behr
Labor-Technik

behrotest®
In-Line Extraction Units

With 30-ml, 100-ml or 250-ml Extractors

R 304, R 304 S
R 306, R 306 S
R 308, R 308 S

R 104, R 104 S
R 106, R 106 S
R 108, R 108 S

R 254, R 254 S
R 256, R 256 S
R 258, R 258 S

User's Manual

197109

Please read this User's Manual carefully before using your new behrotest® In-Line extraction apparatus!

The User's Manual provides you with clear and simple instructions for using the apparatus.

In the interest of insuring safe utilization of the In-Line-Extraction apparatus, observe carefully the safety warnings in the manual, which are designated by a ⚠ !

Additional useful and important information on the functioning of the apparatus is marked by a stripe in the margin.

We wish you success and satisfaction in the use of your

behrotest®
In-Line Extraction apparatus

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Safety Warnings

Danger of toxic solvent vapours! Always conduct the extraction in a fume hood.

Danger of electric shock! Make sure that no liquids get into the cable connections or the inside of the equipment.

Be careful in working with chemicals! Follow the safety guidance in the pertinent Safety Data Sheets.

Glass can break and cause injury! In working with glass components, observe all appropriate safety precautions.

Caution: vessels get hot and can cause burns! Do not touch the solvent vessels and extractors with bare hands during and immediately after an extraction.

Danger of fire or explosion! Do not spill solvents on the hot heating plates. The device is not suitable for extraction with diethyl ether or other highly inflammable solvents.

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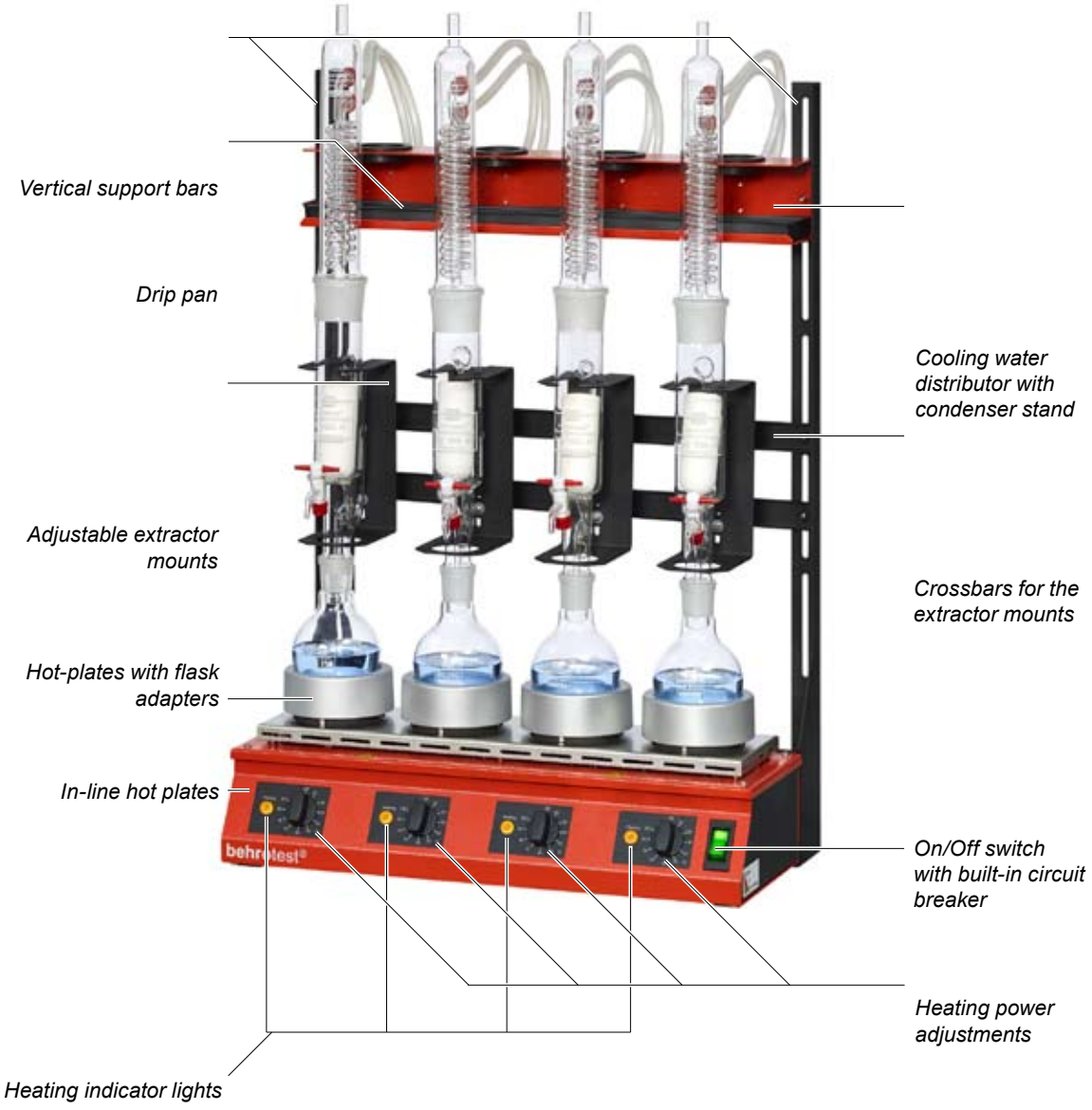
Description

The behrotest® In-Line Extraction Unit is used for Soxhlet extraction, mainly in food, foodstuffs and soil analysis.

Depending on the model and configuration, the apparatus consists of either four, six, or eight individually adjustable heating positions for round-bottom flasks of up to 500 ml volume, which are used in conjunction with extractors between 30 and 250 ml.

The full capabilities of the behrotest® In-Line Extraction Unit in daily laboratory utilization can only be realized if you carefully read and follow all of the guidance in this manual.



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Contents of Delivery

Completeness and Absence of Damage

The individual components of your behrotest® In-Line Extraction Unit have been assembled and packed with the greatest of care.

Please check the contents of the delivery for completeness and absence of damage before assembling the apparatus. The correct contents of delivery is presented in the following list of components.

