Leosmak

COMPACT FREEZE DRYER

Operating Manual

LEO-004 / LEO-004L / LEO-007 / LEO-007L / LEO-010 / LEO-010L





Read this manual before connecting or operating the unit. Keep it near the unit for future use.

Revision 4.0 | 25 August 2026

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DOCUMENT CONTROL AND CONTACT

QUESTIONS OR PROBLEMS?	Contact Leosmak before continuing if any instruction, connection, alarm or operating condition is unclear: **+48 71 715 66 00** | **office@leosmak.com** | **https://leosmak.com/en/support**. For an installed unit, use its dedicated WhatsApp support group whenever available.

Manufacturer	Leosmak S.A., ul. E. Kwiatkowskiego 4, 52-326 Wrocław, Poland
Document	Compact Freeze Dryer Operating Manual, Revision 4.0
Applies to	LEO-004, LEO-004L, LEO-007, LEO-007L, LEO-010 and LEO-010L
Required unit data	Model, serial number, voltage and refrigerant data from the Name Plate
Warranty	Warranty conditions are stated in the Agreement for the individual unit.

Record the unit details before first operation:

Field	Entry
Model	
Serial number	
Installation address	
SAT date	
Leosmak support group	

Online support: https://leosmak.com/en/support

Administration panel: https://admin.leosmak.com/Leosmak

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1. ABOUT THIS MANUAL

1.1 Scope, intended use and document priority

This manual covers the safe receipt, installation, acceptance testing, operation, cleaning and first-line troubleshooting of Leosmak compact freeze dryers. The units are intended for controlled freezing, freeze drying and vacuum drying of suitable food, beverages and food ingredients.

DOCUMENT PRIORITY	The **Name Plate, Agreement, order-specific specification, wiring diagram and written Leosmak instructions** take priority over generic values in this manual. Software labels and available options can differ by revision.

- **Operator:** a trained person who runs and monitors the unit.
- **Cold trap:** the cold surface on which water vapour freezes during drying.
- **FAT:** Factory Acceptance Test completed by Leosmak before dispatch.
- **SAT:** Site Acceptance Test completed after transport and before the first production cycle.

Keep this manual and the signed FAT/SAT records with the unit and transfer them to every subsequent owner or location. Do not modify the refrigeration, electrical, vacuum or control system without written Leosmak approval.

1.2 Unit identification and support

Before contacting support, photograph the Name Plate and HMI and provide the model, serial number, current phase, shelf temperature, cold-trap temperature, pressure, alarm text and a short description of the load. A short video is useful for unusual sound, vibration, leaking or door movement.

SUPPORT CHANNEL	Access to the administration panel and the dedicated WhatsApp support group is granted by Leosmak. If no group exists, contact Leosmak using the details on page 2.

1.3 Three functions in one unit

THREE PROCESSES	A Leosmak industrial unit combines blast chilling/freezing, freeze drying and vacuum drying in one controlled system. Performance depends on the model, load, tray arrangement, ambient conditions and validated settings.

Function	What it does	Typical use
Blast chilling / freezing	Cool from +70 °C to +3 °C within 90 minutes, or from +70 °C to -18 °C within 4 hours.	Rapidly chill or freeze a suitable product before the drying stage.
Freeze drying	Freeze, create vacuum, sublimate ice and complete final drying.	Remove water while preserving product structure and quality.
Vacuum drying - Sweet Mode	Preheating, vaporization, cooling and defreezing without a standard freeze-drying sequence.	Dry suitable confectionery and other validated products under reduced pressure.

For typical food recipes, download the **Leosmak Cook Book** from https://leosmak.com/en/support. Treat every recipe as a starting point and validate it for the actual product, slice size, tray load, moisture target and package.

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1.4 Compact model overview

NAME PLATE FIRST	The table is a family overview from the supplied compact-unit documentation. The delivered unit's Name Plate and order specification are controlling.

Model	Optimal load	Condenser	Trays	Tray format	Spacing	Weight
LEO-004	4 kg	6 kg	4	GN 1/2	50 mm	87 kg
LEO-004L	6 kg	9 kg	7	GN 1/2	28 mm	94 kg
LEO-007	7 kg	10 kg	5	GN 2/3	50 mm	117 kg
LEO-007L	9 kg	14 kg	7	GN 2/3	28 mm	125 kg
LEO-010	10 kg	15 kg	5	GN 1/1	50 mm	156 kg
LEO-010L	15 kg	18 kg	7	GN 1/1	28 mm	168 kg

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2. SAFETY

2.1 Safety pictograms and message boxes

This revision uses coloured, action-based message boxes at the relevant instruction. The following pictograms identify the main hazard groups.

	**Electrical**	High voltage, phase loss, damaged cables and electrical cabinets.
	**Hot / cold surfaces**	Shelves and the vacuum pump can remain hot after a cycle. Cold traps and refrigeration parts can cause cold injury.
	**Heavy load**	The unit and loaded trays can crush feet or hands. Use lifting equipment rated for the actual load.
	**Vacuum**	Do not force a door or technical end cover while the chamber is under vacuum.
	**Biological**	Product residue and contaminated process water can create a hygiene hazard.
	**General warning**	Stop if an abnormal sound, smell, leak, temperature or alarm is detected.

2.2 Operator duties and personal protection

- Wear closed safety footwear. Use thermal gloves when handling cold traps, hot trays or warm pump parts.
- Keep children and untrained persons away. Keep the work area dry, ventilated and free of trip hazards.
- Do not bypass guards, fuses, valves, door hardware, the backup switch or software interlocks.
- Inspect the transparent door, seal, trays, vacuum hose, cable and drain route before every cycle.
- Use only compatible trays, silicone mats, cleaning agents, pump oil and parts approved for the installed unit.

2.3 Main hazards

Hazard	Preventive action	Stop immediately when
Electrical energy	Use a grounded supply matching the Name Plate. Keep water away from cables, switches, HMI and pump compartment.	There is smoke, burning smell, sparking, a hot plug or repeated fuse operation.
Vacuum and door	Never force the transparent door. Equalise pressure with **Open air-in port** before opening.	The door is cracked, displaced, cannot seal or cannot open after air-in.
Hot/cold surfaces	Wear gloves and allow parts to return toward room temperature before cleaning or service.	There is uncontrolled heating, frost outside the intended surfaces or a leak.
Heavy unit	Move only on a level route. Lock castors, or level the LEO-004/004L on its adjustable feet.	The unit tilts, a castor/foot is damaged or the route cannot support the weight.
Refrigerant/oil	Ventilate. Keep ignition sources away. Do not open refrigeration or pump internals.	A visible leak, oil spray, unusual smell or breathing difficulty occurs.
Biological/food	Clean and dry food-contact surfaces and validate time, temperature and packaging.	Product contamination, residues, blocked drainage or unknown cleaning compatibility is found.

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2.4 Health hazards and immediate response

EMERGENCY RULE	Make the area safe without putting yourself at risk. Isolate power where possible, call the local emergency number and follow trained first-aid procedures. The table is not a substitute for medical training.

