behr
Labor-Technik

In-Line Extraction Units

with 100-ml or 250-ml extractors

R 104
R 104 S
R 106
R 106 S
R 254
R 254 S
R 256
R 256 S

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User's Manual

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

The operating manual gives clear and simple instructions for use of the apparatus.

In the interests of eliminating risk please observe the safety instructions given in this manual! They are marked with a ⚠ symbol.

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

We wish you every success in your work with the
behr 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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Contents

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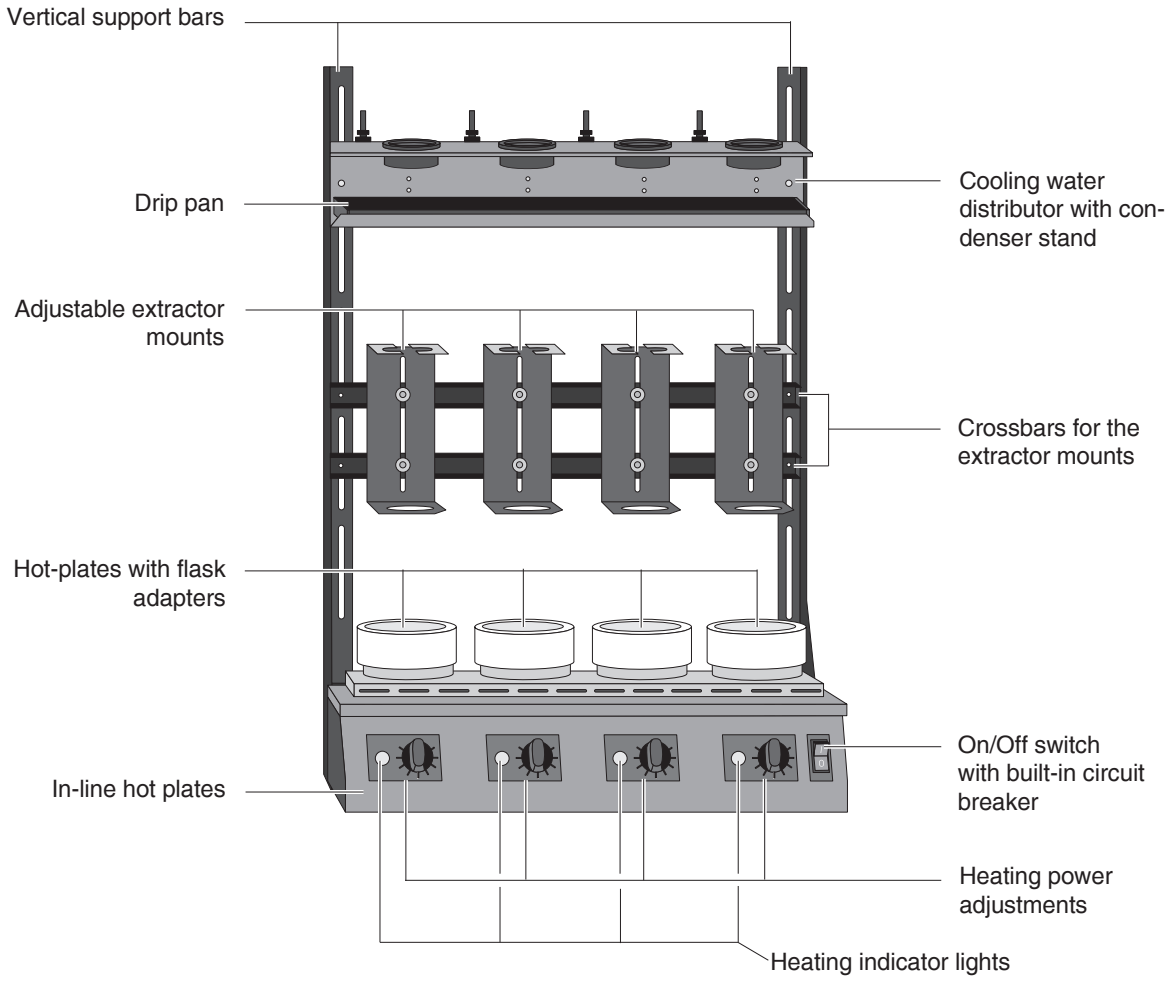
Description

The 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 or six individually adjustable heating positions for round-bottom flasks of up to 500 ml volume, which are used in conjunction with extractors of 100 or 250 ml.

