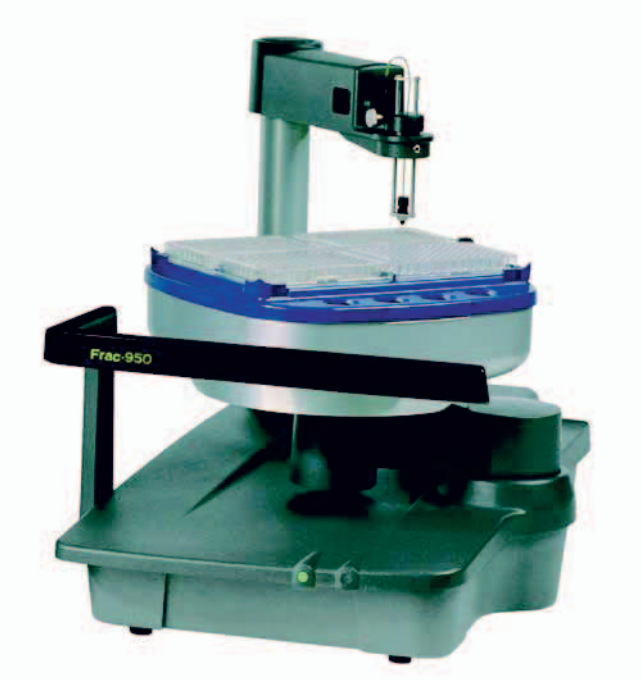
GE Healthcare

Fraction Collector Frac-950

User Manual



ÄKTA

Important user information

All users must read this entire manual to fully understand the safe use of Fraction Collector Frac-950 User Manual.

Important!

Fraction Collector Frac-950 User Manual is intended for research use only, and should not be used in any clinical or in vitro procedures for diagnostic purposes.

Safety notices

This manual contains warnings and cautions concerning the safe use of the product. See definitions below.

WARNING! The WARNING symbol and notice highlight instructions that must be followed to avoid personal injury. Do not proceed until all stated conditions are clearly understood and met.

CAUTION! The CAUTION notice highlights instructions that must be followed to avoid damage to the product or other equipment. Do not proceed until all stated conditions are met and clearly understood.

***Note**: A Note is used to indicate information that is important for trouble-free and optimal use of the product.*

Recycling

This symbol indicates that the waste of electrical and electronic equipment must not be disposed as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer for information concerning the decommissioning of equipment.

WARNING! This is a Class A product. In a domestic environment, it might cause radio interference, in which case the user might be required to take appropriate measures.

WARNING! All repairs should be done by personnel authorized by GE Healthcare. Do not open any covers or replace parts unless specifically stated in the instructions.

CE-certification

This product complies with the European directives listed below, by fulfilling corresponding standards. A copy of the Declaration of Conformity is available on request.

- 73/23/EEC, Low Voltage Directive
- 89/336/EEC, EMC Directive

The **CE** logo and corresponding declaration of conformity, is valid for the instrument when it is:

- used as a stand-alone unit, or
- connected to other CE-marked GE Healthcare instruments, or
- connected to other products recommended or described in this manual, and
- used in the same state as it was delivered from GE Healthcare except for alterations described in this manual.

***Note:** The Declaration of conformity is valid only for systems that are marked with the **CE** logo:*

CE

Contents

1 Introduction

About this manual

This manual comprises two parts; a practical part (sections 1 to 5) and a reference part (Appendix A). Sections 1 to 5 contain the necessary information for operating the instrument.

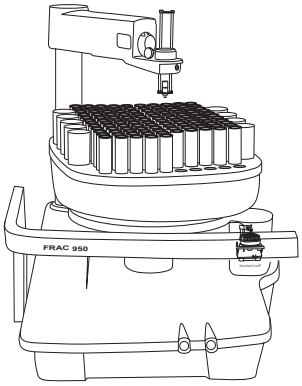
1.1 General

Fraction Collector Frac-950 is a fraction collector for use in ÄKTA™ design chromatography systems. It is intended to be operated as an integrated part of an ÄKTA design chromatography system running UNICORN™ software. Version 3.21 or higher is needed for standard mode, 4.0 or higher for prep mode. For ÄKTAmicro™, UNICORN version 5.0 or later is recommended.

Frac-950 is equipped with an accumulator to eliminate spillage at high flow rates. A drop sensor that can be used to control tube change at low flow rates is also included.

Frac-950 is delivered with one standard mode rack. Different types of racks accommodating different sizes and types of tubes are available as options (see section 2.3 for details).

Accessories for collecting extra large fraction volumes in prep mode are also available (see section 2.3 for details).



Standard mode

Figure 1-1. Fraction collector Frac-950, standard mode.

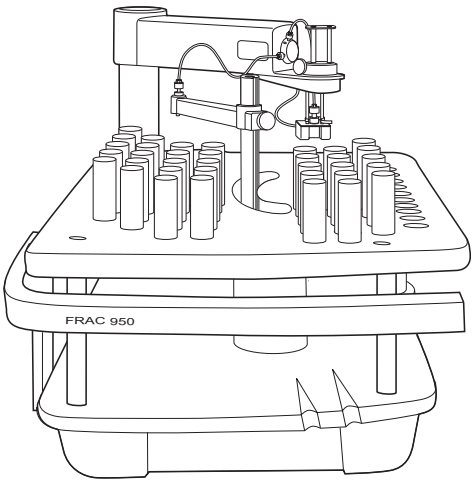


Figure 1-2. Fraction collector Frac-950 prep mode.

Frac-950 features:

- Collection of up to 392 fractions

  -time or volume base

  -fixed volume and/or peak fractionation

  -fixed capillary tip - moving rack (standard mode)

  -fixed rack - moving capillary tip (prep mode)

- Fractionation order:

  -row-by-row

  -column-by-column

  -serpentine-row

  -serpentine-column

- Choice of six different collecting racks–four for standard mode collection and two for preparative (prep) mode. One 18/30 mm tube rack for standard mode collection is supplied with Frac-950. The others are optional accessories.

- Two different methods for reducing spillage during tube change: DropSync or Accumulator.

1.2 Safety

IMPORTANT! Frac-950 is intended for laboratory use only, not for clinical or in vitro use, or for diagnostic purposes.

- The unit is designed for indoor use only.
- Do not use in a dusty atmosphere or close to spraying water.
- Operate in accordance with local safety instructions.

WARNING! Pinch hazard. Do not have any part of your body within the unit base area when Frac-950 is switched on. An automatic calibration process starts when Frac-950 is connected to UNICORN. During calibration, the dispenser arm moves rapidly. Several beeps are heard before the calibration procedure starts.

WARNING! Be sure to fold down the safety bar whenever the rack holder is operated by hand. This blocks the rack holder from accidentally moving while the rack is moved by hand or replaced.

WARNING! The unit must be connected to a grounded mains socket.

WARNING! When using hazardous chemicals, all suitable protective measures, such as protective glasses, must be taken.

WARNING! When using hazardous chemicals, take care to avoid spillage during fraction collection, when the rack holder is moved by hand and when the rack is replaced.

WARNING! The unit must not be opened by the user. It contains high voltage circuits that can deliver a lethal electric shock.

WARNING! When using hazardous chemicals, take all suitable protective measures, such as wearing protective glasses and gloves resistant to the chemicals used. Follow local regulations and instructions for safe operation and maintenance of the system.

CAUTION! Always lift Frac-950 by the base unit, NEVER by the safety bar, delivery arm or rack holder, as this may damage the unit.

2 Installation

2.1 Unpacking

Unpack the unit and check the items against the supplied packing list. Inspect the items for obvious damage which may have occurred during transportation.

Retain all packing materials if onward transport of the unit is expected.

CAUTION! Always lift Frac-950 by the base unit, NEVER by the safety bar, delivery arm or rack holder, as this may damage the unit.

To make it easier to move Frac-950 on the laboratory bench, first lift the front (approx. 30°) and tilt the unit until the rubber feet clear the bench. Then move the unit to the desired location.

2.2 General precautions

The unit should not be installed in a corrosive atmosphere.

The unit should be located in a place of low temperature variations, away from heat sources, draughts and direct sunlight.

The unit may be operated at temperatures in the range +4 °C to +40 °C.

The unit should be installed on a stable laboratory bench. The recommended position for Frac-950 is immediately to the right of the ÄKTA design chromatography system, as shown in the example below.

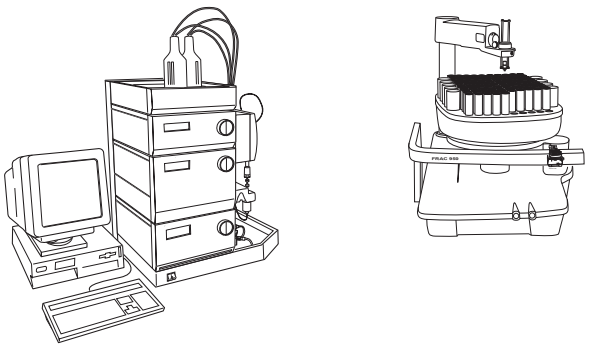


Figure 2-1. Frac-950 placed together with an ÄKTA design system

2.3 Assembling tube racks

There are four standard mode racks and two prep mode racks available, as shown in the following table. Each rack type has its own logical rack definition in UNICORN.

Rack designation	Rack Type	Color	Tube combination	Max Tubes	Max tube height
	Standard mode				
A	18 mm[1] and 30 mm tubes	Yellow	12 × 10 pos. 18 mm tubes 2 × 4 pos. 30 mm tubes	120 8	115 mm 130 mm
B	12 mm tubes	Violet	16 × 15 pos. 12 mm tubes	24	100 mm
C	Microplates 96[2] and 30 mm tubes	Blue	4 × 96-well microplates 2 × 4 pos. 30 mm tubes	38 8	30 mm 136 mm
D	30 mm tubes	Red	45 pos. 30 mm tubes	45	115 mm
	Prep Mode				
E	30 mm tubes	Yellow	80 pos. 30 mm tubes	80	115 mm
F	250 ml bottles	Green	20 pos. 250 ml bottles	20	180 mm
G	30 mm funnels[3] funnel-to-flask	Yellow	30 pos. 30 mm funnels	30	

[1] 18 mm refers to the diameter of the collar of the actual tube. The diameter of the hole is around 17 mm.

[2] The following manufacturers microplates are tested and approved by GE Healthcare for use with this rack type:
Greiner low: 655101, 651101, 650101
Greiner high: 780201
Nunc low: 143761, 168055, 156545, 163320
The difference between these microplates is the bottom shape and that a lid is included in some cases. All have 96 wells.

[3] The funnel-to-flask rack is actually the prep mode 30 mm tube rack but only 30 of the 80 holes are filled with funnels.

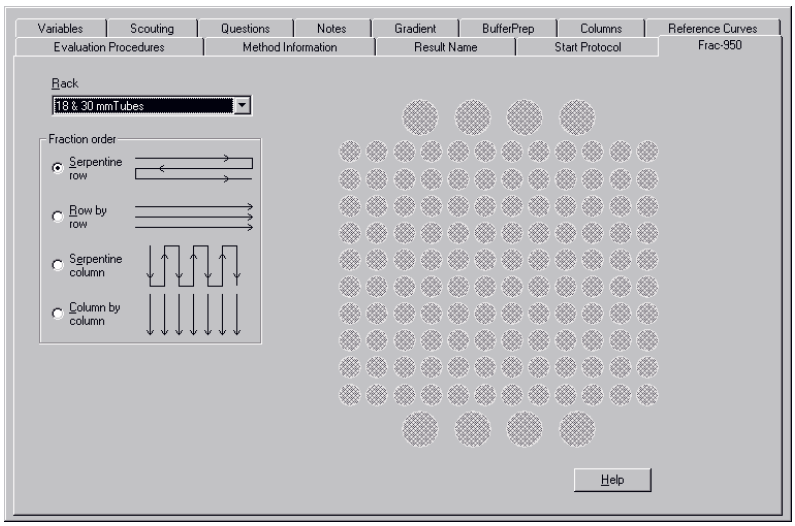
Frac-950 is delivered with rack type A, 18 and 30 mm tubes. The other rack models are available as accessories.