Exposure	Immediate response	Urgent escalation
Electric shock	Do not touch a person still in contact with electricity. Isolate power. Check response and breathing; use CPR/AED if trained.	Emergency services immediately, including after a serious shock.
Cold injury	Move to a warm area. Remove wet clothing. Warm gently; do not rub or apply direct high heat.	Blistering, numb/white skin, large area or persistent pain.
Thermal burn	Cool under cool running water for about 20 minutes. Remove jewellery if not stuck. Cover loosely.	Deep, electrical, chemical, facial, hand, joint or large-area burn.
Refrigerant/oil inhalation	Leave for fresh air and ventilate only if safe. Avoid ignition sources.	Breathing difficulty, dizziness, loss of consciousness or suspected major leak.
Eye/skin chemical contact	Use the product SDS. Rinse exposed eyes/skin with clean water and remove contaminated clothing.	Persistent symptoms, eye exposure or an unknown/aggressive chemical.
Crush/cut injury	Stop movement, secure the unit or tray and control bleeding with clean pressure.	Suspected fracture/crush injury, severe pain or uncontrolled bleeding.

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3. RECEIVING, TRANSPORT AND STORAGE

3.1 Receipt inspection and original packaging

- Inspect the pallet, crate, cabinet, transparent door, HMI, pump compartment and accessories in the carrier's presence.
- Record dents, cracks, shifted panels, oil marks or damaged packaging on the delivery document before signing. Photograph all sides and retain the evidence.
- Keep the original pallet, panels, foam and fixing materials. They are required for safe relocation, return or service transport.
- Do not begin the SAT while transport damage, a loose internal component or an oil/refrigerant leak remains unresolved.

TRANSPORT CLAIM	If damage is suspected, do not discard the packaging or move the unit unnecessarily. Contact Leosmak and the carrier with photographs and the delivery record.

3.2 Safe movement: castors and adjustable feet

Configuration	Safe movement and positioning
LEO-004 / LEO-004L	These models use **height-adjustable feet, not castors**. Lift with suitable equipment under the base/frame. Do not drag the feet. Level all feet so the unit cannot rock.
LEO-007 / LEO-007L / LEO-010 / LEO-010L	Normally supplied on castors. Release brakes only for controlled movement on a level route; use enough trained persons. Apply every brake immediately after positioning.
All compact models	Keep upright. Remove product, trays, loose accessories, ice and water before movement. Never push or lift using the transparent door, HMI, pump, hose, side panels or roof.

HEAVY EQUIPMENT	Compact units weigh approximately **87-168 kg**, depending on model. Verify the actual Name Plate and handling equipment capacity before lifting.

3.3 Storage and acclimatisation

- Store upright in a dry, dust-free location without vibration, impact or large temperature changes.
- Protect the HMI, door, vacuum-pump fittings, drain and ventilation openings with the original materials.
- After cold transport or a change of location, allow the unit to reach stable room temperature and inspect for condensation before connection.
- If the unit was tilted or its transport history is uncertain, keep it upright and contact Leosmak before energising it.

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4. INSTALLATION AND CONNECTIONS

4.1 Compact-unit schematic

The component locations can vary slightly by model and production revision. Use the delivered unit and its order documentation as the final reference.

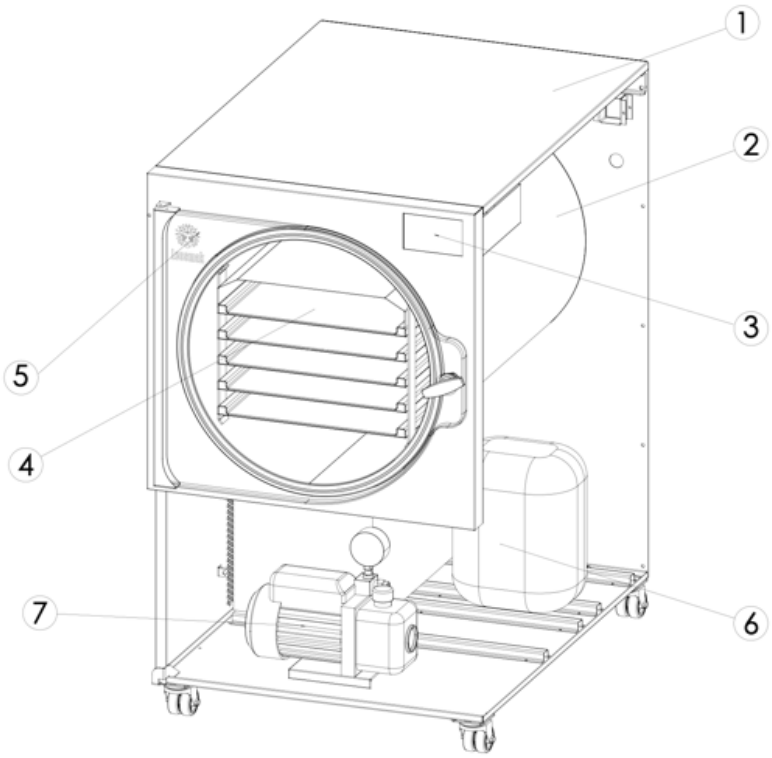


Figure 1. Typical Leosmak compact freeze dryer

No.	Component	Operator relevance
1	Casing	Protects refrigeration, control and circulation components.
2	Vacuum chamber	Must be clean, dry and sealed before every cycle.
3	Touchscreen HMI	Controls phases, settings, Wi-Fi, valves and reports.
4	Shelves	Freeze or heat the trays through direct contact.
5	Transparent door with LED	Provides chamber sealing and optional internal illumination.
6	Refrigeration system	Includes the compressor and cold-trap circuit; authorised service only.
7	Vacuum pump	Located in the lower compartment and connected to its dedicated socket and hose.

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4.2 Site requirements and levelling

Requirement	Practical check
Room	Closed, dry, clean and well ventilated; recommended ambient temperature +10 °C to +30 °C.
Clearance	Keep approximately 1 m around ventilation openings unless the order-specific layout states otherwise.
Floor	Firm, level, non-combustible and able to carry the unit and full load.
Stability	Lock all castors. For LEO-004/004L adjust all feet until the unit is level and does not rock.
Drain	Route continuously downward to a suitable drain or vessel; keep the hose end above the collected liquid.
Environment	No direct sunlight, open flame, corrosive vapour, excessive humidity or strong heat source.

4.3 Electrical supply and power-outage protection

- Connect only to a grounded supply matching the Name Plate. Compact units normally require a dedicated 208-240 V circuit protected as specified for the delivered unit.
- Do not use an extension lead, multi-socket adapter or undersized plug/cable. A hot plug, repeated fuse operation or voltage drop requires an electrician and Leosmak contact.
- The **main power switch** and the dedicated **power-outage protection / backup switch** at the rear or in the lower pump compartment must both be ON before operation.
- For complete shutdown, both switches must be OFF and the unit unplugged. The backup switch alone does not isolate the unit.

BOTH SWITCHES

The unit is not fully started unless **both the main switch and the backup switch are ON**, and it is not fully shut down unless **both are OFF**. This applies after installation, service and transport.

