user's manual

CMA 470 Refrigerated Fraction Collector

cma
a division of Harvard Bioscience, Inc.

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CMA 470 REFRIGERATED FRACTION COLLECTOR USER'S MANUAL

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Figure 1. CMA 470 Refrigerated Fraction Collector.

1 INTRODUCTION

The CMA 470 Refrigerated Fraction Collector is specially designed to collect microliter volume fractions typical of microdialysis. It has thermoelectric cooling down to +6 °C and the fractions can be collected in sealed vials. Both of these are important considerations for the prevention of evaporation and chemical degradation. It is possible to collect fractions as small as 1 µL at the bottom of each vial. The capacity of the collector is 64 vials of 300 µL each or 40 vials of 2 mL each. When equipped with the quadruple cannula assembly, the CMA 470 can collect from four sources into four vials simultaneously. With the dual cannula assembly it can collect from two sources into two vials. There is also an option to collect samples in open vials.

2 SAFETY

CMA 470 Refrigerated Fraction Collector is designed for laboratory use only, e.g. animal experiments, analytical chemistry, etc, and is therefore not equipped with the special safety functions that are necessary for use in studies involving humans. In view of this, the following considerations should always apply:

- **The CMA 470 Refrigerated Fraction Collector should only be used for its intended purpose, namely as a fraction collector for small volumes in laboratory studies.**

- **The CMA 470 Refrigerated Fraction Collector should always be used in accordance with the instructions in the User's Manual.**

- **The CMA 470 Refrigerated Fraction Collector should be used by trained personnel who understand its proper use.**

- **If the CMA 470 Refrigerated Fraction Collector is sold or transferred, the new owner or user should be scientifically responsible and have the capacity and expertise to use the fraction collector properly and solely for its intended purpose.**

It is in the interests of your organization and of every person who is responsible for the custody, operation, and maintenance of the CMA 470 Refrigerated Fraction Collector that the foregoing guidelines are complied with at all times. In the event of an accident, failure to comply could result in legal liability.

3 UNPACKING & ASSEMBLY

The CMA 470 Refrigerated Fraction Collector is delivered in a specially designed box to protect the instrument against damage during transportation. The reusable carton provides excellent protection should it be necessary to transport the instrument or store it for a long period of time.

3.1 Packing list

The CMA 470 Refrigerated Fraction Collector, Ref No 800 2770 consists of:

- Refrigerated Fraction Collector equipped with Holder for Single Cannula
- External Power Supply
- EU Power Cable
- US Power Cable
- 4 Cassettes for Small Vials
- Holder for Quadruple Cannulae
- Holder for Dual Cannulae
- Cannula for Tubing 4 pcs
- Cannula for Septa 4 pcs
- User's Manual

After unpacking the instrument, check the contents against the above packing list to ensure that the shipment is complete. Inspect all items for damage. Any damage or missing parts should be reported immediately to your local supplier or CMA/Microdialysis AB. Remove the transport security material.

3.2 Positioning the Unit

The CMA 470 Refrigerated Fraction Collector can stand directly on a laboratory workbench or any other flat stabile, vibration-free surface adjacent to a grounded wall socket (required).
NOTE: Make sure the drain tubing is not kinked under the instrument so that the moisture from the cassette magazine can be drained. Place the outlet end on the same level, or lower, as the bottom of the instrument.

3.3 Connections

For connection to the mains, use the External Power Supply (12 VDC, 55 W, included).
Please note the following when connecting other CMA instruments to your CMA 470 Refrigerated Fraction Collector:
Before plugging the Fraction Collector into the socket, check that the input voltage and frequency correspond to the information given on the nameplate on the power supply for the instrument.

3.4 Installation of accessories

For the installation of Cassettes, Holder for Cannulae and Cannulae refer to Sections, 4.1 - 4.10 and 6.

4 DESCRIPTION

The CMA 470 Refrigerated Fraction Collector consists of a temperature-controlled cassette magazine (+6 °C to room temperature) and a control panel. Vial storage is divided into four cassettes. When configured for collection from a single source, the cannula can be maneuverable to one of two collection positions. When equipped with the Holder for Dual Cannulae two samples can be collected simultaneously and with the Holder for Quadruple Cannulae three to four samples can be collected simultaneously. Collection can be into either open or sealed vials.
The CMA 470 Refrigerated Fraction Collector is delivered complete with power cables and external power supply. Once the plug has been connected to a wall socket, the instrument is ready for use.