Note: *18 mm refers to the diameter of the collar of the actual tube. The diameter of the hole is around 17 mm.*

Note: *Installing prep mode racks requires a Prep mode conversion kit, see 2.11 Changing from standard mode to prep mode.*

Figures 2–2, 2–3, 2–4 and 2–5 show the tube patterns for the seven different logical rack definitions available in UNICORN.

Rack A: 18 and 30 mm tubes, yellow



Rack B: 12 mm tubes violet

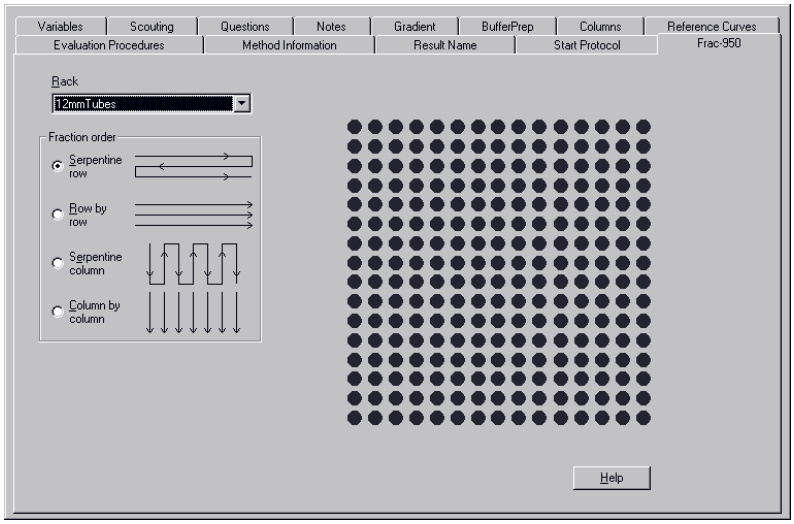
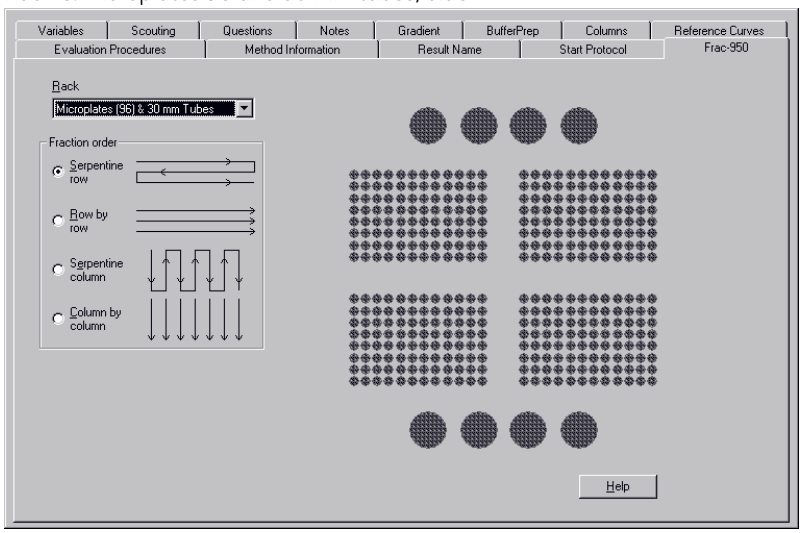


Figure 2-2. Tube patterns as shown in UNICORN Method editor

Rack C: Microplates 96 and 30 mm tubes, blue



Rack D: 30 mm tubes, red

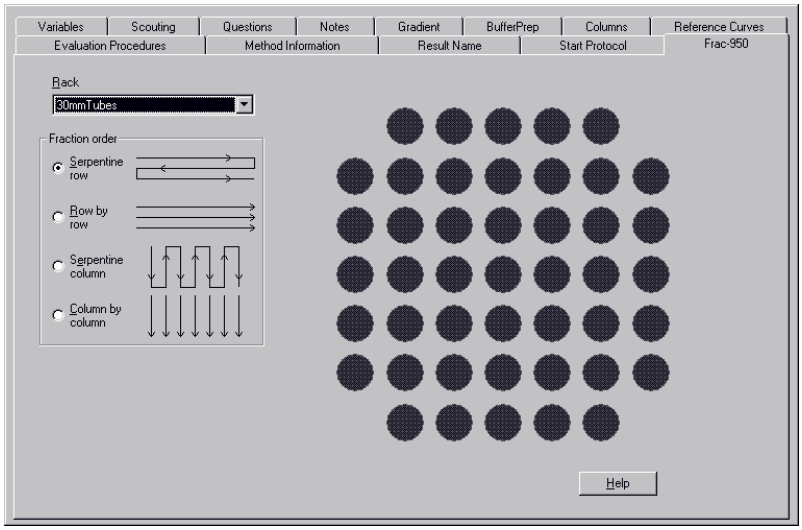
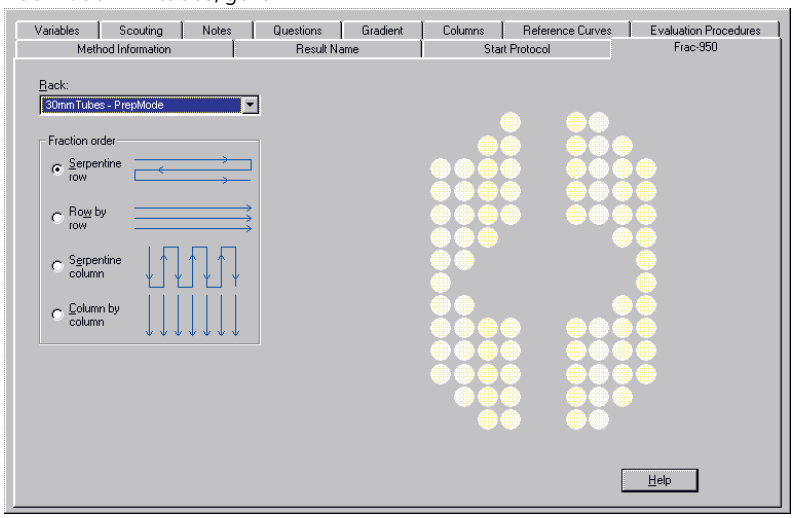
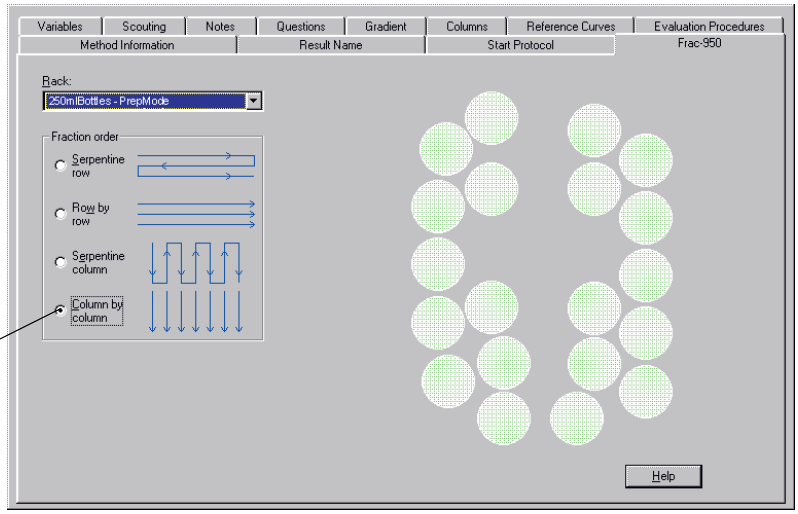


Figure 2-3. Tube patterns as shown in UNICORN Method editor

Rack E: 30 mm tubes, yellow



Rack F: 250 ml bottles, green



The only available option for this rack type

Figure 2-4. Tube patterns as shown in UNICORN Method editor

Rack G: 30 mm funnels, funnel to flask, yellow

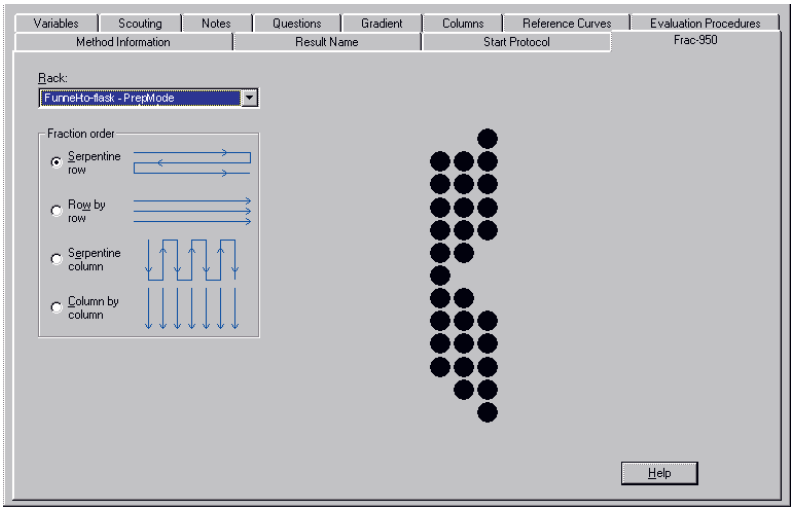


Figure 2-5. Tube patterns as shown in UNICORN Method editor

Assembling standard mode racks

A complete standard mode rack model assembly consists of a bowl, a tube support and a tube holder as shown in Figure 2-6.

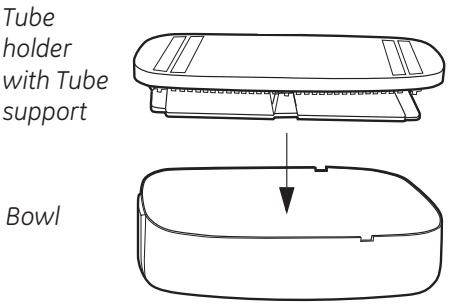


Figure 2-6. Rack model 18 and 30 mm tube parts

1 Push the tube holder and tube support combination onto the bowl, noting the keying guides on the bowl. The surface of the holder should be level.

2 All other standard mode rack models are assembled in a similar way

Assembling prep mode racks

A complete prep mode rack model assembly consists of a rack, 4 rack legs and a bar.

Note: *Place the legs with guide pins towards the side with the bulge.*

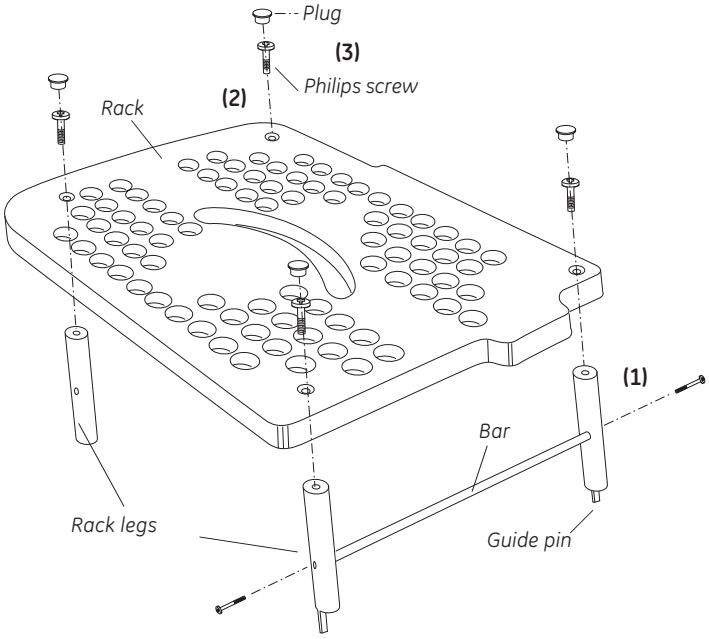


Figure 2-7. Assembling Rack model 30 mm tubes.

Assemble the rack as shown in Figure 2-7.

