Instruction manual SMART PRO

Laboratory freezers

models: **ZLN 85**
ZLN-T 125, ZLN-T 200, ZLN-T 300
ZLW-T 200, ZLW-T 300

Ultra-low freezers

models: **ZLN-UT 200 VIP, ZLN-UT 300 VIP, ZLN-UT 500 VIP**

Before using the equipment, please read carefully this instruction manual!

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CE

Manufacturer's address:

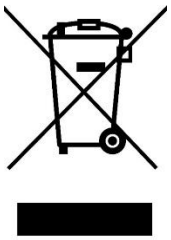
POL-EKO A.Polok-Kowalska sp.k.
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44-300 Wodzisław Śląski
Country of origin: Polska

As the manufacturer of this device, we want to assure you that we have taken every step to ensure it meets your expectations and provides reliable performance over a long period of use. We are constantly improving our products and expanding our offerings, so we welcome any suggestions you may have regarding additional features or operational enhancements. Please feel free to visit our website at www.pol-eko.com.pl for more information.

The manufacturer takes every possible measure to eliminate post-production contamination. However, small oily residues from material processing, such as contact between tools and the processed parts, may still be present. To remove these residues, use a soft cloth or paper towel dampened with warm water and a degreasing solution.

As a manufacturer, we inform you that we took the necessary measures to ensure that this device fully meets your expectations and is reliable for a long period of use. Due to the continuous improvement of our products, as well as the expansion of our offer, any suggestions regarding additional functions and equipment functioning are welcome. Visit our homepage www.pol-eko.com.pl/home-en/

Equipment disposal



This equipment is marked with the crossed out wheeled bin symbol to indicate that this equipment must not be disposed of with unsorted waste. Instead it's your responsibility to correctly dispose of your equipment at lifecycle -end by handling it over to an authorized facility for separate collection and recycling. It's also your responsibility to decontaminate the equipment in case of biological, chemical and/or radiological contamination, so as to protect from health hazards the persons involved in the disposal and recycling of the equipment. For more information about where you can drop off your waste of equipment, please contact your local dealer from whom you originally purchased this equipment.

By doing so, you will help to conserve natural and environmental resources and you will ensure that your equipment is recycled in a manner that protects human health.

Thank you!

Contents:

1. INTENDED USE AND IMPORTANT INFORMATION FOR THE USER 6

2. PACKAGE CONTENTS 7

3. BEFORE THE FIRST USE 7

3.1. Installation of shelves 9

3.2. Remarks on the placement of samples 12

3.3. Closing chamber door 12

3.4. Anchoring two-chamber equipment 13

4. DESCRIPTION OF THE DEVICE 14

4.1. Design of ZLN 85 14

4.2. Design of ZLN-T 125, ZLN-T 200, ZLN-T 300, ZLW 200, ZLW 300 devices 16

4.3. Design of ZLN-UT 200 VIP, ZLN-UT 300 VIP, ZLN-UT 500 VIP devices 18

5. DEVICE EQUIPMENT (standard and optional) 20

5.1. Internal door (standard for ZLN-UT VIP) 20

5.2. Door lock (standard for all units) 20

5.3. Access port for external sensor (standard for all units) 20

5.4. Open door alarm (standard for all units) 20

5.5. USB port (standard for all units) 21

5.6. Display battery backup (optionally for ZLN, ZLN-T, ZLW-T, standard for ZLN-UT VIP) 22

6. DEVICE OPERATION 22

6.1. External memory (USB flash drive) 22

6.2. First boot 23

6.3. Using the keypad 24

6.4. User logging in 24

6.5.  Main screen 26

6.5.1. Information panel 27

6.5.2. The meaning of icons and symbols 28

6.5.3. Upper expandable and configurable menu 30

6.5.4.  Quick Note – user's message 31

6.5.5. Alarm bar 32

6.6. Quick Program 32

6.7.  Programs 34

6.7.1. Creating / editing a program 34

6.7.2. Segments edition 35

6.7.3. Summary of segments 37

6.7.4. Priority 37
6.7.5. Loop 38
6.7.6. Defrosting of ZLN, ZLN-T, ZLN-UT VIP devices 38
6.8. Starting the program 38
6.8.1. The first way 39
6.8.2. The second way 40
6.9. Quick Change of parameters 40
6.9.1. Quick change of set temperature 41
6.9.2. Quick change of set time 41
6.10. Schedules 42
6.10.1. Creating / editing a schedule 43
6.10.2. Starting a schedule 46
6.11. Statistics 48
6.12. Data record 48
6.12.1. Graph 50
6.12.2. Data storage directly on a USB flash drive 51
6.13. Event log 52
6.14. Info 55
6.15. Users 56
6.15.1. Creating / editing a user 57
6.15.2. Account types and their limits 58
6.16. User settings panel (language, dimmed screen, etc.) 60
6.16.1. Unlocking the touch screen 61
6.17. Time 62
6.18. Alarms 63
6.18.1. STM function 64
6.18.2. Mute option 66
6.19. Network 66
6.20. E-mail reports 68
6.21. Automatic defrosting function (standard for ZLW-T) 70
6.22. Temperature – additional temperature sensor Pt 100 (option) 71
6.23. Corrections 72
7. INTERFACE 73

7.1. MODBUS TCP ... 73

8. co_2 back-up SYSTEM (OPTIONALLY FOR ZLN-UT VIP) ... 73

8.1. Indications for using pressure cylinders ... 74
8.1.1. Characteristics of carbon dioxide ... 74
8.1.2.  Hazards when working with CO2 ... 74
8.1.3. Personal protection ... 74
8.1.4. Control devices ... 75
8.1.5. First aid ... 75
8.2. User's responsibility ... 76
8.3. Emergency shutdown of the CO2 back-up system ... 76
8.4. Connecting the freezer to a CO2 cylinder ... 77
8.5. Disconnecting the freezer from the CO2 cylinder ... 79
8.6. CO_2 Backup solenoid valve ... 79
8.7. Starting the device ... 79

9. CONNECTING THE DEVICE TO A COMPUTER ... 80

10. CLEANING AND MAINTENANCE OF THE DEVICE ... 80

10.1. Exterior cleaning ... 80
10.2. Interior cleaning ... 81
10.3. Cleaning the touch screen ... 82
10.4. Consumables ... 83

11. ADVICE ON HOW TO SAFELY STORE THE DEVICE ... 83

12. TROUBLESHOOTING ... 83

12.1. Possible defects ... 84

13. WARRANTY CONDITIONS ... 84

14. RATING PLATE ... 85

15. TECHNICAL DATA ... 86

15.1. ZLN, ZLN-T, ZLW-T devices ... 86
15.2. ZLN, ZLN-UT VIP devices ... 88

16. DECLARATIONS OF CONFORMITY ... 90

1. INTENDED USE AND IMPORTANT INFORMATION FOR THE USER

Laboratory freezers are laboratory equipment intended for freezing and storage of frozen samples below 0°C:

- laboratory freezer ZLN: -25°C … 0°C
- laboratory freezer ZLN-T: -40°C … 0°C
- laboratory freezer ZLW-T: -40°C … 0°C
- ultra-low freezer ZLN-UT VIP: -86°C...-50°C

All devices are controlled by a precise SMART PRO controller, thanks to which the set temperature is maintained with good fluctuation and variation. The ZLN 85 freezer is also available in a 2-chamber version with ST thermostatic cabinet or CHL laboratory refrigerator, where each chamber is independently controlled – for service and operation of ST and CHL devices, see the relevant instruction manual. In 2-chamber devices, the freezer is always at the bottom.

For devices with forced air convection, the symbol  appears on the screen.

The meaning of information symbols

	**This symbol means that failure to follow the instructions could endanger people's health or life, or damage the device. The manufacturer is not liable for damages resulting from non-compliance with the instructions contained in the manual.**
	**A flammable coolant is used in the cooling system. If the cooling system is damaged, ventilate the room carefully and remove all open flames near the unit.**
	**There are extremely low temperatures inside the chamber so do not touch the samples and the interior of the chamber without suitable protective gloves.**
	This symbol indicates helpful tips.

To guarantee your security and the longevity of the unit, please comply with the following rules:

1.	**The unit cannot be installed:** • outside, • in damp places or places which can be easily flooded, • near flammable or volatile substances, • near acids or in corrosive environments.
2.	**It is forbidden to:** • store inflammable or volatile substances inside the unit, • touch live parts of the unit, • operate the unit with wet hands, • put water vessels on the unit, • climb on the unit, • overload the shelves (the maximum load is described in technical data), • place objects on the bottom of the chamber.
3.	**You should:** • place samples in such a way to provide proper air circulation in the chamber, • open the door for the shortest period of time to reduce temperature fluctuations, • secure samples from being blown out by the chamber fan e.g powdery samples, • always check that the doors are closed correctly, • use only mains with earth to avoid electric shocks, • unplug the power cable holding the protective cover and not the cable itself, • disconnect the unit from the mains before undertaking any repairs or maintenance work (in order to not lose the warranty during its duration, all repairs should be carried out by an authorized service),

	• protect the power cable and the plug from any damage, • disconnect the power plug before moving the unit, • disconnect the power plug if the device will not be used for a long period of time, • disconnect the unit and protect it from reconnecting if it has any visual fault.

Failure to comply with the above recommendations may result in damage to the device or deterioration of technical parameters, as well as loss of warranty.

2. PACKAGE CONTENTS

Laboratory freezers in SMART PRO version are delivered with:

Device	ZLN	ZLN-T			ZLW -T		ZLN-UT VIP			
Capacity	85	125	200	300	200	300	130	200	300	500
Shelves [pcs.]	2	2	2	3	2	3	1	2	2	4
Slides [pcs.]	4	4	4	6	4	6	x	x	x	x
Power cord [pcs.]	1	1	1	1	1	1	1	1	1	1
Silicone cap [pcs.]	2	2	2	2	2	2	2	2	2	2
Key for door lock [pcs.]	2	2	2	2	2	2	2	2	2	2
Ethernet cable [pcs.]	1	1	1	1	1	1	1	1	1	1
Lab Desk program (in the internal memory of the equipment)	1	1	1	1	1	1	1	1	1	1
Wrench (13mm) for wheels adjustment [pcs.]	x	x	x	1	x	1	1	1	1	1
Quality Control Certificate [pcs.]	1	1	1	1	1	1	1	1	1	1

3. BEFORE THE FIRST USE

The manufacturer sends the device protected by cardboard profiles and foil. The device **should be transported in an upright position** and the package should be secured against sliding during transport.

	**After receiving the device, visually assess its condition and equipment in the presence of the person delivering the goods. A courier company is responsible for any damage caused during transport.**

	**While carrying the unit, do not tilt it to one side more than 45° from the upright position, as there is a high probability of damaging the compressor. If it is necessary to tilt it to one side more than 45°, then after placing it, please wait about 3 hours before connecting the unit to the mains.**

	**After transporting the device at a temperature below 10°C, wait at least 2 hours before connecting it to the mains.**

On the surface of unit's components made of stainless steel, slight discoloration may occur. It is a result of the technologies used in the production of metal sheet in accordance with the requirements of PN-EN 10088-2 standard and it is not a defect of the unit.

The place of installation of the unit should meet the following conditions:

- ambient temperature +18°C...+28°C,
- recommended relative humidity of the ambient air up to 60%,
- the unit has not been designed to work in highly dusty environments,
- ensure proper ventilation in the room,
- the device should be placed on a hard and stable surface,
- the unit should be placed at least 100mm away from the walls,
- the height of the room must be at least 300mm greater than the height of the unit,
- the unit is not designed to be built-in,
- the place of installation of the device should be equipped with a socket with parameters suitable for the device,
- the device **MUST** be placed only on a stable and properly levelled floor. An uneven surface may lead to changes in the device's geometry, including door misalignment or improper door closing. Correct levelling is essential for the safe and proper operation of the device.

If you don't comply with the above recommendations, the unit may get broken or it may worsen the technical parameters such as:

- **temperature fluctuation,**
- **temperature variation,**
- **power consumption,**
- **icing of evaporator**

and may result in loss of warranty.

Wheels / leveling feet

	**If the device has been equipped with wheels or leveling feet:** • **in the case of wheels after placing the unit at its destination, secure the device against movement by locking the wheels** • **in the case of feet, after placing the device in the destination, they should be leveled.**

If the unit is equipped with reinforced wheels, they must be locked and leveled. For this purpose use the red knob mounted in the wheel housing. Initially, the knob can be turned by hand, but if resistance is encountered, use a 13 size wrench.

For reinforced wheels with leveling feet (see the image), once the unit is in the desired position, the leveling feet must be unscrewed from all wheels – the unit CAN'T stand on the wheels





	**Leveling wheels are ONLY for positioning the device at its destination. They can not be used to transport the device!**

Electric installation

	**Power supply of the equipment is indicated on a rating plate on the unit. Connect the device to a socket with ground in order to avoid electric shocks in case of the unit's failure.**

The installation should be protected by a 16A slow-blow fuse and equipped with a residual current device.

3.1. Installation of shelves

In the ZLN 85 freezer

To install the shelf or to change its position, follow these steps:

Install the shelf slide at the selected height by inserting it into proper slots on the wall of the device. Do the same with the slide on the opposite wall.





Slide the shelf into the installed shelf slides. Now, the shelf is correctly installed!





To remove a shelf, perform the above steps in reverse order. To remove the shelf slide from the slots, lift it up and slide it towards the rear of the chamber.

In the ZL-T 125, ZL-T 200, ZL-T 300 models

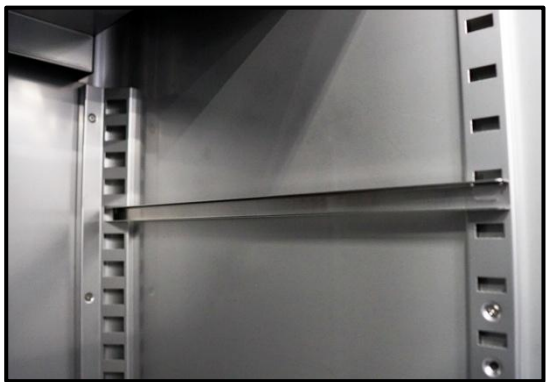
To install the shelf or to change its position, follow these steps:

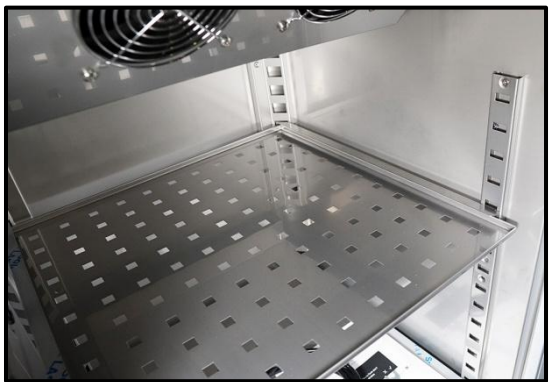
Install the shelf slide at the selected height by inserting it into proper slots on the wall of the device. Do the same with the slide on the opposite wall.





Slide the shelf into the installed shelf slides. Now, the shelf is correctly installed!





In the freezers: ZLN-T 125, ZLN-T 200, ZLN-T 300 there are full shelves with a hole in the middle in standard equipment.

In the freezers: ZLW-T 200 and ZLW-T 300 there are perforated shelves (as shown above) in standard equipment.

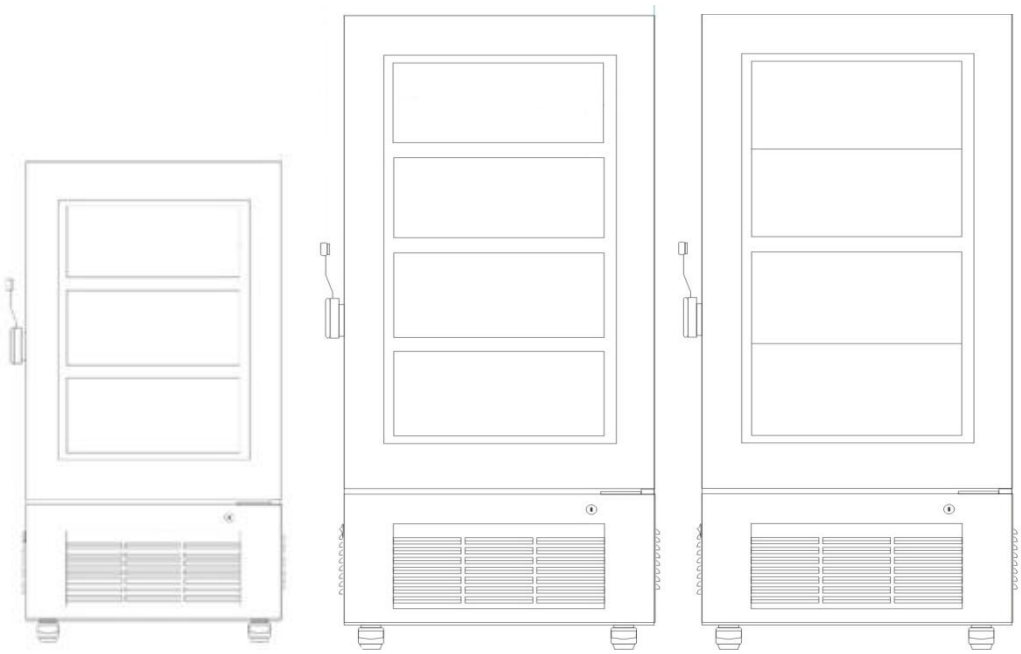
To remove a shelf, perform the above steps in reverse order.

In the ZLN-UT 200 VIP, ZLN-UT 300 VIP and ZLN-UT 500 VIP models

In the ultra-low freezers ZLN-UT 200 VIP and ZLN-UT 300 VIP each separately closed compartment is equipped with a shelf. In the ZLN-UT 500 VIP freezer, in each of the two separately closed compartments there are two shelves.



ZLN-UT 500 VIP



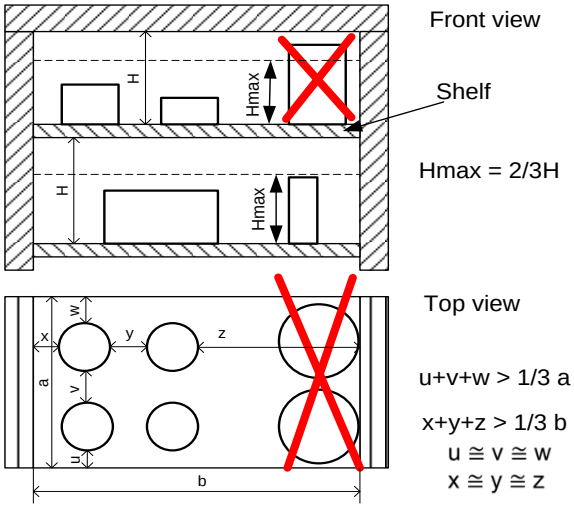
Compartments in ultra-low freezers, ZLN-UT 200 VIP, ZLN-UT 300 VIP, ZLN-UT 500 VIP

3.2. Remarks on the placement of samples

To provide proper air circulation and stable conditions in which the samples are stored in the chamber, it is necessary to keep the following rules:

- the max height of the samples should not exceed 1/3 of the space between the shelves,
- approx. 1/3 of the width and depth of the shelf should remain empty, while the distances between the samples, as well as between the samples and the wall should be approximately equal.

The picture below is an example of the placement of samples in the chamber.



Front view

Shelf

Hmax = 2/3H

Top view

u+v+w > 1/3 a

x+y+z > 1/3 b

u ≅ v ≅ w

x ≅ y ≅ z

Following the above rules will provide best optimal parameters of temperature fluctuation and variation.

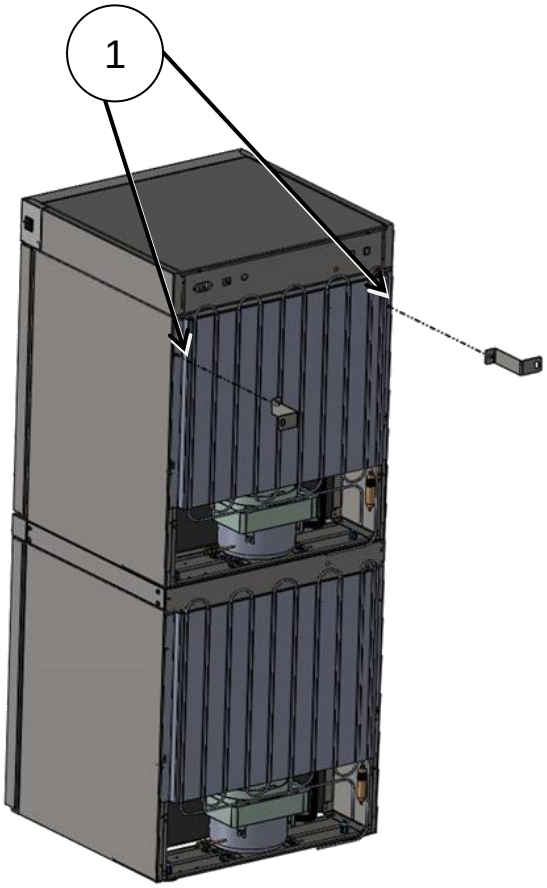
3.3. Closing chamber door

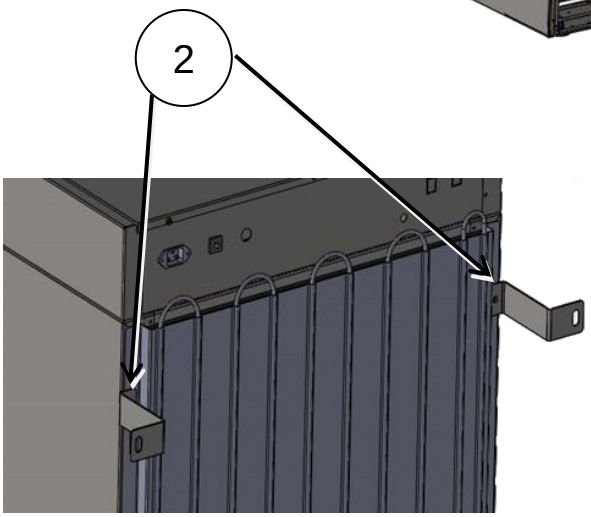
Freezers door have been equipped with a gasket and open door sensor. The external door of the ZL-T and ZL-UT freezers are equipped with a lock. In ultra-low freezers each compartment is closed with a separate door.
If the door has not been closed properly, an audible and visual alarm will start. You can set delay door alarm by: 30s, 1 min, 2 min, 5 min or 10 min *(see* Section 6.18*).*

3.4. Anchoring two-chamber equipment

	In the case of high multi-chamber units (ST/ZLN 85 or CHL/ZLN 85) they must be anchored to the wall with suitable fixings (the anchoring kit is supplied with the device). This prevents the unit from falling over. **Lack of anchoring may result in damage to the device and in extreme cases may endanger the health or life of the person who using the device.**

Rear view





1. Install the mounting brackets (2) to the holes marked (1) on the back of the device using the supplied screws and nuts. Handles can be set up or side-ways.
2. Place the equipment at the destination.
3. Use the ∅ 6 mm wall plugs adapted to the anchoring point to attach the holders. Elongated mounting hole in the bracket 10x10.

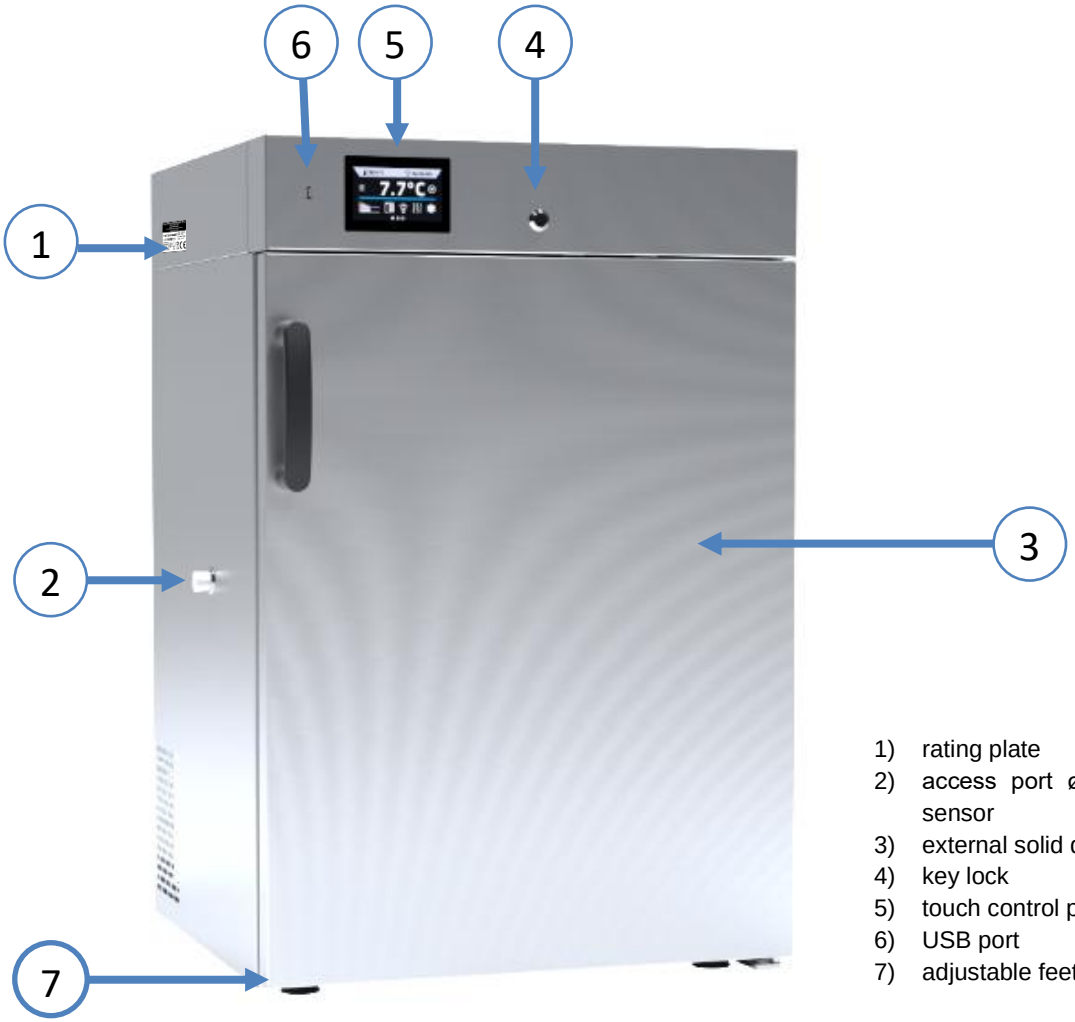
4. DESCRIPTION OF THE DEVICE

SMART PRO models are equipped with a PID microprocessor temperature controller and a 7 inch colour touch screen with a resolution of 800x480.