The full capabilities of the 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 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
40599 Düsseldorf/Germany
Telefon: +49 211 7 48 47 17
Telefax: +49 211 7 48 47 48
eMail: info@behr-labor.com

List of Components

All In-Line Extraction Units consist of a

Basic unit for four or six samples

1 In-line hot-plate array R 4 (4 hot plates) or R 6 (6 hot plates)
2 Vertical support bars
1 Cooling water distributor with condenser stand (4 or 6 place) and drip pan,
1 Crossbar with 4 or 6 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

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

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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 Soxhlet extractors, 100 ml without stopcock (EZ 100, for R 104)
or 100 ml with stopcock (EZ 100 H, for R 104 S)
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 extractors (EX 100 HS)
1 User's Manual

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 Soxhlet extractors, 100 ml without stopcock (EZ 100, for R 106)
or 100 ml with stopcock (EZ 100/H, for R 106 S)
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 extractors (EX 100 HS)
1 User's Manual

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 Soxhlet extractors, 250 ml without stopcock (EZ 250, for R 254)
or 250 ml with stopcock (EZ 250/H, for R 254 S)
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 extractors (EX 250 HS)
1 User's Manual

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 Soxhlet extractors, 250 ml without stopcock (EZ 250, for R 256)
or 250 ml with stopcock (EZ 250/H, for R 256 S)
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 extractors (EX 250 HS)
1 User's Manual

Optional:

Hydrolysis unit EXR 4 and filtration unit FU 4 (4 samples) or
hydrolysis unit EXR 6 and filtration unit FU 6 (6 samples)
Circulating water coolers for condensers – UK 12/1020 or UK 12/2020

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Assembling the il-Line Extraction Unit

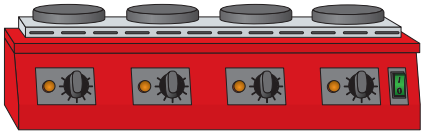
Always operate the in-line extraction unit in a fume hood! Solvent vapors may escape!

To avoid the risk of electrical shock, insure that no liquid comes in contact with the power cable or gets into the inside of the apparatus!

Follow carefully safety regulations and exercise due caution in working with glass components!

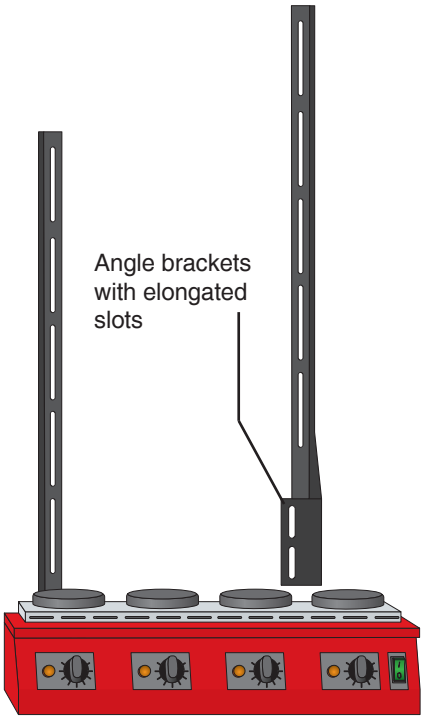
Attaching the Vertical Support Bars

- 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.