1 Fasten the two rack legs with guide pins to the bar using the supplied screws (1).

2 Fasten all rack legs to the rack using the Phillips screws (2). Put the plugs in place (3).

2.4 Installing a tube rack

Installing a standard mode tube rack

1 Make sure the safety bar is folded down.

2 Fit the rack to the rack holder using the keying guide on the holder to position it correctly, see Figure 2–8. Turn the rack on the holder until it snaps firmly in position.

Note: *The rack is kept in place on the holder with magnetic force.*

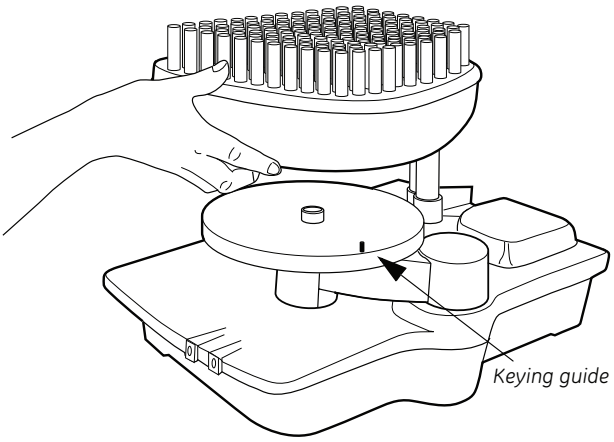


Figure 2-8. Fitting the rack to the rack holder.

3 Check that the tube numbering text on the tube holder is readable from left-down.

4 Insert tubes gently in the tube holder as desired making sure the tubes are inserted completely.

5 Fold up the safety bar.

Installing a prep mode tube rack

Note: *Installing the prep mode racks requires a Prep mode conversion kit. See section 2.11 "Changing from standard mode to prep mode".*

2.5 Installing capillaries

General

Frac-950 is delivered with capillaries to suit all ÄKTA design systems. Select the capillaries to suit your ÄKTA design system:

Tubing i.d. mm	Material/color	ÄKTA design system
0.15	PEEK/Purple	ÄKTAmicro
0.25	PEEK/Blue	ÄKTAexplorer™10 ÄKTApurifier™10
0.50	PEEK/Orange	ÄKTAexplorer 10/100 ÄKTApurifier 10/100 ÄKTAFPLC™
0.75	PEEK/Green	ÄKTAexplorer 100 ÄKTApurifier 100 ÄKTAFPLC
1.00	PEEK/Beige	ÄKTAexplorer 100

The capillaries are fitted with standard ÄKTA finger-tight connectors, code no. 18-1112-55.

Using Frac-950 for micro fraction collection

See chapter 4 for detailed information on micro fraction collection with Frac-950 in combination with ÄKTAmicro.

Using Frac-950 with DropSync

See section 3.10 for recommendations on when to use DropSync. To install the capillary:

1 Connect a green capillary from the chromatographic system outlet. Use a standard ÄKTA connector. Tighten with your fingers only.

   Note: *For ÄKTAexplorer and ÄKTApurifier, this is port 2 on the outlet valve. For* ÄKTAFPLC *in standard configuration, this is the outlet from the Flow restrictor FR-904.*

2 Use the standard ÄKTA connector on the DropSync unit to connect the free end of the capillary to Frac-950 as shown in Figure 2–9.

3 Loosen the knurled screw to lower the DropSync unit to improve access. Thread the capillary end through the DropSync unit and the finger-tight connector.

4 Allow the capillary end to stick out approximately 2 mm (indicated on the DropSync unit plastic housing) and tighten with your fingers only. The capillary end should be straight and cleanly cut.

5 Adjust the height of the DropSync unit to suit the height of the tubes to be used. Fasten the knurled screw.

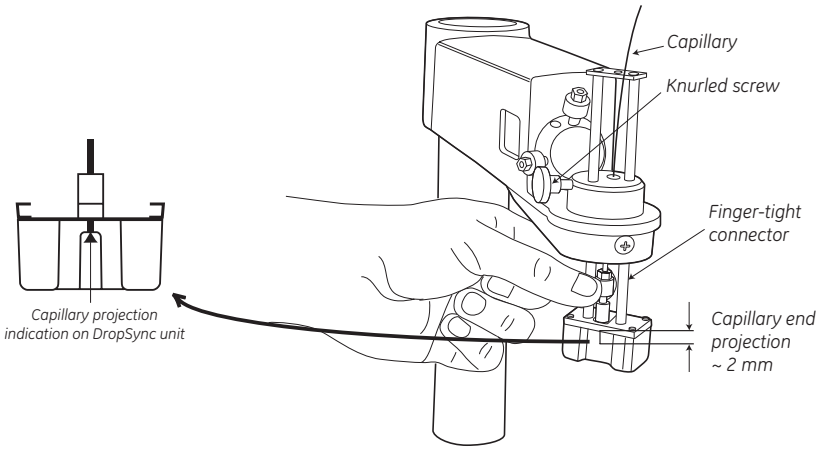
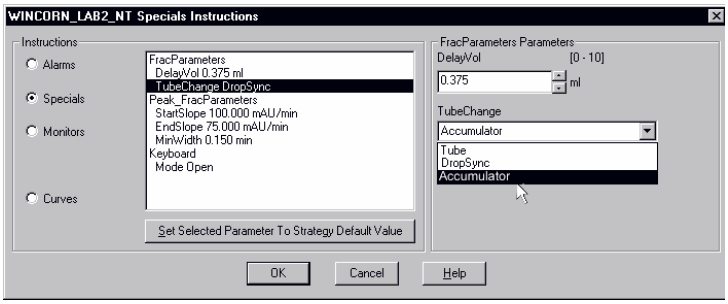


Figure 2-9. Installing a capillary with Dropsync.

CAUTION! The DropSync unit will be damaged if it is positioned below the tube rims.

6 Set operation parameters as follows

- Go to ***System:Settings:Specials*** in UNICORN.



- In ***FracParameters***, change the ***DelayVol*** parameter. The ÄKTA design Optional Configurations User Manual for each ÄKTA design system describes how to calculate the parameter values.
- Select ***Tube*** or ***DropSync*** as ***TubeChange*** parameter.

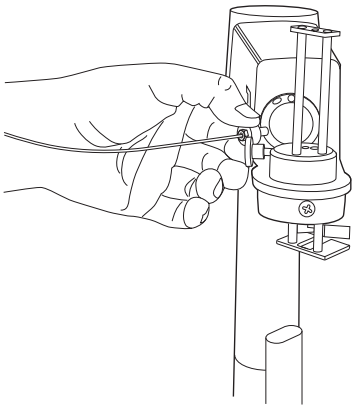
Using Frac-950 with the accumulator

See section 3.10 for recommendations on when to use the accumulator.

1 Connect a capillary from the chromatographic system outlet. Use a standard ÄKTA connector. Tighten with your fingers only.

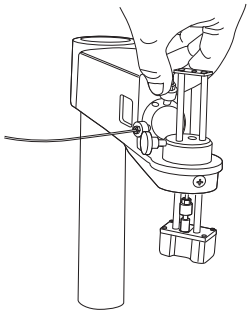
Note: *For ÄKTAexplorer, this is port 2 on the outlet valve. For ÄKTApurifier and* ÄKTAFPLC *in standard configuration, this is the outlet from the Flow restrictor.*

2 Connect the free end of the capillary to the lower port on the valve manifold in the delivery unit on Frac-950.



3 Connect another capillary to the upper port on the valve manifold in the delivery unit on Frac-950.

Note: *A capillary running from the upper connector on the accumulator manifold to the DropSync unit is fitted at the factory. This is a PEEK i.d. 0.75 mm, green, 250 mm long capillary.*
If this capillary needs to be replaced, follow the instructions in steps 3 and 4.



4 Use the standard ÄKTA connector on the DropSync unit to connect the free end of the capillary as shown in Figure 2-9.

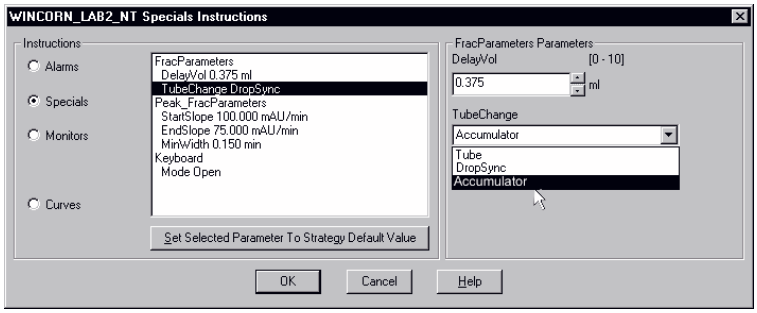
5 Loosen the knurled screw to lower the DropSync unit to improve access. Thread the capillary end through the DropSync unit and the finger-tight connector.

6 Allow the capillary end to stick out approximately 2 mm and tighten with your fingers only. The capillary end should be straight and cleanly cut.

7 Adjust the height of the DropSync unit to suit the height of the tubes to be used. Fasten the knurled screw.

8 Set operation parameters as follows:

- Go to ***System:Settings:Specials*** in UNICORN.



- In ***FracParameters,*** change the ***DelayVol*** parameter. The ÄKTA design Optional Configurations User Manual for each ÄKTA design system describes how to calculate the parameter value.
- Select ***Accumulator*** as ***TubeChange*** parameter.

2.6 Waste handling

1 Connect the supplied waste tubing to the waste outlet as shown in Figure 2-10.

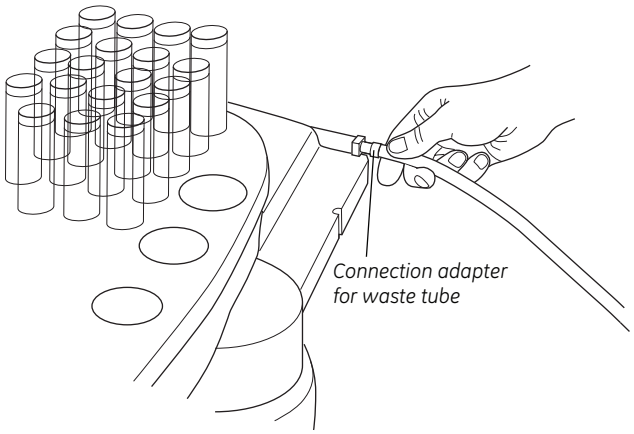


Figure 2-10. Waste tubing connection.

2 Place the free end of the waste tubing in a suitable container.

Note: *For ÄKTApurifier systems with no outlet valve, and for* ÄKTAFPLC*, this waste outlet is used for all liquid waste after the column.*

All other system configurations use port F1 on the outlet valve for liquid waste after the column, except for peak fractionation during which the Frac-950 waste is used between peaks.

To empty the waste tube completely, loosen the waste tube from the cable recess and lower it.

2.7 Connecting electrical signal cables

At delivery, the DropSync and the Accumulator cables are packed in a plastic bag.

See Figure 2–13 to locate the connectors on the rear panel of Frac-950.

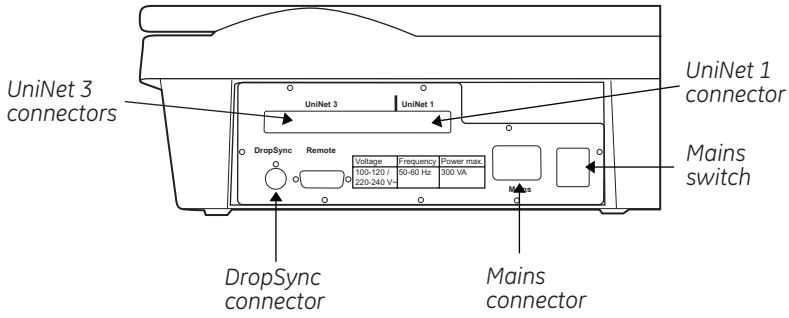


Figure 2-11. Frac-950 rear panel with connectors

DropSync connector

To locate the DropSync connector, see Figure 2–13.

Run the cable from the DropSync unit in the cable recess in the delivery arm and down the rear of the circular stand as shown in Figure 2–14 and connect it to the DropSync connector.