RESTART INTERVAL

Wait at least **2 minutes** between stopping and starting cycles. This allows refrigerant pressure and internal media to equalise. Restarting too quickly can prevent start-up or damage the unit.

4.4 Vacuum-pump and drain connections

BEFORE FIRST POWER-UP

Open the lower vacuum-pump compartment and remove **all transport blocks, straps, foam, bags, cable ties and loose packing materials**. Confirm that nothing can touch the pump fan, hot surfaces or moving parts.

- Connect the vacuum pump plug to the dedicated socket inside the pump compartment.
- Set the switch on the vacuum-pump body to **ON**. The motherboard starts the pump automatically when process conditions are met.
- Confirm that the vacuum hose is not kinked. Seat the connection nut squarely on the pump and tighten it securely by hand; do not cross-thread it or apply excessive force.
- Check the pump oil level in the sight glass before the SAT and before demanding production. Never run an oil-sealed pump with insufficient oil.
- Connect the drain hose with a continuous downward slope. If using a vessel, keep the hose end above the liquid level to prevent backflow under vacuum.

4.5 Wi-Fi, mobile app and administration panel

1

Connect the unit to 2.4 GHz Wi-Fi

- Select the **Wi-Fi** icon on the HMI.
- Enable Wi-Fi, enter the exact network name and password, press **Save**, and confirm status **On**.
- Use a unique 2.4 GHz SSID; the unit does not connect directly to a 5 GHz-only network.

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2

Install and pair the Leosmak app

- Download the Leosmak app from the **Apple App Store** or **Google Play**.
- Open the HMI Wi-Fi menu. Tap the displayed QR code to enlarge it, then scan it from the app and confirm pairing.
- Enable notifications for phase changes and cycle completion in the phone settings and app.

3

Use remote records and support

- Open **https://admin.leosmak.com/Leosmak** with access granted by Leosmak support.
- If access or the dedicated WhatsApp group has not been created, contact Leosmak.
- Remote monitoring supports the operator; it does not replace local supervision or safety checks.

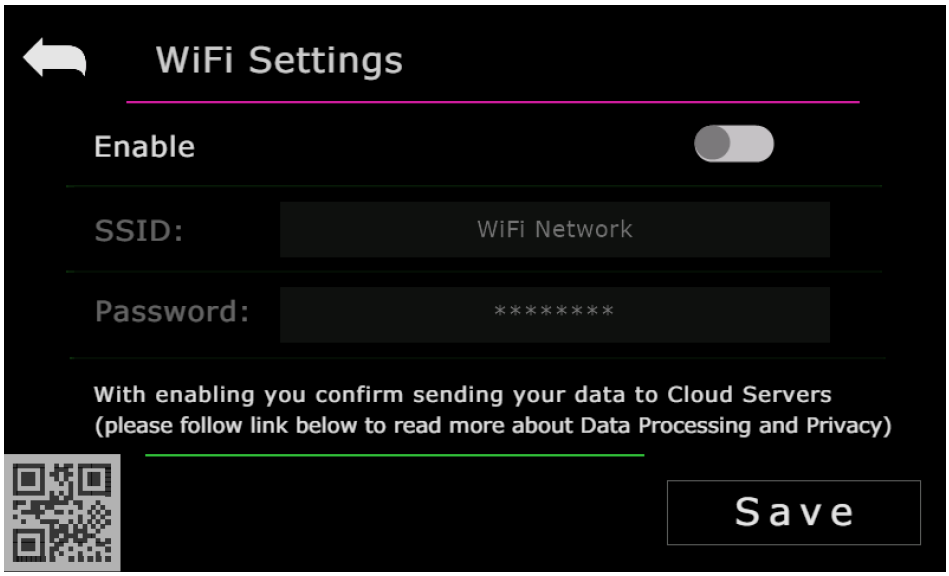


Figure 2. Wi-Fi settings and unit QR code

5. FREEZE-DRYING BASICS

5.1 Sublimation in plain language

SIMPLE DEFINITION	Freeze drying removes water while it is frozen. Below the **triple point of water**, liquid water is not a stable phase: water can exist only as ice or vapour. Under this low pressure, controlled heat causes ice in the product to change directly into water vapour. This direct change is **sublimation**.

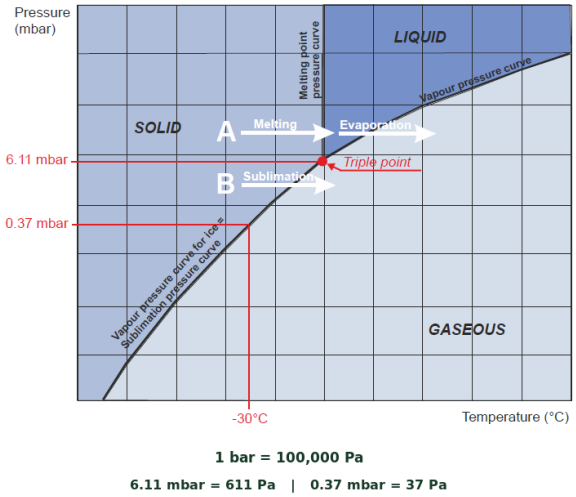


Figure 3. Water phase diagram and the sublimation region, with pressure values in mbar and Pa

The cold traps are colder than the product. Water vapour therefore travels from the product to the traps and freezes there as ice. Pressure, trap temperature, shelf temperature, product structure and time must all be suitable; low pressure alone does not prove that the load is dry.

5.2 Process phases and product preparation

Phase	What happens	Operator focus
Freezing	The shelves cool the product below its freezing/solidification range.	Thin, even layers; good tray contact; fully frozen centre.
Sublimation	The traps cool, the pump lowers pressure and shelf heat drives ice directly to vapour.	Pressure below the safe threshold; traps remain cold; product stays frozen.
Drying	Bound moisture is reduced under vacuum, normally with controlled shelf heat.	Validate endpoint by moisture/water activity and product quality.
Defreezing	Shelf heat and room heat melt ice collected on the traps so it can drain.	Remove product first; route water safely; wait until the chamber is dry.
Sweet Mode	Preheating, Vaporization, Cooling and Defreezing provide vacuum drying for suitable products.	Use a validated recipe and inspect expansion or foaming.

- Slice or perforate products where appropriate; avoid thick skins, sealed packaging and excessive layer depth.
- Do not exceed the condenser ice capacity. Water load, not only total product mass, determines capacity.
- Place trays flat on clean shelves. The top technical shelf, if fitted, is not a loading shelf unless the order documentation says otherwise.
- Package promptly — preferably within 15 minutes — in a low-humidity area; verify the seal.

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6. SITE ACCEPTANCE TEST (SAT)

OBLIGATORY BEFORE USE	Complete the SAT **before the first production cycle and after transport to a new location**. Record results in Appendix B. Do not accept the unit for operation if transport damage or a required parameter remains unresolved.

6.1 FAT, SAT prerequisites and pump-compartment preparation

Every Leosmak unit undergoes a detailed **Factory Acceptance Test (FAT)** before shipment. The SAT confirms that the unit, pump and connections were not damaged or loosened during transport.

