LORDERAN ENVIRONMENTAL TEST CHAMBERS

USER MANUAL

Temperature & Humidity Climate Chamber

Installation · Operation · Programs · Maintenance



−40 → +150 °C
TEMPERATURE RANGE

20 – 98 %RH
HUMIDITY RANGE

±0.5 °C
TEMPERATURE FLUCTUATION

100 – 1000 L
FOUR CHAMBER SIZES

100 L | 250 L | 500 L | 1000 L | JS4 series

Applies to the LORDERAN JS4 series climate chambers JS4010 (100 L), JS4025 (250 L), JS4050 (500 L) and JS4100 (1000 L), also called constant temperature and humidity chambers or damp heat test chambers.

www.lorderan.com

Edition: November 2026

BEFORE YOU BEGIN

About this manual

BEFORE YOU BEGIN

- Read this manual carefully and make sure you understand all of it before you install, connect, operate or maintain the chamber.
- This manual must be kept by the end user, close to the chamber, where every operator can reach it.
- The content of this manual may be revised for functional upgrades without prior notice.
- If you have any questions, contact LORDERAN at **support@lorderan.com**.

Introduction

This manual is written for the technicians who install and operate the LORDERAN JS4 series climate chamber. It explains how to install the chamber and its water supply, how to load samples, how to run a fixed set point or a multi-segment program from the touch screen, what to do when an alarm appears, and how to keep the chamber in good condition. The explanations given on site by the commissioning engineer are part of this manual.

First-time users should read Chapters 1 to 5 in full before the first test, to avoid faults caused by wrong operation. Trained operators will find the essentials on one page in the **Quick Start**, and the key numbers in Appendix A.

What the chamber does

A climate chamber reproduces a defined climate around a test sample: a temperature between -40 °C and +150 °C and, at the same time, a relative humidity between 20 and 98 %RH. It holds that climate steadily for as long as a test needs it, or it changes it step by step in a program — heating, cooling, humidifying and dehumidifying automatically. Typical users test electronics, automotive parts, communication equipment, instruments, plastics, coatings and metals against standards such as IEC 60068-2-1 (cold), IEC 60068-2-2 (dry heat), IEC 60068-2-78 (damp heat, steady state) and IEC 60068-2-30 (damp heat, cyclic).

Labels on the instrument

Label	Name	Meaning
	Warning “Danger”	Follow the danger warnings in this manual.
	Mandatory “Read the manual”	Read the user manual before you switch the chamber on for the first time. During use, follow the maintenance instructions in Chapter 8.
	Danger “Electrical voltage”	Live wiring inside. The cover may only be opened by a qualified electrician.
	Warning “Hot surface”	The air in the chamber and every surface it touches may be very hot. Wear suitable protective clothing and heat-resistant gloves.
	Warning “Low temperature”	The air in the chamber and every surface it touches may be very cold. Wear suitable protective clothing and cold-resistant gloves.
	Protective earth	Marks the protective earth connection. Earth resistance ≤ 4 Ω.

Safety symbols used in this manual

Symbol	Type	Meaning
	Danger	Ignoring the instruction may endanger people, other living beings or the environment.
	Notice	Wrong operation may cause minor injury to the operator or damage to the chamber.
	Prohibited	An action that must never be carried out; it may damage the chamber or the test samples.
	Must do	An action that must be carried out to avoid a hazard.
	Note	Additional information that helps you operate the chamber correctly.
	Tip	A practical recommendation from LORDERAN application experience.

Models covered and documentation set

Table 1 Models covered by this manual. The rating plate of your chamber is binding.

Model	Working volume	Inner size W × D × H	External size W × D × H	Shelves	Weight (approx.)
JS4010	100 L	450 × 450 × 500 mm	780 × 1130 × 1580 mm	2	250 kg
JS4025	250 L	600 × 600 × 700 mm	960 × 1500 × 1760 mm	2	320 kg
JS4050	500 L	800 × 700 × 900 mm	1130 × 1550 × 1950 mm	3	500 kg
JS4100	1000 L	1000 × 1000 × 1000 mm	1320 × 1890 × 2050 mm	3	680 kg

Document	Contents
User Manual (this manual)	Safety, installation, water supply, operation, programs, troubleshooting, maintenance and disposal.
Controller reference manual (electronic)	Detailed description of every screen and parameter of the temperature and humidity controller. Supplied on the USB stick delivered with the chamber.
Packing list, test report	The items supplied with your order and the factory test results of your chamber.
Datasheet	Specifications and test standards of all four sizes, available from www.lorderan.com.

How this manual is organised

Part	What it covers	Read it
Chapter 1 · Safety	Hot and cold surfaces, prohibited samples, electrical safety	Before anything else
Chapter 2 · Installation	Unloading, unpacking, site, levelling, power supply	Before the first test
Chapter 3 · Instrument Overview	Specifications, humidity envelope, parts, protection devices, touch screen	Before the first test

Part	What it covers	Read it
Chapter 4 · Water System	Built-in tank, closed-loop recirculation, water quality (RO / DI), water-system maintenance	Before the first test
Chapter 5 · Operation	Loading samples, fixed-value runs, run settings, curves, shutdown	Every day
Chapter 6 · Programs	Segments, wait, TS outputs, loops, linking, worked example	When needed
Chapter 7 · Troubleshooting	Alarm points, protection devices and how to reset them, other faults	When a problem occurs
Chapter 8 · Maintenance	Schedule, condenser, chamber, gauze, water system, storage	As scheduled
Chapter 9 · Disposal	Materials and how to dispose of them	At the end of life
Appendices A – G	Quick reference, alarm index, logs, checklists, program worksheet, glossary, warranty	Any time

Intended use

The JS4 series climate chamber is intended for climatic testing of products, components and materials at controlled temperature and relative humidity, by trained personnel in laboratories, quality departments and production. It is not intended for:

- explosive, flammable or corrosive samples (Section 1.2);
- storage of food, medicines or biological material for consumption or treatment;
- use as a living space for people or animals;
- operation outdoors or outside the permitted ambient conditions.

ILLUSTRATIONS

Photos, drawings and screens in this manual are examples. Most show the 100 L model; your chamber, and the software version of its controller, may differ in detail. Where they differ, your chamber prevails.

QUICK START

Your first test in eight steps

This page is a summary for trained operators. It does not replace Chapters 1 to 5. The section number on each card tells you where to find the details.

1

Place and level

Level floor, 5 – 32 °C, free space all round, casters locked. **2.3**

2

Fill the water

RO / DI water through the filling port, tank ½ – ¾ full; tray under the overflow. **4.5**

3

Power on

Close the circuit breaker, then press POWER. **5.2**

4

Log in

Choose your user name and enter the password. **5.2**

5

Choose the mode

Fixed value (one set point) or Program (a profile). **5.3**

6

Set the values

Temperature, humidity, run time — or select a program. **5.4**

7

Run

Load samples spaced apart, close the door, RUN → START. **5.4**

8

Stop

STOP → STOP. After a sub-zero test, warm up to 60 °C first. **5.7**

NEVER

- Put explosive, flammable or corrosive substances in the chamber.
- Place samples on the chamber floor or in front of the air outlet on the back wall.
- Switch off the main power while the chamber is hot — stop the run first.
- Fill tap water, or run with an empty water tank.

GOOD HABITS

- Fill the chamber to less than ¾ of its volume and leave gaps for the air.
- Set the over-temperature protector about 15 °C above the test temperature.
- Keep the wet-bulb gauze clean and wet; replace it every three months.
- Back up the data when the memory is more than 80 % full.

The operation screen at a glance



- **Left panel:** temperature — large figure = actual value (PV), SV = set value, MV = heating / cooling output.
- **Right panel:** humidity, with the same layout.
- **Status line:** run time, mode (FIX / PROG) and state (RUN / STOP).
- **Bottom bar:** back, CURVE, PROG, DETAIL and RUN / STOP.
- **Top right:** light, USB, screen lock, date and time.

Full description: Section 3.7.

CONTENTS

Table of contents

CHAPTER 1 **Safety Precautions** 9

1.1 General Safety Guidelines 9
1.2 Substances That Must Not Be Placed in the Chamber 9
1.3 Hot and Cold Surfaces and Other Precautions 10
1.4 Electrical Safety 10
1.5 Limitation of Liability 10

CHAPTER 2 **Installation** 11

2.1 Unloading 11
2.2 Unpacking 12
2.3 Choosing the Site 12
2.4 Positioning and Levelling 12
2.5 Clearance 13
2.6 Checking the Delivery 13
2.7 Power Supply 13

CHAPTER 3 **Instrument Overview** 15

3.1 Technical Specifications 15
3.2 The Humidity Envelope 16
3.3 How the Chamber Works 17
3.4 Parts and Their Functions 18
3.5 Casters 20
3.6 Protection Devices 20
3.7 The Touch Screen 21

CHAPTER 4 **Water System** 23

4.1 Built-In Water Tank and Filling Port 23
4.2 How the Closed Loop Works 24
4.3 Components of the Water System 25
4.4 Water Quality 25
4.5 First Filling and Priming 26
4.6 Daily Use 26
4.7 Preparing a Long Unattended Humidity Test 27
4.8 Overflow and Condensate 27
4.9 Cleaning and Maintenance of the Water System 28
4.10 Low-Water Float Switch 29
4.11 Draining for Shutdown, Transport or Frost 30
4.12 Troubleshooting the Water System 30

CHAPTER 5 **Operation** 32

5.1 Loading Samples 32
5.2 Switching On and Logging In 33
5.3 Run Settings 33
5.4 Running a Fixed Value 34
5.5 Detail Screens 35
5.6 Curves and Data Export 36

5.7 Stopping and Switching Off 37

CHAPTER 6 **Programs** 38

6.1 How a Program Works 38
6.2 The Program List 39
6.3 Editing Segments 40
6.4 Wait Function 40
6.5 Time Signals (TS) 41
6.6 Loops (Partial Cycles) 41
6.7 Program Cycles and Linking 42
6.8 Running a Program 42
6.9 Worked Example: Cyclic Damp Heat 43

CHAPTER 7 **Troubleshooting** 44

7.1 Alarm Points 44
7.2 Over-Temperature Protection, Stage 1: Controller 45
7.3 Over-Temperature Protection, Stage 2: Knob Protector 45
7.4 Short Circuit: Circuit Breakers 45
7.5 Compressor Overload and Over-Pressure 46
7.6 Humidifier Dry-Burn Protection 47
7.7 Low Water in the Tank 47
7.8 Phase Sequence Protection (Three-Phase Models) 48
7.9 Other Faults 48

CHAPTER 8 **Care and Maintenance** 50

8.1 Maintenance Schedule 50
8.2 Cleaning the Air-Cooled Condenser 51
8.3 Cleaning the Test Space 51
8.4 Cleaning the Electrical Compartment 51
8.5 Replacing the Wet-Bulb Gauze 52
8.6 Door Seals and Window 52
8.7 Moving, Storage and Long Breaks 52

CHAPTER 9 **Disposal** 53

9.1 Materials 53
9.2 How to Dispose of the Chamber 53

APPENDIX A **Quick Reference** 54

A.1 Key Values and Limits 54
A.2 Daily Use in Brief 54

APPENDIX B **Alarm Index** 55

APPENDIX C **Logs** 56

C.1 Test Log 56
C.2 Maintenance Log 56
C.3 Water Log 57
C.4 Calibration Record 57

APPENDIX D **Checklists** 58

D.1 Installation and Commissioning 58

D.2 Before and After Each Test 58

APPENDIX E **Test Standards and Program Worksheet** 59

E.1 Common Test Standards 59

E.2 Program Worksheet 59

APPENDIX F **Glossary** 60

APPENDIX G **Warranty and Service** 61

G.1 Warranty 61

G.2 Product Record 61

G.3 Contact 61

CHAPTER 1

Safety Precautions

The chamber works with extreme temperatures, mains voltage, a refrigeration circuit and water. Most accidents come from touching hot or frozen surfaces, from unsuitable samples, or from interrupting the power at the wrong moment. This chapter explains how to avoid them. Read it before you install, test or operate the chamber, and make sure every operator has read it.

1.1 General Safety Guidelines

- Do not operate the chamber before it has been completely installed and set up as described in Chapter 2.
- The chamber works at extreme temperatures. To avoid burns and frostbite, do not touch air, parts or surfaces that are hotter than **+38 °C (+100 °F)** or colder than **0 °C (+32 °F)**.
- Make sure that all safety labels are in place and readable. Replace damaged labels.
- Keep the chamber door closed during operation. Before you open the door, check the actual temperature on the screen.
- The chamber contains live parts. Only qualified electricians may open the electrical cabinet.
- Before you work near fans or other moving parts, disconnect the main power and make sure the protective guards are in place.
- The condenser fan of the refrigeration system can start at any time while the power is on. Keep hands, tools and loose clothing away from it.
- **Do not cut the power while the chamber is running at high temperature**, especially with a heat load inside. Without air circulation, local overheating can burn out components. Stop the run on the touch screen first (Section 5.7).
- Read the safety instructions and safety labels of this manual before you use the chamber.

1.2 Substances That Must Not Be Placed in the Chamber

PROHIBITED · DANGER

The chamber is **not** explosion-proof. Never place explosive or flammable substances, or articles that contain them, in the chamber.

Explosive substances

- Nitroglycol, nitroglycerin, nitrocellulose and other explosive nitrate esters
- Trinitrobenzene, trinitrotoluene, trinitrophenol and other explosive nitro compounds
- Peracetic acid, methyl ethyl ketone peroxide, benzoyl peroxide

Flammable and oxidising substances

- Lithium, potassium and sodium metal; yellow and red phosphorus, phosphorus sulphide; celluloid; calcium carbide; carbon phosphide; magnesium, aluminium and other metal powders; sodium sulphite
- Chlorates, perchlorates, inorganic peroxides, nitrates, chlorites and hypochlorites (for example potassium chlorate, ammonium perchlorate, sodium peroxide, ammonium nitrate, calcium hypochlorite)
- Hydrogen, acetylene, methane, ethane, propane, butane and other gases that burn at 15 °C and 1 atm

PROHIBITED · NOTICE

Do not put corrosive substances in the chamber. If samples can release substances that corrode stainless steel or silicone rubber — such as chlorine, chlorides or acids — the service life of the compressor, the door seals and other parts is shortened considerably. Some of these substances are harmless at room temperature but attack printed circuit boards at high temperature.