Insure that 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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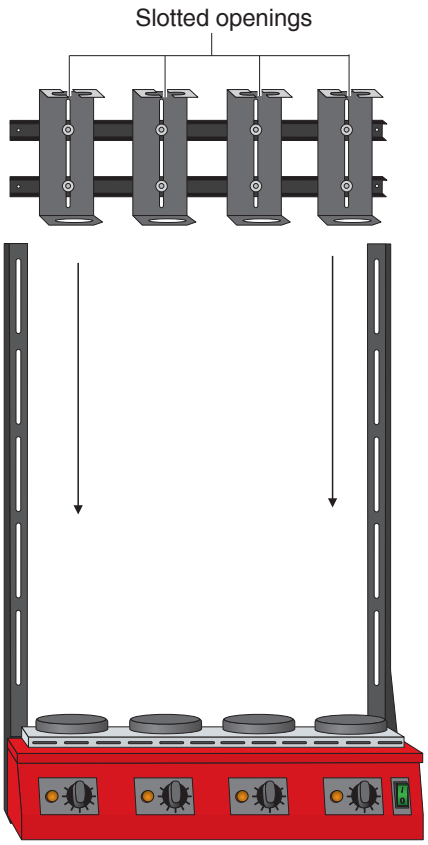
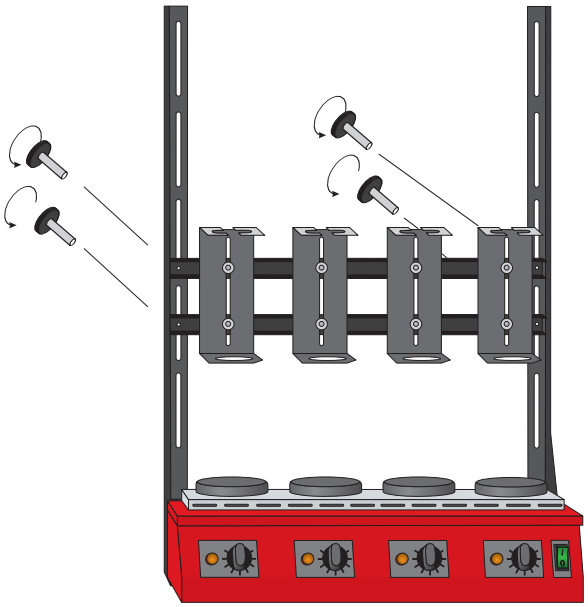
Condenser Storage Stand with Cooling-Water Distributor

- 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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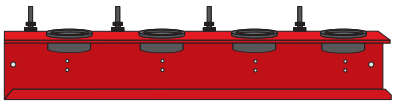
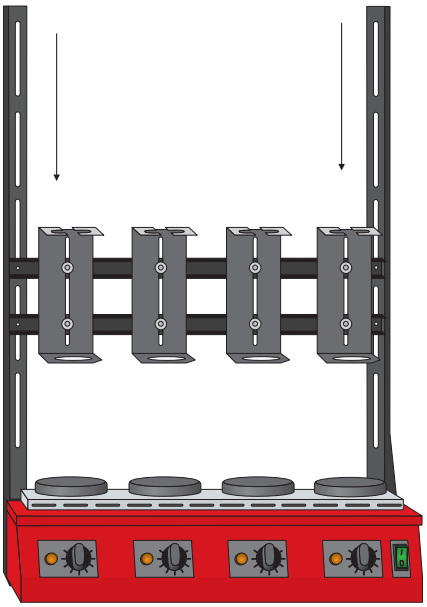
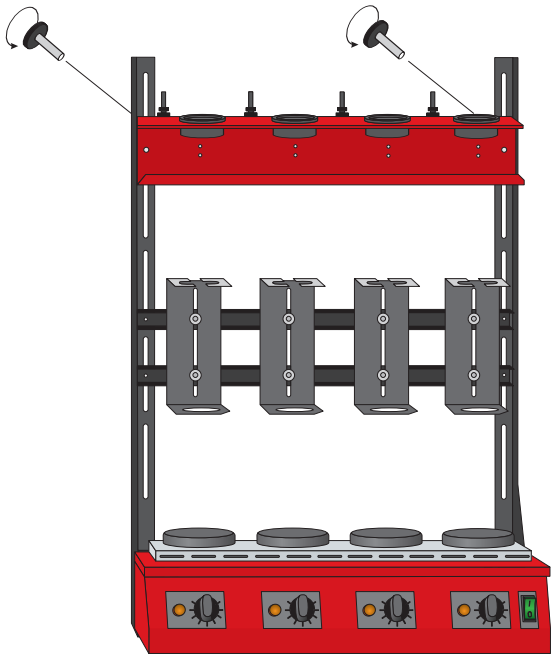
Condenser Stand with Cooling-Water Distributor