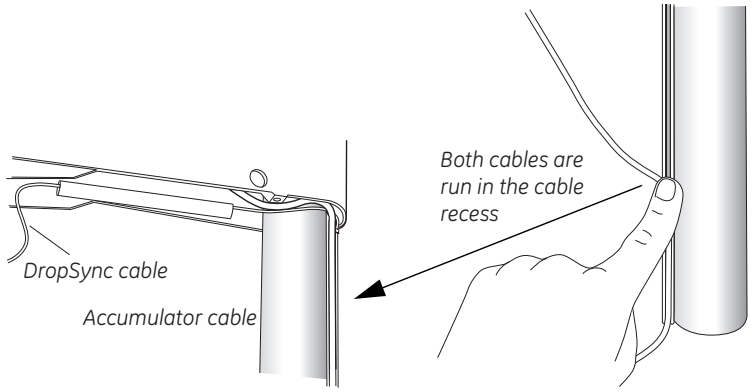


Figure 2-12. Cable runs for the DropSync unit and accumulator cables.

Accumulator connector

To locate the UniNet-3 connector, see Figure 2-11.

Run the cable from the Accumulator unit in the cable recess in the delivery arm (see Figure. 2-14) and connect it to one of the UniNet-3 connectors.

2.8 Connecting to a UniNet 1 communication link

Frac-950 is controlled from a PC running UNICORN version 3.2 or higher using UniNet 1 cables (Prep Mode requires version 4.0). For ÄKTAmicro, UNICORN version 5.0 or later is recommended.

CAUTION! The mains power to the ÄKTA design chromatography system must be switched OFF before connecting Frac-950 to the UniNet 1 link.

1 Disconnect the UniNet 1 cable running from your ÄKTA design system to the computer.

2 Run a new UniNet 1 cable (included) from the ÄKTA design system to one of the UniNet 1 connectors in Frac–950. The example in Figure 2-13. shows connection to an ÄKTAexplorer system.

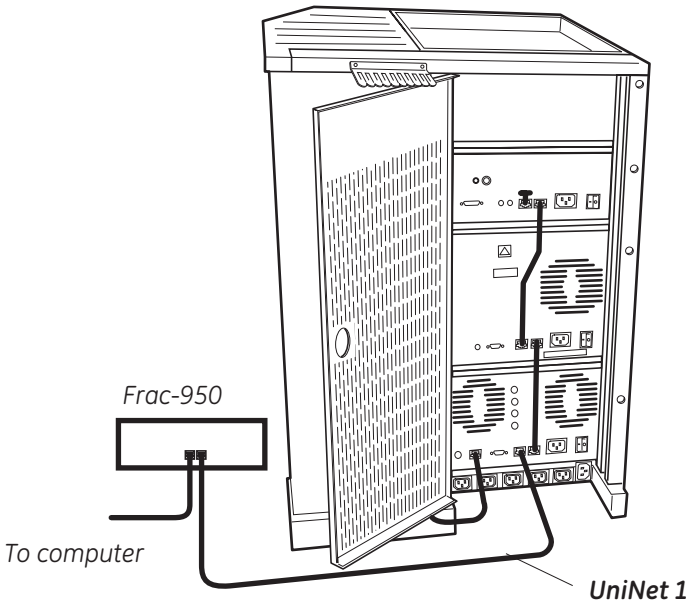


Figure 2-13. Connecting Frac-950 UniNet 1 to an ÄKTAexplorer system.

3 Connect the UniNet 1 cable running to the computer to one of the free UniNet 1 connectors in Frac–950.

2.9 Connecting to a supply voltage

WARNING! The unit must be connected to a grounded mains socket.

WARNING! Only use mains cables delivered or approved by GE Healthcare.

To locate the Mains connector in Frac-950, see Figure 2–13.

Any mains voltage of 100 to 120/220 to 240 V AC, 50 to 60 Hz can be used.

Connect the supplied mains cable between Frac-950 and a mains socket at the rear of the ÄKTA design chromatography system. The example in Figure 2-14. shows connection to an ÄKTAexplorer system.

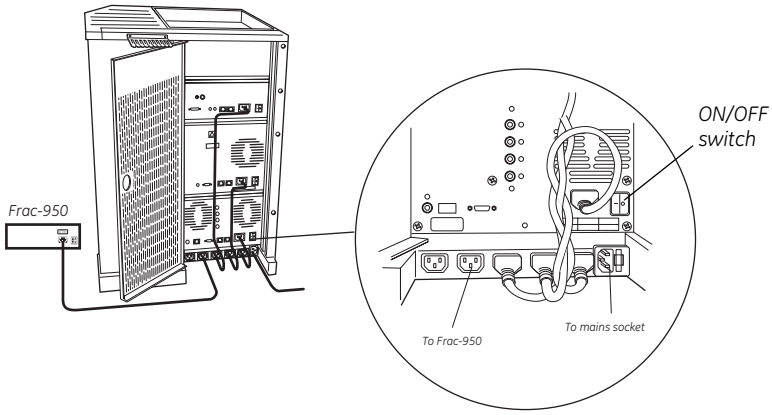


Figure 2-14. Connecting Frac-950 mains supply to an ÄKTAexplorer system.

Note: *Frac-950 contains no user replaceable fuse.*

WARNING! Do not block the rear panel of the system. The ON/OFF switch must always be easy to access.

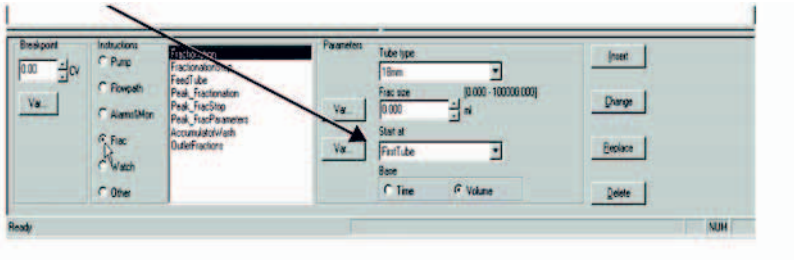
WARNING! The computer should be installed and used according to the instructions provided by the manufacturer of the computer.

2.10 Inserting collection tubes

WARNING! Be sure to fold down the safety bar whenever the rack holder is operated by hand. This blocks the rack holder from accidentally moving while the rack is moved by hand or replaced.

Insert sufficient collection tubes into the rack, gently pushing each one down as far as it will go.

The starting position can be freely selected. This is stated in the method editor or manually in instruction Fractionation using parameter ***Start at***.



2.11 Changing from standard mode to prep mode

General

Using the Frac-950 in prep mode means that the rack is fixed and that the dispenser arm moves. The prep mode is suitable for collecting extra large fraction volumes.

- There are several accessories available for prep mode:
- The Prep mode conversion kit includes a rotary shaft with a dispenser arm. This kit is necessary for using prep mode.
- The Rack E kit includes an 80 position rack for 30 mm tubes and 4 rack legs.
- The Rack F kit includes a 20 position rack for 250 ml bottles and 4 rack legs.
- The Rack G Funnel-to-flask kit includes 50 m silicone tubing, 30 funnels, 1 tubing guide and 4 extended rack legs.

Note: *Standard mode components must be removed before prep mode assembly.*

Before changing the components

CAUTION! Before changing fractionation mode components, the new waste position must be initialized in UNICORN.

Before changing the fractionation mode components, initialize the new waste position of Frac-950 as follows:

1 In UNICORN, start the pump manually.

2 In System Control, select ***Manual:Frac***. Select ***Man_Fractionation*** for the new mode. See also section 3.2.

3 Stop the run immediately when the first tube shift has been reported by clicking on the ***END*** button in the toolbar.

4 Disconnect the system in UNICORN.

5 Switch off Frac-950 at the mains switch on the rear panel.

6 Switch on Frac-950.

7 Connect the system in UNICORN.

When the system has connected to the Frac-950 again, it should be positioned in the waste position of the new mode.

Removing standard mode components

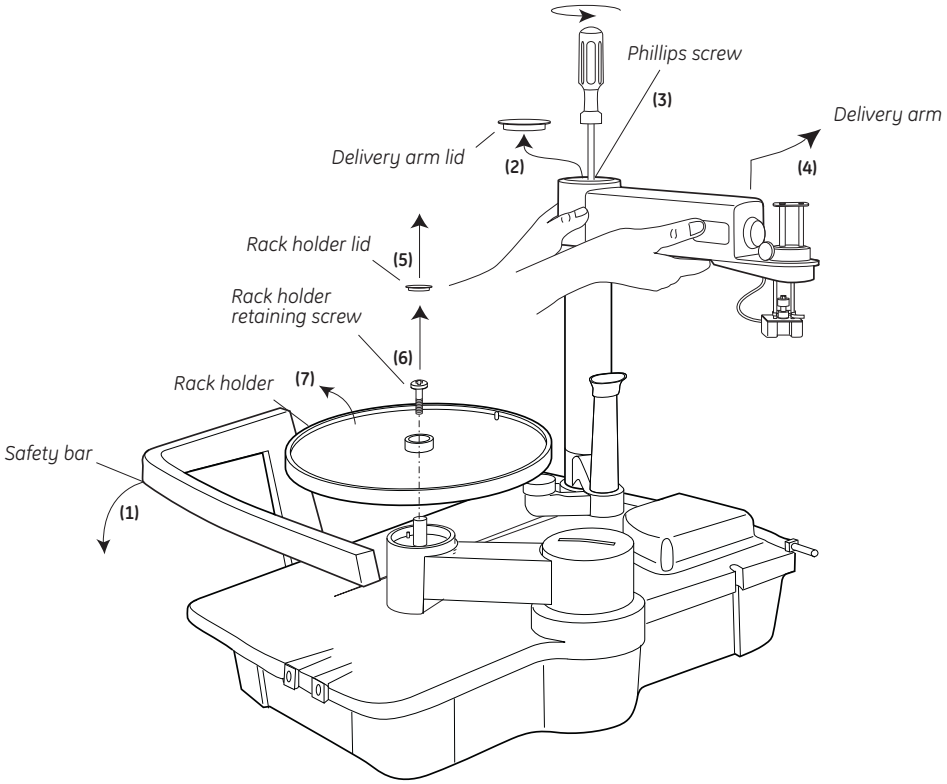


Figure 2-15. Removing standard mode components.

1 Fold down the safety bar (1).

2 Remove the delivery arm lid (2).

3 Loosen the Phillips screw (3).

4 Place the delivery arm in prep mode position (4). Lift (approx. 0.5 cm) and turn the delivery arm backwards until it snaps firmly in position.

5 Tighten the Phillips screw.

6 Fit the delivery arm lid.

7 Remove the rack holder lid (5).

8 Loosen and remove the rack holder retaining screw (6).

9 Remove the rack holder (7).

Installing the Prep Mode Conversion kit

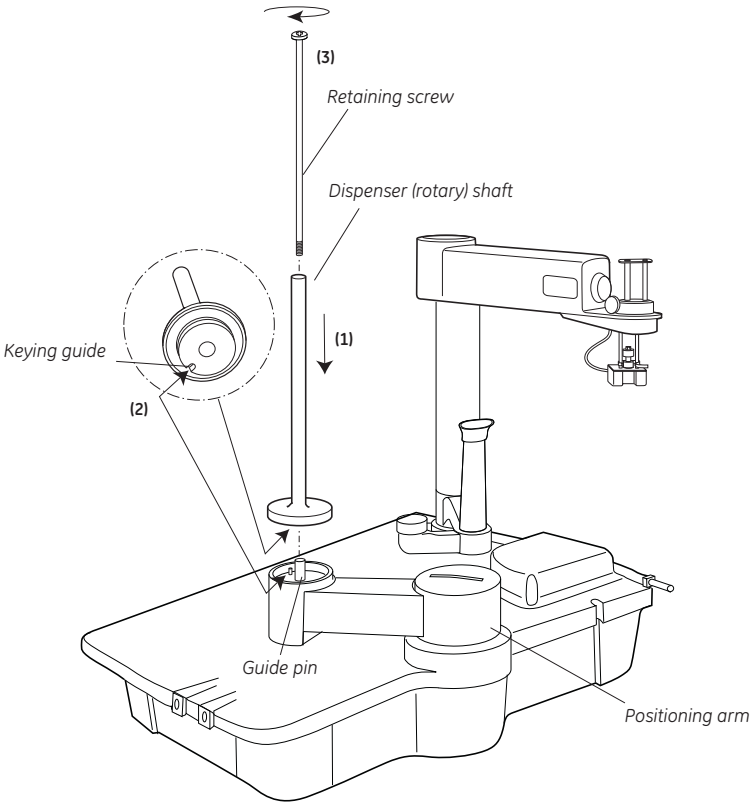


Figure 2-16. Installing the dispenser shaft.