1.3 Hot and Cold Surfaces and Other Precautions

HOT — ABOVE 55 °C

Take great care when you open the door during or just after a high-temperature run: the hot air that escapes is dangerous. Everything inside — walls, samples, shelves and the inside of the door — is hot. Always wear **heat-resistant gloves**.

COLD — BELOW 0 °C

During or just after a run below 0 °C, everything inside is cold enough to cause frostbite. Always wear **cold-resistant gloves**. Do not touch frozen metal with bare or wet skin.

PROHIBITED

- **No conductive dust or powders.** Conductive particles carried into the air-conditioning duct can cause leakage currents in the heater.
- **No batteries or products that may vent, burn or explode** unless the chamber has been equipped for it — ask LORDERAN about safety options. Tell LORDERAN in advance if samples give off more than a few hundred watts of heat.
- **No experiments with unpredictable results.** If you are not sure what an operation will do, do not run the chamber; ask LORDERAN first.

1.4 Electrical Safety

As with any electrical appliance, observe these basic rules strictly:

PROHIBITED

- Do not touch the chamber with wet hands.
- Do not operate the chamber in a damp environment or where water can splash onto it.
- Do not use the neutral conductor as protective earth.

MUST DO

- Keep the outer surfaces of the chamber dry.
- Connect the chamber to a supply that matches its rating plate, with a protective earth of ≤ 4 Ω (Section 2.7).
- Disconnect the main power before any work inside the cabinets.

1.5 Limitation of Liability

LORDERAN accepts no responsibility for damage caused by unauthorised or improper use, incorrect installation, an incorrect power or water supply, unauthorised modification, operation based on a misunderstanding of this manual, or accidents. If you meet a situation that this manual does not cover, stop and contact LORDERAN before you continue.

CHAPTER 2

Installation

A climate chamber weighs between 250 and 680 kg and carries a refrigeration circuit filled with oil and refrigerant. Careful unloading, a level floor and a correct power and water supply are the basis of reliable test results and a long service life. This chapter takes you from the delivery truck to the first power-on.

1. **Unload** — forklift or crane, upright
2. **Unpack** — top first, then sides
3. **Place** — level, 5 – 32 °C
4. **Check** — items, cable ties off
5. **Water** — Chapter 4
6. **Power** — rating plate, earth

2.1 Unloading

The chamber is wrapped in protective film and shipped in a wooden crate on a specially designed pallet. On arrival, move it from the vehicle to level ground with suitable lifting equipment. LORDERAN recommends that this is done by people experienced in forklift work. The capacity of the lifting equipment must be at least the weight of the chamber (see the rating plate and Table 1).

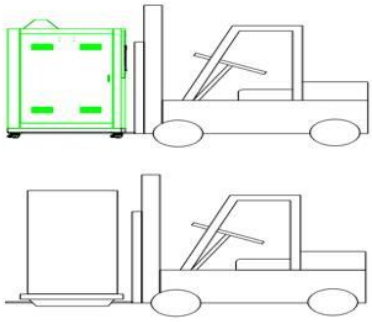


Figure 2-1 Forklift unloading: forks under the crate pallet

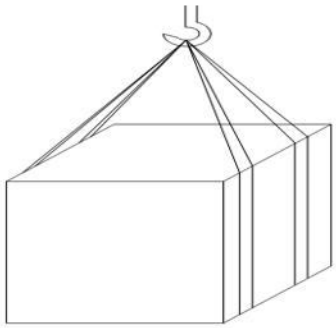


Figure 2-2 Crane lifting: textile slings, not steel cables

NOTICE

- Unload with suitable equipment (forklift or crane). If you lift an uncrated chamber with a forklift, make sure the forks do not touch the refrigeration unit underneath.
- Keep the chamber balanced at all times and do not move it across uneven ground.
- When lifting with a crane, do **not** use steel cables — they damage the cabinet. Use textile slings.
- **Keep the chamber upright.** Move, store and unload it horizontally so that compressor oil cannot enter the refrigerant circuit. If the chamber must be tilted while it is being positioned, contact LORDERAN first.

RECOMMENDED

If the chamber has been tilted or transported in very cold weather, let it stand upright at room temperature for at least **24 hours** before you start the refrigeration system for the first time.

2.2 Unpacking

Precautions

- Wear gloves and safety goggles throughout.
- Collect every nail you pull out in a container — loose nails cause puncture wounds.
- The crate is nailed together; you need a hammer and a pry bar. If you want to reuse the crate, do not use excessive force.



Figure 2-3 Chamber in its wooden crate

Procedure

1. **Order:** remove the top first, then the side panels, the internal partitions and finally the base boards.
2. **Technique:** put the tip of the pry bar into the gap between two boards and lever them apart. Tap stubborn nails loose with the hammer first.
3. Remove the protective film and inspect the cabinet, the door glass and the casters for transport damage. Report damage to the carrier and to LORDERAN at once, with photos.
4. Clean up the site and sort and store the boards for reuse.

2.3 Choosing the Site

- A level, stable floor that carries the weight of the chamber
- Little mechanical vibration
- No direct sunlight, good ventilation
- Ambient temperature **+5 to +32 °C**, humidity **≤ 85 %RH**
- No rapid changes of the room temperature
- Little dust
- No flammable materials nearby; no flammable or corrosive gases
- Close to the power supply and a floor drain or water container
- No fire detector directly above the chamber
- Water-cooled versions only: cooling water connected in the right flow direction, cooling water temperature +5 to +32 °C

> **NOTICE**
> The permitted ambient temperature for operation is **+5 to +32 °C**. Outside this range the refrigeration system can fail or the chamber cannot reach its specified performance.

2.4 Positioning and Levelling

Place the chamber on a level floor and check it with a spirit level (not supplied) on the floor of the test space, from front to back and from side to side. **A chamber that is not level can damage the compressor.** Use the casters to level it (Section 3.5); for the large sizes a hydraulic pallet truck can help.

- **100 L:** the two front casters have brakes. Push the brake pedals down to lock the chamber.
- **250 L / 500 L / 1000 L:** the four casters have height-adjustable feet. Lower the feet until they carry the chamber and it is level.

2.5 Clearance

Leave enough free space around the chamber:

- **Left and right:** access for maintenance and for the test port on the side.
- **Front:** room to open the door fully and to load samples.
- **Rear:** ventilation for the condenser fan, and access to the electrical cabinet (250 L and larger), the water filling port and the water system behind the rear cover. The condenser must not draw in its own warm exhaust air; in a small room, extract the warm air.
- **Above:** no fire alarm detector directly above the chamber.

The drawing shows the minimum distances from the walls. A = 40 cm, B = 60 cm, C = 80 cm.

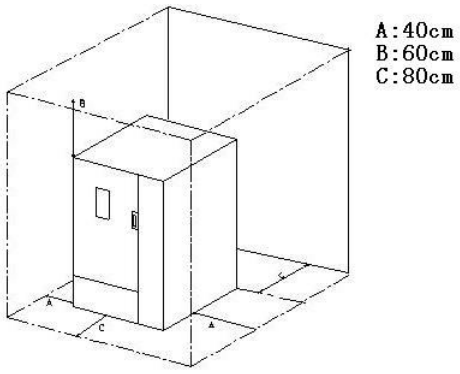


Figure 2-4 Minimum clearances A, B and C

2.6 Checking the Delivery

1. Open the door and check that everything on the packing list is there: documents, USB stick, shelves, spare parts, triangular key and accessories. The water tank, pump and pipes are factory-installed inside the chamber.
2. Cut and remove all **cable ties** that hold the shelves during transport.
3. Set the height of the shelves to suit your samples.

PROHIBITED

Never run the chamber with transport cable ties inside. They melt at high temperature and give off a strong smell.

2.7 Power Supply

Table 2-1 Power supply. The voltage your chamber was built for is on its rating plate. *3-phase: 208, 220–240, 400, 415 or 480 V, 50/60 Hz.

Model	Supply	Power / current
JS4010 · 100 L	1-phase + PE, 208–240 V; or 3-phase + N + PE*	6 kW; 27 A (220 V, 1-phase)
JS4025 · 250 L	1-phase + PE, 208–240 V; or 3-phase + N + PE*	7 kW; 32 A (220 V, 1-phase)
JS4050 · 500 L	3-phase + N + PE*	10 kW; 27 A (220 V), 12 A (480 V)
JS4100 · 1000 L	3-phase + N + PE*	13 kW; 34 A (220 V), 16 A (480 V)

- Use a dedicated circuit with a circuit breaker and residual-current protection sized for the current in Table 2-1.
- Protective earth resistance **≤ 4 Ω**. Never connect the earth to the neutral conductor.
- Three-phase models have a **phase sequence protector**. If the phases are connected in the wrong order the chamber will not start (Section 7.8).
- The power connection must be made by a qualified electrician.

BEFORE YOU SWITCH ON

Work through the installation checklist in Appendix D: position and level, water tank filled with RO / DI water, water tray in place, correct and earthed supply, cable ties removed, test port plugged, samples placed correctly.

CHAPTER 3

Instrument Overview

This chapter describes what the chamber can do, how it is built and how it creates a climate, where its parts and protection devices are, and how the touch screen is organised.

3.1 Technical Specifications

Table 3-1 Technical specifications of the JS4 series. The rating plate of your chamber is binding. *Voltages: see Table 2-1.

Parameter	JS4010 · 100 L	JS4025 · 250 L	JS4050 · 500 L	JS4100 · 1000 L
SIZE				
Inner size W × D × H	450 × 450 × 500 mm	600 × 600 × 700 mm	800 × 700 × 900 mm	1000 × 1000 × 1000 mm
External size W × D × H	780 × 1130 × 1580 mm	960 × 1500 × 1760 mm	1130 × 1550 × 1950 mm	1320 × 1890 × 2050 mm
Shelves (standard)	2	2	3	3
Weight (approx.)	250 kg	320 kg	500 kg	680 kg
TEMPERATURE AND HUMIDITY (ALL MODELS; AMBIENT +25 °C, NO LOAD)				
Temperature range	-40 to +150 °C			
Humidity range	20 to 98 %RH (see the envelope in Section 3.2)			
Temperature fluctuation	±0.5 °C			
Temperature deviation / uniformity	≤ ±2 °C / ≤ 2 °C			
Humidity fluctuation	±2 to 3 %RH			
Humidity deviation	±2.0 %RH (> 75 %RH); ±3.0 %RH (≤ 75 %RH)			
Humidity uniformity	≤ 5 %RH			
Heating rate / cooling rate	2 to 3 °C/min / 0.7 to 1.0 °C/min (average over the full range)			
Heating-up time	+20 → +150 °C in ≤ 60 min			
Cooling-down time	+20 → -40 °C in ≤ 70 min			
REFRIGERATION, CONTROL AND POWER				
Refrigeration	Mechanical compression, air-cooled condenser; refrigerant R449A			
Controller	7-inch colour touch screen; fixed-value and program operation; 100 programs × 100 segments; USB and RS-485 (PC) interfaces			
Noise level	60 – 65 dB	60 – 65 dB	65 – 70 dB	65 – 70 dB
Power supply	1-phase or 3-phase*	1-phase or 3-phase*	3-phase*	3-phase*
Power	6 kW	7 kW	10 kW	13 kW
CONSTRUCTION				

Parameter	JS4010 · 100 L	JS4025 · 250 L	JS4050 · 500 L	JS4100 · 1000 L
Inner chamber / outer cabinet	SUS304 stainless steel, 2 mm, fully welded / SUS304 stainless steel, 1.5 mm			
Insulation	Polyurethane foam and rock wool			
Door	Double silicone seals; heated double-glazed viewing window; interior light			
Water system	Built-in 20 L water tank; closed-loop water recirculation; RO / DI water (≤ 5 µS/cm)			
Test port	Ø 100 mm cable port with rubber plug, left side			
Permitted ambient	+5 to +32 °C, ≤ 85 %RH			

NOTE

Performance figures apply to an empty chamber at an ambient of +25 °C with the condenser clean. Heavy, wet or heat-producing loads slow the rates of change.

3.2 The Humidity Envelope

Relative humidity always depends on temperature. The solid area in Figure 3-1 is the **standard working envelope**: the temperature–humidity combinations the chamber holds as delivered. The hatched area can only be reached with the **optional compressed-air dryer**. Every labelled point is a published limit of the chamber.

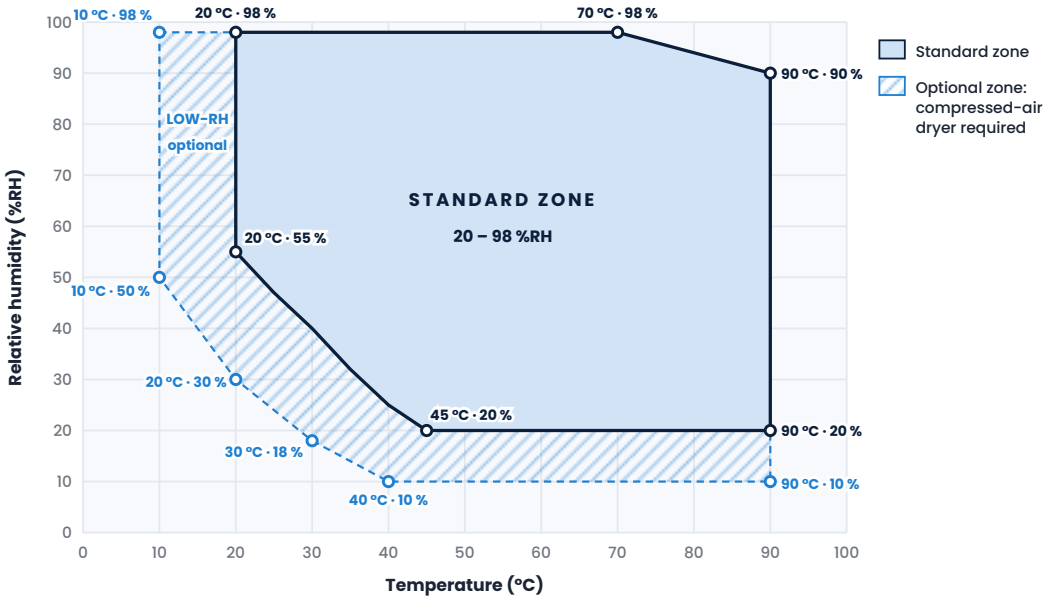


Figure 3-1 Temperature–humidity envelope (standard zone solid; optional zone with compressed-air dryer hatched)

98 %RH

From 20 °C up to 70 °C, easing to 90 %RH at 90 °C. Near-saturation can only be held up to about 90 °C.