- Read Sections 2-4 and confirm the Name Plate supply, stable positioning, clear ventilation and safe drain route.
- Inspect the transparent door, seal, casing, HMI, pump compartment, hose and fittings. Resolve any transport damage first.
- Remove every transport restraint and packing material from the vacuum-pump compartment.
- Plug the vacuum pump into its dedicated internal socket, set the pump body switch to ON, check oil level and securely seat the hose nut.
- Set both the main switch and the power-outage protection switch to ON.
- The chamber and traps must be clean, dry and empty. Close the door and confirm the drain is not manually open.

6.2 Obligatory SAT procedure

1	**Connect the unit to Wi-Fi** • Switch on both the main switch and the backup switch. • Select **Wi-Fi**, enable it, enter the 2.4 GHz SSID/password and press **Save**. • Confirm that Wi-Fi status changes from **Off** to **On**.
2	**Start the test sublimation cycle** • Confirm the pump's internal plug and body switch are **ON**. • Open **Freezing**, disable **Automatic mode**, set duration to **0 hours**, and press **Save**. • Press **Start**; the unit bypasses Freezing and starts the sublimation test.
3	**Monitor for approximately 30 minutes** • Cold traps reach **-30 °C or below**; the vacuum pump starts at approximately **-20 °C**. • Pressure falls below **350 Pa**; shelf heating starts and shelf temperature rises. • Check for abnormal sound, vibration, smell, oil discharge, hose movement, alarms or leaks.
4	**Complete and record the test** • Press **Stop** after all required parameters are reached. • Select **Settings -> Open air-in port** and wait for atmospheric pressure; never force the door. • Complete Appendix B. If any criterion fails, leave the unit out of service and contact Leosmak.

AFTER SAT	Restore the intended Freezing settings before the first production cycle. Observe the minimum **2-minute restart interval**.

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7. DAILY OPERATION

7.1 Pre-cycle checklist

Check	Ready condition
Position	Castors locked, or LEO-004/004L level on all adjustable feet; unit stable.
Electrical	Grounded plug and cable undamaged; main and backup switches ON.
Pump	Dedicated internal plug connected; body switch ON; oil level/condition acceptable.
Vacuum hose	Not kinked; pump connection nut square and secure without excessive force.
Chamber/traps	Clean, dry, empty of water, ice, transport material and product residue.
Door/seal	Transparent door undamaged; seal clean, evenly seated; closure aligned.
Drain	Hose connected, unobstructed, sloped downward and end above collected water.
Load	Correct trays; even layer; weight and expected water content within capacity.
Recipe	Validated phase temperatures/times selected; automatic/manual settings reviewed.

7.2 Loading and door closure

- Load trays manually and keep them level. Do not place fingers between a heavy tray and a shelf.
- Place trays fully on the shelf runners and ensure clean metal-to-metal contact for heat transfer.
- Do not overload one shelf or allow product, liners or packaging to touch the door seal.
- Close the transparent door gently. Operate the handle without force and verify even contact around the entire seal.
- If the door was shifted during transport or does not compress the seal evenly, do not force it. Contact Leosmak for the correct adjustment procedure.

7.3 Starting, monitoring and restarting

1

Review the program

- Confirm Normal or Sweet Mode and check every phase's Auto/manual setting, temperature and duration.
- Confirm the pump body switch, main switch and backup switch are ON.

2

Start and observe

- Press **Start** and remain nearby during initial cooling and pump start.
- Monitor shelf temperature, trap temperature, pressure, duration and alarms.
- Shelf heating normally waits until pressure is below the configured safe threshold.

3

Respond to abnormal operation

- Press **Stop** for abnormal sound, smell, oil discharge, repeated reset, door movement or unexpected heating.
- Record the HMI and use **Send report** when available; then contact the WhatsApp support group.

MINIMUM 2 MINUTES

After stopping a cycle or switching the unit off, wait at least **2 minutes** before starting another cycle. Repeated immediate restarts can prevent the compressor from starting and can cause damage.

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7.4 Unloading and Defreezing

- At cycle completion, follow the HMI prompts and use the air-in function. Wait for atmospheric pressure before opening the door.
- Unload and package the dry product promptly. Inspect representative pieces and validate residual moisture or water activity where required.
- Remove all product and trays before starting **Defreezing**. Compact units use the standard Defreezing phase meaning the shelves start to be heated and have no separate accelerated industrial defrost function.
- Confirm the drain route is safe. Start Defreezing from the HMI and allow collected ice to melt and drain.
- After draining, clean and dry the chamber, traps, shelves, seal and door. Do not start the next cycle with liquid water inside.

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8. HMI, APP AND SPECIAL FUNCTIONS

8.1 Main screen

SCREEN EXAMPLE	Screenshots show one software revision and one unit choice. Labels, available options and °C/°F display can differ with software and configuration.

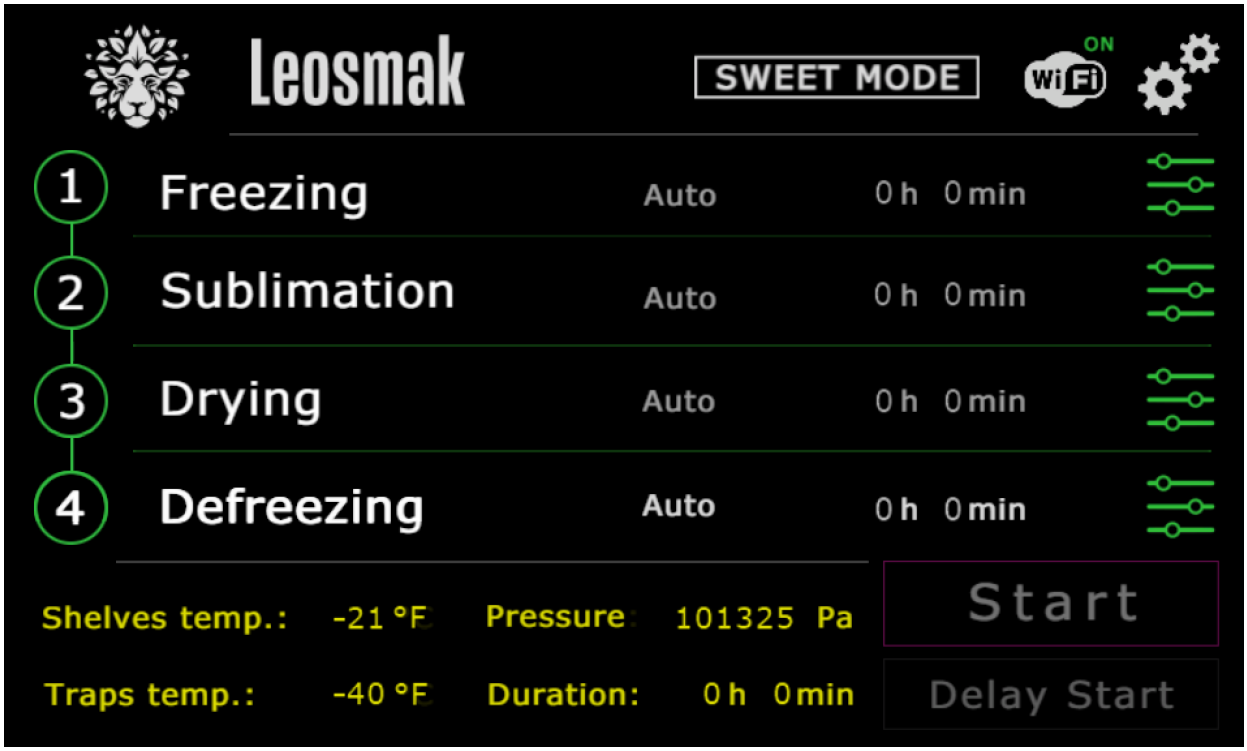
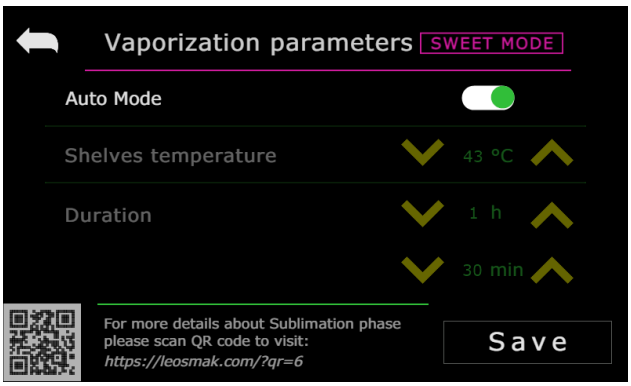