Install the dispenser shaft as shown in Figure 2-16.

1 Fit the dispenser shaft to the guide pin on the positioning arm (1) using the keying guide to position it correctly (2). Turn the shaft on the guide pin until it snaps firmly in position.

2 Insert and tighten the shaft retaining screw (3).

See "Assembling prep mode racks" on page 17 for details on how to assemble the racks.

Install a prep mode rack as shown in Figure 2-17..

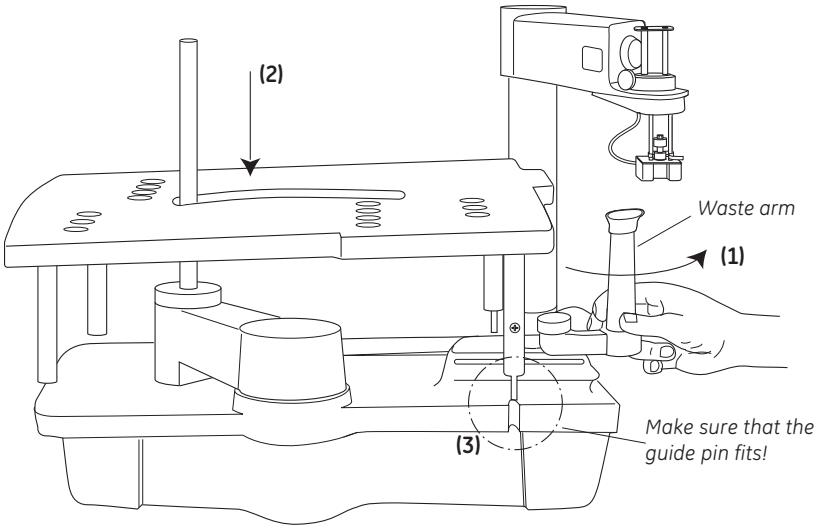


Figure 2-17. Installing a prep mode rack.

1 Push the waste arm to the right (1).

2 Place the rack on the Frac-950 (2). Use the guide pins on the rack legs to position the rack. Check that the guide pin fits (3).

WARNING! Moving parts. The dispenser arm can make sudden rapid movements. Do not have any part of your body within the unit base area when Frac-950 is in operation.

Fit the dispenser arm to the shaft as shown in Figure 2-18.

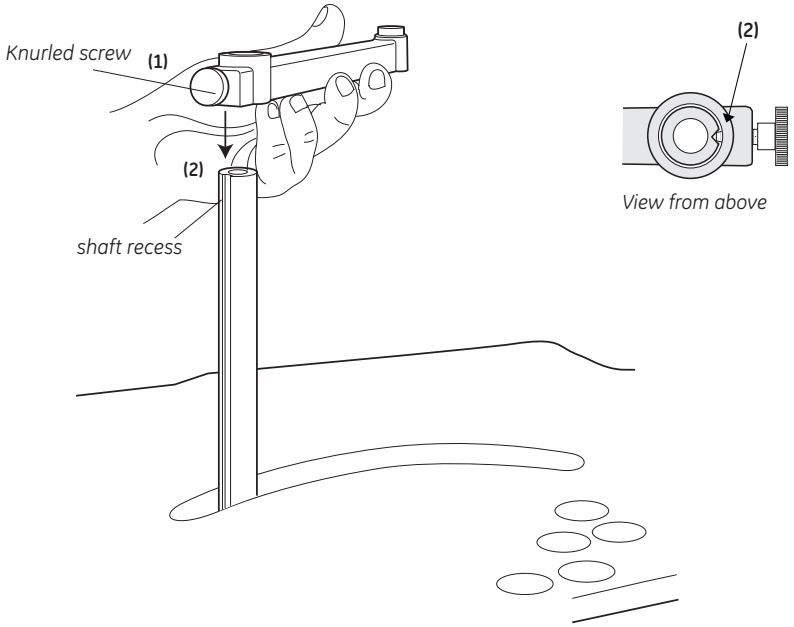


Figure 2-18. Mounting the dispenser arm.

1 Loosen the knurled screw (1).

2 Fit the tip of the knurled screw to the shaft recess (2). Tighten the knurled screw.

WARNING! Moving parts. The dispenser arm can make sudden rapid movements. Do not have any part of your body within the unit base area when Frac-950 is in operation.

Install the capillary as shown in Figure 2-19.

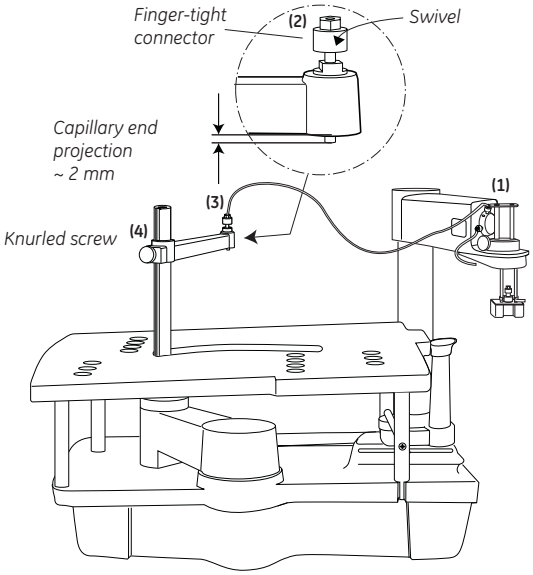


Figure 2-19. Installing the capillary.

1 Make sure that the capillary from the chromatographic system is connected to the lower port on the accumulator.

2 Connect the dispenser arm capillary (i.d. 1.0 mm, l = 800 mm) to the upper port at the accumulator using the finger-tight connector (1).

3 Fit a finger-tight connector to the swivel (2).

4 Thread the free end of the capillary through the finger-tight connector and the swivel. Allow the capillary end to stick out approximately 1 to 2 mm (3). Hold the swivel with the 8 mm key and tighten the connector.

5 Adjust the height of the dispenser arm to suit the height of the tubes or the bottles to be used (a distance between dispenser arm and the tip of the fractionation vessels of 0.5 to 1 cm is appropriate). Tighten the knurled screw (4).

6 Fold up the safety bar.

Note: *For micro fraction collection using ÄKTAmicro, see chapter 4.*

2.12 Installing the Funnel-to-flask kit

1 Attach the extension legs to the rack (model E). See "Assembling prep mode racks" on page 17.

2 Attach the Tubing guide to the rack as shown in Figure 2-20.

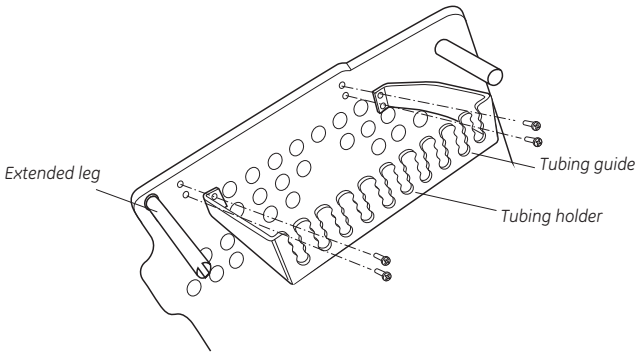


Figure 2-20. Attaching the Tubing guide.

3 Install the rack. See Figure 2-17.

4 Cut the tubing to appropriate lengths. Fit the funnels to the tubings, see Figure 2-21.

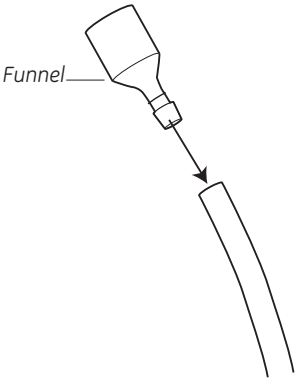


Figure 2-21. Fitting a funnel to a tubing.

5 Feed the tubings with the funnels through the rack holes. Organize the tubings at the tubing holders. Make sure that the tubings are not squeezed.

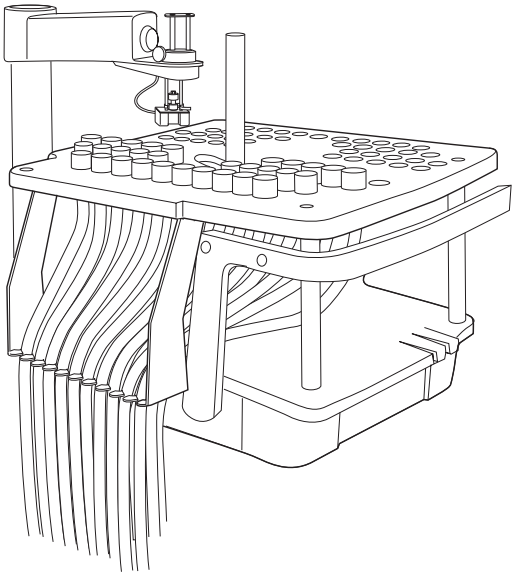


Figure 2-22. Frac-950 with the Funnel-to-flask kit.

2.13 Changing from prep mode to standard mode

CAUTION! Before changing fractionation mode components, the new waste position must be initialized in UNICORN.

Before changing the fractionation mode components, initialize the new waste position of Frac-950 as follows:

1 In UNICORN, start the pump manually.

2 In ***System Control***, select ***Manual:Frac***. Select ***Man_Fractionation*** for the new mode. See also section 3.2 Operating Frac-950.

3 Stop the run immediately when the first tube shift has been reported by clicking on the ***END*** button in the toolbar.

4 Disconnect the system in UNICORN.

5 Switch off Frac-950 at the mains switch on the rear panel.

6 Switch on Frac-950.

7 Connect the system in UNICORN.

When the system has connected to the Frac-950 again, it should be positioned at the waste position of the new mode.

Removing prep mode components
Remove the dispenser arm and the rack as shown in Figure 2-23.

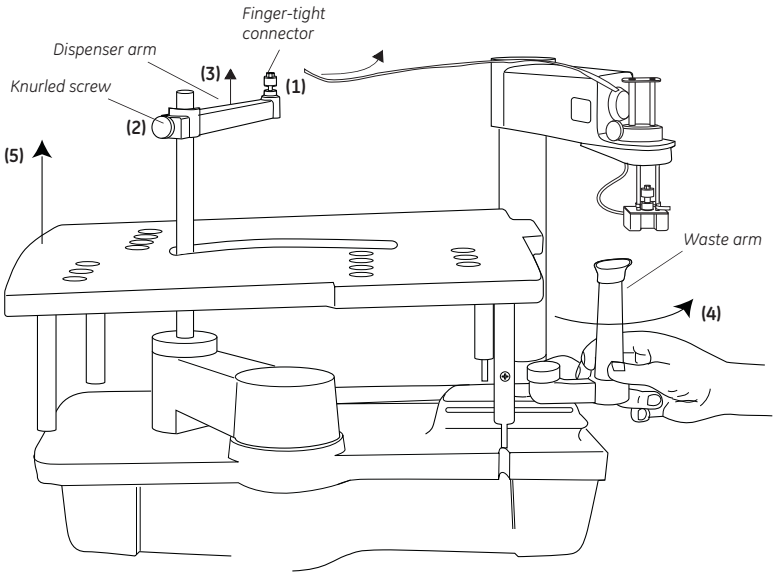


Figure 2-23. Removing the dispenser arm and the rack.