If you do find damage, please follow the instructions provided in the leaflet entitled

„Transportation Damage? What to do if…“,

Which you will find included among the shipping documents. If you do have grounds for a damage claim, please contact:

behr Labor-Technik GmbH
Spangerstraße 8
D-40599 Düsseldorf / Germany
Phone: +49 (0)211 7 48 47 40
Telefax: +49 (0)211 7 48 47 48
eMail: info@behr-labor.com

List of Components

All behrotest® In-Line Extraction Units consist of a

Basic unit for four, six, or eight samples

1 In-line hot-plate array R 4 (4 hot plates), R 6 (6 hot plates) or R 8 (8 hot plates)
2 Vertical support bars
1 Cooling water distributor with condenser stand (4, 6 or 8 place) and drip pan,
1 Crossbar with 4, 6 or 8 adjustable extractor mounts
1 Water inflow hose, polyamide, Ø 8 mm
1 Water outflow hose, PVC, Ø 12 mm
1 Disconnecting tool for Speedfit hose connections
1 Connection for ¾“ pipe thread water tap
1 Adapter for ½“ pipe thread water tap
1 User’s Manual

Depending on the model, the following complete extraction glassware is provided:

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R 304 / R 304 S

4 Aluminium hotplate adapters to fit 100-ml round-bottom flasks
4 100-ml round-bottom flasks (RK 100)
4 distance pieces for round-bottom flasks
4 Soxhlet extractors, 30 ml (EZ 30) or Soxhlet extractors, 30 ml, with spigot (EZ 30H)
4 Spiral coil reflux condensers for 30 ml Soxhlet (RFK 30)
8 Silicone tube, 6 x 2 mm, cuttings of 50 cm
1 Package containing 25 extraction thimbles to fit the 30-ml Soxhlet extractor (EX 30 HS)

R 306 / R 306 S

6 Aluminium hotplate adapters to fit 100-ml round-bottom flasks
6 100-ml round-bottom flasks (RK 100)
6 distance pieces for round-bottom flasks
6 Soxhlet extractors, 30 ml (EZ 30) or Soxhlet extractors, 30 ml, with spigot (EZ 30H)
6 Spiral-coil reflux condensers for 30-ml Soxhlet (RFK 30)
12 Silicone tube, 6 x 2 mm, cuttings of 50 cm
1 Package containing 25 extraction thimbles to fit the 30-ml Soxhlet extractor (EX 30 HS)

R 308 / R 308 S

8 Aluminium hotplate adapters to fit 100-ml round-bottom flasks
8 100-ml round-bottom flasks (RK 100)
8 distance pieces for round-bottom flasks
8 Soxhlet extractors, 30 ml (EZ 30) or Soxhlet extractors, 30 ml, with spigot (EZ 30H)
8 Spiral-coil reflux condensers for 30-ml Soxhlet (RFK 30)
16 Silicone tube, 6 x 2 mm, cuttings of 50 cm
1 Package containing 25 extraction thimbles to fit the 30-ml Soxhlet extractor (EX 30 HS)

R 104 / R 104 S

4 Aluminium hotplate adapters to fit 250 ml round-bottom flasks
4 250-ml round-bottom flasks (RK 250)
4 distance pieces for round-bottom flasks
4 Soxhlet extractors, 100 ml (EZ 100) or Soxhlet extractors, 100 ml, with spigot (EZ 100H)
4 Spiral coil reflux condensers for 100-ml Soxhlet (RFK 100)
8 Silicone tube, 6 x 2 mm, cuttings of 50 cm
1 Package containing 25 extraction thimbles to fit the 100 ml Soxhlet extractor (EX 100 HS)

R 106 / R 106 S

6 Aluminium hotplate adapters to fit 250 ml round-bottom flasks
6 250 ml round bottom flasks (RK 250)
6 distance pieces for round-bottom flasks
6 Soxhlet extractors, 100 ml (EZ 100) or Soxhlet extractors, 100 ml, with spigot (EZ 100H)
6 Spiral coil reflux condensers for 100 ml Soxhlet (RFK 100)
12 Silicone tube, 6 x 2 mm, cuttings of 50 cm
1 Package containing 25 extraction thimbles to fit the 100 ml Soxhlet extractor (EX 100 HS)

R 108 / R 108 S

8 Aluminium hotplate adapters to fit 250 ml round-bottom flasks
8 250-ml round-bottom flasks (RK 250)
8 distance pieces for round-bottom flasks
8 Soxhlet extractors, 100 ml (EZ 100) or Soxhlet extractors, 100 ml, with spigot (EZ 100H)
8 Spiral coil reflux condensers for 100-ml Soxhlet (RFK 100)
16 Silicone tube, 6 x 2 mm, cuttings of 50 cm
1 Package containing 25 extraction thimbles to fit the 100 ml Soxhlet extractor (EX 100 HS)

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R 254 / R 254 S

4 Aluminium hotplate adapters to fit 500 ml round-bottom flasks
4 500 ml round bottom flasks (RK 500)
4 distance pieces for round-bottom flasks
4 Soxhlet extractors, 250 ml (EZ 250) or Soxhlet extractors, 250 ml, with spigot (EZ 250H)
4 Spiral coil reflux condensers for 250 ml Soxhlet (RFK 250)
8 Silicone tube, 6 x 2 mm, cuttings of 50 cm
1 Package containing 25 extraction thimbles to fit the 250 ml Soxhlet extractor (EX 250 HS)

R 256 / R 256 S

6 Aluminium hotplate adapters to fit 500 ml round-bottom flasks
6 500 ml round bottom flasks (RK 500)
6 distance pieces for round-bottom flasks
6 Soxhlet extractors, 250 ml (EZ 250) or Soxhlet extractors, 250 ml, with spigot (EZ 250H)
6 Spiral coil reflux condensers for 250 ml Soxhlet (RFK 250)
12 Silicone tube, 6 x 2 mm, cuttings of 50 cm
1 Package containing 25 extraction thimbles to fit the 250 ml Soxhlet extractor (EX 250 HS)

R 258 / R 258 S

8 Aluminium hotplate adapters to fit 500 ml round-bottom flasks
8 500 ml round bottom flasks (RK 500)
8 distance pieces for round-bottom flasks
8 Soxhlet extractors, 250 ml (EZ 250) or Soxhlet extractors, 250 ml, with spigot (EZ 250H)
8 Spiral coil reflux condensers for 250 ml Soxhlet (RFK 250)
16 Silicone tube, 6 x 2 mm, cuttings of 50 cm
1 Package containing 25 extraction thimbles to fit the 250 ml Soxhlet extractor (EX 250 HS)

