

Micro Centrifuge 5415 C

Instruction Manual



Brinkmann Instruments, Inc.
Cantiague Road
Westbury, N. Y. 11590
USA
Tel. 800-645-3050;
in N. Y. 516-334-7500.
In Canada; 416-675-7911;
50 Galaxy Blvd.,
Rexdale, Ont. M9W 4Y5.

eppendorf

eppendorf

Table of contents

1.	Installation.....	1
2.	Range of application ..	2
3.	Operating controls... ..	3
4.	Mode of operation... ..	4
4.1	Starting up	4
4.2	Loading	4
4.2.1	Microcentrifuge tube rotors	4
4.3	Centrifuging	4
4.3.1	Momentary button ...	4
4.3.2	Timer	4
5.	Safety precautions... ..	5
6.	Applicational limitations	6
7.	Troubleshooting guide	7-8
8.	Maintenance and cleaning	9-10
8.1	Maintenance	9
8.1.1	Instructions for changing the motor brushes	9
8.2	Cleaning	10
9.	Technical data	11
10.	Ordering information	12

1. Installation

Before using the Eppendorf Micro Centrifuge 5415 C, remove its protective packaging:

- Open the lid of the centrifuge. If it is locked, plug the centrifuge into the main power supply. Turn centrifuge power switch on to disengage the lid lock mechanism. Then open the lid and disconnect main power plug.
- Remove plastic foil from the lid pin (metal pin located on the left front of the lid).
- Remove the packaging covering the rotor.
- Unscrew rotor lid. Loosen knurled rotor nut and remove rotor.
- Pull out foam collar with the attached string.
- Reattach rotor and rotor lid and tighten correctly (see Sec. 5).

Caution:

Before plugging in the centrifuge, compare your power supply with the electrical requirements listed on the identification plate located on the back of the centrifuge.

The centrifuge must operate on a flat and stable work surface to ensure proper and safe operation.

Note: Save all packaging for future use.

2. Range of application

The Eppendorf Micro Centrifuge 5415 C (Fig. 1) is used for quickly separating precipitates and liquids of different specific densities.

The standard rotor is a 45° angled rotor for 18–1.5 mL Eppendorf Microcentrifuge Tubes with an 11 mm diameter. There are two special rotors for tubes with a smaller diameter:

Tube diameter 8 mm (e. g. 500 µL and B-D Microtainer™):

38° angled rotor for 24 tubes.
Tube diameter 6 mm (e. g. 400 µL and 250 µL):

38° angled rotor for 30 tubes.

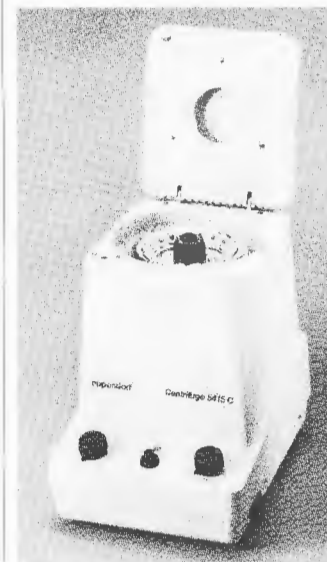


Fig. 1:
Centrifuge 5415 C

The rotational speed is continuously adjustable from 1,000 to 14,000 rpm. Spin times up to 30 min. can be set on the timer.

Short centrifuging times can be regulated using the momentary button (LED flashes at 1-second intervals).

Upon operating the momentary button, the centrifuge always accelerates to the max. possible rotational speed of 14,000 rpm (independent of the setting of the speed control dial).

3. Operating controls (Fig. 2)

- (1) Main switch "On-Off"
 - Controls the power supply and lid release mechanism (the top lid can only be opened when the rotor is stationary and the main button is in the "On" position). Switch off main power when centrifuge is not in use.
- (2) Speed control
 - Continuously adjustable from 1,000 to 14,000 rpm.
- (3) Pilot light (LED)
 - Lights when ready for operation (main switch "On").
 - Flashes at 1-sec intervals when the momentary button is pressed (4).
 - Flashes during spin time.
- (4) Momentary button
 - Micro Centrifuge is in operation as long as the button is pressed.
 - Pilot light (3) flashes at 1-sec intervals.
 - Micro Centrifuge accelerates to its max. rotational speed (14,000 rpm) regardless of speed control setting.