4.1 Control Panel

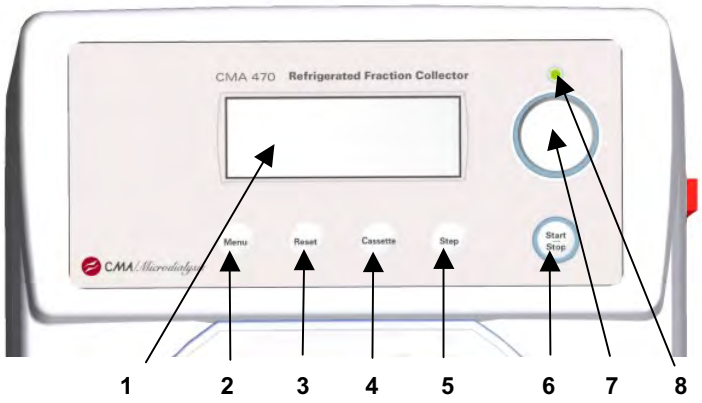

Figure 4.1 Control panel

Locate the following items on the control panel of the CMA 470 Refrigerated Fraction Collector. See figure 4.1

Item	Description
1. Display window	Indicates all basic settings and status: Status Mode Current samples, fraction time, total time and temperature. Cooling activity
2. Menu	Advanced settings.
3. Reset	Push button to reset all running parameters.
4. Cassette	Rotates the magazine clockwise to the first position in the next cassette.
5. Step	Move to next collecting position.
6. Start/Stop	Push button to start/stop the fraction collector.
7. Selection Knob	For selection of mode, number of samples, fraction time and temperature. Turn to select, press to activate and accept. Clockwise to increase or move up, counter clockwise to decrease or move down. Cursor is blinking when active.
8. Green LED	Green LED on – collection is running.

4.2 Rear

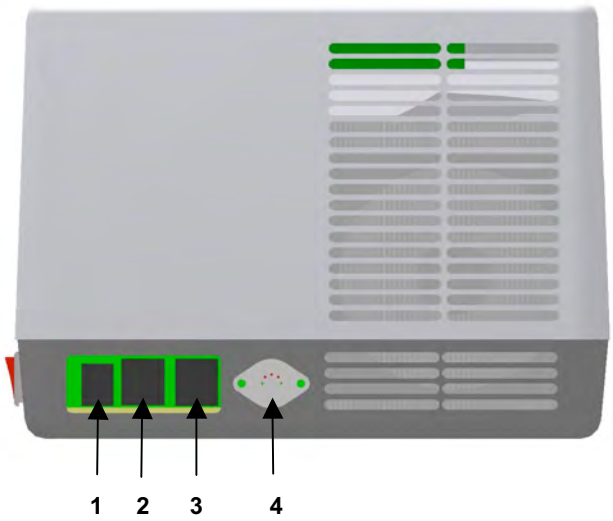

Figure 4.2 Rear

The following are located on the rear of the CMA 470 Refrigerated Fraction Collector, see Figure 4.2

Item	Description
1. USB	Socket for USB connection to PC or other device with USB host port.
2. RS232	Socket for RS232 interface for connection to PC or other device with serial port.
3. Digital I/O	Socket for digital Input/Output for external equipment such as CMA 400 or other instruments.
4. Power	Socket for 12 VDC inlet. Connection for power supply.

4.3 Power Switch

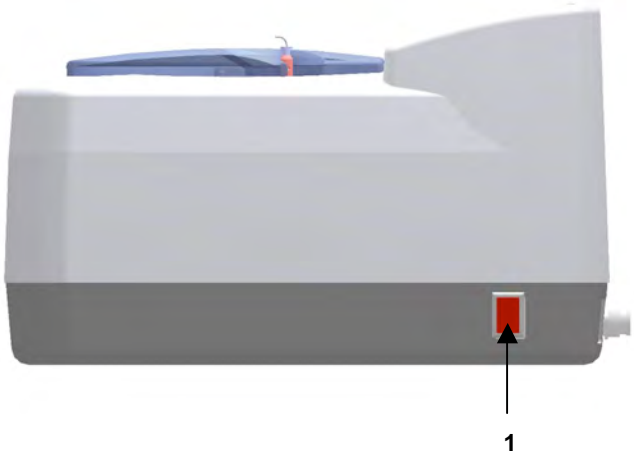

Figure 4.3 Power Switch

Power Switch on the right side of the panel.

Item	Description
1. Power Switch	Switch the power on. The display illuminates.

