Instructions for use

Heatable VACUUM GEL DRYER

Midi (T781.1) & Maxi (T782.1)

WARNING:
These units are capable of delivering potentially lethal voltage when connected to a power supply and are to be operated only by qualified technically trained personnel.

PLEASE READ THE ENTIRE OPERATOR'S MANUAL THOROUGHLY BEFORE OPERATING THIS UNIT.

The Roth Vacuum Gel Dryer units are designed to give long service and reproducible results in your laboratory. A few moments spent reading these instructions will ensure that your expectations are reflected in the successful use of the apparatus.
DO NOT attempt to remove the outer casing or make repairs to our electrical range of products, should any unit fail.

WARRANTY

This unit (excluding all accessories) is warranted against defective material and workmanship for a period of twelve (12) months from the date of shipment ex factory. No liability is accepted for loss or damage arising from the incorrect use of this unit.

TECHNICAL DATA:

- Size:
  - MIDI Gel Dryer Unit: H85x W550 x D435 mm
  - MAXI Gel Dryer Unit: H85 x W680 x D480 mm
- Active Transfer Area:
  - MIDI Gel Dryer Unit: 44 x 34 cm
  - MAXI Gel Dryer Unit: 49 x 41 cm
- Mains Supply: 220 – 240 V, 50 – 60 Hz.
- Mains Fuse: 13 A
- Input Fuse: 6.3 A, 240 V antisurge.
- Heating Element: 800 W.
- Vacuum Timer: 0 - 10 hours.
- Temperature Timer: 0 - 10 hours.
- Digital Display: 40 - 80 °C.
- Controller Accuracy: +/- 2 %.
- Weight:
  - MIDI Gel Dryer Unit: 8 kg
  - MAXI Gel Dryer Unit: 13 kg
- Vacuum Tubing: 9±1 mm inner diameter
- Vacuum System: 1.5 – 6 m^3 / h

PACKING LIST:

1 Gel Dryer Unit
1 Stainless Steel Screen
1 Mylar Sheet made of white or slightly yellow plastic
1 Porous Polyethylene Sheet
1 Clear Silicone Rubber Overlay
1 Mains Lead - European
1 Mains Lead - UK, 13 Amp Fuse
2 Replacement Fuses, 6.3A Antisurge
1 Operating Manual

AVAILABLE ACCESSORIES:

(All accessories can be purchased from Carl Roth GmbH + Co. Please use the indicated ordering numbers.)

MIDI Vacuum Gel Dryer

MIDI Stainless Steel Screen	T818.1
MIDI Mylar Sheet	T820.1
MIDI Porous Polyethylene Sheet	T822.1
MIDI Silicone Rubber Overlay Sheet	T824.1

MAXI Vacuum Gel Dryer

MAXI Stainless Steel Screen	T819.1
MAXI Mylar Sheet	T821.1
MAXI Porous Polyethylene Sheet	T823.1
MAXI Silicone Rubber Overlay Sheet	T825.1

ENVIRONMENTAL CONDITIONS:

- This apparatus is intended for indoor use only.
- This apparatus can be operated safely at an altitude of 2,000 m.
- The normal operating temperature range is between 15 °C and 40 °C.
- Maximum relative humidity 80 % for temperatures up to 31 °C decreasing linearly to 50 % relative humidity at 40 °C.
- The apparatus is rated POLLUTION DEGREE 2 in accordance with IEC 664. POLLUTION DEGREE 2, states that: “Normally only non-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation must be expected”.

QUALITY CHECK
All Roth products are supplied having passed rigorous quality control procedures. If however, you have a query of any nature, please call (+49) 721 5606-0.

OPERATING INSTRUCTIONS

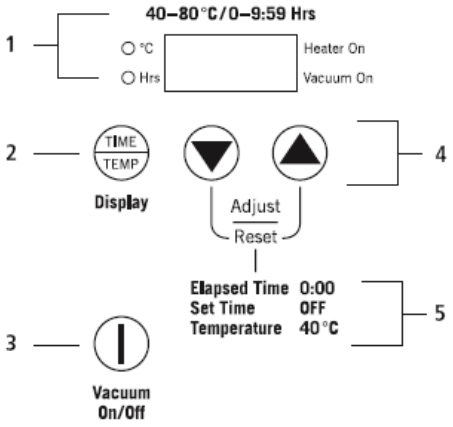
A Safety Precautions

- A 6.3 Amp input fuse is located on the side panel.
- A 13 Amp mains fuse is fitted to the power lead.
- To replace a fuse isolate the control unit from the mains supply and open the fuse holder with a screwdriver blade. The holder contains two fuses. The loose fuse is a spare. Always use the recommended fuse and NEVER replace it with one of a different rating.