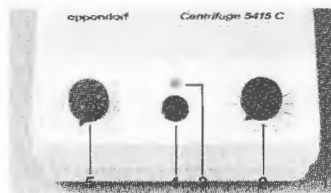


Fig. 2:
Operating controls

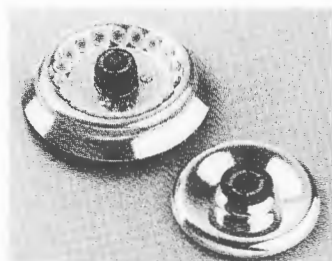


Fig. 3:
Rotor and rotor lid

- (5) Timer
 - Continuously adjustable for spin times up to 30 min.
- (6) Standard rotor, 45°, capacity for 18 microcentrifuge tubes, (Fig. 4).
 - Quick-release rotor with noise damping lid.
 - Rotor mounts by tightening knurled rotor nut; lid attaches to mounted rotor.

A fan is integrated into the base of the centrifuge housing and runs as long as the main power is switched on.

4. Mode of operation

IMPORTANT:

To fasten the rotor and rotor lid, first tighten knurled rotor nut securely. Next screw lid onto rotor. The rotor load must be balanced. Always load the rotor symmetrically! Unsymmetrical loading of the rotor leads to increased wear of the motor bearings and brushes.

4.1 Starting up

- Connect centrifuge line cord to power supply.
- Turn main switch on (pilot light is on).
- Open lid.

4.2 Loading

- Microcentrifuge tube caps or tabs must not overlap.
- Load tubes symmetrically.
- Opposing tubes must be of the same type and weight.
- Tubes should be filled to the same level.

4.2.1 Microcentrifuge tube rotors

There are three different rotors:

- Standard rotor F-45-18-11 for 18 tubes with an 11 mm diameter.
- Special rotor F-38-24-8 for 24 tubes with an 8 mm diameter.
- Special rotor F-38-30-6 for 30 tubes with a 6 mm diameter.

Adapters for the standard rotor are available for 8 mm and 6 mm diameter tubes. The special rotors provide greater capacity and can also be covered with rotor lids.

4.3 Centrifuging

4.3.1 Momentary button

- Fasten rotor securely. If desired, attach noise damping lid onto rotor.
- Close lid.
- Press momentary button for spin times ≤ 1 min, at 14,000 rpm. The pilot light flashes at 1-sec intervals so that the spin time can be counted.
- When the rotor has come to a complete stop (pilot light is on), the lid can be opened.

4.3.2 Timer

- Fasten rotor securely. If desired, attach noise damping lid onto rotor.
- Close lid.
- Set rotational speed.
- Set timer to desired spin time.
- When the rotor has come to a complete stop (pilot light is on), the lid can be opened.

5. Safety precautions

IMPORTANT:

- Always fasten rotor and rotor lid securely.
- Always load the rotor symmetrically.
- Do not centrifuge liquids with a density higher than 1.2 g/mL.
- The microcentrifuge tubes must be capped tightly before centrifuging.

Lid latch: The centrifuge can only be operated when the lid is firmly closed and the lid lock mechanism is in full operation. The lid cannot be opened until the rotor has come to a complete stop.

Important note:

Please only use the accessories recommended by Eppendorf. Using spare parts or disposable tubes which we have not recommended can reduce the reliability, life and precision of the centrifuge and rotor.

6. Applicational limitations

The max. load per rotor bore must not be exceeded; see technical data on the rotor supplement sheet.

When using microcentrifuge tubes, the maximum RCF specifications quoted by the manufacturer must be observed.

When using organic solvents, e. g. chloroform, only use test tubes **once**, as repeated centrifuging may stress the plastic.

Housing, rotor and rotor lid are largely chemical-resistant. All rotor parts including the lid are autoclaveable at 121 °C.

Test tubes whose diameter is less than 11 mm, e. g. 250, 400 and 500 µL tubes and Becton-Dickinson Microtainers may require special rotors or standard rotors or a standard rotor with adapters.

The centrifuge can be operated in a cold room at temperatures of +4 °C.