1 Fold down the safety bar.

2 Loosen the finger-tight connector and pull out the capillary (1).

3 Loosen the knurled screw (2).

4 Remove the dispenser arm (3).

5 Push the waste arm to the right (4).

6 Lift up and remove the rack (5).

7 Remove the dispenser arm shaft as shown in Figure 2-24.

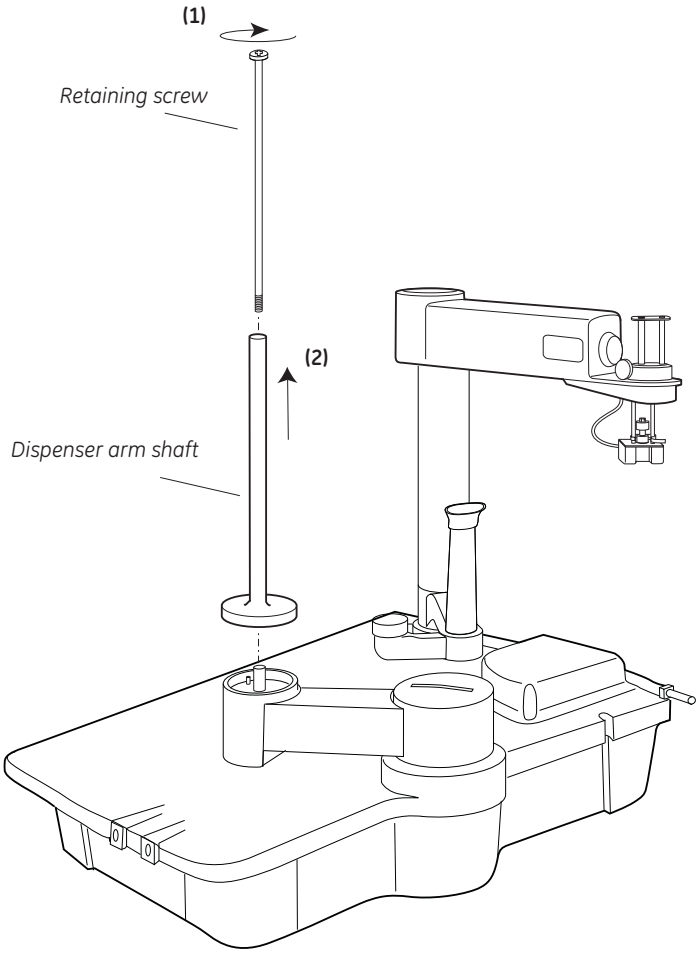


Figure 2-24. Removing the dispenser arm shaft.

1 Unscrew and remove the retaining screw (1).

2 Remove the dispenser arm shaft (2).

Installing standard mode components

Install the standard mode components as shown in Figure 2-25.

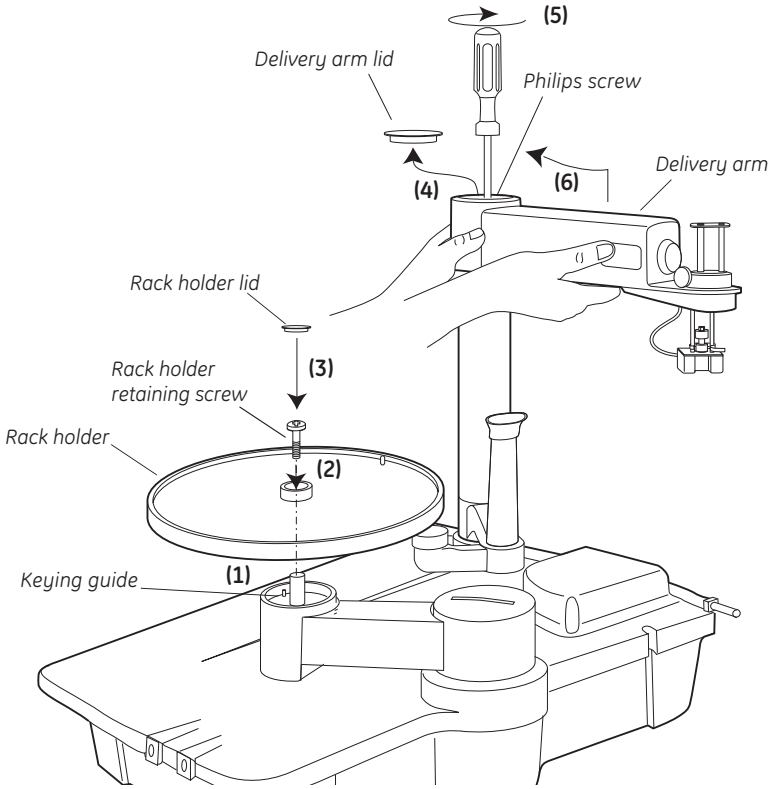


Figure 2-25. Installing standard mode components.

1 Fit the rack holder using the keying guide to position it correctly (1).

2 Insert and tighten the rack holder retaining screw (2).

3 Insert the rack holder lid (3).

4 Remove the delivery arm lid (4).

5 Loosen the Phillips screw (5).

6 Place the delivery arm in standard mode position (6). Lift (approx. 0.5 cm) and turn the delivery arm forward until it snaps firmly in position.

7 Tighten the Phillips screw and refit the lid.

For installing standard mode racks, see “Assembling standard mode racks” on page 16.

3 Operation

3.1 On/Off

WARNING! Pinch hazard. Do not have any part of your body within the unit base area when Frac-950 is switched on. An automatic calibration process starts when Frac-950 is connected to UNICORN. During calibration, the dispenser arm moves rapidly. Several beeps are heard before the calibration procedure starts.

WARNING! Be sure to fold down the safety bar whenever the rack holder is operated by hand. This blocks the rack holder from accidentally moving while the rack is moved by hand or replaced.

WARNING! When using hazardous chemicals, take all suitable protective measures, such as wearing protective glasses and gloves resistant to the chemicals used. Follow local regulations and instructions for safe operation and maintenance of the system.

CAUTION! The DropSync unit will be damaged if it is positioned below the tube rims.

Switch on Frac-950 at the mains switch on the rear panel. At switch-on, Frac-950 performs a self-test.

There are green and yellow indicators on the front of Frac-950.

The green indicator shows:

- when blinking — power is on
- when continuously lit — power is on and connection with UNICORN is established.

When lit, the yellow indicator shows that Frac-950 is running.

When connected to UNICORN, several beeps are heard after which Frac-950 starts to perform an automatic calibration process. During this process, the tube holder moves rapidly in several directions. When calibration is completed, the tube holder stops in the home position.

Note: *The safety bar must be folded up for Frac-950 to start up.*

3.2 Operating Frac-950

Frac-950 is controlled from a PC running UNICORN version 3.21 or higher for standard mode or version 4.0 or higher for prep mode. For ÄKTAmicro, UNICORN version 5.0 or higher is recommended. Control of Frac-950 can be achieved automatically from a method, or manually via the functions available in UNICORN.

Using Frac-950 in a method is described in the ÄKTA design Optional Configuration User Manual.

The following functions are available for operating Frac-950 from UNICORN:

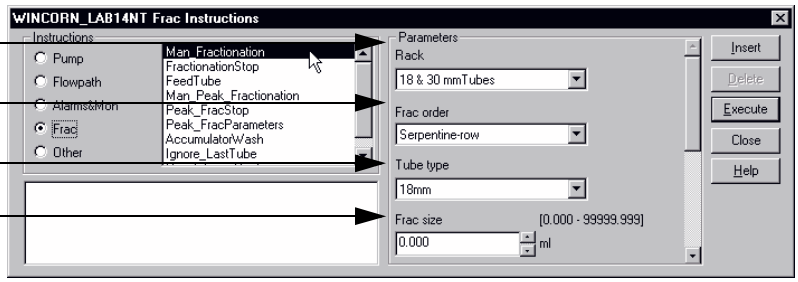
Manual	Method
Man_Fractionation	Fractionation
Fractionation_Stop	Fractionation_Stop
Feed_Tube	Feed_Tube
Man_Peak_Fractionation	Peak_Fractionation
Peak_Frac_Stop	Peak_Frac_Stop
AccumulatorWash	AccumulatorWash
Ignore_LastTube	–
Reset_Frac_Position	Reset_Frac_Position
(PeakFrac Parameters)	(PeakFrac Parameters)

Select rack types

Select fractionation order

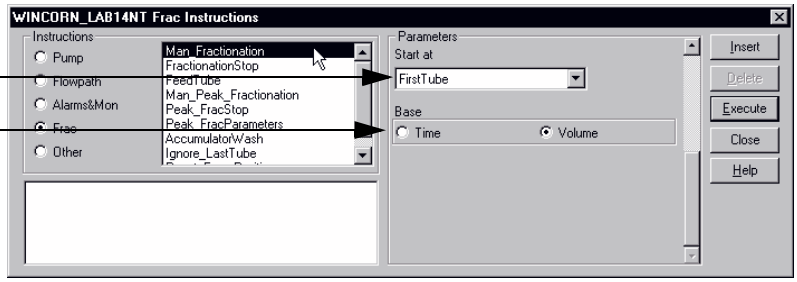
Select tube type and size

Select fractionation size



Select starting tubes

Select fractionation bases



It is also possible to set the delay volume, i.e., the added volume of tubing and components between the UV flow cell in the ÄKTA design system and Frac-950. This value must be changed when the ÄKTA design standard configuration system is changed to an optional configuration.

3.3 Collecting fixed fractions

Details about collecting fixed fraction volumes using Frac-950 in a method are described in the ÄKTA design Optional Configuration User Manual.

3.4 Collecting peak fractions

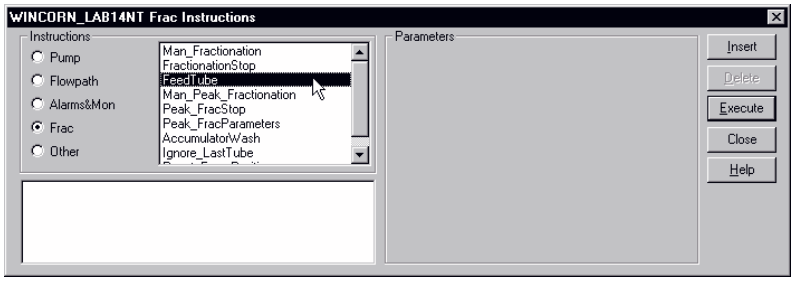
Details about collecting peaks only using Frac-950 in a method are described in the ÄKTA design Optional Configuration User Manual.

3.5 Feed tube

During fractionation, the tube rack can be moved forward one tube with the instruction FeedTube.

1 Select menu ***System Control:Manual:Frac...*** in UNICORN.

2 Select the instruction ***FeedTube*** in the Frac list.



3 Click on the ***Execute*** button. The tube rack moves on to the next tube after the set delay volume has been collected.

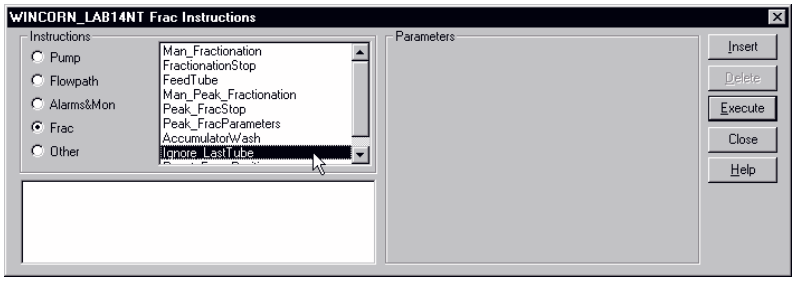
3.6 Ignore_LastTube

The tube position in the rack which is defined in the start protocol to have the last tube can be ignored with the instruction ***Ignore_LastTube***.

When the last tube is reached and there are more fractions to collect, an alarm is generated and the system is paused. You can then fill up with new tubes, and use the instruction ***Ignore_LastTube***.