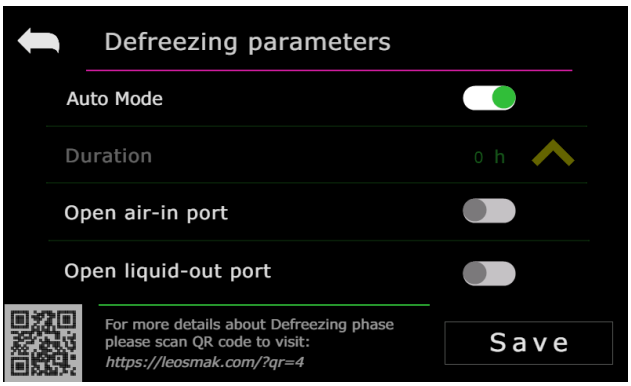
Figure 4. Normal-mode main screen

Area	Purpose
Freezing / Sublimation / Drying / Defreezing	Shows the four phases. Select a phase or its settings icon to review parameters.
Auto / duration	Shows whether the phase uses automatic settings and its programmed duration.
Shelves temp.	Live shelf-circuit temperature.
Traps temp.	Live cold-trap temperature.
Pressure	Live chamber pressure in Pa.
Start	Starts the programmed cycle when interlocks permit.
Delay Start	Sets a delayed start. Use only when the unit and room can remain safely unattended.
Wi-Fi / Settings	Opens network, QR pairing, LED and general settings.

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8.2 Phase settings and operating modes





Use the switch to enable or disable **Auto Mode**. When Auto Mode is off, use the arrows to set available values and press **Save**. Exact editable parameters depend on phase and software revision.

MANUAL SETTINGS	Incorrect shelf temperature or duration can overheat, under-dry or damage a product. Validate manual recipes on a small load before full production.

Sweet Mode is a vacuum-drying mode with Preheating, Vaporization, Cooling and Defreezing phases. Use it only for suitable products and with a validated recipe.

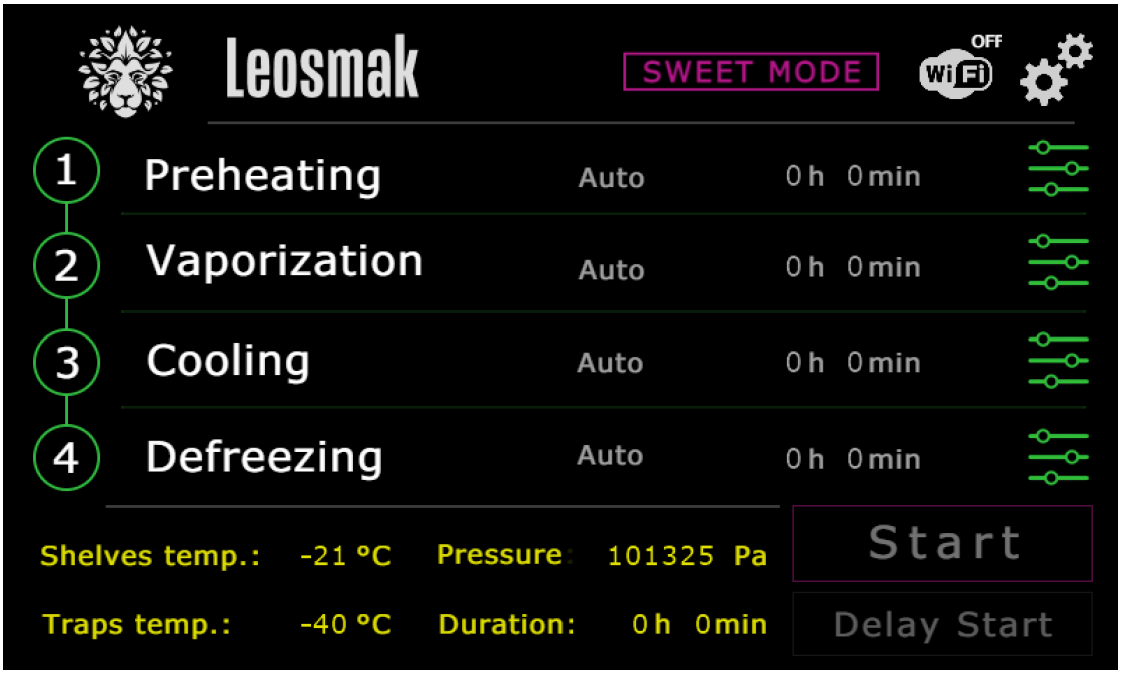


Figure 5. Sweet Mode main screen

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8.3 Wi-Fi, reports, notifications and door LED

