LORDERAN

HIGH ROOM

LOW ROOM

ENVIRONMENTAL TEST EQUIPMENT

Two-Zone Thermal Shock Chamber

Equipment Operation & Maintenance · TEMI8229 Controller Guide



User Manual

Models CJ-100 · CJ-200 · CJ-500

A: -20 to +200 °C | B: -40 to +200 °C | C: -60 to +200 °C

The contents of this manual are subject to change without notice due to feature upgrades or other reasons. If you have any questions regarding this manual, please contact LORDERAN. Read this manual carefully before installing, operating or servicing the equipment, and keep it for future reference.

Contents

About This Manual 3
Introduction 3
Structure of This Manual 3
Safety Symbols and Keywords 3
Safety Labels on the Equipment 4
Applicable Models 5

Part A Equipment Operation and Maintenance 6

Ch. 1 **Safety Precautions** 6
1.1 General Safety Guidelines 7
1.2 Substances That Must Not Be Placed in the Test Chamber 7
1.3 Other Precautions 8

Ch. 2 **Equipment Overview** 10
2.1 Working Principle and Applications 10
2.2 Technical Specifications 10
2.3 Components and Their Functions 11
2.4 Air Circulation 14

Ch. 3 **Installation** 15
3.1 Installation Site 15
3.2 Handling and Unloading 15
3.3 Positioning and Levelling 16
3.4 Installation Space 17
3.5 Power Supply Connection 17
3.6 Cooling Water Connection (Water-Cooled Units Only) 18
3.7 Condensate Drain 19
3.8 Pre-Start Checklist 19

Ch. 4 **Operation** 20
4.1 Placing Test Specimens 20
4.2 Power On and Shutdown 21
4.3 Controller Quick Guide 21
4.4 Data Recording and Export 24
4.5 Typical Thermal Shock Test Procedure 25

Ch. 5 **Inspection and Maintenance** 26
5.1 Inspection and Maintenance Schedule 26
5.2 Maintenance Procedures 27

Ch. 6 **Faults and Remedies** 29
6.1 Self-Diagnosed Faults (Alarm List) 29
6.2 Other Faults 31

Ch. 7 **Disposal and Recycling** 33

Part B TEMI8229 Thermal Shock Controller 34

Ch. 8 Controller Overview and Installation 34
8.1 Installation Location Requirements 35
8.2 Installation Notes 35
8.3 Dimensions 36
8.4 Wiring (Slave Unit / I/O Board) 37

Ch. 9 Input Keyboards 38
9.1 Digital Keyboard 38
9.2 Alphabet Keyboard 39

Ch. 10 Start-up and Main Screen 40
10.1 Start-up Sequence 40
10.2 Main Screen 41
10.3 Title-Bar Icons 41

Ch. 11 Operation Screen 42
11.1 Stop Screen 42
11.2 Run Screen 43
11.3 Test Status (DETAIL) 43

Ch. 12 Function Settings 45
12.1 Mode Set 45
12.2 Waiting Set 46
12.3 Time & Reserve 46
12.4 Defrost Set 47
12.5 Normal (Ambient Temperature) Set 47
12.6 Net Setting 48

Ch. 13 Graph and Data Management 49
13.1 Graph Screen 49
13.2 Curve Settings (Other Set) 50
13.3 File List 50
13.4 Historical File Management and Table View 51
13.5 Sorting the File List 52
13.6 Time Scale Zooming 52
13.7 Curve Select and Cursor 53

Ch. 14 Other Set (System Settings) 54

Ch. 15 Program Setting 55
15.1 Program List 55
15.2 Edit Segment 55
15.3 Program Other Functions 57

App. A Quick Reference of Controller Terms 58

App. B Product Warranty Card 59

BEFORE YOU BEGIN

About This Manual

Introduction

This manual is intended for the operators of the LORDERAN Two-Zone Thermal Shock Chamber, primarily technical personnel. It explains the correct methods for installing, operating, maintaining and disposing of the equipment, and describes every screen of the TEMI8229 thermal shock controller. Read it carefully to ensure safe and efficient operation of the equipment.

If this is your first time using this equipment, read this manual in full before operation to avoid unnecessary malfunctions.

- Keep this manual near the equipment so that every operator has easy access to it, and pass it on with the equipment to any subsequent user.
- The equipment nameplate takes precedence over this manual for model-specific data (power, voltage, temperature range, refrigerant, weight).
- Screen images show a representative software version; the display on your unit may differ slightly.
- The contents of this manual are subject to change without notice due to feature upgrades or other reasons. If you have any questions regarding this manual, please contact LORDERAN.

Structure of This Manual

This manual combines the equipment user manual and the controller instruction manual into one document. Use the part that matches your task.

Part	Chapters	Contents
Front matter	About This Manual	Safety symbols, keywords, safety labels and applicable models.
Part A — Equipment	Chapters 1 – 7	Safety precautions, equipment description, installation, basic operation, inspection and maintenance, troubleshooting, disposal and recycling.
Part B — Controller	Chapters 8 – 15	The TEMI8229 thermal shock controller: installation notes, input keyboards, main screen, operation screen, function settings, graph and data management, system settings and program setting.
Appendix	A – B	Quick reference of controller terms; product warranty card and repair records.

Safety Symbols and Keywords

The following symbols are used in this manual. They indicate hazardous conditions and the action to be taken.

Symbols indicating hazardous conditions

DANGER	Incorrect operation may result in a highly dangerous situation that could lead to **death or serious injury**.
CAUTION	Improper operation may result in a hazardous situation that could cause **minor injury** to the operator or **damage to the equipment**.

Directly prescribed behavioural instructions

These are divided into **[Prohibited]** and **[Mandatory]** categories and accompany the hazard labels above.

PROHIBITED	Indicates a specific action that **must be avoided** to prevent danger.
MANDATORY	Indicates an instruction with a specific action that **must be carried out** to prevent a hazard.

Keywords

NOTE	**Precautions:** information necessary to fully utilise the equipment's performance and to prevent damage to the equipment.
STEP	**Step:** describes the steps for operating the equipment.
REF	**Reference:** provides supplementary information.

Safety Labels on the Equipment

Before using the chamber, read the safety requirements in this manual and the safety labels affixed to the equipment. Make sure all labels are in place and legible; replacement labels can be ordered from LORDERAN.

	**Hazardous area warning** General danger. Observe the instructions in this manual before working on the marked area.
	**High voltage warning** Dangerous voltage behind the marked cover. Only qualified electricians may open it, with the main power switched OFF.
	**Hot surface warning** Surfaces may exceed +38 °C. Wear heat-resistant gloves.
	**Cold surface warning** Surfaces may be below 0 °C. Wear cold-resistant gloves.

Applicable Models

This manual applies to the following equipment models. Verify that it corresponds to your specific model; actual dimensions may vary from those listed. Dimensions are in millimetres, **D × W × H**.

Model No.	CJ-100	CJ-200	CJ-500
Working dimensions D × W × H (mm)	550 × 500 × 550	600 × 600 × 600	800 × 800 × 800
External dimensions D × W × H (mm)	820 × 2300 × 1800	1020 × 2230 × 2080	1050 × 2400 × 2300
Sample area dimensions D × W × H (mm)	300 × 300 × 250	490 × 420 × 360	650 × 650 × 500
RATED POWER BY TEMPERATURE RANGE			
A: −20 °C to +200 °C	5.7 kW	7.5 kW	12.0 kW
B: −40 °C to +200 °C	6.5 kW	8.6 kW	13.5 kW
C: −60 °C to +200 °C	6.5 kW	8.8 kW	14.0 kW
Weight (approx.)	650 kg	900 kg	1,200 kg

NOTE The temperature range code (A, B or C) of your unit is stated on the nameplate. Use the nameplate weight when selecting lifting equipment, and the nameplate power when sizing the supply cable and circuit breaker.

PART A

Equipment Operation and Maintenance

1 Safety Precautions

2 Equipment Overview

3 Installation

4 Operation

5 Inspection and Maintenance

6 Faults and Remedies

7 Disposal and Recycling

CHAPTER 1

Safety Precautions

This chapter describes the safety precautions for using this equipment. To prevent accidents involving the user, the equipment and the test specimens, read this chapter and follow the relevant regulations.

1.1 General Safety Guidelines

DANGER

- Do not operate the equipment until it has been properly installed and set up (Chapter 3).
- The equipment operates at extreme temperatures. To avoid burns or frostbite, do not touch air, components or surfaces with temperatures higher than **+38 °C (+100 °F)** or below **0 °C (+32 °F)**.
- Dangerous electrical currents are present when the unit is operating. Non-professionals must not open the electrical control panel.
- When working near moving parts (basket lift, fans), turn off the main power switch and make sure the protective devices are intact. **The condenser heat-exchange fan of the refrigeration system may start at any time while the main power is on**; stay away from it.

- Ensure that all safety labels are properly affixed. New labels can be ordered from LORDERAN if necessary.
- Ensure that the chamber door is securely closed while the equipment is in operation. Before opening the door, check the internal temperature to avoid burns or frostbite.
- Do not disconnect the power supply while the equipment is operating at high temperature, especially when there is a thermal load inside the unit. This can easily cause localised overheating and burn out equipment components. Stop the test on the controller first.
- Before using the chamber, carefully read the safety requirements in this manual and the safety labels on the equipment (see *Safety Labels on the Equipment*).

1.2 Substances That Must Not Be Placed in the Test Chamber

PROHIBITED (DANGER)

It is strictly prohibited to place the following explosive substances, flammable substances, or items containing such substances inside the test chamber of this unit. The chamber is **not explosion-proof**.

Category	Substances (not exhaustive)
Explosives	• Glycerol nitrate (nitroglycerin), glycol nitrate, nitrocellulose and other explosive nitrate esters. • Trinitrobenzene, trinitrotoluene, trinitrophenol and other explosive nitro compounds. • Peracetic acid, methyl ethyl ketone peroxide, benzoyl peroxide and other organic peroxides.

Category	Substances (not exhaustive)
Flammable solids	Metallic lithium, metallic potassium, metallic sodium, yellow phosphorus, phosphorus sulfide, red phosphorus, celluloid, calcium carbide, calcium phosphide, magnesium powder, aluminium powder, other metal powders, sodium dithionite (hydrosulfite).
Oxidisers	• Potassium chlorate, sodium chlorate, ammonium chlorate and other chlorates. • Potassium perchlorate, sodium perchlorate, ammonium perchlorate and other perchlorates. • Potassium peroxide, sodium peroxide, barium peroxide and other inorganic peroxides. • Potassium nitrate, sodium nitrate, ammonium nitrate and other nitrates. • Sodium chlorite and other chlorites.
Flammable liquids	• Ether, gasoline, acetaldehyde, propylene oxide, carbon disulfide and other substances with a flash point below −30 °C. • n-Hexane, ethylene oxide, carbon disulfide and other substances with a flash point of −30 °C or higher and below 0 °C. • Methanol, ethanol, xylene, pentyl acetate and other substances with a flash point of 0 °C or higher and below 30 °C. • Kerosene, light oil, turpentine, isopentanol and other substances with a flash point of 30 °C or higher and below 65 °C.
Flammable gases	Hydrogen, acetylene, methane, ethane, propane, butane and other gases that are flammable at 15 °C and 1 atmosphere.

PROHIBITED (CAUTION)

Do not place corrosive substances inside the test chamber.

- If test specimens that produce corrosive substances (substances that corrode stainless steel and silicone rubber) are used, the service life of the chamber's components — including the compressor — and of the door gasket may be significantly reduced.
- Corrosive substances include chlorine, chlorides, acids and others. Even substances that are not corrosive at room temperature can corrode components such as printed circuit boards at high temperatures.

1.3 Other Precautions

Be sure to follow the precautions below when using the unit.

CAUTION

- **Exercise particular caution when opening the door during high-temperature operation or immediately after operation has ended.** The hot air blowing out of the chamber is dangerous.
- **During operation above 55 °C, or immediately after such operation ends,** everything inside the chamber (chamber interior, test specimens, basket, shelves and the inside of the door) is extremely hot. Direct contact can cause burns — **wear heat-resistant gloves**.
- **During operation below 0 °C, or immediately after such operation ends,** everything inside the chamber is at low temperature. Direct contact can cause frostbite — **wear cold-resistant gloves**.

PROHIBITED

Do not place conductive, loose test specimens inside the chamber. If a specimen falls into the unit's air-conditioning section, it may cause electrical leakage in the heater.

PROHIBITED

Do not attempt operations with unpredictable results. If you are unsure of the consequences of an operation, do not operate the equipment; contact LORDERAN. The manufacturer assumes no liability for injuries or damage resulting from:

- Unauthorised or improper use.
- Improper installation.
- Incorrect power or water supply.
- Unauthorised modifications.
- Operation resulting from a misunderstanding of the operating instructions.
- Accidents.

CHAPTER 2

Equipment Overview

This chapter gives an overview of the test chamber: its working principle, technical specifications, components and air circulation.

2.1 Working Principle and Applications

The thermal shock test chamber consists of **two independent and separately controllable test chambers** — a high-temperature (hot) chamber above and a low-temperature (cold) chamber below. Test specimens are placed in a basket that is automatically transferred between the two chambers, subjecting them to rapid temperature change (thermal shock). The results of this testing are highly valuable for assessing component reliability.

Thermal shock testing is typically used for products such as chips, integrated circuits and printed circuit boards that must meet military standards, as part of a process to enhance reliability and improve product quality.

High-temperature testing
Specimens held in the hot chamber at a constant set temperature.

Low-temperature testing
Specimens held in the cold chamber at a constant set temperature.

Thermal shock testing
Specimens cycled automatically between the hot and cold chambers.

2.2 Technical Specifications

The following performance data apply to the model **CJ-500** as specified in the original documentation. Values for other models and temperature-range codes are stated on the equipment nameplate.

Model	CJ-500
Temperature range	−60 °C to +180 °C
Temperature shock range	−40 °C to +120 °C
Temperature deviation	≤ ±2.0 °C
Temperature fluctuation (constant-temperature operation)	≤ ±0.5 °C
Temperature uniformity	≤ 2.0 °C
Transition time (basket transfer)	≤ 5 s
Temperature recovery time	≤ 5 min
Controller	TEMI8229 thermal shock controller, touchscreen (see Part B)
Operating ambient conditions	+5 °C to +35 °C; 45 – 85 %RH

Power supply	Per nameplate; voltage fluctuation < ±5 % (permissible operating range ±10 %)

> **NOTE** The temperature ranges in the model table (up to +200 °C) and in the CJ-500 specification above (up to +180 °C) refer to different configurations. Always use the range stated on your nameplate when setting test values and the over-temperature protection.