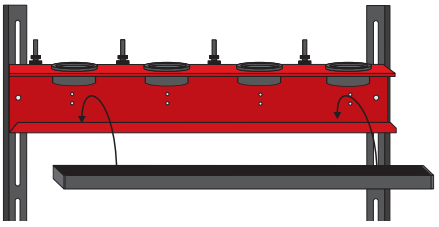




- Insert the condenser stand from above between the internal track formed by the horizontal support bars.
- Position the screw hole of the condenser stand at the lower ends of the uppermost elongated slots in the vertical support bars.



- Fasten the condenser stand in place with the pair of knurled screws provided.



- Insert the drip tray into the condenser stand.

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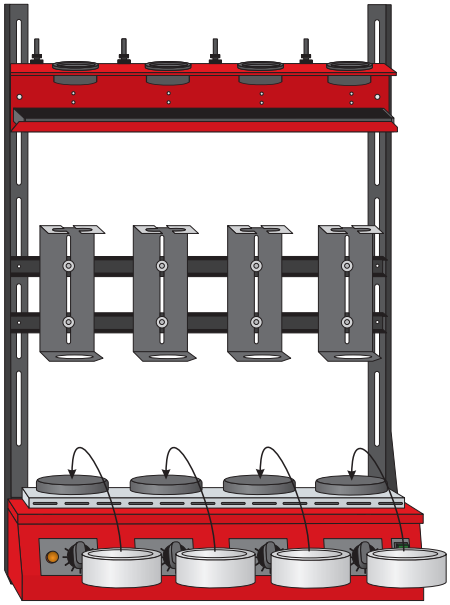
Installing the Hot-Plate Flask Adapters

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

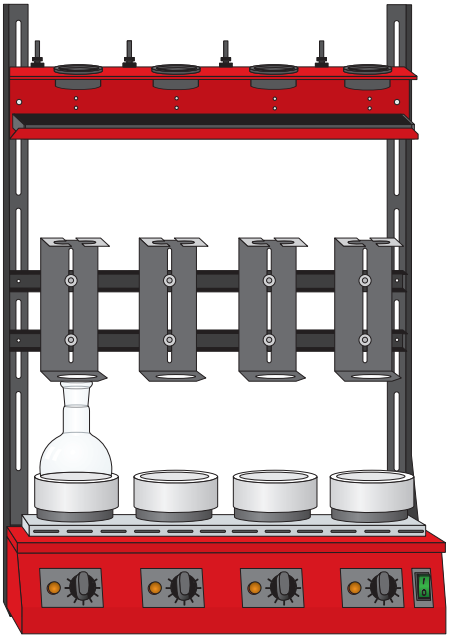


Inserting the Glassware

To minimize the risk of breakage, always hold all glassware in the vicinity of the standard taper joint! Never use grease on the standard taper joints!

- Place the round bottom flask in the flask adapter on the hotplate.

