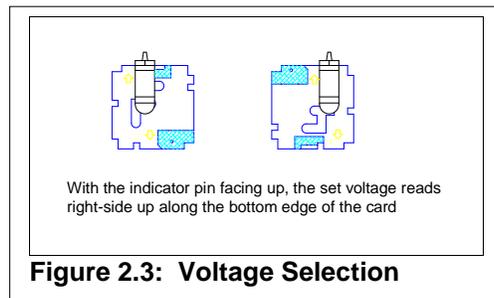


Figure 2.3: Voltage Selection

Mechanical Assembly

Assembling Tube Racks

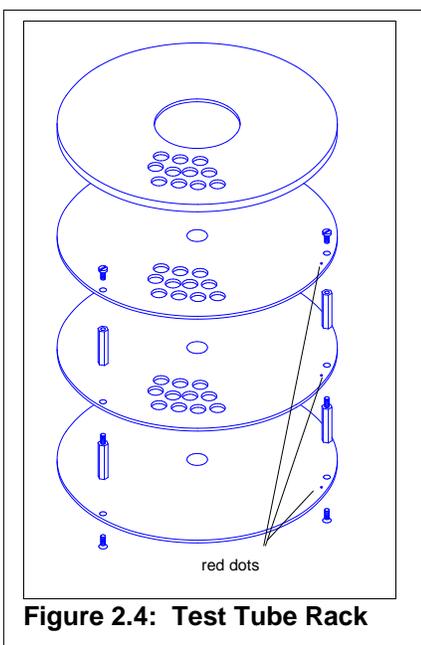


Figure 2.4: Test Tube Rack

Assemble the collector rack(s) as shown in Figure 2.4. Be sure that;

- the unit is assembled with the red dots on each plate facing up.
- the unit is assembled with all of the red dots lined up in the same orientation.

Place the solid plate (base plate) on a flat surface with the red dot facing up. Insert the flat-head screws in each hole from the bottom up. Place a long hex male-female spacer on each screw and loosely fasten the screws. Add the punched plate without numbers (if present) on top of the hex spacers with the red dot facing up and aligned with the corresponding dot on the base plate. Screw on and tighten the short female-female hex spacers. Mount the top punched plate, numbered side up so that the red dot is visible and aligned with the other two, and secure with round-head screws. Finally tighten all screws.

Now, place the plastic overflow tube in the last position (the innermost position marked "drain") on the rack. You will have to flex the plastic connector between the tube and the arm in order to get the tube in position. The drain arm from the overflow tube should be turned so that it is over the center hole in the collector rack base plate. The polypropylene distribution plate is placed on top of the tubes after the rack has been loaded with tubes.

Checking/Changing the Capstan Collar

The Eldex Universal Fraction Collector uses a patented mechanism in which rotation of the collector rack winds a cable around a capstan to pull the tube guide inward. The diameter of the capstan determines how far in the tube guide moves for each advance. Thus, the capstan diameter must be matched to the tube spacing on the collector rack.

As shipped from the factory, the Fraction Collector Base Unit is configured for use with the “standard” U-136 or U-160 rack. If you are using either of these racks, you may skip this section and proceed directly to “Mounting the Tube Guide”, following.

If you are using a different rack, you will need to change the capstan collar and the associated spacers on the carriage guide rod to the ones provided with that rack (see Table 1)

Rack	Spacers	Capstan Collar Diameter
U-200	None	.490”
U-RIA	.875”	.800”
UP-50	.875”	.800”
U-136	1.5625”	.375”