20 %RH

The standard lower limit from 45 °C upwards; between 20 °C and 45 °C the lower limit rises to 55 %RH. With the optional dryer: down to 10 %RH from 40 °C.

Below 20 °C

Humidity control below 20 °C (down to 10 °C) needs the optional dryer, and the range narrows to keep the evaporator free of frost. For tests outside the envelope, ask LORDERAN.

BEFORE YOU ORDER OR PLAN A TEST

Check every temperature–humidity combination against this envelope. A set value outside the solid area will not be reached without the optional dryer; a set value outside both areas cannot be held at all. No humidity limits are published below 10 °C or above 90 °C: run such tests with humidity OFF, or ask LORDERAN first.

3.3 How the Chamber Works

The chamber is a vertical cabinet. The outer cabinet and the inner chamber are both made of SUS304 stainless steel, and the space between them is filled with insulation. Behind the back wall of the test space is the **air-conditioning duct**: a fan blows air through the evaporator, the heater and past the humidifier and back into the test space, so that the whole working space has the same temperature and humidity.

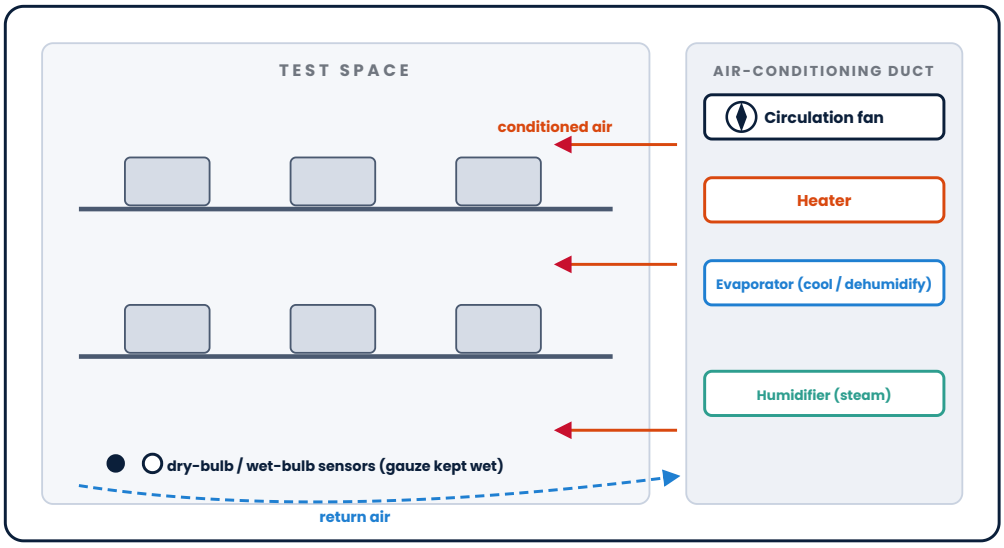


Figure 3-2 Air circulation (schematic)

Function	How it is done
Heating	Electric heater in the duct, switched by a solid-state relay (SSR).
Cooling	Refrigeration unit at the bottom: compressor, air-cooled condenser, expansion valve and evaporator in the duct.

Function	How it is done
Humidifying	Steam from a heated humidifier tank, fed with purified water (Chapter 4).
Dehumidifying	The cold evaporator condenses water out of the air. The condensate leaves through the overflow outlet or is returned to the water reservoir.
Measurement	Dry-bulb and wet-bulb sensors below the front edge of the test-space floor. The wet-bulb sensor is wrapped in gauze that must stay wet; the controller calculates the relative humidity from the two temperatures.
Control	The controller compares the actual values (PV) with the set values (SV) and drives heater, refrigeration and humidifier (MV = output in %).

Air circulation keeps the ceiling of the chamber dry, so that no condensate drips onto the samples even in hot and humid tests. When a program has finished, the chamber returns automatically to room temperature to protect the samples.

3.4 Parts and Their Functions

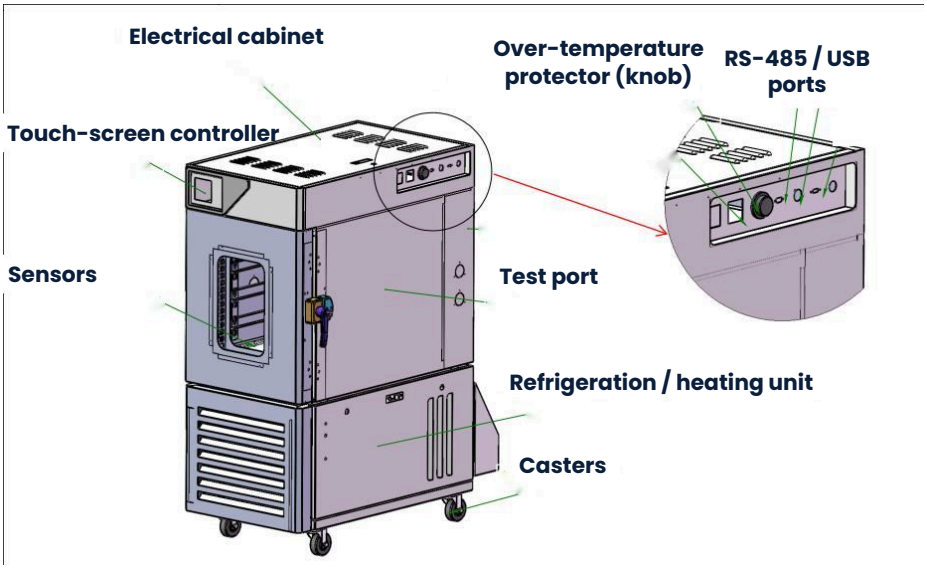


Figure 3-3 Front and top (100 L shown)

Part	Function
Test space	Polished stainless steel. Samples stand on the adjustable shelves — **never on the floor of the test space**.
Door	Double silicone seals and a heated viewing window, so you can watch the samples during the test. Switch on the interior light from the touch screen.
Touch screen / controller	All settings and commands are made by lightly touching the symbols on the screen (Section 3.7).
POWER button	Switches the controller and the chamber on and off after the circuit breaker has been closed.
Temperature and humidity sensors	Below the front edge of the test-space floor. The wet-bulb sensor is covered with white gauze that must stay wet. Replace the gauze every three months, or at once if it turns yellow or hard (Section 8.5).

Part	Function
Test port	Cable entry with rubber plug in the left side panel, for test leads and measuring equipment. Close it with the plug when it is not in use.
Water system	Built-in water tank with pump and low-water float, closed-loop recirculation of the condensate, filled through the purified-water filling port at the rear (Chapter 4).
Overflow outlet	Condensate and overflow drain below the rear cover. Place a water tray under it (Section 4.8).
Electrical cabinet	Circuit breakers, fuses, compressor overload relay, phase sequence protector, solid-state relays. 100 L: under the top cover; 250 L / 500 L / 1000 L: behind the rear cover. Opened with the supplied triangular key — **qualified electricians only**.
Over-temperature protection	Two independent stages: the over-temperature controller and the knob protector, at the top right of the chamber (Sections 7.2 and 7.3).
Refrigeration / heating unit	Compressor, condenser and related parts, behind the lower front cover (opened with the triangular key).
Interfaces	USB port for data and program export; RS-485 port for PC monitoring and control.
Casters	Four casters for moving the chamber (Section 3.5).



Figure 3-4 POWER button



Figure 3-5 Triangular key for the covers



Figure 3-6 Circuit breakers in the electrical cabinet

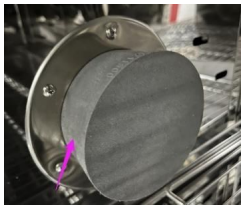


Figure 3-7 Test port with rubber plug (inside)

3.5 Casters

100 L: four swivel casters; the two front casters have brakes. Press the brake pedal down to lock the chamber.

250 L / 500 L / 1000 L: four swivel casters with height-adjustable feet, which keep the chamber stable on uneven floors. Each caster consists of a lifting turntable (1), a fixed foot (2) and a wheel (3).

1. **To move the chamber:** turn the lifting turntable of each caster to raise the foot until the wheel touches the floor. Do this on all four casters, then push the chamber to its new place.
2. **To fix the chamber:** turn the turntables the other way. The feet come down onto the floor and the wheels are relieved. Check the level (Section 2.4).

> ⚠ **NOTICE**
> Before you move the chamber, release the brakes of the front casters (100 L) or raise the feet (larger sizes). Never force the chamber to move with the brakes on — this damages the casters. Disconnect the power and empty the overflow tray first; before a transport, drain the water system (Section 4.11).

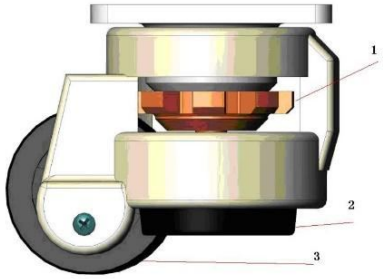


Figure 3-8 Adjustable caster: 1 turntable, 2 foot, 3 wheel



Figure 3-9 Caster with brake (100 L)

3.6 Protection Devices

The chamber has ten protection functions for the samples, the refrigeration system and the operator. Alarm points and resets are described in Chapter 7.

Protection	What it does	Section
Sample over-temperature (controller)	Adjustable limit; cuts the chamber off when the temperature exceeds the limit	7.2
Over-temperature knob protector	Independent second stage that protects the chamber itself	7.3
Compressor overload	Thermal overload relay that protects the compressor motor	7.5
Compressor over-pressure	Pressure switch in the refrigeration circuit	7.5
Fan motor overload	Protects the circulation fan motor (alarm point DI10)	7.1
Humidifier dry-burn	Switches off the humidifier heater when the tank runs dry	7.6
Water shortage	Float switch in the water tank stops humidifying	7.7
Phase loss and reversal	Three-phase models: will not start with a wrong or missing phase	7.8
Short circuit and leakage	Circuit breakers and residual-current protection	7.4
Three-colour alarm light, flame-retardant materials	Visible status; flame-retardant non-metallic materials inside	—

3.7 The Touch Screen

Touch the symbols lightly with a finger; do not use pointed or hard objects. The screen sequence after power-on is: start-up screen → login → main menu.

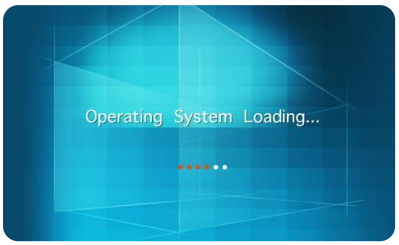


Figure 3-10 Start-up screen



Figure 3-11 Login screen



Figure 3-12 Main menu

User levels

User name	Level	Typical use
admin	Super user	All functions, including controller settings. For the commissioning engineer and the person responsible for the chamber.
user2	Administrator	Setting up programs and run settings.
user3	Operator	Starting and stopping tests, viewing curves.

The default password is **0**. Change it after installation and keep a record of it in a safe place.

Status icons (top right of every screen)



Figure 3-13 Status icons

- **Light:** touch to switch the interior light on or off.
- **USB:** lights up when a USB stick is inserted; data can then be copied. Touch it to eject the stick safely.
- **Lock:** unlocked by default. Touch it to lock the screen against accidental input; touch again to unlock.
- **Date and time.**

The operation screen



Figure 3-14 Operation screen, fixed-value mode, stopped

PV	Actual temperature / humidity (large figures)
SV	Set value
MV	Present control output for temperature and humidity, in %
RUNTIME	Accumulated run time
CURVE	Trend curves and data export (Section 5.6)
PROG	Program list (Chapter 6)
DETAIL	Detail screen (Section 5.5)
RUN / STOP	Opens the run pop-up

CHAPTER 4

Water System

Humidity tests consume water. All JS4 chambers have a built-in water tank and a closed-loop water recirculation system: the chamber recovers the water it has used and feeds it back to the humidifier. This chapter explains how the loop works, which water to use, how to run it day to day and how to keep it clean.

Built-in	**> 80 %**	**½ – ¾**	**RO / DI**
TANK, PUMP AND PIPES FACTORY-INSTALLED	HIGHER WATER UTILISATION *	WORKING LEVEL IN THE TANK	PURIFIED WATER ONLY — NO TAP WATER

* Manufacturer's figure, compared with a humidification system that discharges its condensate to drain.

4.1 Built-In Water Tank and Filling Port

The 20 L tank is installed inside the chamber, together with the pump, the water pipes and the low-water float switch. **No water pipes or pump need to be connected on site.** You fill the tank from outside through the **purified-water filling port** at the rear of the chamber.



Figure 4-1 Purified-water filling port

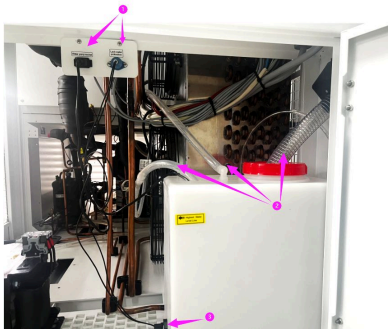


Figure 4-2 Factory-installed tank, pump and pipes (behind the rear cover)



Figure 4-3 Position of the water tank

- Before the first start, fill the tank with purified water to between **½ and ¾** (Section 4.5).
- Keep the level at or above the ½ mark **even for temperature-only tests** with humidity switched off. Otherwise the low-water alarm (DI8) stops the chamber, and the pump may run dry.
- The tank is behind the rear cover panel, which is opened with the supplied triangular key. You only need to open it to clean the water system (Section 4.9).

OPTIONAL AUTOMATIC TOP-UP

If you want to connect a purified-water supply for automatic top-up, ask LORDERAN. Do not connect a tap-water line.