1 Select menu System ***Control:Manual:Frac...*** in UNICORN.

2 Select the instruction ***Ignore_LastTube*** in the Frac list.



3 Click on the ***Execute*** button.

4 Fill up the rack with new tubes.

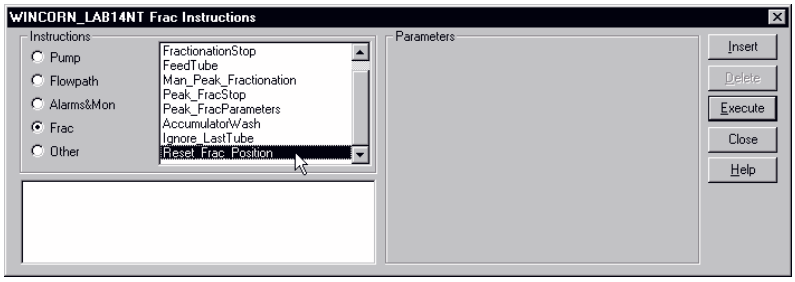
5 Click on the ***Continue*** button to restart the fractionation in the next tube.

3.7 Reset_Frac_Position

The instruction ***Reset_Frac_Position*** resets the fraction collector. This means that fractionation set to start at next position will start in the first position. The instruction will reset next position for all tube types.

1 Select menu System ***Control:Manual:Frac...*** in UNICORN.

2 Select the instruction ***Reset_Frac_Position*** in the Frac list.



3 Click on the ***Execute*** button.

3.8 AccumulatorWash

The accumulator used to eliminate spillage at tube change can be manually washed with the instruction ***AccumulatorWash***.

1 Start a flow of 10 ml/min manually using the system pump.

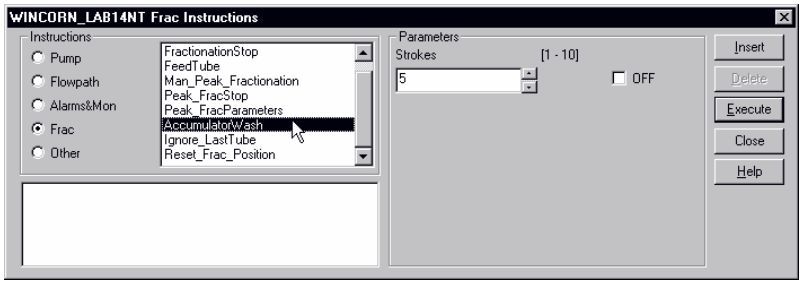
2 If the fraction collector is connected to any other port than port 1 in the Outlet valve, you must manually switch Outlet Valve to the other port. Select menu System ***Control:Manual:Flowpath*** in UNICORN.

3 Select the instruction ***OutletValve*** and select the desired port.

4 Click on the ***Execute*** button.

5 Select menu System ***Control:Manual:Frac...*** in UNICORN.

6 Select the instruction ***AccumulatorWash*** in the Frac list.



7 Select the number of strokes to be used for washing with the parameter Strokes.

8 Click on the ***Execute*** button.

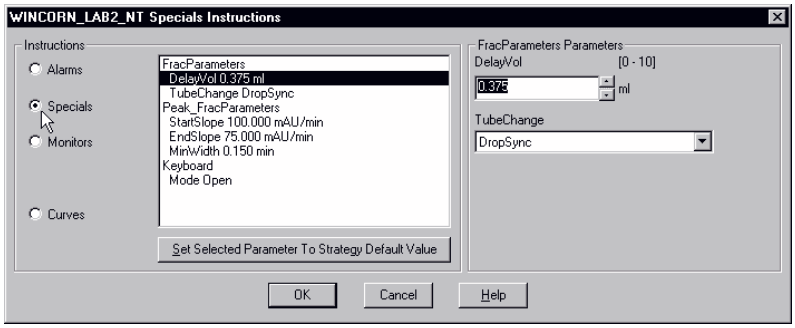
3.9 Setting delay volume

The delay volume between the UV flow cell in the chromatographic system and Frac-950 must be known to UNICORN. The delay volume is used to adapt the collected fractions to the event marks generated by UNICORN.

1 In UNICORN, select menu System ***Control:System:Settings...***

2 Click the Specials radio button and select instruction ***FracParameters***. The ***DelayVol*** instruction becomes highlighted.

3 To change the setting, click on the up and down arrows for the ***DelayVol*** parameter, or type a new value directly in the parameter window.



4 The appropriate value for your ÄKTA design system is found in the ÄKTA design Optional Configuration User Manual.

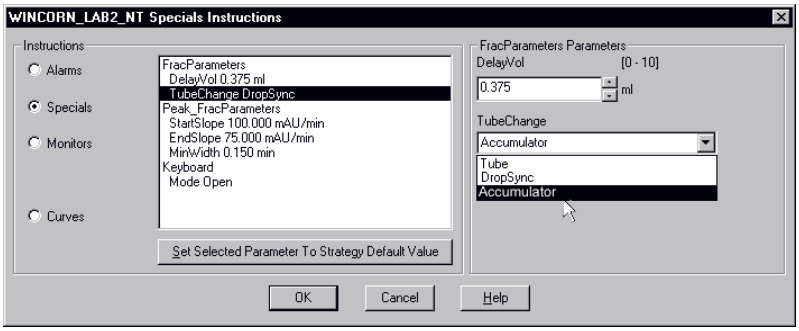
5 Click on the ***OK*** button. The value entered will be used until a further change is made.

3.10 Flow control during tube change

The liquid flow during tube change can be handled in three different ways.

1 In UNICORN, select menu System ***Control:System:Settings...***

2 Click the ***Specials*** radio button and select instruction ***FracParameters***. Highlight the ***TubeChange*** instruction.



3 For the parameter ***TubeChange***, select one of the following options:

- ***Tube***
  No synchronization of collection. Spillage will occur between tubes.
- ***DropSync***
  Tube change is synchronized to drop release to minimize spillage. Use i.d. 0.75 mm tubing between the DropSync and the accumulator.
- ***Accumulator***
  During tube change, the flow is diverted to the accumulator which stores the liquid. When the new tube is in position, the liquid is pressed out rapidly for collection.

4 Flow rate limit recommendations using ***DropSync*** without spillage are given in the table below. For higher flow rates the accumulator is recommended for spillage free fractionation. For the 30 mm rack and Prep mode racks the accumulator is recommended.

Rack type	Flow rate limit using dropSync [ml/min]
microplates	0 to 1.0
12 mm	0 to 1.5
18 and 30 mm	0 to 2.0

5 After selection, click on the ***OK*** button.

3.11 Define rack and tube parameters

When running a method, the rack and tube parameters for the rack to be used must be set. This is described in detail in the ÄKTA design Optional Configuration User Manual.

4 Micro fraction collection with ÄKTAmicro

For micropreparative applications it is sometimes important to be able collect small fraction volumes for further downstream processing. The following instruction describes mounting of a fused silica capillary tubing (80 cm × 150 µm i.d.) between ÄKTAmicro system and Frac-950, enabling reproducible collection of fractions in the range 40 to 500 µl. Components for the installation are included in the Micro Fraction Collection Kit (28-9487-80).

1 Remove the default 1/16" peek tubing between the instrument and Frac-950. Also unscrew the connection between the conductivity cell and UV-cell for easier handling.

2 Mount the fused silica/sleeve construct (80 cm x 150 µm i.d.) to the fingertight connection of the fraction collector, bypassing the accumulator. Be sure to align the sleeve with the top of the fingertight connector. (See Figure 4-1.

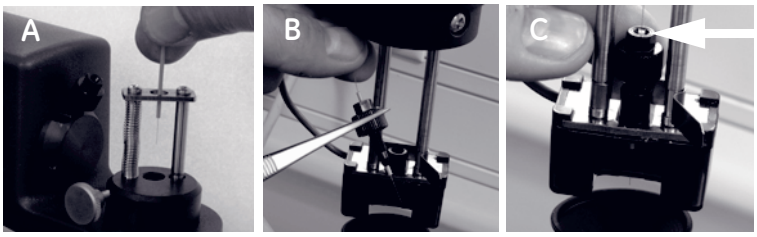
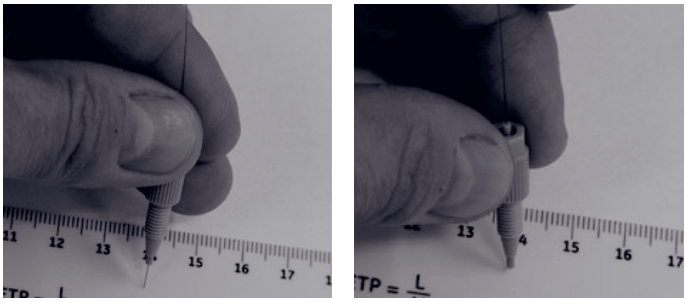
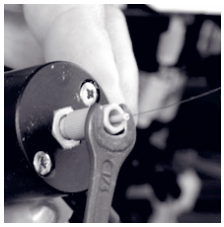


Figure 4-1. The photo series shows the installation of the 150 µm o.d. capillary tubing to Frac-950. The procedure includes (A) insertion of sleeve/capillary construct through the opening of the collector head, (B) insertion trough fingertight connector and (C) connection to the Drop Sync unit. Observe that the sleeve should be aligned with the upper part of the fingertight connector (indicated by arrow).

3 Insert an orange sleeve into the other end of the fused silica, protruding approximately 2 mm out of the tip of the fingertight. Align the capillary end with the sleeve using a flat surface such as a ruler. This will assure a dead volume free connection.



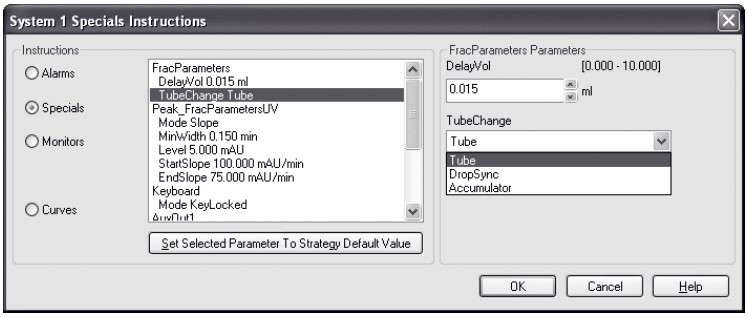
4 Carefully mount the tubing construct directly in the open end of the conductivity cell by screwing the fingertight connector into the conductivity cell by hand. When finger tight, use the supplied ¼" wrench to tighten the connection, approximately half a turn. Similarly, tighten the connection between the conductivity cell and the UV-cell.



5 Check all connections for leakage and safety by applying a flow of 500 µl/min.

6 For increased safety, fix the capillary to the delivery arm with the round attachment label.

7 Open the ***System Control*** module in UNICORN and navigate to ***System\settings\.***



- Adjust the delay volume to 0. 015 ml.

5 Maintenance

5.1 Periodic Maintenance

Fraction collector Frac-950 requires no periodic maintenance.

WARNING! Remove liquid or dirt from the system surface using a cloth and, if necessary, a mild cleaning agent.

WARNING! When using hazardous chemicals, take all suitable protective measures, such as wearing protective glasses and gloves resistant to the chemicals used. Follow local regulations and instructions for safe operation and maintenance of the system.

WARNING! When using hazardous chemicals, make sure that the entire system has been flushed thoroughly with bacteriostatic solution, e.g. NaOH, and distilled water before service and maintenance.

5.2 Cleaning and checking

WARNING! When using hazardous chemicals, make sure that the entire system has been flushed thoroughly with bacteriostatic solution, e.g. NaOH, and distilled water before service and maintenance.

The fraction collector should be kept clean and spilled liquid should be wiped off before it dries. The rack holder should be positioned over the centre, and the safety bar should be folded down when the fraction collector is not in use.

When your ÄKTA design system is cleaned, also clean the capillaries and the accumulator in Frac-950 with distilled water.

The instrument should be wiped regularly with a damp cloth. Remember to wipe the DropSync unit photocell as well. Allow the instrument to dry completely before use.

5.3 Cleaning the system

- Wipe the surface regularly with a damp cloth. Do not allow spilled liquid to dry on the instrument.
- Remove dirt from the surface using a cloth and a mild cleaning agent.
- Let the system dry completely before using it.

5.4 Changing capillaries

Change the capillaries when they show signs of leakage or wear (sharp bending, for example).