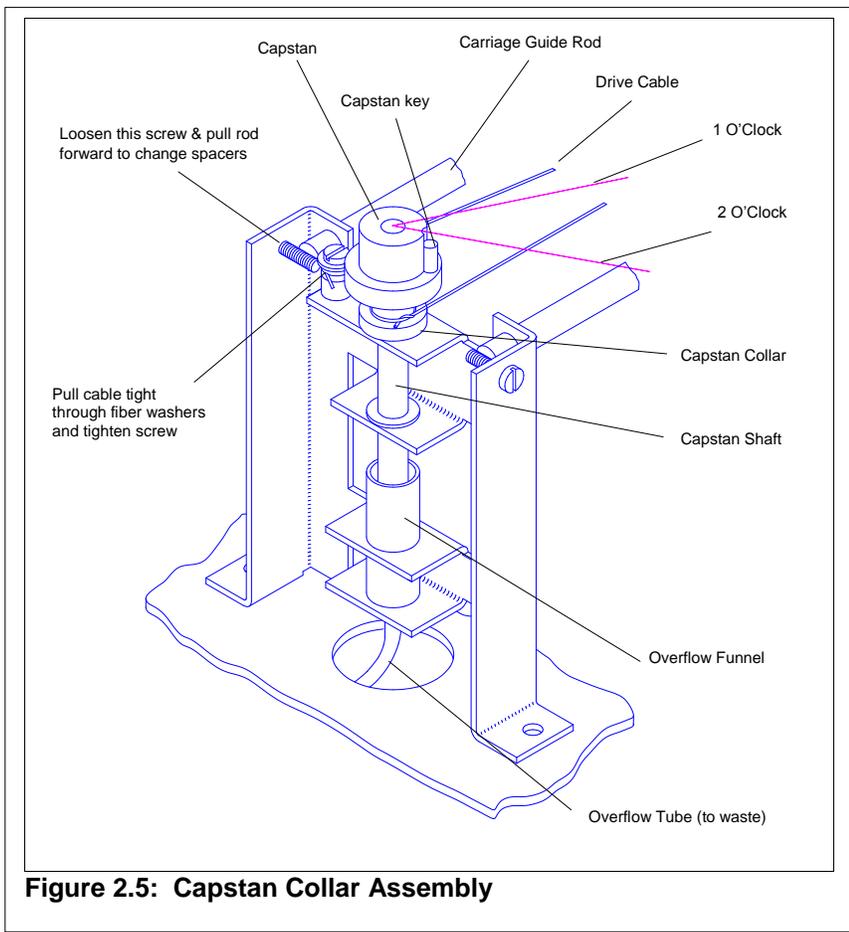


Figure 2.5: Capstan Collar Assembly

- a. Unplug the power cord.
- b. If the unit has been used, remove the tube guide. If the unit is being installed for the first time, remove the screw holding the shipping bracket to the tube guide arm on the back panel.
- c. Remove the Base Unit Cover
Loosen and remove six screws (three on each side).
Lift cover straight up.
- d. Loosen the screw that holds the cable between the two fiber washers to the left of the capstan key and thread the cable out of the pulley.
- e. Loosen the screw to the left of the front end of the carriage guide rod which carries the spacers (the left rod). Slide the rod toward the front of the unit. Remove the old spacers and replace them with the appropriate spacers provided with the rack. Slide the rod back until it engages with the support hole on the rear panel, and then tighten the screw at the front of the rod.
- f. The capstan key, capstan collar, and the capstan shaft are held in place in their bearing by a rubber O-ring beneath the lower bearing. Pull the assembly gently straight up to remove it from the bearings.

The O-ring may fall to the bottom of the unit.

- g. Use the Allen wrench provided with the Fraction Collector to loosen the set screw in the capstan collar. Pull the capstan collar down off the bottom of the shaft.
- h. Slip the new capstan collar up onto the shaft and loosely fasten the setscrew. Tighten the setscrew until the collar is a “slip-fit” on the shaft (the collar should stay in place, but you should be able to rotate it on the shaft by hand). Now rotate the capstan collar until the cable attachment is oriented 45 degrees clockwise from the pin on the capstan key (Hint: Looking down on the shaft, orient the pin at the 1 o’clock position, then adjust the capstan collar until the cable attachment is at 3 o’clock). Tighten the setscrew.
- i. Hold the O-ring under the lower bearing and re-insert the capstan assembly down through the bearings. The end of the shaft should project into the waste funnel beneath the lower bearing.
- j. Thread the cable through the pulley and between the fiber washers under the retaining screw. Orient the capstan assembly so that the cable attachment is at the 3 o’clock position and pull the cable until it is snug (until the carriage just begins to be pulled forward from contact with the spacers). Tighten the retaining screw to clamp the end of the cable firmly between the fiber washers.
- k. Replace the Base Unit Cover. Slip the cover straight down over the base unit (make sure the support rollers face the front of the unit). Replace and tighten the six screws (three on each side).

Mounting the Tube Guide

Insert the tube guide rod (1/4” diameter) into the carriage arm protruding from the rear panel of the Fraction Collector. Tighten the thumbscrew to hold the rod in place. Mount the tube guide and guide coupling assembly onto the tube guide rod. Adjust the position of the tube guide to match the particular tubes and rack you are using, and tighten the thumbscrews to hold the tube guide in place.