4.2 How the Closed Loop Works

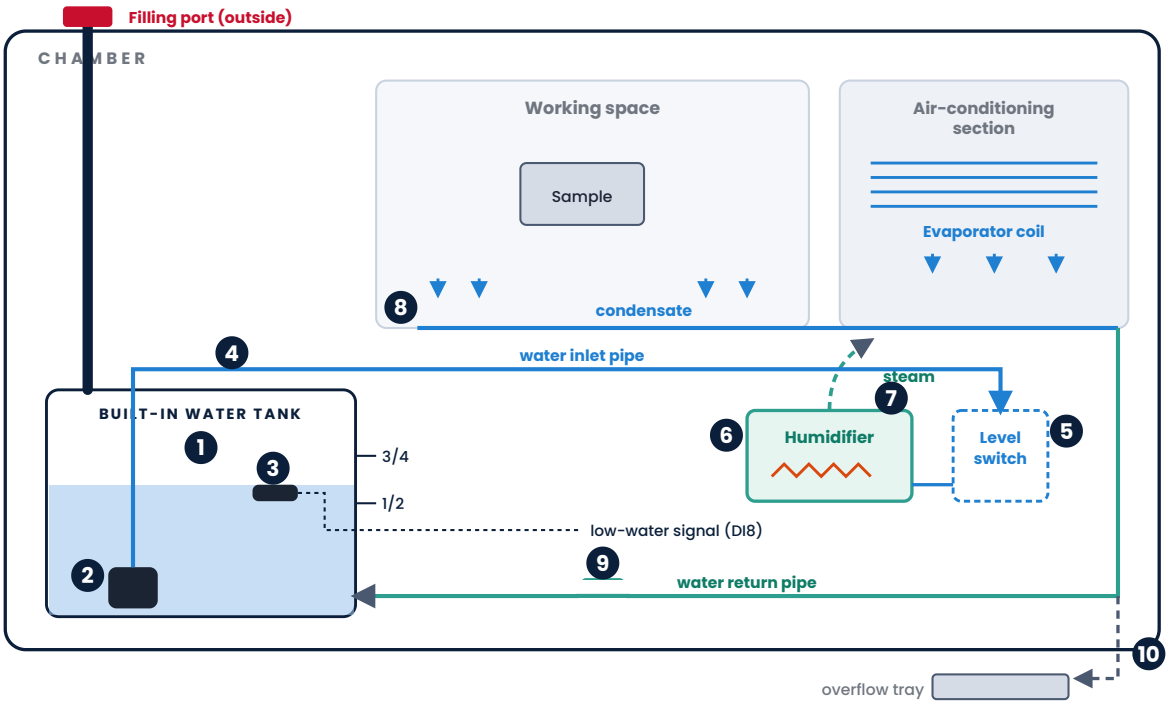


Figure 4-4 Water recirculation system (schematic, not to scale)

1	Built-in water tank — the reservoir of the loop	**2**	Submersible pump, held on the tank bottom by a suction cup
3	Low-water float switch — raises alarm DI8	**4**	Water inlet pipe — tank to humidifier
5	Water level switch — keeps the humidifier level constant	**6**	Humidifier with dry-burn protection (DI3)
7	Steam into the air-conditioning section	**8**	Condensate from the chamber floor and the evaporator
9	Water return pipe — back to the tank by gravity	**10**	Overflow outlet to the tray — surplus only

Supply. The pump (2) pushes water through the inlet pipe (4) to the water level switch (5). The switch and the humidifier (6) are connected like the two arms of a U-tube, so the water stands at the same height in both; when the level falls, the switch calls for water. A heater below the water surface makes steam (7), which the circulating air carries into the working space. The same water keeps the wet-bulb gauze moist.

Recovery. Whenever humid air meets a surface colder than its dew point, water condenses — on the evaporator coil, which dehumidifies, and on the chamber floor and walls during cooling. This condensate (8) is collected and runs back to the tank by gravity (9). Only a surplus that the loop cannot take leaves through the overflow outlet (10).

What is still consumed. The loop is closed for liquid water, not for vapour. Water leaves as humid air every time the door is opened, through the pressure-equalising path and through the overflow. The tank level therefore falls slowly during humidity tests; under normal use one filling lasts up to about 7 days.

4.3 Components of the Water System

Component	Function	What can go wrong
Water tank with cap	Holds the purified water. Keep the cap closed so that dust and light stay out.	Algae or biofilm if the water stands for a long time
Submersible pump	Draws water from the bottom of the tank and feeds the inlet pipe.	Floats if the suction cup releases; inlet blocked; runs dry at low level
Low-water float switch and terminal	The float follows the water surface. At low level it signals alarm DI8.	Float stuck; terminal not fully inserted
Water inlet pipe	Carries water from the pump to the humidifier.	Kinks; air locks after the first filling
Water level switch	Keeps the water in the humidifier at working height.	Air bubble in the tube; switch displaced, giving too low a level
Humidifier	Stainless-steel vessel with immersed heater; generates the steam.	Scale on the heater if unsuitable water is used
Dry-burn protector	Switches the humidifier heater off if it runs without water: alarm DI3.	Set too low: false alarms. Defective: no protection
Condensate collection and return pipe	Collect the water from the chamber floor and the evaporator and return it to the tank.	Pipe blocked by fibres or sample residue; chamber not level
Overflow outlet and tray	Discharge surplus water and equalise the pressure.	Tray full; pipe end under water (siphon)

WHY THIS MATTERS FOR CYCLIC TESTS

A damp-heat cycle condenses and re-evaporates the same water again and again: every cooling phase wrings the moisture out of the air, every humid phase puts it back. Without recovery such a test empties a tank quickly; with recovery it can run unattended for long periods and needs far less purified water.

4.4 Water Quality

The humidifier works like a still: pure water leaves as steam, and everything dissolved in the feed water stays behind. With recirculation the same water passes through many times, so the quality of the water you put in decides how long the system stays clean.

Water	Use	Reason
Reverse-osmosis (RO) water	**Recommended**	Low mineral content. Recommended electrical conductivity: **≤ 5 µS/cm** at the time of filling.
Deionised (DI) water	**Recommended**	
Distilled water	Suitable	
Tap water, well water, mineral water	**Not to be used**	Calcium and magnesium salts form scale on the humidifier heater, which then overheats and trips the dry-burn protection; scale stiffens the wet-bulb gauze and falsifies the humidity reading; chlorides attack stainless steel at high temperature.
Softened water	**Not to be used**	Softening exchanges calcium for sodium; the salt content is unchanged and is carried into the chamber.

Water	Use	Reason
Water with additives (antifreeze, biocide, descaler)	**Not to be used**	Additives evaporate onto the samples or concentrate in the humidifier.

A SIMPLE QUALITY CHECK

A hand-held conductivity meter is an inexpensive way to control water quality. Measure the fresh water when filling, and the tank water once a month. Dissolved matter accumulates in a closed loop, so the reading rises slowly. Replace the water completely when it has clearly risen, when the water looks cloudy or coloured, or when deposits are visible — and at the latest monthly.

WHAT THE SAMPLES ADD TO THE WATER

Flux residues, plasticisers, oils and dust from the samples are washed down by the condensate and return to the tank. If you test products that give off such substances, shorten the water-change and cleaning intervals and keep the chamber floor clean.

4.5 First Filling and Priming

1. Open the cap of the filling port and fill the tank with purified water until the level is between **½ and ¾**. Close the cap.
2. Place a water tray under the overflow outlet (Section 4.8).
3. Switch the chamber on. The pump fills the water level switch and the humidifier; this takes a few minutes at the first start.
4. If a low-water (DI8) or dry-burn (DI3) alarm appears at the first start although the tank is filled, there is air in the line. Open the rear cover and squeeze the tube between the water level switch and the humidifier several times by hand, until the bubbles are gone and water stands in the tube. Then touch CLEAR.
5. Check the hose joints behind the rear cover for drops.
6. Run a short humidity test, for example 40 °C / 90 %RH for 30 minutes, and check that the humidity reaches the set value and the tank level stays in range.

WHY ½ TO ¾

Not below ½: the pump must stay submerged, and the float needs a margin before the low-water alarm stops the test.

Not above ¾: the tank needs room for the water that comes back. At the end of a humid phase a large volume of condensate returns within a short time; a brim-full tank overflows.

4.6 Daily Use

1. **Look** — level ½ – ¾, water clear
2. **Top up** — RO / DI water; cap closed
3. **Tray** — empty; pipe end free
4. **Gauze** — white, soft, wet
5. **Run** — no DI3 / DI8

Go through these five points before every humidity test; they take less than a minute.

Type of test	Water consumption	Recommended check of the tank
Temperature only (humidity OFF)	None	Weekly
Constant damp heat (for example 40 °C / 93 %RH, 85 °C / 85 %RH)	Low and steady	At the start; then every few days until you know the rate for your test

Type of test	Water consumption	Recommended check of the tank
Temperature–humidity cycling	Moderate; level swings with each cycle	At the start; daily for the first runs of a new program
Tests with frequent door openings	Highest	Daily

- Top up with the chamber stopped or in a stable phase, not during a cooling phase, when returning condensate raises the level anyway.
- After a humid test the tank level is normally a little higher than during the test, because the water held in the chamber has drained back. This shows that the loop is working.
- Do not open the door unnecessarily during humid phases. Each opening releases moist air — water the loop cannot recover.
- Record refills in the water log (Appendix C) to learn the refill interval of your own tests.

4.7 Preparing a Long Unattended Humidity Test

CHECKLIST

- [ ] Tank cleaned and filled with fresh purified water to ¾; cap closed.
- [ ] Float moves freely; low-water terminal engaged (Section 4.10).
- [ ] Return pipe clear; chamber floor free of debris.
- [ ] Overflow tray empty and large enough; pipe end above the water in the tray.
- [ ] Wet-bulb gauze new or in good condition (Section 8.5).
- [ ] Test port sealed; door seals clean.
- [ ] Power-failure mode chosen deliberately (Section 5.3); over-temperature protection set (Section 7.2).
- [ ] Remote monitoring by PC set up if the test runs over a weekend, so that a DI3 or DI8 alarm is noticed.

4.8 Overflow and Condensate

Most condensate is returned to the tank. A small surplus drains through the pipe at the **overflow outlet** below the rear cover. This is normal. Place a water tray at the end of the overflow pipe.

NOTICE

- Check the overflow pipe and the hose joints regularly.
- The overflow pipe also equalises the pressure between the test space and the room. Lay it so that it cannot siphon: the end must stay open to the air, never under water.
- Empty the tray before it overflows.

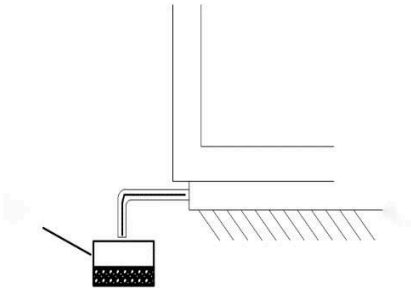


Figure 4-5 Water tray under the overflow pipe



Figure 4-6 Overflow outlet

4.9 Cleaning and Maintenance of the Water System

Interval	Task
Before each humidity test	Check level, clarity of the water, tray and gauze (Section 4.6).
Weekly, in regular use	Check hose joints for drops and hoses for kinks. Empty the overflow tray.
Monthly	Replace the water completely and rinse the tank. Clean the pump inlet; check the return pipe. Measure the conductivity of the tank water before draining and note it in the water log.
Every 3 months	Replace the wet-bulb gauze. Inspect the water level switch and its tube for deposits and air bubbles. Check the low-water alarm by lifting the float out of the water for a moment with the chamber in standby.
Every 6 – 12 months	Have the humidifier inspected for scale and cleaned if necessary. Replace hoses that have hardened, discoloured or cracked.
Before a shutdown of more than two weeks	Drain and dry the system (Section 4.11).

Intervals are LORDERAN recommendations for regular laboratory use with water of the recommended quality. Shorten them for continuous humidity testing, for samples that contaminate the condensate, or if the water quality cannot be guaranteed.

Changing the water and cleaning the tank

1. Stop the chamber, let it return to room temperature and switch it off with POWER.
2. Open the rear cover with the triangular key. Unplug the pump power cord and the low-water terminal from the chamber. Pull the inlet and return pipes off the tank; keep the pipe ends up so that they do not drip.
3. Lift out the pump and empty the tank.
4. Wash the inside of the tank with warm purified water and a soft, clean cloth or bottle brush. Remove any slippery film. Do not use scouring agents, solvents or household cleaners — residues would evaporate into the chamber.
5. Rinse twice with purified water.
6. Refit the pump: press its suction cup firmly onto the tank bottom; the pump must stand upright and must not float. Connect the inlet pipe to the pump and push the return pipe fully home.
7. Plug the pump cord into its socket and the low-water terminal into the “Low-water protection” socket, with the guide slots aligned.
8. Close the rear cover, fill with fresh purified water to ½ – ¾ through the filling port and prime the system (Section 4.5).



Figure 4-7 Pump and water inlet pipe



Figure 4-8 Pump held on the tank bottom

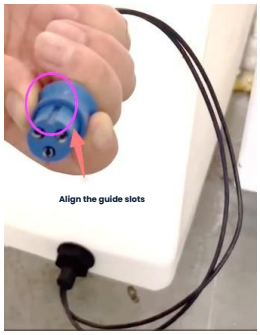


Figure 4-9 Low-water terminal: align the guide slots

IF THE TANK SHOWS ALGAE OR SLIME

Green or slimy deposits mean that light, warmth and nutrients have reached standing water. Clean the tank as above, then disinfect it with a **3 % hydrogen peroxide** solution left to act for about 30 minutes, and rinse very thoroughly with purified water. Hydrogen peroxide breaks down to water and oxygen and leaves no residue. **Never use chlorine bleach** — chlorides corrode stainless steel. Keep the cap closed and change the water more often.

Pump

- With the pump out of the tank, rinse its inlet openings under purified water and remove fibres or particles. Check the power cord along its whole length.
- A pump that hums but delivers no water is air-locked — tilt it under water to release the air — or blocked. A pump that does not run at all: check its plug; if it is powered and silent, replace it.

PROHIBITED

Do not run the pump dry. Never switch the chamber on with the tank empty, and never lift a running pump out of the water.

Return path

- Keep the chamber floor free of labels, fibres, cable-tie ends and sample debris; the condensate carries them into the return pipe.
- The condensate runs back to the tank by gravity; there is no filter and no pump in the return path. If the tank level does not recover after a humid test, look for a blocked or sagging return pipe.
- Check that the return pipe falls continuously towards the tank without sagging loops in which water can stand.
- Water standing on the chamber floor after a humid test means that the return path is blocked or the chamber is not level (Section 2.4).

Humidifier and water level switch

- With water of the recommended quality the humidifier stays clean for a long time. White or grey crust on the heater is scale: it insulates the heater, slows humidification and finally trips the dry-burn protection.
- The humidifier is in the machine compartment, next to live and hot parts. **Inspection and descaling must be done by qualified service personnel** with the main power disconnected and the humidifier cold.
- **Service personnel:** drain the humidifier, dissolve the scale with a food-grade citric acid solution (about 5 %), rinse repeatedly with purified water until the rinse water is neutral, and refill. Do not use hydrochloric acid or other chloride-containing descalers on stainless steel.
- The water level switch must be upright and at its original height. If it has been moved down, the humidifier level is too low and dry-burn alarms follow.