4.1. Design of ZLN 85

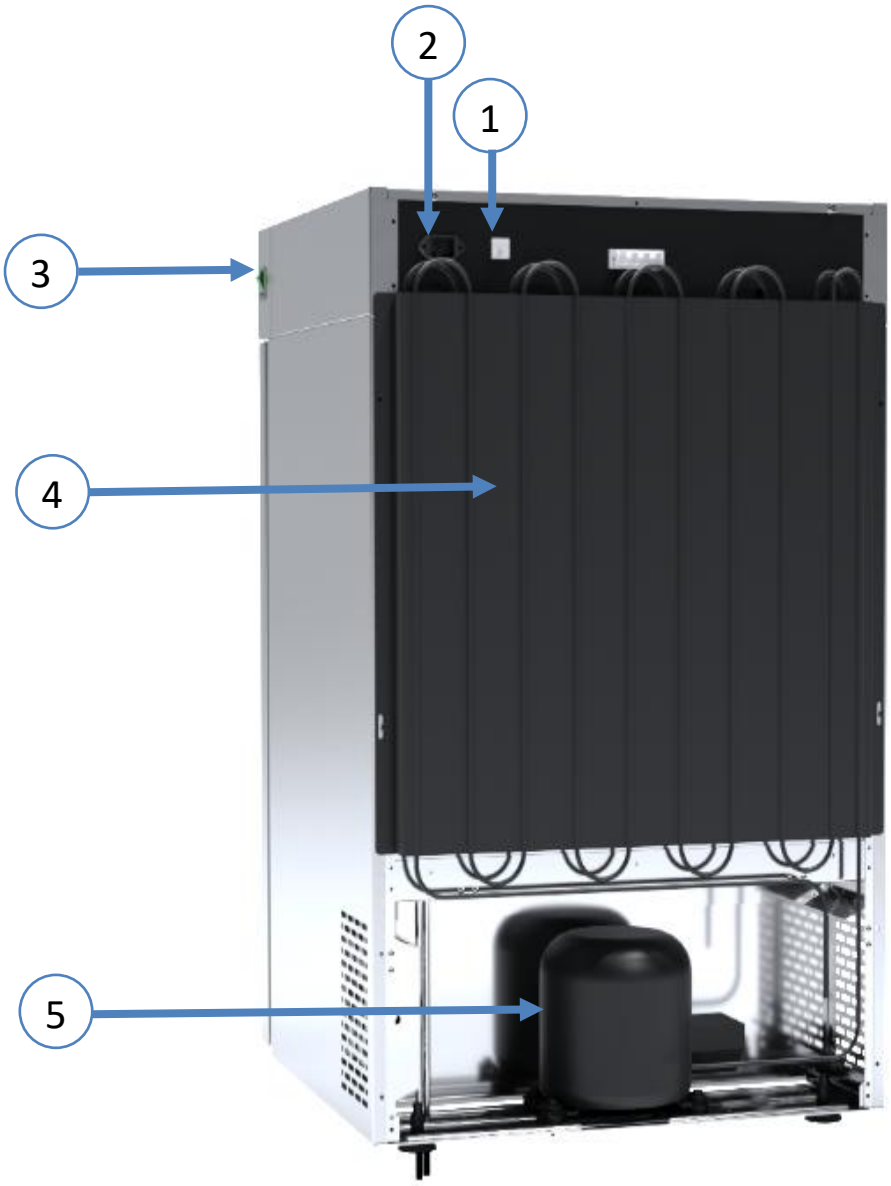
Below there's a picture of ZLN 85 model with a description of the important components of the device.

Front view



1) rating plate
2) access port ø20mm for external sensor
3) external solid door
4) key lock
5) touch control panel
6) USB port
7) adjustable feet

Rear view



1) fuse
2) main power socket C14
3) main switch
4) condenser
5) cooling system

4.2. Design of ZLN-T 125, ZLN-T 200, ZLN-T 300, ZLW 200, ZLW 300 devices

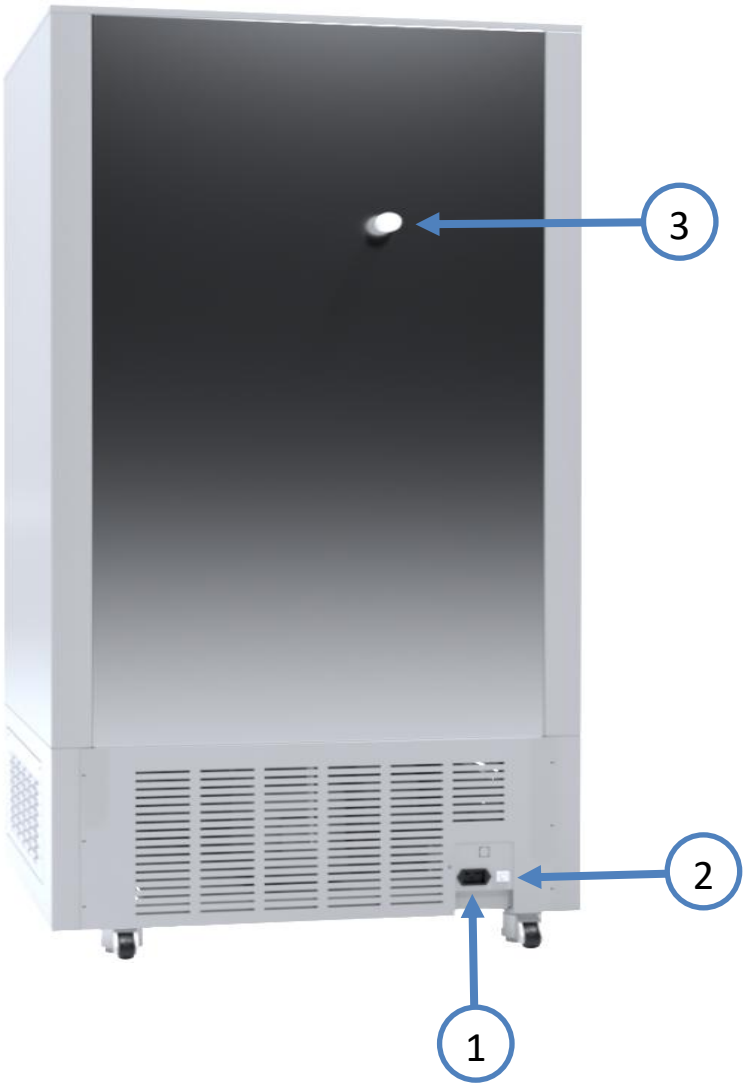
Below there's a picture of ZLN-T 200 model with a description of the important components of the device.

Front view



1) rating plate
2) handle with bolt lock with a key
3) main switch
4) wheels
5) condenser housing
6) external solid door
7) touch control panel

Rear view



1) main power socket C20
2) fuse
3) balancing valve

4.3. Design of ZLN-UT 200 VIP, ZLN-UT 300 VIP, ZLN-UT 500 VIP devices

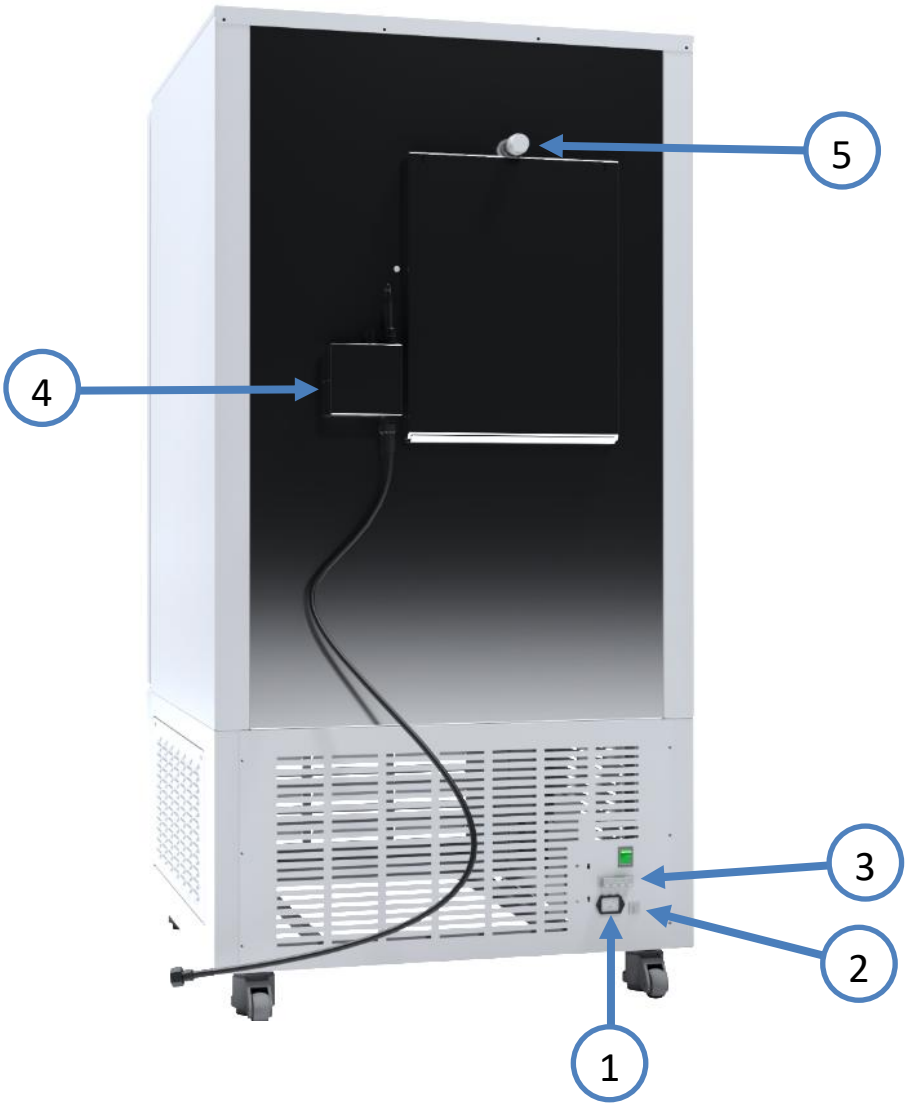
Below there's a picture of ZLN-UT 500 VIP model with a description of the important components of the device.

Front view



1) rating plate
2) handle with bolt lock with a key
3) main switch
4) wheels
5) condenser housing
6) emergency back-up system switch
7) external solid door
8) internal door
9) touch control panel

Rear view



1) main power socket C20
2) fuse
3) potential-free alarm contact (option)
4) CO2 back-up system (option)
5) balancing valve

5. DEVICE EQUIPMENT (STANDARD AND OPTIONAL)

5.1. Internal door (standard for ZLN-UT VIP)

The interior of the ZLN-UT 200 VIP, ZLN-UT 300 VIP and ZLN-UT 500 VIP low-temperature freezers is divided into sub-compartments, which are additionally isolated by an internal door. This allows samples to be removed without the risk of temperature increase in the remaining sub-chambers.

5.2. Door lock (standard for all units)

All devices have a key lock. In the model ZLN 85 the key lock is situated above the door. In the freezers ZLN-T, ZLW-T and ZLN-UT VIP the bolt lock is located in the door handle.Two keys are supplied with the device.



5.3. Access port for external sensor (standard for all units)

A Ø20 mm access port can be used to insert an external temperature sensor for independent temperature control inside the device. The access port has been secured with a silicone plug. The plug should cover the access port while the unit is operating. If multiple cables have been inserted through the access port and it is not possible to use the plug, secure the access port with adhesive tape. If you leave the access port open, it may affect temperature fluctuation and variation inside the chamber.







5.4. Open door alarm (standard for all units)

All units have been equipped with an open door sensor. If you open the door, the icon: 

will appear (the number above the icon presents open door counter. Press the icon to cancel the counter. The counter is also cancelled by turning of the device). If the door remains open longer than the time set by the user (30s, 1 min, 2 min, 5 min, 10 min) an acoustic signal, red pulsating alarm bar and *„open door”* alarm with active status will appear.

Open door sensor in ZLN 85



Open door sensor in ZLN-T and ZLN-UT

5.5. USB port (standard for all units)

The USB port on the front panel is used only to transfer data from the device's internal memory to the flash drive. To do this insert the flash drive into the USB port on the front panel and then:

- go to the main menu ☰,
- go to the data record ⤓,
- press and choose type of the file: *.csv, or *.plkx.
- press ✓. Data has been copied.

After copying the data to the USB flash drive, before removing it from the USB socket, it should be unmounted by pressing the icon in the top drop-down list. If the pendrive is not unmounted after connecting to the computer, a message about pendrive damage may be displayed with a repair proposal, when actually the pendrive is not damaged

Figure 1 Unmounting USB flash drive



Data saved in the * .csv file can be opened in a spreadsheet. Data saved as * .plkx can be opened in the Lab Desk program (standard equipment). This program allows, among others, for data preview in the form of a table or a graph. It also allows you to prepare a statistic report for a selected range of data. More information Section 6.1.

5.6. Display battery backup (optionally for ZLN, ZLN-T, ZLW-T, standard for ZLN-UT VIP)

Units in the SMART PRO version can be optionally equipped with a battery backup of the display. This is a standard equipment for the ZLN-UT VIP ultra-low freezers.
The power loss and switching to the battery backup display mode is signaled by a pulsating red frame around the display and a sound signal (if it is turned on). In the battery backup display mode, all parameters are displayed, ie temperature. Other alarms, e.g. exceeding the temperature range, are also signaled.

In order to extend the battery life, the display is dimmed all the time. Batteries are automatically charged in AC mode.

	Batteries should be replaced every 12 months. When it is time to replace the battery, a message will appear on the display, see. During the warranty period, the replacement should be performed by an authorized service. Otherwise, you will lose your warranty.

Figure 2 Battery replacement message



6. DEVICE OPERATION



This symbol means that a given window can be moved in the direction shown in the picture.

6.1. External memory (USB flash drive)

The external memory (USB flash drive) allows to copy: instruction manual, data record, event log and service log from the device memory. Before first use the USB flash drive should be formatted in the FAT 32 file system. Insert the device in the USB slot on the front of the device next to the display. Wait a few seconds, the correct reading is indicated by the message *„USB flashdrive connected”* at the bottom of the screen.

	USB slot is used to connect **only** a flash memory – a flash drive or a card reader with a memory card. Connecting any other device (e.g. external hard drive) without consultation is not authorized by the manufacturer and may damage the USB slot.

	After copying the data to the USB flash drive, before removing it from the USB socket, it should be un-mounted (see Section 5.5.).

6.2. First boot

During the first startup, a wizard appears on the screen allowing you to configure settings such as:

- language selection
- downloading the manual
- connection to a computer network
- setting the time zone and time
- connection to the LabDesk Cloud cloud service

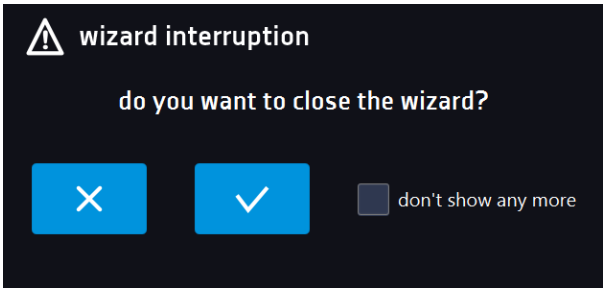
Figure 3 Settings wizard



It is recommended to complete the entire wizard, but you can interrupt it at any time by pressing 
You can then choose one of the options:

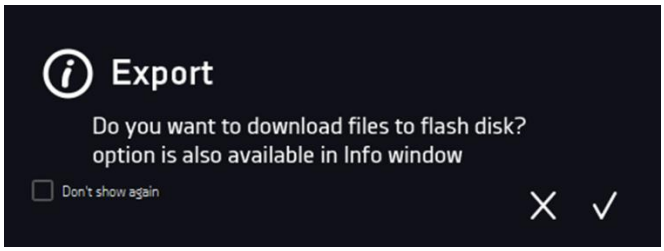
- one-time closing – the wizard will be displayed again during the next launch
- check the option so that the wizard will no longer appear the next time you run it
- return to the wizard

Figure 4. wizard interruption



During the first boot, the screen will display information about saving the "Download" folder (with instruction manual in pdf format) on the USB flash drive. In order to do it, insert the USB flash drive and wait a second to detect the hardware, then press .
If you press  you quit downloading the folder. The window will appear again during the next boot. You can tick *„Don't show again"* so that the window will not be displayed after switching on the device. You can always download the *„Download"* folder in the Info submenu. More information Section 6.14.

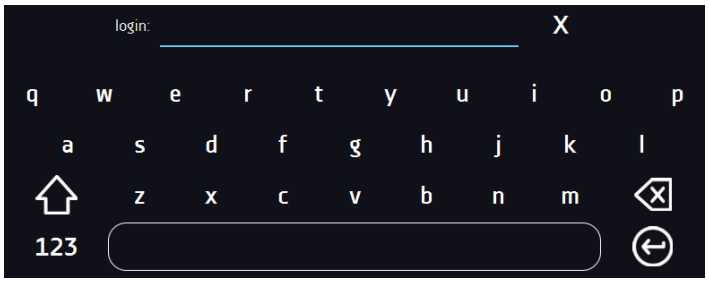
Figure 5 Downloading files



6.3. Using the keypad

When operating the device, sometimes it is necessary to enter alphanumeric characters (e.g. when logging into the system, entering the user name, etc.). In such cases, a keyboard appears on the display screen. In addition to the standard letters, it contains symbols that correspond to the computer keyboard.

Figure 6 Keypad





Deleting the entire text


Changing to capital letters (it´s matters when entering login and password).



Changing to numbers and special characters.



Changing to letters.


Deleting the entered character.


Confirming the entered text / closing the keypad.


Sometimes entered characters can be hidden (then they are replaced with „* ”). This happens when classified information is entered (e.g. when a user enters a password).

6.4. User logging in

Setting device parameters is only possible by the logged in user. To log in, press  in the main screen. The login window will appear:

login: from 1 to 10 characters
password: from 1 to 10 characters

Factory default login parameters:

login: admin
password: leave the password field blank

Factory user: Super Admin

Figure 7 *Login panel*



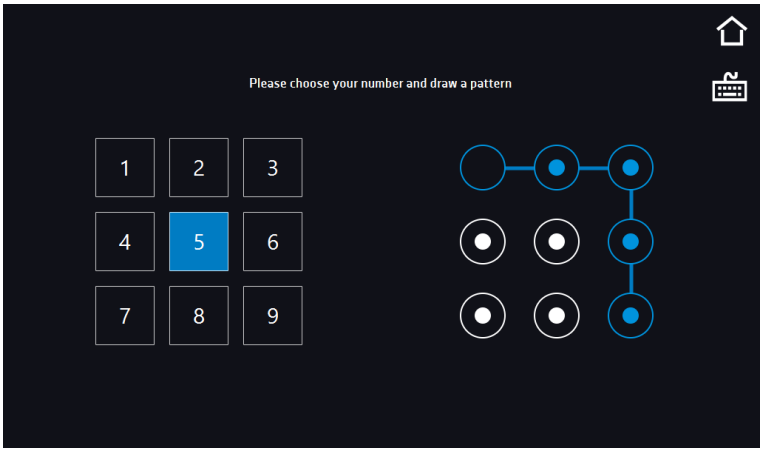
 - switching to login using a pattern

It is recommended to set a password for the Administrator account during the first start-up and write it down in a safe place to avoid unauthorized persons interfering with the device settings.

	Please remember or write down the password because it is not possible to delete the Admin account password. If you lose your password, please contact the manufacturer's service. Password deletion is not possible

Instead of a text password, you can choose to log in using a pattern. to do this, press the buton , select the number and then draw the pattern. The pattern is not set by default. For detailed information on creating a pattern, see section 6.15.1. Creating/editing a user.

Figure 8. Creating a login template



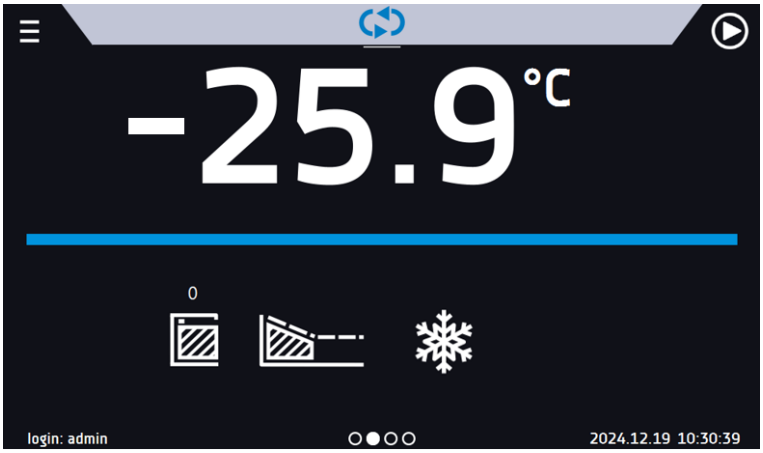
For information on user account types, see Section 6.15.

Logout: in the main menu, press . Automatic logout, see Section 6.16.

6.5. Main screen

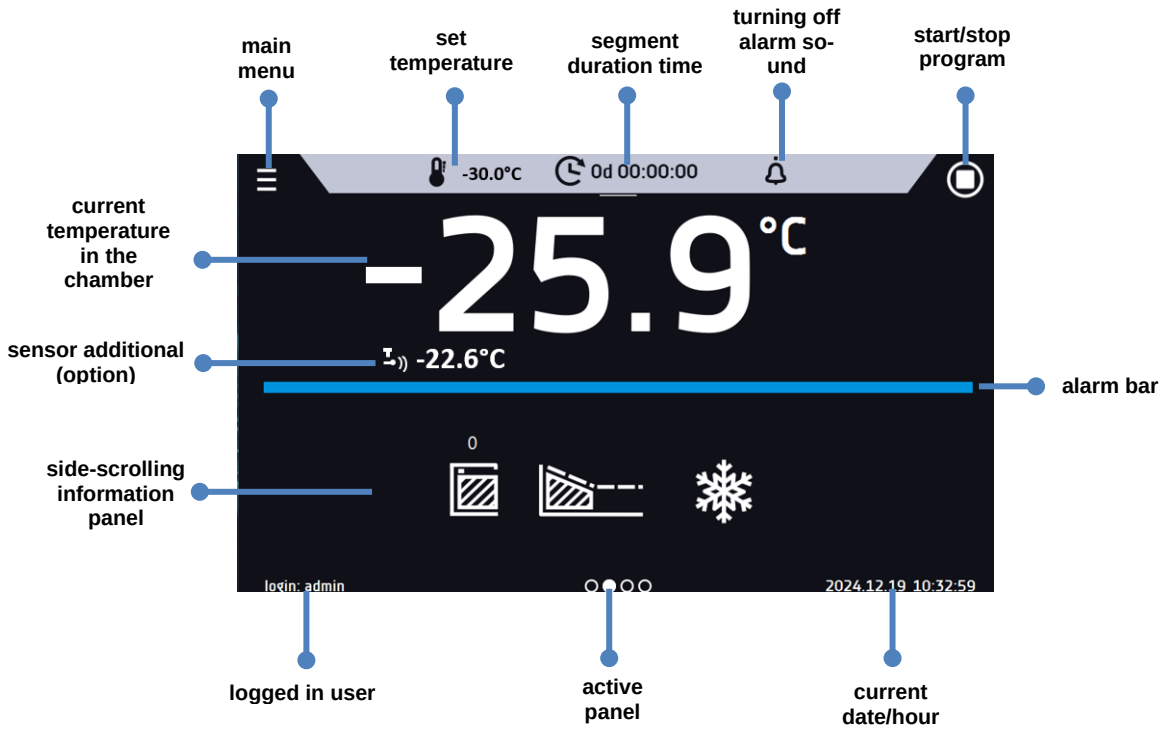
After switching on the device, the main screen appears. It contains the information about the device status. After starting the program, additional information appears on the screen. For devices with forced air convection (ZLW-T 200, ZLW-T 300) symbol appears on the screen.

Figure 9 Main screen



From this point, any action requires logging in.

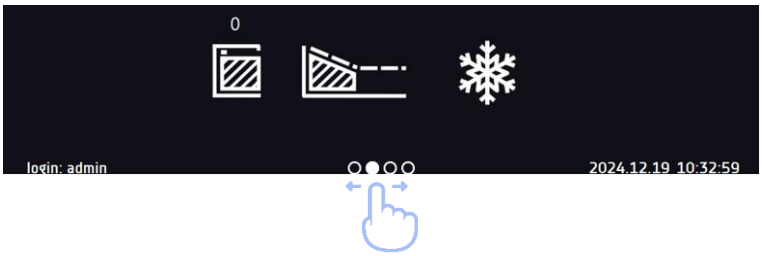
Figure 10 Main screen – running program in ZL



6.5.1. Information panel

There are four different windows in the information panel. Switching between them is done by swiping the finger left or right.

Figure 11 Information panel



The icon  indicates information about which window is active.

6.5.1.1. Alarms panel

On the first page of the information panel there's alarms panel.

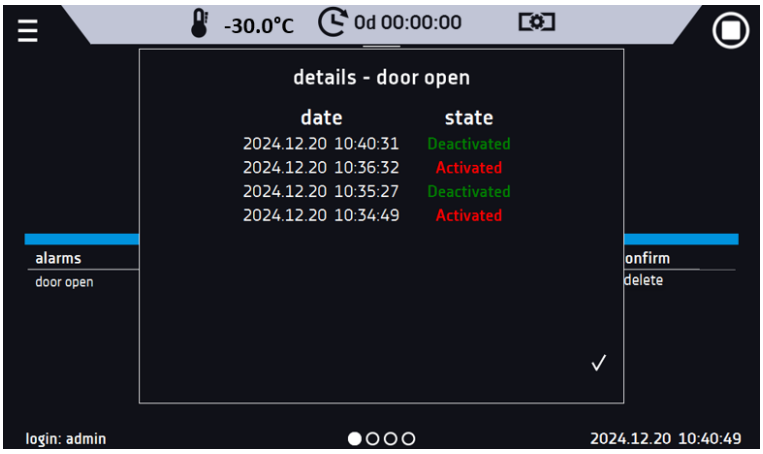
Figure 12 Icon: Alarms panel



In the alarms panel there's a list with active alarms or the alarms that have occurred but have not been confirmed. When the alarm is active, the alarm bar is red and the alarm event is displayed in the list with the status *"active"*. When the alarm event stops, the state changes to *"inactive"*.

- "**delete**" button – confirms and removes the alarm from the list (only inactive alarms can be deleted),
- "**confirm**" button – confirms an alarm,
- "**details**" button – displays a preview of all instances of selected alarm.