Check once more the height of the cross-bars 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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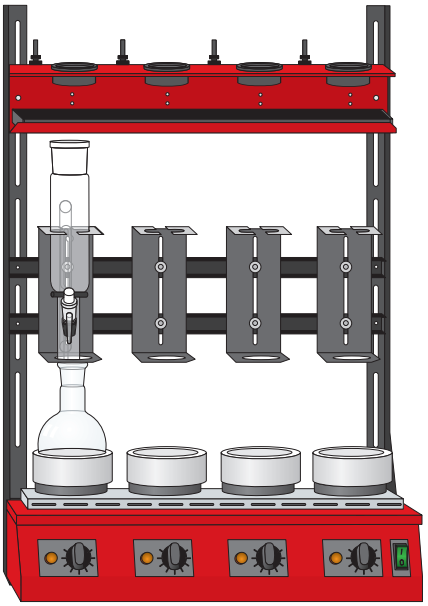
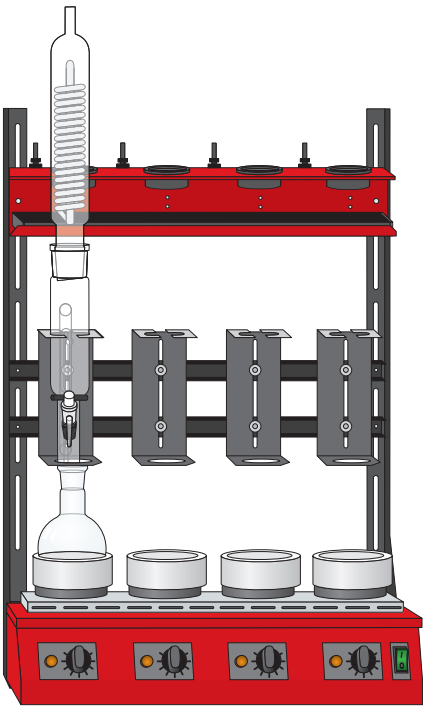
- Insert the extractors from above into the extractor mounts and seat them on the round bottom flasks.

  The upper horizontal segment of the extractor mounts have a slot in front. In the event that you are using an extractor with spigot (EZ 100 H or EZ 250 H, respectively), then guide the extractors with the spigots carefully through these slots.



- Insert the reflux condensers onto the extractors.

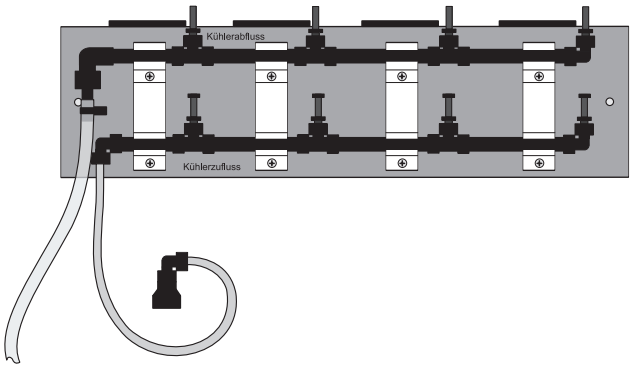


Connecting the Water Hoses

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 following these procedures a leak-free seal will be guaranteed in the push-on fitting.

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

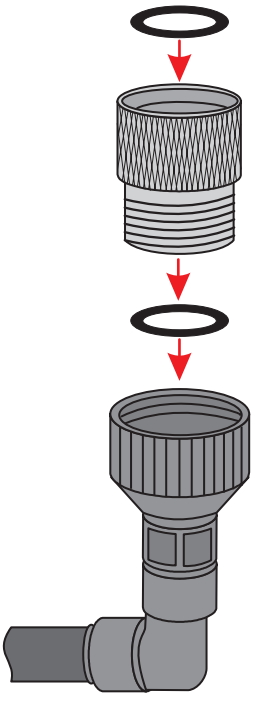
- Push one end of the water supply hose as far as it will go into the connection.
- In the same manner, attach the ¾“ water tap connection to the other end of the hose.
- Bring the water supply hose to a laboratory water tap.

Water tap with ¾“ pipe thread

- Insert a washer in the connector and screw the 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.



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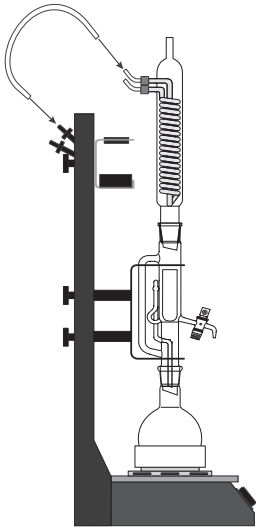
Cooling-water outflow

The connection for the cooling water outflow (3, figure on previous page) 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.