2.3 Components and Their Functions

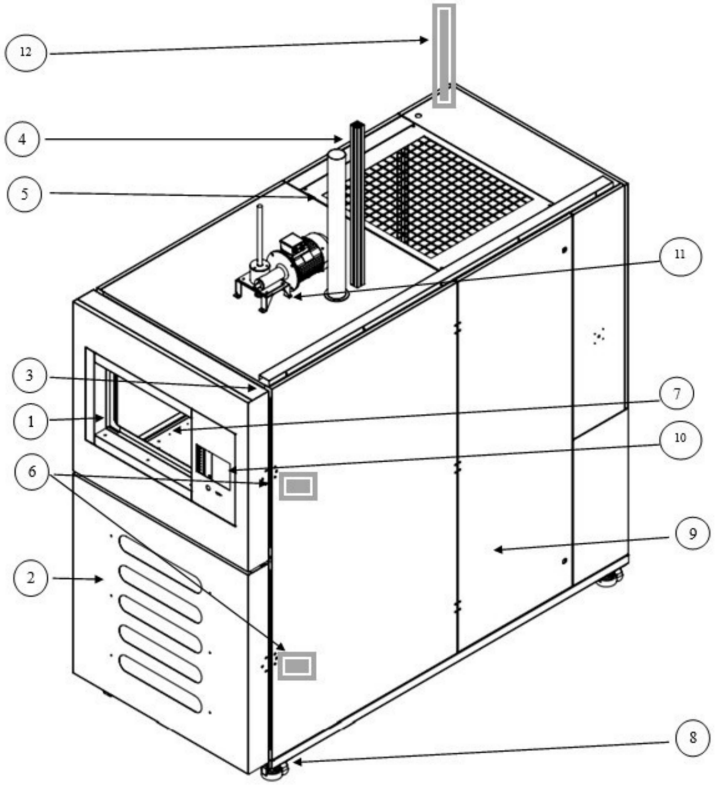


Figure 2-1 Component locations

No.	Component	See
1	High-temperature chamber	2.3.1
2	Low-temperature chamber	2.3.2
3	Door sensor switch	2.3.3
4	Limit switch	2.3.4
5	Test port	2.3.5
6	Door lock	2.3.6
7	Viewing window	2.3.7
8	Adjustable casters	2.3.8
9	Refrigeration unit	2.3.9
10	Touchscreen panel	2.3.10
11	Motor	2.3.11
12	Three-colour alarm light (optional)	2.3.12

2.3.1 High-Temperature Chamber

The hot chamber is located above the cold chamber. Test specimens are placed in a basket inside the hot chamber. The hot chamber door (test chamber door) is equipped with a glass viewing window.

The test chamber door can only be opened when the basket is inside the hot chamber. A limit switch installed on top of the test chamber cuts off the unit's power supply when the door is opened. After the door is closed, the basket moves into the hot chamber and the test resumes automatically.

2.3.2 Low-Temperature Chamber

The cold chamber is located below the hot chamber and remains closed during normal operation. **The cold chamber door may only be opened for maintenance purposes.**

2.3.3 Door Sensor

The cabinet door is equipped with a sensor switch, located in the upper right corner of the unit, which detects whether the door is open or closed (see Figure 2-2). When the door is opened, the door sensor signal stops the circulation fan.

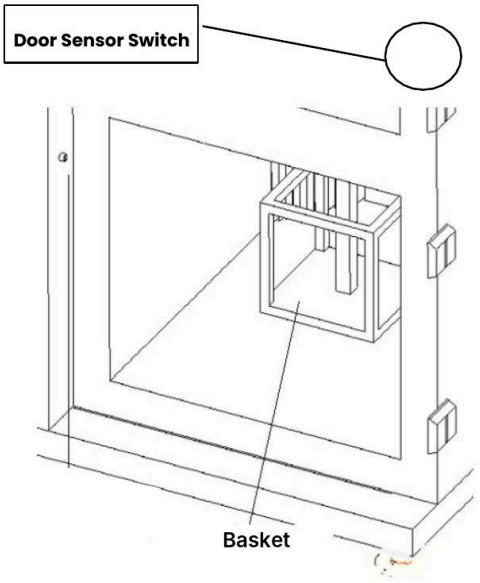


Figure 2-2 Door sensor switch and basket

2.3.4 Limit Switch

During operation the basket moves between the cold and hot chambers. It is driven via the main shaft by a motor with a brake. To position the basket, a position sensor is mounted on the basket support:

- **Rising:** the low-position indicator light turns off; when the basket reaches the top position, the high-position indicator light turns on and the basket stops moving upward.
- **Descending:** the high-position indicator light turns off; when the basket reaches the bottom position, the low-position indicator light turns on and the basket stops descending.

2.3.5 Test Port

A test port above the test chamber allows wiring to be routed to the interior of the basket. The test port moves up and down with the support frame (see Figure 2-1, item 5). Seal any gap around routed cables so that chamber performance is not affected.

2.3.6 Door Lock

The test chamber door is equipped with a lockable latch.

- **To open:** turn the lever clockwise to the left; the latch retracts (Figure 2-3).
- **To close:** slowly rotate the door handle downward to the closed position. The latch engages and the door closes (Figure 2-4).



Figure 2-3 Open



Figure 2-4 Closed

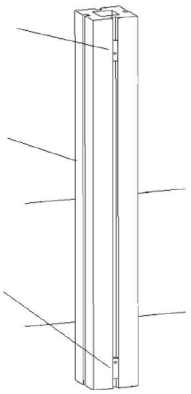


Figure 2-5 Latch side (reference drawing)

2.3.7 Viewing Window

The equipment has a viewing window that allows real-time observation of test conditions inside the chamber.

2.3.8 Adjustable Casters

The test chamber is equipped with casters and/or adjustable feet to ensure adequate ventilation of the mechanical components and to compensate for uneven floors. For adjustment, see Section 3.3.

2.3.9 Refrigeration Unit

The mechanical (refrigeration) components are located at the rear of the test chamber and can be viewed by removing the side covers and the rear cover.

2.3.10 Touchscreen Instrument Panel

All control and operation commands are executed by tapping the corresponding function icons on the touchscreen. One touchscreen is provided as standard and is installed on the left side of the test chamber door (see Part B).

Emergency stop button	Ensures safety throughout the test. Press it in an emergency to stop the equipment immediately.
Reset button	Resets the system after a fault alarm triggered by the self-diagnostic function.
USB port	For periodic backup of the test data stored in the instrument.
Power switch	Switches the instrument on; the display lights up.



Figure 2-6 Control panel

2.3.11 Motor

The motor (with brake) drives the basket between the hot and cold chambers via the main shaft (see 2.3.4). Lubricate the spindle every 10,000 cycles (Section 5.1).

2.3.12 Three-Colour Alarm Light (Optional)

The three-colour warning light is located in the upper-left corner of the equipment.

Light	Status
Green	Operating
Yellow	Test chamber standby
Red	Error occurred

2.4 Air Circulation

- **Hot chamber:** air is drawn in through the centre of the rear panel, flows past the heating elements, and re-enters the test chamber via the ceiling and the air deflectors on both sides.
- **Cold chamber:** air is drawn in through the centre of the rear panel, flows past the evaporator, and re-enters the front of the test chamber via the air deflectors.

Temperature uniformity depends on this air circulation. Never block the air intake or return vents with specimens (see Section 4.1).

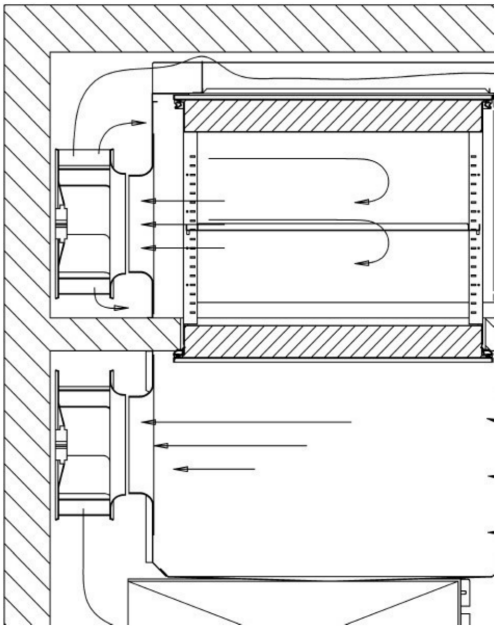


Figure 2-7 Air circulation (section view)

CHAPTER 3

Installation

This chapter describes the installation site, handling, positioning and the electrical, water and drain connections required before the first start-up.

3.1 Installation Site

Install this unit in a location that meets all of the following requirements.

Requirement	Specification
Floor	Level and stable, able to carry the equipment weight.
Vibration	Minimal mechanical vibration.
Environment	Protected from direct sunlight, with good ventilation.
Operating ambient temperature	**+5 °C to +35 °C**, without drastic fluctuation.
Storage ambient temperature	**−25 °C to +55 °C**.
Ambient humidity	**45 %RH to 85 %RH**; maximum relative humidity 85 %.
Cleanliness	Low dust levels.
Fire safety	No flammable materials in the vicinity; free of flammable and corrosive gases.
Utilities	Near the mains power supply, gas (compressed air) supply and drainage outlet.
Fire alarms / smoke detectors	No fire alarms directly above the unit. Set smoke detectors near the chamber door at an appropriate distance and sensitivity — water vapour may escape when the door is opened.
Water-cooled units only	Verify the cooling water connection and that the flow direction is correct. Keep the cooling water temperature between **+5 °C and +32 °C**.

CAUTION

The operating ambient temperature range of the unit is **+5 °C to +35 °C**. If the temperature falls outside this range, malfunctions may occur.

3.2 Handling and Unloading

The equipment is typically shipped in a wooden crate. Depending on the destination it may be shipped unpackaged or in other types of packaging; packaging can also be customised to user requirements.

On arrival, the equipment can be unloaded with a forklift, crane or other suitable method. The load capacity of the unloading equipment must be **greater than or equal to the weight of the equipment** (see *Applicable Models* and the nameplate). This operation should be performed by personnel experienced in forklift unloading.

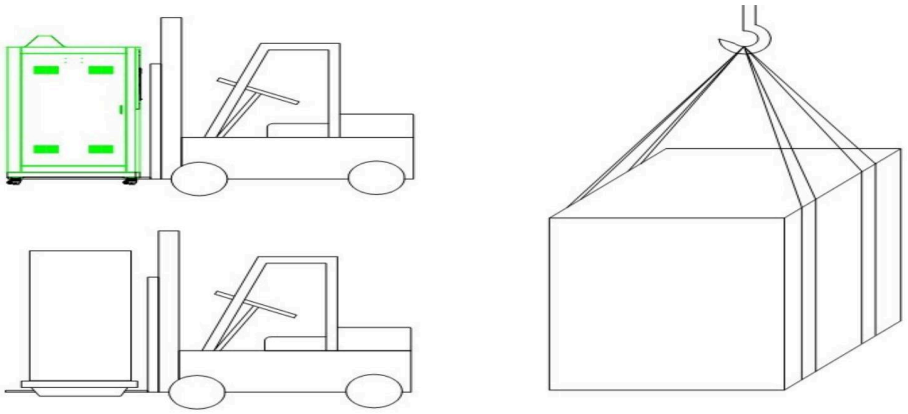


Figure 3-1 Unloading by forklift (left) and by crane with lifting straps (right)

CAUTION

- Unload the equipment using appropriate methods (forklift, crane, etc.). The specially designed wooden base plate assists with unloading.
- Keep the equipment balanced throughout the entire process.
- If using a forklift, the forks must be **at least 500 mm longer than half the depth** of the chamber.
- If unloading with a crane, **do not lift with steel cables**; they can damage the external structure.
- Do not move the equipment over uneven ground.
- If an accidental impact occurs or there are protrusions on the surface, check the condition of the equipment and contact LORDERAN if necessary.
- To prevent compressor oil from entering the refrigeration circuit, the unit must be moved, stored and unloaded **upright**. If the unit must be tilted or turned over during positioning, contact LORDERAN first.

3.3 Positioning and Levelling

During initial installation, place the unit on a level surface and level the cabinet. **If the cabinet is not level during operation, compressor failure may result.**

Each of the four casters consists of:

1. Lifting turntable
2. Fixed base (foot)
3. Movable caster

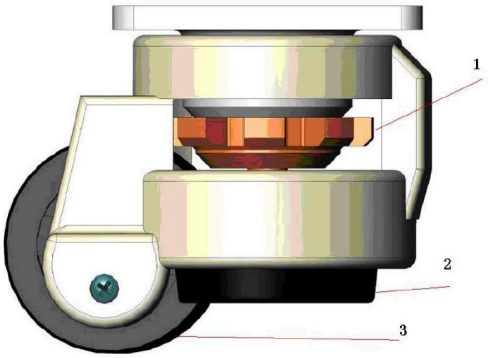


Figure 3-2 Adjustable caster: 1 lifting turntable, 2 fixed base, 3 movable caster

Procedure

1. Rotate the lifting turntable to raise the fixed base so that the caster contacts the floor. Confirm this for all four casters.
2. Move the chamber to the desired location (observe the clearances in Section 3.4).
3. Once the position is confirmed, rotate the turntable to lower the fixed base until it contacts the floor and the caster is raised, securing the chamber in place.
4. Check the chamber with an external spirit level (provided by the customer) and adjust the four feet until the chamber is level. If necessary, use a hydraulic jack or similar equipment to assist.

3.4 Installation Space

- **Left and right:** sufficient space for maintenance.
- **Front:** sufficient space for the door to open fully.
- **Rear:** space for condenser fan ventilation. For air-cooled units the distance between the exhaust vent and the wall must be **greater than 0.8 m** (see Section 6.1).
- **Above:** no fire alarm devices may be installed on or directly above the unit.

Minimum clearances as marked in Figure 3-3: **A = 40 cm, B = 60 cm, C = 80 cm**.

