

Extractor King

Closed Loop Extraction Equipment & Accessories · Langley, BC, Canada

BASIC OPERATION GUIDE

Science King Rotary Evaporators

Set-up, chiller and vacuum settings, daily operation, receiver draining, cleaning, maintenance and troubleshooting for all Science King rotary evaporators.

Covers: Science King 5L, 10L, 20L and 50L Rotary Evaporators, and the 20L (R1020H) and 50L (R1050H) Dual Condenser Rotary Evaporators.

Read this whole guide before first use and keep it with the evaporator. Where this guide and the unit's nameplate or the documents supplied with it differ, follow the nameplate and those documents. Questions: 1.888.609.KING (5464) · admin@extractorking.com · extractorking.com

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1 Safety first

Rules that prevent most rotary evaporator accidents

1. **Never use cracked, chipped or star-cracked glass.** A large flask under vacuum can implode.
 2. **Never heat a sealed system.** The system is either open to the pump or vented to air, never shut in while heating.
 3. **Never run the bath dry.** Fill it before switching it on.
 4. **Never evaporate to dryness** solvents that can form peroxides (ethers such as diethyl ether and THF). Concentrated residues can explode.
- **Flammable solvents:** ethanol, isopropanol, methanol, acetone, hexane and heptane all catch fire easily (flash points from -26°C to 14°C). Run the evaporator in a well-ventilated area with no ignition sources. Vapour from a loose joint can reach the hot bath or the electrics.
 - **Not explosion-proof:** Science King rotary evaporators are CE certified and are **not** rated for hazardous (classified) locations. If your room is classified, or may contain flammable vapour, check with your local electrical inspector before installing. Use an ignition-proof vacuum pump, vent its exhaust outdoors or to an exhaust hood, and ground the frame.
 - **Electrical:** connect only to a grounded supply matching the nameplate (220 V single phase as standard; 3 phase on request), on a circuit sized for the unit's current draw. Keep the controls and cords dry. Unplug before moving, cleaning or servicing.
 - **Hot bath:** the bath reaches 99°C . Keep hands clear of the moving lift and the rotating flask.
 - **Personal protection:** safety glasses or goggles (a face shield with large flasks), a lab coat, and nitrile or neoprene gloves.
 - **Cold traps:** dry ice with isopropanol is enough. Do not use liquid nitrogen; it can condense liquid oxygen.
 - **Never leave the evaporator running unattended.** Know where your fire extinguisher and eyewash are. Emergency stop: pump off, vent to air, then all power off.

2 Know your evaporator

All Science King rotary evaporators are floor-standing units on locking casters, with an electric lifting stainless steel water bath, digital temperature control and stepless speed control.

Part	What it does
Evaporating flask	Holds the solution and turns in the heated bath, spreading it into a thin film that evaporates quickly.
Motor and rotation head	Turns the flask through the vapour duct.
PTFE rotary seal	Seals the turning vapour duct so the system holds vacuum. A wear part.
Vapour duct	Glass tube carrying vapour from the flask to the condenser.
Condenser(s)	Vertical double-coil condensers cooled by your chiller. The 5L has one condenser; the 10L, 20L and 50L have a main and an auxiliary condenser; the Dual models have a main and a secondary condenser.
Receiving flask(s)	Collect the condensed solvent. Each has a PTFE drain valve. The Dual models have two receivers and a vacuum valve so one can be drained without stopping.
Feed tube and valve	Draws more solution into the flask under vacuum while running (continuous feed).
Vent valve	On top of the condenser. Lets air back in to release vacuum.
Water bath and lift	Heats the flask (up to 99 °C) and raises or lowers it electrically.

Model	Flask	Receiver	Speed	Condensers
5L	5 L	3 L	0–120 rpm	1
10L	10 L	5 L	0–120 rpm	Main + auxiliary
20L	20 L	10 L	0–120 rpm	Main + auxiliary
50L	50 L	20 L	0–120 rpm	Main + auxiliary
20L Dual (R1020H)	20 L	2 × 10 L	20–130 rpm	Main + secondary
50L Dual (R1050H)	50 L	2 × 20 L	20–110 rpm	Main + secondary

3 Operating limits

Bath	Water only, up to 99 °C. No oil.
Flask fill	No more than half full. One-third full is best for speed and to avoid foaming. Top up with the feed tube.
Vacuum	Down to the rated maximum (–29.8 inHg gauge, about 4 mbar absolute). Never positive pressure.
Condensate level	Should cover about two-thirds to three-quarters of the condenser coil. Never above the top quarter, or vapour reaches the pump.
Room temperature	Operate between 5 and 25 °C (5 and 35 °C for the Dual models).

4 Unpacking and inspection

1. Check every item against the packing list. Keep the crate and packing in case anything must be shipped back.
2. Inspect every piece of glass in good light (flask, vapour duct, condensers, receivers, feed tube) for chips, scratches and star cracks. **Do not use damaged glass.** If anything is damaged, take photos and contact us right away.
3. Check the casters and locks, the bath lift, and that the power plug matches your receptacle and the nameplate voltage.
4. Wash all glass before first use (section 14).