Figure 13 Alarm details



With more alarms, a button appears on the right side of the list and allows you to enlarge the view to full screen.

6.5.1.1. Status panel

The status of the device is displayed descriptively on the third page of the information panel.

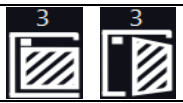
Figure 14 Icon: Status panel



program name	the name of running program
user	name of the user to whom the program is assigned
priority	of time or parameters
current segment	currently running segment / total number of segments in the program
current loop	currently performing cycle/ total number of cycles to perform
status	stage of device operation, e.g. reaching or maintaining of set temp.
time set	set time of running segment
time elapsed	elapsed time since the segment has started
time remaining	remaining time until the end of the segment

6.5.2. The meaning of icons and symbols

icon	function
	The icon allows you to go to the main screen.
	Automatic return to the home screen. Factory setting: disabled.
	The icon allows you to go to the main menu.

	Automatic logout. Factory setting: disabled.
	Automatic screen lock. Factory setting: disabled.
	Unmounting the USB flash drive before removing it from the USB socket.
	Fan icon. Rotating icon shows that the fan is running (for ZLW-T).
	Icon is visible only when the chamber is cooling down.
	Available when the program is running Clicking the icon allows you to quickly change the set temperature (Quick Change function).
	When the program is running, click the icon to quickly change the time of program duration (Quick Change function). Indicates the time that has elapsed from the program start.
	Countdown of the time remaining to the end of the program.
	Going to alarms panel.
	Going to the status panel with information about the program parameters.
	Going to the menu to create, edit, delete and start programs.
	User message. Clicking on the icon allows you to enter a message.
	The icon appears in the event log and symbolizes entered user message.
	Turning off of the alarm sound (open door alarm, exceeding temperature range). Critical alarms (i.e. damage to the temperature sensor, temperature protection, etc.) continue emitting a sound.
	The arrow icon allows navigation between: segments, program parameters and summary.
	Closed door, open door. The number above the icon presents open door counter. Press the icon to cancel the counter. The counter is also cancelled by turning of the device.
	Ramp status: Chamber is currently cooling down.
	Set temperature is reached.
	The program will start on the given date / time. Start delay activated.

	Starting the selected program. In the list of programs - the program is running.
	Stopping the program.
	Adding a new program to the program list. The user can create up to 40 programs.
	Editing the selected program from the list. In the program list, a new program has been created but not approved yet.
	Removing selected program from the list.
	Canceling adding or editing of the program. Canceling changes.
	Editing individual program segments (the program can have max. 100 segments).
	Immediate start of the program selected from the program list.
	Delayed start of the program from the list of programs. The program starts according to the set date and time.
	Going to the SMART program (Quick Program function).
	Active STM function (Smart Temperature Monitor) informs the user about the problem of reaching or maintaining the set temperature. • white color - option enabled, the program is stopped • blue color - option enabled, the program is running red color - warning about problems with reaching / maintaining the temperature

6.5.3. Upper expandable and configurable menu

When the program is running, in the upper part of the main screen there's a bar menu with parameter icons (temperature, time, mute function). These parameters can be quickly changed (Quick Change).

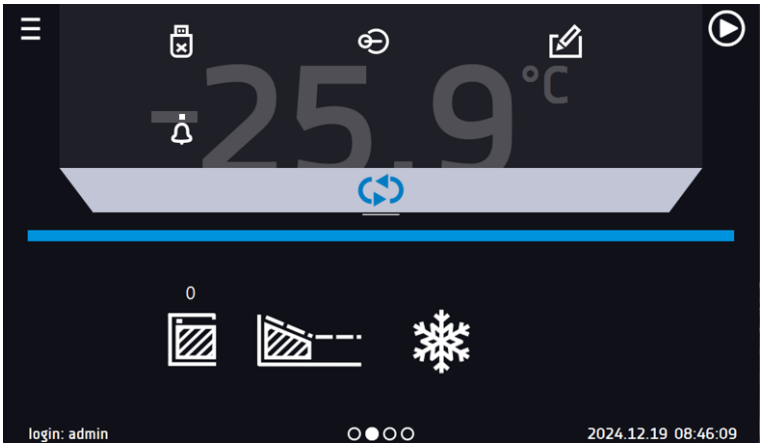
Depending on the model, after swiping your finger down you will see icons for all parameters which can be quickly changed (*see Section 6.9*). Among the options available in the bar you will find the following icons:

-  USB flash drive unmounting – more information *Section 5.5.*
-  Quick Note – more information *Section 6.5.4.*
-  mute option. Critical alarms e.g. damage to the temperature sensor, temperature protection (if available) will be still emitted.
- Quick Change (more information Section 6.9.) of:
  -  program duration time
  -  set temperature

Figure 15 Upper expandable menu when the program is running

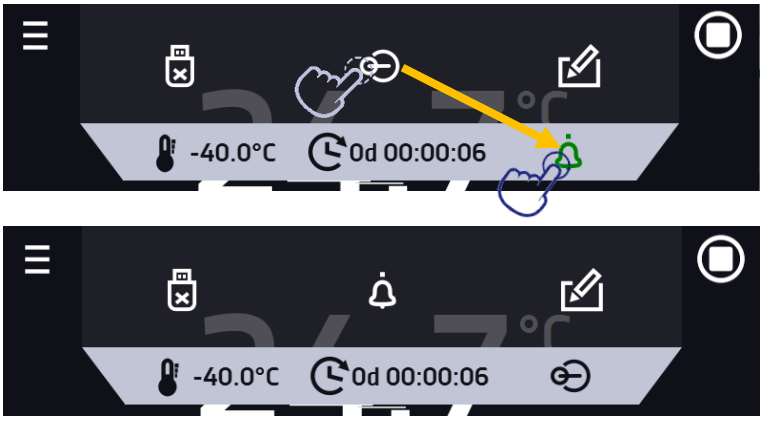


Figure 16 Upper expandable menu when the program is stopped



Positions available on the upper bar can be personalized. Just drag the selected icon to a new location.

Figure 16 Changing icon's position

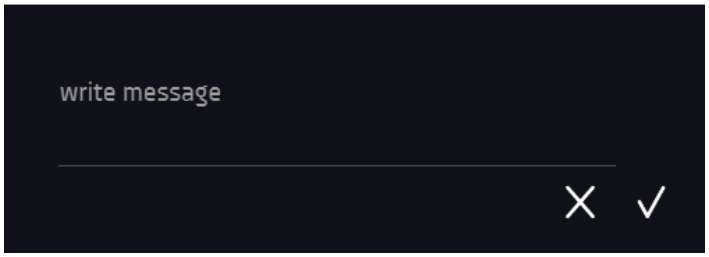


6.5.4. Quick Note – user's message

During equipment's operation, the user can save messages in unit's memory with information about: the date of inserting a new sample, observed changes in the samples, the place of sampling, etc. To enter a message you must first log in

and then press the icon in the main screen in upper menu. Click on „*Write a message*”. Using the keypad, enter the message and confirm it with the button . Once entered, a message cannot be changed. Entered notes can be seen in the event log, they are symbolized by the icon . More information *Section 6.13.*

Figure 17 User's message



6.5.5. Alarm bar

The alarm bar is a quick visual information about the device status. The colour of the bar indicates the status of the device:

– blue - the device is working properly

– red bar and pulsating frame– active alarm

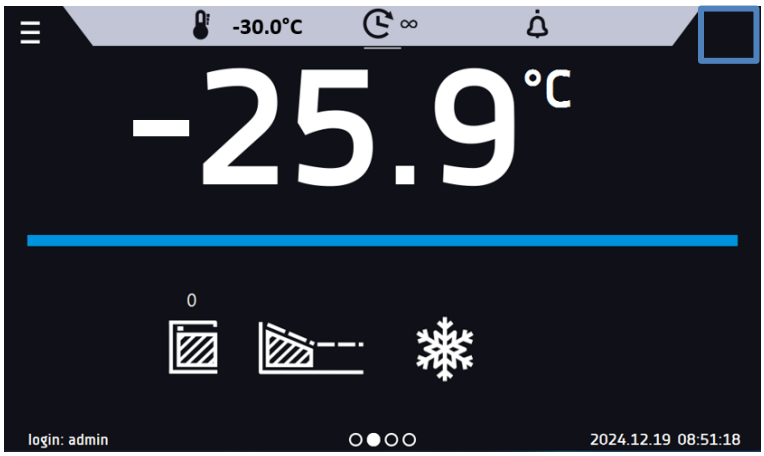
6.6. Quick Program

Quick program allows you to quickly start the program from the main screen position without having to enter to the menu .

The Quick program has several features that guarantee its uninterrupted operation:

- you can not set the duration of the program - time is always set to infinity,
- if the display fails, the program continues,
- after the power supply is resumed (after its failure), the program continues,
- to prevent the program from stopping accidentally, the STOP button was removed from the main window.

Figure 18 SMART program

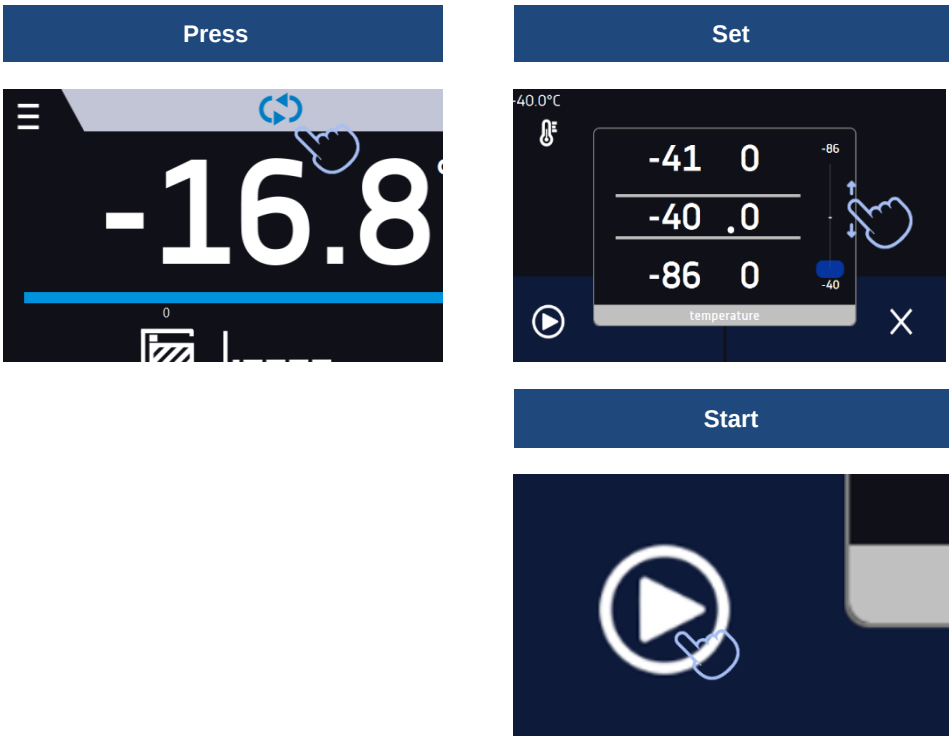


In order to go to Quick program click the icon in the main screen. By clicking the appropriate icon you can set:

–  temperature,

Clicking the icon  starts the program in continuous mode (time set to infinity).

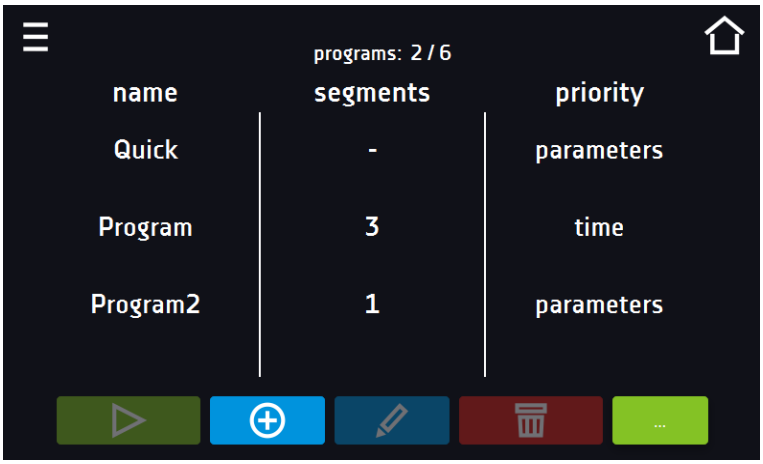
Figure 19 Starting the Quick Program



Stopping a Quick program has been made difficult on purpose (this prevents the program from being stopped accidentally) – to stop a program, you have to go to the menu , click the program window  and keep pressing STOP button  for 5 seconds.

After configuriation of the Quick Program, it appears in the programs list. Quick Program is displayed at the top of the list by default. Moreover, it cannot be deleted and cannot be assigned to a user of the User type.

Figure 20 Quick program on programs list



In Quick Program editing mode, you can change:

- settings of the data recording interval,
- settings of the protection class.

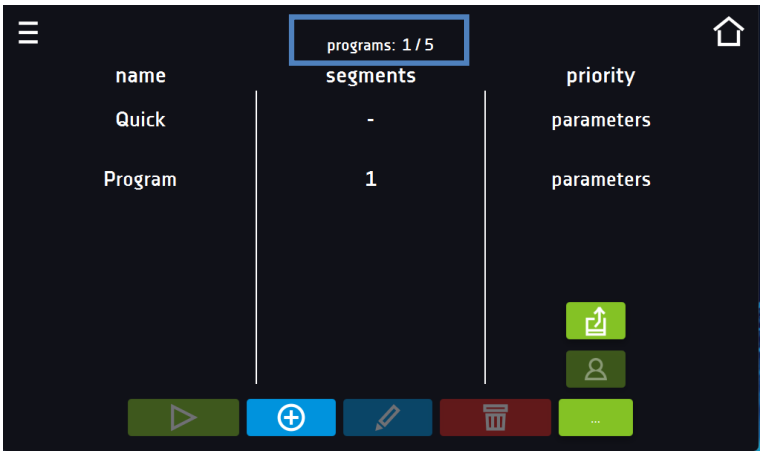
When the program is running you can change the temperature by pressing the icon . During next launch of the Quick program, your previous settings will be remembered.

6.7. Programs

Press the icon of main menu , and then press . In this panel you can run the selected program, add a new one, edit the program, delete it or share it with another user and download the program from a USB flash drive. The number of programs that can be created depends on the limit assigned by the **Super Admin** user. More information on the rights and configuration of account types (Super Admin, Admin, User) see *Section 6.15.2.*

	Start the selected program.
	Stop the program.
	Add a new program.
	Edit the selected program.
	Delete the selected program.
	Download program from USB flash drive.
	Share the selected program with the user type account.

Figure 21 List of programs



Information on the number of created programs / the maximum number of programs that the user can create is at the top of the screen (programs: 1/10).

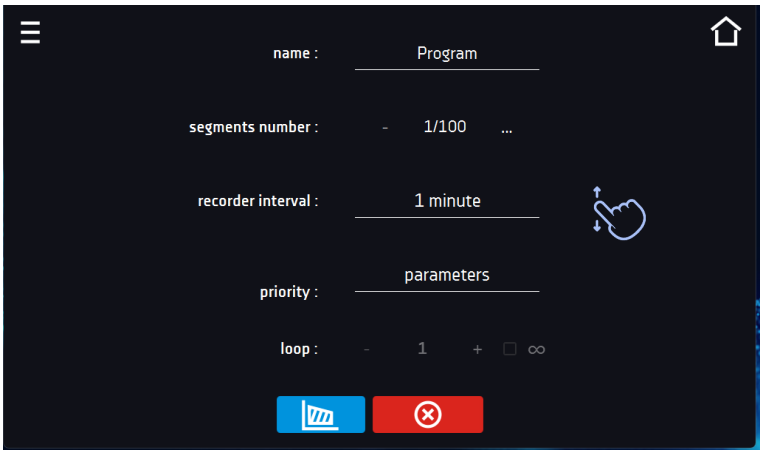
6.7.1. Creating / editing a program

Press the button or and a panel with program parameters will appear.
In this panel you can set:

- **Program name** – after clicking, the keypad will appear and you will be able to enter the program name,
- **Segments number** – max. 100 segments
- **Interval** – frequency of saving the data in the data record (1 min, 2 min, 5 min, 10 min, 15 min, 30 min, 1 h),
- **Priority** – the priority of time or parameters, more information *Section 6.7.4.*

- **Loop** – the number of program repetitions, more information *Section 6.7.5.*

Figure 22 Program parameters



Cancels adding or editing of the program.

Going to the edition of program segments.

With more parameters, the window can be scrolled up and down.

6.7.2. Segments edition

For each program, you can set maximum 100-segment time-temperature profiles that allow you to gradually increase or decrease the incubation temperature of the samples. This can e.g. protect the sample from so-called thermal shock. Example of program operation with programmed segments (parameters priority):
Program 1 (for ZLN-T/ZLW-T)
segment1: temp. -5°C, time 2 hours (after reaching the temperature -5°C, it is maintained for 2 hours)
segment2: temp. -10°C, time 3 hours (after reaching the temperature -10°C, it is maintained for 3 hours)
segment3: temp. -15°C, time 3 hours (after reaching the temperature -15°C, it is maintained for 3 hours)
segment4: temp. -20°C, time 2 hours (after reaching the temperature -20°C, it is maintained for 2 hours)
segment5: temp. -30°C, time 2 hours (after reaching the temperature -30°C, it is maintained for 2 hours)
segment6: temp. -40°C, time ∞ (after reaching the temperature -40°C, it is maintained in continuous way)

Press the buton and the first program segment will appear.

In this window you can set:

- **temperature –** target temperature which the device is to achieve in this segment
- **time –** the time of maintaining the set temperature ([d hh:mm]) in days, hours and minutes. It is possible to select continuous work ∞ in the last segment,
- **ramp time** – the time of reaching the set temperature ([d hh:mm]) in days, hours, minutes.

The active value is highlighted in blue. The item highlighted in red means that the value is out of range and you should enter another one, e.g. the temperature is above / below the operating range of the device or the protection temperature.

In ZLW-T 200 and ZLW-T 300 freezers the fan is set to 100% by default and cannot be changed.

	Ramp time - setting a short time will not accelerate reaching the ramp, but the ramp will be reached in the shortest possible time depending on the set temperature, ambient conditions and the possibilities of the cooling system in the device.

The ramp parameters are factory set in accordance with the manufacturer's instructions. If it is necessary to set individual parameters when reaching the segment temperature, activate the ramp edition field ramp edit and set your own values.

	With more parameters, the window can be scrolled up and down.

Figure 23 Program segment edition



The navigation between: segments, program parameters and summary is done by touching the icon <<< >>>.

	If, when editing a program, you automatically return to the home screen or you are automatically logged out, the edited program will not be lost, but saved as a draft (see below).

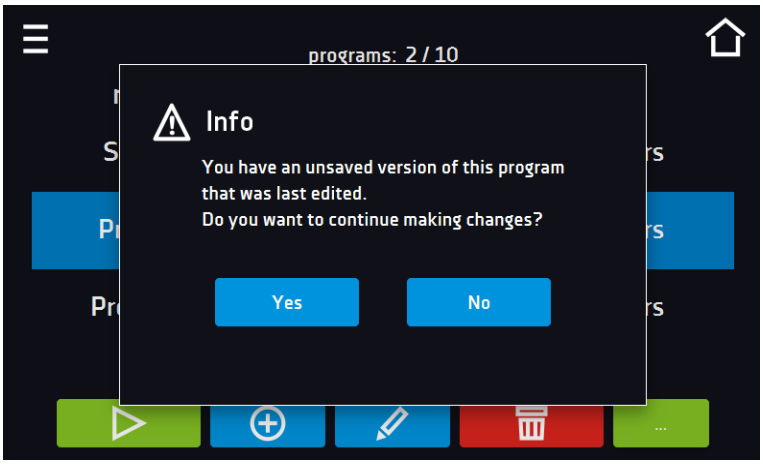
After configuring all segments, a window with the protection class is displayed.For 3.2 (option) you can set the protection temperature.

Figure 24. program protection



After switching to the program edition, the information about the possibility of continuing changes in the program settings appears.

Figure 25 Info

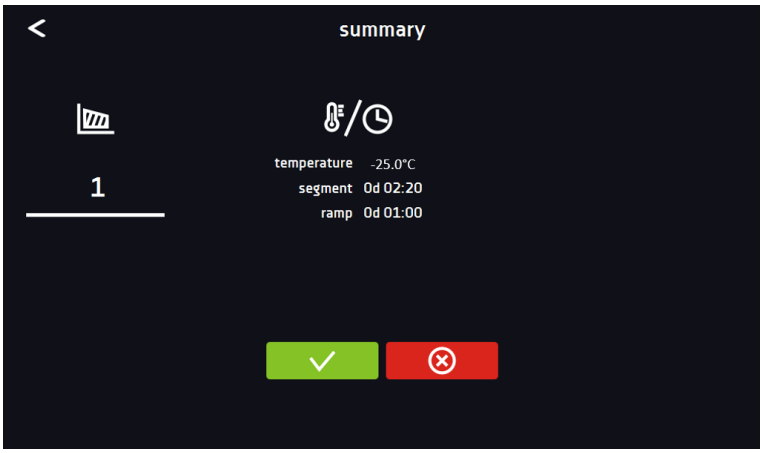


6.7.3. Summary of segments

In the segments summary all segments can be seen along with introduced parameters:

- number of segments,
- temperature,
- duration time of the segment,
- target time of reaching temperature of a given segment (ramp).

Figure 26 The summary of the segment





Confirms and saves the changes.



Cancels the entered changes in the segments and goes to program parameters.

6.7.4. Priority

Can be set in terms of:

Parameters:

In the program without ramp – the device starts the countdown of the segment time when the set temperature is reached.

In the program with ramp – first, the device counts down the time of the ramp and then proceeds to the segment countdown when the set temperature is reached. Regardless of whether the time of ramp elapsed.



It may happen that the device failed to reach the set temperature within the set time because the reaching time was too short. In such situation the reaching time will be prolonged and the segment's time count-down will start when the set temperature will be reached.

Time:

In the program without ramp – the device starts counting down the segment time when the program is started. Regardless of whether the temperature has been reached.
In the program with ramp – first, the device counts down the ramp time and after its expiry it proceeds to the countdown of the segment time. Regardless of whether the temperature has been reached.



It may happen that the time of reaching was too short and the device failed to reach the set temperature within the set time. Then the countdown of the segment time will start before reaching the set temperature. Thus, the actual time of device operating in the set temperature will be shortened.

6.7.5. Loop

The option is available if the number of segments is equal to 2 or more (maximum 100). When the program finishes the last segment, the device starts the program again from the first segment. You can define if the program should be carried out once (loop: 1) or multiple times (loop: 2 to 255). In order to set the program to be carried out continuously, tick the „∞" option. If the time of the last segment is set to infinity, it will be treated as infinite only in the last cycle. In other cycles it will be treated as 0.

Example:
Loop:3
segment1: temp. -10°C, time 2 h
segment2: temp. -30°C, time 2 h,
segment3: temp. -40°C, time „∞"

The device will run segment1 and segment2 three times and then will go to segment3 which will last indefinitely.

Due to the fact that laboratory freezers do not have a heating system, when switching from a lower to a higher temperature, the compressor turns off, and the temperature rises naturally, which greatly extends the cycle. The cycle duration can be determined empirically.

6.7.6. Defrosting of ZLN, ZLN-T, ZLN-UT VIP devices

During operation, a layer of ice may form inside the freezer's compartment. The speed of ice or frost formation depends on several factors: ambient conditions (temperature, humidity), how often the door is opened, and the type of samples. When an ice or frost layer covers the entire chamber, defrosting is necessary. **Defrosting** is performed manually in the following order:

1. turn off the device (unplug the power cable from the socket),
2. open the door and allow the device to defrost (do not accelerate the defrosting process),
3. wipe dry the water accumulating on the bottom and the walls of the chamber,
4. turn on the device (insert the power plug into the socket).

6.8. Starting the program

The created program can be started in two ways:

6.8.1. The first way

- Go to the main menu and press the icon „programs”.
- Then select the program you want to activate and press „start” button.

Figure 27 Main menu

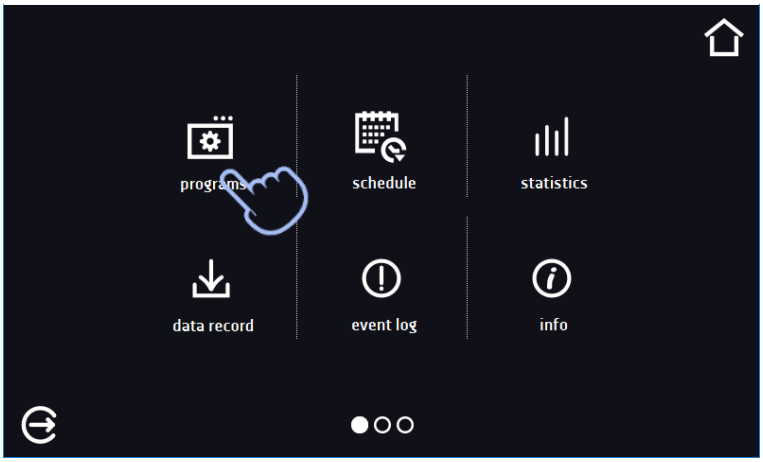
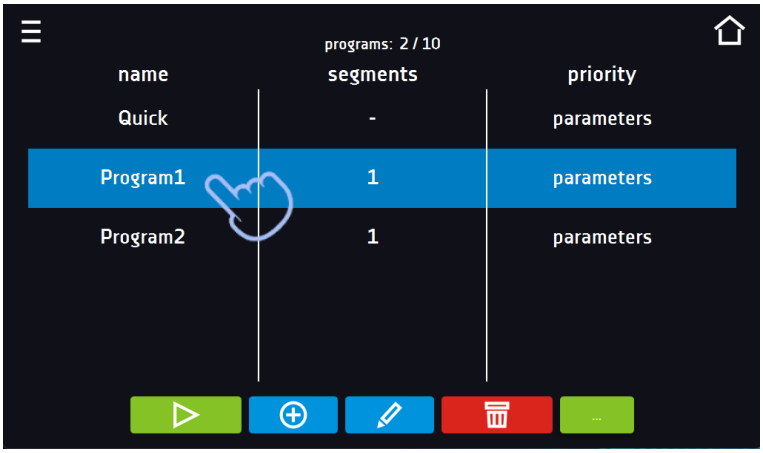
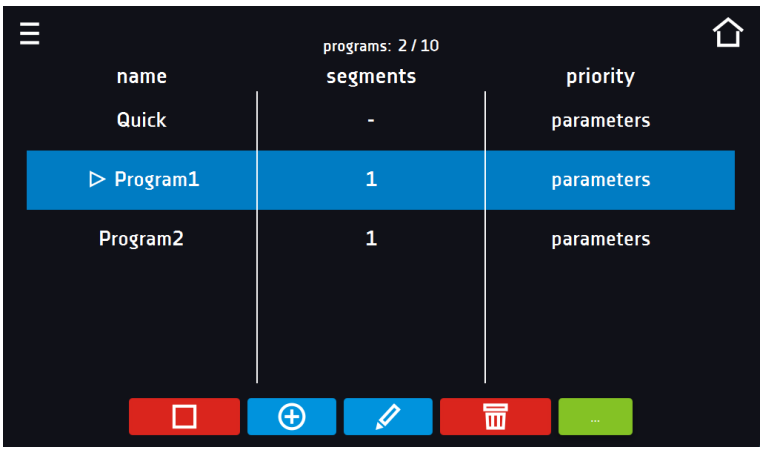


Figure 28 Program management menu



If the program is running, the symbol appears next to the program name on the list. The symbol means that the program has been edited, but the changes have not been confirmed.