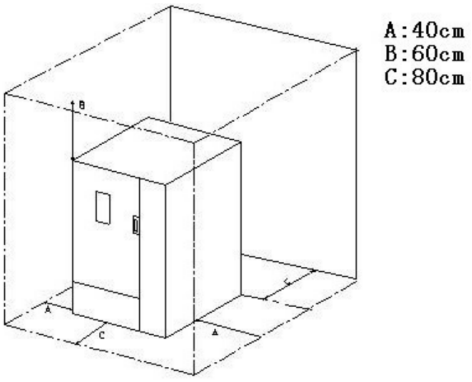


Figure 3-3 Installation clearances

3.5 Power Supply Connection

! PRECAUTIONS

- All electrical connections must be performed by qualified personnel. The power supply must comply with the technical specifications on the nameplate. Input voltage fluctuation should be **less than ±5 %** (permissible operating range **±10 %**).
- Connect the equipment to the grid by cable via a circuit breaker. The breaker's maximum current rating must exceed the equipment's maximum operating current.
- To prevent electric shock, complete the entire connection process with the power turned off.
- To ensure stable operation, the customer must provide a distribution box.
- Apart from the designated grounding terminal, the equipment requires no additional grounding. Before connecting the ground wire, unroll it and check it for damage.

PROHIBITED

- Do not share the ground wire with equipment that has no main power switch installed; otherwise the main power switch will not operate.
- Do not interconnect the ground wires of different pieces of equipment; otherwise the main power switch will not operate.
- Do not connect the ground wire to a gas line — explosion hazard.

MANDATORY

Be sure to ground the equipment. Otherwise, even if electrical leakage occurs the main power switch will not trip and an electric shock may result. Interference from external power sources is also common without proper grounding.

PROHIBITED

As with any other electrical appliance, strictly observe the following:

- Do not touch the equipment with wet hands.
- Keep the floor around the equipment dry.
- Do not disconnect the power supply during operation.
- Do not use the equipment in a damp environment.

3.6 Cooling Water Connection (Water-Cooled Units Only)

Air-cooled units: skip this section.

CAUTION

Pipe leaks or breaks may cause accidental cooling water leaks. Leaking water is a slip hazard and may damage property or buildings.

- Ensure the water source is purified and free of microorganisms (such as algae).
- Ensure the water pressure does not exceed the maximum allowable pressure specified for the unit. Install a pressure-relief valve in the shut-off section that opens at **10 bar**.
- Install a shut-off device on the water supply line.
- Install a water (leak) sensor downstream of the cooling water return line.
- Use temperature- and pressure-resistant connectors.
- Keep the cooling water temperature between +5 °C and +32 °C with a steady flow.

NOTE For cooling water circuits with on-site shut-off valves, impermissible pressures may occur if the refrigeration unit operates with the shut-off valve closed. Never start the unit with the cooling water valves closed.

3.7 Condensate Drain

Condensate is discharged during long-term testing. The drain outlet is on the outside of the cabinet (see Figure 2-1).

- Use a connecting pipe with a diameter equal to or slightly larger than the drain pipe.
- Route the pipe freely downward without forced bends.
- Connect the pipe to a floor drain. If no floor drain is available, use a sufficiently sized collection container, to prevent slippery floors caused by leaks.

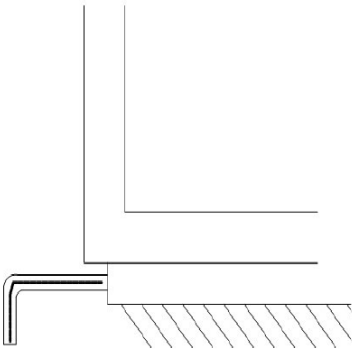


Figure 3-4 Drain pipe routed downward

3.8 Pre-Start Checklist

✓	Item	See
☐	Installation site meets all requirements; clearances observed.	3.1, 3.4
☐	Chamber levelled; fixed bases lowered to the floor.	3.3
☐	Power supply matches the nameplate; breaker and distribution box installed; equipment grounded.	3.5
☐	Water-cooled units: cooling water connected, valves open, temperature +5 – +32 °C.	3.6
☐	Condensate drain connected to a floor drain or container.	3.7
☐	Compressed air supply (if fitted) connected; filter-regulator checked.	5.2.6
☐	Chamber interior, basket and door seals clean; seal check passed.	5.1, 5.2.3
☐	Emergency stop button released; all doors closed.	2.3.10

CHAPTER 4

Operation

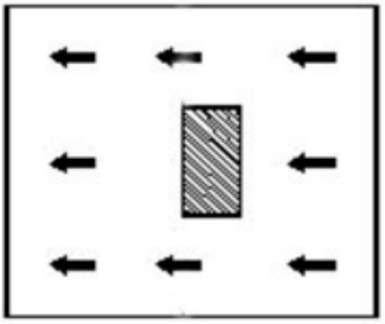
This chapter covers specimen placement, switching the equipment on and off, and a quick guide to the most frequently used controller functions. Full details of every screen are in Part B.

4.1 Placing Test Specimens

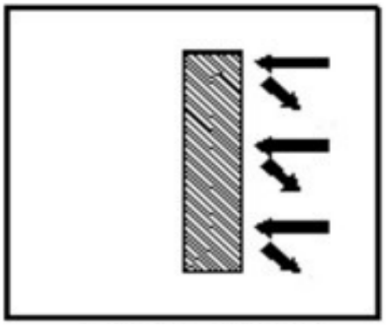
1. Test specimens must not extend beyond the basket.
2. Maintain a distance between the specimens and the edge of the basket.
3. Make sure the specimens are stable in the basket so that they cannot fall and be damaged while the basket moves.

The temperature uniformity of the equipment relies on air circulation. If ventilation inside the chamber deteriorates, uniformity deteriorates and test errors increase. Follow the recommendations in Figure 4-1.

> **PROHIBITED**
>
> Do not allow specimens to block the chamber's air intake or return vents. This severely impedes air circulation and affects the equipment's performance.



✔ Correct: airflow passes around the specimen



✘ Incorrect: specimen blocks the airflow

Figure 4-1 Specimen placement

4.2 Power On and Shutdown

STEP **Power on**

1. Connect the power cord according to the requirements on the equipment nameplate.
2. Turn the power switch to **ON**. All circuits are energised and the unit is ready for operation.
3. The controller shows the initial screen and, after about 15 s, the operation (monitor) screen with the current status (see Chapter 10).



Figure 4-2 Controller showing the current status

STEP **Shutdown**

1. Stop the test on the controller (**STOP**) and allow the chambers to approach room temperature (see Section 12.5, Normal Set).
2. Turn off the power switch.
3. For a prolonged shutdown, unplug the power cord / switch off the supply (see Section 5.2.5).

! IMPORTANT NOTES ON OPENING THE DOOR

- Opening the door when there is a large difference between the internal and ambient temperatures may damage the equipment.
- If the internal temperature is high, expansion of the inner walls may make the door difficult to close.
- If the internal temperature is too low, opening the door lets moist outside air in, and frost forms on the surface of the specimens.
- Frequent opening and closing of the door lets in a large amount of moisture, which can freeze the evaporator and reduce cooling performance.
- When the door is opened, the door sensor detects it and stops the fan.

4.3 Controller Quick Guide

The following introduces the commonly used functions. For a full description of each screen, see Part B.

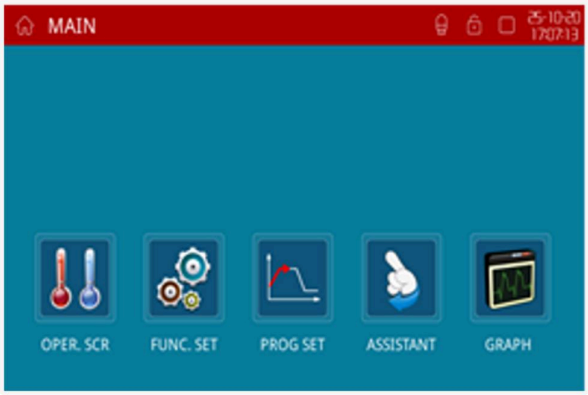


Figure 4-3 Main screen

The main screen has five modules:

Button	Module	See
OPER. SCR	Monitoring / operation screen	Ch. 11
FUNC. SET	Operation (function) settings	Ch. 12
PROG SET	Program settings	Ch. 15
ASSISTANT	Auxiliary (other) settings	Ch. 14
GRAPH	Curve display and data	Ch. 13

A. Monitoring screen

Displays the current actual values (PV), set values (SV), control mode and operating status of the high-temperature chamber (red), low-temperature chamber (blue) and test area (green).

Press **DETAIL** to view the current temperatures, output values (MV), output status and operating time. The **Run, Stop, Hold (Pause), Skip (Next)** and **Cancel** commands are also available here.



Figure 4-4 Monitoring screen

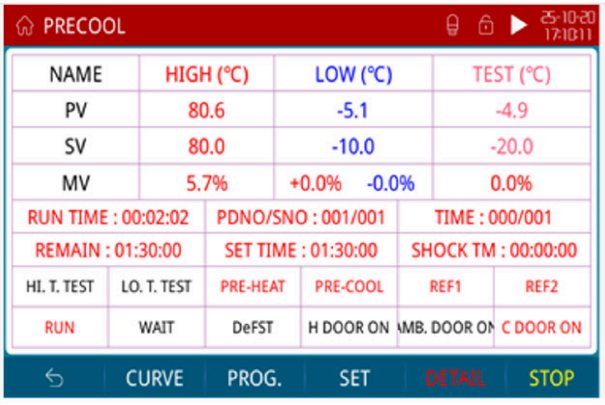


Figure 4-5 Details (test status) screen — see Section 11.3

B. Operation settings (FUNC. SET)

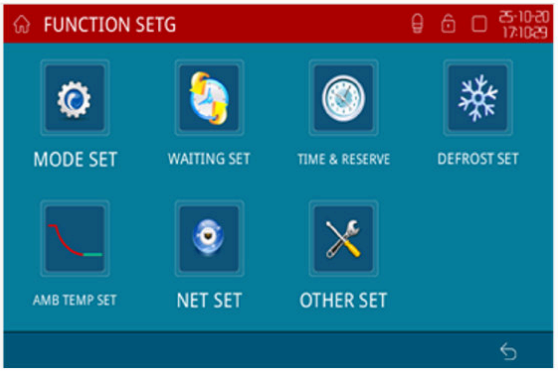


Figure 4-6 Function settings screen

Setting	Function	See
a) Mode set	View/select the program number to run and the power-failure (boot) mode — how the equipment behaves when power is lost during operation and then restored (table below).	12.1
b) Waiting (standby) set	Turn the standby function on or off, set the standby duration (standby is cancelled when the duration exceeds the set time), and set the high-temperature and low-temperature standby ranges (°C).	12.2
c) Time & reserve	Display or modify the current time; schedule an automatic start time. The scheduled time must be later than the current time and takes effect only when the scheduling switch is on.	12.3
d) Defrost set	Set the defrost method, defrost end temperature, defrost duration, etc.	12.4
e) Other functions	Return to normal (ambient) temperature after the test; network settings for units connected to a local area network.	12.5, 12.6

Power-failure mode	Program running before the outage	Fixed value running before the outage
STOP	The display lights up automatically when power is restored, but operation stops and the equipment enters standby. The test must be restarted manually.	
COLD START	Resumes automatically from the program's starting point (first segment).	Resumes automatically with the set value in effect before the outage.
HOT START	Resumes automatically from the segment that was running when the power went out.	Resumes automatically with the set value in effect before the outage.

> **CAUTION**
>
> With COLD START or HOT START selected, end a test early by tapping **STOP** on the controller — never by switching off the power, otherwise the equipment restarts automatically when power returns.

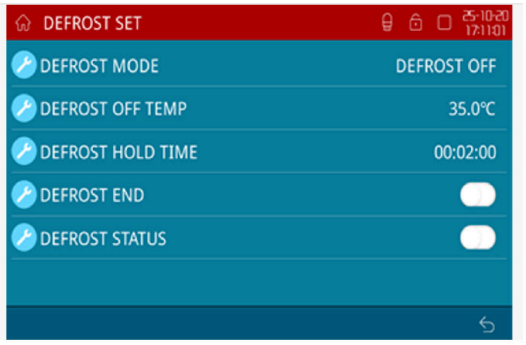


Figure 4-7 Defrost settings

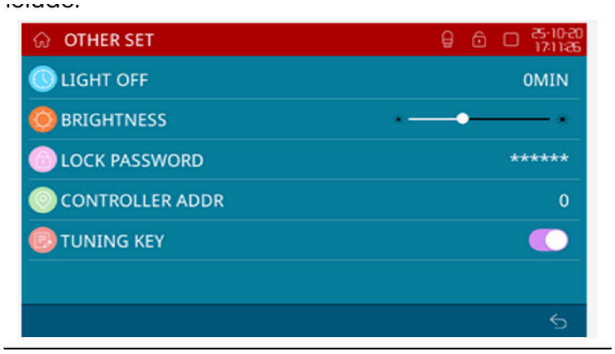


Figure 4-8 Auxiliary (other) settings

C. Program settings and auxiliary settings

Program settings (creating and editing thermal shock programs) are described in Chapter 15. Auxiliary settings (backlight time, brightness, keyboard lock password, controller address, tuning key) are described in Chapter 14.

4.4 Data Recording and Export

Test data are recorded and saved automatically; the recording interval is adjustable. With the standard recording interval of **60 seconds**, the controller can store **one year** of data records. When the memory is full, the oldest data are overwritten automatically, so export and save data periodically.