5 Assembly

Two people are needed to handle the 20 L and 50 L flasks.

1. Place the unit on a level floor in a ventilated area and lock the casters.
2. Check that the rotation head is locked at its working angle. Support the glass whenever you loosen an angle knob; the assembly can tip and break.
3. Fit the PTFE rotary seal into the head **the right way round** (a reversed seal leaks). Slide seals straight along the glass, never twisted or at an angle, and do not nick the sealing lip.
4. Insert the vapour duct through the seal and tighten its locking nut.
5. Mount the condenser(s) in the frame clamps and join them.
6. Fit the receiving flask(s) under the condenser with the drain valve **closed**. Clamp them so they cannot move under vacuum.
7. Fit the feed tube with its valve closed.
8. Mount the evaporating flask on the vapour duct and tighten its clamp. Support a 20 L or 50 L flask from below while you tighten.
9. Connect the vacuum pump with heavy-wall vacuum hose. Put a cold trap and a shut-off valve between the evaporator and the pump.

10. Connect the chiller to the condensers: **coolant in at the bottom, out at the top** of each condenser so the coils fill completely. Clamp every hose barb.
11. Fill the bath with water to the working level (section 13), allowing for the water the flask will push aside when lowered.
12. Use a thin film of vacuum grease on ground-glass joints if your unit uses greased joints. **Do not grease the PTFE rotary seal** unless your supplied documents say to.

6 Leak and vacuum test

Do this before the first run and after any reassembly, with the system empty.

1. Close the vent, feed and drain valves.
2. Start rotation and pull full vacuum.
3. Close the valve to the pump (or pinch the hose) and watch the gauge. A good system rises less than 3 mbar per minute (about 0.1 inHg per minute).
4. If it fails: re-tighten clamps and hose clips, re-seat the glass joints, check the rotary seal is the right way round, then replace the seal. To check the pump itself, connect the gauge straight to the pump.

7 Chiller set-up: the 20-degree rule

Keep about **20 °C between each of three temperatures**: the bath, the vapour (the temperature at which your solvent boils at the vacuum you set) and the condenser coolant. The bath supplies the heat and the condenser has to take it away.

Bath	Vapour (boiling)	Coolant	Use
60 °C	40 °C	20 °C or colder	Standard. A good starting point for ethanol.
50 °C	30 °C	10 °C or colder	Gentler on heat-sensitive extracts.
40 °C	20 °C	0 °C or colder	Most heat-sensitive products. Needs a glycol mix in the chiller.

- Set the bath and the chiller first, then lower the vacuum until the solvent boils at the vapour temperature you want (section 8).
- Below about 0 °C, run a water/glycol mix in the chiller.
- A colder coolant improves capture, but a chiller loses capacity at very low set points. Set it only as cold as you need.
- Start the chiller first and let the condensers get cold before you make any vapour.

8 Vacuum settings by solvent

Vacuum needed for each solvent to boil at **40 °C** (the standard 60/40/20 setting). Absolute pressure is the reliable number. Gauge readings in inHg are approximate and change with altitude and weather.

Solvent	Normal boiling point	mbar absolute	Approx. gauge (sea level)
Ethanol	78 °C	175	-24.7 inHg
Isopropanol (IPA)	82 °C	137	-25.9 inHg
Methanol	65 °C	337	-20.0 inHg
Acetone	56 °C	556	-13.5 inHg
n-Hexane	69 °C	335	-20.0 inHg
n-Heptane	98 °C	120	-26.4 inHg
Water	100 °C	72	-27.8 inHg

A vacuum controller or an absolute gauge makes these settings repeatable and reduces bumping.

9 Running a batch

1. **Check:** glass undamaged, receivers empty, bath full, hoses clamped, protective gear on, room ventilated.
2. **Chiller on** and down to temperature.
3. **Bath on** and heating, with the flask raised out of the bath.
4. **Load the flask** no more than half full.
5. **Start rotation first**, slowly, then raise the speed. Faster rotation spreads a thinner film, evaporates faster and reduces bumping.
6. **Close the vent valve and pull vacuum gradually**, watching the flask. If it starts to foam or bump, back the vacuum off a little and go down in steps.
7. **Lower the flask into the bath** with the lift. Do not submerge it completely, and make sure nothing touches the bath.
8. **Tune:** condensate should cover about two-thirds to three-quarters of the condenser. Too little: lower the pressure slowly or raise the bath. Above the top quarter: reduce heat or vacuum, or check the chiller.
9. Empty the receiver before it fills (section 11). Never let it back up into the condenser.

10 Continuous feed

1. With the system running under vacuum, put the end of the feed tube into your solution.
2. Open the feed valve slowly; vacuum draws the solution in.
3. Keep the flask no more than half full, then close the valve.
4. Never let the feed tube draw in air or run dry while the valve is open; it breaks the vacuum.