Depending on your applications, you may need as well:

- Hydrolysis unit EXR 4 and filtration unit FU 4 (4 samples) or Hydrolysis unit EXR 6 and filtration unit FU 6 (6 samples) or Hydrolysis unit EXR 8 and filtration unit FU 8 (8 samples)
- Circulating water coolers for condensers – UK 12/1000 or UK 12/2000

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Appropriate Use

The in-line heating unit serves for heating samples in appropriate vessels, as, for example, fat extraction with petroleum ether or heating under reflux. Round-bottom flasks and other vessels with small contact surface may only be used with the appropriate flask adapters. Heating the unit without dissipating the heat that is being produced can destroy the heating plates. The in-line heating unit is not suitable for non-intermittent operation at high temperature.

Do not make arbitrary alterations in the unit. These could affect its safety and reliability and will void the product guarantee.

Do not expose the device to aggressive vapours e. g. of acids, bases or solvents!

Non-appropriate use will make the guarantee void.

The in-line heating unit must only be connected to a mains receptacle of sufficient load capacity. For the 8-place versions, a fuse protection of 16 A is recommended.

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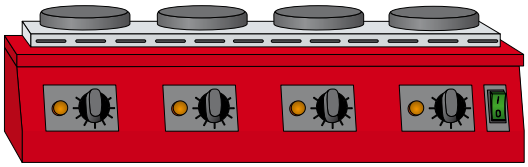
Assembling the behrotest® In-line extraction unit

Danger of toxic solvent vapours! Always conduct the extraction in a fume hood.

Danger of electric shock! Make sure that no liquids get into the cable connections or the inside of the equipment.

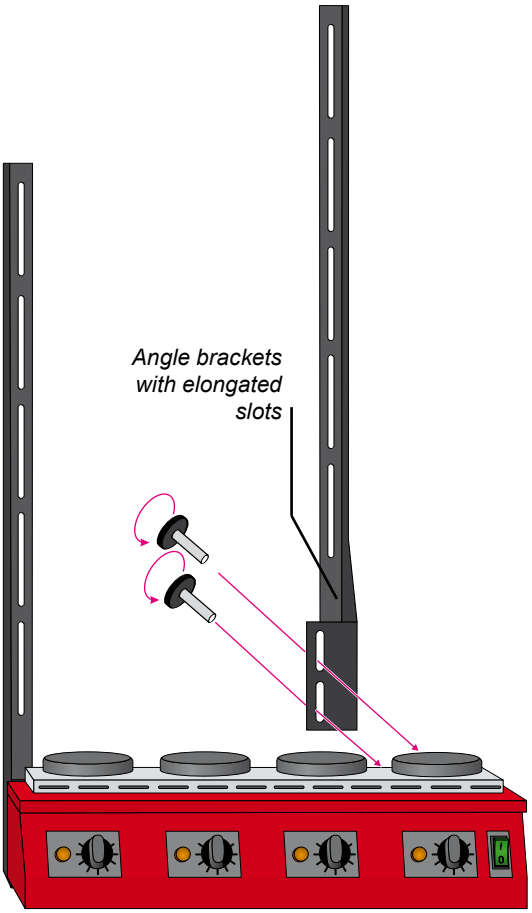
Glass can break and cause injury! In working with glass components, observe all appropriate safety precautions.

Attaching the Vertical Support Bars



- Place the in-line heating unit on a flat level surface.
- Attach both vertical support bars to the side of the in-line heating unit using the four knurled screws provided.
  Befestigen Sie die beiden Standpfosten mit den 4 Rändelschrauben an der Rückseite der Reihenheizbank.

Make sure the lower ends of the support bars, which are to be attached to the heating unit, are resting on the bench top. The angle bracket for attaching the support bars has elongated slots for inserting the screws. This allows you to adjust the vertical height of the support bars.



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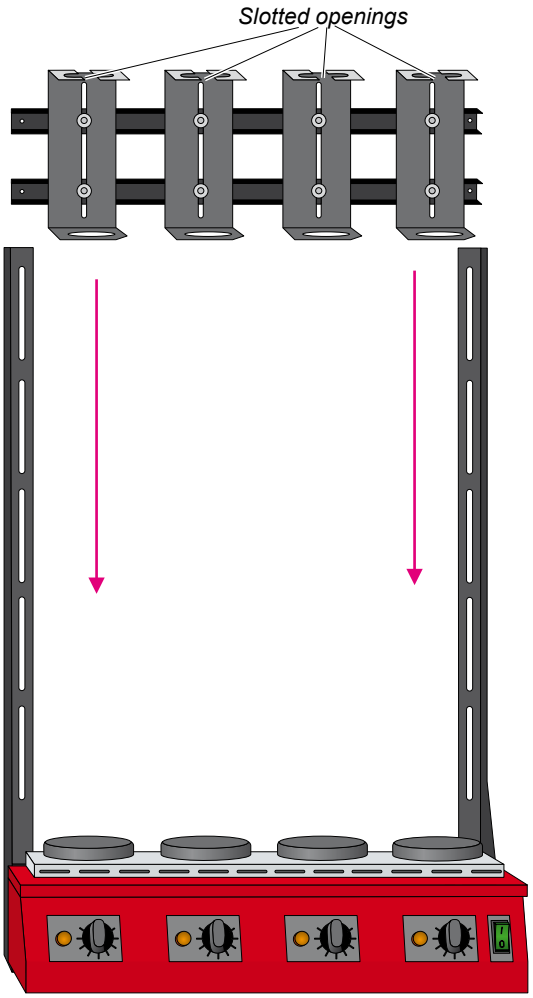
Attaching the Horizontal Support Bars