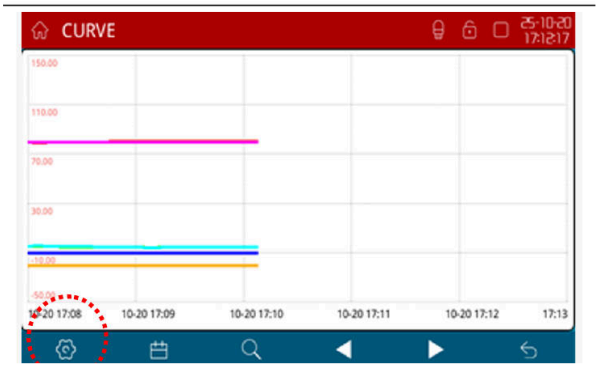


Figure 4-9 Curve display — tap the settings icon (circled)

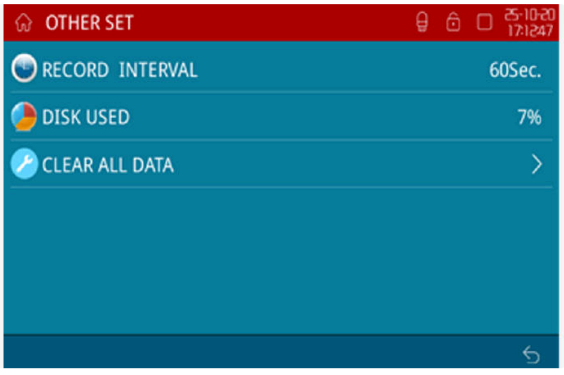


Figure 4-10 Curve settings

On the main screen tap **GRAPH** to open the curve display, then tap the settings icon at the bottom left:

- **Record interval:** the time interval for curve recording.
- **Disk used:** the memory currently in use.
- **Clear all data:** opens a confirmation dialog; tap **OK** to delete all records. **Deleted data cannot be recovered.**

STEP Exporting data to a USB drive

1. Insert a USB flash drive into the USB port on the control panel. A USB icon appears in the title bar to indicate a successful connection. (Export buttons are not available without a USB drive.)
2. In the curve display, tap anywhere on the curve to show a cursor with the time and temperature values at that point; drag the cursor left or right to review data.
3. Tap the file-list (calendar) icon to open the historical records. Tap the record to be saved and select an option:
   - **CURVE** — show the curve for that period.
   - **TABLE** — show the data in tabular form (Section 13.4).
   - **DEL** — delete the selected record (its NO. turns red when selected).
   - **EXP TO UDISK (XLS)** — export the record to the USB drive in Excel format.
   - **EXP TO UDISK (BIN)** — export the record in binary format.
4. The export is complete when the status indicator reaches **100 %**. Tap the USB icon at the upper right to eject the drive before removing it.

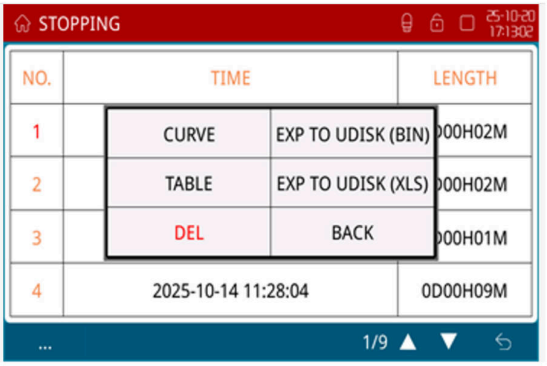


Figure 4-11 Historical records with options

4.5 Typical Thermal Shock Test Procedure

1. Complete the pre-start checklist (Section 3.8) and clean the basket, seals and window (Section 5.1).
2. Switch the equipment on (Section 4.2).
3. Create or check the test program in **PROG SET**: low and high test temperatures, pre-cool/pre-heat values, dwell times, number of cycles and starting zone (Chapter 15).
4. In **FUNC. SET → Mode set**, select the program number and the power-failure mode (Section 12.1). Set the defrost and waiting functions if required (Sections 12.2, 12.4).
5. Load the specimens into the basket (Section 4.1), route any test leads through the test port (Section 2.3.5) and close the door.
6. On the operation screen tap **RUN**. The chambers pre-heat/pre-cool and the basket transfers automatically according to the program.
7. Monitor the test on the operation and DETAIL screens. Alarms are shown on screen and by the alarm light (Chapter 6).
8. When the test ends, let the chamber return to normal temperature, open the door wearing protective gloves (Section 1.3) and remove the specimens.
9. Export the test data to a USB drive (Section 4.4).

CHAPTER 5

Inspection and Maintenance

This equipment requires periodic inspection and maintenance due to long-term use. Unless stated otherwise, switch off the main power before any maintenance work.

5.1 Inspection and Maintenance Schedule

Inspection checklist

Operational inspection item	Interval
Verification of the upper- and lower-limit temperature deviation alarm actions	Once a month
Check the test chamber seal for leaks (method below)	Before each test

> **REF — CHECKING THE DOOR SEAL FOR LEAKS**
>
> Accurate temperature control requires the test chamber to be a sealed space. During prolonged use the door seals may become dirty and seal poorly. Clean them first with a neutral detergent, then wipe with a damp cloth.
>
> **Method:** place a strip of paper between the door and the seal, close the door, then pull the paper outward. You should feel noticeable resistance. Repeat around the entire perimeter of the door. If the door still does not seal tightly after cleaning, contact a LORDERAN after-sales engineer.

Maintenance checklist

Maintenance item	Interval	See
Clean the test basket	Before each test	5.2.3
Clean the seals of the test chamber	Before each test	5.1
Clean the observation window glass	Before each test	5.2.3
Clean the interior of the chamber	Before starting operation	5.2.3
Clean the air-cooled condenser (dust check)	Every three months	5.2.1
Clean the heat-exchange fan of the air-cooled condenser	Once every six months	5.2.1
Clean the electrical control room	Once every six months	5.2.4
Back up historical data and system parameters	Every two months	4.4
Refrigeration system	Annually	5.2.6
Electrical system	Annually	5.2.6

Maintenance item	Interval	See
Compressor	Annually	5.2.6
Sensor calibration	As needed	5.2.6
Condenser (water-cooled: strainer and descaling)	As needed	5.2.2
Lubricate the spindle (main shaft)	Every 10,000 cycles	2.3.11
Handling for prolonged non-use	Before and after the idle period	5.2.5

5.2 Maintenance Procedures

5.2.1 Cleaning the Air-Cooled Condenser

Air-cooled units

During prolonged operation dust accumulates on the condenser and reduces the cooling efficiency of the refrigeration system. Check the heat dissipation periodically; cleaning is recommended **every three months**. The air-cooled condenser is located on the rear panel of the equipment (Figure 5-1). Check the following:

1. **Is the condenser fan operating normally?** If not, contact LORDERAN.
2. **Is there a significant build-up of dust on the heat exchanger in front of the fan?** If so, clean the condenser:



Figure 5-1 Air-cooled condenser (rear panel)

STEP 1 Open the rear door of the mechanical compartment (screwdriver or triangular key).
STEP 2 Remove dust from the heat exchanger with a soft brush or compressed air (air gun / high-pressure nitrogen).
STEP 3 Close the rear door of the mechanical compartment.

> **PROHIBITED / CAUTION**
>
> - Never clean the unit with a water gun or spray system — this may damage the insulation and cause malfunctions.
> - The condenser fins have sharp edges that may cause cuts. Wear safety gloves during cleaning.

5.2.2 Cleaning the Water-Cooled Condenser Strainer

Water-cooled units

First shut off the cooling water supply, then use a tool to remove the filter screen and rinse it with water. Refit the screen, open the water supply and check for leaks.

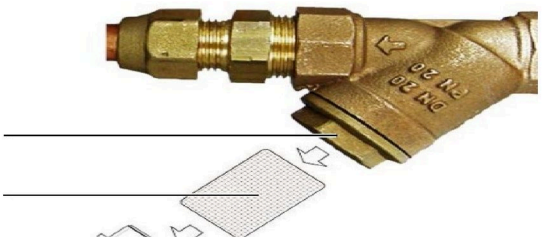


Figure 5-2 Dirt strainer and filter screen

5.2.3 Cleaning the Chamber Interior

Dust and impurities adhering to the interior walls can affect the accuracy of test results. Clean the interior before starting a test.

1. Open the chamber door.
2. Clean with a soft cloth dampened with a neutral detergent, then wipe with a damp cloth. Clean the basket and the viewing window in the same way.
3. Close the chamber door.

5.2.4 Cleaning the Electrical Control Room

Dust accumulation in the electrical control room can easily cause malfunctions. Clean it regularly (every six months).

1. Make sure the main power is turned off.
2. Open the electrical control room door.
3. Remove dust with a vacuum cleaner. Never use water.
4. Close the control room door.

5.2.5 Prolonged Non-Use

If the unit will not be used for an extended period:

1. Conduct a dry run of the test chamber: run the unit for approximately **60 minutes** with the door closed, then open the door slightly and run it for approximately **15 minutes**.
2. Turn off (OFF) the main power switch and the input power supply.
3. Cover and wrap the equipment with waterproof and moisture-proof material and store it in a warehouse (storage ambient −25 °C to +55 °C).

5.2.6 Other Maintenance

Refrigeration system	Hermetic compressors do not require refrigerant replenishment provided there are no leaks. Regular inspection by a professional is still recommended.
Electrical system	The control system is built from reliable components; periodic functional verification by LORDERAN-authorised personnel is recommended.
Water-cooled condenser	Regular cleaning of the fittings and descaling, performed by a qualified professional. (Not applicable to air-cooled units.)
Sensor calibration and replacement	Must be performed by a professional organisation or authorised personnel.
Compressed air	Regularly check the supply air pressure, clean the filter-regulator combination and purge impurities and moisture.

CHAPTER 6

Faults and Remedies

When the self-diagnostic function detects a malfunction, the control panel displays the specific fault (Section 6.1). Faults that cannot be self-diagnosed, and operating errors easily confused with malfunctions, are listed in Section 6.2.

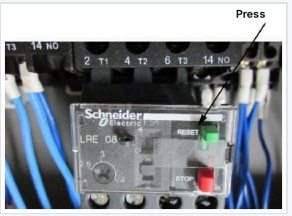
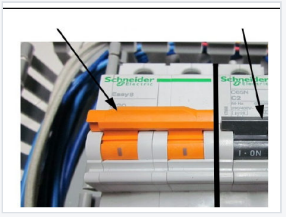
DANGER

- When performing maintenance on the input-side power supply, turn off (OFF) the main power switch of the input-side supply. Troubleshooting with the power ON may result in electric shock and is extremely dangerous.
- Before opening the electrical control room, turn off (OFF) the main power switch.

After rectifying the cause of an alarm, press the **Reset** button on the control panel (Section 2.3.10). If the unit still does not operate normally after the measures below, contact LORDERAN with the model, serial number and the displayed alarm.

6.1 Self-Diagnosed Faults (Alarm List)

Display	Cause	Remedial action
Phase sequence protection	1. Missing phase in the power supply. 2. Incorrect power supply phase sequence. 3. Protector malfunction.	1. Check the power supply. 2. Replace the phase-loss protector. 3. Swap the positions of two phase wires (electrician, power OFF). 
Hot chamber position fault	1. High-position sensor malfunction. 2. Basket hoist malfunction — the basket did not rise to the correct position.	1. Check the high-position sensor. 2. Check the area around the basket for foreign objects.
Cold chamber position fault	1. Low-position sensor malfunction. 2. Basket hoist malfunction — the basket failed to lower fully.	1. Check that the low-position sensor functions properly. 2. Check whether the cold chamber has iced up.
Hot chamber door fault (same for the cold chamber)	1. Door sensor malfunction. 2. The door was opened during operation.	1. Check whether the door sensor is damaged or obstructed. 2. Check that the door is closed.

Display	Cause	Remedial action
Hot chamber over-temperature protection (same for the cold chamber)	Localised overheating in the chamber triggers the over-temperature alarm.	Stop the equipment and check that the specimens are properly arranged. A blocked air duct can cause localised overheating. If a specimen generates heat, remove it from the test and determine whether it is the cause.
Compressor overload protection	1. Input voltage too high. 2. Condenser fan stopped, causing compressor overpressure. 3. Condenser clogged, causing excessive compressor pressure. 4. Compressor malfunction. 5. Internal compressor over-temperature protection.	1. Air-cooled units: provide ventilation; the distance between the exhaust vent and the wall must be > 0.8 m. 2. Water-cooled units: keep the cooling water at +5 to +32 °C with a steady flow. 3. Verify that power fluctuations are less than 10 %. 4. Verify that the condenser fan operates normally and ventilation is adequate. 5. Clean the air-cooled condenser and the cooling water filter. 6. If the compressor's internal over-temperature protection has tripped, wait **6 hours** before restarting. 7. Reset the thermal relay to restart the unit (press RESET, figure). 
Blower overcurrent	1. With the door open, outside water vapour froze the fan and prevented normal operation. 2. Blower current too high.	1. Check that the blower operates normally. 2. Reset the blower current protection. 3. Dry the low-temperature chamber at high temperature to remove excess moisture.
Circuit breaker tripped	The equipment trips or the display goes blank due to electrical leakage, short-circuited components, etc.	1. Use the key to open the rear cover of the equipment and access the circuit board (electrician). 2. Locate the power reset button / breaker and press it to reset the system. 

6.2 Other Faults

The table below lists faults that the equipment cannot self-diagnose (no alarm is triggered) and common operating errors that are easily mistaken for faults.

Fault	Possible cause	Remedy
Display does not light up after pressing [Power]	Power supply not connected.	Connect the power supply.
	Main power switch is OFF.	Turn on the power switch.
	Display malfunction.	Contact LORDERAN.
	Power supply does not meet requirements.	Check the power supply against the nameplate.
Temperature does not rise (difficult to increase)	Too many test specimens.	Reduce the number of specimens.
	Incorrect set temperature entered.	Verify the set point.
	Solid-state relay controlling the heater faulty.	Contact LORDERAN after-sales service.
	Heater wire broken.	Contact LORDERAN after-sales service.
	Heater circuit breaker is OFF (tripped).	Turn on the circuit breaker.
Temperature does not drop (difficult to lower)	Excessive heat generated by the specimens.	Reduce the heat generated by the specimens.
	Insufficient cooling capacity.	Check the condenser heat-exchange system (condenser / cooling tower) and verify that the compressor is operating.
	Compressor circuit breaker tripped.	Turn off the main power switch, open the electrical control room and switch the compressor breaker back on (electrician).
	Condenser fan start capacitor damaged.	Check the fan's operating condition.
	Evaporator iced up.	Dry the low-temperature chamber at high temperature; use the defrost function (Section 12.4).
Poor temperature uniformity	High heat generation from the specimens.	Reduce the number of specimens.
	Improper placement of specimens.	Change the placement (Section 4.1) and adjust the air deflector at the air outlet.

Fault	Possible cause	Remedy
Main power circuit breaker tripped	Excessive current — overcurrent protection triggered.	Turn off the power switch and restart the unit.
	Earth-leakage circuit breaker tripped.	Check the power supply and contact LORDERAN.