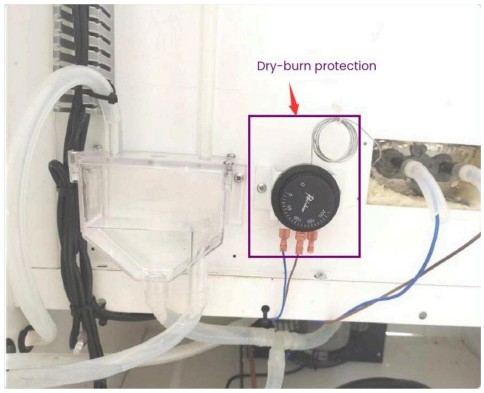


Figure 4-10 Water level switch (transparent vessel) and dry-burn protector

4.10 Low-Water Float Switch

If the chamber shows the low-water alarm (DI8) although the water level is normal, check the black float in the tank. It must float up at a normal level and hang down only when the tank is nearly empty.



Figure 4-11 Float at normal water level



Figure 4-12 Float at low water level

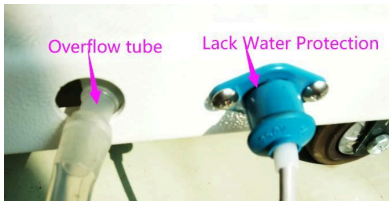


Figure 4-13 Overflow tube and low-water protection

- The float must move freely between the two positions. Deposits on its hinge can hold it down; clean it with purified water.
- Check that the low-water terminal is fully inserted in the "Low-water protection" socket, with the guide slots aligned.
- While the alarm background is red, CLEAR is disabled. When the fault has been removed the background turns green; touch CLEAR to resume.

4.11 Draining for Shutdown, Transport or Frost

Standing water ages. Drain the system if the chamber will be out of use for more than about two weeks, before it is moved, and whenever the room could fall below 0 °C.

1. Run the chamber at 60 °C with humidity OFF for 30 minutes to dry the test space, the evaporator and the gauze. Let it return to room temperature and stop it.
2. Switch off with POWER and open the main circuit breaker.
3. Open the rear cover. Disconnect the pump cord, the low-water terminal and both pipes from the tank. Empty and dry the tank and the pump; store the pump inside the dry tank.
4. Let the pipes drain into a container. Empty the overflow tray.
5. Have the humidifier and the water level switch drained by service personnel if frost is possible or before transport.
6. Remove the wet-bulb gauze; fit a new one when the chamber is put back into service.
7. Leave the door slightly open during storage so that the interior stays dry.

NOTICE
Water expands when it freezes. Ice in the humidifier, the level switch, the pump or the pipes cracks them. A chamber that has been stored or transported in frost must stand at room temperature for at least 24 hours before it is filled and switched on.

RETURNING TO SERVICE
Reconnect the pump and pipes, fit a new gauze, fill with fresh purified water and prime the system (Section 4.5). Discard the first tankful if it turns cloudy during the first test.

4.12 Troubleshooting the Water System

Symptom / likely cause	Remedy
DI8 — WATER TANK LOW WATER	
Tank level below the float	Top up with purified water; wait for the green background; CLEAR

Symptom / likely cause	Remedy
Float stuck in the low position	Free and clean the float (Section 4.10)
Terminal loose or guide slots not aligned	Re-insert the terminal
Air in the line at the first start	Squeeze the tube at the water level switch (Section 4.5)
DI3 — DRY-BURN PROTECTION	
Humidifier level below the heater: pump not delivering, pipe kinked, level switch displaced	Check pump, pipe and the position of the level switch (Section 7.6)
Scale on the humidifier heater	Service: descale; use RO / DI water
Dry-burn protector set too low or defective	Service: check and replace if necessary
HUMIDITY DOES NOT REACH THE SET VALUE	
Pump floating or blocked	Re-seat and clean the pump
Set value outside the humidity envelope	Check the envelope (Section 3.2)
Door seal leaking, test port open	Clean or replace the seal; plug the port
HUMIDITY READING UNSTABLE OR IMPLAUSIBLE	
Gauze dry, yellow or hard	Replace the gauze and wet it fully (Section 8.5)
Gauze frozen after a cold phase	Allow time above 0 °C before the humid phase
WATER ON THE CHAMBER FLOOR / TRAY OVERFLOWING	
Return pipe blocked; chamber not level	Clear the pipe; level the chamber
Tank filled above ¾	Keep the level between ½ and ¾

CHAPTER 5

Operation

The chamber has two operating modes. **Fixed-value mode** holds one temperature and one humidity for a set time or indefinitely. **Program mode** runs a profile of segments — see Chapter 6. This chapter covers everything you need for daily use: loading samples, switching on, setting and running a fixed value, watching the curves and switching off.

1 **Load** 5.1 — 2 **Switch on** 5.2 — 3 **Mode** 5.3 — 4 **Set & run** 5.4 — 5 **Watch** 5.5 – 5.6 — 6 **Stop** 5.7

Mode 1 · Temperature only

One temperature, humidity control switched off. For cold and dry-heat tests.

Mode 2 · Constant climate

A fixed temperature and a fixed humidity for as long as you need (fixed-value mode).

Mode 3 · Programmed cycles

Multi-segment profiles that repeat automatically: up to 100 programs of 100 segments.

5.1 Loading Samples

Uniform conditions need free air flow around every sample.

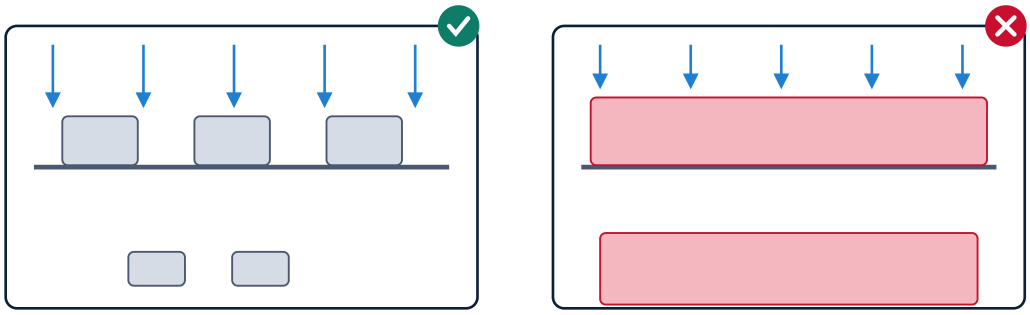


Figure 5-1 Sample placement

- Place samples evenly and **staggered** on the shelves, with gaps between them and to the walls.
- The total volume of the load must be **less than ¾ of the working volume** of the chamber. Smaller is better for uniformity.
- Do not block the air flow. Large flat samples act like a partition — stand them on edge in the direction of the air flow, or use a perforated tray.
- Close the test port with its rubber plug. If cables pass through it, seal around them.

PROHIBITED

Do not place samples on the **floor of the test space** (the sensors are below its front edge) or in front of the **air outlet on the back wall**.

TIP
For humidity tests, bring cold samples to room temperature before you load them. Cold samples cause condensation on their surfaces and disturb the humidity control at the start of the test.

5.2 Switching On and Logging In

1. Check that the tank level is between ½ and ¾ and the water tray is in place (Chapter 4).
2. Switch on the main circuit breaker of the supply. Three-phase models: check that the indicator of the phase sequence protector shows normal (Section 7.8).
3. Press the POWER button. The controller starts up; after the start-up screen the login screen appears.
4. Touch **USER NAME**, select your user, enter the password and touch LOGIN. The main menu opens (Figure 3-12).
5. Touch OPER. SCR to open the operation screen. The chamber is in standby (STOP).

MAIN MENU
OPER. SCR operation screen · **FUNC. SET** run and system settings · **FIX SET** fixed-value settings · **PROG SET** programs · **GRAPH** curves.

5.3 Run Settings

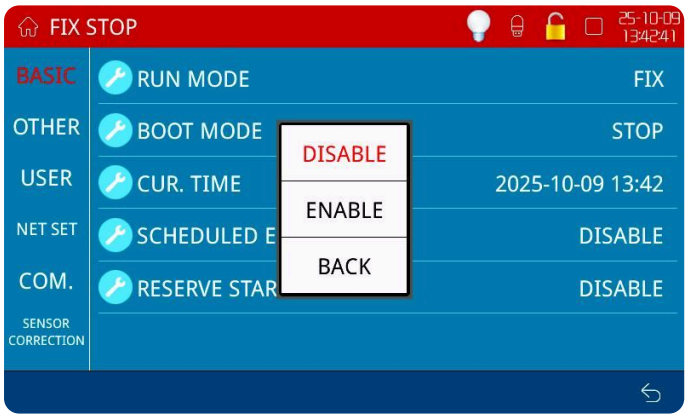


Figure 5-2 Run settings with the pop-up for one item

RUN MODE	FIX (fixed value) or PROG (program)
BOOT MODE	Behaviour after a power failure: STOP, COLD or HOT start
CUR. TIME	Present date and time
SCHEDULED	One-time start at a set date and time
RESERVE START	Daily start at a set time

Behaviour after a power failure (BOOT MODE)

Setting	When the power returns, the chamber …
STOP	stays stopped. Restart the test by hand.
COLD start	restarts automatically from the beginning: segment 1 of the program, or the fixed set value.
HOT start	continues automatically from the segment where the power failed, or at the fixed set value.

NOTICE
With COLD or HOT start, stop a test that you want to end early with the STOP button on the screen. Do **not** end it by switching off the main power or pulling the plug — otherwise the chamber will start again by itself the next time the power is switched on.

Scheduled start and daily start

1. Touch the value next to **SCHEDULED** (shows DISABLE). A pop-up opens.
2. Touch **ENABLE**, then touch the current time to switch to the date and time entry.
3. Set year, month, day, hour and minute, and touch **OK**. The chamber starts at that moment.

RESERVE START works the same way, but with a time of day only: once enabled, the chamber starts automatically every day at that time — for example every day at 09:00.

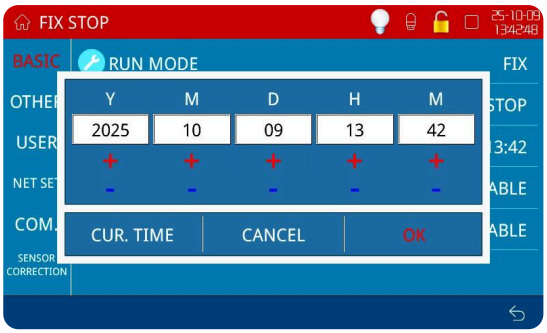


Figure 5-3 Setting the date and time of a scheduled start

5.4 Running a Fixed Value



Figure 5-4 Fixed-value settings

RUN TIME	INFINITUDE = continuous run, or a run time after which the chamber stops by itself
TEMP SLOPE	Rate at which the temperature set value moves to the new target, in °C/min
HUMI SLOPE	The same for humidity, in %/min

With a slope set, the set value moves step by step from the actual value to the target — useful for gentle ramps that protect samples from thermal shock. A slope of 0 means no limit.

1. In **Run settings**, set RUN MODE to **FIX**.
2. In **FIX SET**, set the run time and, if required, the slopes.
3. On the operation screen, touch the temperature **SV** and enter the set value on the keypad. Do the same for humidity — or set humidity to **OFF** for a temperature-only test.
4. Load the samples (Section 5.1) and close the door.
5. Touch **RUN** at the bottom right. In the pop-up, touch **START**. The status changes to **FIX RUN** and the run time starts counting.



Figure 5-5 Run pop-up in fixed-value mode



Figure 5-6 Fixed-value run: 40 °C, 90 %RH

Button	Function
START	Starts the chamber.
STOP	Stops the chamber.
AT	Auto-tuning: the controller measures the chamber and calculates new control parameters.
BACK	Closes the pop-up without a change.

AUTO-TUNING

The control parameters are set at the factory. Auto-tuning takes some time, the temperature swings during it, and it must be done with an empty chamber. Use AT only after consulting LORDERAN, never during a test.

5.5 Detail Screens

Touch DETAIL on the operation screen to see more information about the run in progress.

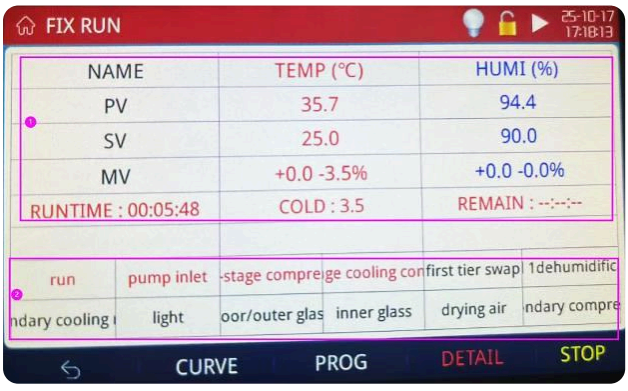


Figure 5-7 Detail screen, fixed-value run



Figure 5-8 Detail screen, program run

- **Top:** actual value, set value and output of temperature and humidity, as on the operation screen.
- **Digital input / output status** (bottom row): the state of each controlled function, such as pump inlet, compressor stage, cooling, light, heating and humidifying. **Red** = active, black = inactive. These assignments are set at the factory and need no change.
- **Program runs only:** program and segment number (for example PROG 001 / SEG 001), the total cycle count of the program and the partial loop in progress.

5.6 Curves and Data Export



Figure 5-9 Curve screen

- The curve shows actual and set values of temperature and humidity with the date and time.
- Use the arrow keys to scroll forwards and backwards to any period.
- The keys at the bottom open the record settings, the interval selection and the export menu.

The logging interval is adjustable; the default is 60 seconds.

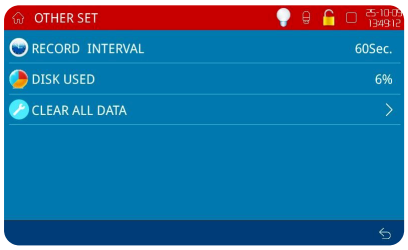


Figure 5-10 Record settings



Figure 5-11 Choosing the time span shown

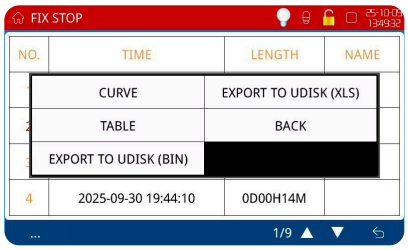


Figure 5-12 Curve, table and export menu

Item	Function
RECORD INTERVAL	Time between two stored data points.
DISK USED	Memory in use. Above 80 %, copy the data to a computer and then clear the records. When the memory is full, the oldest data are overwritten automatically.
CLEAR ALL DATA	Deletes all records after a confirmation with OK. **Deleted data cannot be restored.**
Time span	Shows 1 min to 4 h of data on one screen.
CURVE / TABLE	Switches between the curve and a table of the recorded values with date, time and duration.
EXPORT TO UDISK	Exports the records to the USB stick as an Excel file (XLS) or a binary file (BIN). Appears only when a USB stick is inserted.