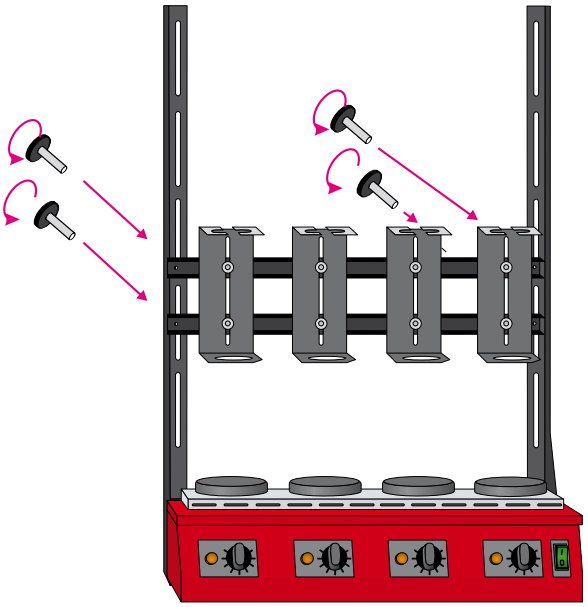
Bars with Extractor Mountings

- Insert the bars with the extractor mountings from below between the internal track formed by the horizontal support bars. The extractor mountings must be oriented with the slotted opening on top, facing forward.

The correct height of attachment for the horizontal support bars depends on the glassware being used. For example, in the case of the 100 ml Soxhlet extraction, locate the screw holes of the upper horizontal support bar at the lower ends of the third elongated slots in the vertical support bars. The height can be readjusted as needed at any time in the future.



- Fasten the horizontal support bars with the four knurled screws provided.



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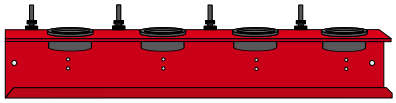
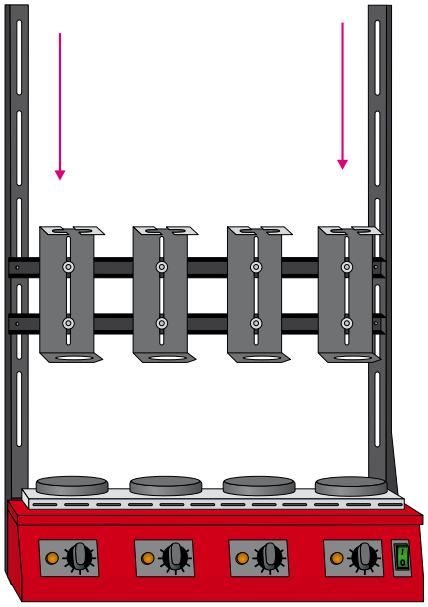
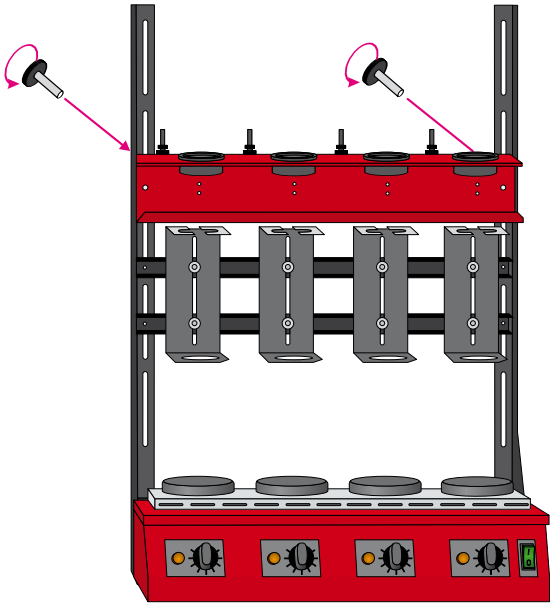
Condenser stand with cooling-water distributor



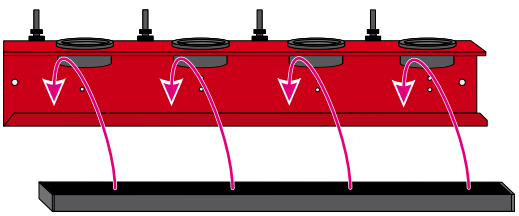
- Insert the condenser storage stand from above between the internal track formed by the horizontal support bars.



- Position the screwhole of the condenser stand at the lower ends of the uppermost elongated slots in the vertical support bars.
- Fasten the condenser stand in place with the pair of knurled screws provided.



- Insert the drip tray into the condenser storage stand.



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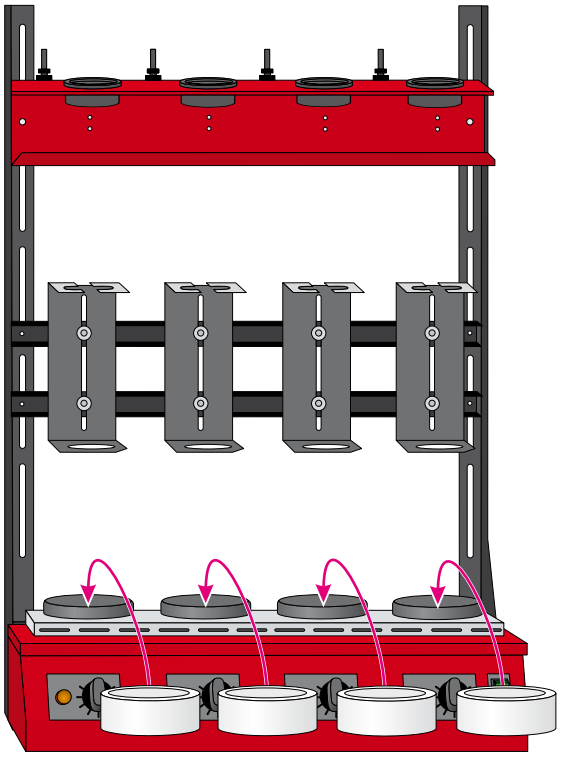
Installing the Flask Adapters

- Place the hotplate-flask adapters on the hotplates.
  Take care that the adapters are seated securely on the hotplates and cannot slip off sideways.