CHAPTER 7

Disposal and Recycling

The equipment is composed of the following materials:

No.	Material	Used in
1	Epoxy-coated steel plate	External structure
2	Polyurethane (or similar)	Thermal insulation
3	G-grade steel plate	Support frame
4	Painted steel	Compressor
5	Copper	Condenser, refrigerant piping, evaporator, heat exchanger
6	Aluminium	Control panel, fan, evaporator, condenser
7	Polycarbonate	Control panel
8	PVC	—
9	Refrigerant	Refrigeration circuit
10	Antifreeze (compressor refrigeration oil)	Compressor
11	Other materials	—

Certain materials such as copper, steel and aluminium are easy to recycle, but others such as insulation, oil and refrigerant must be handled by specialised companies. The equipment does not contain any toxic or flammable materials that could pose a hazard during disposal.

PROHIBITED

- Do not dispose of compressor antifreeze (oil) into the environment.
- Do not release refrigerant into the environment. Refrigerant must be recovered by qualified personnel.
- Do not dispose of insulation materials into the environment.

For the above materials, contact a specialised company for recycling, and dispose of the equipment in accordance with local regulations.

PART B

TEMI8229 Thermal Shock Controller

8 Controller Overview and Installation

9 Input Keyboards

10 Start-up and Main Screen

11 Operation Screen

12 Function Settings

13 Graph and Data Management

14 Other Set (System Settings)

15 Program Setting

CHAPTER 8

Controller Overview and Installation

The TEMI8229 is the touchscreen thermal shock controller fitted to the LORDERAN Two-Zone Thermal Shock Chamber. This part of the manual explains how to use and install it effectively.

- Read this part carefully and make sure you fully understand how to operate the controller before use.
- Redistribution and use of this manual, with or without modification, are prohibited.
- Every effort has been made to ensure accuracy. If you find any errors, please inform LORDERAN.

NOTE The controller is installed and wired at the factory. Sections 8.1 – 8.4 are provided for service personnel and for reference when the controller is replaced.



Figure 8-1 TEMI8229 thermal shock controller

8.1 Installation Location Requirements

The controller must be installed where:

1. No one can accidentally touch the terminals.
2. Mechanical vibration is minimal.
3. Corrosive gas is minimal.
4. The temperature can be kept between 10 °C and 50 °C with minimal fluctuation.
5. It is indoors.
6. The altitude is up to 2,000 m.
7. There is no direct radiant heat or ultraviolet light.
8. There are no magnetic disturbances.
9. No wind blows against the terminal board; no dust or salt is present.
10. There are no flammable materials nearby.

8.2 Installation Notes

1. Keep the influence of electromagnetic fields and electrical noise low.
2. Make sure no moisture can get into the system.
3. Ambient conditions (non-freezing): **operation 10 – 50 °C, 20 – 90 %RH; storage −25 – 70 °C, 5 – 95 %RH.** These are the limits of the controller itself; the chamber's operating conditions (Section 3.1) are narrower and always apply.
4. If the controller has been kept below 0 °C, warm it up for **2 hours** at room temperature before connecting power, and for a further **30 minutes** after connecting power. Otherwise it may not function normally and may be damaged.
5. Do not use it near machines that generate heat. Do not install it with the front facing at a slant.
6. Transient overvoltage category II; rated pollution degree 2.
7. Before wiring, switch off the system — risk of electric shock.
8. Install the guard panel under the controller for safety and easier installation.

⑨ The I/O relay board must be installed inside the chamber.

⑩ The I/O relay board must be secured with 4 bolts and nuts through the 4 holes on the board.

8.3 Dimensions

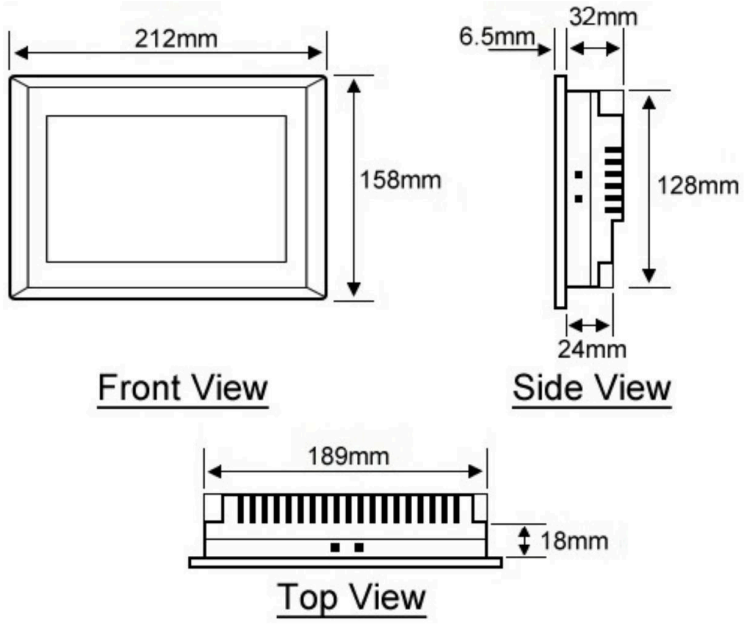


Figure 8-2 TEMI8229 dimensions (mm)

Appearance dimensions (L × H × W)	212 × 158 × 38.5 mm
Mounting (cut-out) dimensions (L × H)	189 × 128 mm

CAUTION

- Before installing and wiring, switch off the system — risk of electric shock.
- Do not over-tighten the mounting screws; the case or bracket may be damaged.
- Ground the controller to the chamber case when connecting the power supply.

8.4 Wiring (Slave Unit / I/O Board)

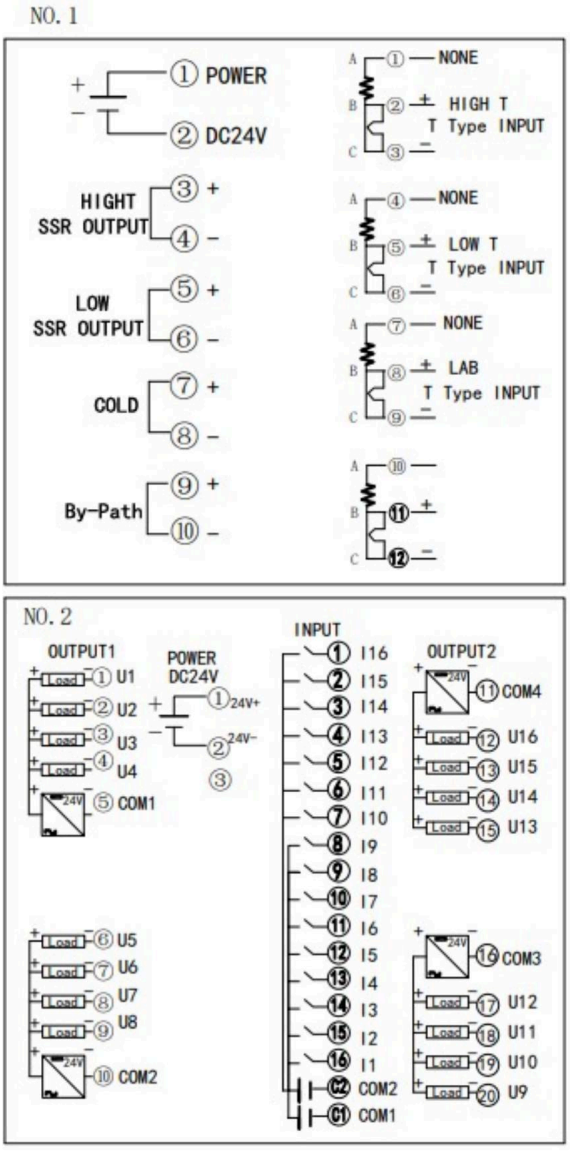


Figure 8-3 I/O terminal wiring (NO.1 and NO.2 terminal blocks)

Figure 8-3 shows the terminal assignment of the controller's I/O board as wired at the factory: 24 V DC power supply; high, low and test (LAB) temperature inputs (T-type sensors); high and low SSR outputs; cold and bypass outputs; relay outputs and digital inputs (DI).

! CAUTION

- Do not mix up the input polarity when connecting. Wrong polarity can cause the unit to malfunction.
- Wiring changes must only be made by LORDERAN-authorised service personnel.

CHAPTER 9

Input Keyboards

A keyboard opens automatically when an input field is tapped. The digital keyboard is used to enter set values; the alphabet keyboard is used to edit program names and DI names.

9.1 Digital Keyboard

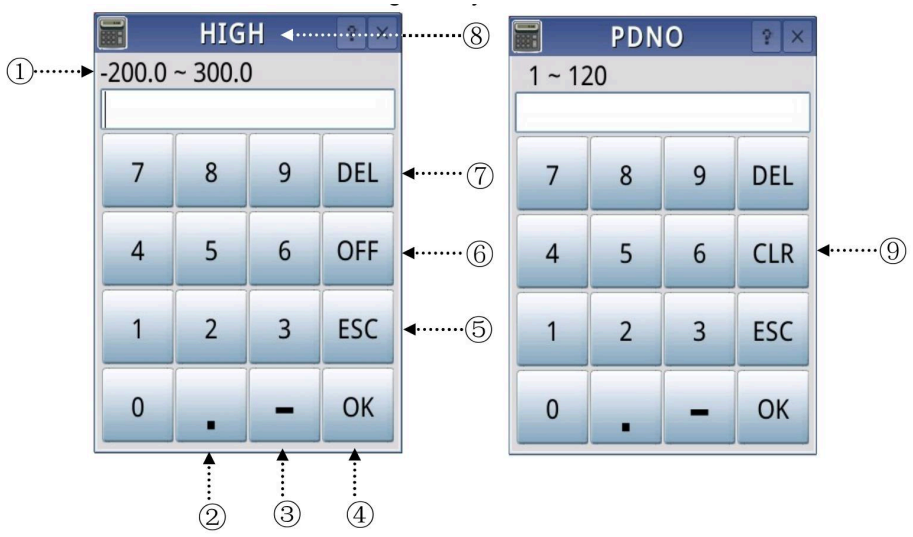


Figure 9-1 Digital keyboard (left: decimal entry; right: integer entry with CLR)

No.	Key / field	Function
①	Data range	Valid input range for this item (e.g. −200.0 – 300.0). Values outside the range are not accepted.
②	.	Decimal point.
③	–	Inputs the minus sign.
④	**OK**	Saves the input and closes the keyboard.
⑤	**ESC**	Cancels the input.
⑥	**OFF**	Closes the keyboard. For items that can be switched off, enters the value OFF.
⑦	**DEL**	Deletes the input characters one by one.
⑧	Title	Name of the item being edited.
⑨	**CLR**	Clears all input.

9.2 Alphabet Keyboard

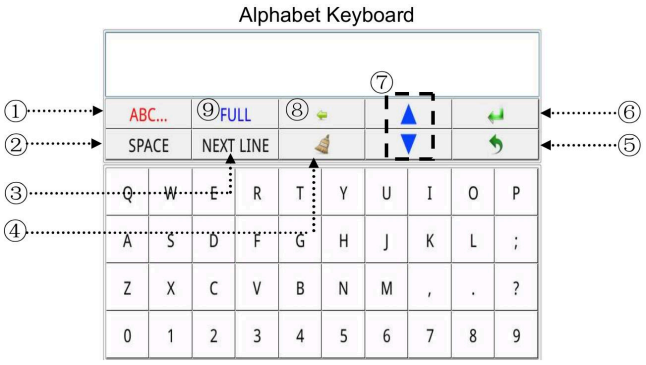


Figure 9-2 Alphabet keyboard

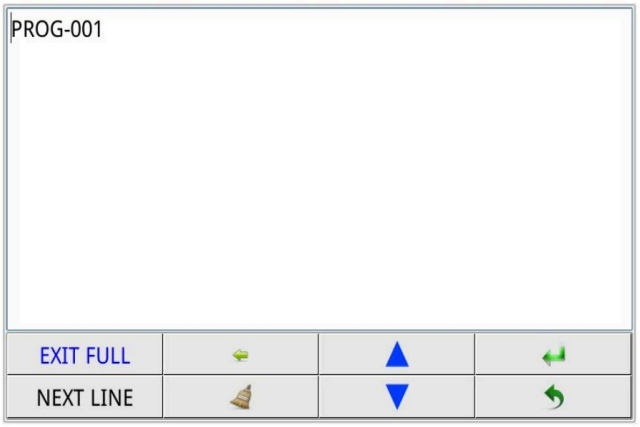


Figure 9-3 Full-screen editing

No.	Key	Function
①	**ABC...**	Switches the character set (ABC / Chinese / symbols, etc.).
②	**SPACE**	Inserts a space.
③	**NEXT LINE**	Moves to the next line.
④		Deletes all input.
⑤		Returns to the previous step without saving.
⑥		Saves the input and returns to the previous step.
⑦		Page up / page down.
⑧		Deletes the input characters one by one.
⑨	**FULL**	Full-screen display (Figure 9-3); **EXIT FULL** returns to normal size.