7. Troubleshooting guide

Error	Cause	Solution
Lid cannot be opened, switch is in the "On" position.	<ul style="list-style-type: none"> – Rotor still turning. – Power not connected. – Power failure. – Blown fuse. – Electronic error. 	<ul style="list-style-type: none"> – Wait until rotor stops. – Connect main power plug. – Disconnect main plug; operate lid latch manually: insert a wire (e. g. bent paper clip) into the small hole at the top of the left wall of the housing. Then lift lid. – Call Brinkmann Instruments Service Dept.; do not attempt to replace fuse. – Call Brinkmann Instruments Service Dept.
Pilot light not on.	<ul style="list-style-type: none"> – Power not connected. – Power failure. – Electronic error. 	<ul style="list-style-type: none"> – Connect main power plug. – Operate lid latch manually (see above). – Call Brinkmann Instruments Service Dept.
Pilot light flashes very quickly.	<ul style="list-style-type: none"> – Electronic error. 	<ul style="list-style-type: none"> – Switch main power off and on again (reset function). If this does not resolve the problem, call Brinkmann Instruments Service Dept.
Centrifuge does not start or stops during operation.	<ul style="list-style-type: none"> – Lid open. – Program error. – Power failure. – Power not connected. – Motor brushes worn out. – Electronic error. 	<ul style="list-style-type: none"> – Lock lid. – Switch main power off and on again (reset function). If this does not resolve the problem, call Brinkmann Instruments Service Dept. – Operate lid latch manually (see above). – Connect main power plug. – Change motor brushes (see Section 8.1.1). – Call Brinkmann Instruments Service Dept.

Error	Cause	Solution
Material being centrifuged becomes too warm (10 °C above room temperature).	<ul style="list-style-type: none"> – Fan malfunction. 	<ul style="list-style-type: none"> – Call Brinkmann Instruments Service Dept.
Centrifuge vibrates excessively.	<ul style="list-style-type: none"> – Rotor not properly loaded. – Different tube volumes. – Rotor and/or lid not tight. 	<ul style="list-style-type: none"> – Load rotor symmetrically. – Load equal tube volumes opposite to each other. – Tighten rotor and/or rotor lid securely by hand.

8. Maintenance and cleaning

8.1 Maintenance

No routine maintenance is necessary, however, motor brushes should be checked for wear at least every four months, depending on use, and replaced if $\leq 1/4$ inch. See Sec. 8.1.1.

8.1.1 Instructions for changing the motor brushes

- Raise lid and place cardboard or foam over lid interlock pin hole. This will allow the upper housing to be removed without lid lock mechanism interference.
- Switch off main power.
- Disconnect main power plug!
- Remove rotor.
- Pull off timer and speed control knobs.
- Remove the 4 housing screws (2 on each side). Pull upper housing carefully upwards and lay it on its left side.
- The motor brushes are under the white plastic knurled screw caps on the opposite sides of the motor (see Fig. 5, [2]).
- Remove the white plastic screw caps with a large screwdriver or coin and remove the motor brushes.
- Check motor brushes for wear (Fig. 4 and 5): If a thin black pin (1) is visible on either motor brush, the motor brushes must be changed.

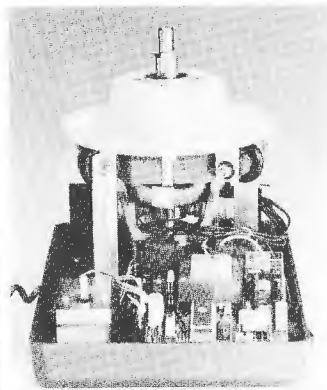


Fig. 4 :
Model 5415 C disassembled
for service

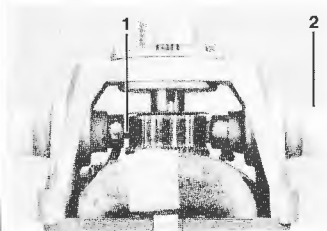


Fig. 5:
Detail: collector and motor
brushes

Note: When reinstalling the used motor brushes, the correct brush should be reoriented and installed in the same side of the motor from which it was removed.

- Insert new motor brushes and tighten the white plastic screw caps until two "clicks" are heard.
- Reattach the upper housing. Be sure that the pilot light (LED) fits properly through the face plate of the housing. Reattach the 4 housing screws.
- Press on the timer and speed control knobs.
- Connect main power plug.
- Switch on main power and let the centrifuge run with an empty rotor at 10,000 rpm for approx. 1/2 hr. This allows the new motor brushes to properly wear in to the motor contacts.

8.2 Cleaning

IMPORTANT:

Open lid. Turn power off. Disconnect main power plug!