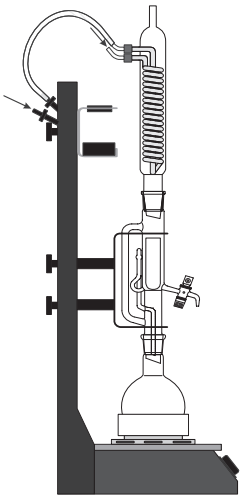
Insure that there are no tight curves or kinks in the hose. If necessary, shorten the hose to prevent constrictions of this nature.

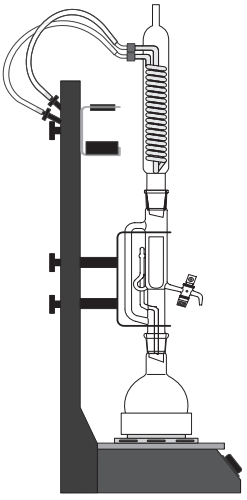


Connections to the Condensers

- Attach the silicone tubing segments to the tubing nipples on the cooling water distribution unit identified as „Kühlerabfluss“ (outflow) and „Kühlerzufluss“ (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 „Kühlwasserzufluss“ panel of the cooling water distributor to these nipples. Connect the upper nipples of the condensers in the same manner with the upper „Kühlwaserabfluss“ panel of the cooling water distributor.





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.

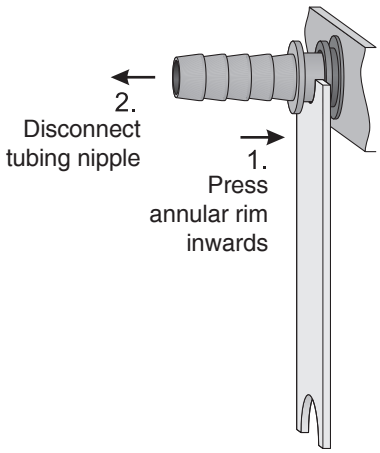
> Use the narrow slot of the tool for the nipples and the inflow tube and the wide slot for the outflow tube.

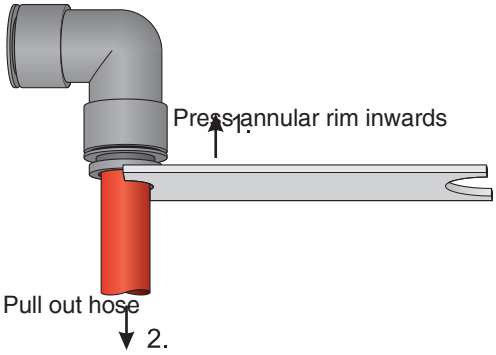
Tubing nipple quick push-in connector

- 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.

Hose 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

In order to connect this hose to the pumparound cooler, you need to attach an adapter to the pumparound cooler. This adapter (it came with the UK12) has a quick push-in socket too; so you connect the hose in the same way here as with your cooling-water distributor.

- Screw the adapter into the middle nozzle of the pumparound cooler (second from above). The nozzle is marked “Austritt” (Outlet); the water will flow out of this nozzle into your cooling-water distributor.
- Push the inlet hose of your cooling-water distributor into the adapter. Push it in firmly as far as it will go.

The return line (a thick, green, transparent PVC hose) is connected to the „Eintritt“ (Inlet) nozzle of the circulating water cooler. This hose is just pushed on to the nozzle. Secure the connection to the pumparound cooler with a hose clip.

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 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 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.