5.5 Changing waste tubing

Change the waste tubing when it shows signs of wear.

5.6 Recycling

This symbol indicates that the waste of electrical and electronic equipment must not be disposed as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer for information concerning the decommissioning of equipment.

All waste chemicals and other substances shall be handled according to local regulations. Please contact an authorized representative of the manufacturer for information concerning the safe handling of residual waste and chemicals in your area.

6 Troubleshooting

WARNING! Always disconnect the power supply before attempting to replace any item on the instrument during maintenance.

WARNING! The instrument must not be opened by the user. It contains high voltage circuits that can deliver a lethal electric shock.

WARNING! Be sure to fold down the safety bar whenever the rack holder is operated by hand. This blocks the rack holder from accidentally moving while the rack is moved by hand or replaced.

CAUTION! Only spare parts approved or supplied by GE Healthcare may be used for maintaining the unit.

See section 5.6 recycling for information on the handling of chemical residues.

6.1 Faults and actions

If the suggested actions do not correct the fault, call GE Healthcare.

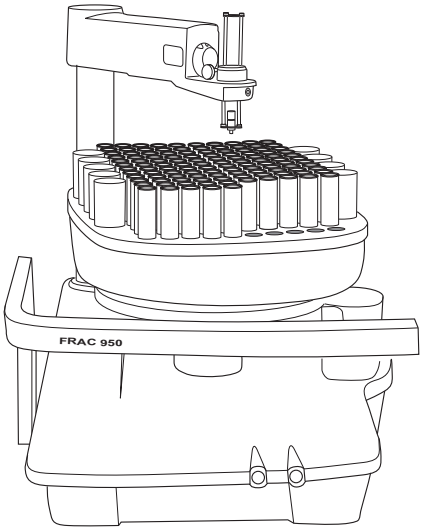
Fault	Action
No tube change	1 Start a flow and start fractionation.
	2 Select FeedTube from the menu System Control:Manual:Flowpath. If the motor does not start and an error appears, contact GE Healthcare.
	3 Check the delay volume. A large delay volume at a low flow rate generates a long delay time.
Tubes skipped	1 Faulty parameters in UNICORN may be the cause.
DropSync is not functioning	1 The drop sensor photocell is dirty. Clean the photocell with a damp cloth.

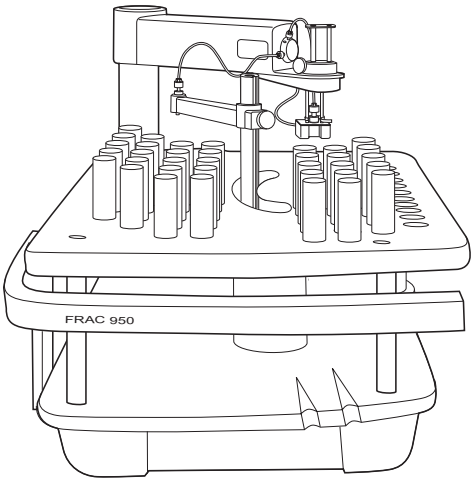
Fault	Action
	2 Check that the capillary end projection is not too long (~2 mm).
	3 Check that the flow rate is not too high (a continuous flow).
No fractions are collected	1 Check that the safety bar is folded up.
Liquid misses the tubes	1 Check that the DropSync unit is close enough over the tubes.
	2 Check that the rack is correctly fitted to the rack holder.
	3 Check that the capillary end is cut cleanly and straight.
	4 Check that the correct rack type is selected.

Appendix A Reference information

A.1 Description

A.1.1 Instrument





Fraction Collector Frac-950 is an automated fraction collector for use in liquid chromatography as part of an ÄKTA design chromatography system.

The fractionation base can be selected as time or volume. Collection vessel positions in a rack can be pre-programmed (using standard racks), or occupy any position within the fractionation area (new rack definition).

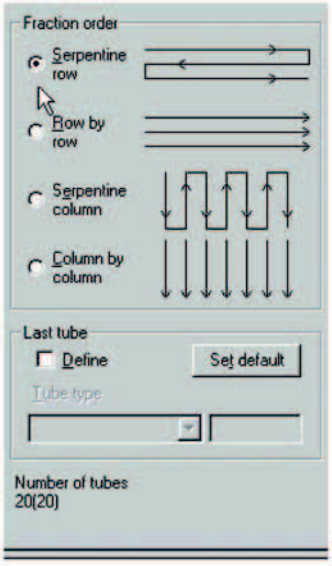
In standard mode, which is the normal operational mode, the capillary delivering the liquid is fixed and the rack holding the collecting vessels moves in an x-y coordinate system to position the vessels under the capillary tip for collection.

In prep mode, the opposite applies; the rack holding the collecting vessels is fixed and the capillary delivering the liquid moves.

The moving pattern can be selected to collect serpentine-row, row-by-row, serpentine-column or column-by-column.

When ***Last tube*** is Defined and there are more fractions to collect, an alarm is generated and the system is paused.

New, empty tubes can then be inserted. By using the instruction ***Ignore_LastTube***, collecting fractions can resume.



Frac-950 can be set up to handle spillage during tube change in three different ways:

- Tube
- DropSync
- Accumulator

Tube means changing tubes without taking spillage into account, i.e. spillage will occur.

Accumulator means that liquid is stored in an accumulating reservoir during tube change. The accumulator reservoir consists of a syringe with a controlled plunger and a manifold. When tube change is ordered, liquid is drawn into the syringe by the moving plunger to store the required amount of liquid during tube change (depends on the actual flow rate in the chromatography system). When a new tube is positioned under the capillary tip, the accumulated volume is quickly emptied in the new tube by the plunger, and the remaining fraction volume is delivered to the capillary tip. This is repeated for every tube change during fractionation.

DropSync means that liquid is controlled on a drop-by-drop basis. A drop sensor is positioned at the delivery unit outlet. It senses the drops falling from the capillary tip. Tube change is carried out directly when the last drop in a fraction has fallen. This method is suitable for small fractions at low flow rates.

A.2 Technical specifications

A.2.1 Operating data

Maximum flow rate	**100 ml/min**
pH stability range	1 to 13, 1 to 14 (<1 day exposure)
Fraction size	
Volume mode:	0.1 to 99999.99 ml
Time mode:	0.1 to 99999.99 min
No spillage range for DropSync	
Microplates	0 to 1.0 ml/min
12 mm rack	0 to 1.5 ml/min
18 and 30 mm rack	0 to 2.0 ml/min
No spillage range for Accumulator	
All racks	0 to 100 ml/min
Environment	+4°C to +40 °C 20 to 95% relative humidity 84 to 106 kPa (840 to 1060 mbar) atmospheric pressure

A.2.2 Tube racks

Rack designation and color	Tube combination	Max. tubes
Standard mode		
Rack A, yellow	12 × 10 pos. 18[1] mm tubes 2 × 4 pos. 30 mm tubes	120 8
Rack B, violet	16 × 15 pos. 12 mm tubes	240
Rack C[2], blue	4 × 96-well microplates 2 × 4 pos. 30 mm tubes	384 8
Rack D, red	45 pos. 30 mm tubes	45
Prep mode		
Rack E, yellow	80 pos. 30 mm tubes	80
Rack F, yellow	20 pos. 250 ml bottles	20
Rack G[3], green	30 pos. 30 mm funnels	30

[1]18 mm refers to the diameter of the collar of the actual tube. The diameter of the hole is around 17 mm.

[2]The following manufacturer's microplates are tested and approved by GE Healthcare for use with this rack type:
Greiner low: 655101, 651101, 650101
Greiner high: 780201
Nunc low: 143761, 168055, 156545, 163320
The difference between these microplates is the bottom shape and that a lid is included in some cases. All have 96 wells.

[3]The funnel-to-flask rack is actually the prep mode 30 mm tube rack but only 30 of the 80 holes are filled with funnels.

A.3 Physical data

Degree of protection	IP 21
Wetted materials	PEEK (polyetheretherketone) UHMW-PE (ultra high molecular weight polyethylene) GlassElgiloy HT
Chemical resistance	The wetted parts of the instrument are resistant to organic solvents and salt buffers commonly used in chromatography of biomolecules, except 100% ethylacetate, 100% hexane and 100% tetrahydrofuran (THF)
Power requirement	100 to 120/220 to 240 V AC, 50 to 60 Hz (autorange switching)
Power consumption	300 VA

Dimensions, H×W×D	480 × 380 × 550 mm
Weight	16.5 kg
Compliance with	The declaration of conformity is valid for the standards instrument only if it is: • used in laboratory locations • used in the same state as it was delivered from GE Healthcare except for alterations described in the User Manual • connected to other CE labelled GE Healthcare modules or other products as recommended.
Safety standards	This product meets the requirement of the Low Voltage Directive (LVD) 73/23/EEC through the following harmonized standards: • EN 61010-1 • IEC 61010-1 • CAN/CSA-C22.2 No. 61010-1 • UL 61010-1
EMC standards	This device meets the requirements of the EMC Directive 89/336/EEC through the following harmonized standards: • EN 61326 (emission and immunity) • EN 55011, GR 2, Class A (emission) • This device complies with part 15 of the FCC rules (emission). Operation is subject to the following two conditions: 1 This device may not cause harmful interference. 2 This device must accept any interference received, including interference that maycause undesired operation.

A.4 Accessories and consumables

Item	Quant. /pack	A/C[1]	Code No.
Fraction collector Frac-950 complete with Rack A, 18^2 mm + 30 mm tube rack	1	A	18-6083-00
Micro Fraction Collection Kit	1	A	28-9487-80
Rack A, 18^2 mm + 30 mm tubes, complete with bowl, tube support and tube holder	1	A	18-6083-11
Rack B, 12 mm tubes, complete with bowl tube support and tube holder	1	A	18-6083-12
Rack C, microplates + 30 mm tubes, complete with bowl, tube support and tube holder	1	A	18-6083-13
Rack D, 30 mm tubes (standard mode) complete with bowl, tube support and tube holder	1	A	18-6083-14
Rack E, 30 mm tubes (prep mode) complete	1	A	18-6083-15
Rack F, 250 ml bottles, complete	1	A	18-6083-16
Rack G, Funnel-to-flask kit, complete with tubing, funnels, tubing guide and extension legs	1	A	18-6083-17
Prep mode conversion kit, complete with shaft	1	A	18-6083-18
Safety bar with screws	1	A	18-6083-22
DropSync assembly, complete	1	A	18-6083-23
PEEK tubing i.d. 0.25 mm, o.d. 1/16"	2 m		18-1120-95
PEEK tubing i.d. 0.50 mm, o.d. 1/16"	2 m		18-1113-68
PEEK tubing i.d. 0.75 mm, o.d. 1/16"	2 m		18-1112-53
PEEK tubing i.d. 1.00 mm, o.d. 1/16"	2 m		18-1115-83
Finger-tight connector 1/16"	10		18-1112-55
Mains cable, EU standard	1		19-2448-01
Mains cable, US standard	1		19-2447-01
UniNet cable	1,5 m		18-1117-75
UniNet cable	0,7 m		18-1109-74

Item	Quant. /pack	A/C[1]	Code No.
UniNet cable	3 m		18-1109-75
UniNet cable	15 m		18-1117-74

[1] A=accessory C=consumable

[2] 18 mm refers to the diameter of the collar of the actual tube. The diameter of the hole is around 17 mm.

Index

For local office contact information, visit
www.gelifesciences.com/contact

GE Healthcare Bio-Sciences AB
Björkgatan 30
751 84 Uppsala
Sweden

www.gelifesciences.com/AKTA

GE Healthcare Europe GmbH
Munzinger Strasse 5
D-79111 Freiburg
Germany

GE Healthcare UK Limited
Amersham Place
Little Chalfont
Buckinghamshire, HP7 9NA
UK

GE Healthcare Bio-Sciences Corp.
800 Centennial Avenue
P.O.Box 1327
Piscataway, NJ 08855-1327
USA

GE Healthcare Bio-ScienceKK
Sanken Bldg.3-25-1
Hyakunincho Shinjuku-ku
Tokyo 169-0073
Japan

imagination at work

18-1139-56 AI 03/2009