4.4 Cassette Magazine

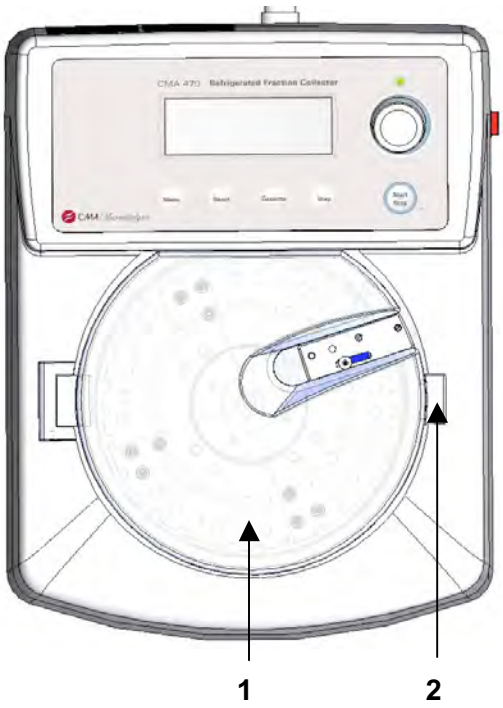

Figure 4.4.1 Cassette magazine, closed lid

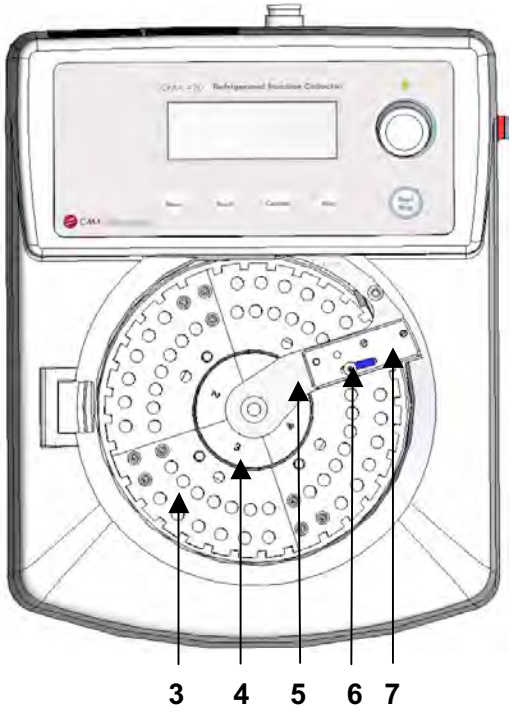

Figure 4.4.2 Cassette magazine, open lid

Locate the following items for the cassette magazine of the CMA 470 Refrigerated Fraction Collector. See Figures 4.4.1 and 4.4.2

Item	Description
1. Lid	Lid to keep the cooling and to protect from light.
2. Lid handle	To open the lid.
3. Cassette	Removable cassettes, one of four.
4. Cassette position	Numbering of cassettes
5.Supporting arm for cannula holder	To mount the holder for single or quadruple cannulae on
6. Cannula for Septa	For use when collecting in vials with Teflon septa
7. Holder for Single Cannula	For use in single collecting mode with cannula for tubing or for septa.

4.5 Vial cassettes

Two options are available, 64 x 300 µl vials (H 35,OD 5 mm), or 40 x 2 ml vials (H 35, OD 11 mm).
All four cassettes in the magazine must be the same model. Figures 4.5.1-2 show how to number fractions when using different cassettes and different numbers of cannulae.
The collector is equipped with cassettes for small vials.

Step sequences for small vials:

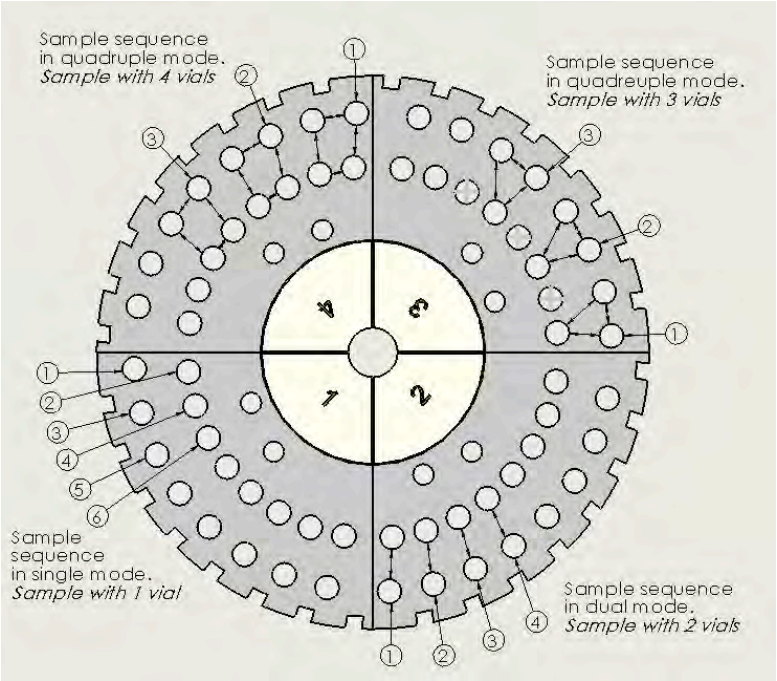

Figure 4.5.1 Numbering of the cassette positions for single, dual and quadruple cannulae

NOTE: When three cannulae are in use, numbering is as for four cannulae. Every fourth position will be empty.