B General Care and Maintenance

- Turn mains power switch off and unplug the power cord.
- Remove the stainless steel screen and cover sheets and wash separately with a mild laboratory detergent.
- Do not use abrasives or solvents on any part of the dryer.
- Periodically remove accumulations left by autoradiography reagents from the platen and stainless steel screen. Apply a strong detergent for no longer than 5 minutes and rinse thoroughly.
- Dry with a soft towel.

C Number Control feature Function



1. LED display Shows Set Temperature, Set Time or Elapsed Time. On the left of the LED display, a light indicates whether the displayed value is °C (temperature) or Hrs (time). When the displayed value is time and the LED colon blinks, the value is Elapsed Time. When the colon is not blinking, the value is Set Time. Press either Adjust key once to go from Elapsed Time to Set Time. On the right side of the display, two red lights, labelled “Heater On” and “Vacuum On,” indicate the status of the heater and vacuum.
2. Time/Temperature key Toggles the LED display between showing time or temperature.
3. Vacuum key Toggles the vacuum outlet On or Off. A red light appears on the right side of the LED display when the vacuum is On.
4. Adjust keys Adjust Set Temperature and Set Time; reset Elapsed Time. Press a key once briefly to move one interval. Press and hold a key down to move in larger intervals. Press both keys simultaneously to reset Temperature or Time to the Reset values.
5. Reset values Lists the Reset values for Elapsed Time, Set Time and Set Temperature: Elapsed Time 0:00; Set Time OFF; Temperature 40 °C

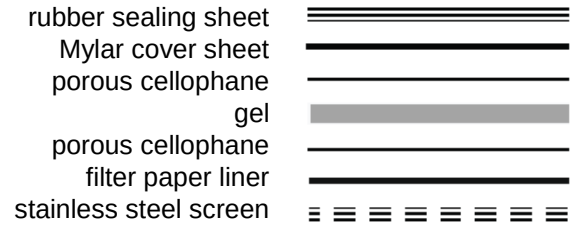
D Detailed operating Instructions

After you have attached the vacuum pump to the gel dryer, follow these instructions to prepare the dryer and gel drying stack. Once you set the temperature and the timer, the gel dryer automatically starts the vacuum pump and turns on the heat after 10 seconds. At the end of a timed run, the heat is turned off first and the vacuum ten minutes later.

Step 1: Prepare the dryer
Wipe away all contaminants with a soft damp cloth. See “General Care and Maintenance” for recommendations on how to remove accumulations of radioactive materials. Fit the stainless steel screen into the recess on the platen and then place a sheet of filter paper on the screen slightly larger than the surface area required by the gel(s). The paper should not extend over the ridge that surrounds the platen.

Step 2: Prepare the gel drying stack
The slab dryer accommodates both agarose and polyacrylamide gels. The configuration of the gel stack layers depends on the next processing step and the thickness of the gel(s).

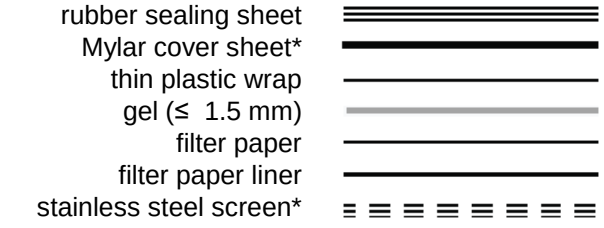
Drying between cellophane sheets
Use this configuration for gels to be scanned, imaged, and stored.
1. Immerse two sheets of porous cellophane (Art. No. K422.1 or K423.1) in water.
2. Lay one cellophane sheet smoothly on top of the filter paper liner. Carefully center the gel on the cellophane. Cover the gel with the second sheet of wet cellophane.
3. Cover this stack with the Mylar cover sheet. The Mylar cover sheet produces a smooth gel surface that reduces scan irregularities.