11 Draining the receiving flask

Standard models (5L, 10L, 20L, 50L)

1. Raise the flask out of the bath and vent the system slowly with the vent valve.

2. Place a labelled container rated for the solvent under the receiver.
3. Open the receiver drain valve, drain, and close it again.
4. Close the vent, pull vacuum again and lower the flask to continue.

Dual models (R1020H, R1050H): drain without stopping

1. Close the vacuum valve between the condenser and the full receiver; the other receiver keeps collecting.
2. Let air into the full receiver only, open its drain valve, drain, then close the drain valve.
3. Pull vacuum on that receiver again before reopening it to the condenser.

12 Shutdown

1. Switch the bath heat off and raise the flask out of the bath.
2. Vent the system slowly with the vent valve, then switch off or isolate the pump.
3. Stop the rotation.
4. Leave the chiller running for at least 5 more minutes to condense the last vapour.
5. Let the flask cool, then remove it while supporting its weight.
6. Drain the receiver(s). Switch off the chiller and the bath. Unplug if it will sit unused.

13 Bath water

- Use water only. The Science King bath is a water bath (up to 99 °C).
- Pure deionised water corrodes stainless steel over time. Use a 50/50 mix of deionised and tap water.
- Keep the bath topped up. Never switch it on empty.
- Descale now and then with a mild citric or acetic acid solution warmed to about 50 °C, then rinse.

14 Cleaning

- Rinse the glass with a solvent that dissolves the residue (ethanol for most extracts), then wash with warm water and a mild lab detergent using a soft, non-metal brush. Rinse with clean water.
- For deposits inside the condenser coils, circulate a mild alkaline lab cleaner, then rinse well.
- Rinse the rotary seal with water after a bump or when working with crystalline products, and dry it with a soft cloth. Never touch it with sharp tools.
- Wipe the housing and controls with a damp cloth only.

15 Maintenance

When	What to do
Before every run	Inspect all glass for cracks, chips and star cracks. Check the hoses and clamps.
About every 3 months	Clean and re-grease the ground-glass joints with a thin film of vacuum grease (wipe off old grease first).
About every 6 months	Replace the PTFE rotary seal kit, sooner if the leak test fails or vacuum gets worse.
When cracked, hard or discoloured	Replace vacuum and coolant hoses.
Regularly	Descale the bath; drain and refill the chiller fluid; service the vacuum pump to its own schedule (oil changes on oil-sealed pumps).

Seal kits, vacuum grease and hoses are available at extractorking.com. Owners in My account get reminders when these jobs come due.

16 Troubleshooting

Problem	Likely cause	What to do
Vacuum won't hold or won't go low enough	Worn or reversed rotary seal; loose clamp, joint or hose clip; vent, feed or drain valve open; cracked hose; weak pump	Close all valves, re-seat joints, check the seal direction, run the leak test, replace the seal, check the pump on its own
Slow evaporation	Temperatures too close together; vacuum too weak; flask too full; rotation too slow; coolant too warm	Use the 20-degree rule, lower the pressure slowly or raise the bath, fill less, raise the speed, check the chiller
Bumping (sudden boiling)	Vacuum pulled too fast; bath too hot; flask over half full; rotation too slow	Pull vacuum gradually, lower the bath, fill less, raise the speed
Foaming	Extracts with natural surfactants	Back off the vacuum in steps; reach vacuum before lowering into the bath; use a larger flask or less sample
Ice on the condenser	Coolant much colder than needed	Raise the coolant toward the 20-degree rule setting; use a glycol mix; insulate the hoses
Solvent smell, or solvent reaching the pump	Condensate above the top quarter of the condenser; chiller too small or too warm; leak	Reduce heat or vacuum, check the chiller, add or empty the cold trap, check joints
Flask won't turn or slips	Flask clamp loose; seal seated wrongly; speed set to zero	Re-tighten the clamp while supporting the flask; re-seat the seal; check the speed setting
Drip or leak at the seal	Seal worn, damaged or reversed; scratched vapour duct	Replace the seal; inspect the vapour duct
Bath won't hold temperature	Low water; wrong set point	Top up; check the set point
Collection stops	Receiver full, or the solvent is used up	Empty the receiver and continue

17 Storage

- Drain the bath, the receivers and the chiller lines. Dry all glass.
- Remove the evaporating flask so its weight does not rest on the seal and drive.
- Pad and cover the glass. Store indoors, frost-free, within the room temperature range in section 3.

Need help? Live chat at extractorking.com, call 1.888.609.KING (5464) or email admin@extractorking.com. Have your model and serial number ready. You can save your serial number in My account → My machines.

This guide gives general operating practice for rotary evaporators and does not replace your own risk assessment, your local electrical and fire codes, or the safety data sheets for the solvents you use. Vacuum figures are standard reference values for pure solvents. Extractor King Industries Inc. · Langley, BC, Canada · Guide version 1.0, October 2026.