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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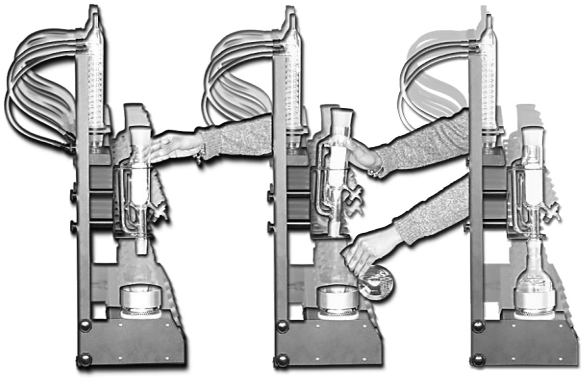
Sample Preparation

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



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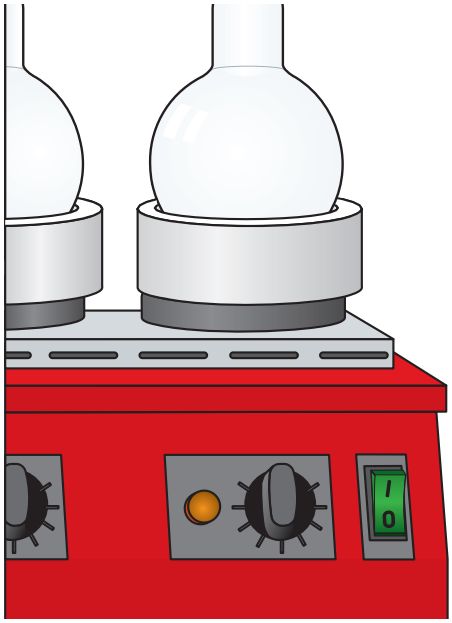
Switching the Heating Unit On

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

The power switch of the 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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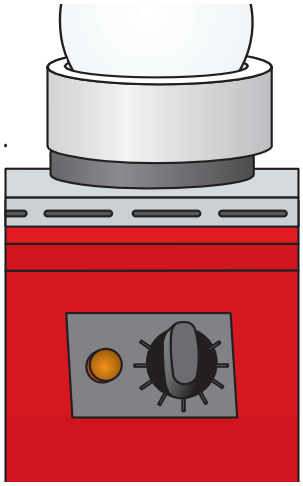
Starting the Extraction

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.



Ending 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 round-bottom 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.

Cleaning the In-Line Extraction Apparatus

Basic framework and horizontal support bars

The basic framework and mountings are robust, but for cleaning, we suggest not using aggressive cleaning agents.

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.

Replacement Parts and Accessories

Description	Model	Art. no.
Circulating water cooler, 1000 W	UK 12/1020	B 006 02388
Circulating water cooler, 2000 W	UK 12/2020	B 006 02389
Adapter piece for connecting the inlet hose to a circulating water cooler, with quick push-in connection		B 002 26071
PTFE joint sleeves for EZ 100, EZ 100/H, EZ 250 and EZ 250/H	PTFE 45	B 002 17909
For 100-ml Extraction:		
Round-bottomed 250-ml flask for 100-ml extraction	RK 250	B 002 18499
Reflux condenser for 100-ml or 250-ml extractors	RFK 100	B 002 18214
Soxhlet extractor, 100 ml	EZ 100	B 002 17967
Soxhlet extractor, 100 ml, with spigot	EZ 100 H	B 002 17970
Extraction thimbles for 100-ml extractors (EZ 100 or EZ 100 H), package of 25	EX 100 HS	B 001 16487
For 250-ml Extraction:		
Round-bottomed 500-ml flask for 250 ml extraction	RK 500	B 002 18500
Reflux condenser for 100-ml or 250-ml extractors	RFK 100	B 002 18214
Soxhlet extractor, 250 ml	EZ 250	B 002 17974
Soxhlet extractor, 250 ml, with spigot	EZ 250 H	B 002 17973
Extraction thimbles for 250-ml extractors (EZ 250 or EZ 250 H), package of 25	EX 250 HS	B 002 17975

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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
Weight of entire system (apparatus w/o glassware)	4 samples	15,1 kg
	6 samples	19,8 kg
Line voltage of inline heating		230 VAC, 50/60 Hz
Power consumption	4 samples	1440 W
	6 samples	2160 W

Customer Service

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

behr Labor-Technik GmbH
Spangerstraße 8
40599 Düsseldorf/Germany
Phone: +49 (0) 211 7 48 47 17
Telefax: +49 (0) 211 7 48 47 48

E-mail: info@behr-labor.com

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