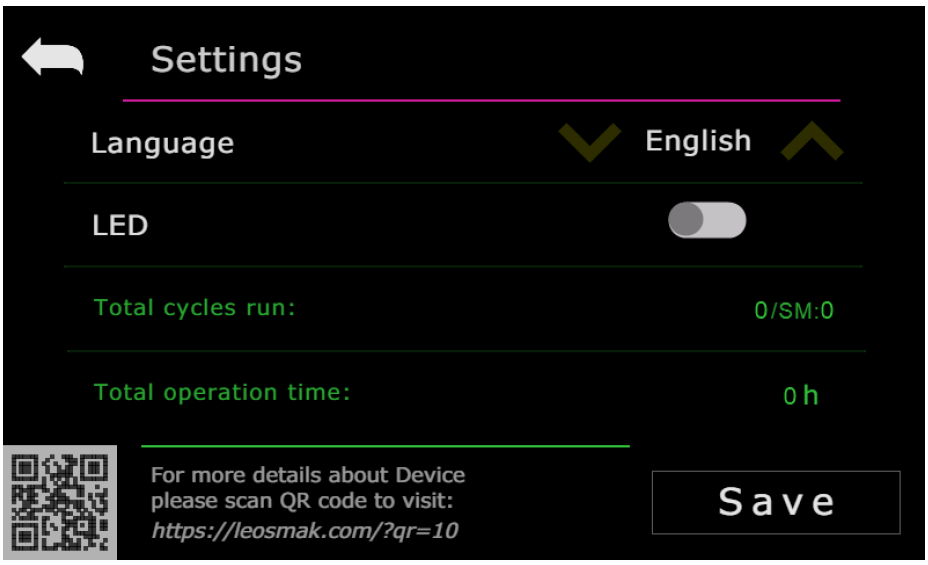


Figure 6. General Settings screen

Task	HMI path / action
Connect Wi-Fi	Select **Wi-Fi** -> Enable -> enter 2.4 GHz SSID and password -> **Save**.
Pair mobile app	Open Wi-Fi. In the app select add/link device. Tap the HMI QR code to enlarge it, scan it and confirm pairing.
App notifications	After pairing, enable notifications for phase changes and cycle completion.
Enable door LED	Select **Settings** -> LED switch -> **Save**. The LED illuminates the chamber through the transparent door.
Protect LED cable	Do not pull, pinch or twist the door cable. If lighting is intermittent or the cable is damaged, switch LED off and contact Leosmak.
Open air-in port	Use after Stop or cycle completion to equalise chamber pressure.
Open liquid-out port	Use only at atmospheric pressure and with a safe drain route.
Send diagnostic report	Open the information/service page and select **Send report**, if available; then notify support.
Cycle graphs	Open https://admin.leosmak.com/Leosmak with credentials granted by support.

SENSOR DISPLAY	A value such as **9999 or -9999** normally indicates a missing, disconnected or invalid sensor signal. Stop the cycle if the value affects process control, photograph the screen and contact Leosmak.

8.4 Power-outage protection

The compact unit has a dedicated battery-backed control supply. With the backup switch ON, a short mains interruption does not immediately erase the running cycle: the controller and HMI remain active for **at least 5 minutes**, and the cycle can resume when mains power returns.

Situation	What the operator should expect / do
Short interruption	The control system stays active. Refrigeration, heaters and the vacuum pump may pause while mains power is absent and resume automatically when it returns.
Longer interruption	Pressure can rise and ice can warm or melt. Assess the product and process history; contact Leosmak if safety or batch quality is uncertain.

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Situation	What the operator should expect / do
Switching during a valve movement	After mains return, verify pressure and valve state. If the sequence is abnormal, stop, fully switch off both switches, wait 2 minutes and contact Leosmak before one controlled restart.
Backup switch OFF	Power-outage protection is unavailable and the unit is not ready for normal operation.

NOT A PRODUCTION UPS	The backup protects the controller and cycle state during a short outage. It is not intended to power the compressor, heaters or vacuum pump for extended operation.

9. VACUUM SYSTEM

9.1 Oil-sealed vacuum pump

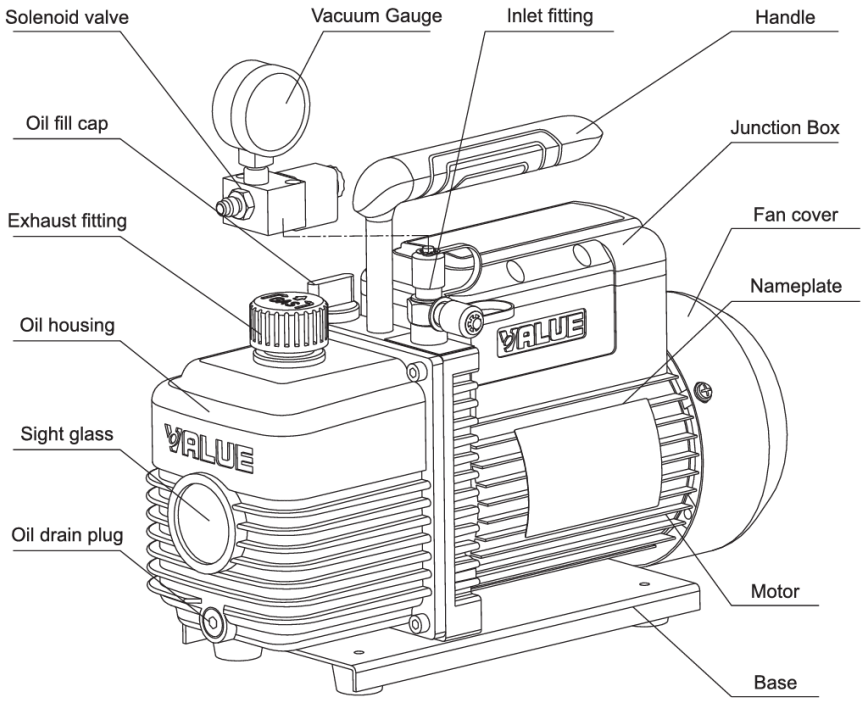


Figure 7. Typical oil-sealed vacuum pump used with compact units

The installed rotary-vane pump removes gas from the chamber. Pump oil lubricates moving parts and also contributes to sealing. Oil level, oil condition, a tight inlet connection and an unobstructed exhaust are therefore essential for achieving vacuum.

- Use only the oil grade specified for the installed pump; use ISO VG 100 where stated by Leosmak for that pump.
- Check the oil level in the sight glass at least weekly and before demanding production.
- Change oil when it becomes dark, cloudy, emulsified, foamy or contaminated, and when the HMI oil-quality warning appears.
- Never run the pump with insufficient oil. Stop if it expels oil, makes abnormal noise, overheats or cannot rotate.
- Keep the exhaust and fan cover clear. Dispose of used oil according to local law.

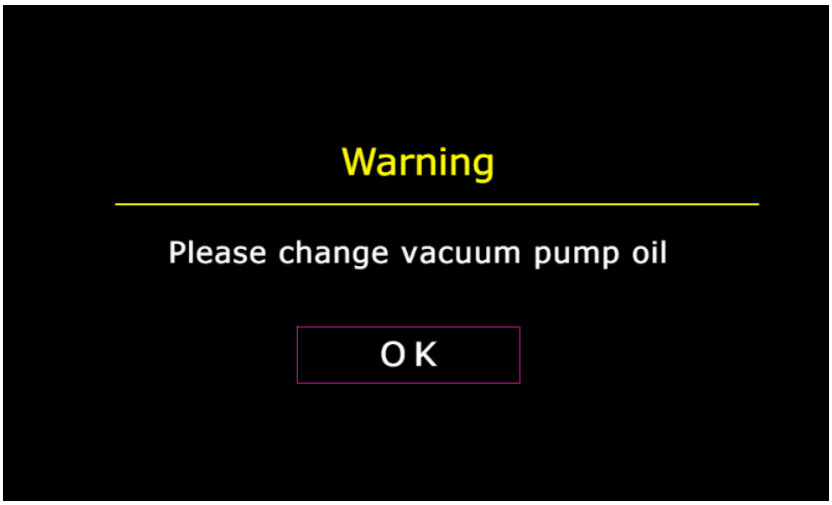


Figure 8. Vacuum-pump oil-change warning

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9.2 Hose, oil and first-line checks

Check	Correct condition	Why it matters
Pump power	Plug in dedicated internal socket; pump body switch ON.	The HMI cannot start a disconnected or locally switched-off pump.
Hose	Straight, undamaged and not collapsed or kinked.	A damaged or restricted hose limits pumping speed.
Pump nut	Square on the thread and securely hand-tightened; no excessive force.	A loose nut leaks; cross-threading or over-tightening can damage the fitting.
Oil level	Within the pump sight-glass range.	Low oil reduces sealing and can damage the pump.
Oil condition	Clear and suitable; not foamy or milky.	Water-contaminated oil reduces vacuum and can be expelled.
Door/seal	Door aligned; seal clean, even and compressed around its circumference.	Door leakage is the most frequent field cause of high pressure.