Step sequences for large vials:

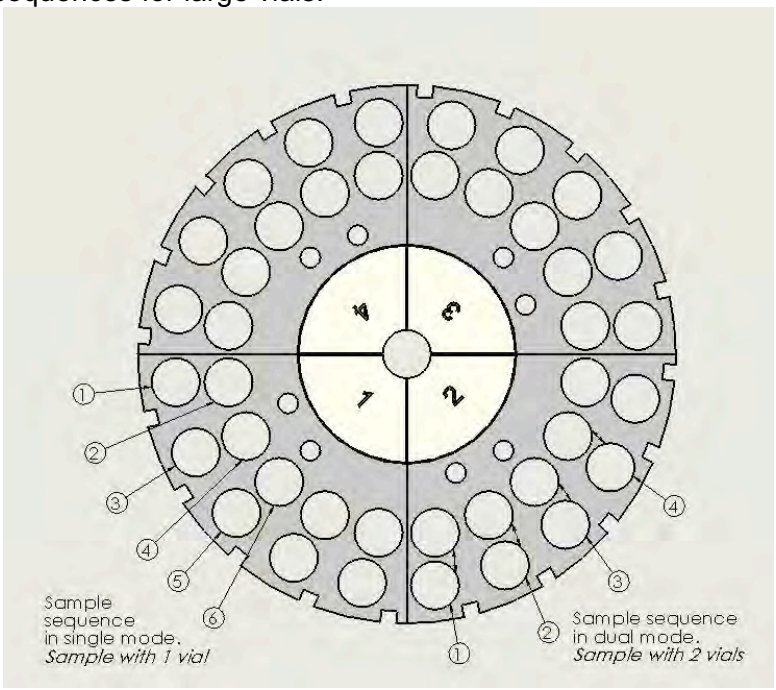

Figure 4.5.2 Numbering of the cassette positions for single and dual cannulae

NOTE: When collecting into large vials up to 2 cannulae can be used simultaneously.

To change cassettes, lift them by the knob and replace with the others, one at the time. Press the cassette button to be able to release all.

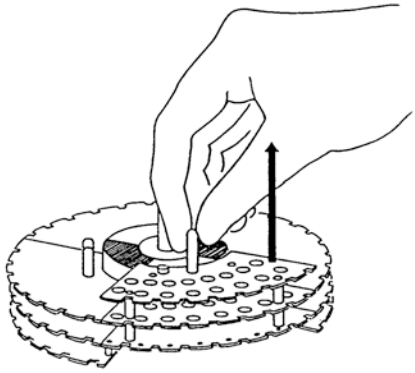

Figure 4.5.3 Removal of cassette.

Warning: Risk for instrument damage.

Only use vial cassettes for CMA 470 Collector.
These cassettes are equipped with blue lift handles.

Cassettes belonging to CMA/170 Collector can not be used, they will damage the instrument.

Contact CMA representative for more information.

4.6 Cannula for Tubing

To collect from tubing into the bottom of an open vial, use this option that consists of a cannula and a plastic knob. The tubing from the probe is fed through the supporting cannula until it touches the bottom of the collecting vial. Secure the tubing in place by lifting the plastic knob.

NOTE: Make sure the tubing is not pushed so far into the vial that the end bends.

4.7 Cannula for Septa

To collect into vials with Teflon septa, use this option that consists of a beveled piercing cannula for the penetration of the septa.
Connect the tubing to the inlet of the cannula by the use of a Tubing Adapter.

NOTE: Use Teflon septa only.

4.8 Single collect Assembly

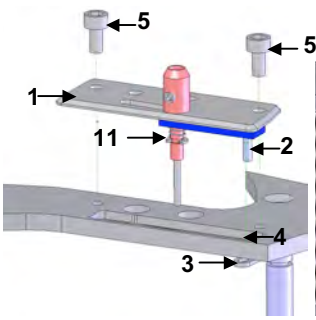

Fig. 4.8.1 Setting up Holder for Single Cannula

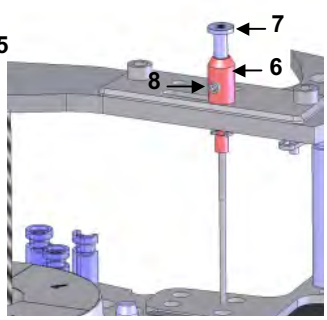

Fig. 4.8.2 Setting up Single Cannula for Tubing

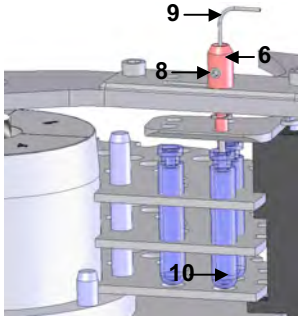

Fig. 4.8.3 Setting up Single Cannula for Septa

4.8.1 Place the Holder for Single Cannula (1) so the tap (2) fit into the loop (3) in the right side slot (4) on the Supporting Arm. Secure the holder with the two accompanying screws (5). See Figure 4.8.1

4.8.2 Collecting in vials with tubing:
Insert the Cannula for Tubing in the Multi Holder for Cannula (6), adjust the upper end of the metal cannula to the same level as the top of the Plastic Locker Knob (7) when it is mounted in the Multi Holder for Cannula. Secure the cannula with the screw in the Multi Holder for Cannula (8). See Figure 4.8.2

4.8.3 Collecting in vials with septa:
Place a waste vial in position 1 in the cassette and move it to the collection position. Insert the Cannula for Septa (9) in the Multi Holder for Cannula (6). Adjust the lower end of the cannula into the bottom of the vial (10). Secure the cannula with the screw in the Multi Holder for Cannula (8). See Figure 4.8.3

