Instruction manual SMART PRO

Laboratory incubators

models: **CLN 53, CLN 115, CLN 180, CLN 240**
CLW 53, CLW 115, CLW 180, CLW 240, CLW 400, CLW 750, CLW 1000

Drying ovens

models: **SLN 53, SLN 75, SLN 115, SLN 180, SLN 240**
SLW 53, SLW 75, SLW 115, SLW 180, SLW 240, SLW 400, SLW 750, SLW 1000

Drying ovens with nitrogen blow

models: **SLWN1 53, SLWN1 115, SLWN1 240**
SLWN2 53, SLWN2 115, SLWN2 240

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

Version 1.30

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PN-EN ISO 9001
ISOCERT CERTYFIKAT

CE

Manufacturer's address:

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

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

CL laboratory incubators and SL drying ovens are laboratory devices designed for incubation, drying and sterilization with hot air of samples at following temperature ranges:

- laboratory incubators CL: 5°C above ambient temperature … +100°C
- drying ovens SL: 5°C above ambient temperature … +300°C
- SLWN drying ovens with nitrogen or other inert gas blow (with a dozen exchanges per hour): 5°C above ambient temperature … +250°C. When used as a standard drying oven, the temperature range is: 5°C above ambient temperature … +300°C

Laboratory incubators and drying ovens have an electric heating system. All devices are controlled by a precise SMART PRO controller, thanks to which the set temperature is maintained with good fluctuation and variation. The devices are available in the following versions:

- with natural (N) air convection: models CLN, SLN
- forced (W) air convection: models CLW, SLW, SLWN (in the chamber there is one or more fans, depending on unit's capacity, which force air movement – for devices with forced air circulation, the symbol  appears on the screen .

Drying ovens with nitrogen flow, SLWN1 and SLWN2 models are used, among others, for the determination of total moisture in hard coal according to the **PN-ISO 589:2006** norm which requires that coal samples susceptible to oxidation should be dried at a temperature of + 105°C in a drying oven with a nitrogen flow.
Requirements for the use of the equipment are given in point 6 of the norm. A drying oven with nitrogen flow should be used to control the temperature in the range of + 105°C to + 110°C with the additional possibility of blowing with a stream of dry nitrogen at a flow rate of about 15 volumes of the drying oven per hour. For detailed information on the available models and equipment, see *Section 9*.

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.**
	**Applies to SL: when operating at high temperatures (over 200°C), the door and the unit housing may be hot.**
	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 – equipment is not made in an explosion-proof version, • 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).
3.	**<u>You should:</u>** • 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.

The manufacturer is not responsible for corrosion, damage to electronics or other elements of the equipment caused by placing inside substances that have an adverse effect on the materials from which it was made.

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

Drying ovens (SL) and laboratory incubators (CL) in SMART PRO version are delivered with:

Device	**SL/CL**							
Capacity	**53**	**75**	**115**	**180**	**240**	**400**	**750**	**1000**
Shelves [pcs.]	2	2	2	3	3	3	5	6
Slides [pcs.]	4	4	4	6	6	6	10	12
Power cord [pcs.]	1	1	1	1	1	1	1	1
						SL - INTEGRATED		
Rubber cap [pcs.]	1	1	1	1	1	1	1	1
Key for door lock [pcs.]	2	2	2	2	2	2	2	2
Wrench (13mm) for wheels adjustment [pcs.]	x	x	x	x	x	1	1	1
Lab Desk program (in the internal memory of the equipment)	1	1	1	1	1	1	1	1
LAN cable [pcs.]	1	1	1	1	1	1	1	1
Quality Control Certificate [pcs.]	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 **<u>should be transported in an upright position</u>** 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.

	After transporting the device at a temperature below 10°C, wait at least 2 hours before connecting it to the mains.
	Applies to drying ovens (SL, SLWN). Before first boot, it is recommended to turn on the device for 3 hours at the set temperature of 250°C. There might be a specific smell coming out from the interior of the chamber and this is not a malfunction.

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.

	In SL drying ovens, SR sterilizers and CL laboratory incubators there's a ventilation air-flap at the back of the device. Hot air comes out of the air-flap during operation of the device. The manufacturer recommends using a non-flammable insulation screen on the wall or increasing the distance from the wall. Failure to do so may result in permanent damage to the wall, and in extreme cases even a fire.

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

- recommended ambient temperature +10°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.

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

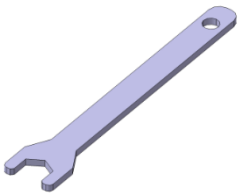
- **temperature fluctuation,**
- **temperature variation,**
- **power consumption,**

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 device is equipped with wheels, they must be locked and leveled. For this purpose use the red knob mounted in the wheel housing. At the beginning, the knob can be turned by hand, if it encounters resistance, use a 13 size wrench.



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

If the device is to be placed on a table (option) or frame (option) which is equipped with the wheels with a lock, the wheels MUST be locked after placing the table / frame in its final destination.

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

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

Install the shelf slide at the selected height by inserting it into perforations 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!

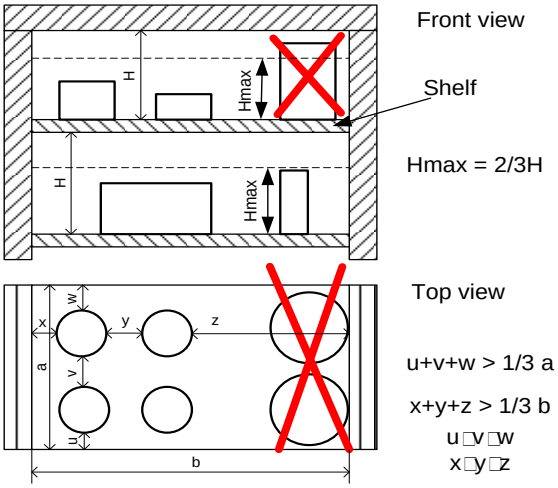
To remove a shelf, perform the above steps in reverse order.

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.