Lightly clamp the delivery tube from your column in the end of the tube guide using the thumbscrew provided.

Mounting the Column Support Rod

The Eldex Universal Fraction Collector is shipped with a 1/2” diameter aluminum support rod. This rod accommodates standard clamp holders and clamps to hold chromatography columns used with the fraction collector. Clamp holders and clamps are not provided with the unit; they can be obtained from any laboratory supply house.

The Column Support Rod has two holes which match the threaded holes located on the left side of the rear panel. Use the thumbscrews provided to mount the rod to the rear panel; use the washers provided as spacers between the rear of the fraction collector and the column support rod.

Mounting the Drop Counter Head (optional)

CAUTION: the optics in the Drop Counter Head are made of glass. If the Head is dropped or jarred, the glass liner may crack. A broken drop counter head cannot be repaired; it must be replaced.

If you wish to use drop counting to control fraction collectors, you must install the optional drop counter head. This head is not included with the Fraction Collector Base Unit; you must order it separately (see the Appendix).

The Drop Counter Head is mounted in place of the Tube Guide on top of the Fraction Collector. Tubing from the column should be run through the stainless steel sheath on top of the drop counter head. Adjust the tubing until it protrudes approximately 2 mm from the bottom of the sheath. The drop counter head must be adjusted so that the drops fall freely, without touching the internal wall of the drop counter head.

The connecting cable from the optional drop counter head plugs into the jack on the rear panel of the Fraction Collector Base Unit. The jack is keyed so that the connector can only fit one way (one pin is larger than the other three). Do not force-fit the connector. If it does not mate properly, check to verify that the connector is correctly oriented.

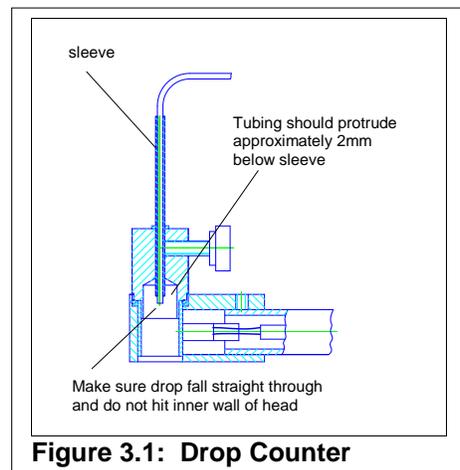


Figure 3.1: Drop Counter

Adjustment and Check-Out

Mounting the Collector Rack

- a. Place the collector rack on the capstan key (central hub). Be sure that the cutout in the center hole of the rack drops down over the pin in the capstan key.
- b. Orient the waste tube over the capstan shaft so that the end of the waste tube protrudes into the central hole in the hollow shaft.
- c. Turn on the power and allow the rack to wind clockwise until it stops at the first position. If the rack does not stop at the first tube position, check that the correct capstan has been installed (different racks are supplied with different capstans) and that the drive cable tension has been correctly adjusted according to the procedure described previously.
- d. Adjust the tube guide or drop counter over the first tube (generally, orienting the tube guide or drop counter so it is over the beginning of the first tube is best).

Adjusting the automatic stop

The automatic stop is shipped from the factory adjusted for the standard U-136 test tube rack. If other racks are used, the automatic stop will have to be re-adjusted:

- a. Turn the power OFF, then set the Mode Selector switch to 0 (seconds) and set the countdown timer to 2.
- b. Wind the rack clockwise by hand until the tube guide is aligned with the last position (generally, the one with the overflow funnel). If you feel resistance (from the adjusting screw contacting the limit switch too soon), insert the blade of a long screwdriver through the access port on the rear panel and back off several turns on the adjusting screw. Now turn on the power and press the ADVANCE/RESET switch on the front panel. The collector rack should barely move forward and then stop.

If the rack moves past the overflow funnel before stopping, turn off the power and manually wind the rack back to the next-to-last position. Use the screwdriver to adjust the screw forward. Press the ADVANCE/RESET switch and allow the rack to advance until it comes to rest. Repeat the adjustment until the rack comes to rest with the tube aligned with the overflow funnel.

OPERATION

The Eldex Universal Fraction Collector may be operated on any level surface which allows sufficient clearance for the base unit, collector rack, and tube guide carriage. The drain line connected to the hollow central shaft should be connected to flexible tubing and routed to any suitable waste reservoir or drain.