CHAPTER 10

Start-up and Main Screen

10.1 Start-up Sequence

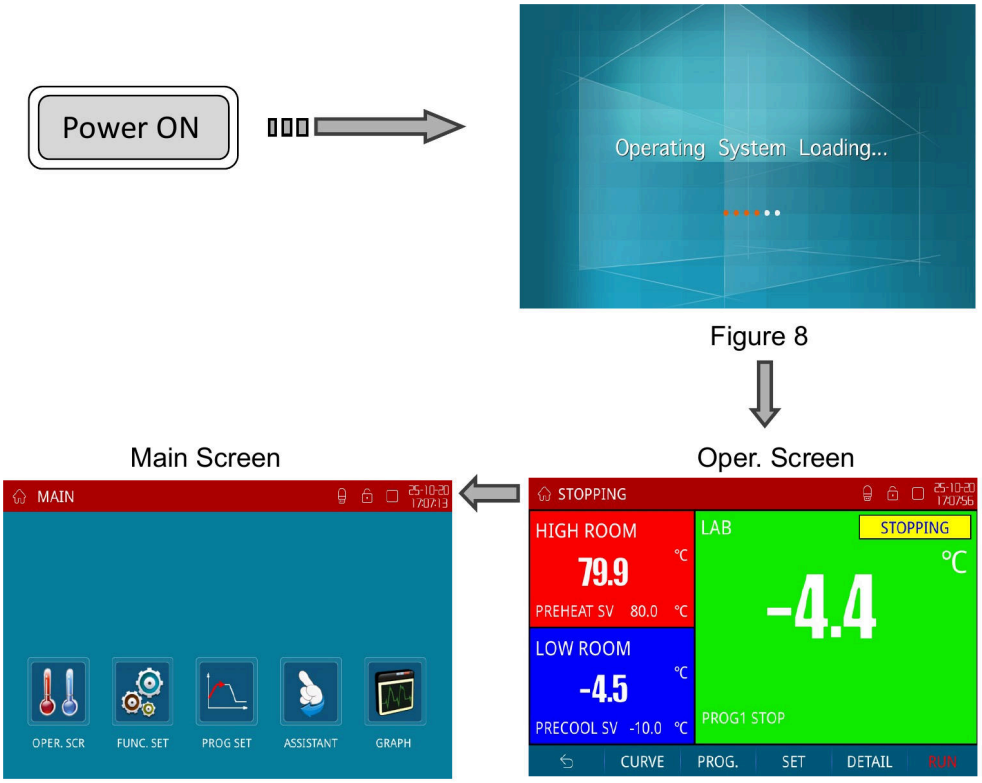


Figure 10-1 Basic processing: Power ON → Initial screen → Operation screen ⇄ Main screen

At power-on the controller displays the **initial screen** ("Operating System Loading...") and, after about **15 seconds**, enters the **operation (monitor) screen**. Tap the home icon to enter the **main screen**.

> **CAUTION**
>
> Do not touch the screen with a pen, pencil, fingernail or any other sharp object. The touch screen may be broken or fail.

10.2 Main Screen

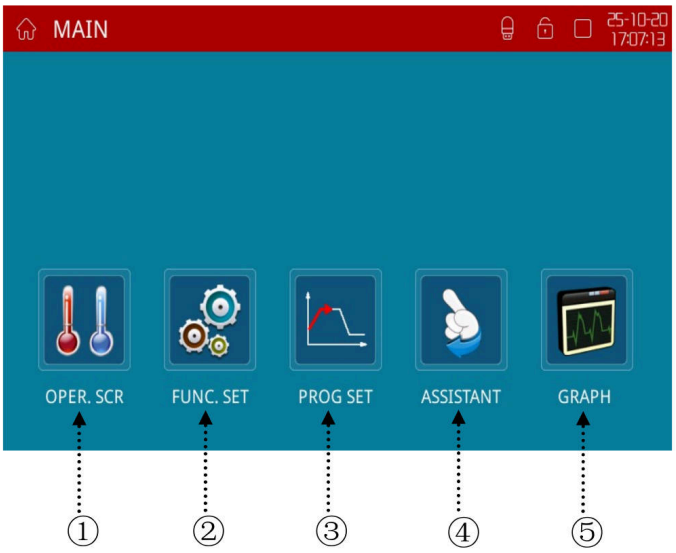


Figure 10-2 Main screen

The main screen is the centre from which all other screens are entered. Tap the home icon on any screen to return to it.

No.	Button	Opens
①	**OPER. SCR**	Operation screen — Ch. 11
②	**FUNC. SET**	Function setting screen — Ch. 12
③	**PROG SET**	Program setting screen — Ch. 15
④	**ASSISTANT**	Other set (system settings) — Ch. 14
⑤	**GRAPH**	Graph screen — Ch. 13

10.3 Title-Bar Icons

The following icons appear in the title bar of every screen.

Icon	Meaning
	Home: returns to the main screen.
	Test status (Stop / Run / End): tap once on any screen to switch to the monitor screen; tap again to come back.
	Keyboard lock: tap once to lock and twice to unlock input (password set in Chapter 14).
	USB: indicates that a USB drive is inserted; tap to eject safely.
TIME	Current date and time (YY-MM-DD hh:mm:ss).

CHAPTER 11

Operation Screen

Tap **OPER. SCR** on the main screen to open the operation screen. It shows the status of the high-temperature chamber, the low-temperature chamber and the test area (LAB), and is used to start and stop tests.

11.1 Stop Screen

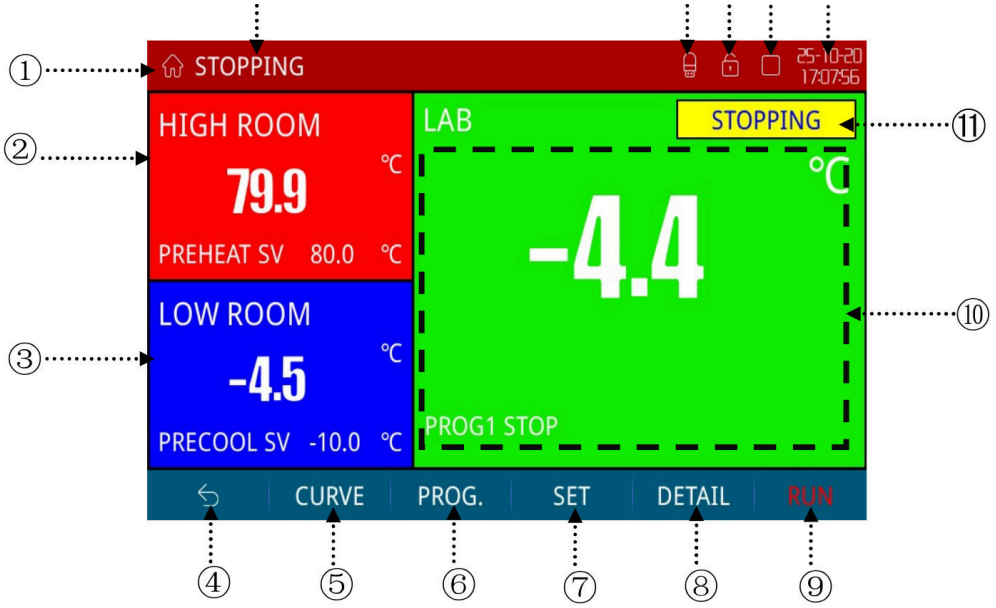


Figure 11-1 Operation screen while stopped

No.	Item	Description
①	Home	Enters the main screen (Ch. 10).
②	Red zone — **HIGH ROOM**	High-temperature chamber status. Large digits: current (PV) temperature of the high-temperature chamber. **PREHEAT SV:** its set value.
③	Blue zone — **LOW ROOM**	Low-temperature chamber status. Large digits: current (PV) temperature of the low-temperature chamber. **PRECOOL SV:** its set value.
④	Back arrow	Returns to the previous screen.
⑤	**CURVE**	Enters the graph screen (Ch. 13).
⑥	**PROG.**	Enters the program setting screen (Ch. 15).
⑦	**SET**	Enters the function setting screen (Ch. 12).
⑧	**DETAIL**	Switches to the test status screen (Section 11.3).
⑨	**RUN / STOP**	Starts or stops the test.

No.	Item	Description
⑩	Green zone — **LAB**	Test area (sample chamber) status. Large digits: current test-area temperature (PV). **PROG NO.:** current program number and status (e.g. PROG1 STOP). The current test name is also displayed.
⑪	Test status	Shows STOPPING or RUNNING.
⑫	Time	Current date and time.
⑬		Test status button (Stop/Run/End): tap once on any screen to switch to the monitor screen, twice to come back.
⑭		Locks the keyboard function.
⑮		Indicates that a USB drive is inserted.
⑯	Title	Name/status of the current screen.

11.2 Run Screen

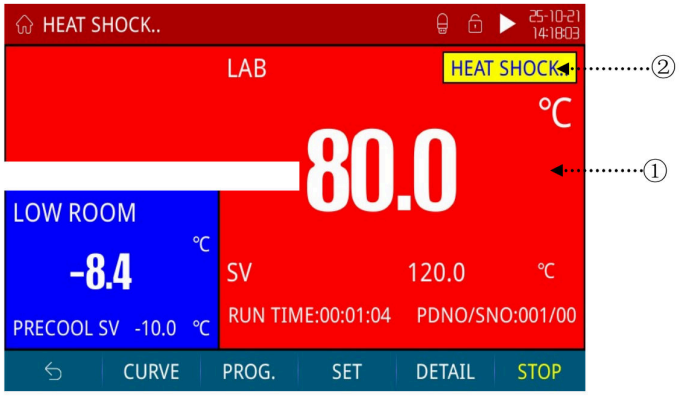


Figure 11-2 Operation screen while running

No.	Description
①	**Test-area status of the running test** (shown in the colour of the active zone — red during a high-temperature exposure): • Test mode (e.g. HEAT SHOCK) • Large digits: current test-area temperature • **SV:** set value of the running segment • **RUN TIME:** total running time of the test • **PDNO/SNO:** program no. (001) / segment no. (002)
②	Current test name / mode indicator.

! CAUTION — PAUSE vs. STOP

- **STOP** ends the current test, clears the recorded time and starts a new historical curve file at the next run.
- **PAUSE (Hold)** suspends the current test. Tap it again to continue the same test; the running time and recording continue in the same file.

11.3 Test Status (DETAIL)

Tap **DETAIL** on the operation screen (Figure 11-1, ⑧) to open the test status screen.

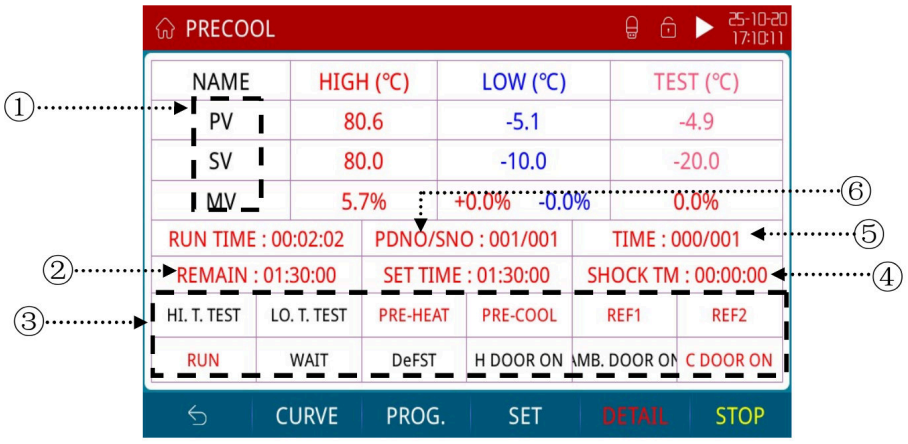


Figure 11-3 Test status screen

No.	Item	Description
①	PV / SV / MV	For each zone (HIGH, LOW, TEST): **PV** present value; **SV** set value of the current segment; **MV** control output (%).
②	REMAIN	Remaining time of the fixed-mode set time or of the running segment (SET TIME shows the segment time).
③	Status lamps	Each lamp represents a relay/status signal; it turns **red** when active: HI. T. TEST, LO. T. TEST, PRE-HEAT, PRE-COOL, REF1, REF2, RUN, WAIT, DeFST (defrost), H DOOR ON, AMB. DOOR ON, C DOOR ON.
④	SHOCK TM	Cold or hot shock (exposure) time.
⑤	TIME (cycles)	Program cycle count: cycles completed (000) / cycles set (001).
⑥	PDNO/SNO	Program number (001) / segment number (001) of the running program. RUN TIME shows the elapsed time.

> **! CAUTION**
>
> Test values cannot be modified while a test is running.

CHAPTER 12

Function Settings

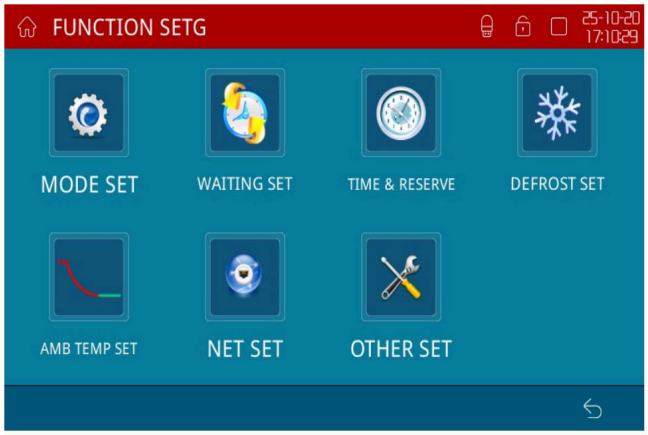


Figure 12-1 Function setting screen

Tap **FUNC. SET** on the main screen (or **SET** on the operation screen) to open the function setting screen.

Icon	Function	See
MODE SET	Program number to run; boot (power-failure) mode	12.1
WAITING SET	Standby (waiting) function	12.2
TIME & RESERVE	Clock and scheduled start	12.3
DEFROST SET	Defrost of the low-temperature chamber	12.4
AMB TEMP SET	Return to normal (ambient) temperature	12.5
NET SET	Network communication	12.6
OTHER SET	System settings	Ch. 14

12.1 Mode Set

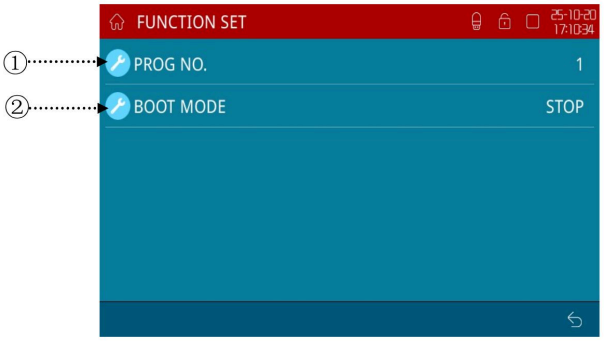


Figure 12-2 Mode set

① **PROG NO.:** selects the program number to be run in program mode.

② **BOOT MODE:** selects how the controller recovers when power fails during a test and is then restored.

Boot mode	Behaviour after power is restored	Test restarts
STOP	Restores the SV of the program or fixed mode that was running, but the test is stopped.	Manually

Boot mode	Behaviour after power is restored	Test restarts
COLD	Restarts from the **first segment** of the program that was running, or with the fixed-mode SV that was running.	Automatically
HOT	Resumes from the **segment that was running** when power failed, or with the fixed-mode SV.	Automatically

12.2 Waiting Set



Figure 12-3 Waiting set

The waiting (standby) function holds the program until the chamber temperature has reached the target zone, so that the exposure time is only counted once the temperature is within range.