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10. CLEANING AND MAINTENANCE

10.1 Cleaning after a cycle

- Finish or stop the cycle, equalise chamber pressure and remove product and trays.
- For manual cleaning, switch both unit switches OFF and unplug the unit unless a controlled HMI valve function is required.
- Remove residues and clean trays, chamber, shelves, traps, drain, transparent door and seal with clean, soft, non-abrasive materials.
- Use agents compatible with stainless steel, acrylic/polycarbonate door material, seals and sensors. Ask Leosmak if compatibility is uncertain.
- Do not pressure-wash the unit. Do not spray the HMI, LED cable, pump compartment, ventilation openings, switches, cables or external panels.
- Drain all water and leave the chamber open until dry. Confirm it is dry again before the next cycle.

10.2 Maintenance schedule

Interval	Operator / service task
After every cycle	Clean and dry chamber, traps, shelves, trays, drain, door and seal. Inspect for residues, cracks and leaks.
Weekly	Check pump oil level/condition, pump sound, hose and nut, ventilation openings, cable and plug.
Monthly	Inspect door alignment, seal seating, tray condition, drain hose, LED cable, castors/brakes or adjustable feet and safety labels.
As required	Change pump oil/filter, replace damaged seals or trays and arrange diagnosis for alarms, unstable temperature or poor vacuum.
Before relocation	Drain and dry fully; protect door/HMI/pump; use original transport fixings and packaging.

SERVICE INTERVAL	Compact units do **not** require a mandatory annual Leosmak inspection. Maintenance is condition- and component-based. Contact Leosmak whenever performance deteriorates, a safety item is damaged or the installed pump manual requires authorised service.

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11. TROUBLESHOOTING

CONTACT LEOSMAK	For questions, alarms or unresolved problems, use the dedicated WhatsApp support group or contact **+48 71 715 66 00**, **office@leosmak.com** or **https://leosmak.com/en/support**. Always provide the model and serial number.

11.1 First response and diagnostic package

1

Make the condition safe

- Press **Stop**. Use both unit switches and unplug if there is smoke, burning smell, major oil/refrigerant leak, uncontrolled heating, severe vibration or electrical danger.
- Never open refrigeration, control or pump internals.

2

Record the evidence

- Model/serial; date/time; phase; product/load; shelf temperature; trap temperature; pressure; alarm code.
- Photograph the HMI, door/seal, pump hose connection and oil sight glass. Record unusual sound or movement.

3

Use compact-unit first-line checks

- Confirm both unit switches ON, pump internal plug connected, pump body switch ON and the 2-minute restart interval observed.
- For poor vacuum, check in this order: **door closure/alignment -> seal cleanliness/seating -> pump-hose nut -> oil level/condition -> drain/air valve state**.
- Do not repeatedly reset an unresolved fault.

4

Send report and contact support

- Select **Send report** if available and Wi-Fi is connected.
- Send photographs/video to the dedicated WhatsApp group. If no group exists, contact Leosmak.

11.2 Symptom-based troubleshooting

Symptom	Safe operator checks	Stop / contact Leosmak when
Unit does not power up	Confirm grounded outlet, plug, **main switch ON and backup switch ON**. Check the facility circuit. Do not replace internal parts.	There is a hot plug, burning smell, repeated fuse operation or no response with correct supply.
Unit will not restart	Wait at least 2 minutes. Confirm both switches and the HMI state, then make one controlled start attempt.	It still will not start, trips again or an alarm returns.
Vacuum pump does not start	Confirm pump plug in the dedicated internal socket and pump body switch ON. Check trap temperature has reached the automatic start point.	The pump hums, overheats, cannot rotate or still receives no start command.
Pressure does not fall below 350 Pa	Close the door gently and verify even seal contact. Clean/reseat the seal. Confirm drain closed, hose intact, pump nut secure and oil correct.	Pressure remains high after checks, the door is displaced, or a leak/pump fault is suspected.
Door does not seal evenly	Do not force the handle. Check for product/debris and visible transport shift. Photograph the gaps around the seal.	Contact Leosmak for the correct model-specific door-adjustment procedure before changing hinges or seal packing.
Oil is expelled / becomes milky	Stop the pump. Correct the vacuum leak first; check oil level and whether water entered through the drain. Replace oil only as instructed.	Oil discharge repeats, the pump is noisy/hot, or liquid may have entered the pump.

Symptom	Safe operator checks	Stop / contact Leosmak when
Shelf heating does not start	First confirm pressure is below 350 Pa; heating is intentionally inhibited above the safe threshold. Check the programmed phase temperature.	Pressure is correct but shelves stay cold, or a thermal/circulation fault is suspected.
Shelves freeze/heat unevenly	Confirm clean tray contact and even load. Record each shelf temperature and listen for abnormal circulation-pump sound.	Several shelves differ materially, circulation is noisy or fluid leakage is visible.
Cold traps do not reach -30 °C	Check room temperature, clearance, airflow and that vents are clean. Record trap trend and any compressor sound.	Temperature rises during Sublimation, cooling does not start or a refrigerant leak is suspected.
Door is scratched or cracked	Remove protective film only as instructed and inspect in good light. Do not use abrasive cleaners.	A crack, deep impact, distortion or loss of vacuum integrity is possible; stop using the unit.
HMI freezes / sensor 9999 or -9999	Photograph the screen. Stop safely, wait 2 minutes and perform one restart. Use **Send report**.	The value controls the process or the fault repeats.
Wi-Fi/app does not connect	Use a unique 2.4 GHz SSID, re-enter password, move router closer, enlarge the HMI QR and rescan from the app.	HMI remains Off/connecting, the app reports connection error or the module is not detected.
Door LED does not work	Enable LED in Settings. Check only for visible cable pinching; do not pull or repair the door cable.	Cable is cut, lighting flickers with door movement or HMI resets.
Water does not drain	At atmospheric pressure, check hose slope, vessel level, kinks and visible blockage. Remove residues safely.	Valve does not respond. Never reverse-flush with pressurised water.
Air-in does not equalise pressure	Press Stop and select **Open air-in port**. Wait and watch pressure; do not force the door.	Pressure stays low or the valve does not respond.
Power outage during cycle	Keep both switches ON while mains is expected to return. Record outage length and verify phase, pressure and temperatures after restoration.	Outage exceeds backup time, product warmed/thawed, or valves/sequence are abnormal.
Product remains wet	Check preparation, layer thickness, load water content, time, trap temperature, pressure and packaging humidity. Use a validated recipe.	Parameters were abnormal, only part of the load dried or repeated extension does not solve the problem.