4.8.4 To remove the Holder for Single Cannula, untight the two screws, turn the Multi Holder for cannula so the opening of the locking washer (11), seen under the supporting arm, is facing you. Lift up the Holder for Single Cannula from the Supporting Arm. See Figure 4.8.1

4.9 Dual and Quadruple Collect Assembly

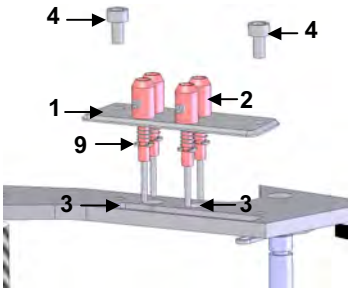

Fig. 4.9.1 Setting up Holder Quadruple Cannulae

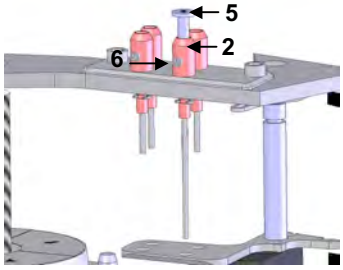

Fig. 4.9.2 Setting up Quadruple Cannulae for Tubing

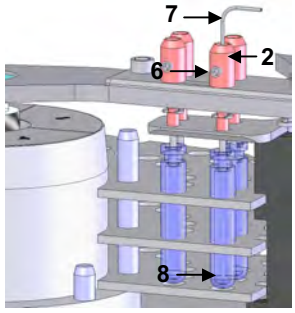

Fig. 4.9.3 Setting up Quadruple Cannulae for Septa

4.9.1 Place the Holder for Dual or Quadruple Cannulae (1) on the Supporting Arm so that the Multi Holders for cannula (2) fit into the left slot (3) and the two holes (3). Secure the holder with the two accompanying screws (4). See Figure 4.9.1

4.9.2 Collecting in vials with tubing:
Insert the Cannulae for Tubing in the Multi Holders for Cannula (2), adjust the upper ends of the metal cannulae to the same level as the top of the Plastic Locker Knobs (5) when they are mounted in the Multi Holders for Cannula. Secure the cannulae with the screws in the Multi Holders for Cannula (6). See Figure 4.9.2

4.9.3 Collecting in vials with septa:
Place waste vials in the cassette and move them to the collection position. Insert the Cannulae for Septa (7) in the Multi Holders for Cannula (2). Adjust the lower ends of the cannulae into the bottom of the vials (8). Secure the cannulae with the screws in the Multi Holders for Cannula (6). See Figure 4.9.3

4.9.4 To remove the Holder for Dual or Quadruple Cannulae, untight the two screws, turn the Multi Holders for cannula (2) so the opening of the locking washers (9), seen under the supporting arm, are facing you. Lift up the Holder for Dual or Quadruple Cannulae from the Supporting Arm. See Figure 4.9.1

WARNING: Risk for cannulae damage.

When changing from quadruple mode to single or dual mode, always change from the *Holder for Quadruple Cannulae* to the proper one needed for the application.

Do not excessive tight the screw (6) to not damage the cannula lumen.
A too loose screw (6) can't hold the cannula in position.

4.10 Basic Functions

- The vial cassettes rotate clockwise for positioning and sample collecting.
- The Holder for Single Cannula maneuver the cannula into one of two collection positions, an inner and outer position.
- The Holders for Dual and Quadruple cannulae have fixed positions for 2 (dual), 3 or four cannulae (quadruple).
- The vial cassettes are maneuvered to the low position for the change of collecting vials.
- The vial cassettes are in upper position for collecting sample(s).
- When the vial cassettes are lifted to the high position, fractions are collected directly in the bottom of the vials. In this way, a very high degree of precision is achieved and fractions smaller than a falling droplet can be collected in a reproducible manner. When fraction are collected in vials fitted with a septum, some of the liquid may be lost against the septum upon withdrawal of the piercing needle such that the quantity collected in each vial may vary depending on the rate of flow. Change of fractions is controlled by time intervals, or by external signals.
- The cassette magazine is temperature-controlled by means of a thermoelectric cooler with a fan.

4.11 Safety Devices

Keep finger and other objects away from moving parts in the cooling compartment. Be careful when handling cannulae and collecting accessories.

WARNING:

Moving parts can cause injury and/or damage the collector.

5 OPERATING INSTRUCTIONS

The CMA 470 Refrigerated Fraction Collector is easy to use. It is advisable to read this user manual carefully before starting to use the instrument.
The CMA 470 Refrigerated Fraction Collector CMA can collect fractions from up to four sources into four vials simultaneously. The cannulae can be individually fitted and removed.
Prepare the instrument for the experiment (cassettes and cannulae).
See 4.5 - 4.9 for setting up the system.

5.1 POWER on

Connect to the external power supply. Switch POWER on. The display illuminates. (Fig. 4.1 – 4.3)

5.2 Set collection mode

Available Modes: Single, Dual and Quadruple mode.

NOTE: Use Quadruple mode for triple cannula collection.

Turn the *Selection Knob* to move the cursor to the upper row.
Press the *Selection Knob* to activate the selection.
Turn the *Selection Knob* to set the desired mode.
Press the *Selection Knob* to acknowledge and lock the setting.