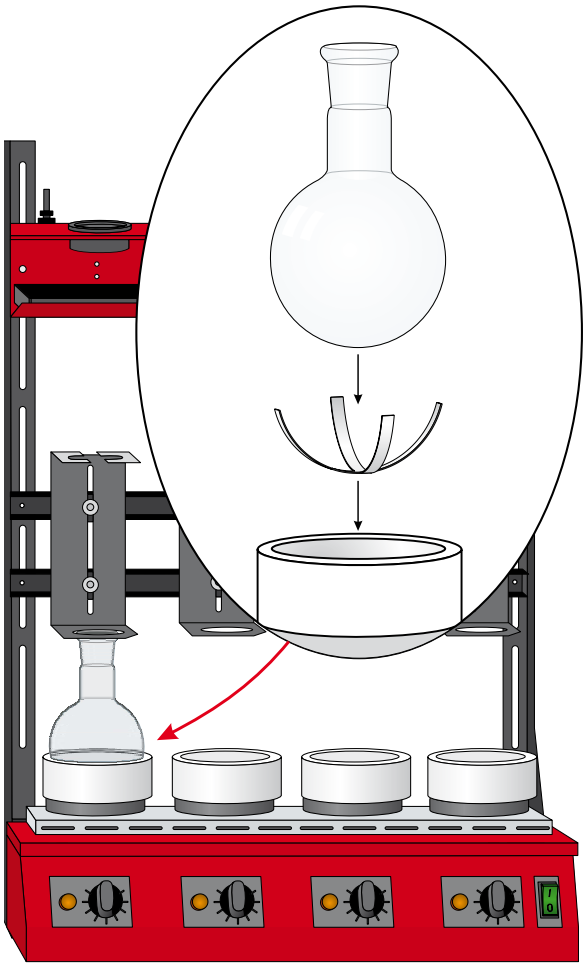
Inserting the Glassware

To minimize the risk of breakage, always hold all glassware in the vicinity of the standard taper joint!

- Lay the cross-shaped distance parts into the hotplate-flask adapters.

The round-bottom flasks must not be immediately inserted in the hotplate-flask adapters; otherwise they could break on heating. Never operate your in-line extraction unit without the distance parts!

- Place the round-bottom flask in the flask adapter on the hotplate.
- Check once more the height of the crossbars with extractor mounts. The upper end of the neck of the round bottom flask must protrude several millimeters into the lower opening of the extractor mount. This will secure the flask against tipping over. If necessary, adjust the height of the crossbars.



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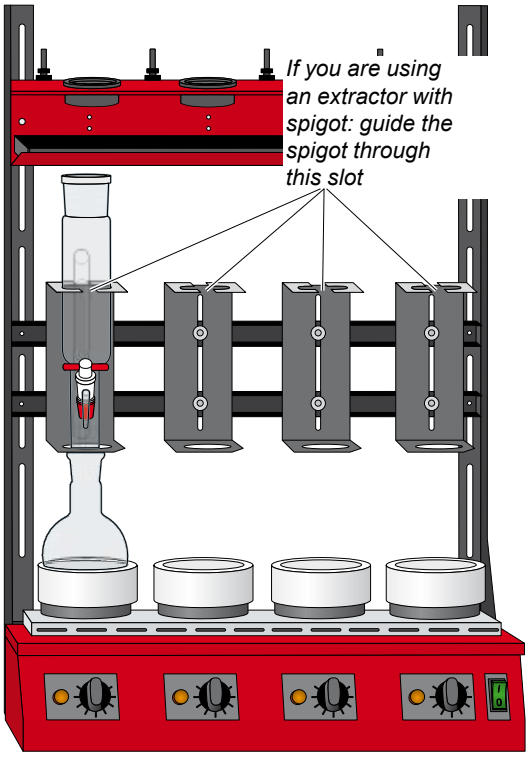
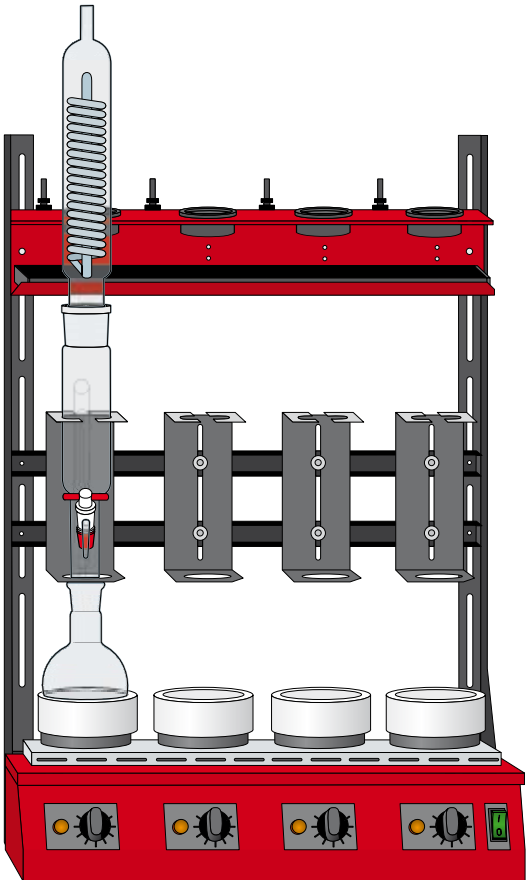
- Insert the extractors from above into the extractor mounts and seat them on the round-bottom flasks.

  The upper horizontal segment of the extractor mounts have a slot in front. In the event that you are using an extractor with spigot (for example, the behrotest® EZ 100 H), then guide the extractors with the spigots carefully through these slots.



- Insert the reflux condensers onto the extractors.



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Connecting the Water Hoses

Cooling-Water Distributor

Cooling-water supply

The cooling water supply hose is made of polyamide and is 2 meters long. If necessary, shorten it as required.

> Use only a very sharp blade, such as a scalpel or box cutter to cut polyamide hoses. The cut end must be free of burrs and at a sharp right angle. Avoid deformation of the hose. By this you will get a leak-free seal in the push-on fitting.