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12. SHUTDOWN, DISPOSAL AND DISCLAIMER

12.1 Complete shutdown and storage

- Finish or stop the cycle, use **Open air-in port**, remove product and trays, complete required Defreezing, drain water and dry the chamber.
- Set the **main switch OFF and the power-outage protection switch OFF**. Set the pump body switch OFF for transport/service and unplug the unit.
- Both unit switches must be OFF for complete shutdown; otherwise the battery-backed controller can remain energised.
- For storage, keep the clean chamber slightly open and protect the HMI, transparent door, pump fittings, cable and ventilation openings.
- Retain the original packaging and keep the Declaration of Conformity, FAT/SAT records and service history with the unit.

12.2 Disposal and recycling

AUTHORISED DECOMMISSIONING	The unit contains electrical equipment, refrigerant, oils, a rechargeable backup battery and other controlled materials. Decommissioning and refrigerant recovery must be performed by authorised specialists according to applicable local law.

- Disconnect and secure all energy sources before dismantling. Prevent accidental restart and isolate the backup battery.
- Do not cut or puncture refrigerant piping. Recover refrigerant and pump/compressor oil using approved equipment and routes.
- Separate the battery, electrical/electronic assemblies, motors, sensors, controls, insulation, oils and refrigerants for regulated waste streams.
- Recycle stainless-steel chamber/frame parts after safe decontamination and removal of controlled components.
- Reuse or recycle the pallet, panels, cardboard, film and protective foam according to local rules.

12.3 Disclaimer and limits of use

DISCLAIMER	To the maximum extent permitted by applicable law, Leosmak is not responsible for malfunction, equipment damage, product loss or process failure caused by use outside the Name Plate, order specification, validated recipe or written Leosmak instructions. Contractual liability and warranty remain governed by the Agreement and mandatory law.

- Excluded causes include unauthorised modification/repair; incorrect electrical supply; transport without original protection; forced or misaligned door operation; damaged pump fittings; insufficient ventilation; unsuitable oil; incompatible cleaners; and use with damaged seals, trays, cables or piping.
- Do not force the chamber door, open the liquid-out port under vacuum, run the pump with insufficient oil, operate with liquid water in the chamber, or restart before the 2-minute equalisation interval.
- Recipes and operating values in this manual or the Cook Book are starting references. The operator is responsible for product preparation, load, cycle validation, hygiene, residual moisture/water activity, packaging and shelf life.
- Wi-Fi, the mobile app, notifications and administration panel are monitoring aids. Availability is not guaranteed and they do not replace local supervision, safety interlocks or operator checks.

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APPENDIX A. INDICATIVE OPERATING PARAMETERS

REFERENCE ONLY	The values below are indicative normal-mode observations, not universal recipes or acceptance limits. The HMI configuration, Name Plate and validated product recipe take priority.

Phase / condition	Shelves	Cold traps	Pressure
Start / idle	Room temperature	Room temperature	Approximately atmospheric
Freezing	Typically -25 °C or lower	Configuration dependent	Approximately atmospheric
SAT sublimation check	Begins to rise after vacuum threshold	<= -30 °C	< 350 Pa
Typical sublimation	Recipe dependent; often around +40 °C	Typically <= -35 °C	Low vacuum; process dependent
Drying	Recipe dependent	Typically <= -35 °C	Low vacuum; process dependent
Defreezing	Controlled heating	Ice melts and drains	Atmospheric before opening

A cycle is complete only when the product meets its validated moisture/water-activity target and quality specification. Similar shelf and product temperatures can support an endpoint assessment, but product validation remains the operator's responsibility.

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APPENDIX B. SAT FORM

Complete this detachable form during the obligatory Site Acceptance Test described in Section 6. Keep the signed form with the unit documentation.

Model	
Serial number	
Installation site	
Date / time	
Operator	
Leosmak support contact	

Check	Required	Measured / observed	Pass / fail
Receipt inspection	No unresolved transport damage		
Pump compartment	All transport materials removed		
Pump power	Internal plug connected; body switch ON		
Pump hose / oil	Nut secure; hose intact; oil correct		
Unit switches	Main ON; backup ON		
Wi-Fi	2.4 GHz; status On		
Cold traps	<= -30 °C		
Vacuum pump start	Automatic at trap temperature <= -20 °C		
Pressure	< 350 Pa		
Shelf heating	Starts below 350 Pa; temperature rises		
Leaks / alarms	None		
Stop / air-in	Pressure equalises correctly		
Restart interval	At least 2 minutes observed		

Final result: □ Accepted for operation □ Not accepted

Open actions: _____

Operator signature: _____ Date: _____

Leosmak confirmation/reference (if required): _____

APPENDIX C. EC DECLARATION OF CONFORMITY

DOCUMENT CONTROL	The signed EC Declaration supplied with the individual unit takes priority over this reproduced copy. Confirm that the declaration covers the delivered model and retain it with the technical file.

C E
Certification

EC Declaration of conformity

We:

Leosmak S.A. (Leosmak JSC)
ul. E. Kwiatkowskiego 4
52-326 Wrocław, Poland

declare, under our sole responsibility, that the following product:

Product name:
Freeze Dryer

Model numbers:
LEO-004, LEO-004L, LEO-007, LEO-007L, LEO-010, LEO-010L

is in conformity with the relevant Union harmonization legislations:
Directive 2006/42/EC (Machinery),
Directive 2014/30/EU (EMC),
Directive 2014/35/EU (LVD),
Regulations 1935/2004 (Food contact).

Used standards:
EN ISO 13849-1, EN ISO 14121-1, EN ISO 13850:2015, EN ISO 14159:2008, EN 60204-1:2018, EN 1672-2:2020, EN IEC 61000-6-1:2019, EN IEC 61000-6-3:2021

Authorized person to compile the technical file:
Iurii Panchenko, Technical Director
Phone: +48 71 715 66 00, e-mail: office@leosmak.com

I, the undersigned, representing the manufacturer's authorized representative in EU, declare the sole responsibility, that the product specified above, to which this declaration relates, conforms to the above-mentioned Directives and Standards.

Prezes Zarządu
Andrij Włach

Andrij Włach, Chairman of the Board

CE

This product carries CE mark, which was first applied in 2022

Date and place of issue: 9th October 2025, Wrocław, Poland

LEOSMAK S.A.
ul. E. Kwiatkowskiego 4, 52-326 Wrocław
NIP: 8943170814, REGON: 389508910
KRS: 0001199055

DECLARATION OF CONFORMITY NO.DOC-2510-03-004

Figure 9. EC Declaration of Conformity for Leosmak compact freeze dryer models