Figure 29 List of programs with the selected status



6.8.2. The second way

- In the main screen press the icon in the upper right corner .
- Select the program you want to start. You have two additional options to start the program:

 Immediate start of the program.

 Scheduled program start according to the set date and time.

Figure 30 Main screen

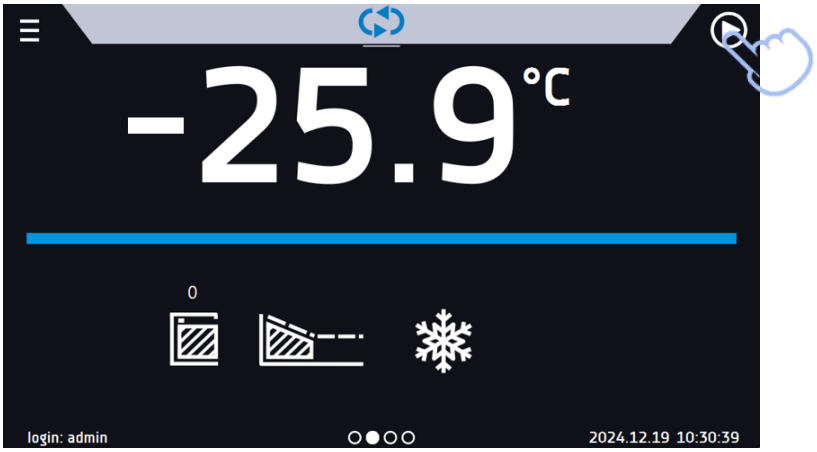
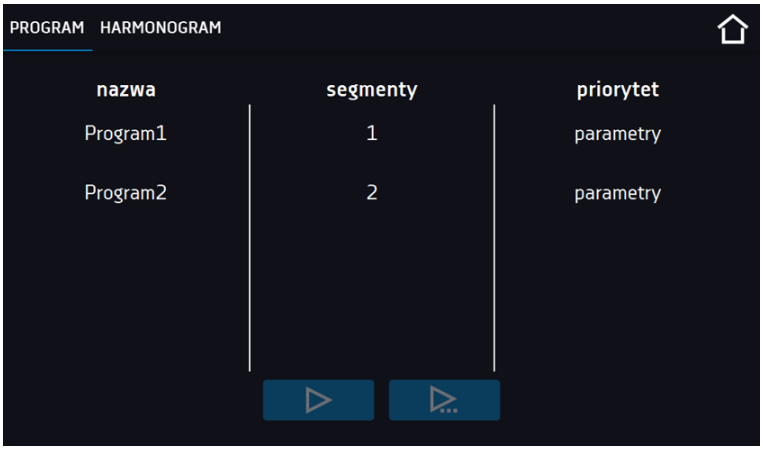
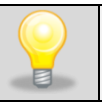


Figure 31 Selection and launch of the program

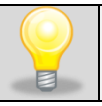




It is possible to delay the program start (up to a maximum of 7 days). This is possible for the programs with time priority. Program segments that would last from the back date to the current date will be skipped.

If the program is running, the symbol  appears next to the program name on the list.

6.9. Quick Change of parameters



Although the ramp time has been included in the program, the Quick Change of parameters will take place immediately while the temperature is being reached.

6.9.1. Quick change of set temperature

In order to quickly change the value of set temperature of a running program, press the icon in the main screen. The value of the temperature should be selected by scrolling the list up or down. Click to confirm the change.

Figure 32 Quick temperature change – selection

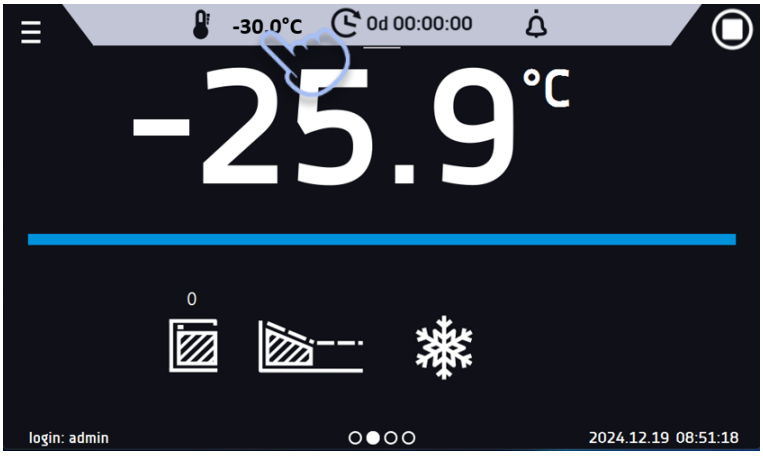
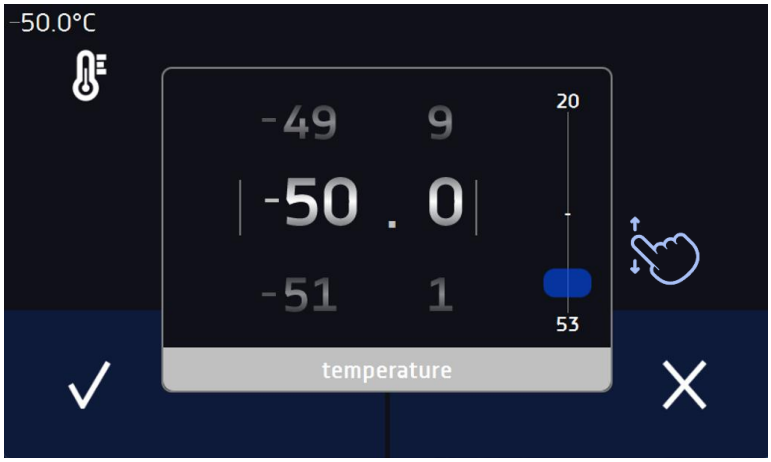


Figure 33 Quick temperature change - setting the value



	If the set temperature is higher than the current temperature inside the chamber, the compressor turns off and the device reaches the set temperature naturally (freezers do not have a heating system).

6.9.2. Quick change of set time

In order to quickly change the duration time of a running program, press the icon in the main screen. Select the number of days, hours and minutes by scrolling the list up or down. Click to confirm the change. To set the continuous work press ∞.
To change the way of displaying the time, press::

– to display the elapsed time

– to display the remaining time

To change only the way of displaying, you do not have to confirm it by ☑.

Figure 34 Quick change of the set time - setting the value

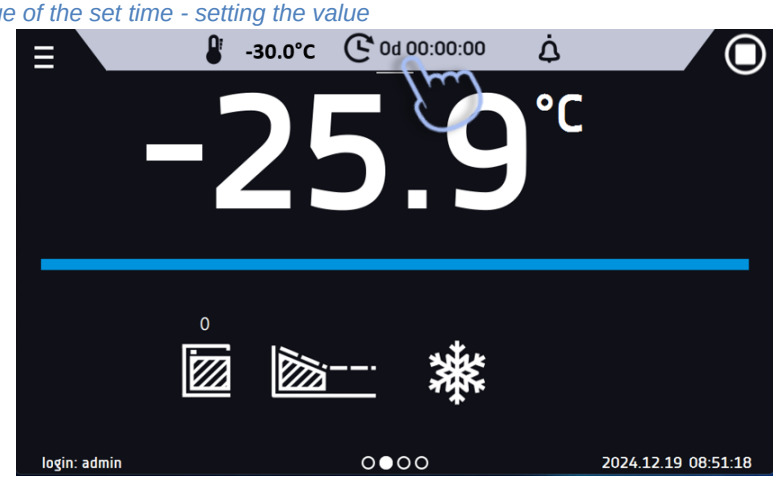
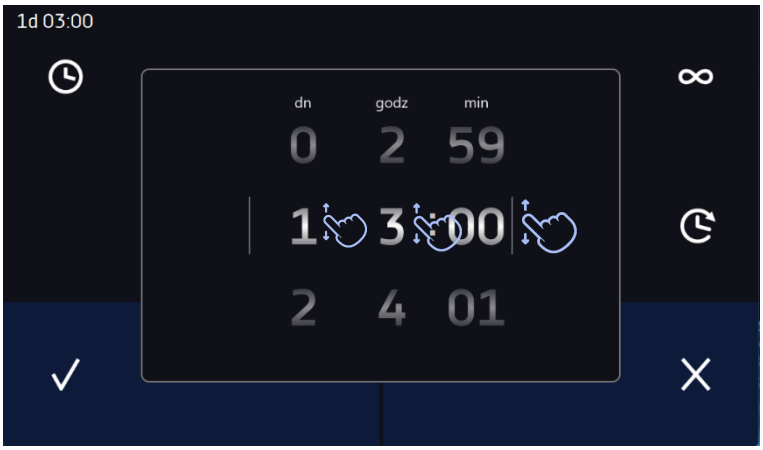


Figure 35 Quick change of set time



6.10. Schedules

The option allows creating a list of programs to be implemented in a given time. You can create several independent schedules. The schedules window contains a list of all created schedules of the logged-in user.

	Before you start creating a schedule, you must create programs that you want to include in it.

On the upper part of the screen there is information about the number of created schedules / the maximum number of schedules to be created (1/10).

Figure 36 List of schedules



 Start the schedule

 Stop the schedule

 Add the schedule

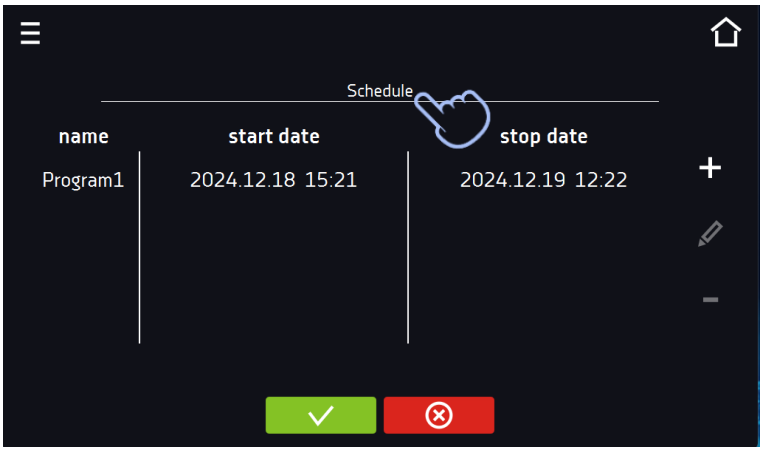
 Edit the schedule

 Delete the schedule

6.10.1. Creating / editing a schedule

To create / edit a schedule, press the button  or . The panel with schedule parameters will appear on the screen. Press "Schedule" and use the keypad to enter the schedule name. The schedule may consist of up to 10 programs.

Figure 37 Creating / editing a schedule



 Add a new program to the queue (program must be previously created)

 Edit and make changes to the selected position

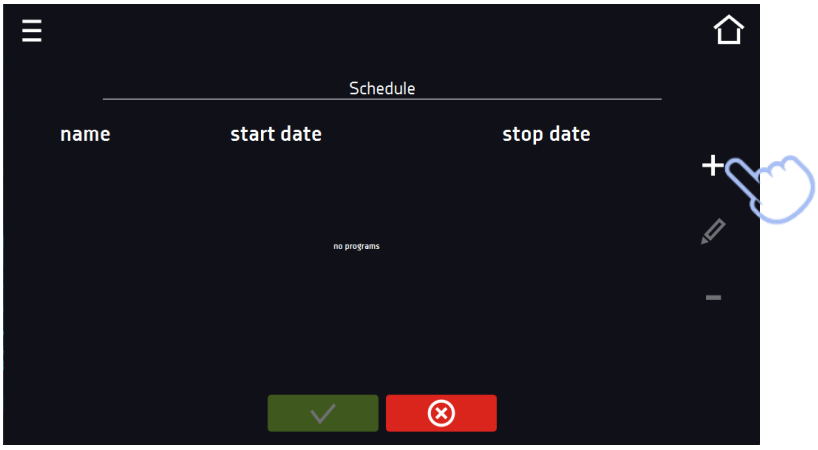
Delete the selected position from the list

Save the schedule

Cancel instroduced changes

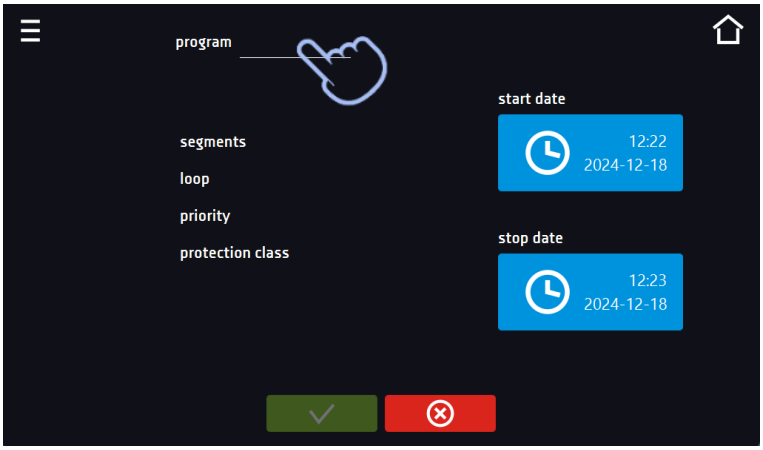
After pressing or a window appears allowing you to select the program and the date and time o its start and end

Figure 38 Adding a program to the schedule



Select a program from the drop-down list and press on the field next to the inscription "program". Information about the selected program will be displayed: number of segments, number of cycles, priority, temperature protection, upper protection, lower protection. This is only a preview of the parameters - it is not possible to change them in this window.

Figure 39 Selection of the program



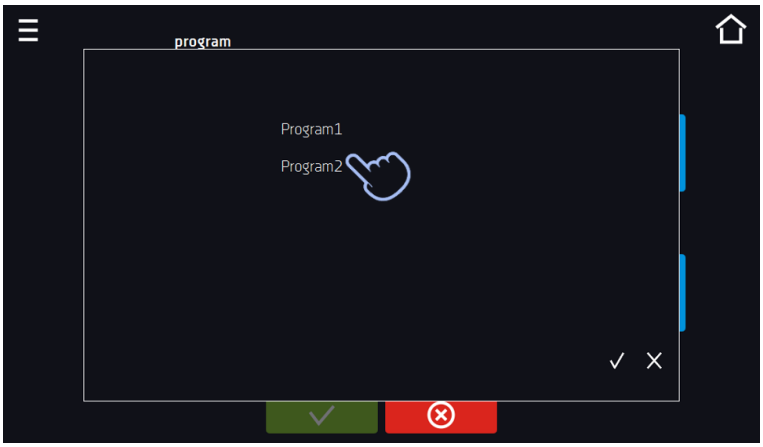
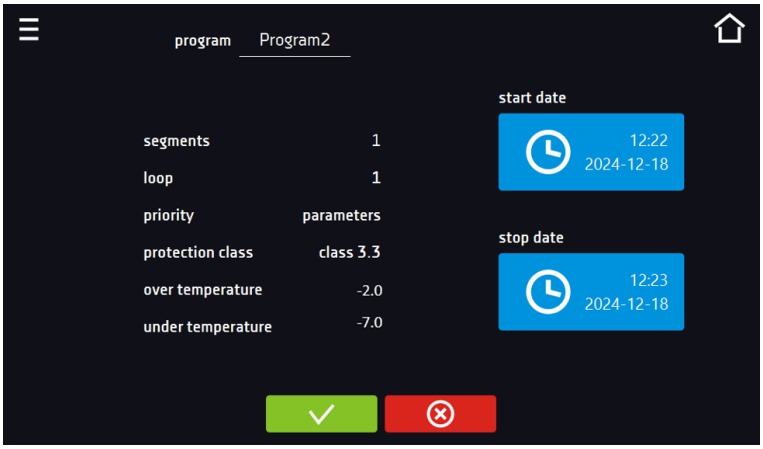
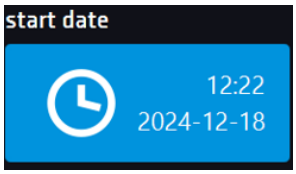


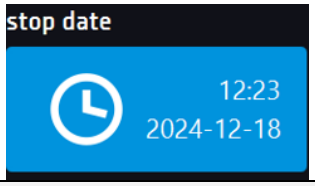
Figure 40 Information about the program



Press the 'start date' field and then set the date and time of program start.



Press the 'stop date' field and then set the date and time of the program end.



	You can assign up to 10 programs to one schedule. In total you can create ten schedules.

When creating a schedule, consider the following restrictions:

- the start time of the first program on the list cannot be earlier than the current date and time,
- the start time of the next program on the list cannot be earlier than the end time of the previous program,
- the program end time cannot be later than the start time of the next program,
- the end time of the next program does not have to coincide with the start time of the next one, there may be a break between them,
- if the program is not fully completed (due to setting a too short time of a schedule), it will be interrupted.

	When choosing time intervals, consider whether they are long enough for the selected program to be implemented. The duration of the program can be affected by: ambient conditions, samples and the program carried out immediately before it.

6.10.2. Starting a schedule

The schedule can be started in two ways:

6.10.2.1. The first way

- Press the icon of the main menu  and then press the icon „schedule” .
- Then select the schedule you want to activate and press the start button. .

Figure 41 Main menu

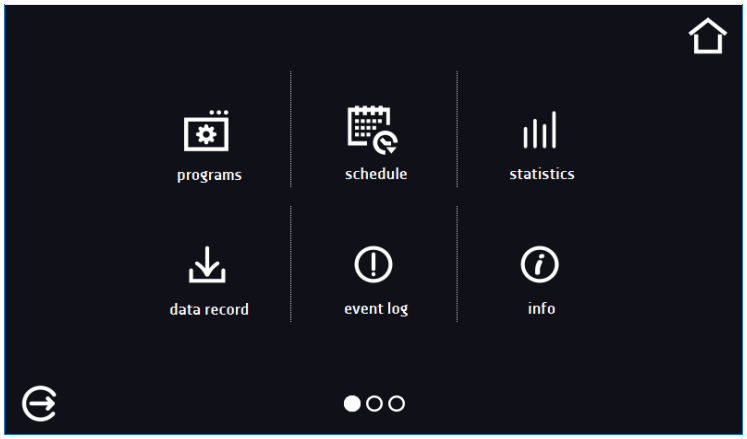
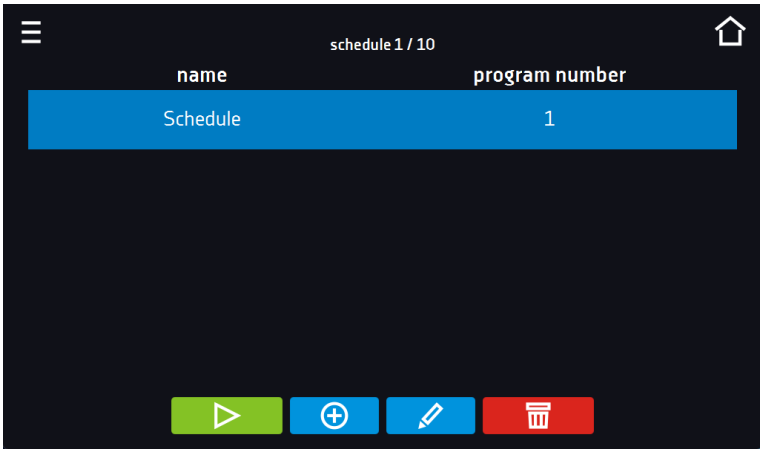


Figure 42 List of schedules



 Start the schedule

6.10.2.2. The second way

- In the main screen press the icon , then press the SCHEDULE inscription. The schedule selection window will be displayed.
- Then select the schedule you want to activate and press the button .

	Please note that it is not possible to run a schedule in which all parameters refer to the past time.

Figure 43 Main screen

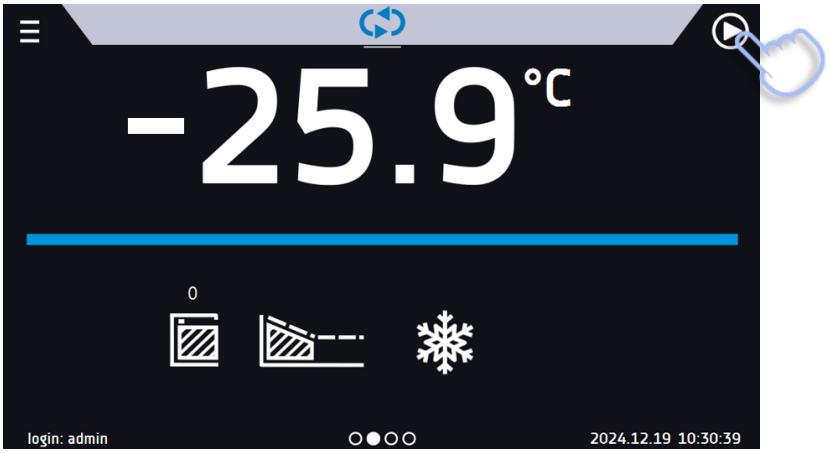
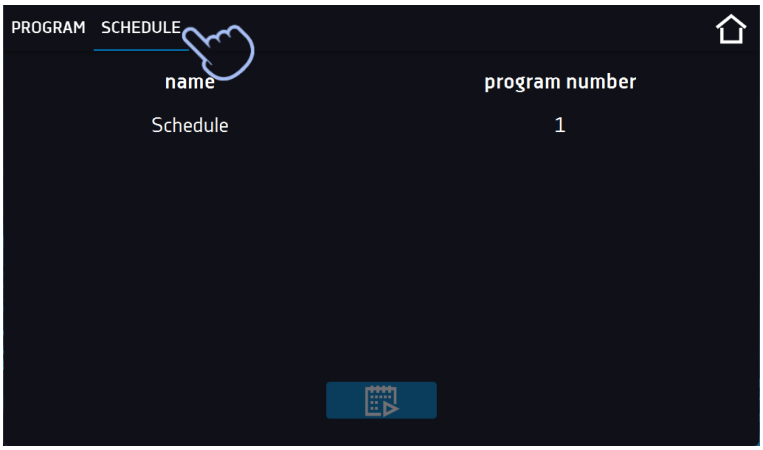


Figure 44 Selection of the schedule



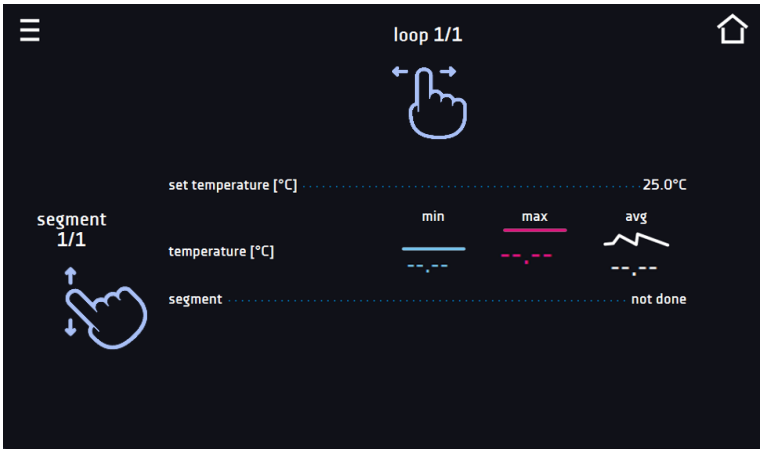
6.11. Statistics

Press the icon of the main menu and then press . In this panel statistics of the currently running program or program that has ended are displayed. Statistics are calculated separately for each segment. Data logging for calculation starts after 30 seconds from reaching the set temperature in the segment. Further data is registered every 1 minute.
The following information is available:

- **set temperature [°C] –** set temperature in the segment,
- **minimum temperature [°C] –** the lowest recorded temperature,
- **maximum temperature [°C] –** the highest recorded temperature,
- **average temperature [°C] –** average temperature,
- **segment –** status of the segment:
  - **in progress –** currently running segment (data is being constantly updated),
  - **finished –** the segment has been completed,
  - **interrupted –** the segment was interrupted by the user before the set time has elapsed,
- **segment 1/2 –** the number of the currently overviewing segment / number of the currently performed or completed segment. Navigating between the segments is done by swiping your finger up or down.
- **loop 1/1 –** the number of the currently overviewing cycle / number of the currently performed or completed cycle. Navigating between the cycles is done by swiping your finger left or right.

	You cannot overview the segment / cycle data that has not started yet.

Figure 45 Statistics



6.12. Data record

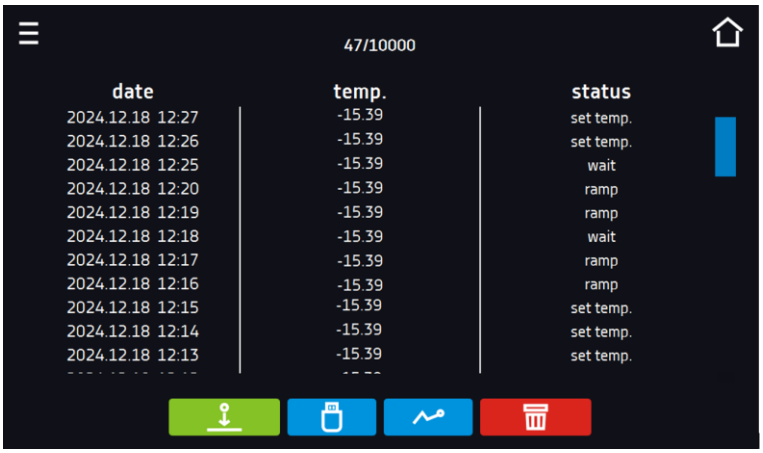
Press the icon of the main menu and then press . Data record window contains the following information:

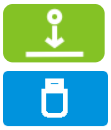
- time and date of sample registration [date],
- temperature value measured with the main sensor in the chamber [temp.].