Loading Tubes

Up to 200 tubes may be loaded into a collector rack (depending on the tube size). Consult the Appendix for the available collector racks and tube sizes accommodated. If you will be using fewer tubes than the rack accommodates, you should load the tubes into the rack starting at the next-to-last position (the last position is normally reserved for the overflow funnel). This will ensure that the Fraction Collector will shut off after the last tube.

After the tubes have been loaded in the Collector Rack, place the polypropylene distribution plate over the tubes. Be sure that the spiral pattern of holes in the distribution plate aligns with the tubes in the collector rack and that the first collection position on the distribution plate coincides with the first tube in the rack.

A collector rack may be loaded with tubes before being placed on the Fraction Collector.

Timing Basis

The Eldex Universal Fraction Collector can count down on the basis of seconds, minutes, or drops. Selection of the timing mode is made with the Model Selector Switch on the front panel. Mode 0 = seconds, Mode 1 = minutes, Mode 2 = drops.

Timing

The time per fraction is set with the Interval Selection Switch on the front panel. Any three digit number (0-999) may be set. Once a tube is in position, the countdown timer is reset and countdown (in the selected units: seconds, minutes, or drops) begins. The remaining count is continuously displayed on the LED display on the front panel. When the countdown reaches zero, the Collector Rack is advanced to the next position.

Manual Advance

The rack may be advanced to the next position at any time by pressing the Advance/Reset switch on the front panel of the fraction collector. This advances the rack and initializes the countdown timer.

Changing Tube Racks

Tube racks of the same kind (e.g., standard 136 position) can be interchanged at any time. Changing to a different size rack, however, may require changing the carriage spacers and/or the capstan collar. Refer to page 9 for the complete procedure. It may also be necessary to re-adjust the autostop switch according to the procedure described on page 13.

Starting Collection

Full Collector Rack

With the power to the Fraction Collector turned OFF, place the collector rack loaded with tubes on the Fraction Collector Base Unit. Be sure that the notch on the center hole of the rack engages with the pin in the capstan key. Set the Mode Selection Switch to the desired countdown mode (0 = seconds, 1 = minutes, 2 = drops) and set the interval selection switch to the desired countdown interval (0-999 seconds/minutes/drops). Turn on the power and allow the collector rack to advance until it stops at the first collection position, then turn the power OFF again. Adjust the tube guide or drop counter head so that the sample is being delivered into the first tube (it is usually useful to position the tube guide or drop counter head so that it is oriented toward the beginning of the first position). Turn the power ON to begin collection timing.

Partially Filled Collector Rack

If you are not using enough tubes to completely fill the rack, begin loading tubes from the next-to-last position (the last position is normally occupied by the overflow funnel). This leaves the empty collection positions at the beginning of the rack. Place one tube in the first collection position. With the power to the Fraction Collector turned OFF, place the collector rack on the base unit. Be sure that the notch in the center hole of the rack engages with the pin in the capstan key. Set the Mode Selection Switch to the desired countdown mode (0 = seconds, 1 = minutes, 2 = drops) and set the interval selection switch to the desired countdown interval (0-999 seconds/minutes/drops). Turn on the power and allow the collector rack to advance until it stops at the first collection position, then turn the power OFF again. Adjust the tube guide or drop counter head so that the sample is being delivered into the tube in the first position (it is usually useful to position the tube guide or drop counter head so that it is oriented toward the beginning of the first position). Now wind the collector rack clockwise by hand until the tube guide or drop counter head is one or two positions before the tube at which you wish to begin collecting.

Turn the power ON and press the Advance/Reset button as required to bring the first collection tube into position under the tube guide or drop counter head.

External Control

If you are using a detector or data system equipped with “peak detection” circuitry, you may wish to use the detector to control fraction collection instead of relying on simple time or volume cuts. A simple cable connected to the Advance terminal on the rear panel triggers tube advance when a TTL active-low signal is received from the external detector or controller.

As an alternative, external instruments equipped with “relay” or “switch closure” terminals may be used to trigger collector rack advance by momentarily connecting the Advance terminal to Ground.

End of Run

At the last collection position (normally occupied by the overflow funnel), the fraction collector will trigger the autostop switch. Further rotation of the rack will be prevented. The countdown display on the front panel will blink, and any liquid that continues to be delivered from the column will be diverted to waste through the overflow funnel.