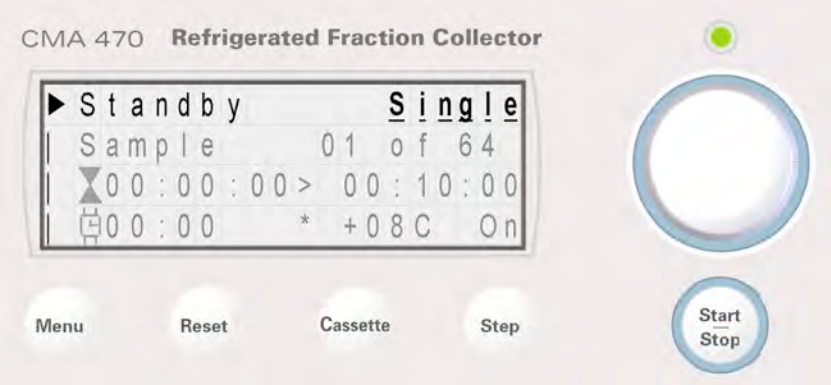

Figure 5.2 Setting collection mode

5.3 Set temperature

NOTE: Turn on the cooling approximately 30 minutes before use.
The cooling capacity is -15 °C from environmental temperature or better.

Turn the *Selection Knob* to move the cursor to the lowest row.
Press the *Selection Knob* to activate the temperature setting.
Turn the *Selection Knob* to set the desired temperature.
Press the *Selection Knob* to acknowledge. The curser moves to the data field for cooling on/off selection.
Turn the *Selection Knob* to select cooling on/off.
Press the *Selection Knob* to acknowledge and lock the setting.

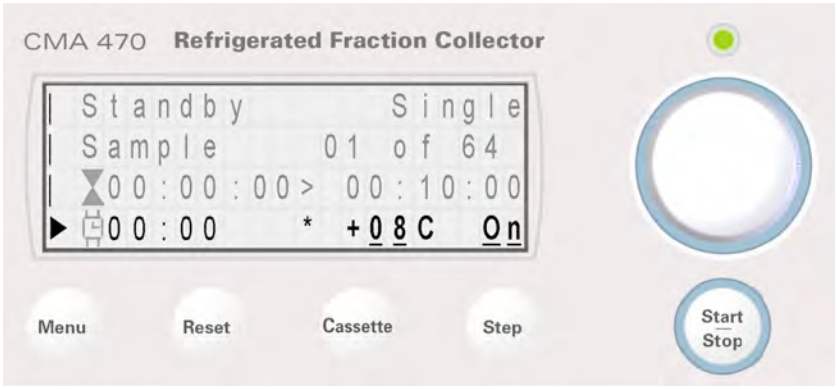

Figure 5.3 Setting temperature

5.4 Set first sample and number of samples

Sample collection starts one position after the current position (waste position) in the cassette magazine.

NOTE: First collecting fraction will be the position after the cannula location at the start.

Turn the *Selection Knob* to move the cursor to the second row.
Press the *Selection Knob* to the position for number of samples.
Turn the *Selection Knob* to select the desired number.
Press the *Selection Knob* to acknowledge and lock the setting.

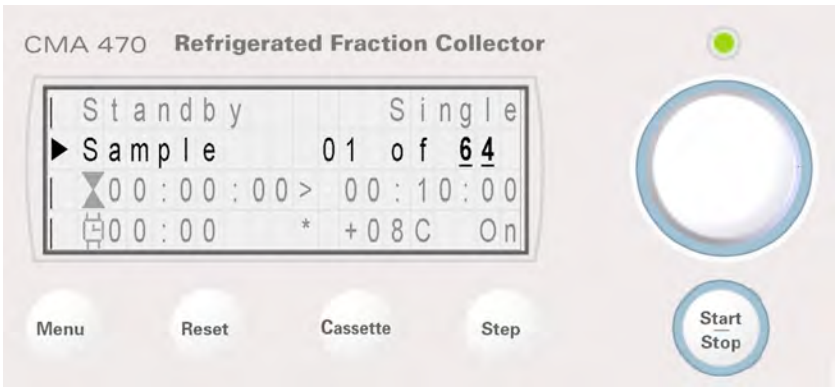

Figure 5.4 Setting number of samples

5.5 Set fraction time

Turn the *Selection Knob* to move the cursor to the third row.
Press the *Selection Knob* to activate the position for the number of hours.
Turn the *Selection Knob* to set the desired value.
Press the *Selection Knob* to acknowledge. The curser moves to the data field to the position for the number of minutes.
Turn the *Selection Knob* to set the desired value.
Press the *Selection Knob* to acknowledge. The curser moves to the data field to the position for the number of seconds.
Turn the *Selection Knob* to select the desired value.
Press the *Selection Knob* to acknowledge and lock the settings.