① **WAIT SW.:** turns the waiting function ON or OFF.

② **WAIT TIME:** maximum waiting time. When it is exceeded, waiting is cancelled and the program continues.

③ **HIGH TEMP WAIT RANGE:** band (°C) around the high-temperature set value within which the high-temperature exposure starts.

④ **LOW TEMP WAIT RANGE:** band (°C) around the low-temperature set value within which the low-temperature exposure starts.

12.3 Time & Reserve



Figure 12-4 Date / time and reserve

① **CUR. TIME:** sets the controller's current date and time.

② **RESERVE START:** turns the scheduled-start function ON or OFF. Enabling it opens a time-setting window; the reserved start time is then shown on the monitor screen. The scheduled time must be later than the current time.

12.4 Defrost Set

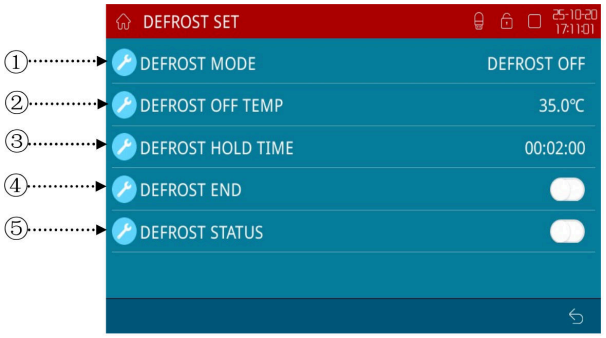


Figure 12-5 Defrost set

① **DEFROST MODE:** selects the defrost mode (table below).

② **DEFROST OFF TEMP:** temperature at which defrosting ends.

③ **DEFROST HOLD TIME:** holding time of the defrost. Defrosting runs for this time and switches off when the countdown ends.

④ **DEFROST END:** ON = perform one more defrost after the test has finished.

⑤ **DEFROST STATUS:** manual defrost (start defrosting now).

Mode	Description
None	Defrost function OFF.
Time	Defrost is triggered by a time interval. Both conditions must be met at the same time: a low-temperature exposure has ended **and** the set interval has elapsed. Set the interval together with the program segment times.
Cycle	Defrost is triggered after a set number of low-temperature exposures. Set it together with the program cycle count. *Example:* Cycle = 5 → defrosting starts after every 5 low-temperature exposures.

NOTE Moisture entering the cold chamber freezes on the evaporator and reduces cooling performance. For long tests with many cycles, enable periodic defrosting; also see Section 4.2 (door opening) and Section 6.2.

12.5 Normal (Ambient Temperature) Set

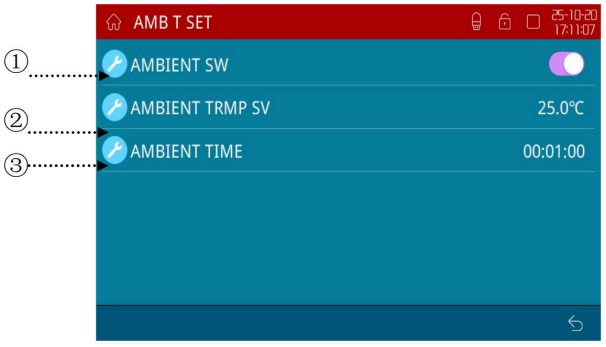


Figure 12-6 Ambient temperature set

① **AMBIENT SW (come back normal):** ON = after the test finishes, the controller brings the test area back to the normal set value.

② **AMBIENT TEMP SV (normal SV):** the normal temperature value.

③ **AMBIENT TIME:** how long the normal temperature is maintained after it has been reached.

Returning to normal temperature before opening the door prevents burns, frostbite and frost on the specimens (Section 4.2).

12.6 Net Setting



Figure 12-7 Net config, page 1/2

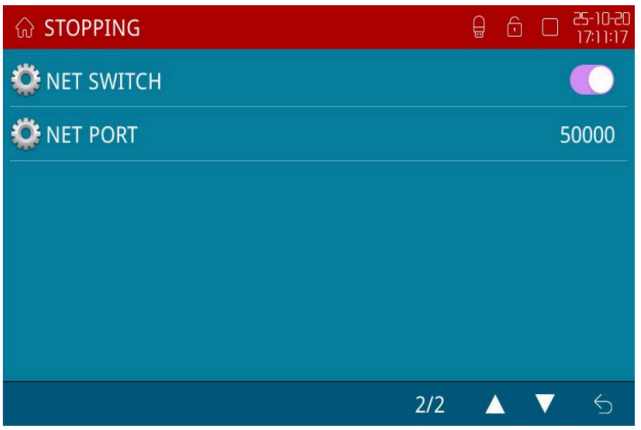


Figure 12-8 Net config, page 2/2

Parameter	Example value	Description
CONTROLLER IP	192.168.1.220	IP address of the controller. Must not conflict with any other device on the network.
SUBNET MASK	255.255.255.0	Must match the subnet mask of the local network (router).
NET GATE	192.168.1.1	Gateway — normally the router's IP address.
MAC	CD:12:03:11:43:02	Hardware address of the controller (display).
DNS1 / DNS2	192.168.1.1	DNS servers.
NET SWITCH	ON / OFF	Enables or disables network communication.
NET PORT	50000	Communication port used by the PC software.

CAUTION

- The net setting function is used for communication between the controller and a computer.
- The CONTROLLER IP must not conflict with another IP address on the network.
- The SUBNET MASK must be the same as that of the router / local network.

CHAPTER 13

Graph and Data Management

13.1 Graph Screen

Tap **GRAPH** on the main screen (or **CURVE** on the operation screen) to open the graph screen.

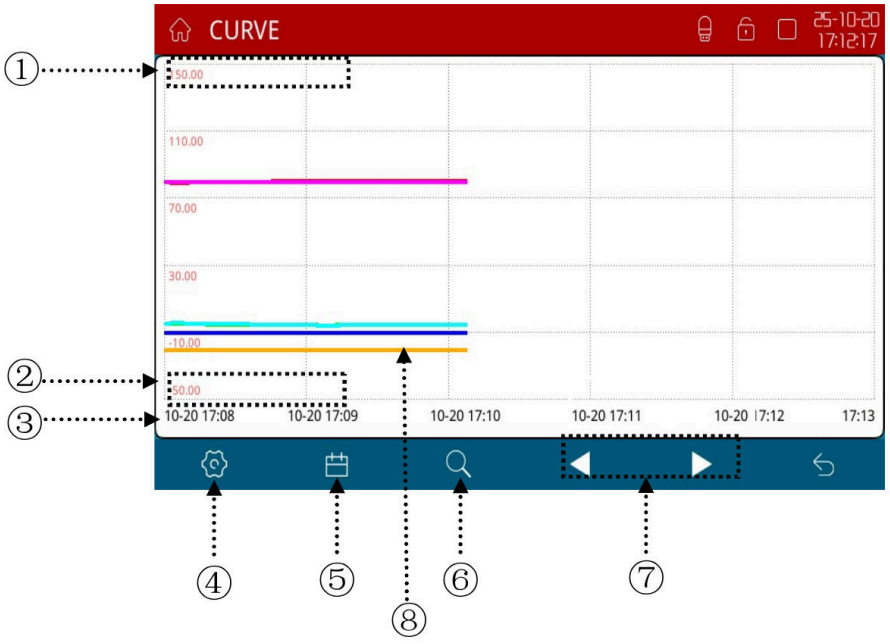


Figure 13-1 Graph screen

No.	Item	Description
①	Highest display point	Tap the top scale value to set the upper limit of the display range.
②	Lowest display point	Tap the bottom scale value to set the lower limit of the display range.
③	Time display	Recorded time of the displayed curve.
④		Opens the curve settings (Other Set) screen — Section 13.2.
⑤		Opens the file list — Section 13.3.
⑥		Time scale zooming — Section 13.6.
⑦		Moves to the previous / next time period of the curve.
⑧	Curve select	Tap any point in the curve area to select which curves are displayed — Section 13.7.

13.2 Curve Settings (Other Set)

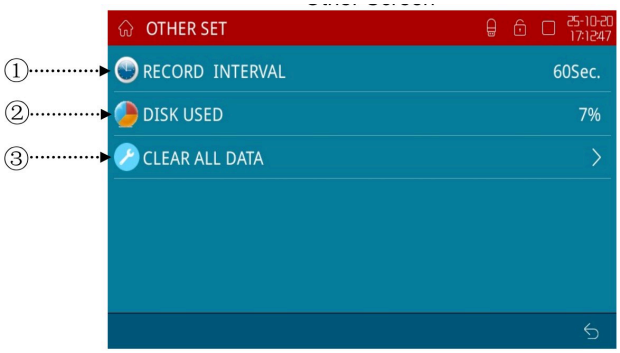


Figure 13-2 Curve settings

① **RECORD INTERVAL:** curve recording interval of the test (default 60 s; at 60 s about one year of data can be stored).

② **DISK USED:** percentage of the controller's storage in use.

③ **CLEAR ALL DATA:** deletes all curve data after confirmation. Deleted data cannot be recovered — export first.

13.3 File List

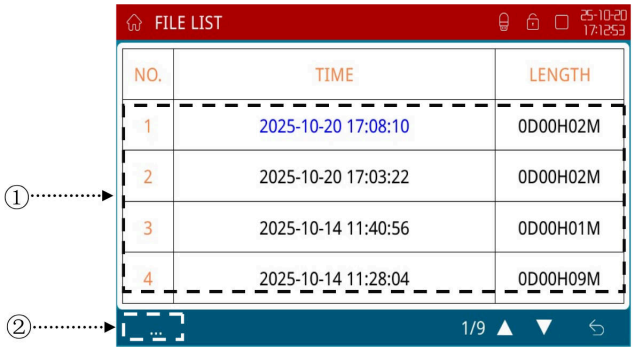


Figure 13-3 File list

① **Historical file:** tap a file to review its curve and table, export it or delete it (Section 13.4).

② **Ellipsis (...):** opens the sorting / navigation options for the file list (Section 13.5).

Each row shows the file number, start TIME and LENGTH (recorded duration, e.g. 0D00H02M = 0 days 0 hours 2 minutes).

CAUTION

A new historical file is generated automatically each time the controller starts up. If no test is started, this file contains no test data and shows a short time length, as in the example on the right.

NO.	TIME	LENGTH
1	2024-10-29 15:25:04	0D00H02M

13.4 Historical File Management and Table View

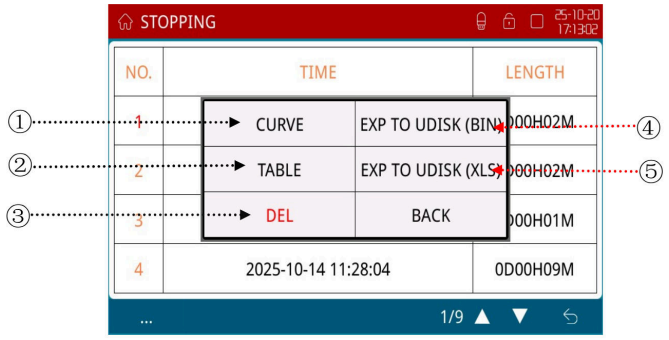


Figure 13-4 Historical file options

① **CURVE:** shows the curve of this historical file.

② **TABLE:** shows the data of this file as a table (below).

③ **DEL:** deletes the selected historical file.

④ **EXP TO UDISK (BIN):** exports the file to the USB drive in binary format.

⑤ **EXP TO UDISK (XLS):** exports the file in Excel format.

> **NOTE** Options ④ and ⑤ are available only when a USB drive is inserted. Wait until the progress reaches 100 % before removing the drive.

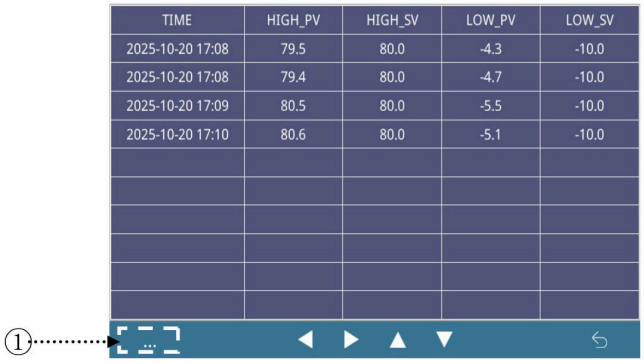


Figure 13-5 Table view

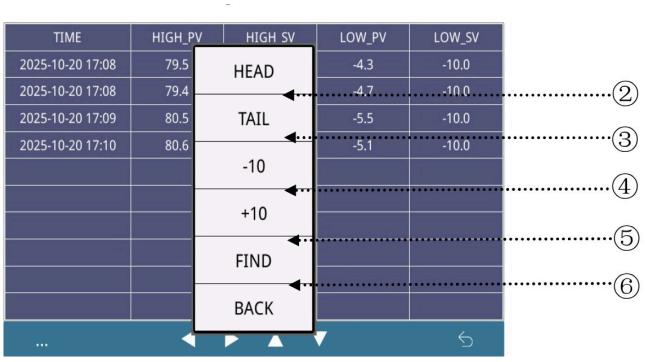


Figure 13-6 Table navigation menu

The table lists TIME, HIGH_PV, HIGH_SV, LOW_PV and LOW_SV for each record. Tap the ellipsis ① to open the navigation menu:

②	**HEAD**	Jumps to the first page of the table.
③	**TAIL**	Jumps to the last page of the table.
④	**−10**	Jumps back 10 pages.
⑤	**+10**	Jumps forward 10 pages.
⑥	**FIND**	Opens a date/time keyboard; enter a time and tap OK to jump to that point in the table.

13.5 Sorting the File List

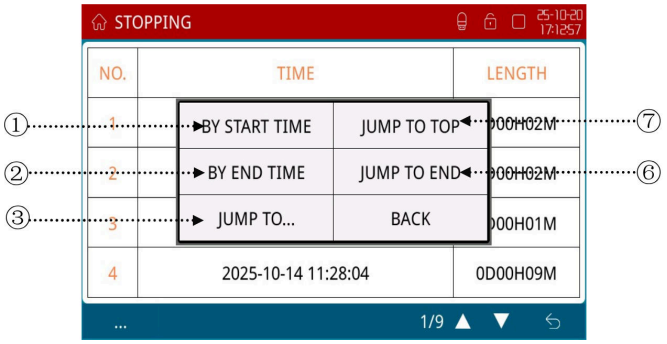


Figure 13-7 File list order and navigation

1. **BY START TIME:** sorts files by start time, oldest first.
2. **BY END TIME:** sorts files by end time, newest first.
3. **JUMP TO...:** enter a page number to jump to it.
4. **JUMP TO END:** jumps to the last page of historical files.
5. **JUMP TO TOP:** jumps to the first page of historical files.