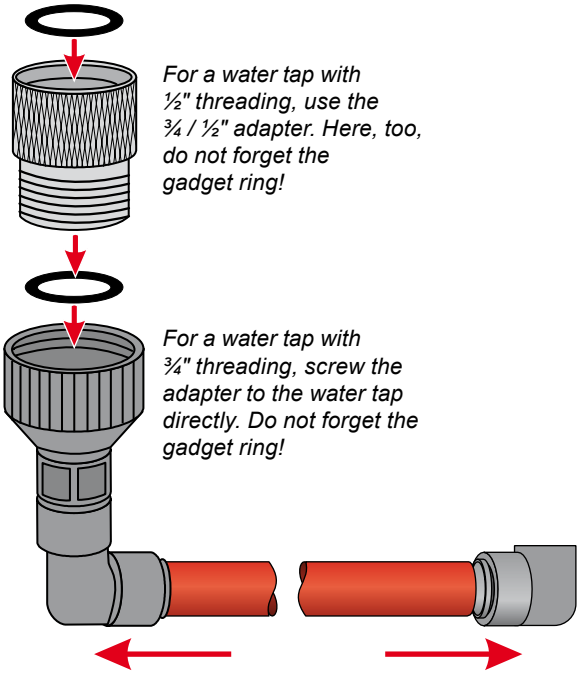
Push the supply hose firmly into the socket on the lower distributor line as far as it will go

The connection for the cooling-water supply hose is found on the rear of the condenser stand.

- Push one end of the water supply hose as far as it will go into the connection.
- In the same manner, attach the ¾“ water tap connection to the other end of the hose.
- Lead the water-supply hose to a laboratory water tap.

  Water tap with ¾“ pipe thread:
  Insert a washer in the connector and fasten the water supply hose to the water tap by screwing the connector onto the ¾“ pipe thread of the water tap.

  Water tap with ½“ pipe thread:
  Use the ¾“ to ½“ adapter.
  Place a washer in the connector and screw the adapter and connector together. Then screw the adapter onto the ½“ pipe thread of the water tap.



For a water tap with ½" threading, use the ¾ / ½" adapter. Here, too, do not forget the gadget ring!

For a water tap with ¾" threading, screw the adapter to the water tap directly. Do not forget the gadget ring!

Firmly push the end of the supply hose in the hose adapter.

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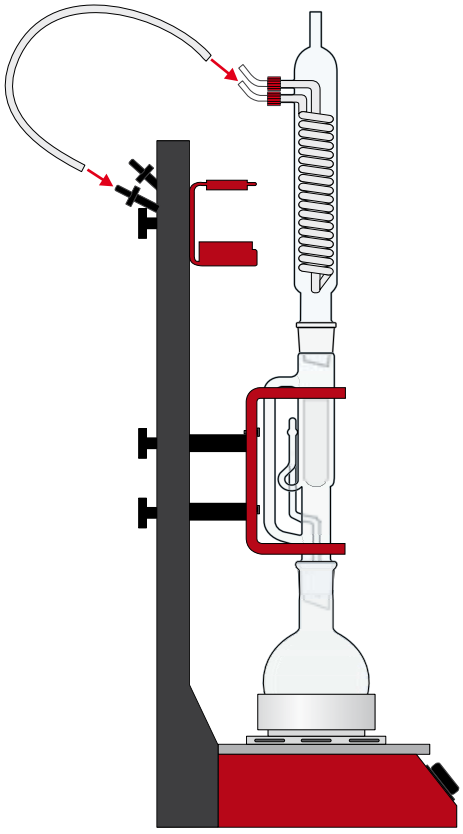
Cooling-water outflow

The connection for the cooling water outflow is likewise located on the rear of the cooling water distributor with condenser stand.

- Insert the black tubing segment of the outflow (drain) hose as far as it will go into the hose receptacle.
- Lay the hose to a sink or other drain.

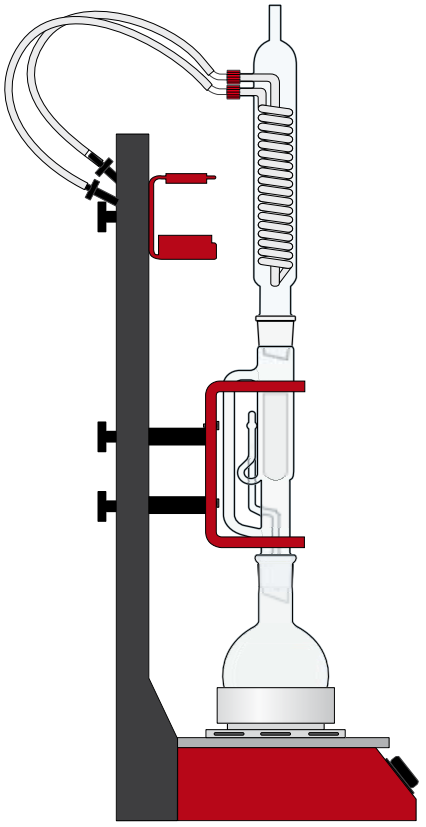
Make sure that there are no tight curves or kinks in the hose. If necessary, shorten the hose to prevent constrictions of this nature.



Connections to the Condensers

- Attach the silicone tubing segments to the tubing nipples on the cooling water distribution unit identified as „Out“ (outflow) and „In“ (inflow).
- Attach the tubing segments to the condensers.

The lower nipple on the reflux condenser is for water inflow. Connect the tubing segments coming from the lower „In“ panel of the cooling water distributor to these nipples.
Connect the upper nipples of the condensers in the same manner with the upper „Out“ panel of the cooling water distributor.



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Disconnecting the quick push-in connections

If needed, the connections of the polyamide tubing or the tubing nipples can easily be disconnected. Use the special tool provided for this purpose.

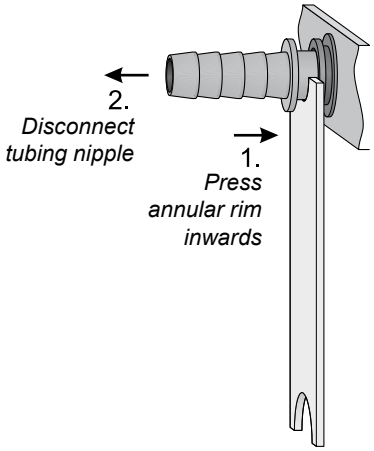
Use the narrow slot of the tool for the nipples and the inflow tube and the wide slot for the outflow tube.