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

3.3. Closing chamber door

The external solid door of the units CL and SL have two-point lock and open door sensor. If the door has not been closed properly, audible and visual alarm will appear. You can set delay door alarm by: 30s, 1 min, 2 min, 5 min or 10 min *(see Section 6.18.2).*

4. DESCRIPTION OF THE DEVICE

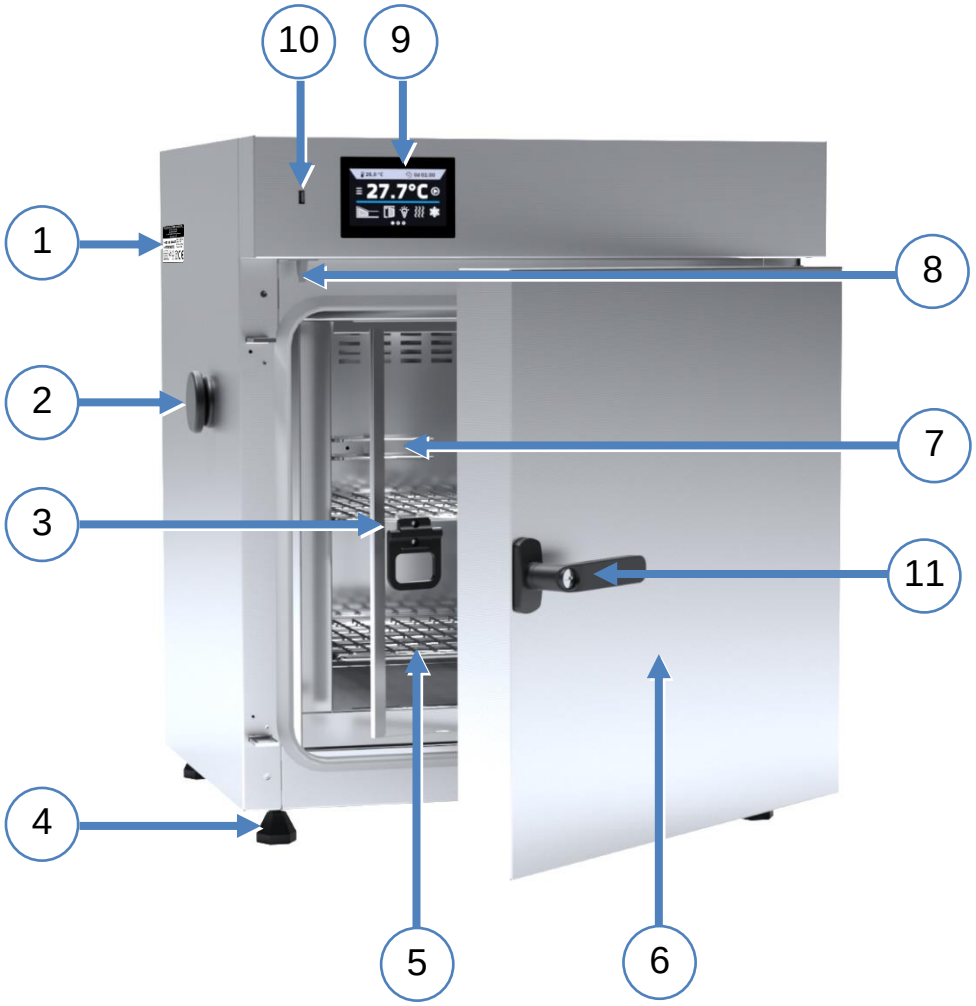
SMART PRO models are equipped with a PID microprocessor temperature controller and a 7 inch colour touch screen with a resolution of 800x480.

4.1. Design of CL / SL devices

Below there's a picture showing CL and SL type devices (exemplary picture) with a description of the important components of the device.

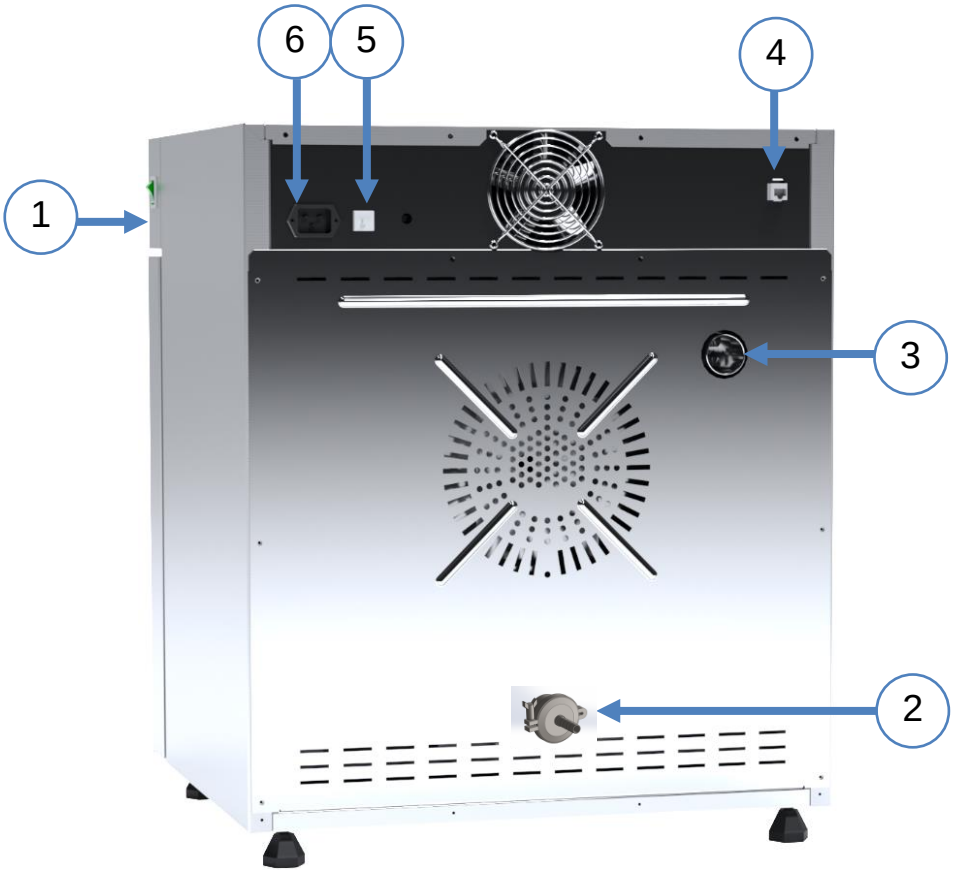
The elements of the device are shown on the basis of a CLN 53 SMART PRO.

Front view



1) rating plate
2) access port ø30mm for external sensor
3) internal glass door (for CL)
4) adjustable feet
5) shelf
6) external solid door
7) temperature sensors
8) open door sensor
9) touch control panel
10) USB port
11) handle with key lock

Rear view



1) main switch
2) connector for connecting a hose with nitrogen (only for SLWN models)
3) air-flap
4) LAN port
5) fuse
6) main power socket C20

5. DEVICE EQUIPMENT (STANDARD AND OPTIONAL)

5.1. External door with viewing window (optionally for CL, SL)

The external door with a viewing window is an optional equipment for CL and SL models.

	In SL drying ovens with door with viewing window, the maximum operating temperature is lowered to +250°C at the factory.

	During operation, when the temperature inside the chamber is high, do not touch components of the external door with viewing window, as there is a risk of burns. Use protective gloves to protect yourself against the effects of burns from hot components.

5.2. Internal glass door (standard for CL)

Internal glass door is a standard equipment in CL laboratory incubators. To open and close the door use the plastic handle attached to the glass.

	During operation, when the temperature inside the chamber is high, do not touch the internal components and glass door, as there is a risk of burns. Use protective gloves to protect yourself against the effects of burns from hot components.