It is possible to register 10 000 data records for the max period of 12 months. If all the memory cells are full, the oldest ones are overwritten. The data appears in the table in the order they were added, not in chronological order by the date. The most recently added record is at the top. The samples are only registered when the program is running. The frequency of registration depends on the program parameters settings.

	When opening the data record, all data is downloaded. If the data download is interrupted by the user, press to continue downoading of the rest of the data.

Figure 46 Data record





Press to continue downloading data.

Recording data onto the USB flash drive. .csv files are available - separated by semicolon when opening e.g. with a spreadsheet, .plkx - opening with the Lab Desk application



Before removing the USB flash drive from the USB port, it must be unmounted, see *Section 5.5.*



Displaying data as a graph, see *Section 6.12.1.*



Deleting data. Users with Super Admin privileges can delete all data, including those registered by other users.

If there is a lot of data, a progress bar appears on the display:

Figure 47 Progress bar

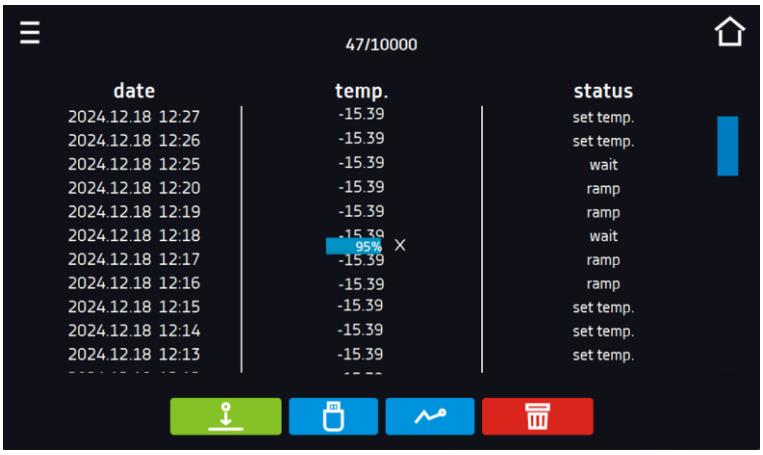
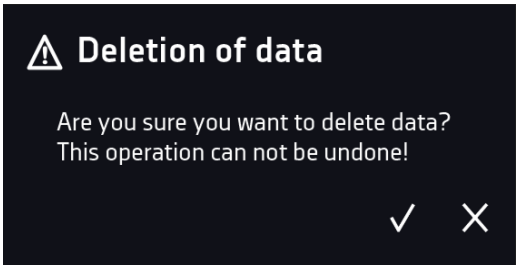


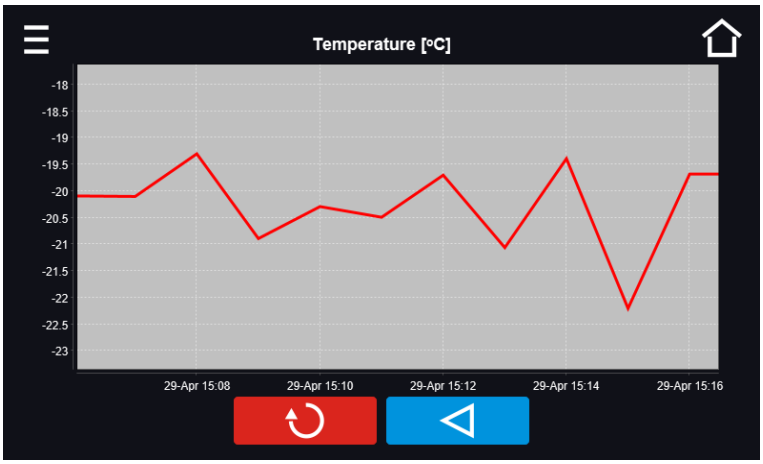
Figure 47 Deleting data

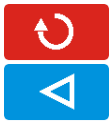


6.12.1. Graph

A graph can be generated from the data stored in the data register. The time during which the graph opens depends on the number of saved samples data. If the unit is equipped with additional sensors, press the selected graph twice.

Figure 48 Temperature graph





Returns to displaying the entire chart (undo all magnifications) / returns to the list of charts.

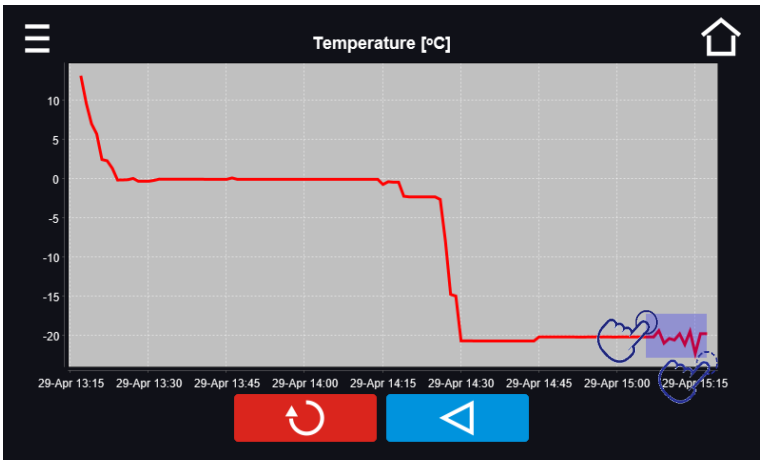
Returns to data register

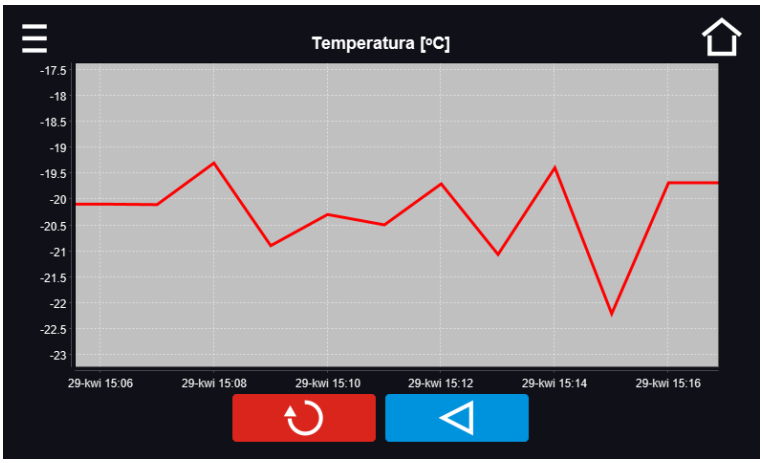


The opening time of the chart depends on the number of saved data samples. The greater the number of saved samples, the longer this window will open.

You can enlarge a fragment of the chart. Press the graph anywhere and drag to the right and down simultaneously - enlarge in the same way as it is done on a smartphone. Swipe left to return the chart to normal size.

Figure 49 Enlarging a part of the chart





6.12.2. Data storage directly on a USB flash drive

The saved data (temperature and / or humidity, date and time) can be saved directly on a connected USB flash drive. To do this, enable the option of saving data, see point *6.16*. The USB flash drive must be connected to the USB socket located on the front of the equipment.

The date / time, temperature of the sensor installed in the chamber and indications of additional sensors in the unit (humidity, additional temperature sensor) are saved to the file. The frequency of saving to the file is equal to the frequency of saving the data in the register set in the program, see section *6.7.1. Creating / editing a program* (saving interval to the data register). Few comments can be found below:

- saving to the file takes place only when the program is running,
- data register is continued after power is restored,
- during registration, the USB flash drive can be removed but it is necessary to unmount it in the main window on the upper menu bar, see section *5.5. USB port*,
- registration is continued after reinserting the USB flash drive,
- a folder with the name consistent with the serial number of the device is created on the flash drive, all files are saved in it. The files are saved in the csv format (separated by semicolons), which can be read in a spreadsheet or notebook

	A	B	C
1	date	temp.	status
2			
3	23.03.2022 11:06	25.04°C	wait
4	23.03.2022 11:07	25.04°C	ramp
5	23.03.2022 11:08	25.04°C	ramp
6			

- the current measurement is saved to a file named measurements.csv,
- if the size of the current file exceeds 513 kB or the calendar month is changed, the current file is named in the format yyyy-mm_ measurements_0.csv, where 0 means the file number in the month, e.g. 2021-05_measurements_0.csv

6.13. Event log

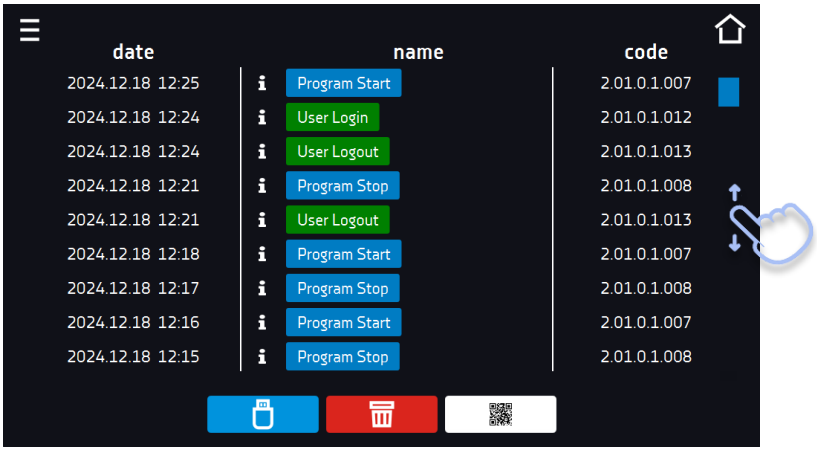
Data available for the following users *(see Section 6.15 Users)*:

- **Super Admin** who can overview, download to USB flash drive and delete all data,
- **Admin** who can overview, download to USB flash drive all data,
- **User** who can only overview all data.

The log can store up to 10,000 esvents. When the memory reaches its capacity, new data automatically overwrites the oldest entries.

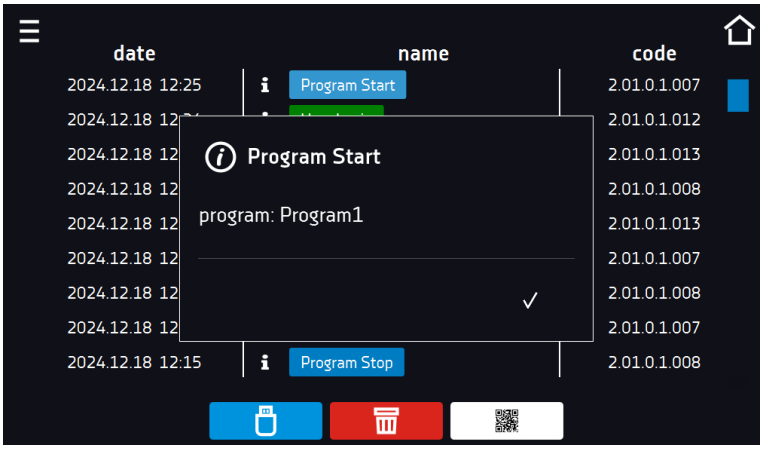
Go to the main menu and press the icon .The window displays information about registered events, alarms and errors.

Figure 51 Event log



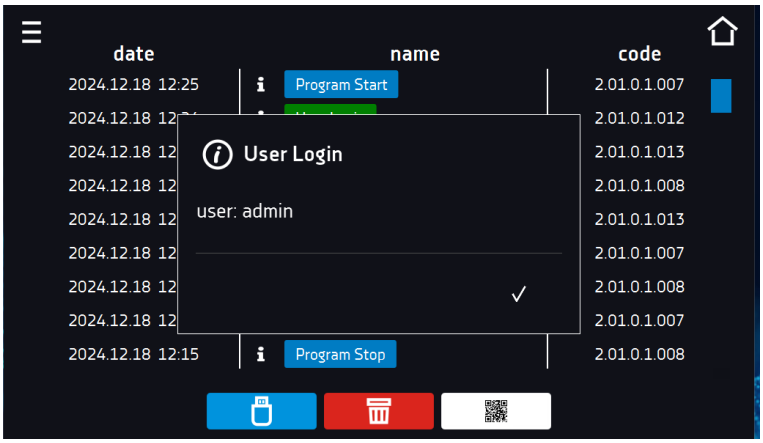
For program-related events, after pressing the event name, the program name is displayer.

Figure 52 Event log



For user-related events, after pressing the event name, it displays the login of the user to whom the event relates.

Figure 53. Event log



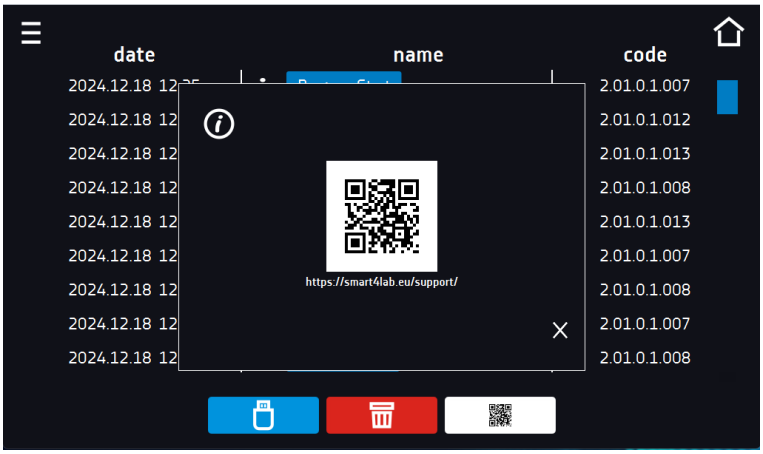
Recording data onto the USB flash drive. .csv files are available - separated by semicolon when opening e.g. with a spreadsheet, .plkx - opening with the LabDesk application

Before removing the USB flash drive from the USB port, it must be unmounted, see *Section 5.5.*

Deleting data

QR code – opens smart4lab.eu (in the "Support" tab there are explanations of some of the information appearing in the event log). Press the symbol and enlarge the code QR, and then scan it with your smartphone

Figure 53 QR code



The events in the event log are sorted chronologically. However, it may happen that the event "Program restarted" will not be displayed according to the chronology but the date and time of the event will be correct. This is not an error.

Before removing the USB flash drive from the USB port, it must be unmounted, see *Section 5.5.*

Information signs in the event log:



Information event

Message entered by the user

Alarm event

Error

Warning

Possible events:

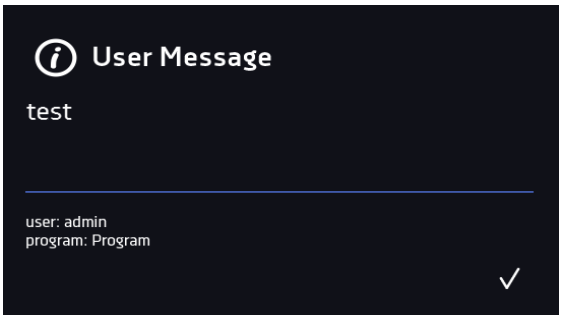
Program Start	starting the program
Program Stop	stopping the program
Program Edit	changing the program parameters
Program End	program is completed
DeviceOn	the device is switched on (on the main switch)
DeviceOff	the device is switched off (on the main switch)
Door opened	the door is opened
Open door alarm start	open door alarm has been activated
Door closed	the door is closed
Open door alarm stop	open door alarm has been deactivated
Program Restarted	program has been reasumed after power failure
Date/time change	date/time has been changed
Lower temp. alarm Start	activation of the alarm of exceeding the temperature below the set temperature
Lower temp. alarm End	deactivation of the alarm of exceeding the temperature below the set temperature
Upper temp. alarm Start	activation of the alarm of exceeding the temperature above the set temperature
Upper temp. alarm End	deactivation of the alarm of exceeding the temperature above the set temperature
Deleted Measurement	user measurements have been deleted
Deleted All Mesurement	all measurements have been deleted
User added	new user has been added
User updated	user has been changed
User deleted	user has been deleted
Program deleted	program has been deleted
Program updated	program has been updated
Time Zone Changed	in the time settings the time zone has been changed
Temperature Correction Changed	main sensor temperature correction has been changed
Emergency stop of the program	the program has been automatically stopped – there was a situation that didn't allow the program to be continued. PLEASE CONTACT THE SERVICE
Defrosting Start	starting the defrosting process
Defrosting Stop	stopping the defrosting process
Power Fail Start	power failure / device fuse blown out.
Power Fail Stop	power reasumed, returned to maintain program parameters
User login	date and time of login
User logout	date and time of logout

An unexpected temperature	An unexpected temperature rise may occur after the defrosting cycle when the temperature continues to rise up and the device is not able to return to maintaining the setpoint temperature. Possible Causes: • Extended door opening during or shortly after defrost cycle (within 15 minutes), leading to prolonged thermal exchange. • Insertion of a load right after or during defrost cycle (within 15 minutes), of a significantly higher temperature than the chamber setpoint. • Severely frosted evaporator due to improperly configured defrosting parameters (e.g., excessively long intervals between defrost cycles or insufficient defrost duration). • Refrigeration system malfunction, resulting in decreased cooling efficiency.

Quick note

To view message details, click User Message. In this window you can see the content of the message, the name of the user who entered it and the name of the program during which the message was written.

Figure 54 Details of user's message



6.14. Info

Press the icon of the main menu and then press .The panel contains the following information:

- name of device,
- serial number,
- temperature range,
- Software version,
- manufacturer's address,
- manufacturer's website,
- QR code.

Figure 55 Info window (example)



Press icon to save the “Download” folder (with instruction manual) on the USB flash drive. After inserting the flash drive into USB port wait few seconds until the information *“Flashdrive connected”* will appear on the display - for more information go to the Section 6.1. Press the icon to write the service data on the USB flash drive – contact the service department for more information.

Press to go to the main screen. If a USB flsh drive is connected to the device, when entering the "Info" panel, a proposal to save configuration file will appear. This file is used to create an offline program in the Lab Desk application.

Figure 56 Saving configuration file

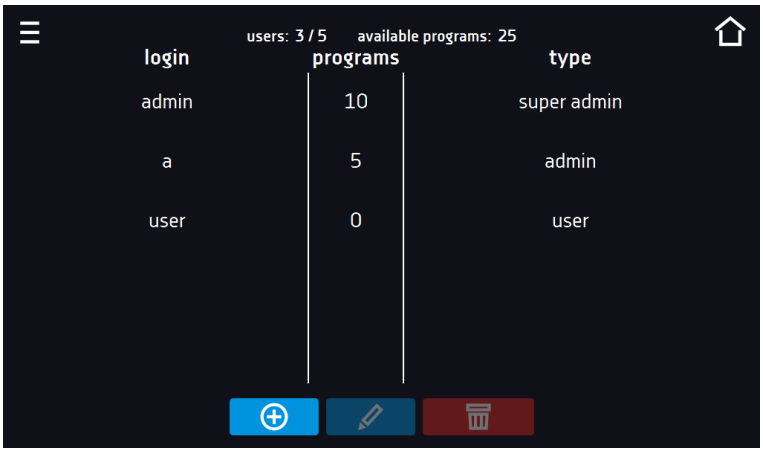


Before removing the USB flash drive from the USB port, it must be unmounted, see Section 5.5.

6.15. Users

Go to the main menu and press the icon . In this panel you can add a new user, edit an existing one or delete it.

Figure 57 Users list



Adding a new user


Editing selected user


Deleting selected user - his programs and data register will be deleted with the user.

At the top of the screen you can see information about:

- **users:** number of created users / total number of users to create (users 2/5),
- **available programs:** the number of free programs to be assigned to users.

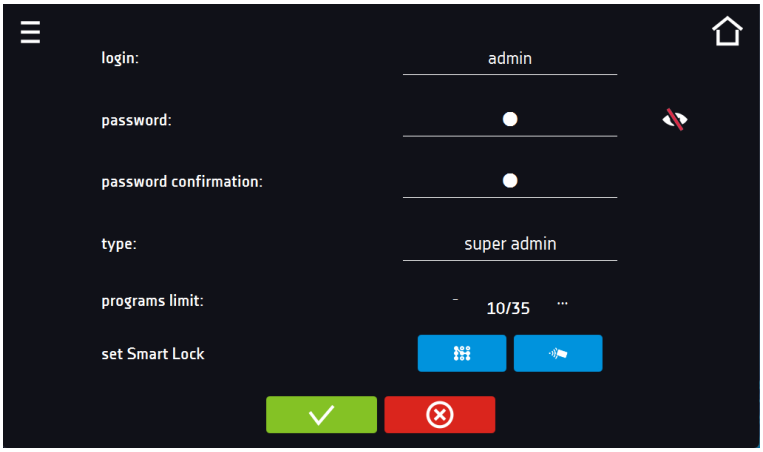
6.15.1. Creating / editing a user

To add or change user settings, press the button  or , a panel with user data will be displayed.

You have to enter:

- **login** – user name,
- **password** – account password,
- **password confirmation** – you must enter the password again to confirm it,
- **type –** account type (Super Admin , Admin, User), for more information see Section 6.15.2.,
- **programs limit** – number of programs that can be created by the user / number of available programs (it's not possible to set a limit to the User).
- **Smart Lock** - selection of login using a pattern (additional option).

Figure 58 Editing a user




User pattern for logging in, adding, changing and deleting a pattern

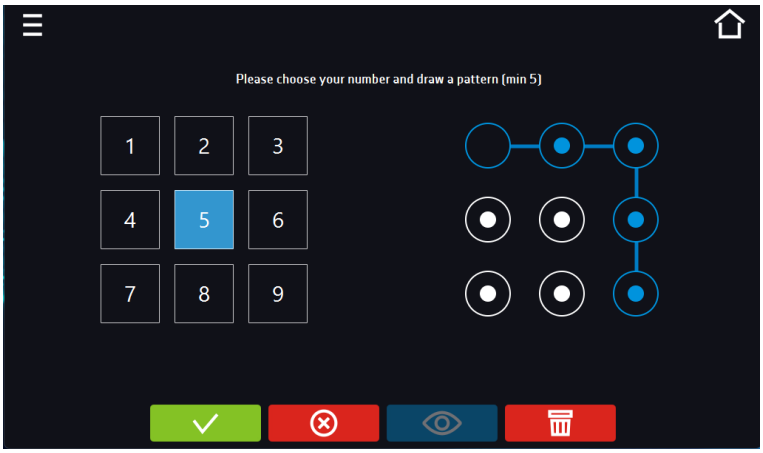

Confirm and save the user.


Cancel the changes made and return to the user list.


The device can have maximum 5 users. There are 40 programs available which can be freely distributed among users.

To log in, the User can choose a login in text form or a template. To enable the user to log in using a pattern, press in the Edit User window . The pattern login window will appear.

Figure 59. Login using a template




Confirm and save the user.


Cancel the changes made and return to the user list.


Pattern preview.


Delete the pattern.

Adding or changing a pattern - select any free number and draw a pattern consisting of at least 5 points. Numbers that have previously been used by other users are unavailable.
Example:
In Fig. 63, numbers 3, 4 and 7 have already been used by other users. The edited user used number 5.

A pattern can be assigned to a maximum of 9 users.

6.15.2. Account types and their limits

Three different types of users (accounts) are available: Super Admin, Admin, User. Each user has their rights and limitations described below in the *table 1*.

Table 1. Right and limitations of the users.

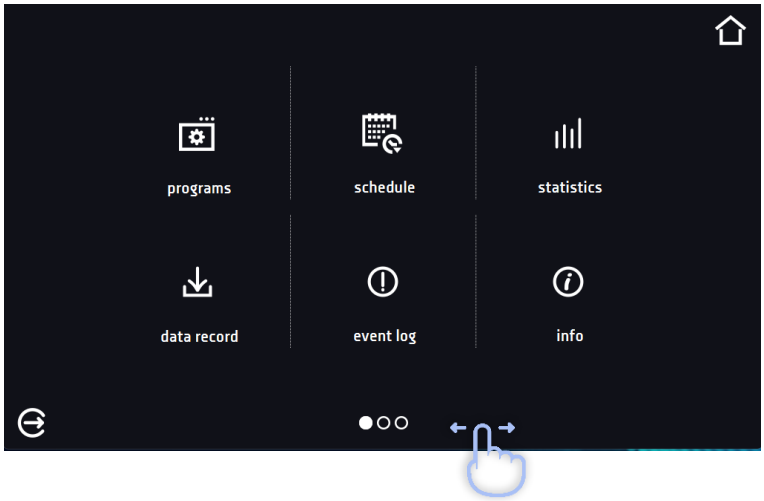
	Super Admin	Admin	User
Creating programs	✔	✔	✗
Editing programs	✔	✔	✗
Stopping your own program	✔	✔	✔
Stopping a program of another user	✔	✗	✗
Quick program	✔	✔	✗
Quick change of set time	✔	✔	✗
Quick change of set temperature	✔	✔	✗
Assigning a program to a user of the user type	✔	✔	✗
Creating a schedule	✔	✔	✗
Editing a schedule	✔	✔	✗
Defrost control	✔	✗	✗
Management of the illumination shelves in the unit (FIT version)	✔	✗	✗
Setting temperature measurement parameters	✔	✗	✗
Temperature value correction	✔	✗	✗
Setting the alarms	✔	✗	✗

Temporarily silencing the alarms	✔	✔	✗
Enabling / disabling the sound	✔	✗	✗
Saving a Quick Note	✔	✔	✔
Creating users accounts	✔	✗	✗
Changing user's settings	✔	✗	✗
Changing equipment's name	✔	✗	✗
Setting a time zone	✔	✗	✗
Changing the language	✔	✗	✗
Setting the automatic logout time	✔	✗	✗
System information preview	✔	✔	✔
Statistics preview	✔	✔	✔
WiFi settings	✔	✗	✗
LAN settings	✔	✗	✗
Setting e-mail reports	✔	✗	✗
Access to the archive	✔	✗	✗
Events preview	✔	✔	✔
Deleting events	✔	✗	✗
Copying data to a pendrive	✔	✔	✗
Data preview	✔	✔	✔
Copying data to a pendrive	✔	✔	✔
Displaying data as a graph	✔	✔	✔
Deleting your own data	✔	✔	✔
Deleting all data	✔	✗	✗
Reseting the open door counter	✔	✗	✗

Super Admin account

The Super Admin account has no limits. Has access to the program management menu and to the settings menu, go to the *table 1*.