Clean housing with a lightly moistened cloth (e. g. mild soap solution).

Rotor cleaning:

- Remove rotor from centrifuge.
- Place rotor upside down onto a protective pad and remove the three Phillips head screws.
- Separate rotor tray and spring plate from the rotor plate.
- Remove tube holders from the rotor plate.
- Clean rotor parts or sterilize if necessary (autoclave up to 121 °C).

Rotor decontamination

Centrifuge rotors can become contaminated when used for spinning radioactive samples. Eppendorf rotors are made of aluminum which can be discolored or pitted by high-alkaline decontamination solutions. Recommended low-alkaline solutions include Rad Con™ and Radiacwash™.

Reassemble rotor as follows:

- Only use undamaged original parts!
- Place rotor plate **without tube holders** upside down onto a protective pad.
- Attach spring plate (bores must be visible).
- Attach rotor tray (bores must be visible).
- Insert and tighten the three Phillips head screws.
- Turn rotor right side up and firmly insert the tube holders.

9. Technical data

Power supply:	220 V/50 Hz; 115 V/60 Hz
Rotational speed (rpm):	continuously adjustable from 1,000 to 14,000 rpm (± 1 %)
Acceleration time:	approx. 10 sec
Deceleration time:	approx. 15 sec
Power requirement:	250 W
Dimensions:	height: 28.0 cm width: 21.0 cm depth: 28.5 cm
Weight:	14.3 lbs (6.5 kg)

Rotational speed (rpm) and relative centrifugal force (RCF)

The relative centrifugal force (RCF) can be calculated from the centrifugal radius (r) and the rotational speed (n).

$$RCF = 1.118 \cdot 10^{-5} \cdot r \cdot n^2$$

The acceleration of gravity ($g = 9.81 \text{ m} \cdot \text{sec}^{-2}$) is a measure for the RCF. The centrifugal force is expressed as a multiple of the acceleration of gravity.

r = centrifugal radius in cm
n = rotational speed in rpm

For the Centrifuge 5415 C, with Standard rotor, the following values are valid for Eppendorf 1.5 mL Safe-Lock-Tube, Flex-Tube and Standard Micro Centrifuge Tube:

rpm	RCF
1,000	82
2,000	325
3,000	735
4,000	1,310
5,000	2,040
6,000	2,940
7,000	4,000
8,000	5,220
9,000	6,610
10,000	8,160
11,000	9,880
12,000	11,750
13,000	13,800
14,000	16,000

The rotational speed is determined from the following formula:

$$rpm = \sqrt{\frac{RCF}{1.118 \cdot 10^{-5} \cdot r \text{ (cm)}}}$$

Example: An RCF of 8,000 is desired using Eppendorf 1.5 mL Safe-Lock Tube, Flex-Tube or Standard Tube ($r = 7.3 \text{ cm}$).

$$rpm = \sqrt{\frac{8000}{1.118 \cdot 10^{-5} \cdot 7.3}} = 9,930$$

10. Ordering information

Centrifuge 5415 C 220 V/50 Hz	22 36 285-2
Centrifuge 5415 C 115 V/60 Hz	22 36 280-1

Standard accessories:

Standard rotor for 18 tubes (d = 11 mm)	22 36 651-3
Rotor lid	22 36 652-1

Special accessories:

Special rotor for 24 tubes (d = 8 mm)	22 36 656-4
Special rotor for 30 tubes (d = 6 mm)	22 36 647-5
Rotor lid	22 36 652-1
Motor brushes, 2 per set	22 36 527-4
Tube holder for special rotor for 24 tubes	22 36 657-2
Tube holder for special rotor for 30 tubes	22 36 648-3
Spring plate for special rotor for 24 tubes	22 36 658-1
Spring plate for special rotor for 30 tubes	22 36 649-1
Adapter for 400 µL and 250 µL microcentrifuge tubes, 18 per set (for use with Standard rotor)	22 36 565-7
Adapter for 500 µL and Becton-Dickinson Microtainer™ tubes, 18 per set (for use with Standard rotor)	22 36 575-4