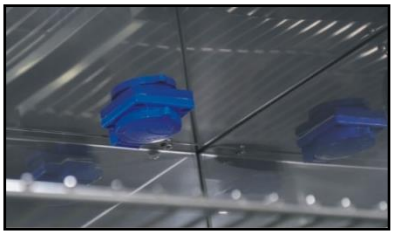
	We do not recommend installing and removing internal glass door. Incorrect assembly or disassembly may result in damage to the glass and injury to the user.

5.3. HEPA filter (optionally for all units)

The HEPA filter is an optional accessory for CL incubators and SL drying ovens. HEPA filter is used where the highest standards of clean air are required. The equipment at the production stage is adapted to the installation of the filter. The filter has H13 class to PN-EN1822-1:2019 norm. It's located at the rear of the unit. The filter itself is delivered separately. You should place it in the square filter cover so the black gasket is outside, then screw the cover to the rear wall of the unit. Please ensure that the distance between the filter and wall is not less than 100mm.

5.4. Internal socket (optionally for CL)

An internal socket with grounding and IP44 protection is an optional equipment for CL laboratory incubators. The internal socket (depending on the model: 230V 50Hz / 230V 60Hz / 115V 60Hz) is intended for EU plugs or plugs type B. The socket can be used to connect electrical devices inside the device.



	The maximum permissible load of all sockets inside the device (max. 3 pcs.) is 200 [W].

	In laboratory incubators with internal socket the maximum operating temperature is lowered to +70°C at the factory.

	Always make sure that the safety rules for working with electrical devices are followed!

5.5. Door lock (standard for all units)

All devices have a key lock. In the models CL, SL the key lock is situated in the door handle. Two keys are supplied with the device (hung on the back of the device).

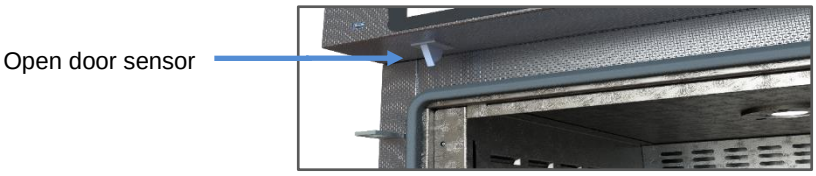
5.6. Access port for external sensor (standard for all units)

A Ø30 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 rubber 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.

5.7. 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 (5s, 30s, 1 min, 5 min, 10 min) an acoustic signal, red pulsating alarm bar and *„open door"* alarm with active status will appear.



5.8. Internal light (optionally for CL, SL)

Internal light is optional for CL and SL devices. Internal light is integrated with an open door sensor. When the light switches on, the icon  will appear on the display. For devices with door with viewing window, pressing the icon  allows you to turn the light ON or OFF (the light is not integrated with the open door sensor).

	In incubators with internal light, the maximum operating temperature is lowered to + 70°C at the factory. In drying ovens with internal light, the maximum operating temperature is factory reduced to + 250°C.

5.9. 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 *(Figure 1)*. 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 option). 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, see *Section 6.12.*

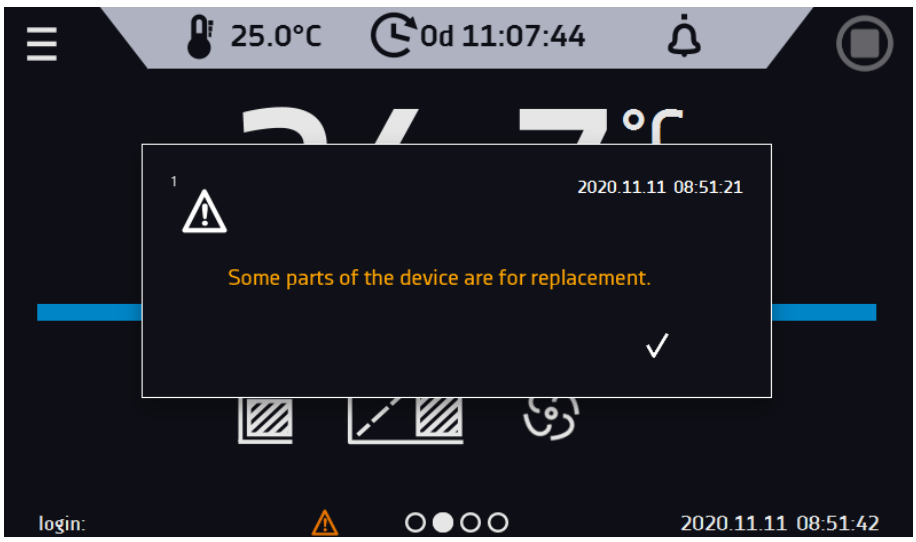
5.10. Display battery backup (optionally for CL, SL, SLWN)

Units in the SMART PRO version can be optionally equipped with a battery backup of the display. 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 *Figure 2.* 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.

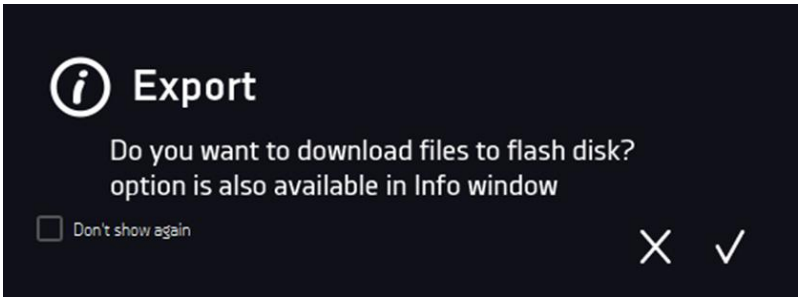
	USB slot is used to connect **only** a flash memory – a pendrive or a card reader with a memory card. Connecting any other device (e.g. external hard drive) without consultation is not authorized by the manufacturer and may damage the USB slot.

	After copying the data to the USB flash drive, before removing it from the USB socket, it should be unmounted (see *Section 5.9.*).

6.2. First boot

During the first boot, the screen *(Figure 3)* will display information about saving the "Download" folder (with instruction manual) on the USB flash drive in pdf format. 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.*

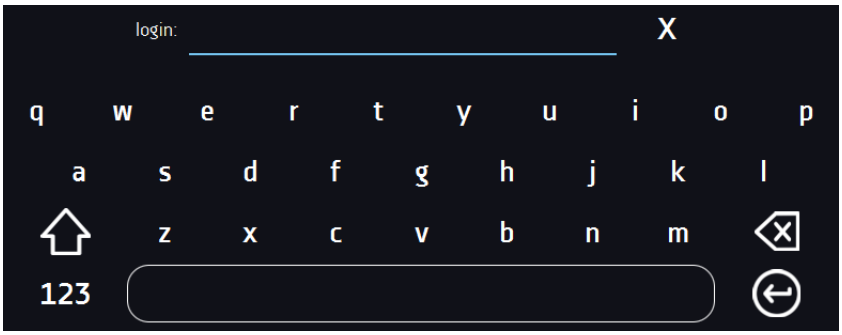
Figure 3 Downloading files



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 *(Figure 4).* In addition to the standard letters, it contains symbols that correspond to the computer keyboard.

Figure 4 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).