MAINTENANCE

The simple, reliable design of the Eldex Universal Fraction Collector minimizes the requirements for routine maintenance and service. The following maintenance operations need to be carried out if operation becomes erratic (see the Troubleshooting section for more details on diagnosing operation problems).

Cleaning Collector Racks

The Eldex Universal Fraction Collector identifies the collection positions by means of a photosensor which “reads” the presence of black bars on the bottom of the collector rack. If the bottom of the rack becomes dirty, the sensor may be unable to reliably detect the location of the bars resulting in erratic operation.

The bottom of the collector rack should be cleaned once a month (more frequently if used in a dirty environment) using rubbing alcohol or a solution of dishwashing detergent in water and a soft cloth. Do not use abrasive cleaners or bleaching agents! Dry the bottom of the rack carefully before replacing it on the fraction collector.

While you are cleaning the bottom of the rack, examine it carefully for scratches or damage to the black coding bars.

Cleaning Photosensor

After long usage, the photosensor may become dirty and cause erratic operation. The photosensor may be cleaned with a cotton swab moistened with a small amount of rubbing alcohol.

Autostop Adjustment

When you change from one type of rack to another, you may have to re-adjust the autostop switch.

Turn the power OFF, then set the Mode Selector Switch to 0 (seconds) and set the countdown timer to 2.

Wind the rack clockwise by hand until the tube guide is aligned with the last position (the one with the overflow funnel). If you feel resistance (or hear the switch) from the adjusting screw contacting the limit switch too soon, insert the blade of a long screwdriver through the access port on the rear panel and back off several turns on the adjusting screw. Now turn on the power and press the Advance/Reset switch on the front panel. The collector rack should barely move forward and then stop. If the rack moves past the overflow funnel before stopping, turn off the power and manually wind the rack back to the next-to-last position. Use the screwdriver to adjust the screw forward. Press the Advance/Reset switch and allow the rack to advance until it comes to rest. Repeat the adjustment until the rack comes to rest with the tube aligned with the overflow funnel.

Replacing Drive Wheel

After prolonged use (especially in an atmosphere containing ozone or other oxidizing agents), the rubber “tire” on the drive wheel may lose its flexibility. To replace the tire, simply pry the old tire off the drive wheel with the blade of a small screwdriver and pull the tire out through the gap between the drive wheel and the rear of the carriage assembly. To install the new tire, simply reverse the removal process.

APPENDIX

Standard Accessory Kit

The Eldex Universal Fraction Collector as shipped from the factory, contains the following:

1 each Fraction Collector Base Unit

1 each Modular Power Cord

1 each 1/4" Diameter Rod

1 each Tubing Guide

1 each Column Support Rod

1 each 0.050-inch Allen Hex Wrench

Spare Parts and Accessories

- 1046 DC-1 Drop Counter Head
- 1047 U-136 Test Tube Rack for 135 test tubes, 13 x 100 mm (9mL)
- 1048 U-200 Test Tube Rack for 200 test tubes, 16 x 150 mm (22mL) or 18 x 150 mm (28mL)
- 1049 UP-50 Preparative rack for 50 test tubes, 25 x 200 mm (75mL)
- 1050 URIA-50 RIA rack for 50 vials, 20mL, less scintillation vials
- 1093 Extra polypropylene distribution plate for U-136 rack
- 1094 Extra polypropylene distribution plate for U-160 rack
- 1095 Extra polypropylene distribution plate for UP-50 and URIA-50 racks
- 1096 Extra polypropylene distribution plate for U-200 rack

Warranty

Eldex Fraction Collectors are guaranteed against failure due to manufacturing defects for 12 months from the date of shipment. Both parts and labor are covered under the warranty.

The warranty does not apply when there has been obvious misuse or mistreatment by the user, when damage has been caused by attempted repairs by unauthorized personnel, or when the unit has been exposed to corrosive or other inappropriate chemicals.

Return Procedure

To return an instrument for repair, contact our factory at (800)969-3533 or (707)224-8800 to obtain authorization. Describe the problem with the instrument to our factory personnel and receive a Return Authorization Number. Reference the number on the outside of the packing box in which you return the instrument. Also reference the Return Authorization Number on any paperwork you send with the unit. Be sure to enclose a brief note describing the problems, reference the serial number of the unit, and describe any chemicals used. Also reference your return address. Send the instrument freight prepaid to:

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Napa, CA 94558-6278

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