Exporting to a USB stick

1. Insert the USB stick into the USB port. The USB icon appears at the top right of the screen.
2. Open the curve screen, open the export menu and choose **EXPORT TO UDISK (XLS)** or **(BIN)**.
3. Wait until the export status shows **100 %**.
4. Touch the USB icon to eject the stick safely, then remove it.

5.7 Stopping and Switching Off

1. Touch STOP at the bottom right of the operation screen, then touch STOP in the pop-up. The chamber goes to standby.
2. Wait until the temperature in the chamber is safe before you open the door; wear gloves (Section 1.3).
3. Remove the samples. Wipe off water in the test space after a humidity test.
4. Press POWER to switch the chamber off.
5. If the chamber will not be used for a longer period, switch off the circuit breaker or disconnect the plug.



Figure 5-13 Screen after switching off

AFTER A TEST BELOW 0 °C

Before switching off, set the temperature to **60 °C** and run the chamber for **30 minutes**, so that ice and moisture in the test space and on the evaporator are dried out. Then stop the chamber and switch it off.

RECOMMENDED AFTER HUMIDITY TESTS

Run the chamber for about 1 hour at 60 °C with humidity **OFF** before switching off. This dries the test space and the duct and prevents corrosion and mould.

PROHIBITED

Do not switch off the power during a hot run. Always stop the run on the screen first (Section 1.1).

CHAPTER 6

Programs

A program is a temperature and humidity profile made of segments. The controller stores up to 100 programs with up to 100 segments each. Programs can repeat parts of themselves, repeat as a whole and hand over to another program — so even long cyclic damp-heat or temperature-cycling tests run unattended.

6.1 How a Program Works

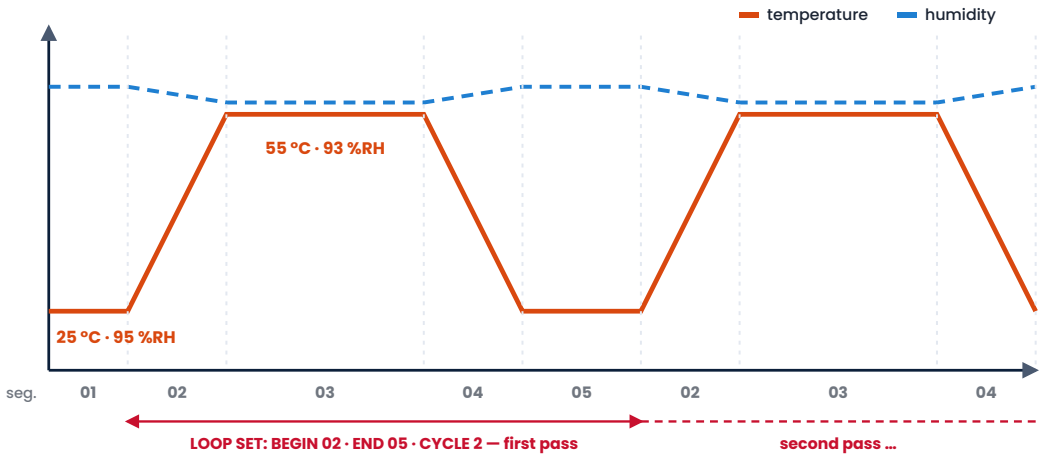


Figure 6-1 A cyclic damp-heat profile with a partial loop (example from Section 6.9)

Segment

One step with a target temperature, a target humidity and a time. The set value moves from the previous target to the new one within the segment time: a **ramp** if the target changes, a **hold** if it stays the same.

Loop (partial cycle)

Repeats a range of segments, for example segments 02 to 05 twice. Up to four loops per program.

Program cycle and link

Repeats the whole program a set number of times, then starts a linked program or ends.

When a program has finished, “Finished” appears at the bottom right of the screen and the chamber returns to room temperature.

6.2 The Program List

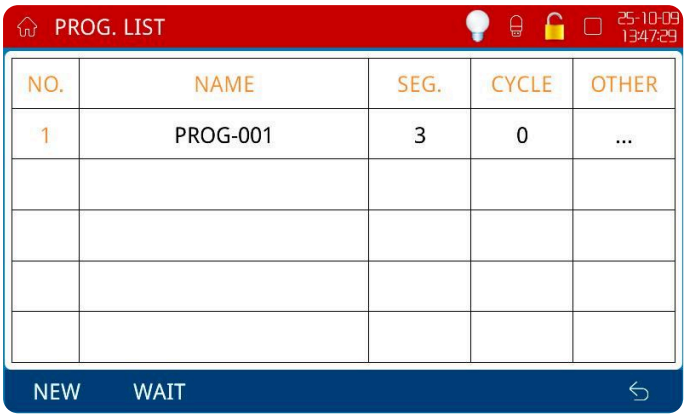


Figure 6-2 Program list

NO.	Program number. Touch it to open the program menu.
NAME	Touch to edit the program name.
SEG.	Number of segments. Touch to edit the segments.
CYCLE	Touch to open the loop and program cycle settings.
OTHER	Touch for further settings of the program.
NEW	Opens the keypad: enter a new program number and touch OK.
WAIT	Opens the wait (standby) settings (Section 6.4).

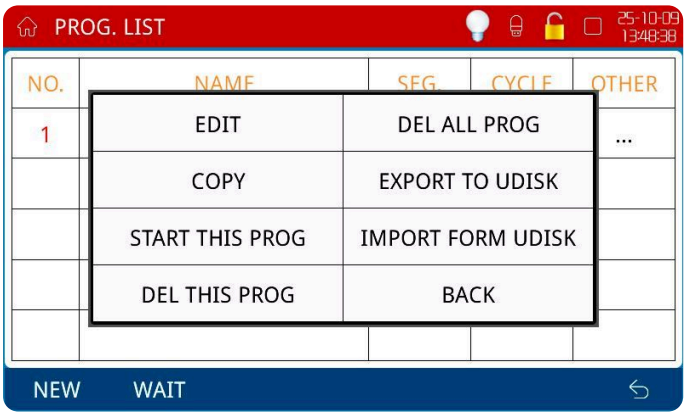


Figure 6-3 Program menu

EDIT	Edit the segments of the program.
COPY	Copy the program to another number. Example: select program 1, touch COPY and enter 3 — program 3 now has the same settings as program 1.
START THIS PROG	Start the selected program.
DEL THIS PROG	Delete the selected program.
IMPORT FROM UDISK	Import programs from a USB stick.
EXPORT TO UDISK	Export programs to a USB stick.
DEL ALL PROG	Delete all programs.

NOTICE

Programs cannot be edited, inserted or deleted while the chamber is running. Export your programs to a USB stick as a backup before you delete any.

6.3 Editing Segments

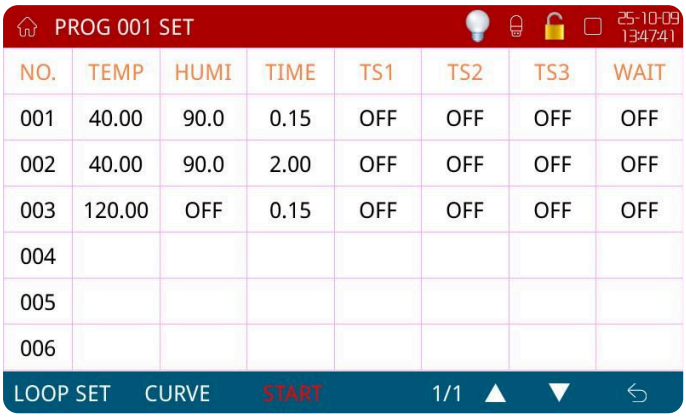


Figure 6-4 Segment editor (PROG 001 SET)

NO.	Segment number. Touch it to show **INSERT** and **DELETE** for that segment.
TEMP	Target temperature of the segment
HUMI	Target humidity, or OFF
TIME	Segment time in hours.minutes
TS1 – TS3	Time-signal outputs (Section 6.5)
WAIT	Wait function ON / OFF for this segment
LOOP SET	Loop settings (Section 6.6)
CURVE	Shows the programmed profile as a curve, so you can check it before the test

Entering the segment time

You want	1 hour	30 minutes	1 minute	12 h 30 min	Segment off
Enter	**1.00**	**0.30**	**0.01**	**12.30**	**-0.01**

NOTE

Hours and minutes are separated by the decimal point: **0.30 means 30 minutes, and 0.50 means 50 minutes — not half an hour**. Write 1 h 45 min as 1.45. A segment that is still at its initial values cannot be inserted or deleted.

6.4 Wait Function



Figure 6-5 Wait settings

The wait function makes sure that a segment does not end before the chamber has really reached its set value — for example with a heavy load that heats up slowly. At the end of a segment with WAIT = ON, the program waits until the actual values are within the wait zone.

WAIT SW.	Switches the wait function on or off
WAIT TIME	Maximum waiting time. If the condition is not met within this time, the wait is cancelled and the program continues.
TEMP WAIT ZONE	Temperature band around the set value
HUMI WAIT ZONE	Humidity band around the set value, in %RH

EXAMPLE
TEMP WAIT ZONE = 5 °C and set value = 50 °C: the wait ends as soon as the actual temperature is between **45 °C and 55 °C**. The humidity zone works the same way.

6.5 Time Signals (TS)

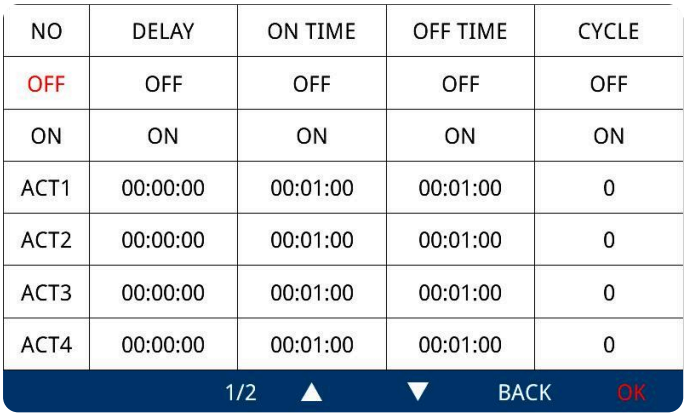


Figure 6-6 TS settings

Time signals switch outputs (ACT 1 to 6) during a segment — for example to power the test sample on and off, or to signal an external data logger. The outputs must have been wired by LORDERAN or your electrician.

Mode	OFF = not activated; ON = active for as long as the chamber runs
DELAY	Delay before the action starts
ON TIME	Time the output stays on
OFF TIME	Time the output stays off
CYCLE	Number of ON/OFF cycles; 0 = endless

EXAMPLE FOR ACT 1
ON TIME = 3 h, OFF TIME = 2 h, CYCLE = 2: output ACT 1 is on for 3 h, off for 2 h, on for 3 h, off for 2 h, and then stays off.

6.6 Loops (Partial Cycles)



Figure 6-7 Loop and program cycle settings

BEGIN	First segment of the loop
END	Last segment of the loop
CYCLE	How often the loop is run; 0 = no loop
PROG CYCLE	How often the whole program is run; 0 = endless
LINK PROG NO.	Program started after this one has finished; 0 = none

A loop always starts at its BEGIN segment and runs the segments in order, without skipping. Two examples with overlapping loops in an 8-segment program:

NO.	1	2
BEGIN	02	03
END	04	05
CYCLE	02	02

Figure 6-8 Example 1: loop 1 = 02 – 04 × 2, loop 2 = 03 – 05 × 2

NO.	1	2
BEGIN	03	02
END	05	04
CYCLE	02	02

Figure 6-9 Example 2: loop 1 = 03 – 05 × 2, loop 2 = 02 – 04 × 2

#	Segments run	Meaning
①	01 → 02 → 03 → 04	02 – 04, first run
②	02 → 03 → 04	02 – 04, second run
③	03 → 04 → 05	03 – 05, first run
④	03 → 04 → 05 → 06 → 07 → 08	03 – 05, second run, then to the end

#	Segments run	Meaning
①	01 → 02 → 03 → 04 → 05	03 – 05, first run
②	03 → 04 → 05	03 – 05, second run
③	02 → 03 → 04	02 – 04, first run
④	02 → 03 → 04 → 05 → 06 → 07 → 08	02 – 04, second run, then to the end

TIP

Overlapping loops are hard to predict. Check the result with CURVE in the segment editor before you start a long test, and prefer one loop per range where possible.

6.7 Program Cycles and Linking



Figure 6-10 Program 1: cycle 1, link 2



Figure 6-11 Program 2: cycle 2, link 3



Figure 6-12 Program 3: cycle 3, no link

Example	Settings	Execution
1	Program 1 runs once, then starts the linked program 2	Program 1 → Program 2
2	Program 2 runs twice, then starts the linked program 3	Program 2 → Program 2 → Program 3
3	Program 3 runs three times; no program is linked	Program 3 → Program 3 → Program 3 → End

Started with program 1, the three settings together give: P1 → P2 → P2 → P3 → P3 → P3 → End.

6.8 Running a Program

1. In **Run settings**, set RUN MODE to **PROG** (Section 5.3). Or select the program in the list and touch **START THIS PROG**.

2. Load the samples and close the door.
3. Touch RUN at the bottom right, then START in the pop-up.
4. Follow the progress on the operation screen and on the detail screen (Figure 5-8).



Figure 6-13 Run pop-up in program mode

START / STOP	Start or stop the program
JUMP	End the current segment and go to the next one
HOLD	Hold the present set value, or release the hold. During HOLD all outputs stay active and the remaining segment time pauses.
BACK	Close the pop-up

6.9 Worked Example: Cyclic Damp Heat

This example programs a damp-heat cycle in the style of IEC 60068-2-30 (variant 2, upper temperature 55 °C) with two 24-hour cycles, as shown in Figure 6-1. Always take the exact values from the standard or specification you test to.