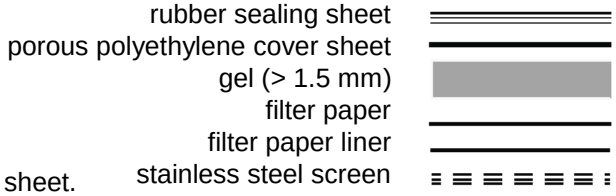
4. Check that the edges of all the sheets fall within the recess of the platen. If necessary, trim the corners of the sheets to fit within the recess.
5. Cover the stack with the silicone rubber sealing sheet.

Note: Cellophane provides a transparent support for densitometric scanning. Remove all air pockets at every step of this procedure to avoid scanning distortions.

Drying thin or low-concentration polyacrylamide gels (≤ 1.5 mm) and agarose gels on paper
For drying thin or low-concentration polyacrylamide gels and agarose gels to filter paper for autoradiography**.**
1. Lay a sheet of filter paper on top of the filter paper liner and position the gel on this sheet, taking care to avoid trapping air beneath the gel.
2. Cover the gel with thin plastic wrap. Do not leave wrinkles in the plastic wrap.
3. Use the Mylar cover sheet with polyacrylamide gels but not with agarose gels.
4. Check that the edges of all the sheets fall within the recess of the platen. If necessary, trim the sheets to fit within the recess.
5. Cover the stack with the silicone rubber sealing sheet.



Drying thick gels (> 1.5 mm), high concentration gels, gradient gels on paper
For drying thick gels to filter paper for autoradiography.
1. Lay a sheet of filter paper on top of the filter paper liner and then position the gel on this sheet, taking care to avoid trapping air beneath the gel.
2. Cover the gel with the porous polyethylene cover sheet, with the smooth side toward the gel.
3. Check that the edges of all the sheets fall within the recess of the platen.
4. If necessary, trim the sheets to fit within the recess.
5. Cover the stack with the clear silicone rubber sealing sheet.



Step 3: Set the temperature
The highest setting, 80 °C, can be used for many types of gels for reliable, rapid drying. Use a temperature of 50 °C for agarose gels. Polyacrylamide gels prepared for fluorography may require a setting of 60 °C to protect the fluors. Follow the manufacturer’s instructions. If your gels tend to crack, slower drying at a lower temperature setting may be indicated.

Note: The melting temperature of an agarose gel is dependent on its concentration and properties. The drying temperature should not exceed the melting temperature. We recommend a drying temperature of 50 °C for most agarose gels.

1. In order to set the temperature, make sure the red light labelled °C is lit. If necessary, press the Time/Temp key to toggle between the time and temperature display.
2. Use the Adjust keys to change the temperature. You can set the heater to any temperature from 40 to 80 °C or to 0FF (room temperature).
3. Press the Up or Down key once briefly to change by one degree. Press and hold the key down to count five 1-degree intervals, followed by 5-degree intervals.
4. When the display reads 40 °C, press the Down key once to go to 0FF. When the temperature is 80 °C, press the Up key once to go to 0FF.
5. Press the Up and Down arrows simultaneously to reset the temperature to 40 °C. To use the vacuum at room temperature, turn the heater off.
6. The platen begins to heat at the same time that the vacuum pump starts— 10 seconds after you have finished setting the time. A red light next to the words “Heater On” indicates when the heating element is on.

Note: When the heater attains the temperature setting, the red heater light goes off. The heater light blinks when the heater comes on to maintain the set temperature.

Step 4: Set the timer

The amount of time required for a gel to dry depends on such factors as gel thickness, gel concentration, drying temperature, and vacuum applied. A typical sequencing or 1.5 mm 10 % T gel can be expected to dry in approximately 45 minutes at 80 °C. Larger gels may take 2 to 3 hours. When dry, the thickness of an agarose gel seen through the silicone flap decreases to about 1 mm.