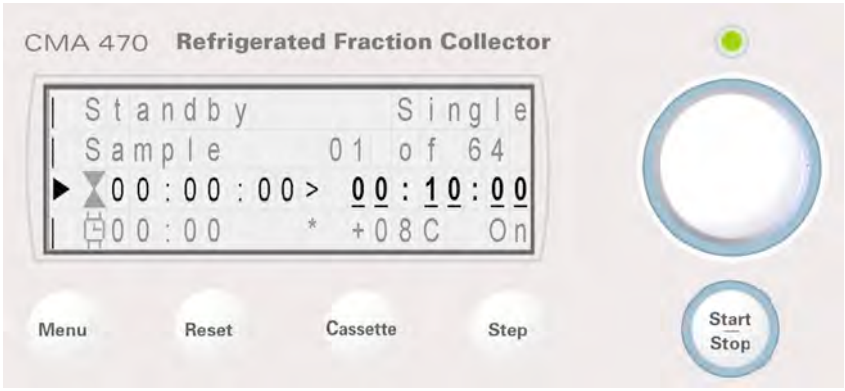

Figure 5.5 Setting fraction time

5.6 Prepare for collection experiment

Load the cassettes with collection vials. Position waste vials at the first position. Press Cassette and Step buttons to position the waste vials at cannula/e position.
See Figures 4.5.1 and 4.5.2 for numbering of vials.

5.7 Connect the sample set up

When collecting straight from the tubing into the bottom of the collection vial, feed the tubing down to the bottom of the waste vial and secure it by lifting up the plastic knob.
See Figure 4.8.2 and 4.9.2

When collecting into vials with septa, connect the tubing to the collection cannula with a Tubing Adapter.
See Figure 4.8.3 and 4.9.3

5.8 Start/Stop

Press "Start/Stop" to begin operation. The collector will move one step and start the time mode fraction collection. The green LED will illuminate.
See Figure 4.1

5.9 Save settings

All settings will be stored when the instrument is turned off. When restarting the instrument the last settings will be activated.

5.10 Reset settings

When in ‘Stopped mode’ press the ‘Reset’ button to restart collection, using the last saved settings.
In ‘Running mode’, use the reset button to restart the time for the ongoing fraction. By pressing the Step button the collector will move to the following fraction.

5.11 Clean the system after use

When finished with collection using the piercing Cannulae for Septa, flush them with deionized water and then 70% ethanol. Use vials for waste.
Dry the magazine with a soft cloth.

6 ADVANCED OPERATION

With the Menu button a set of commands and service functions can be activated.
For the user, only the Manual commands are useful.

When setting up the CMA 470 for a new sample method, single/dual/quadruple mode or for the set up of collection for tubing or cannula, manual commands is used to control sampling sequences.

When the Manual function is activated cassettes can be moved Up or Down and the Multi Holder can be moved from the Outer to Inner vial row and back (Single mode) with commands from the Menu.

Press the front panel buttons Cassette, Step and the Menu/Manual commands Up/Down and In/Out when setting up the CMA 470 as described in chapter 4.8 and 4.9.

Press the Menu button.
Turn the *Selection Knob* to move the cursor to the second row.
Press the *Selection Knob* to activate the Manual functions.
Turn the *Selection Knob* to select the desired function.

Press the *Selection Knob* to acknowledge and execute selected function. To execute the function a second time, press the Selection Knob.

Turn the *Selection Knob* to select a new function.
Press the *Selection Knob* to acknowledge and execute selected function.
Press the Menu button to exit.

Figure 6.1 Menu options

Figure 6.2 Menu Manual operations

The menu functions Set-Up and Info are only for maintenance and service purpose. Information can be found in the technical manual.

7 ACCESSORY KIT

The CMA 470 Refrigerated Fraction Collector accessory kit includes:

- Holder for Dual Cannulae
- Holder for Quadruple Cannulae
- Cannula for Tubing 4 pcs
- Cannula for Septa 4 pcs

NOTE: At delivery the fraction collector is equipped with cassettes for small vials and Holder for Single Cannula.

8 OPTIONAL ACCESSORIES

8.1 Vials

The fraction collector can be run with 300 uL plastic or glass vials, OD: 6 mm, height: 35 mm (max) or 2mL glass vials OD: 12 mm, height: 35 mm (max) Crimp Caps with Teflon membrane(non-resealing) can be used.

8.2 Cassettes for collection into 2 mL vials

When collecting into large vials these cassettes must be used. Large vial cassettes must be placed in all four positions in the magazine. A maximum of two collection cannulae can be used with this option.

8.3 Cables

CMA RS232 PC/RJ45 Cable for computer control of CMA 470.

USB cable type A-B for computer control of CMA 470.

9 MAINTENANCE & SERVICE

The CMA 470 Refrigerated Fraction Collector does not require periodic lubrication or changes of any parts.

9.1 Cleaning the Instrument

Keep your CMA 470 Refrigerated Fraction Collector clean. Wipe off any spillage using a soft cloth with mild detergent or 70% alcohol. Periodic wipe off the cooling compartment.