Table 6-1 Example program. LOOP SET: BEGIN 02, END 05, CYCLE 2. PROG CYCLE 1, LINK PROG NO. 0.

Segment	TEMP	HUMI	TIME	WAIT	Purpose
01	25.0 °C	95 %	3.00	ON	Stabilise the samples at 25 °C
02	55.0 °C	93 %	3.00	OFF	Ramp up within 3 h
03	55.0 °C	93 %	9.00	OFF	Hold at the upper temperature
04	25.0 °C	95 %	3.00	OFF	Ramp down within 3 h
05	25.0 °C	95 %	9.00	OFF	Hold at the lower temperature (cycle = 24 h)

1. In the program list, touch NEW, enter a free program number and name it, for example “DAMP HEAT 55”.
2. Touch the SEG. column and enter segments 01 to 05 from Table 6-1.
3. Touch LOOP SET: loop 1 BEGIN 02, END 05, CYCLE 2. Set PROG CYCLE to 1.
4. Touch CURVE and check the profile. Then start the program (Section 6.8).

A blank worksheet for planning your own programs is in Appendix E.

CHAPTER 7

Troubleshooting

The chamber watches itself while it runs. When a protection device responds, the screen shows the alarm point and the chamber stops or stops humidifying, depending on the fault. This chapter tells you what each alarm means, how to find the cause and how to reset the chamber safely.

> **DANGER**
> Work inside the electrical cabinet and on the refrigeration unit may only be done by a **qualified electrician or refrigeration technician**, with the main power disconnected unless a measurement requires otherwise. If you are not sure, contact LORDERAN at support@lorderan.com.

7.1 Alarm Points

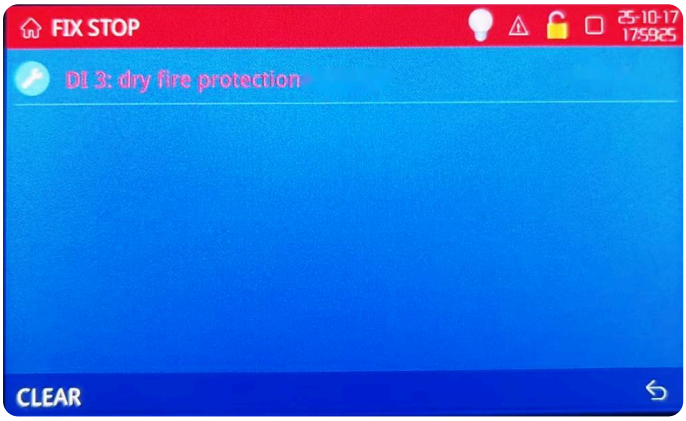


Figure 7-1 Alarm screen (example: alarm point DI3, dry-burn protection)

- The alarm screen names the alarm point and sounds an audible alarm; the three-colour light shows red.
- **Red background:** the fault is still present. The CLEAR / RESET button does not work yet.
- **Green background:** the fault has been removed. Touch CLEAR to resume operation.

The actual alarm text may vary with the software version.

Table 7-1 Alarm points

Point	Alarm	What happens / what to do	See
DI1	Over-temperature controller (sample protection)	The chamber is switched off. Find the cause, let it cool down.	7.2
DI2	Over-temperature knob protector	The chamber is switched off. Let it cool down.	7.3
DI3	Humidifier dry-burn protection	Alarm on the screen. Remove the cause, then touch CLEAR.	7.6
DI4	Compressor overload, stage 2 (optional, two-stage systems)	The chamber cannot start.	7.5
DI5	Compressor overload, stage 1	The chamber cannot start.	7.5
DI6	Phase sequence protection	The chamber cannot start.	7.8
DI8	Water tank low water	Alarm on the screen; humidifying stops. Top up, wait for the green background, touch CLEAR.	7.7
DI10	Circulation fan protection	Alarm on the screen. Have the fan motor checked, then touch CLEAR.	—

Point	Alarm	What happens / what to do	See
—	Short circuit (no alarm on the screen)	A circuit breaker trips; the chamber is off and the screen is dark.	7.4

7.2 Over-Temperature Protection, Stage 1: Controller

Over-temperature protection has two independent stages, both at the top right of the chamber. Stage 1 is a separate digital temperature controller. It mainly protects the **samples**: set it to the highest temperature your samples can tolerate. The factory setting is an alarm deviation of 5 °C.

- The upper display (**PV**, red) shows the actual temperature.
- The lower display (**SV**, green) shows the protection limit.
- Change the limit with the ▲ and ▼ keys.

When the limit is exceeded, the chamber is switched off and alarm point DI1 appears. Find out why the temperature rose (wrong set value, heat from the samples, heating fault), let the chamber cool down until the screen background turns green, then touch CLEAR.



Figure 7-2 Over-temperature controller

7.3 Over-Temperature Protection, Stage 2: Knob Protector

Stage 2 is a mechanical knob thermostat that protects the **chamber itself**. If the local temperature in the test space exceeds the value set on the knob, the power is cut off; the chamber cannot be restarted until it has cooled down. The value next to the scale mark is the protection temperature. **Set the knob about 15 °C above the highest test temperature.**

Possible cause	Remedy
The test temperature is higher than the protection setting	Let the chamber cool down; set the knob about 15 °C above the test temperature.
The heating is out of control	Electrician: check whether the solid-state relay (SSR) of the heater gives an output when it should not.
The protector is defective	Test: with the knob set below room temperature, the chamber must not run, and the knob must click when turned. If not, have the protector replaced.



Figure 7-3 Knob protector with scale mark

7.4 Short Circuit: Circuit Breakers

If a circuit breaker trips, or the controller shows nothing, because of a leakage current or a short circuit in an accessory, have a qualified electrician check the supply line, and check that the earth and neutral bars carry no voltage. When the cause has been removed, reset the breaker:

1. Disconnect the main power. Open the electrical cabinet with the triangular key — **qualified electricians only**. 100 L: under the top cover; 250 L / 500 L / 1000 L: behind the rear cover.
2. Find the circuit breakers (Figure 7-6). Left: **main power breaker**; right: **controller breaker**.
3. Switch the tripped breaker back on, close the cabinet and reconnect the power.

> **NOTICE**
> If the breaker trips again, do not reset it a second time. Contact LORDERAN.



Figure 7-4 Opening the cover



Figure 7-5 Triangular key in the cover lock



Figure 7-6 Main power breaker (left) and controller breaker (right)

7.5 Compressor Overload and Over-Pressure

If the compressor is mechanically blocked when it starts, the current rises quickly. The **thermal overload relay** trips and protects the start winding from burning out. It also trips during operation if the motor gets too hot or draws too much current. A pressure switch stops the compressor if the refrigerant pressure is too high. The chamber cannot start (alarm DI5, or DI4 on two-stage systems).

Find and remove the cause, then press the **RESET** button on the overload relay (electrician).

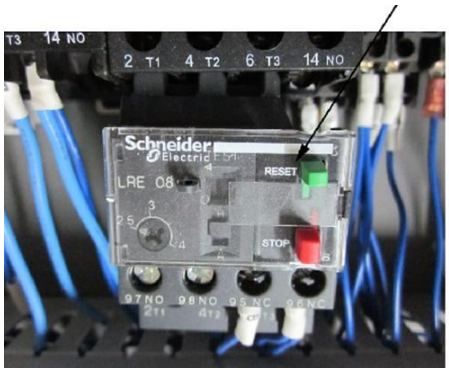


Figure 7-7 Overload relay — press RESET

Causes of overload	Remedy
Low supply voltage, or unbalanced phase voltages	Have the supply checked.
Compressor running for a long time at low speed or under load at low voltage	Have the supply checked; reduce the load.
Cooling path of the compressor motor blocked; condenser dirty	Clean the condenser (Section 8.2); keep the rear clearance free.

Causes of overload	Remedy
Ambient temperature too high	Keep the room at +5 to +32 °C; ventilate.
Wrong current setting of the overload relay	Have it set correctly by LORDERAN service.

PREVENTION
Dust on the condenser is the most common cause of compressor overload. Clean the air-cooled condenser every three months.

7.6 Humidifier Dry-Burn Protection

If the humidifier tank runs dry for lack of water, the dry-burn protector switches the humidifier heater off, an audible alarm sounds and alarm point **DI3** appears. The protector is at the lower rear of the chamber. Check:

1. **Water level in the humidifier tank.** A level below the heater causes the alarm. Check whether the water level switch has moved: if it is set too low, the tank level is too low.
2. **Water supply from the pump.** If there is no water in the pump hose, the pump may be defective — replace it.
3. **Air or a blockage in the hose** between the water level switch and the chamber. Squeeze the hose by hand to push the air out, or clean the hose.
4. **Defective protector** (false alarm). Turn the knob a little higher and lower and see whether the chamber reacts normally. Replace a defective protector.



Figure 7-8 Dry-burn protector

AT THE FIRST START
A water-shortage or dry-burn alarm at the very first start is usually caused by air in the water pipe. Open the rear cover and squeeze the hose between the humidifier tank and the water level switch several times by hand.

7.7 Low Water in the Tank

- Fill the tank with purified water to ½ – ¾ (Section 4.5). When the background of the alarm screen turns green, touch CLEAR.
- Alarm with a full tank: check that the black float moves freely, that the low-water plug is fully inserted, and that there is no air in the lines.
- If the pump floats instead of sitting on the bottom, open the rear cover and press its suction cup down again.
- More water-system faults and remedies: Section 4.12.

7.8 Phase Sequence Protection (Three-Phase Models)

The phase sequence protector is in the electrical cabinet. If its **red indicator** is lit, two phases are swapped or a phase is missing: the chamber does not start and alarm point **DI6** appears.

Remedy (electrician): disconnect the power and swap **any two** of the three phase conductors at the supply connection. Check the supply for a missing phase.

> **NOTE**
> If the chamber gives an alarm and does not start after installation or after work on the supply, check the phase sequence first.



Figure 7-9 Phase sequence protector

7.9 Other Faults

Faults that the chamber does not detect itself, and common operating errors:

Table 7-2 Other faults

Fault / possible cause	Remedy
THE SCREEN STAYS DARK	
No supply voltage	Switch on the supply.
Main switch OFF	Switch the main circuit breaker on.
Wrong supply	Check voltage and phases against the rating plate.
Display defective	Contact LORDERAN.
NOT HEATING ENOUGH	
Too many samples	Reduce the load.
Wrong set value	Check the set value.
Heater circuit breaker OFF	Switch the heater breaker on.
Heater solid-state relay defective	Contact LORDERAN service.
Heater wire broken	Contact LORDERAN service.
NOT COOLING ENOUGH	
Samples give off too much heat	Reduce the heat output of the samples.
Not enough refrigeration capacity	Check the condenser (clean?) and whether the compressor runs.
Compressor circuit breaker OFF	Switch off the main power, open the electrical cabinet and switch the compressor breaker on (electrician).
Starting capacitor of the condenser fan defective	Check whether the fan runs; contact LORDERAN service.
Evaporator iced up	Open the door and defrost by running at a high temperature (for example 60 °C, see Section 5.7).

Fault / possible cause	Remedy
POOR TEMPERATURE UNIFORMITY	
Samples give off too much heat	Reduce the number of samples.
Wrong sample arrangement	Rearrange the samples (Section 5.1).
Air outlet baffle badly adjusted	Adjust the baffle; ask LORDERAN.
HUMIDITY TOO LOW OR UNSTABLE	
Wet-bulb gauze dry, dirty or hard	Replace the gauze; check its water supply (Section 8.5).
Not enough water; pump floating	Top up the tank; fix the pump to the bottom.
Test port or door not sealed	Close the test port with its plug; check the door seal.
MAIN POWER BREAKER TRIPS	
Over-current in the main circuit	Switch off and restart. If it trips again, contact LORDERAN.
Earth-leakage protection has tripped	Have the supply checked and contact LORDERAN.

CHAPTER 8

Care and Maintenance

A few minutes of care at regular intervals keep the chamber accurate and prevent most faults. The most important points are a clean condenser, a clean and wet wet-bulb gauze, purified water and a clean test space.

> **DANGER**
> Before any cleaning or maintenance: stop the chamber, let it return to room temperature, switch it off and disconnect the main power. Wear gloves.

8.1 Maintenance Schedule

Table 8-1 Maintenance schedule. * = LORDERAN recommendation; shorten the intervals in dusty rooms or with heavy use.

Interval	Task	Section
Before each test	Check the water level (½ – ¾), the water tray, that the gauze is wet and white, and that the test space is clean and dry	4.5
After each humidity test	Dry the chamber (1 h at 60 °C, humidity OFF); wipe off water	5.7
Weekly *	Check hose joints for drops and hoses for kinks; empty the overflow tray	4.9
Monthly *	Change the water and clean the tank and pump inlet; inspect the door seals; clean the test space	4.9
Every 3 months	**Clean the air-cooled condenser. Replace the wet-bulb gauze** (at once if it is yellow or hard)	8.2 / 8.5
Every 6 months *	Vacuum the electrical compartment (electrician); check both over-temperature protectors; have the humidifier checked for scale	8.4
Yearly *	Calibration of temperature and humidity by an accredited laboratory; service check of the refrigeration system by LORDERAN or an authorised partner	—

Record maintenance in the log in Appendix C.

8.2 Cleaning the Air-Cooled Condenser

Over time dust collects on the condenser and reduces the heat transfer of the refrigeration system — the chamber cools more slowly and the compressor overheats. Check the condenser regularly:

1. Check that the condenser fan runs during cooling.
2. If the fins of the heat exchanger are covered with dust, switch off and disconnect the power, then remove the lower access panel of the machine compartment with a suitable screwdriver or the triangular key.
3. Remove the dust with a soft brush or with compressed air (air gun or high-pressure nitrogen), blowing against the normal air flow. Do not bend the fins.
4. Refit the panel.



Figure 8-1 Position of the condenser

PROHIBITED
Never clean with a water jet or a spray. Water damages the electrical insulation and causes faults.

8.3 Cleaning the Test Space

Dust and residues on the inner walls can affect the test results. Clean the test space before you start a test:

1. Open the door.
2. Remove loose debris with a vacuum cleaner.
3. Wipe the surfaces with a soft cloth moistened with a neutral detergent, then wipe with a cloth moistened with clean water.
4. Dry the surfaces and close the door.

NOTICE
Do not use abrasive cleaners, steel wool, chlorine-based cleaners or solvents. They damage the stainless steel and the seals. Do not pour water into the test space — the sensors are below the floor edge.