Figure 59 Menu available for Super Admin

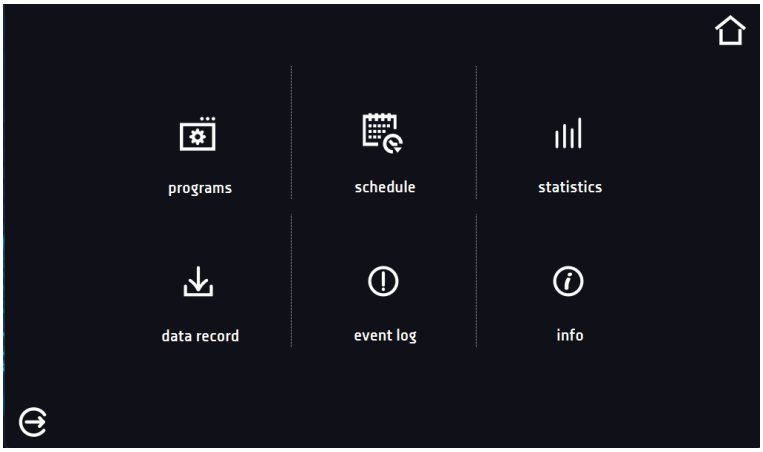


Information about the currently displayed window indicates .

Admin account

Has access to **programs menu**  and has rights and limitations in accordance with *table 1*.

Figure 60 Menu available for Admin

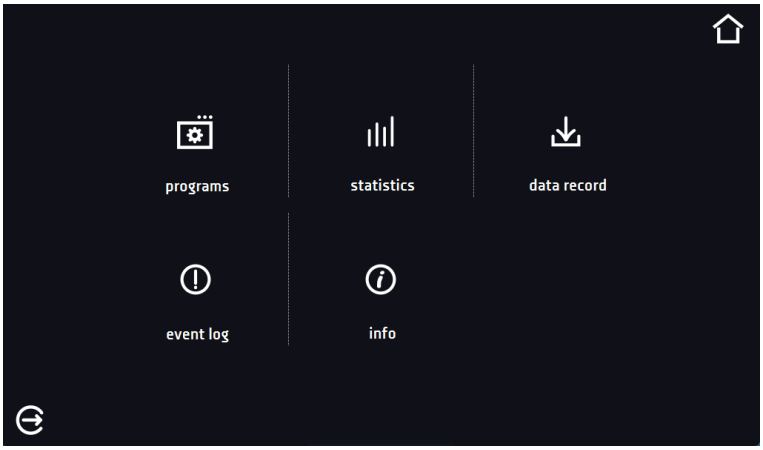


User account:

- has access to **programs menu** , where User can start **programs** previously assigned to him, check their statistics (**statistics**, **data register**), check events history of the equipment (**event log**) and the information about the system (**info**),
- can´t create his own programs and schedules but start those which has been assigned to him by Super Admin,
- can´t stop or edit a program or schedule which wasn´t started by him,
- doesn´t have access to create or edit schedules,
- the program started by the User can be stopped by a user with Super Admin privileges.

Other rights and limitations of the User type account are shown in *table 1*.

Figure 61 Menu available for User



6.16. User settings panel (language, dimmed screen, etc.)

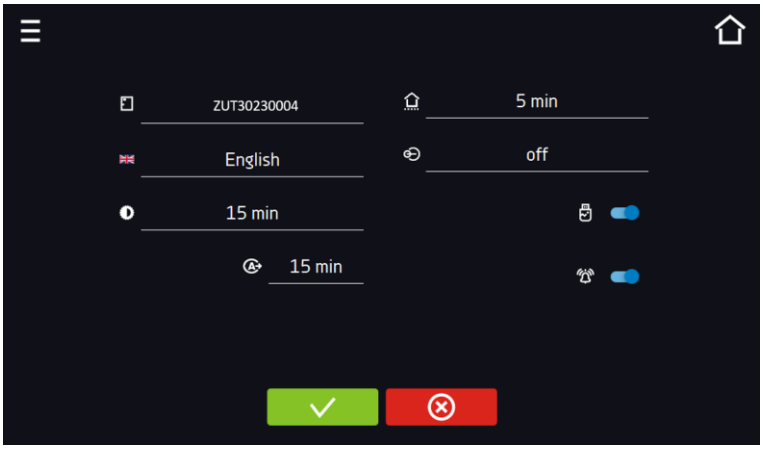
Press the icon of the main menu and then press . In this panel you can:

	Change the name of the equipment – by default, the device serial number is entered.
English	Change the language in the equipment´s menu.

	Set the time after which the screen will be dimmed.
	Turn on/off the sound . Critical alarms will continue emitting a sound.
	Set the time after which the user will be automatically logged out. Available settings: off, 1 min, 3 min, 5 min, 10 min. Factory setting: enabled.
	Set the time after which the user will return to the home screen. Available settings: off, 1 min, 3 min, 5 min, 10 min.
	Set the automatic screen lock. Available settings: off, 5 min, 15 min, 30 min, 60 min. Factory setting: disabled.
	Enable / disable data register on a USB flash drive (connected to the USB port on the front of the unit).

	Only one feature can be enabled at the same time: automatic logout or automatic screen lock.

Figure 62 User settings panel



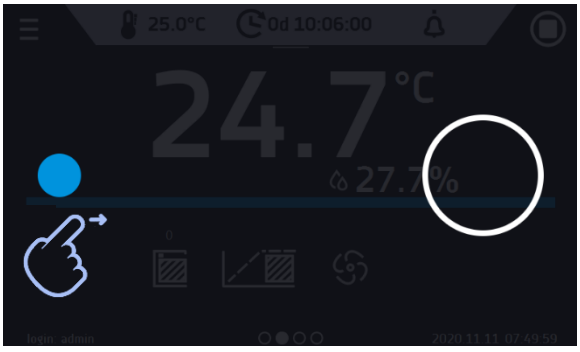
 Confirms changes

 Cancels the entered changes

6.16.1. Unlocking the touch screen

When the automatic touch screen lock is enabled *(Section 6.16)*, slide the blue circle into the white circle to unlock the screen.

Figure 63 Unlocking the touch screen





6.17. Time

Go to the main menu and press the icon . In this panel you can change the date and system time and time zone.

	The time and time zone must be set correctly during the first start-up.

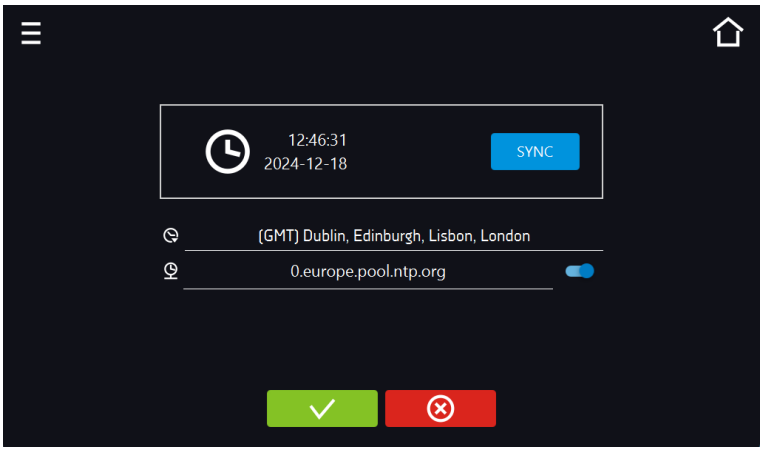
Change of the date / system time

	If the date / system time is changed to the later date / time comparing with the data and events which are stored in the memory, they will remain in the register. If the date / system time is changed to the earlier date than the date / time which is stored in the memory, they will be transferred to the archive

After changing the date/system time the device will be restarted.

To change the date / system time it is necessary to press in the window. The window will appear and you will be able to make changes.

Figure 64 Time change

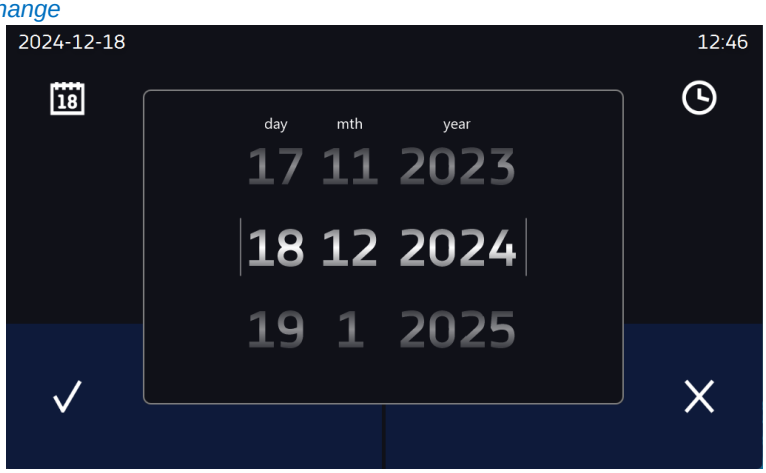


If the unit is permanently connected to the internet, the time will be synchronized with the time server.
Time synchronization is performed:

- manually using the button SYNC
- while enabling the automatic synchronization option and then every 12 hours ( )
- after starting the unit, then every 12 hours

	If the time in the equipment was set incorrectly or it became out of sync with the period of use (which is natural), then if: • automatic synchronization is turned on and the device is not connected to the internet but will be able to access the internet • automatic synchronization is turned off and will be turned on, in addition, the unit is connected to the internet the time will be synchronized with the NTP time server.

Figure 65 Date / time change



Confirms changes and restarts the device

Cancels the entered changes

Change of time zone

The change of time zone will not affect the date / time in data and events previously saved.

To change time zone, you have to press the buton in the window. Select the time zone from the drop-down list. After changing only the time zone, the device is not restarted.

Confirms changes

Cancels the entered changes

	The same time zones on the device and computer are required for correct operation of the programs.

6.18. Alarms

Go to the main menu and press the icon . You can set parameters related to alarms.

- **lower alarm** – an alarm will be activated if the temperature drops below the value given in this field,
- **upper alarm** – an alarm will be activated if the temperature rises above the value given in this field.

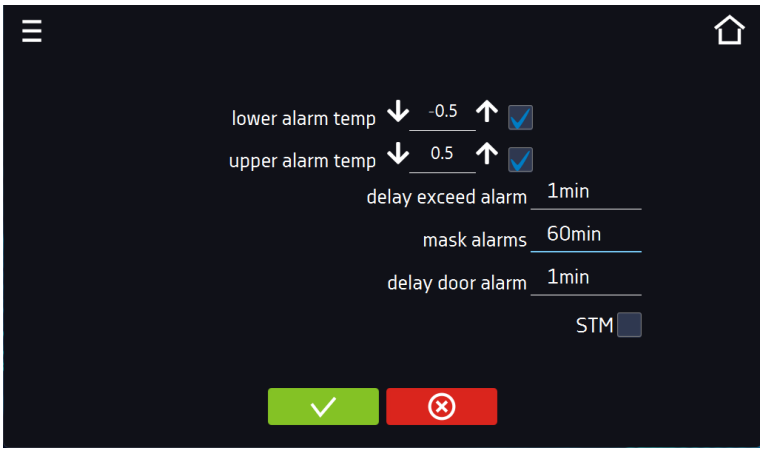
The lower and upper alarm can only be activated after reaching the set temperature.

- **delay temp alarm:**

  the alarm will be activated with a delay (1 min, 2 min, 5 min, 10 min, 15 min) after exceeding the permitted temperature.
- **delay door alarm:**

  the door alarm will be activated when the door is opened for the time selected by the user (30 s, 1 min, 2 min, 5 min, 10 min).
- **turning on/off the STM function** (to read the description of the function go to the section 16.18.1)

Figure 66 Alarms





Confirms changes



Cancels the entered changes

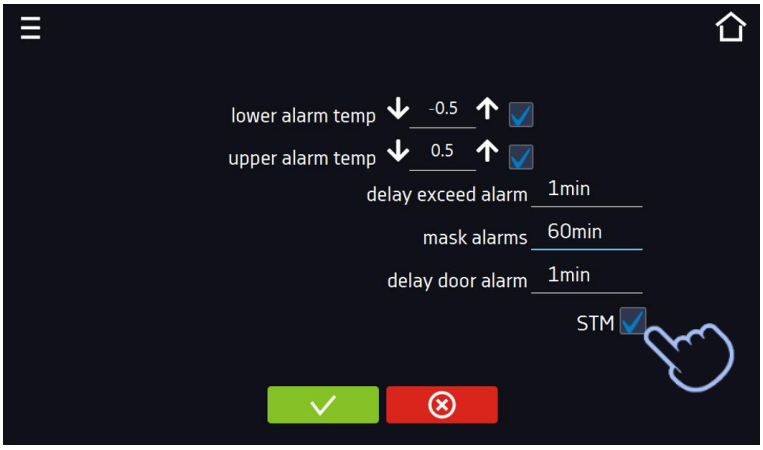


In the field "lower alarm temp" you can set a value of -0,5°C to - 5°C and in the field "upper alarm temp" you can set a value of +0,5°C to +5°C.

6.18.1. STM function

The STM function (Smart Temperature Monitor) informs the user about the problem of reaching or maintaining the set temperature. The user can enable / disable the function. If the STM function is on, the STM symbol will appear on the screen next to the temperature of the main sensor.

Figure 67 Enable/disable STM function





Confirm the changes.



Cancels the entered changes.

The function status is signaled with the following colors:

- no STM on the display - option disabled,
- white color - option enabled, the program is stopped,
- blue color - option enabled (temperature monitoring), the program is running,
- red color - option enabled, warning about problems with reaching / maintaining the temperature.

Figure 68. STM Function - option enabled, the program is stopped

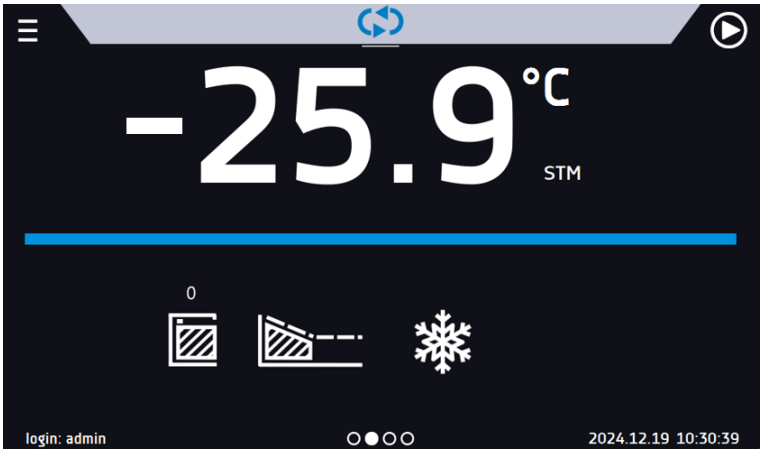


Figure 69 STM Function - option enabled, the program is running

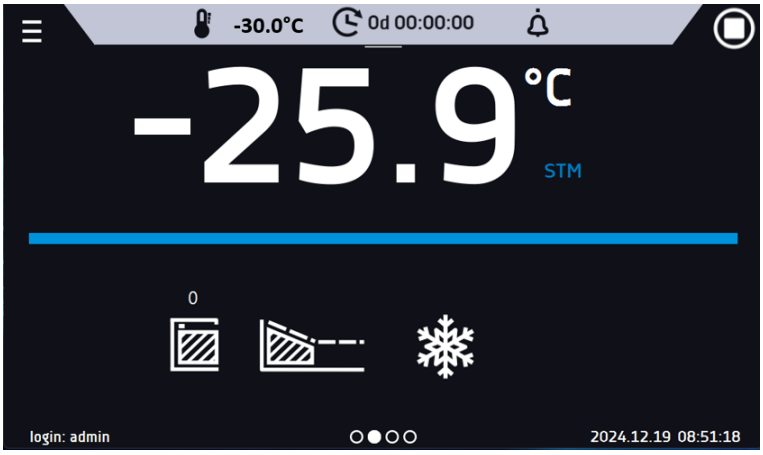
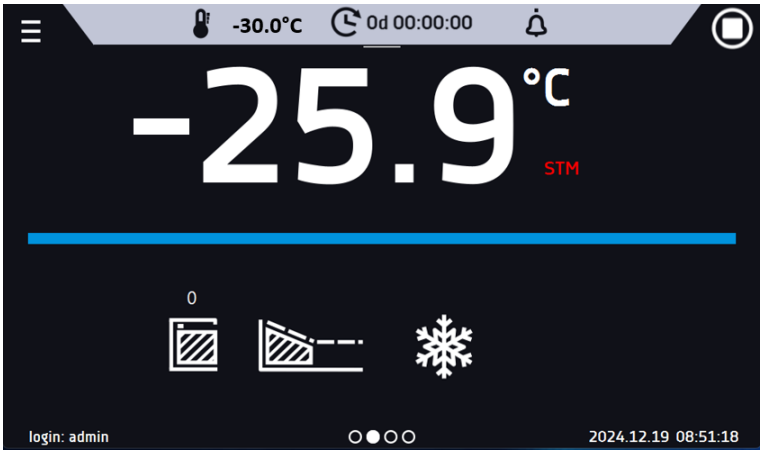


Figure 70 STM Function - option enabled, warning about problems with reaching / maintaining the temperature



Possible causes:

1. damaged heater,
2. the sample inserted into the chamber absorbs / dissipates too much energy.

If the color was red before opening the door, the color changes to blue after opening the door.

In case of activation of the function (detection of problems with reaching / maintaining the temperature):

- the warning 4.00.0.1.009… appears in the event log

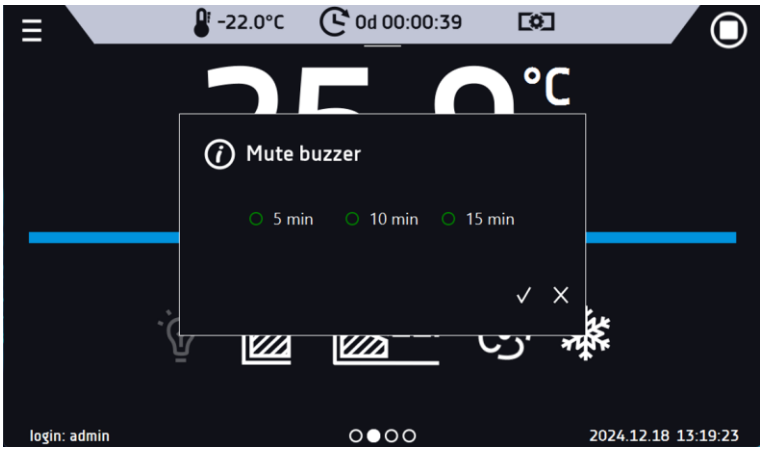
- the color of the STM inscription changes to red and remains as long as the failure occurs, the segment is changed or the program is turned off
- when the status changes from red to blue, an entry about the end of the function 4.00.0.1.010 appears in the event log

6.18.2. Mute option

The icon in the main screen in the upper menu allows temporary switching off of the alarms sound (open door alarm, exceeding temperature range), e.g. to avoid door alarm during planned loading of the samples into the chamber.

To set the mute time, press the icon and choose: 5, 10 or 15 minutes, however, the sounds of critical alarms (e.g. damage to the temperature sensor) will be still emitted.

Figure 70 Mute function



6.19. Network

Go to the main menu and press the icon . In this panel you can change the settings for LAN or WiFi. Switch between LAN / WiFi network by pressing or .

LAN settings:

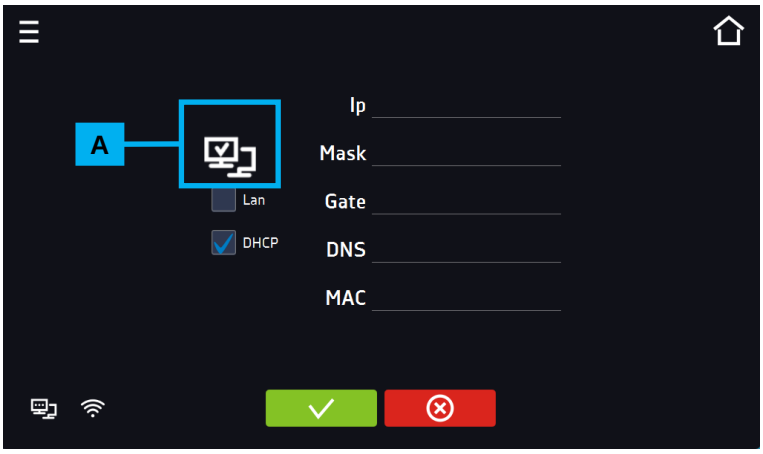
- **IP** – the device's IP address
- **Mask** – an Ethernet network mask to which the device is connected
- **Gate** – Server's IP address or router's that manages the Ethernet network
- **DNS** – IP address of the domain name system
- **MAC** – the address of the network card, read-only
- **DHCP** – you can select if the server that allocates IP addresses is running on the local network. You can then skip setting IP, Masks, Gates

Icon A indicates the connection status:

Device connected to the network

Device disconnected from the network

Figure 71 LAN settings



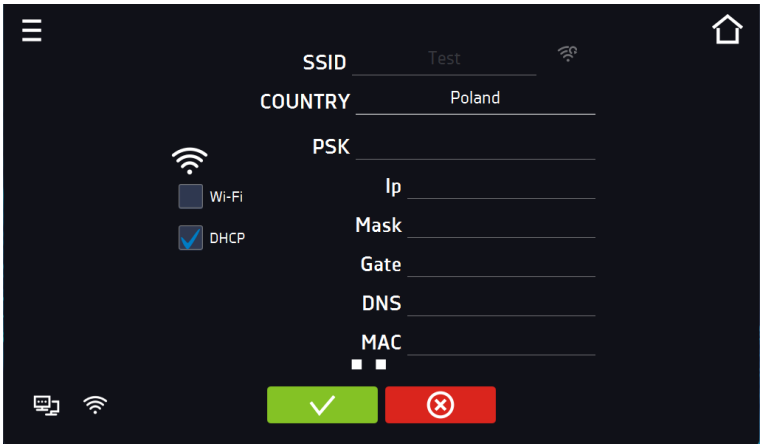
Confirms changes

Cancels the entered changes

WiFi settings:

- – press to refresh network list,
- **SSID** – press to select network from the drop-down list,
- **COUNTRY** - select a country
- **PSK** – network password,
- **IP**, **Mask**, **Gate**, **DNS** – after a successful connection to the network these fields are automatically completed,
- **MAC** – physical address of the network card, read-only.

Figure 72 WiFi settings



Confirms changes

Cancels the entered changes

6.20. E-mail reports

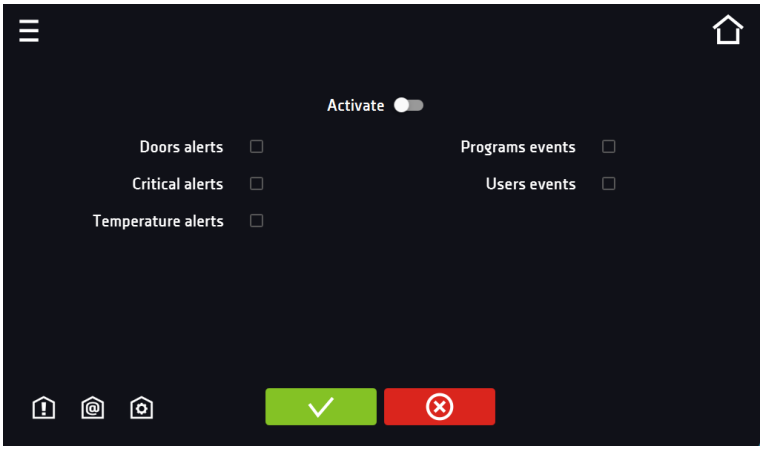
Go to the main menu and press the icon . In this window you can set the parameters needed to activate e-mail notifications.

In the panel there are three windows:

Selection of event types for which notifications should be sent.

- **Activate** – turning on/off e-mail notifications,
- **Doors alerts** – alarms triggered by an open door,
- **Critical alerts** – critical alarms (e.g. sensor damage),
- **Temperature alerts** – alarms caused by too high or too low temperature,
- **Programs events** – program-related events (e.g. adding, editing, deleting a program),
- **Users events** – events related to editing user settings (e.g. adding, editing, deleting users).

Figure 73 E-mail: events



Confirms changes

Cancels the entered changes

If the "activate" option at the top of the panel is not enabled, emails will not be sent!

Sender and recipients

- **Sender** – sender's e-mail address
- **Recipients** – recipients e-mail addresses, maximum

Figure 74 E-mail: Sender – Recipients



 Confirms changes

 Cancels the entered changes

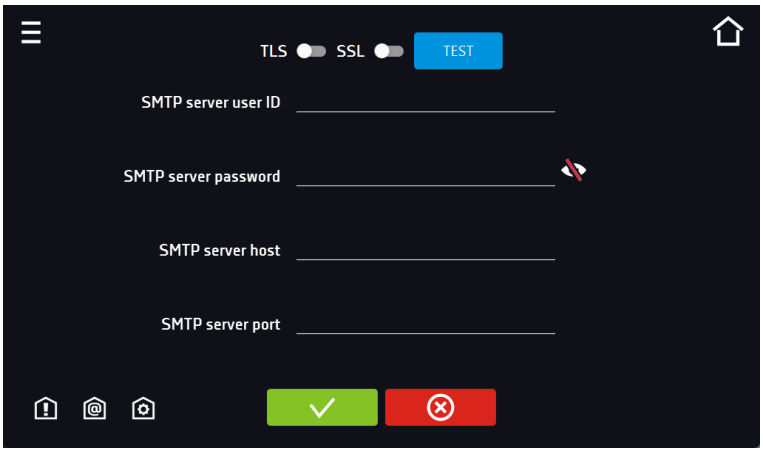
 Configuration of the sender's e-mail account

In this window, enter your e-mail account details:

- SMTP server user ID
- SMTP server password
- SMTP server host
- SMTP server port

You can also choose the **TLS** or **SSL** encryption method (get more information from your email account provider).

Figure 75 E-mail: email account configuration



 Connection test

 Confirms changes

 Cancels introduced changes

Before testing the connection, make sure that the device is connected to the network and has a properly configured network connection, see Section 6.19.