Eppendorf Microcentrifuge Tubes with Attached Caps

Safe-Lock™ Tubes

500 Safe-Lock Tubes, 1.5 mL, natural polypropylene	22 36 320-4
500 Safe-Lock Tubes, 1.5 mL, amber polypropylene	22 36 322-1
500 Safe-Lock Tubes, 1.5 mL, blue polypropylene	22 36 324-7
500 Safe-Lock Tubes, 1.5 mL, green polypropylene	22 36 326-3
500 Safe-Lock Tubes, 1.5 mL, red polypropylene	22 36 328-0
500 Safe-Lock Tubes, 1.5 mL, yellow polypropylene	22 36 330-1

Flex-Tubes™

500 Flex Tubes, 1.5 mL, natural polypropylene	22 36 411-1
500 Flex Tubes, 1.5 mL, amber polypropylene	22 36 351-4
500 Flex Tubes, 1.5 mL, blue polypropylene	22 36 353-1
500 Flex Tubes, 1.5 mL, green polypropylene	22 36 355-7
500 Flex Tubes, 1.5 mL, red polypropylene	22 36 357-3
500 Flex Tubes, 1.5 mL, yellow polypropylene	22 36 359-0

Standard Tubes

500 Standard Tubes, 1.5 mL, natural polypropylene	22 36 380-8
500 Standard Tubes, 1.5 mL, amber polypropylene	22 36 413-8
500 Standard Tubes, 1.5 mL, blue polypropylene	22 36 419-7
500 Standard Tubes, 1.5 mL, green polypropylene	22 36 418-9
500 Standard Tubes, 1.5 mL, red polypropylene	22 36 416-2
500 Standard Tubes, 1.5 mL, yellow polypropylene	22 36 417-1
500 Standard Tubes, 500 µL, polypropylene	22 36 430-8
1,000 Standard Tubes, 400 µL, polypropylene	22 36 390-5
1,000 Standard Tubes, 400 µL, hard opaque polyethylene	22 36 530-4
1,000 Standard Tubes, 400 µL, soft translucent polyethylene, for Eppendorf 5413 Micro Centrifuge only	22 36 535-5
1,000 Standard Tubes, 250 µL, polyethylene	22 36 440-5

Anticoagulant Micro Centrifuge Tubes also available
Contact Brinkmann Instruments.

Eppendorf Micro Centrifuge 5415 C and 5402

18-place rotor F-45-18-11 for 1.5 mL microcentrifuge tubes

Supplement to the instruction manuals for the Micro Centrifuge 5415 C and 5402

CAUTION:

This rotor can **only** be used in the Micro Centrifuge 5415, 5415 C and 5402!

Max. load per bore: 4.2 g.

To fasten the rotor and rotor lid in the centrifuge, first tighten the knurled rotor nut securely. Next, screw the rotor lid onto the rotor.

Important: Be sure that the rotor lid screw and the internal thread of the knurled rotor nut do not become soiled, otherwise problems could occur with the lid release.

Grease the lid screw lightly with silicone grease. All other parts of the rotor and lid fastening mechanism **must not** be greased!

Cleaning the rotor

- Remove the rotor and place it upside down.
- Loosen and remove the three Phillips screws.
- Take the tray off the rotor. Remove the spring plate. Take the tube holders out of the rotor tray.
- Clean the rotor parts and, if necessary, autoclave them (up to 121 °C). Grease the knurled nut of the rotor lid lightly with silicone grease after autoclaving.

- Reassemble rotor without tube holders. Replace the three Phillips screws and tighten them. Then firmly insert the tube holders. Only use undamaged, original parts when reassembling the rotor.

Important note:

Please only use the accessories recommended by Eppendorf. Using spare parts or disposable tubes which we have not recommended can reduce the reliability, life and precision of the centrifuge and rotor.

Ordering information

	Order no.
18-place standard rotor, (11 mm bore) with lid	22 36 672-6
Tube holder (1 only)	22 36 643-2
Spring plate	22 36 644-1
Replacement Rotor lid	22 36 652-1

Technical data for Rotor F-45-18-11

Capacity:	18 tubes
Diameter of bore:	11 mm
Angle of bore:	45°
Max. load per bore:	4.2 g
Max. rotational speed:	14,000 rpm
Max. centrifugal force:	RCF = 16,000
K-value for rotor	k = 460 h
Max. permitted density of liquids:	1.2 g/mL
Weight:	1.0 lb (0.47 kg)

Technical specifications
subject to change!

Brinkmann Instruments, Inc.
Cantiague Road
Westbury, N. Y. 11590
In Canada: 50 Galaxy Blvd.,
Rexdale, Ont. M9W 4Y5

eppendorf