8.4 Cleaning the Electrical Compartment

Dust in the electrical compartment can cause faults. Have it cleaned regularly by a qualified electrician:

1. Make sure the main power is disconnected.
2. Open the compartment cover with the triangular key.
3. Remove the dust with a vacuum cleaner.
4. Close the cover.

8.5 Replacing the Wet-Bulb Gauze

The humidity is calculated from the wet-bulb temperature. Dirty, dry or hardened gauze makes the measured humidity wrong. Replace the gauze **every three months**, or at once if it turns yellow or hard.

1. Let the chamber reach room temperature and switch it off.
2. Find the sensors below the front edge of the test-space floor. The wet-bulb sensor is the one covered with white gauze.
3. Pull off the old gauze. Do not bend the sensor.
4. Slide a new gauze sleeve over the sensor so that it covers the sensing tip completely, and lay its end into the water supply of the wet bulb as before.
5. Wet the new gauze with purified water. Handle it with clean hands or gloves — skin grease repels water.

A dry or stiff gauze evaporates too little, the wet sensor reads too warm and the chamber shows a humidity that is too high — it then under-humidifies. Unstable humidity readings are very often a gauze problem, not a sensor fault. Below 0 °C the gauze freezes; in a program that goes from a cold phase straight into a humid phase, allow a few minutes above 0 °C first.

TIP
Use only the original gauze from LORDERAN; other materials absorb water differently. Keep a few spare pieces in stock.

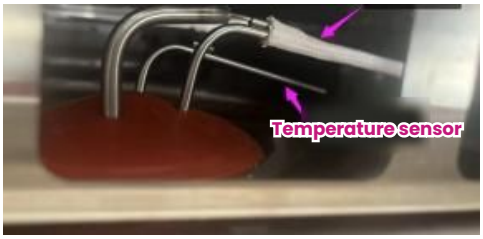


Figure 8-2 Temperature and humidity sensors

8.6 Door Seals and Window

- Inspect the double silicone door seals for cracks and deformation. Clean them with a damp cloth; do not use oil or solvents.
- A leaking seal causes ice on the door at low temperatures and unstable humidity. Have damaged seals replaced.
- Clean the viewing window with a soft cloth and glass cleaner.

8.7 Moving, Storage and Long Breaks

- **Before a long break:** drain and dry the water system (Section 4.11), leave the door slightly open, switch off and disconnect the power.
- **Storage:** upright, dry, frost-free and dust-protected.
- **Moving:** disconnect the power, empty the overflow tray (drain the water system before a transport, Section 4.11), release the brakes or raise the feet (Section 3.5), push slowly on level floors only. Keep the chamber upright at all times (Section 2.1).
- **Restart after storage:** work through the installation checklist in Appendix D, fill the tank with fresh RO / DI water, prime the system and replace the gauze.

CHAPTER 9

Disposal

This chapter lists the materials of the chamber and how to dispose of them properly at the end of its life.

9.1 Materials

#	Material	Where it is used
1	SUS304 stainless steel	Outer cabinet
2	Stainless steel	Inner chamber, shelves
3	Polyurethane foam, rock wool	Insulation
4	Galvanised steel sheet	Support frame
5	Painted steel	Compressor
6	Copper	Condenser, refrigerant pipes, evaporator, heat exchanger
7	Aluminium	Control panel, fans, evaporator, condenser
8	Polycarbonate	Control panel
9	PVC	Cables, hoses
10	Refrigerant R449A	Refrigeration circuit
11	Compressor oil	Refrigeration circuit
12	Electronic components	Controller, control circuits

9.2 How to Dispose of the Chamber

Copper, steel and aluminium are easy to recycle. Insulation, oil and refrigerant must be handled by specialised disposal companies. The chamber contains no toxic or flammable materials that would create a hazard during disposal.

PROHIBITED

- Do not release compressor oil into the environment.
- Do not release refrigerant into the environment.
- Do not dispose of insulation material in the environment.

RECOMMENDED

- Have the refrigerant recovered by a certified refrigeration company before the chamber is dismantled.
- Hand the chamber to a specialised recycling company and follow your local regulations for electrical and electronic equipment (for example WEEE in the EU).

APPENDIX A

Quick Reference

The key data of the JS4 series on one page. Full specifications: Table 3-1.

-40 / +150 °C	20 – 98 %RH	±0.5 °C	100 × 100
TEMPERATURE RANGE	HUMIDITY RANGE	FLUCTUATION	PROGRAMS × SEGMENTS

A.1 Key Values and Limits

Item	Value	Section
Ambient for operation	+5 to +32 °C, ≤ 85 %RH	2.3
Maximum load	< ¾ of the working volume; nothing on the floor or in front of the air outlet	5.1
Water	RO / DI water ≤ 5 µS/cm, no tap water; tank ½ – ¾ full; change monthly	4.4
Earth resistance	≤ 4 Ω	2.7
Over-temperature controller (stage 1)	Factory alarm deviation 5 °C; set to the sample limit	7.2
Knob protector (stage 2)	About 15 °C above the highest test temperature	7.3
Segment time format	h.mm — 1.00 = 1 h, 0.30 = 30 min, -0.01 = off	6.3
Loop CYCLE / PROG CYCLE / TS CYCLE	0 = no loop / 0 = endless / 0 = endless	6.6
Data logging interval	Default 60 s; back up when memory > 80 %	5.6
Default password	0 (users admin, user2, user3)	3.7
After a test below 0 °C	60 °C for 30 min before switching off	5.7
Condenser cleaning / gauze replacement	Every 3 months	8.1

A.2 Daily Use in Brief

START A TEST

- [ ] Water level ½ – ¾, tray empty, gauze wet
- [ ] Circuit breaker on → POWER → log in
- [ ] Run settings: FIX or PROG
- [ ] Set SV values / select the program
- [ ] Load samples, close door and test port
- [ ] RUN → START

END A TEST

- [ ] STOP → STOP
- [ ] Below 0 °C: 60 °C for 30 min first
- [ ] Humidity test: dry at 60 °C, humidity OFF
- [ ] Wait for a safe temperature, gloves on
- [ ] Remove samples, wipe the test space
- [ ] Export data if needed → POWER off

APPENDIX B

Alarm Index

All alarm points at a glance. Details and remedies are in Chapter 7.

Point	Alarm	Effect	First check	See
DI1	Over-temperature controller	Chamber off	Set value vs. protection limit; heat from samples	7.2
DI2	Over-temperature knob protector	Chamber off	Knob setting ≈ test temperature + 15 °C	7.3
DI3	Humidifier dry-burn	Humidifier off, alarm	Water level, pump, air in the hose	7.6
DI4	Compressor overload, stage 2	Cannot start	Condenser, supply voltage, ambient	7.5
DI5	Compressor overload, stage 1	Cannot start	Condenser, supply voltage, ambient	7.5
DI6	Phase sequence	Cannot start	Swap two phases (electrician)	7.8
DI8	Water tank low water	Humidifier off, alarm	Fill the tank; float, plug, air	7.7
DI10	Circulation fan	Alarm	Fan motor (service)	7.1
—	Short circuit / leakage	Breaker trips, screen dark	Supply line, accessories	7.4

RESETTING

Red alarm background = fault still present, reset impossible. Green background = fault removed: touch **CLEAR** to resume. If the same alarm comes back, stop and contact LORDERAN with the alarm point, the test conditions and a photo of the screen.

APPENDIX C

Logs

Copy these pages, or keep the logs electronically. The maintenance schedule is in Section 8.1.

C.1 Test Log

Date	Operator	Mode / program	Set values / standard	Duration	Remarks / alarms

C.2 Maintenance Log

Date	Done by	Condenser	Gauze	Other work / parts replaced	Sign

Date	Done by	Condenser	Gauze	Other work / parts replaced	Sign

C.3 Water Log

Date	Action (top-up / change / cleaning)	Litres added	Conductivity µS/cm	Remarks	Sign

C.4 Calibration Record

Date	Laboratory / certificate	Result (temperature / humidity)	Next due

APPENDIX D

Checklists

Tick each item. Keep the completed installation checklist with the product record (Appendix G).

D.1 Installation and Commissioning

SITE AND PLACEMENT

- [ ] Unloaded upright; no transport damage
- [ ] Room +5 to +32 °C, ≤ 85 %RH, no sunlight, little dust
- [ ] Clearances A / B / C kept; no fire detector above
- [ ] Chamber level; brakes locked or feet lowered
- [ ] All cable ties removed; shelves set
- [ ] Packing list checked; USB stick and triangular key kept

SUPPLY AND FIRST START

- [ ] Supply matches the rating plate; earth ≤ 4 Ω
- [ ] Three-phase: phase sequence correct
- [ ] Tank filled ½ – ¾ with RO / DI water; system primed
- [ ] Water tray under the overflow outlet
- [ ] Passwords changed; date and time set
- [ ] Both over-temperature protectors set
- [ ] Test run: heat, cool and humidify reached

D.2 Before and After Each Test

BEFORE

- [ ] Test space clean and dry
- [ ] Water level ½ – ¾; gauze white and wet
- [ ] Test conditions inside the humidity envelope
- [ ] Knob protector ≈ test temperature + 15 °C
- [ ] Samples staggered, < ¾ volume, not on the floor
- [ ] Test port plugged; door closed
- [ ] Program checked with CURVE

AFTER

- [ ] Stopped with STOP on the screen
- [ ] Below 0 °C: 60 °C for 30 min
- [ ] Humidity: dried with humidity OFF
- [ ] Gloves on; samples removed
- [ ] Test space wiped dry
- [ ] Data exported; water tray emptied
- [ ] Test log filled in

APPENDIX E

Test Standards and Program Worksheet

Common climatic test standards that the JS4 series can be used for, and a worksheet for planning your own programs. Always work to the current edition of the standard and to your product specification.

E.1 Common Test Standards

Standard	Test	Typical conditions (examples)
IEC 60068-2-1 / GB/T 2423.1	Cold (Test A)	-40, -25, -10 °C … for 2, 16, 72 or 96 h
IEC 60068-2-2 / GB/T 2423.2	Dry heat (Test B)	+40 … +150 °C for 2, 16, 72 or 96 h
IEC 60068-2-78 / GB/T 2423.3	Damp heat, steady state (Test Cab)	40 °C, 93 %RH for 4 to 56 days
IEC 60068-2-30 / GB/T 2423.4	Damp heat, cyclic (Test Db)	25 °C ↔ 40 or 55 °C, 93 – 97 %RH, 24 h cycles (see Section 6.9)
GJB 150.3	High temperature	Per the procurement specification
GJB 150.4	Low temperature	Per the procurement specification
GJB 150.9	Damp heat	Per the procurement specification

E.2 Program Worksheet

Check every temperature–humidity combination against the envelope in Section 3.2 before you enter the program.

Program no. / name	**Standard / spec.**
Loop 1 BEGIN / END / CYCLE	**PROG CYCLE / LINK**
Wait zone T / RH / time	**Prepared / checked by**

Seg.	TEMP (°C)	HUMI (%RH / OFF)	TIME (h.mm)	WAIT	TS	Purpose

APPENDIX F

Glossary

Terms and abbreviations used in this manual.

Term	Meaning
AT (auto-tuning)	The controller measures the response of the chamber and calculates its control parameters.
Closed loop	Water recirculation: condensate drips back to the tank by gravity instead of going to drain.
Condensate	Water that condenses out of the air on the cold evaporator.
Condenser	Heat exchanger that releases the heat taken from the test space into the room.
Conductivity	Electrical conductivity of water in µS/cm; a simple measure of its dissolved-salt content.
Deviation	Difference between the set value and the mean actual value in the working space.
DI (digital input)	Signal from a protection device to the controller; used as the alarm point number.
Dry-burn	Heating of the humidifier heater without water around it.
Dry bulb / wet bulb	The two temperature sensors from which relative humidity is calculated; the wet bulb is wrapped in wet gauze.
Envelope	The range of temperature–humidity combinations the chamber can hold.
Evaporator	Cold heat exchanger in the duct that cools and dehumidifies the air.
Fixed-value mode (FIX)	Operation at one constant set value.
Fluctuation	Variation of the actual value over time at one point, after stabilisation.
HOLD / JUMP	Freeze the present program segment / go to the next segment.
Loop (partial cycle)	Repetition of a range of segments within a program.
MV	Manipulated value: the present control output in %.
Program mode (PROG)	Operation along a profile of segments.
PV / SV	Process (actual) value / set value.
%RH	Relative humidity: water vapour in the air as a percentage of the maximum possible at that temperature.
Segment	One step of a program, with target temperature, humidity and time.
Slope	Limited rate of change of the set value, in °C/min or %/min.
SSR	Solid-state relay that switches the heaters.
TS (time signal)	Programmable output (ACT 1 – 6) switched during a program.
Uniformity	Largest difference between the actual values at different points of the working space at the same moment.
Wait	Function that holds the program until the actual values are within a band around the set value.

APPENDIX G

Warranty and Service

LORDERAN stands behind every chamber it delivers. This appendix summarises the warranty and how to obtain service.

G.1 Warranty

- The JS4 series climate chamber is covered by a **3-year worldwide warranty** from the date of delivery against defects in materials and workmanship, under normal use in accordance with this manual.
- Within the warranty period, LORDERAN repairs or replaces defective parts free of charge. Major defects that cannot be repaired are covered by replacement or a full refund, as stated in the LORDERAN warranty policy on www.lorderan.com.
- The warranty does not cover damage caused by: unauthorised modification or repair; transport or handling after delivery; incorrect installation or supply voltage; tap water or no water in the humidifier; use not in accordance with this manual; accidents, fire, flooding or other force majeure; wear parts and consumables such as gauze, hoses, seals and lamps.
- Outside the warranty, or for excluded damage, LORDERAN offers repair against a charge for service and parts.
- Please keep your proof of purchase. The serial number on the rating plate identifies your chamber.

G.2 Product Record

Fill in this record when the chamber is installed and keep it with this manual.

Product	Climate chamber	**Model**	JS4010 · JS4025 · JS4050 · JS4100
Serial number		**Delivery date**	
Supply voltage		**Commissioned by**	
Organisation / department			
Contact person		**Telephone**	
E-mail			

G.3 Contact

Technical support and service

support@lorderan.com
www.lorderan.com

Spare parts and consumables

Gauze, hoses, seals, pumps and other parts: order through www.lorderan.com or support@lorderan.com, stating the model and serial number.

LORDERAN

Temperature & Humidity Climate Chamber — User Manual

JS4 SERIES

The content of this manual may be revised due to functional upgrades without prior notice.

www.lorderan.com · Edition: November 2026