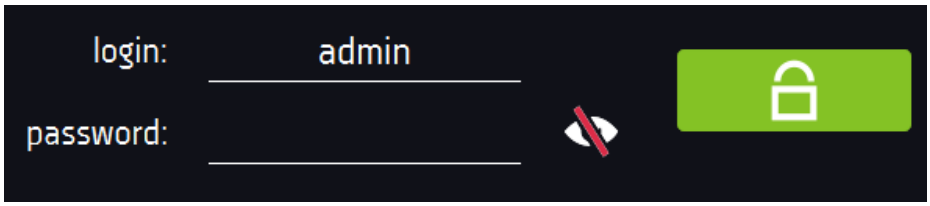
6.4. User logging in

Setting device parameters is only possible by the logged in user. To log in, press  in the main screen. The login window will appear *(Figure 5)*:

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

Factory default login parameters:
login: admin
password: leave the password field blank

Figure 5 Login panel



It is recommended during the first boot to set the password of the Admin account and write it down in a safe place to avoid tampering with the device settings by unauthorized persons.

	The password should be remembered or noted down because it is not possible to delete the password of the admin account. If you lose your password, please contact the manufacturer's service. Deleting the password is not covered by the warranty.

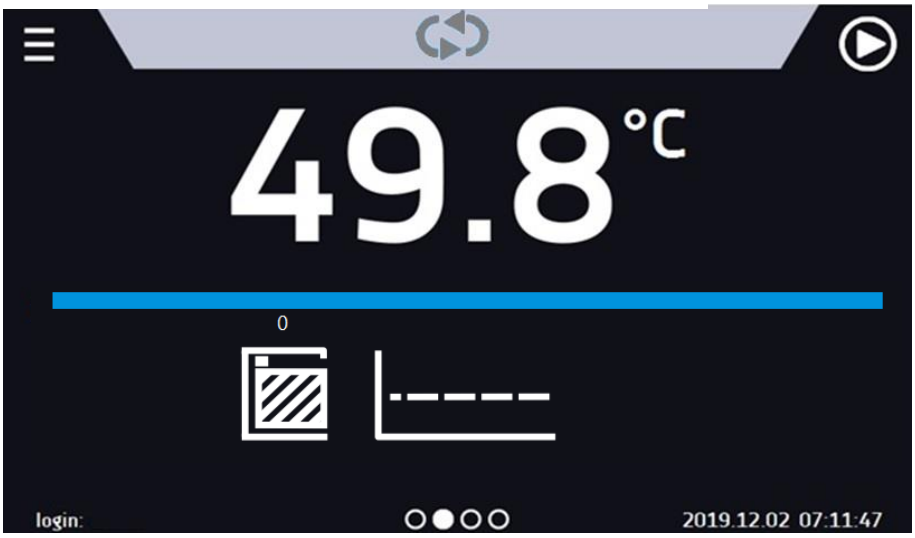
For information on user account types, see *Section 6.15.*

Logging out: press  in the main menu. For automatic logout, go to the *Section 6.16.*

6.5. Main screen

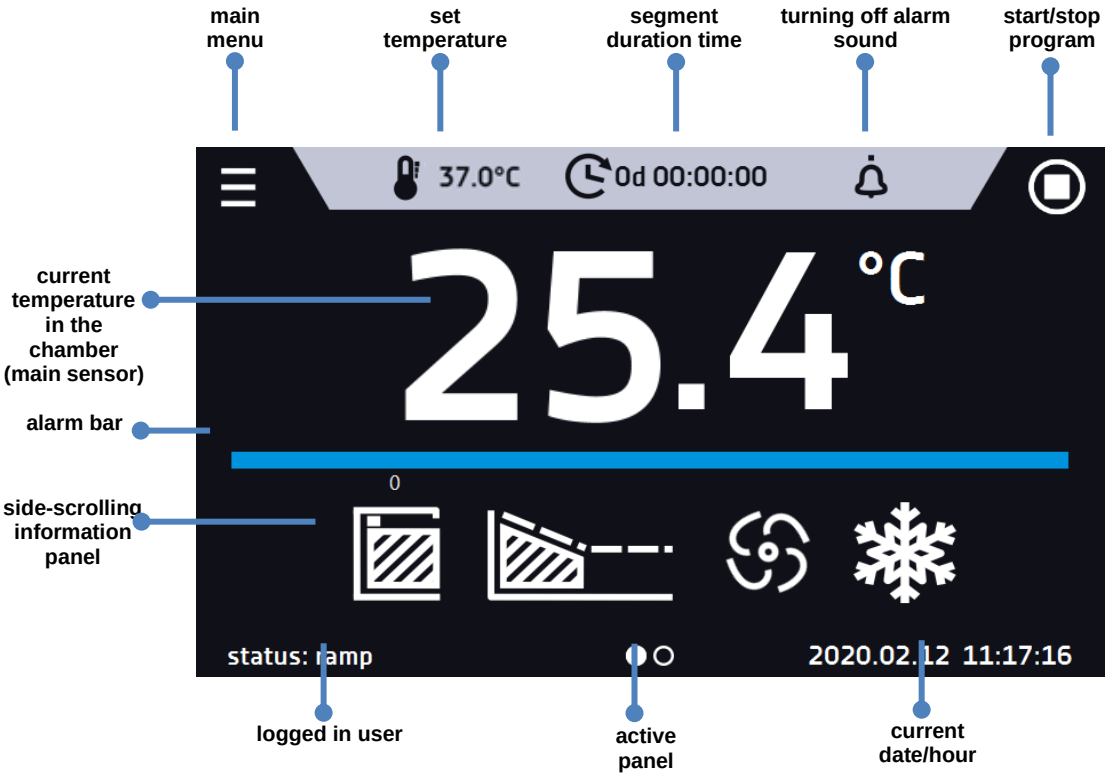
After turning on the device, the main screen *(Figure 6)* appears. It contains the information about the device status. After starting the program, additional information appears on the screen *(Figure 7)*.

Figure 6 Main screen (program is switched off, no user is logged in)



From this point, any action requires logging in.