6.21. Automatic defrosting function (standard for ZLW-T)

Press the icon of the main menu and then press . In this panel you can control the defrosting of the interior of the device. This is a standard equipment for the freezers with forced air convection: ZLW-T 200 and ZLW-T 300. ZLW units are additionally equipped with evaporator temperature measurement and heating of the condensate drain system. Defrosting has additional parameters to set:

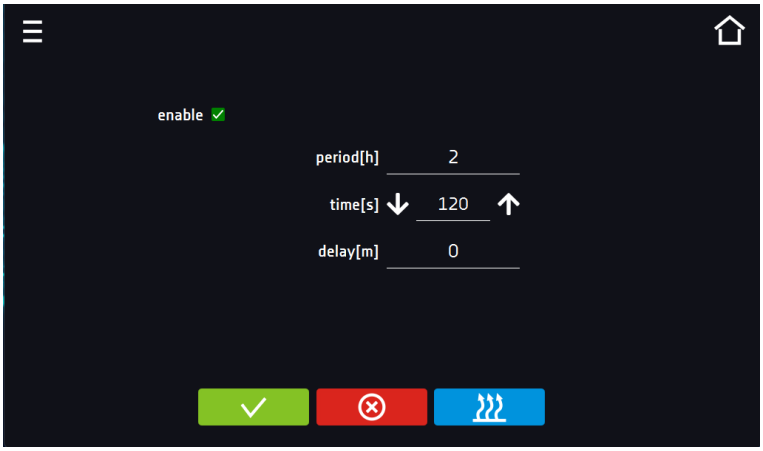
- **preheat time of the tray [s]** - time before defrosting during which the condensate drain system should be preheated,
- **evaporator temperature [°C]** – temperature (on the evaporator) for the end of defrosting. Defrosting ends when the evaporator reaches the set temperature or after the time set in the **time** parameter has elapsed, depending on what occurs first.

User can set parameters such as: **time**, **preheat time of the tray**, **evaporator temperature.**
CAUTION: too low values may cause that the accumulated ice will not melt during the defrost cycle, which may result in increased icing. However, higher values can cause an unnecessary increase of the temperature in the chamber.

Pressing the button – restores the default defrost settings (period [h]: 2, time [s]: 120, delay [m]: 0, preheat time [s]: 90, evaporator temperature [°C]: 0.

NOTE: the option enable must be selected.

Figure 76 Defrosting program



Confirms changes

Cancels the entered changes

Restores the default defrost settings

6.22. Temperature – additional temperature sensor Pt 100 (option)

Go to the main menu and press the icon . In this panel you can set parameters related to the temperature measurement in the equipment using an additional temperature sensor.

Additional sensor

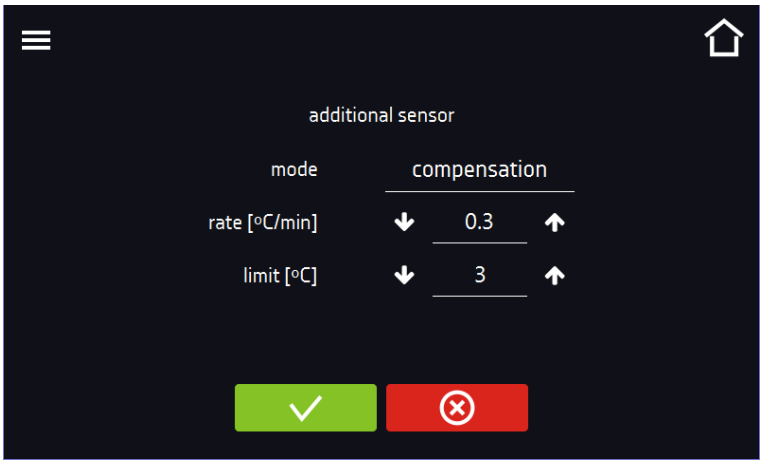
The following parameters can be set relative to the additional temperature sensor:

- **mode** – sensor operation mode:
  - **disable** – the sensor is switched on,
  - **measure** – displaying in the main window and recording temperature from the additional temperature sensor,
  - **compensation** - displaying in the main window and recording temperature from the additional temperature sensor + compensation,
- **rate [C°/min]** – determines how fast the equipment is to respond to differences in temperature indications between the additional temperature sensor and the main sensor (higher value = faster response of the equipment, can affect the stability of temperature maintenance),
- **limit** – parameter which defines the acceptable difference in temperature compensation during operation; the limit range is from 2°C to 8°C.

Compensation

The compensation value is a correction for the regulation of the main sensor in order to obtain the set temperature at the place of measurement of the additional sensor. To control the equipment according to the additional temperature sensor's indications, select the "compensation" operating mode. An additional temperature sensor can be used to control the temperature in the chamber according to e.g. sample temperature.

Figure 78 Temperature measurement settings with an additional sensor



Confirms changes

Cancels the entered changes

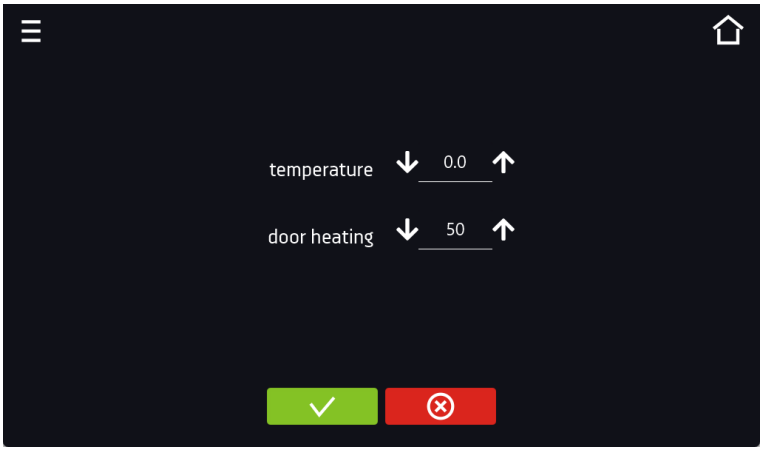
6.23. Corrections

Press the icon of the main menu and then press . In this window you can correct:

- temperature value indicated on the display by adding the correction value. The set correction value applies to the whole temperature range of the device. For example, if the average temperature displayed by the device indicates -20,0°C and the average temperature measured by independent, external sensor indicates -20,5°C, the correction should be set on -0,5°C. The average temperature should be calculated from chosen period of time e.g. 30 min. The correction available range is between -5°C to +5°C.
- In this window, you can also adjust the heating of the external door seal to individual needs. This solution is applied to prevent the door from freezing to the housing, which could consequently make it impossible to open the door or damage the seal.
  - Range:
    - **50% - default setting** - should protect the device from the door freezing to the housing,
    - **0%** - complete lack of heating,
    - **100%** - heating at maximum power specified by the manufacturer.
  - If frost forms on the external door seal, the heating power should be increased until an acceptable level is achieved. However, keep in mind that this will also increase energy consumption.
  - If frost does not form on the external door seal, the heating power should be reduced to minimize energy consumption until an acceptable level is achieved.

	The device has been calibrated by the manufacturer in accordance with applicable norms. The temperature shown on the display corresponds with a great accuracy to the temperature near chamber's sensor. For the correct operation of the device it is not necessary to use user's calibration. The user is performing temperature correction **on his own responsibility** and must be aware of consequences of changing manufacturer's settings. If the equipment was calibrated, calibration certificate **loses its validity**.

Figure 79 User's correction



Confirms changes

Cancels the entered changes

7. INTERFACE

7.1. MODBUS TCP

The device allows status monitoring using the MODBUS TCP communication interface.
Connection parameters:

- IP address: same as device's (set in the panel Section 6.18.)
- port: 502

register INPUT REGISTERS function READ_INPUT_REGISTERS (0x30001)			
Address	Type	Multiplier	Description
0	int	10	temperature from the main sensor
3	bool	-	Open door
4	bit	-	b0 – door alarm b1 – upper temperature alarm b2 – lower temperature alarm b5 – main sensor error b6 – additional sensor error b8 – temperature sensors error b10 – hardware error b11 – MRW error

8. CO_2 BACK-UP SYSTEM (OPTIONALLY FOR ZLN-UT VIP)

The CO_2 back-up emergency power supply system provides protection against temperature rise in the freezer's chamber and maintains a safe temperature of the samples in the event of a power outage. The operating range for the CO2 back up system is above -70°C and results from the physical properties of carbon dioxide. An increase of temperature above 10°C from the set temperature and loss of power supply causes the dosing of liquid CO_2 to the chamber. The cylinder connected to the CO2 back up system must be a siphon, thanks to which the gas in the liquid phase enters the freezer's chamber, where it is released. The phase change cools down and keeps the temperature low. Gas dosing is carried out by opening a solenoid valve powered from a buffer battery. The decompression valve on the back of the device balances the pressure with the surroundings. The dosing of gas and the opening of the decompression valve causes an increase in noise. The amount of dispensed liquid CO_2 is regulated by a microprocessor controller. If the chamber door is open during CO_2 dosing, the gas will be automatically cut off.

Time of temperature maintenance by CO_2 back-up system depends on:

- capacity of CO_2 cylinder,
- ambient temperature,
- type and temperature of samples at the moment of power failure,
- degree of freezer filling.

Theoretically, a full 50l high-pressure cylinder is enough for 8 hours of CO2 back-up operation in the ZLN-UT 300 VIP freezer (set temp. -80°C).



- **During the operation of the CO_2 back-up emergency power supply system, a significant amount of CO_2 enters the room, which in high concentration can be life-threatening. The device does not emit CO_2 when working with the power supply switched on.**
- **The CO_2 back-up system can't be operated near concentrated acids or corrosive vapors.**
- **The key to turn off the CO_2 back-up emergency power supply system must always be in an easily accessible place.**
- **The workplace must be properly ventilated!**

8.1. Indications for using pressure cylinders

	The liquid CO2 pressure cylinder is NOT supplied with the freezer with CO2 backup system. The purchase, transport and connection is the responsibility of the user.

- Together with a pressure cylinder with compressed or liquefied gas, the user should be given a safety data sheet for the gas and instructions for its use.
- The ventilation performance in the room must ensure levels of gas concentrations in the rooms below the limit values.
- Opening the pressure cylinder valves is only permitted if the cylinders have been connected to the receiving installation first.
- During gas intake from the gas cylinder, check the pressure level regularly.

8.1.1. Characteristics of carbon dioxide

Carbon dioxide (CO2) is a colorless, odorless, non-flammable and slightly acidic liquid gas. CO2 is heavier than air and soluble in water.

Warning signs on the bottle containing CO2



Non-flammable and non-toxic gases



Pressurised gas

Product ID: Carbon dioxide (100%)
Chemical formula: CO_2
Application of the substance: General industrial applications

	**Supplying gases other than CO2 to the freezer is UNACCEPTABLE.**

8.1.2.  Hazards when working with CO2

1. The bottle contains compressed gas that may cause cryogenic burns or injury (extremely cold liquid and high pressure gas).
2. Carbon dioxide in elevated concentration causes shortness of breath, circulation problems and ultimately death. Avoid breathing gas.

8.1.3. Personal protection

1) Hand protection

Wear loose fitting thermal-insulated gloves or gloves for handling cryogenic liquids. Norm EN 511 - protective gloves against the cold.

2) **Eye or face protection**
Wearing safety glasses is recommended when working with the bottle. Protect eyes, face and skin from splashes of liquid. Use safety goggles and face shield when reloading the product or disconnecting the transmission connections. Norm EN 166 – Personal eye protection.

3) **Skin and body protection**
Never touch with exposed body parts uninsulated elements of the CO2 backup system. Extremely cold metal can cause the body to stick quickly and to damage it (detach) when attempting to retract.

4) **Respiratory protection**
In an atmosphere where there is a lack of oxygen (excess of carbon dioxide), use a self-contained breathing apparatus or a face mask with a positive pressure air supply. Respirators with air filters will not provide protection.

8.1.4. Control devices

To prevent the accumulation of gas above the permissible concentrations in the room, natural or mechanical ventilation should be provided. In addition, a natural or mechanical installation must be provided to prevent the oxygen concentration from falling below 19.5%.

According to the recommendations, the highest acceptable concentration of CO_2, that affects an employee during the 8-hour daily and average weekly working time specified in the Labor Code is: **9000mg / m3**. Maximum permissible instantaneous concentration: **27,000mg / m3**



It is recommended to use control and measurement equipment for measuring CO2 concentration in rooms with a CO2 backup system.

8.1.5. First aid

Contact with eyes: In case of contact with eyes, rinse them immediately with plenty of water and seek medical advice. Keep eye wide open while rinsing.

Skin contact: In the event of frostbite, seek medical assistance immediately. Whenever possible, immerse the affected area in a warm bath not exceeding 40°C (105°F). Do not rub frostbitten parts of the body as it may cause tissue damage. Apply a sterile dressing to the wound.

Inhalation: Move the victim to fresh air. CO2 gas is heavier than air and accumulates e.g. at the floor. If breathing has stopped or is difficult, give aided respiration. Oxygen administration may be indicated. In the event of cardiac arrest, a trained person should immediately begin cardiopulmonary resuscitation.

in life-threatening emergencies:

1) protect yourself with a breathing apparatus,
2) remove the victim from the contaminated area,
3) call a doctor,
4) start CPR.

In the event of a gas leak:

Leave the room immediately, warn other people and ventilate the room if possible.

Emergency shutdown of the CO2 back-up system:

1) close the gas cylinder valve,
2) turn off the freezer by turning the rotary switch on the front panel of the device to the OFF position.

Figure 80 Rotary switch



8.2. User's responsibility

The user is obliged to:

1) be familiar and comply with applicable health and safety rules, regulations and to train operators properly,
2) secure the device against access by unauthorized persons,
3) keep the device in perfect condition,
4) follow the maintenance schedule,
5) ensure that operators use appropriate personal protective equipment,
6) share the user manual and CO2 safety data sheet with operators working with the freezer.

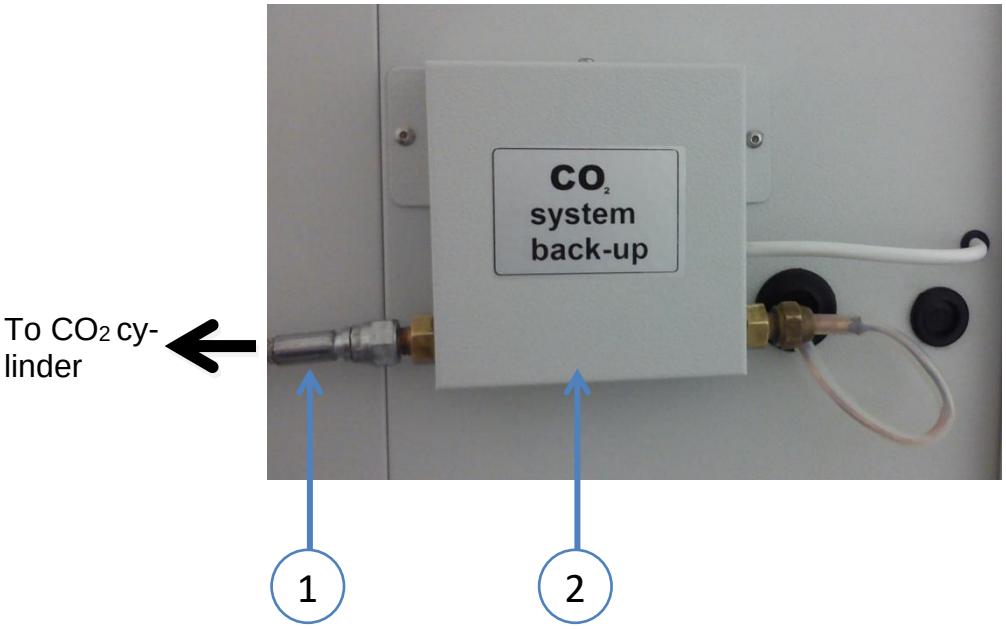
8.3. Emergency shutdown of the CO2 back-up system

In each ZLN-UT VIP ultra-low freezer at the front in the bottom there is an emergency switch for emergency temperature maintenance system. To turn off the device, turn the rotary switch key of the CO2 Backup system to the "OFF" position.



8.4. Connecting the freezer to a CO2 cylinder

The CO_2 back-up system is located in the rear of the equipment (on the back).

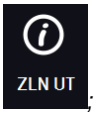


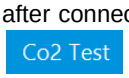
1) Steel hose for connecting CO2 cylinder with 1/4" SAE internal thread
2) CO_2 back-up system

The manufacturer supplies the device with a specialist steel hose with a length of 1500 mm. This hose is used to connect CO2 cylinder. On one side the hose is screwed to the CO2 back-up system - **DO NOT** unscrew it. On the other side, it should be screwed to a CO2 cylinder (see below *"Connecting the equipment to a CO2 cylinder"*). The kit comes with a reduction on cylinder W21,8 x 1/4 " SAE. The minimum bend radius of the hose is 110 [mm].

	The bending radius of the steel hose should not be smaller than specified in the documentation, otherwise the hose or its teflon inner coating may be damaged. Prevent: • sharp hose bends near the ends, • twisting, cutting, rubbing, stretching and squeezing the hose, • exceeding the maximum solenoid working pressure of 70 bar, • if you notice any signs of damage of the components, replace it.

To connect the freezer to a CO2 cylinder you have to:

1) place the CO2 cylinder vertically and attach it to the wall with a special clamp, rope or chain,
2) screw the supplied reduction W21,8 x 1/4 " SAE on the cylinder connector,
3) screw the hose to the reduction,
4) slowly unscrew the valve while checking low leakage connection,
5) after connecting the cylinder correctly, press the main menu icon  and then press 

; press the button 

and carry out the solenoid valve opening test.

	When working on CO2 back-up system is recommended to lock the freezer's door with a key.

Figure 82 Main menu

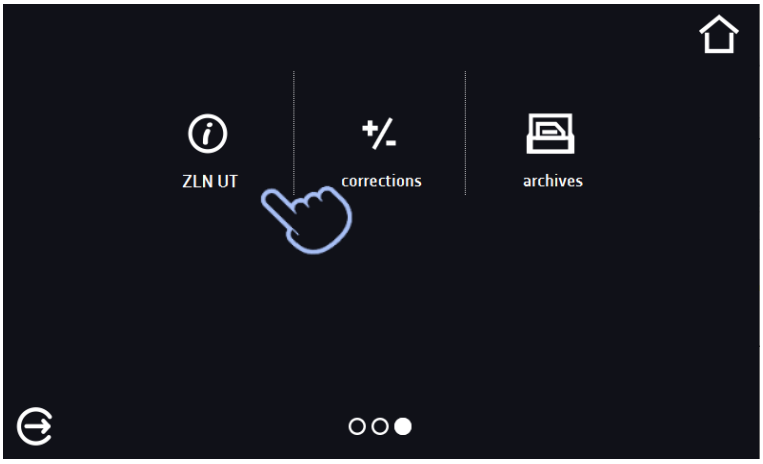
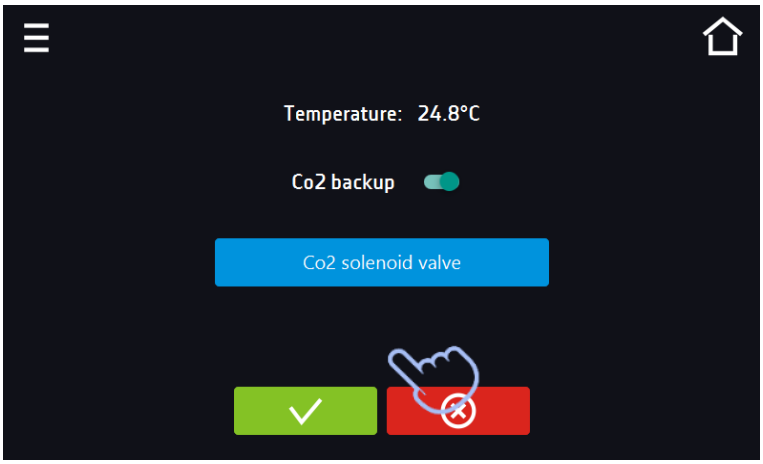
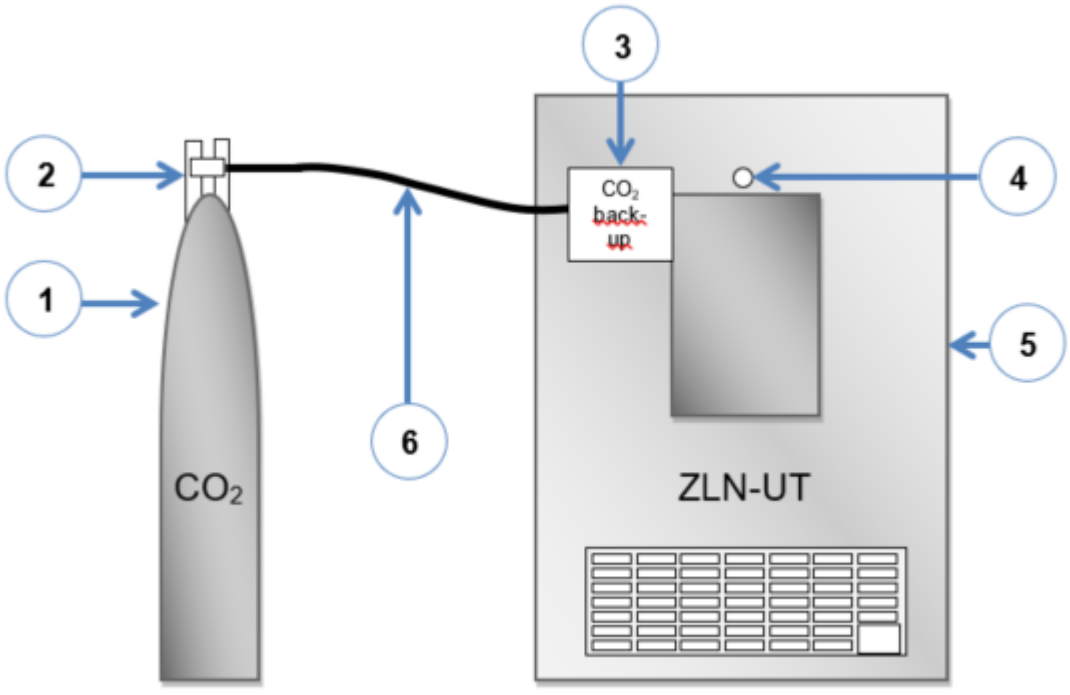


Figure 83 test CO2



When the button is pressed, the CO2 valve opens, accompanied by a loud noise and a drop in temperature.

Connection diagram of a CO2 cylinder with a freezer:



1) cylinder containing CO2
2) CO2 cylinder valve
3) CO2 back-up system
4) pressure reducer of the freezer's chamber
5) frezer
6) steel hose for connecting a CO2 cylinder ended with an internal thread W21,8 according to DIN477

	CO2 back-up system should be connected to a **siphon cylinder.**

	The manufacturer does not provide the equipment with a CO2 cylinder.

	Water condensation on the solenoid valve and steel hose is a natural phenomenon (only during operation of the CO2 back-up system).

	Connection to a CO2 cylinder should be made by a person who has undergone appropriate training.

8.5. Disconnecting the freezer from the CO2 cylinder

To disconnect the freezer from the CO2 cylinder:

1) close the cylinder's valve,
2) press the main menu icon , and then press ; using the button  perform the solenoid valve opening test three times to empty the gas in the connection,
3) unscrew the connection and reduction of W21,8 x 1/4 " SAE from the CO2 cylinder.

8.6. CO_2 Backup solenoid valve

When the CO2 backup solenoid valve is opened, the Start backup CO2 entry appears as an alarm in the event log.
When the CO2 backup solenoid valve is closed, the Stop CO2 backup record appears as an alarm in the event log.

When Backup CO2 is operated for the first time, Backup CO2 is displayed:,

- the CO2 solenoid valve is open - active state,
- the CO2 solenoid valve is closed - inactive state.

When the CO2 solenoid valve is open, a pulsating red frame and a red alarm bar appear on the display. When the CO2 solenoid is closed, there is no pulsating frame and the bar is blue.

8.7. Starting the device

To start the device, turn the key of the rotary switch of the CO2 back-up system to the "ON" position, and then turn the main switch to the "I" position.

	It is not recommended to open the freezer door during operation of the CO2 back-up system because it causes a sudden increase of the temperature in the chamber of the equipment, and thus an increase in the amount of CO2 dosed.

During the system operation, frost will accumulate in the device - this is normal. CO2 dosing is done through the nozzles inside the freezer.

	The manufacturer does not recommend placing the samples directly under the CO2 nozzle. Covering the perforations on the device shelves reduces the efficiency of the system.

	When the BACKUP CO2 system is operational, i.e. the cylinder contains gas, the valve is open, the hose connection to the device is correct, then the signaling (active state, red color and a sound signal) appear only briefly (for the time the valve is open). When the system is "incomplete", ie the gas has run out, there are problems with the gas supply to the device, the alarm (red frame, red status bar, sound signal) will be continuous.

9. CONNECTING THE DEVICE TO A COMPUTER

Each device in the SMART PRO version can be connected to an Ethernet network or directly to a computer with a LAN cable (standard equipment). Using the Lab Desk program (standard equipment), you can program and monitor the operation of multiple devices with the SMART PRO controller. The features of the software have been described in a separate instruction manual.

10. CLEANING AND MAINTENANCE OF THE DEVICE

	**Disconnect the device from the power supply before carrying out any activities related to the cleaning! In the case of the battery back-up of the controller, also turn it off.**

On the internal walls of the device (in particular the new one) made of stainless steel, discoloration (spots) may appear - which are not caused by factory defects, but only by the steel production process. They can be cleaned using extraction gasoline.

INOX products are manufactured with stainless steel. When used in standard laboratory conditions they do not rust. However it is possible that stains (which may look like rust) form on the steel surface (e.g. due to the kind of samples that are incubated in the chamber). In such case we recommend using cleaning solution (to clean the stains) which is dedicated to this particular application, e.g. Pelox.

	**When cleaning stainless steel product with dedicated cleaning solution, one should pay attention to the suggestions and recommendations given in the instruction manual or in the safety data sheet of the cleaning solution.**

10.1. Exterior cleaning

1.	The housing of the device should be cleaned at least once a week, depending on the working conditions.
2.	The housing and door should be cleaned with caution using a soft cloth dampened with water.
3.	Only mild cleaning products should be used to clean the device.
4.	Electrical parts should not get in contact with water or detergent.
5.	Clean **the touch screen** using a soft cloth or a foam for cleaning touch screens.
6.	**USB port** can be cleaned with a vacuum cleaner to prevent accumulation of dirt inside the port.

10.2. Interior cleaning

The interior of the freezers is made of stainless steel 0H18 acc. with DIN 1.4301 or 0H17 acc. with DIN 1.4016. Stainless steel also corrodes. To slow down the corrosion process as much as possible, this type of steel requires regular maintenance and cleaning. Avoid aggressive cleaning agents and preparations based on chlorine and bleach, do not allow stainless steel to come into contact with non-alloy steel, unless you are dealing with ground steel, and avoid materials that may scratch the surface.