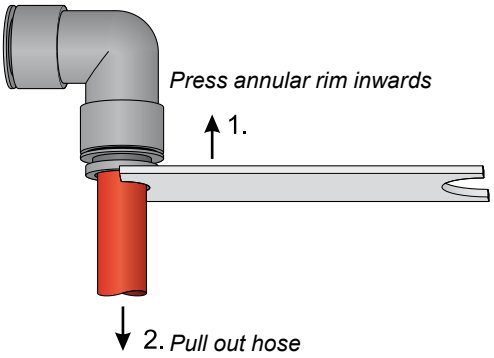
Tubing nipple quick push-in connector

- Place the tool in front of the annular rim of the quick connector.
- With the other hand, grasp the tubing nipple.
- Press the annular rim inwards with the tool while simultaneously pulling the tubing nipple forwards and out of the cooling water distributor.

Inflow/ Quick Connector

- Place the tool in front of the annular rim of the quick connector of the hose.
- With the other hand, grasp the hose.
- Press the annular rim inwards with the tool while simultaneously pulling the hose forwards and out of the quick connector.





Using a Model UK 12 Circulating Water Cooler

Follow carefully the instructions in the UK 12 User's Manual.

The hose set of the circulating water cooler contains an adapter for connecting the inflow hose of the cooling water distributor.

From the connector labelled ***OUT*** the fresh cooled water will come out of the circulating water cooler. So that's where the (thin red) inflow hose of the apparatus must be connected. Connect the inflow adapter to the nipple of the OUT connector, and push ther red inflow hose firmly into the connector of the adapter.

The ***IN*** connector is where the used cooling water must go in. So connect here the outlet hose (the thick PVC hose).

Connect the outlet hose (the thick green PVC hose) directly to the IN connector of the UK 12

For the inlet hose of the apparatus (the thin red hose) there comes an adapter with the UK 12 hose set. Connect this adapter to the OUT connector of the UK 12...

... and push the hose firmly into the end part of the adapter.

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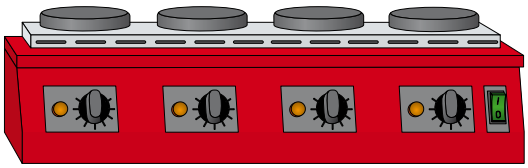
Connecting to Mains Power

First insure that the local mains (electrical) power is of the same voltage as that indicated on the model label of your behrotest® inline apparatus.

Insure that the power switch on the front of the inline apparatus is set to „0“.

Insert the plug of the electrical power cable coming from the back of the inline heating unit into a mains power socket.



Leak Testing

You can now check the hose and tubing connections for leaks.

Turn on the water tap and make any necessary changes to the hose and tubing connections.

Using the Inline Extraction Unit

Danger of toxic solvent vapours! Always conduct the extraction in a fume hood.

Danger of electric shock! Make sure that no liquids get into the cable connections or the inside of the equipment.

Be careful in working with chemicals! Follow the safety guidance in the pertinent Safety Data Sheets.

Glass can break and cause injury! In working with glass components, observe all appropriate safety precautions.

Caution: vessels get hot and can cause burns! Do not touch the solvent vessels and extractors with bare hands during and immediately after an extraction.

Danger of fire or explosion! Do not spill solvents on the hot heating plates. <u>The device is not suitable for extraction with diethyl ether or other highly inflammable solvents.</u>

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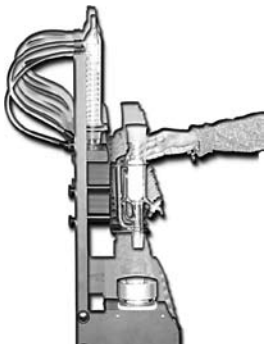
Sample Preparation

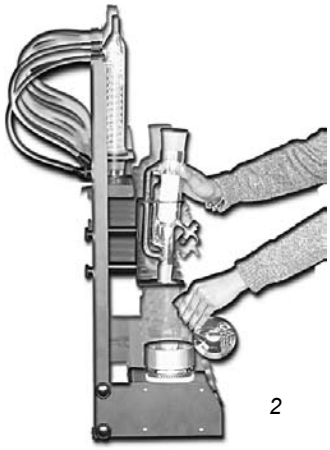
Prepare the sample for extraction.

- Place the sample material into the extraction thimble. Close the top of the thimble with fat-free cotton wool and insert the closed thimble into the extractor.
- Insert the extractor into the extractor mounting (1).



1

- Now fill solvent into the round-bottom flask. Place the flask on the hotplate flask adapter (2) and insert the extractor into the mouth of the flask (3).



2

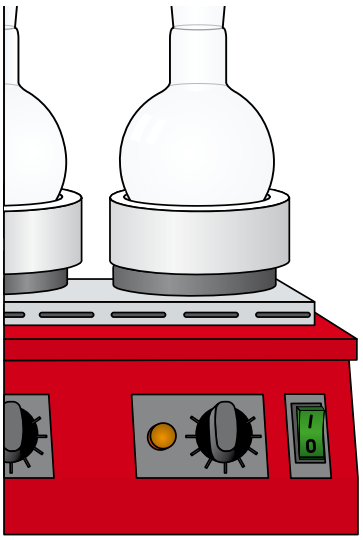
- Attach the reflux condenser to the extractor and start the flow of cooling water.

3

Switching the Heating Unit On

Turn the power switch on the front of the inline heating unit to the „I“ position.

> The power switch of the behrotest® inline heating unit fulfills two functions. It serves to turn the apparatus on and off and also contains a built in electrical circuit-breaker.
>
> The circuit-breaker operates similarly to those in household appliances – it shuts off the electrical power supply.
>
> Since this safety feature (circuit-breaker) requires cocking a spring, turning the power switch of the inline heating unit to the on position will require somewhat more force than a simple on/off switch.



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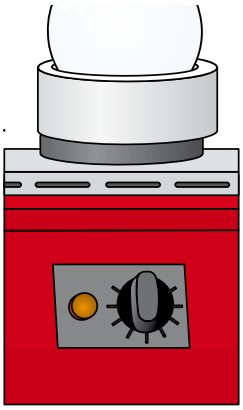
Starting the Extraction

Adjust the heat level for the individual sample positions with the power level knobs.

Adjust the power levels so that the solvent boils uniformly in all positions and condenses in sufficient amounts to uniformly extract all of the samples.

The yellow „HEATING“ indicator lamps of each heating position indicate heating activity.



Finishing the Extraction

If you are using an extractor with stopcock, you can now evaporate the solvent. Draw the solvent that is accumulating in the extractor off in portions; collect it in a bottle that can be properly closed.