BACK closes the menu.

13.6 Time Scale Zooming

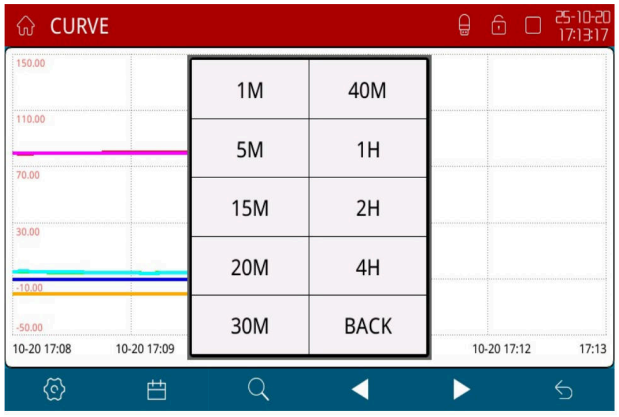


Figure 13-8 Time scale selection

Tap the zoom icon on the graph screen and select the time span of the screen: **1M, 5M, 15M, 20M, 30M, 40M, 1H, 2H, 4H** (M = minutes, H = hours per grid division). The time axis changes as follows:

Scale	Axis labels (5 grid lines)	Total span
1M	0M · 1M · 2M · 3M · 4M	4 min
5M	0M · 5M · 10M · 15M · 20M	20 min
15M	0M · 15M · 30M · 45M · 1H	1 h
20M	0M · 20M · 40M · 1H · 1H 20M	1 h 20 min
30M	0M · 30M · 1H · 1H 30M · 2H	2 h
40M	0H · 40M · 1H 20M · 2H · 2H 40M	2 h 40 min
1H	0H · 1H · 2H · 3H · 4H	4 h
2H	0H · 2H · 4H · 6H · 8H	8 h
4H	0H · 4H · 8H · 12H · 16H	16 h

13.7 Curve Select and Cursor

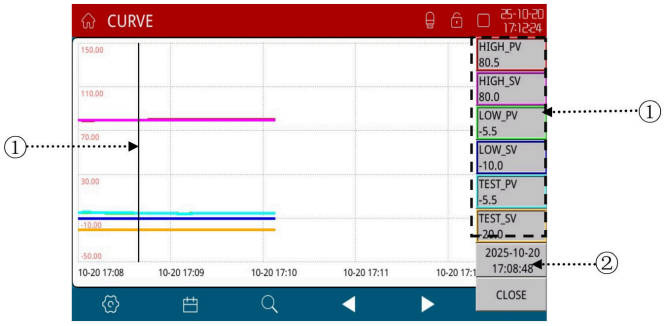


Figure 13-9 Curve select with cursor

① Tap any point in the curve area: a black cursor line appears, and the **curve select** list opens on the right (HIGH_PV, HIGH_SV, LOW_PV, LOW_SV, TEST_PV, TEST_SV). Drag the cursor to review the values at any time; select or deselect curves in the list. Tap **CLOSE** to close the list.

② **Corresponding recorded time:** as the cursor moves, the recorded time at the cursor position is displayed.

CHAPTER 14

Other Set (System Settings)

Tap **ASSISTANT** on the main screen, or **OTHER SET** on the function setting screen, to open the system settings.

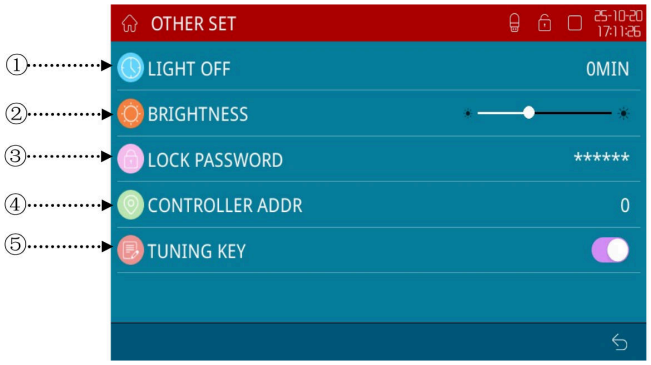


Figure 14-1 Other set screen

1. **LIGHT OFF:** time after which the screen backlight switches off (0MIN = always on).
2. **BRIGHTNESS:** adjusts the LCD brightness.
3. **LOCK PASSWORD:** password for the keyboard lock. Initial value **"0"** = password disabled. Tap the lock icon in the title bar once to lock and twice to unlock. Once a new password is set, set values cannot be entered or modified without the correct password.
4. **CONTROLLER ADDR:** communication address of the controller.
5. **TUNING KEY:** shows or hides the AT (auto-tuning) button on the fixed-mode operation screen.

> **NOTE** Record the lock password in a safe place. Auto-tuning (AT) changes the control parameters; use it only on the advice of LORDERAN.

CHAPTER 15

Program Setting

A program defines the thermal shock test: the sequence of low- and high-temperature exposures, their temperatures and times, and the number of cycles.

15.1 Program List

Tap **PROG SET** on the main screen (or **PROG.** on the operation screen) to open the program list.

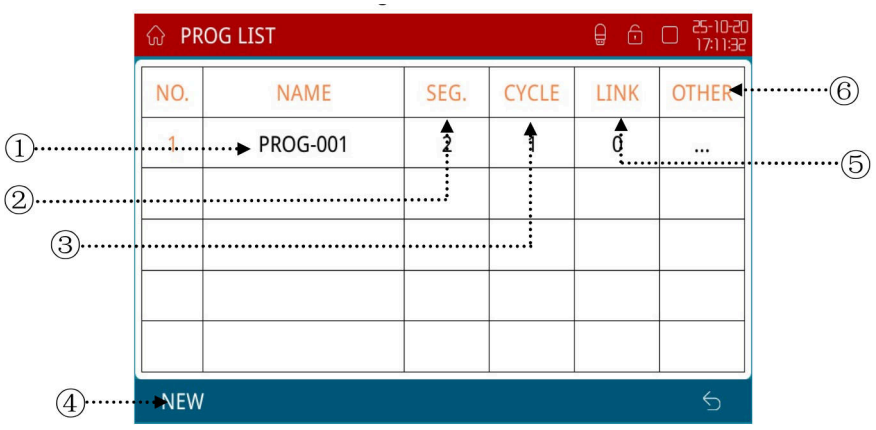


Figure 15-1 Program list

No.	Column / button	Function
①	**NAME**	Tap to edit the program name with the alphabet keyboard (Section 9.2).
②	**SEG.**	Number of segments; tap to edit the segments (Section 15.2).
③	**CYCLE**	Number of times the program is repeated.
④	**NEW**	Adds a new program.
⑤	**LINK**	Number of the program to run next after this one finishes (0 = no link).
⑥	**OTHER**	Other program functions (Section 15.3).

15.2 Edit Segment

Tap the **SEG.** column of a program to open its segment editor.

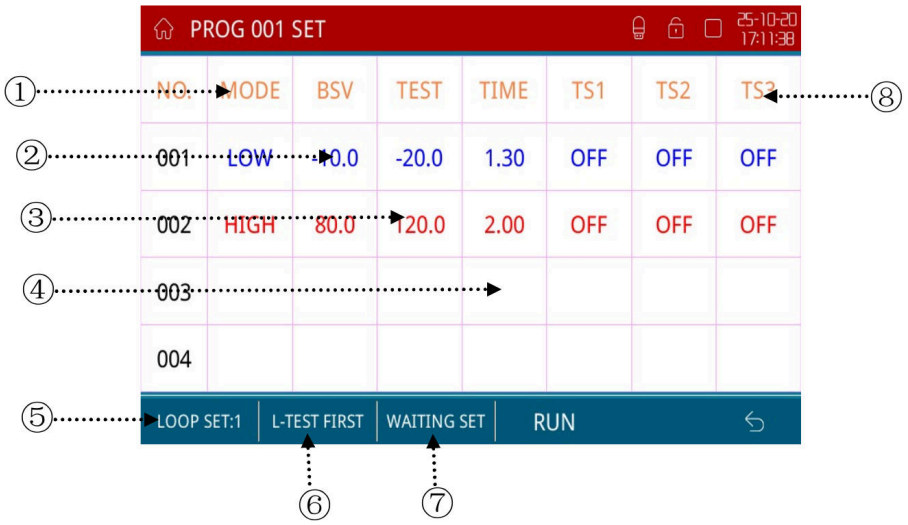


Figure 15-2 Edit segment screen (PROG 001)

No.	Column / button	Function
①	**MODE**	Exposure zone of the segment: **LOW** (low-temperature chamber) or **HIGH** (high-temperature chamber).
②	**BSV** (pre-SV)	Pre-cooling (LOW) or pre-heating (HIGH) set value of the corresponding chamber.
③	**TEST**	Test temperature set value of the test area for this segment.
④	**TIME**	Duration (exposure time) of the segment.
⑤	**LOOP SET**	Opens the loop (cycle) setting.
⑥	**L-TEST FIRST / H-TEST FIRST**	Selects whether the program starts with the low- or high-temperature exposure.
⑦	**WAITING SET**	Waiting function for the program (Section 12.2).
⑧	**TS1 – TS3**	Time-signal outputs: ON/OFF per segment.

! CAUTION — TIME FORMAT

Where a time field has no unit such as HH.MM.SS, the value is **hours.minutes**: 0.01 = 1 min, **0.30 = 30 min**, **1.00 = 1 hour**, 1.30 = 1 h 30 min.

REF Example: reading the program in Figure 15-2

SEG	MODE	BSV	TEST	TIME	Meaning
001	**LOW**	−10.0 °C	−20.0 °C	1.30	Low-temperature exposure at −20 °C for 1 h 30 min; the low-temperature chamber is pre-cooled to −10 °C.
002	**HIGH**	80.0 °C	120.0 °C	2.00	High-temperature exposure at 120 °C for 2 h; the high-temperature chamber is pre-heated to 80 °C.

With LOOP SET 1 and L-TEST FIRST, the program runs one cycle starting with the low-temperature exposure. Increase the loop/cycle count for repeated thermal shock cycles. Keep all values within the temperature and shock ranges of your unit (Section 2.2).

15.3 Program Other Functions

Tap the **OTHER** column of a program to open its options.

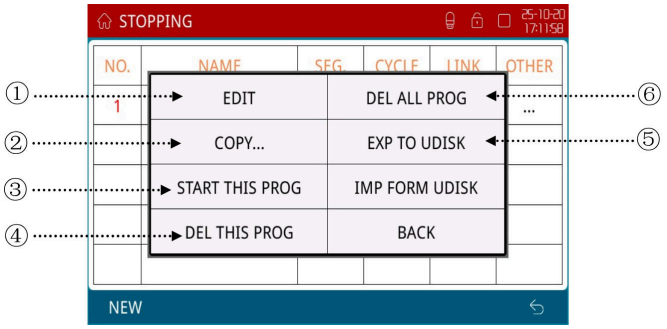


Figure 15-3 Program options

1. **EDIT:** edits this program's details.
2. **COPY...:** copies this program's set values to a target program. Example: select program 1, tap COPY and enter target no. 3 — program 3 keeps its name but its set values become the same as program 1.
3. **START THIS PROG:** starts the selected program.
4. **DEL THIS PROG:** deletes the selected program.
5. **EXP TO UDISK:** exports the program to a USB drive.
6. **DEL ALL PROG:** deletes all programs.

IMP FORM UDISK imports a program from a USB drive; **BACK** closes the menu.

> **NOTE** USB import/export is available only when a USB drive is inserted.

APPENDIX A

Quick Reference of Controller Terms

Term	Meaning
PV	Present value — measured temperature.
SV	Set value — target temperature.
MV	Manipulated value — control output (%).
HIGH ROOM	High-temperature (hot) chamber.
LOW ROOM	Low-temperature (cold) chamber.
LAB / TEST	Test area where the specimens (basket) are located.
PREHEAT SV / PRECOOL SV (BSV)	Standby set values of the hot / cold chamber, reached before the basket transfers.
PDNO / SNO	Program number / segment number.
SHOCK TM	Exposure (shock) time.
FIX mode	Fixed-value operation at constant set values.
PROG mode	Program operation following programmed segments.
DeFST	Defrost.
TS1 – TS3	Time-signal outputs.
AT	Auto-tuning of control parameters.
UDISK	USB flash drive.

APPENDIX B

Product Warranty Card

Product model	
Product name	Two-Zone Thermal Shock Test Chamber
Serial number (see equipment nameplate)	(to be filled in by the user)
Date of manufacture (see nameplate)	(to be filled in by the user)
Date of purchase	
Manufacturer	LORDERAN INC
Phone	805-304-9498

Important notes

1. The product is covered by a **three-year warranty** from the date of purchase. During the warranty period the product will be inspected in accordance with the manufacturer's instruction manual; if it fails to meet the technical requirements and is unusable, LORDERAN will honour the "Three Guarantees" policy (repair, replacement, refund).
2. The time spent on free repairs is not counted toward the warranty period.
3. The "Three Guarantees" policy does not apply to:
   a. Damage caused by the user's improper storage or use;
   b. Damage caused by unauthorised disassembly or replacement of parts by the user;
   c. Damage caused by reasons other than manufacturing defects, including fire, flood and other acts of God, loss of password, improper installation, improper or unauthorised repairs, and units whose serial number is missing or altered.
4. All warranty repairs must be performed by LORDERAN or its authorised service centre.
5. LORDERAN is not responsible for incidental or consequential damage or loss suffered by the user or a third party through the use of this product, beyond the obligations stated in this warranty.

Repair records

Date	Maintenance / repair performed	Signature

LORDERAN

Two-Zone Thermal Shock Chamber — User Manual

The contents of this manual are subject to change without notice due to feature upgrades or other reasons.
If you have any questions regarding this manual, please contact LORDERAN · 805-304-9498