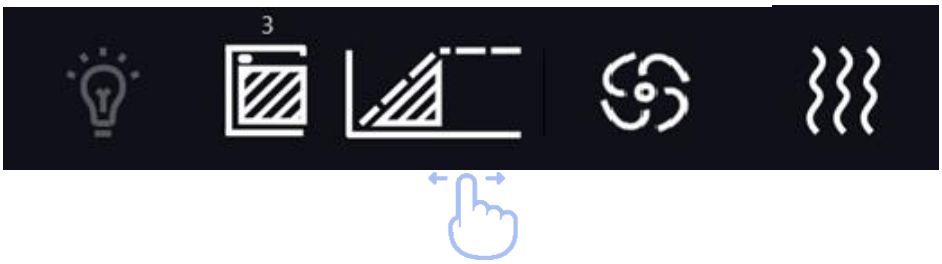
Figure 7 Main screen – running program in CL, SL



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 8 Information panel

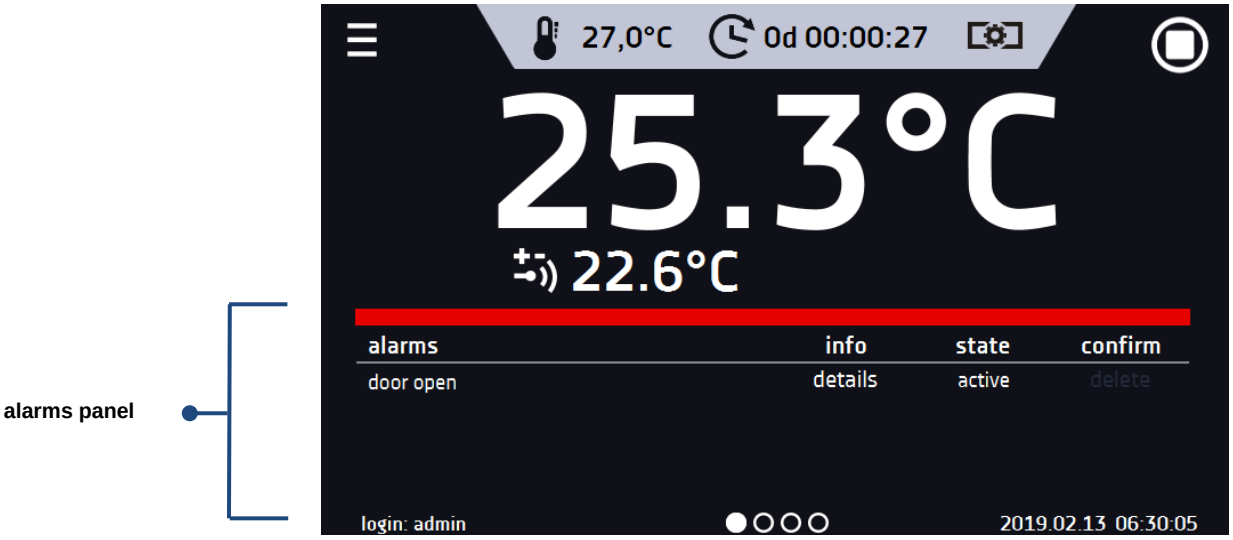


The icon  indicates information about which window is active.

6.5.1.1. Alarms panel

On the first page of the information panel there's alarms panel *(Figure 9)*.

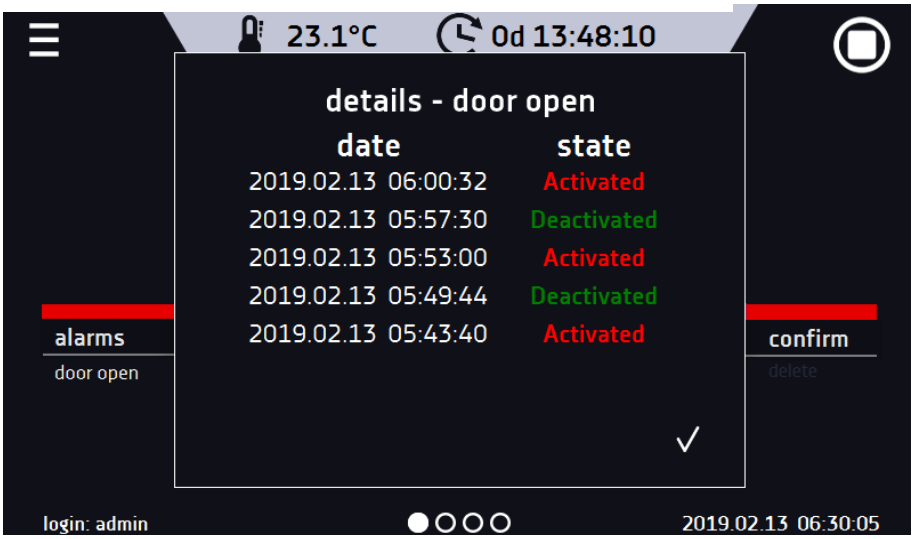
Figure 9 Icon: Alarms panel



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 10)*.

Figure 10 Alarm details

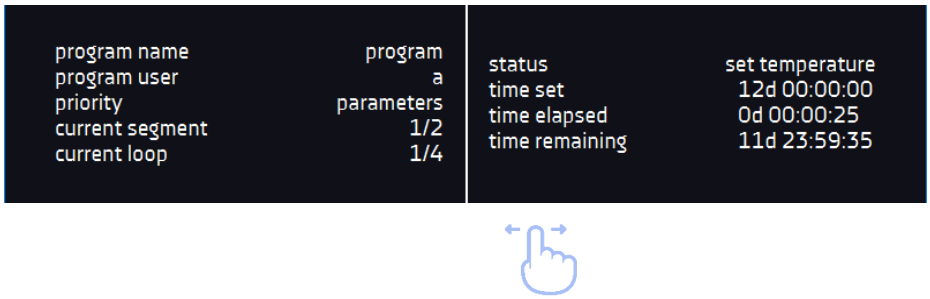


With more alarms, a button appears on the right side of the list and allows you to enlarge the view to full screen.

6.5.1.2. Status panel

The status of the device is displayed descriptively on the third page of the information panel *(Figure 11)*.

Figure 11 Status - description



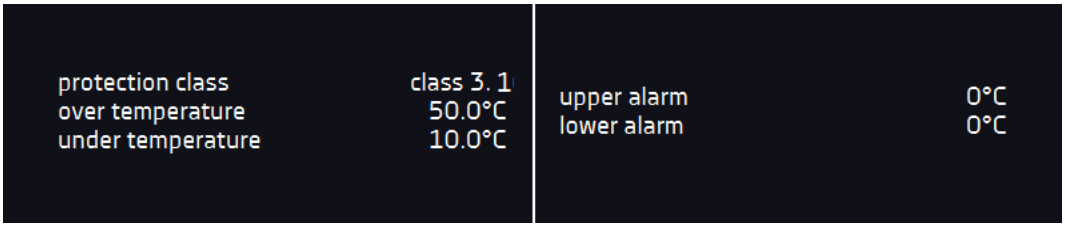
program name	the name of running program
user	name of the user to whom the program is assigned
priority	of time or parameters
current segment	currently running segment / total number of segments in the program
current loop	currently performing cycle/ total number of cycles to perform
status	stage of 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

6.5.1.3. Status panel – protection and alarms

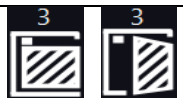
On the fourth page of the information panel there is an information about the protection class along with the set protection temperatures as well as an alarm for the upper and lower temperatures. This information is associated with a running or finished program. To set protection parameters, go to the *Section 6.7.5.* For information on protection classes, see *Section 6.7.4.*

The second part of the panel (on the right side) displays information about set upper and lower alarms. To set alarms, see *Section.6.18.* Value „-" means the alarm is off.