9.2 Storage

If the CMA 470 Refrigerated Fraction Collector will not be used for a significant length of time:

Disconnect the mains supply
Clean the instrument
Wipe off the cooling compartment.
Store the instrument away from dust and moisture

9.3 Warranty

CMA/Microdialysis AB (called CMA) guarantees all components of the CMA 470 Refrigerated Fraction Collector to be free from defects of material and workmanship for a period of one year after initial purchase.
For warranty service or repair, all CMA products must be returned to CMA or to an authorized representative.
The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by the Owner, Owner-supplied software or interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or improper site preparation or maintenance.
For any product expressly covered under this warranty, CMA is liable only to the extent of replacement of the defective items. CMA shall not be liable for any personal injury, property damage, or consequential damages of any kind whatsoever. The foregoing warranty is in lieu of all other warranties of merchantability and fitness for a particular purpose.

9.4 Damaged shipments

Breakages of any part of this instrument during shipping should be reported immediately to CMA Customer Service or an authorized representative. You must retain the original packing box and contents for inspection by the freight handler. CMA will replace any new instrument damaged in shipping with an identical product as soon as possible after the claim filing date. Claims not filed within 30 days after the shipping date will be invalid. Do not return damaged goods to CMA without first contacting Customer Service.

9.5 Service

CMA and CMA distributors have skilled service staff to solve your technical problems if an equipment-oriented problem should arise. For further details, call/email/fax first your local CMA distributor and secondly direct to CMA.

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84 October Hill Road
Holliston, MA 01746 USA
Phone Orders: 800-232-2380 • Fax: 508-429-5732
E-mail: support@hbiosci.com • www.harvardapparatus.com

10 TROUBLESHOOTING

If the CMA 470 Refrigerated Fraction Collector does not function, check that:

the input voltage and frequency correspond to the information given on the nameplate on the bottom of the instrument.

the wall socket is live.

the power cables are undamaged and properly connected both to the wall socket and to the instrument.

11 TECHNICAL DATA

Volume per Collection: 1 µL- 1,2 mL/min
Number of vials: 64 x 300µL, 40 x 2mL
Septa: Non reclosing (Teflon)
Cooling: Down to +6 °C in steps of 1 °C
Cooling capacity: -15 °C from environmental temperature or better
Temperature accuracy: +- 1.5 °C
Collection mode: Time, minutes and seconds
Environment temperature: 10 – 32 °C
Display: LCD 4 x 20 characters, back lit
Memory: Non - volatile. Stores all settings
External connections: General purpose digital Input/Output
Computer connection: RS 232 serial interface and USB (for user software)
Voltage: 100 – 240 VAC, 50 – 60 Hz
Power consumption: External adaptor 12 VDC, 55 W
Dimensions: 222 x 279 x 142 (167) mm (W x D x H)
Weight: Approx. 3.8 kg

Standards:	EN 61010-1 and IEC 61326
Directives:	LVD (Low Voltage, 73/23/EEC and 93/68/EEC), EMC (2004/108/EG)

CMA 470 is designed to operate in a controlled electromagnetic environment, i.e. where radio frequency transmitters such as mobile telephones may not be used in close proximity.

Intended use: Designed for research and industrial applications, the CMA 470 Refrigerated Fraction Collector is not approved for clinical use.

12 TEXT AND SYMBOL EXPLANATION

⚠ User must consult user manual before handling

CE The product meets EU directives for EMC and LVD

Do not dispose of this product as unsorted municipal waste.
Follow local municipal waste ordinances for proper disposal provisions to reduce the environmental impact of waste electrical and electronic equipment (WEEE).
European Union customers:
Contact your local CMA Microdialysis representative or your local authority for guidance.

13 ORDER INFORMATION

	Ref No
CMA 470 Refrigerated Fraction Collector	800 2770
Including:	
Cassette for Small Vials, 4 pcs	
Holder for Single Cannula	
Holder for Dual Cannulae	
Holder for Quadruple Cannulae	
Cannula for Tubing, 4 pcs	
Cannula for Septa, 4 pcs	

Accessories

Vials, Plastic 300 µL (1000/pkg)	743 1100
Caps, Plastic* (1000/pkg)	743 1101
Vials, Glass 300 µL (500/pkg)	743 1007
Caps/Seals Non-Reclosing Small (1000/pkg)	743 2175
Vials, Glass 2 mL (500/pkg)	743 2009
Caps/Seals Reclose Large* (500/pkg)	743 2011
Crimper, Small	743 2017
Crimper, Large	743 2018
Cassette, Small Vials, Plastic	832 0010
Cassette, Large Vials, Aluminum	832 0008
Cannula for Tubing CMA 470	800 2999
Cannula for Septa CMA 470	800 3000
Holder for Quadruple Cannulae	800 2774
Holder for Dual Cannulae	800 2777
Holder for Single Cannula	800 2775
FEP Tubing 1 m	340 9501
FEP Tubing 10 x 1 m	840 9501
Tubing Adapters	340 9500
CMA RS232 PC/RJ-45 cable	800 2031
USB cable type A-B	800 2032
Power Supply 100 – 240 VAC, 12 VDC, 55W	800 2779

* Not for use in the fraction collector.

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