1. Press the Time/Temp key to go to the Time mode.
2. The LED display reads 0:FF and the LED colon blinks to indicate Elapsed Time.
3. Press either the Up or Down key once to go from Elapsed Time to Set Time.
4. Press either the Up or Down key to change the Set Time.
5. Press Up once to set time for a continuous run. On a continuous run, the LED display reads r:un and the heater and vacuum run continuously until you manually turn them both off.
6. Press Up again to count up in 15-minute intervals.
7. Press the Up and Down keys simultaneously to reset the time to 0. When the Set Time is set to 0, the display reads 0:FF.
8. When you have finished setting the time, you can start the heater and vacuum.

Note: Agarose gels become brittle when over-dried.

<u>Starting the heater and the vacuum pump</u>

- ✔ You can press the Time/Temp key to immediately start the heater and vacuum pump.
- ✔ If you don’t press the Time/Temp key, ten seconds after you stop adjusting the time, the heater and vacuum pump start automatically.
- ✔ As the heater and vacuum pump start, the timer begins to count Elapsed Time (Hours:Minutes). The LED colon between the hours and minutes blinks each second when the timer is in Elapsed Time.
- ✔ You may change the Set Time at any point after the LED begins to count Elapsed Time.

<u>Changing the set time while the heater is on</u>

- ✔ Make sure the LED displays time. The red light labeled Hrs is lit when the LED displays time. Press the Time/Temp key to toggle between temperature and time display. The LED colon blinks when the display shows Elapsed Time.
- ✔ Press the Up or Down arrow key to change the display from Elapsed Time to Set Time.
- ✔ Press the Up or Down arrow key to change the Set Time.

Step 5: Create a vacuum seal

Ten seconds after you set the timer, the vacuum starts automatically if it is connected through the vacuum receptacle on the dryer. Watch for a seal to form between the rubber overlay and the platen.

If the seal does not form almost immediately, check stack for misalignment. No materials should extend beyond the edge of the recess. Assist seal formation by pressing gently at each corner to ensure that the rubber sheet is pulled into the recess.

Without removing the rubber sealing sheet, periodically inspect the gel as it dries. When the gel appears dry, check the temperature of the gel by briefly touching the sealing sheet over the gel. Wet gels feel cold

compared to the platen. Typically, the gel is dry when the drying surface has become evenly hot. A markedly flattened gel contour also indicates that the gel has dried.
In automatic mode, when the set time is reached, the dryer beeps once and the heater turns off. The vacuum power remains on for 10 minutes. During this cooling down period, the Elapsed Time display counts from "C:00" to "C:10". After ten minutes, the vacuum power automatically turns off and the dryer beeps once.
Important! Once the gel has begun to dry, do not break the vacuum seal until the gel is completely dry. Gels may crack if you turn off the vacuum before the gel is dry.
Note: If using a cold trap with inline valves, close the valve between the trap and gel dryer and then open the valve between the trap and the pump. After the trap is pumped down, open the valve to the gel dryer. The extra vacuum should quickly pull the sealing sheet down and accelerate the sealing process.
Note: Some gels may curl as they dry. To minimize curling, the vacuum continues for 10 minutes after the heating timer shuts off.
Note: If you manually turn off the vacuum during a continuous run, the heat remains on until you also turn it off manually.

Step 6: Disassembly
Remove each layer of the drying stack and clean the dryer according to instructions in "General Care and Maintenance".
Note: If the gel contains radioactive materials and was covered with plastic wrap, dispose of the wrap according to local regulations pertaining to radioactive waste.
Note: Fluorescent compounds, such as ethidium bromide, cannot be visualized after drying.

E Options for manual operations

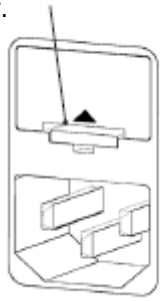
To apply a vacuum without heat:
Set the Temperature to 0:FF, then set the timer. Ten seconds after you set the time, the vacuum starts without heat. The vacuum stops when the Elapsed Time equals the Set Time.
To preheat the dryer:
Set the Temperature and set the Time. After ten seconds, the vacuum starts. Press the Vacuum key to turn off the vacuum and leave the heat on. To restart the vacuum, press the Vacuum key again.
Note: When you manually preheat the dryer, be sure the set time includes the time needed to prepare the gel stack as well as the time needed to dry the gel.