Figure 12 Status – protection and alarms



6.5.2. The meaning of icons and symbols

	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.
	Internal light is switched on. It's automatically turned on when the door is opened and turned off when it is closed. By clicking the icon  on the status panel you can manually turn on / off the light (applies to devices with the door with viewing window).
	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.
	Fan icon. Rotating icon shows that the fan is running. Quick Change function - clicking the icon allows you to change the fan efficiency (without editing the program) in the range of 0% ... 100% (for CLW/SLW 53-115, in the range 10%...100% (for CLW/SLW 180, 240, 400, 750, 1000)
	Ramp status: Chamber is currently heating up.
	Set temperature is reached.
	The program will start on the given date / time. Schedule or start delay activated.
	Schedule activated - the program will run from-to the given date / time.

	Icon is visible only when the chamber is heating up.
	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.
	The arrow icon allows navigation between: segments, program parameters and summary.
	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 limit is 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.
	Going to the menu to create, edit, delete and start programs.
	Canceling adding or editing of the program. Cancelling 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).
	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.
	When the program is running, click the icon to quickly change the fan speed and degree of opening the air-flap (Quick Change function).
	User message. Clicking on the icon allows you to enter a message.

	The icon appears in the event log and symbolizes entered user message.
	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

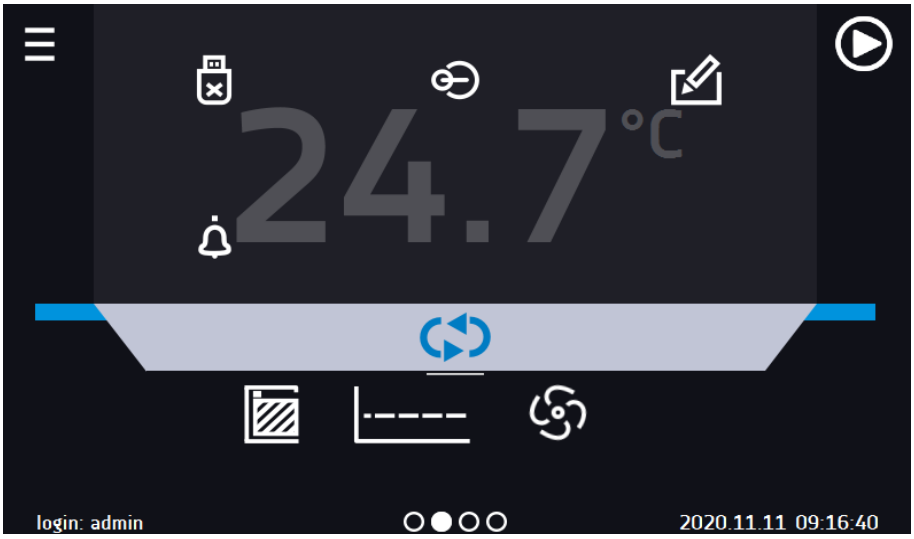
When the program is running, in the upper part of the main screen there's a bar menu with parameter icons (temperature, time, mute function, fan speed, degree of opening the air-flap). These parameters can be quickly changed (Quick Change).

Depending on the model, after swiping your finger down *(Figure 13, 14)* 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 5.9.*
-  Quick Note – more information *Section 6.5.4.*
-  mute option. Critical alarms (i.e. damage to the temperature sensor, temperature protection, etc.) continue emitting a sound, see *Section 6.18.1.*
- Quick Change (more information *Section 6.9.*) of:
  -  program duration time,
  -  set temperature,
  -  fan efficiency and degree of opening the air-flap.

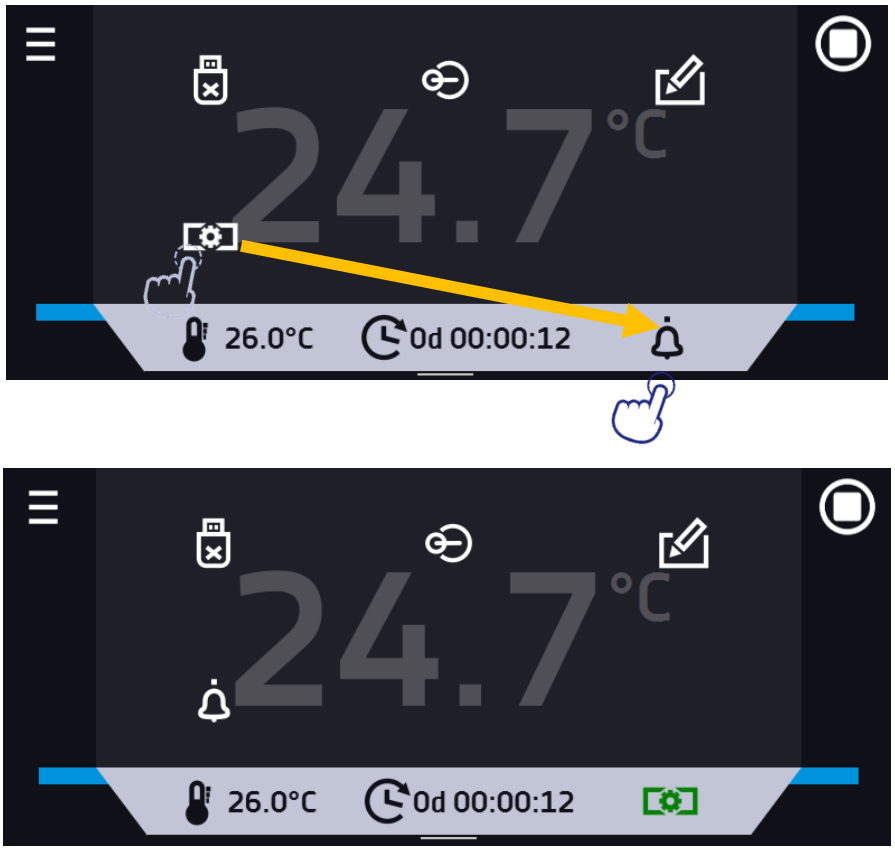
Figure 13 Upper expandable menu when the program is running

Figure 14 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 15)*.