1.	Before cleaning the interior of the device, empty the chamber.
2.	After opening the appliance door, wait until the temperature in the chamber reaches the ambient temperature. After removing the shelves, you can start washing the device.
3.	To clean the device, use a lint-free, lint-free, soft cloth and water or water with a mild detergent.
4.	In the case of ground steel, movements should be made in the direction of grinding on the surface.
5.	If rust occurs: • slight discoloration - use household cleaners for stainless steel containing calcium carbonate or citric acid, • medium discoloration - clean with a 10% phosphoric acid solution; after cleaning, neutralize the acid with diluted ammonia or a mild alkaline detergent, • severe rust – use products for pickling and passivation of steel – for example Pelox FR-D After each cleaning, wipe the surface thoroughly with clean water.
6.	Having finished cleaning, you should allow the device to dry fully and instal all parts removed before cleaning.
7.	During cleaning you should make sure not to damage the temperature sensors which are located inside the chamber.

8.	**At least once a month** clean the condenser with a vacuum cleaner, dry cloth or a soft brush. Placement of the condenser in the freezers it's at the front in the bottom of the device. To access it, pull the ventilation cover (a) towards you and then pull it up (b). After cleaning the condenser (1), install the cover. 

	Failure to clean regularly may result in damage to the compressor and loss of the rights for repair under warranty.

10.3. Cleaning the touch screen

The touch screen is exposed to dirt, so it must be cleaned regularly. To clean the touch screen, use a clean and dry microfiber cloth. It is a very delicate material and collects dirt well.

	Before using the cloth, make sure that on the surface there are no crumbs or particles. During cleaning, they can act like sandpaper and scratch the surface of the screen.

If the stains cannot be removed by dry cleaning, the cloth can be lightly dampened with water.

	Do not use paper towels to clean the screen as it may cause microdamages.

Before cleaning, lock the screen by pressing  on the top drop-down list.

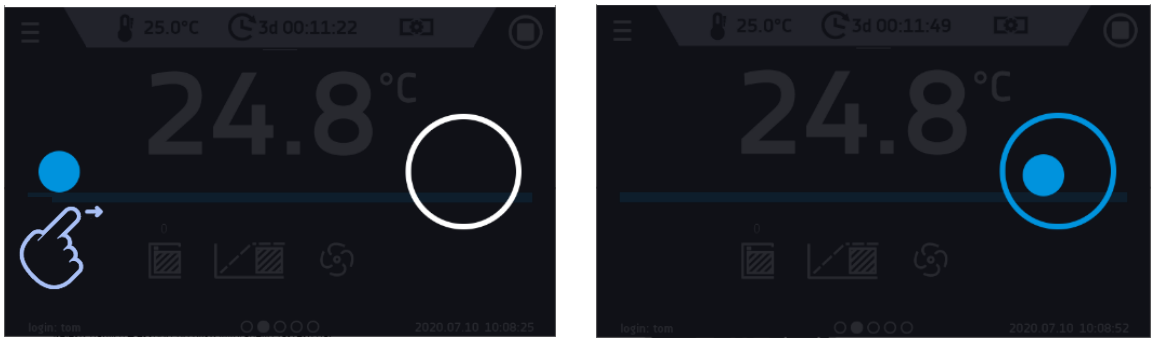
Figure 86 Locking the screen



The screen is ready to be cleaned.

To unlock the touch screen, slide the blue circle into the white circle

Figure 87 Unlocking the screen



10.4. Consumables

Consumables during normal operation are:

- silicone door seal - in all units,
- chamber fan - in equipment with forced air convection,
- interior lighting bulb - in units with the option of interior lighting.

11. ADVICE ON HOW TO SAFELY STORE THE DEVICE

1.	Remove all objects from the chamber.
2.	Disconnect the device from the mains. If the unit is equipped with battery back-up of the controller (optional), also turn it off.
3.	Clean and dry the chamber.
4.	Leave the door open to avoid unpleasant odors.
5.	Store in temperatures between 0°C and 50°C and relative humidity maximum 70%.

12. TROUBLESHOOTING

Before you contact Service Department:

1.	Make sure that the operation complies with the instruction manual of the device.
2.	Restart the device to make sure that the unit is not functioning properly. If it still does not work, disconnect the unit again from the mains and repeat the operation after one hour. Do the same with optional battery back-up of the controller.

Service

Visit the POL-EKO website at: www.pol-eko.com.pl in order to:
• get full contact details of technical service
• access to POL-EKO® online catalogue, and information about accessories and related products
• receive additional product information and special offers

To receive information or technical assistance, contact the Service Department or visit the website: www.pol-eko.com.pl

12.1. Possible defects

Malfunction	What to check?	What to do?
The unit is not working	Check if the unit is plugged in correctly	Plug in the unit correctly
	Check if the circuit-breaker has tripped	Press the circuit breaker on the back of the device
	Check the voltage in the socket	Connect the device to a different socket, preferably from a different electrical circuit. Call a licensed electrician to check the electrical installation.
	Check if the power cable is broken	Change the cable
The unit is not cooling down	Check if the condenser is dirty	Clean the condenser
	Check if the unit is exposed to direct sunlight	Change the location of the unit
	Check if there is a heat emitter near the device	Change the location of the unit
	Check if the door is closed properly	Clean the gasket
The unit is working too loud	Check if the unit is not touching other objects or furniture etc.	Remove other objects
	Check if the door is properly leveled	Level the device
The door has dropped or is skewed	Check if the door is properly leveled	Level the device. If this does not help, contact the service.
No battery backup of the display	Is the battery exhausted?	Replace the battery (replace the battery every 12 months)
Condenser failure	Is the condenser temperature too high? 1. When the condenser temperature reaches +40°C, the "Condenser temperature exceeded" alarm is triggered. When the condenser temperature rises to +45°C, the "Condenser overheating" alarm is activated, and the compressor shuts down.	Clean the condenser - see section 10.2.



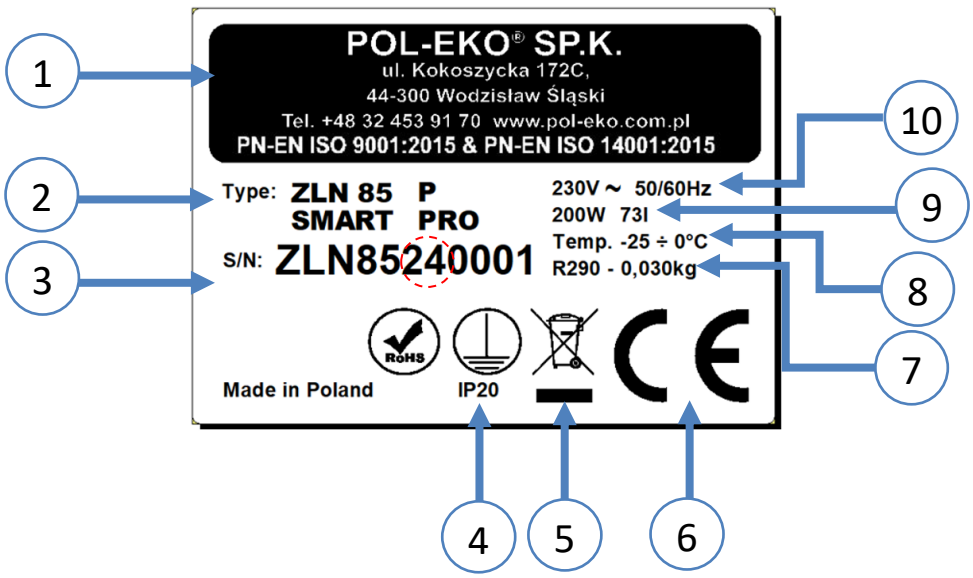
Gurgling sound of the refrigerant fluid flowing in the refrigerant circuit is normal.

13. WARRANTY CONDITIONS

POL-EKO® warrants that this product will be free from defects in material and workmanship for a period of two (2) years from the date of the invoice. In the event of a defect, contact your dealer. This warranty does not apply if the product has been damaged by accident, abuse, misuse, or misapplication, or from ordinary wear and tear. If the required maintenance and inspection services are not performed according to the manuals and any local regulations, such warranty turns invalid.

Compliance with local laws and regulations
The user is responsible for obtaining any approvals or authorizations required to launch and use the product. POL-EKO® shall not be liable for any negligence in the above matter except when the refusal to obtain authorization is caused by a product defect.

14. RATING PLATE



1. Manufacturer's data
2. Type of device
3. Serial number (the two marked digits indicate the year of manufacture of the device)
4. Degree of protection against electric shock (class I: protection against indirect contact) and IP enclosure protection rating
5. Disposal of used device according to WEEE2
6. CE marking as confirmation of compliance with the directives
7. Information about cooling system (gas type and quantity)
8. Temperature range of the device
9. Maximum power consumption, and capacity of device
10. Acceptable range of voltage and frequency of mains supply

The numbers marked with a red circle indicate the year of manufacture of the device.

15. TECHNICAL DATA

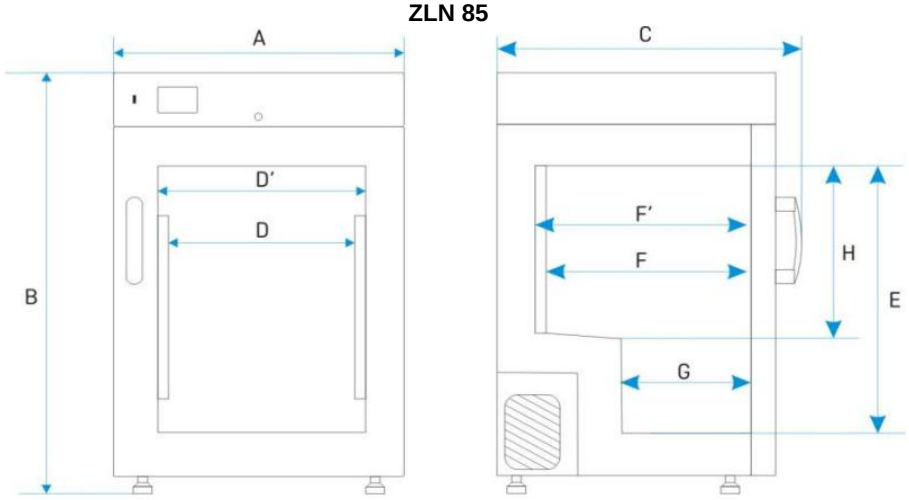
Technical data are given with a tolerance of ± 5%, the working capacity of the chamber is always smaller. All the below technical data refers to standard units (without optional accessories).

15.1. ZLN, ZLN-T, ZLW-T devices

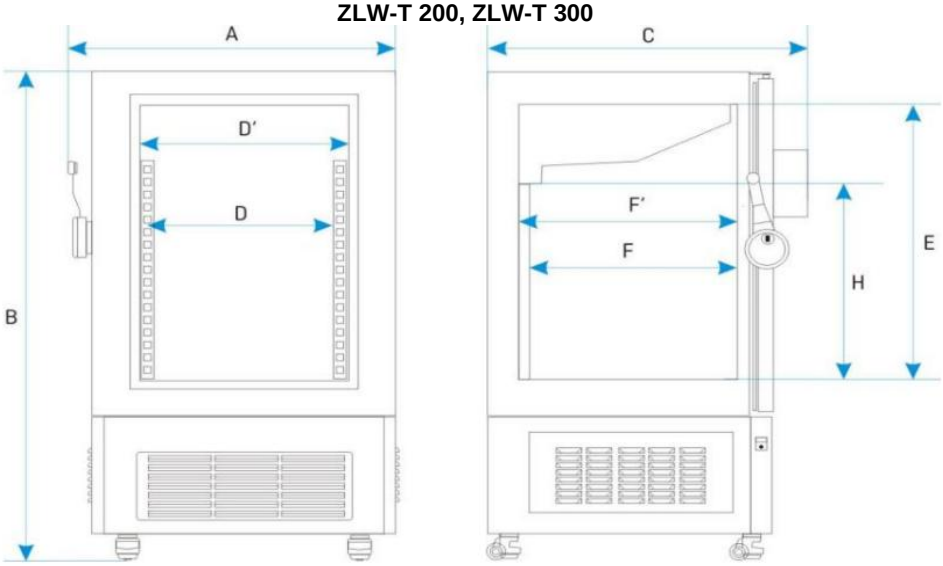
Paremeter		**ZLN 85**	**ZLN-T 125**	**ZLN –T 200**	**ZLN- T 300**	**ZLW- T 200**	**ZLW-T 300**
Air Convection		natural				forced	
Chamber capacity[1] [l]		85	138	217	314	217	314
Working capacity[2] [l]		82	127	202	293	172	263
Working capacity [l]		73	109	180	262	140	213
Door		solid					
Temperature range [ºC]		- 25…0	-40…0				
Temperature range pracy [ºF]		-13…32	-25,6…32				
Temperature resolution [ºC]		every 0,1					
Controller		microprocessor with external touch screen 7’					
Interior	P Smart	acid-proof stainless steel according to DIN 1.4301					
	PS Smart	acid-proof stainless steel according to DIN 1.4301					
Housing	P Smart	powder coated sheet					
	PS Smart	polished stainless steel					
Overall dims[3] [mm]	A widith	610	720	820	820	820	820
	B height	930	1190	1380	1730	1380	1730
	C depth	650	810	810	810	810	810
Internal dims [mm]	D widith	380	370	450	450	450	450
	D´ widith	420	420	520	520	520	520
	E height	590	600	770	1120	770	1120
	F depth	400	520	520	520	520	520
	F´ depth	440	530	530	530	530	530
	G depth	230	-	-	-	-	-
	H height	380	-	-	-	550	900
Max shelf wor-kload[4] [kg]	-	10	10	10	10	10	10
	version PW[5]	-	50	50	50	50	50
Max unit wor-kload [kg]	-	30	50	65	80	65	80
	version W[6]	-	100	130	160	160	160
Nominal power [W]		200	450	450	450	450	450
Weight [kg]		62	105	120	185	120	185
Refrigerant gas		R290 / GWP=36	R290 / GWP=3	R290 / GWP=3	R290 / GWP=3	R290 / GWP=3	R290 / GWP=3
Shelves fitted/max		2/4	2/3	2/4	3/6	2/4	3/6
Warranty		24 months					
Manufacturer		POL - EKO					

1. Chamber capacity (gross)
   The maximum theoretical internal volume of the chamber, calculated based on its internal dimensions, without taking into account equipment and structural elements. An informational value, always higher than the working (net) capacity.
2. Working capacity (net)
   The actual working space of the chamber available for loading products, excluding fixed and structural elements (e.g. fans, evaporators, air ducts, guide rails). It defines the real amount of material that can be placed inside the device.
3. depth does not include 50mm of power cable
4. on uniformly loaded surface
5. reinforced shelf
6. reinforced version

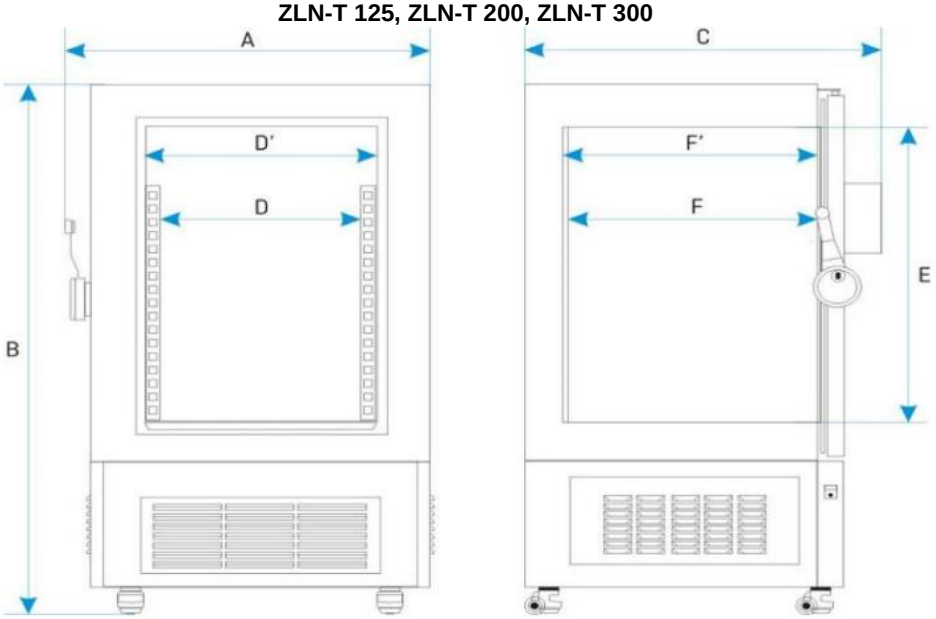
ZLN 85



ZLW-T 200, ZLW-T 300



ZLN-T 125, ZLN-T 200, ZLN-T 300

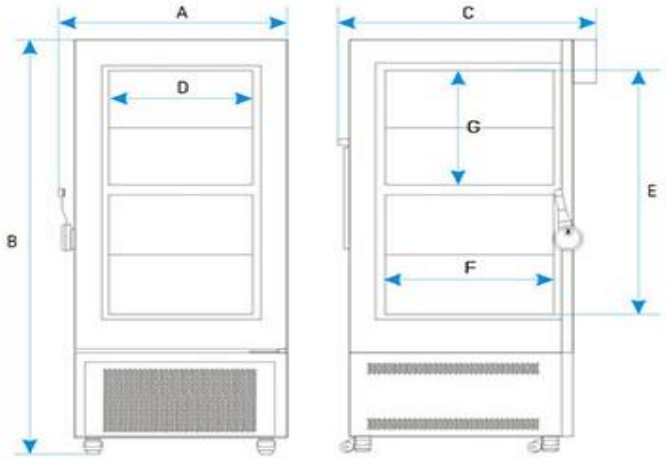


15.2. ZLN, ZLN-UT VIP devices

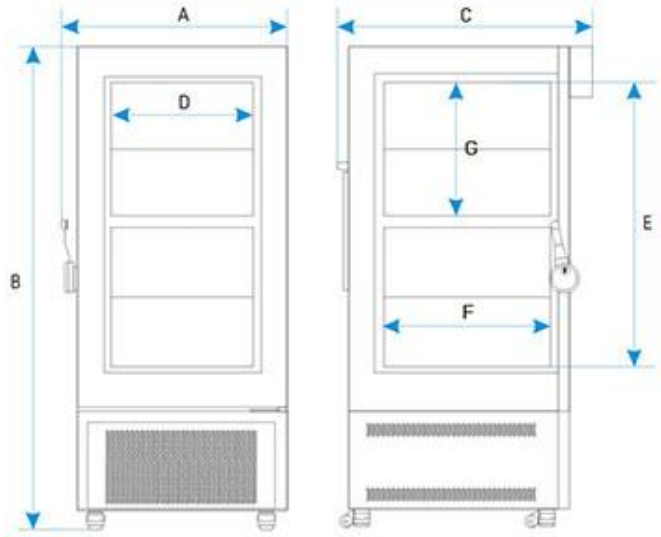
Parametr		ZLN-UT 200 VIP	ZLN- UT 300 VIP	ZLN- UT 500 VIP
Air circulation		Natural		
Chamber capacity [l]		259	345	482
Number of boxes 133x133x50mm [pcs]		192	256	352
Door		solid		
Operating temperature range [°C]		-86 …-50		
Operating temperature range [°F]		-122,8 …-58		
Temperature control [°C]		every 0.1		
Controller		microprocessor PID with 4.3' graphic display		
Chamber material	C Smart	acid-resistant stainless steel according to DIN 1.4016		
	P Smart	stainless steel acc. to with DIN 1.4301		
Housing material		powder-coated sheet metal		
External dimensions[1][mm]	A szerokość	880	880	880
	B wysokość	1390	1620	2000
	C głębokość	960	960	960
Chamber dimensions [mm]	D szerokość	620	620	620
	E wysokość	770	1000	1380
	F głębokość	580	580	580
	G wysokość	360	480	670
Maximum load on the device [kg] [2]		65	65	85
Maximum shelf load [kg]		10	10	10
Rated power of the device [W]		2100	2100	2100
Weight [kg]		200	220	243
Refrigerant		R290 / GWP=3 | R170 / GWP=6	R290 / GWP=3 | R170 / GWP=6	R290 / GWP=3 | R170 / GWP=6
Power supply		230 V 50-60 Hz		
Number of internal chambers		2	2	2
Number of shelves standard | max		2 | 2	2 | 2	4 | 4
Guarantee		24 months		
Producer		POL-EKO® A. Polok-Kowalska sp.k.		

1. depth does not include 50mm of power cable
2. on uniformly loaded surface

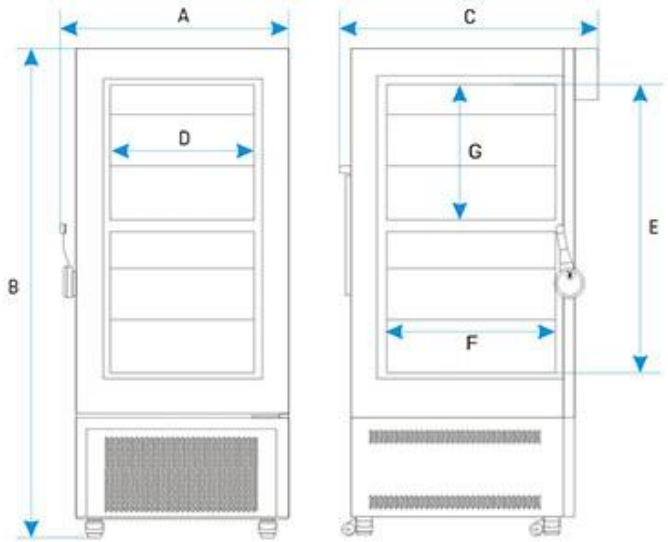
ZLN-UT 200 VIP



ZLN-UT 300 VIP



ZLN-UT 500 VIP



16. DECLARATIONS OF CONFORMITY

DEKLARACJA ZGODNOŚCI UE

EU DECLARATION OF CONFORMITY

Produkt:	***Product:***
Zamrażarka laboratoryjna	*Laboratory freezer*
Model:	***Model:***
ZLN 85; ZLN-T 125; ZLN-T 200; ZLN-T 300; ZLN 85/ZLN 85; ZLW-T 200; ZLW-T 300	
w wersjach:	***in version:***
C SMART PRO; CS SMART PRO; P SMART PRO; PS SMART PRO	
Nazwa i adres producenta:	***Name and address of the manufacturer:***
POL-EKO® A.Polok-Kowalska sp.k. ul. Kokoszycka 172 C, 44-300 Wodzisław Śląski Polska/Poland	
Niniejsza deklaracja zgodności wydana zostaje na wyłączną odpowiedzialność producenta.	***This declaration of conformity is issued under the sole responsibility of the manufacturer.***
Wymieniony powyżej przedmiot niniejszej deklaracji jest zgodny z odnośnymi wymaganiami unijnego prawodawstwa harmonizacyjnego:	***The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:***
RED 2014/53/UE RoHS 2011/65/UE & 2015/863UE WEEE 2012/19/UE	RED 2014/53/EU RoHS 2011/65/EU & 2015/863EU WEEE 2012/19/EU
Odniesienia do odnośnych norm zharmonizowanych, które zastosowano lub do innych specyfikacji technicznych, w stosunku, do których deklarowana jest zgodność:	***References to the relevant harmonised standards used or references to the other technical specifications in relation to which conformity is declared:***
RED	ETSI EN 300 328 V2.2.2: 2019 ETSI EN 301 893 V2.1.1: 2017 ETSI EN 301 489-1 V2.2.3: 2019 ETSI EN 301 489-17 V3.1.1: 2017 IEC EN 62368-1: 2018 BS EN 62311: 2008
LVD	PN-EN 61010-1:2011 PN-EN 60529:2003/A2:2014-07
EMC	PN-EN IEC 61326-1:2021-10
RoHS	PN-EN IEC 63000:2019-01

Wodzisław Śl. 10.07.2024

Podpis / Signature:

Dawid Rybarz
Dyrektor Techniczny (CTO)

DEKLARACJA ZGODNOŚCI UE

EU DECLARATION OF CONFORMITY

Produkt:	***Product:***
Zamrażarka niskotemperaturowa	Ultra-low freezer
Model:	***Model:***
ZLN-UT 200 VIP; ZLN-UT 300 VIP; ZLN-UT 500 VIP	
w wersjach:	***in version:***
C SMART PRO; P SMART PRO	
Nazwa i adres producenta:	***Name and address of the manufacturer:***
POL-EKO® A.Polok-Kowalska sp.k. ul. Kokoszycka 172 C, 44-300 Wodzisław Śląski Polska/Poland	
Niniejsza deklaracja zgodności wydana zostaje na wyłączną odpowiedzialność producenta.	***This declaration of conformity is issued under the sole responsibility of the manufacturer.***
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Wodzisław Śl. 10.07.2024

Podpis / Signature:

Dawid Rybarz
Dyrektor Techniczny (CTO)

Manufacturer of control and measurement equipment
for laboratory tests and technological processes,
distributor in Poland of the following companies:
HAMILTON, THERMO SCIENTIFIC, WTW / XYLEM.

We produce:

- thermostatic cabinets
- laboratory refrigerators
- laboratory incubators
- devices with photoperiod and phytotron system
- drying ovens and sterilizers
- drying ovens with nitrogen blow
- laboratory freezers
- ultra-low freezers
- climatic chambers
- Caldera fluid and blanket warmers
- colony counters
- laboratory shakers
- stationary samplers
- Hydromat water dispensers
- Eurodrop stations
- FEKO+ waste water receipt station
- heating ovens
- cooled incubators
- fume hoods

We offer portable, laboratory and on-line equipment:

- pH-meters
- ionmeters
- dissolved oxygen meters
- conductivity meters
- photometers and spectrophotometers
- thermo reactors
- turbidity metres
- pH electrodes
- conductivity sensors
- oxygen probes
- heavy metals trace analyzers
- water baths
- autoclaves
- pH buffer solutions
- conductivity standards
- photometric tests
- laboratory accessories
- consumables

We organize:

- regional trainings
- individual trainings
- seminars

We provide:

- warranty and post-warranty service
- consultancy in the selection, maintenance and operation of laboratory equipment

POL-EKO LAB is Accredited by the Polish Centre for Accreditation (a member of ILAC) and provides accredited calibration of:

- thermostatic and climatic chambers (incubators, drying ovens,
- thermostatic cabinets, climatic chambers, freezers)
- water baths and thermo reactors
- autoclaves
- electric and electronic thermometers
- data loggers
- high temperature laboratory furnaces
- thermohygrometers
- laboratory sieves

POL-EKO Laboratorium Pomiarowe

PCA Polskie Centrum Akredytacji WZORCOWANIE
AP 115

Calibration is confirmed with the issue of 'Calibration Certificate'.

Services outside the scope of accreditation:

- checking equipment for physicochemical measurements (meters and probes),
- carrying out IQ, OQ, PQ qualification procedures,
- mapping of temperature and humidity in the rooms

PN-EN ISO 9001 ISOCERT CERTIFICATE

PN-EN ISO 14001 ISOCERT CERTIFICATE

POL-EKO®

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ul. Kokoszycka 172 C