F Replacing fuses

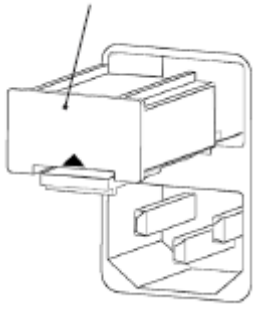
230 V~ Model. The fuse drawer holds two F 6.3A 250 V 5 × 20 mm fuses.
1. The fuse drawer is in the power entry module, found on the left side of the control panel.
2. Insert a small, flat-blade screwdriver into the slot below the fuse drawer. Push in the direction of the arrow to release the drawer. Grasp the fuse drawer with your fingers and pull it out.
3. Pull the fuse out of the drawer to inspect it. If the fuse element is burned or broken, replace it. If the fuse appears to be intact, check it with a multi-meter. A reading of 1 Ω or less indicates the fuse is still usable.
4. Push the fuse drawer back into the power entry module until it snaps into place.
5. Plug the power cord in and turn the mains power switch on.

Important! Fuses protect equipment by disconnecting loads too large for the circuit design. Always replace fuses with those that conform to the specified fuse rating.
Important! Detach the power cord before replacing fuses.

Insert a small screwdriver blade in the slot. Push in the direction of the arrow to release the fuse drawer.



Use your fingers to pull out the fuse drawer.



G Replacing the rubber sealing sheet

Occasionally, a tear or nick in the rubber sealing sheet may inhibit the formation of the vacuum seal. The rubber sealing sheet is attached to the dryer by four screws in a retaining bar along the edge of the platen. In order to change the sealing sheet, you also need a small tube of clear silicone adhesive, available at hardware stores.
1. Use a Phillips-head screwdriver to remove the four screws on top of the retaining bar that holds the rubber sealing sheet in place.

2. Lift off the retaining bar and the damaged rubber sealing sheet.
3. If necessary, use a sharp edge to clean out any old silicone adhesive on the inside of the retaining bar.
4. Position the replacement sealing sheet on the platen, aligning the four holes in the overlay with the four holes for the screws.
5. Lay a bead of clear silicone adhesive along the inside edge of the retaining bar. Replace the retaining bar, aligning the four holes of the retaining bar over the holes in the platen and sealing sheet.
6. Screw the retaining bar and sealing sheet in place.

H Troubleshooting

Problem	Solution
No power or LED Display	Check that the power switch is turned on. Check that the dryer is plugged into a working receptacle. Check the fuse(s).
No heat	Make sure time is set and the LED colon is blinking. Make sure the temperature is not set to 0FF. If still no heat, contact us for service
No vacuum	Make sure the tubing connects the vacuum port to the vacuum pump. Make sure the vacuum pump is plugged into the vacuum receptacle on the dryer. Check that time is set. Vacuum automatically starts 10 seconds after time is set. Check switches on the vacuum source.
Can't create vacuum seal	Make sure the rubber sealing sheet seals around the entire inside edge of the recess. Omit the mylar sheet and use plastic wrap on top of gel. Check for tears or punctures in the rubber sealing sheet. Replace it, if necessary.
Gels crack	Use thinner gels (≤0.75 mm), if possible. Thin gels rarely crack. Reduce % T. Equilibrate gels with 30 % ethanol, 2 % glycerol for one hour before drying. Make sure gel is completely dry before turning off vacuum.
Gels do not dry	Do not use >5 % glycerol during pre-drying treatment. Empty the liquid or cold trap. Replenish dry ice in the cold trap. Make sure to place only porous cellophane or filter paper under the gel. Do not use plastic film or the Mylar plastic cover sheet in the stack below the gel.
Fluors become degraded	Follow manufacturer's handling instructions, paying close attention to recommended temperature exposure.

Carl Roth GmbH + Co. KG

Schoemperlenstraße 3-5 • 76185 Karlsruhe
P.O. Box 100121 • 76231 Karlsruhe
Phone: +49 (0) 721/ 5606-0
Fax: +49 (0) 721/ 5606-149
info@carlroth.com • www.carlroth.com gh 03/2021