Figure 15 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*" *(Figure 16)*. 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 16 User's message

6.5.5. Alarm bar

The Alrm 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

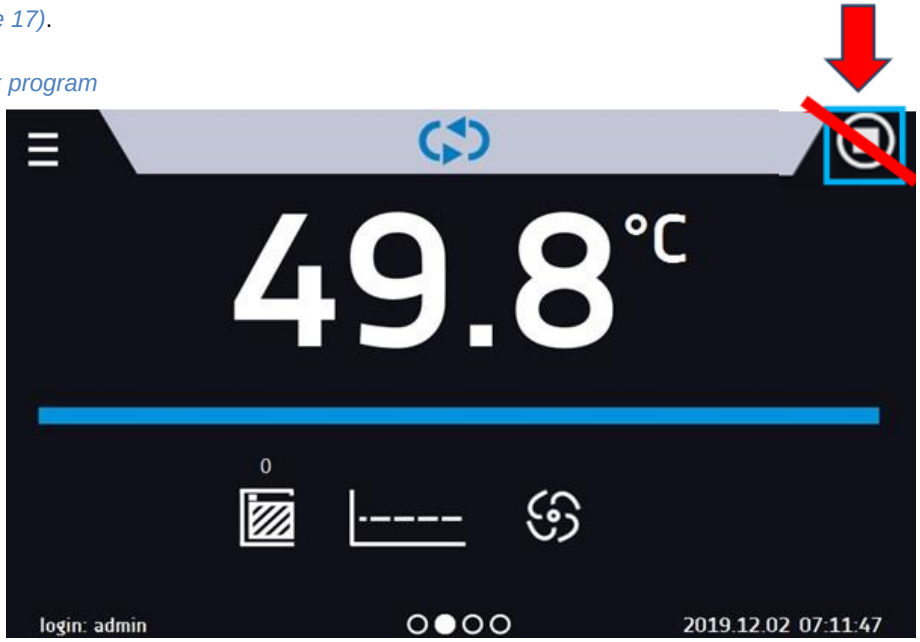
6.6. Quick Program

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

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 17)*.

Figure 17 Quick program



In order to go to Quick program, first you have to log in (if none of the users is logged in, the icon of Quick program will be inactive - grayed out). Then click the icon in the main screen. By clicking the appropriate icon you can set *(Figure 18)*:

- temperature
- fan (only for equipment with forced air convection)
- degree of opening of the air-flap

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

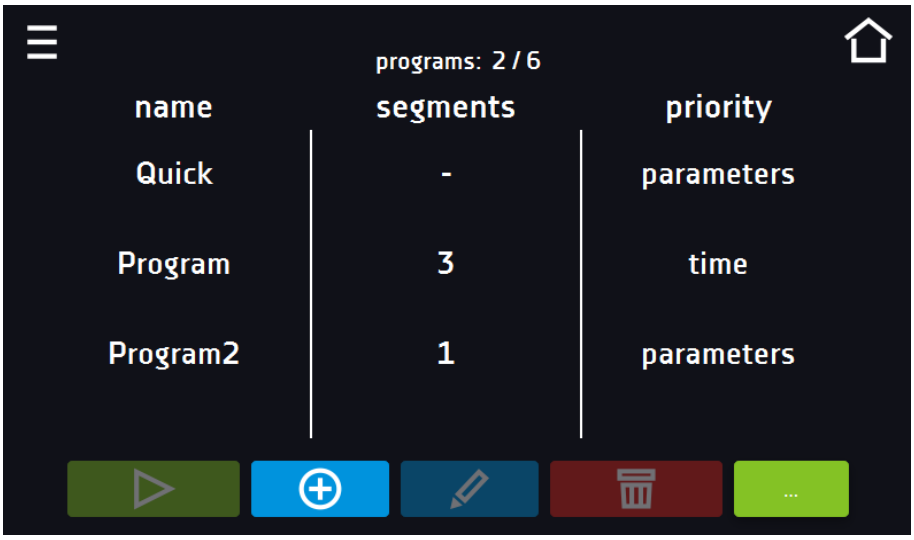
Figure 18 Starting the Quick Program

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:

1. go to the menu ,
2. click the program window ,
3. keep pressing STOP button for 5 seconds.

After configuriation of the Quick Program, it appears in the programs list *(Figure 19)*. 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 19 Quick program on programs list



In Quick Program editing mode, you can change:

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

Temperature protection

The highest protection class available for the device is set. The protection values depend on the set temperature:

- set temperature > 15°C: lower protection = set temperature – 5°C (max 20°C) , upper protection = set temperature + 5°C (min. 30°)

When the program is running you can change the parameters (temperature, air-flap and fan if available) by pressing the icon or . 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 *(Figure 20)* 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.*

Start the selected program.

Stop the program.

Add a new program.

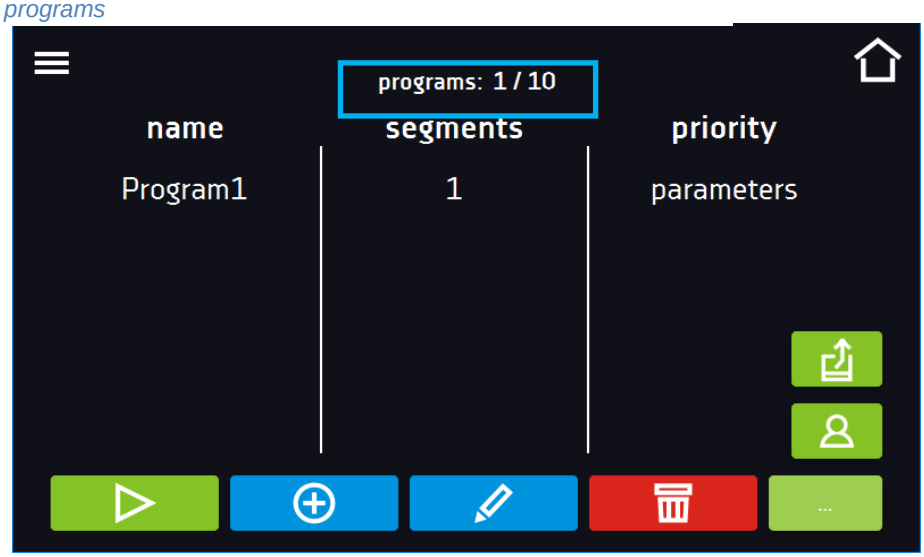
Edit the selected program.

Delete the selected program.

Download program from USB flash drive.

Share the selected program with the user type account.

Figure 20 List of programs



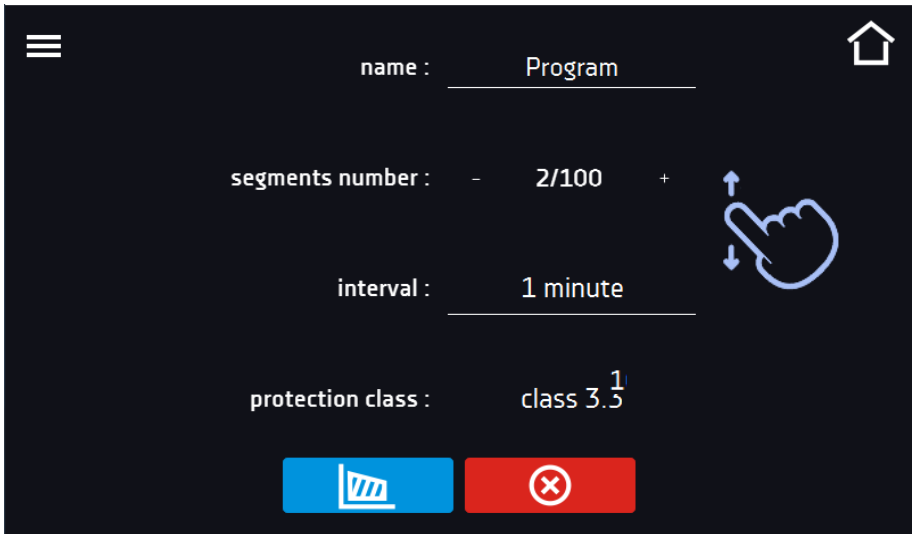
Information on the number of created programs / the maximum number of programs that the user can create is at the top of the screen (programs: 1/10).