Afterwards, shut the energy controls down and then switch the in-line heating unit off with the MAIN SWITCH.

If you are using an extractor without stopcock, the easiest will be to evaporate the solvent with a rotary evaporator:

- Shut the energy controls down to zero and then swith the in-line heating unit off with the main switch.
- Wait till the solvent has ceased boiling.
- Take the condensers off the round-bottom flasks and place them in the borings of the condenser stand.
- Cautiously take the extractors off the roundbottom flasks; be careful not to let the solvent run through the siphon while you are doing this. Collect the solvent in a bottle that can be properly closed.
- Take the round-bottom flasks out of the device and insert them in your rotary evaporator.

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Cleaning the In-Line Extraction Apparatus

Basic Framework and Horizontal Support Bars

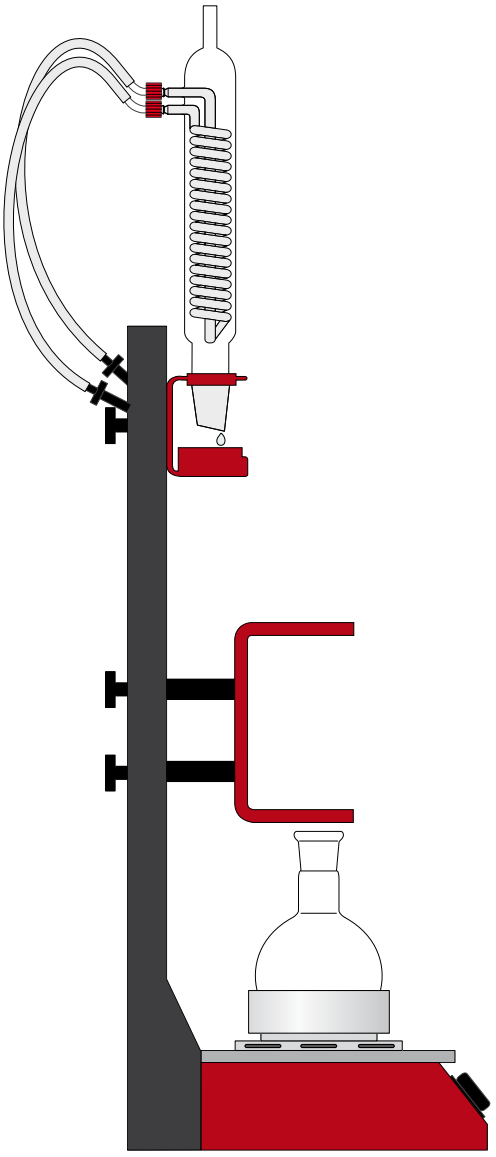
The basic framework and mountings are robust. Anyhow, do not use aggressive cleaning agents like abrasives or steel wool.

Round-bottom flasks and extractors

Remove the round bottomed flasks and extractors from the apparatus for cleaning.

Reflux Condensers

First separate the condensers from the extractors and place them in the recesses in the condenser holding bar. Any condensate possibly dripping from the condensers will fall into the drip pan. Remove the drip pan regularly from the condenser holding bar and clean it.



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Spare Parts and Accessories

Description	Code	Art. No.
Circulating water cooler, 1000 W	UK 12/1020	B00602388
Circulating water cooler, 2000 W	UK 12/2020	B00602389
Adapter piece for connecting the water-inlet hose to the circulating-water cooler, with quick push-in connection		B00226071
PTFE joint sleeve for EZ 30 (H) (for NS 29 tapers)	PTFE 29	B00217905
PTFE joint sleeve for EZ 100 and EZ 100 H, EZ 250 and EZ 250 H (for NS 45 tapers)	PTFE 45	B00217909
For 30-ml extraction:		
Round-bottomed 100-ml flask for 100-ml extraction	RK 100	B00218501
Distance part for round-bottom flasks 100 ml, cross-shaped		B00231009
Reflux condenser for 30-ml extractors	RFK 30	B00217955
Soxhlet extractor, 30 ml	EZ 30	B00217966
Soxhlet extractor, 30 ml, with spigot	EZ 30H	B00217970
Extraction thimbles for EZ 30(H), 25 pcs.	EX 30 HS	B00600442
For 100-ml extraction:		
Round-bottomed 250-ml flask for 100-ml extraction	RK 250	B00218499
Distance part for 250 ml / 500 ml flasks, cross-shaped		B00694581
Reflux condenser for 100-ml extractors or 250-ml extractors	RFK 100	B00218214
Soxhlet extractor, 100 ml	EZ 100	B00217967
Soxhlet extractor, 100 ml, with spigot	EZ 100H	B00217970
Extraction thimbles for EZ 100(H), 25 pcs.	EX 100 HS	B00116487
For 250-ml extraction:		
Round-bottomed 500-ml flask, for 250-ml extraction	RK500	B00218500
Distance part for 250 ml / 500 ml flasks, cross-shaped		B00694581
Reflux condenser for 100-ml extractors or 250-ml extractors	RFK 100	B00218214
Soxhlet extractor, 250 ml	EZ 250	B00217974
Soxhlet extractor, 250 ml, with spigot	EZ 250H	B00217973
Extraction thimbles for EZ 250(H), 25 pcs.	EX 250 HS	B00217975

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Technical Specifications

Dimensions (W x H x D) (apparatus w/o glassware)	4 samples	approx. 53 x 74 x 32 cm
	6 samples	approx. 76 x 74 x 32 cm
	8 samples	approx. 90 x 74 x 32 cm
Weight of entire system (apparatus w/o glassware)	4 samples	15.1 kg
	6 samples	19.8 kg
	8 samples	24.5 kg
Line voltage of inline heating	230 V~, 50/60 Hz	
Power consumption	4 samples	1440 W
	6 samples	2160 W
	8 samples	2880 W

Customer Service

In the event of a malfunction or defect in your behrotest® in line extraction apparatus, always contact:

behr Labor-Technik GmbH Spangerstraße 8 D-40599 Düsseldorf	Phone: Telefax: eMail: Internet:	(+49 211) 7 48 47 40 (+49 211) 7 48 47 48 info@behr-labor.com http://www.behr-labor.com

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