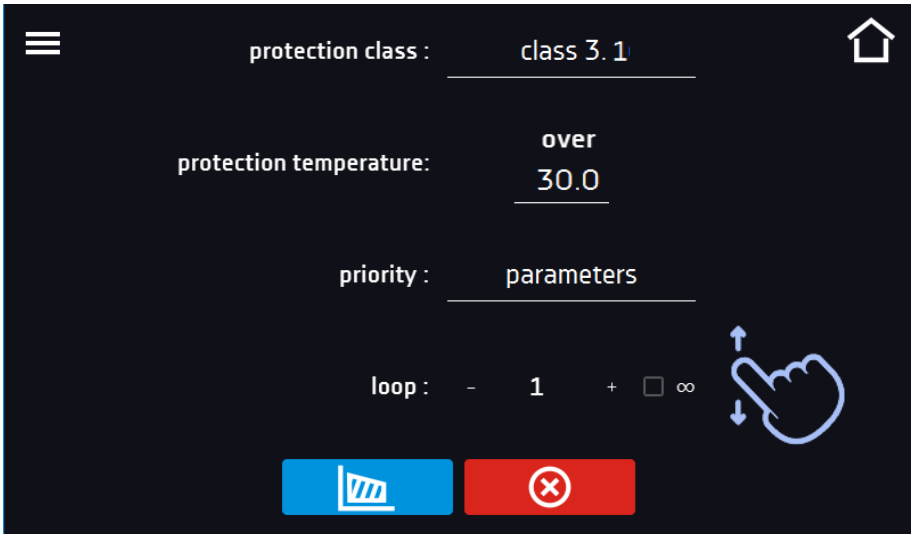
6.7.1. Creating / editing a program

Press the button  or  and a panel with program parameters will appear *(Figure 21)*.
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),
- **Protection class** – more information *Section 6.7.4.*
- **Temperature protection** – temperature range for the protection class, more information *Section 6.7.5.*
- **Priority** – the priority of time or parameters, more information *Section 6.7.6.*
- **Loop** – the number of program repetitions, more information *Section 6.7.7.*

Figure 21 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
segment1: temp. 40°C, time 3 hours (after reaching the temperature 40°C, it is maintained for 3 hours)
segment2: temp. 50°C, time 3 hours (after reaching the temperature 50°C, it is maintained for 3 hours)
segment3: temp. 40°C, time 2 hours (after reaching the temperature 40°C, it is maintained for 2 hours)
segment4: .....
segment5: .....
Press the buton and the first program segment will appear *(Figure 22)*.

In this window you can set:

- **temperature –** target temperature which the device is to achieve in this segment (needs to be minimum 2°C below the value for over temperature protection and minimum 2°C above the value for under temperature protection),
- **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.
- **fan** - fan efficiency in percent,
- **air-flap** – degree of opening of the air-flap,
- **fan ramp** – fan efficiency when reaching the set temperature,
- **air-flap ramp** - degree of opening of the air-flap when reaching the set temperature.

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.

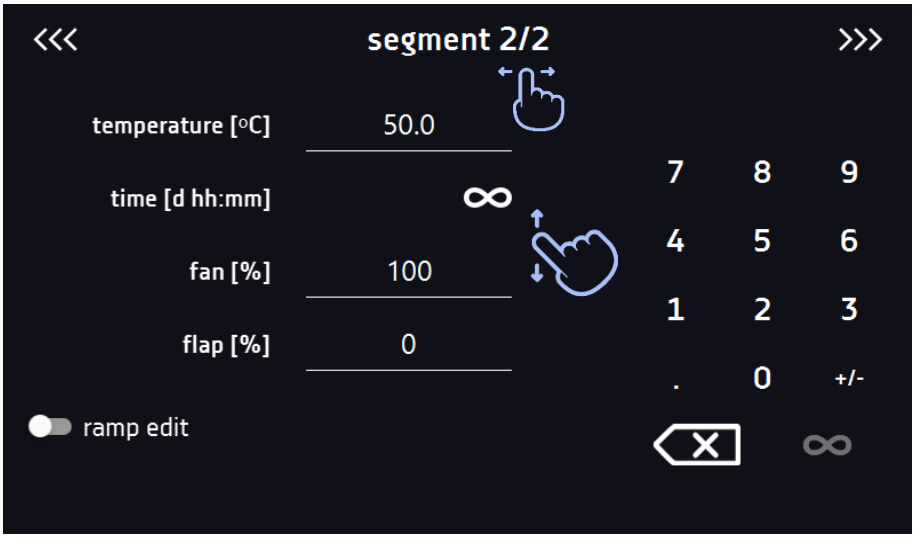
	The fan efficiency set to 100% is the default value. Reducing the fan efficiency may cause improper operation of the device, e.g. chamber icing, worse fluctuation and variation of temperature, excessive condensation of water.

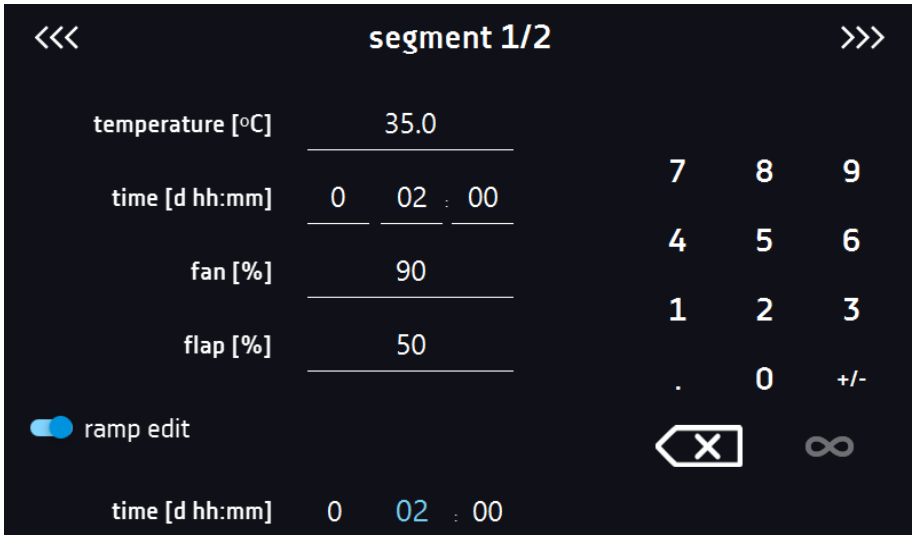
	Ramp time - setting a short time will not accelerate reaching the ramp, but the ramp will be reached in the shortest possible time depending on the set temperature, ambient conditions and the possibilities of the cooling or heating system in the device.

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 edit ramp field ramp edit and set your own values.

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

Figure 22 Program segment edition



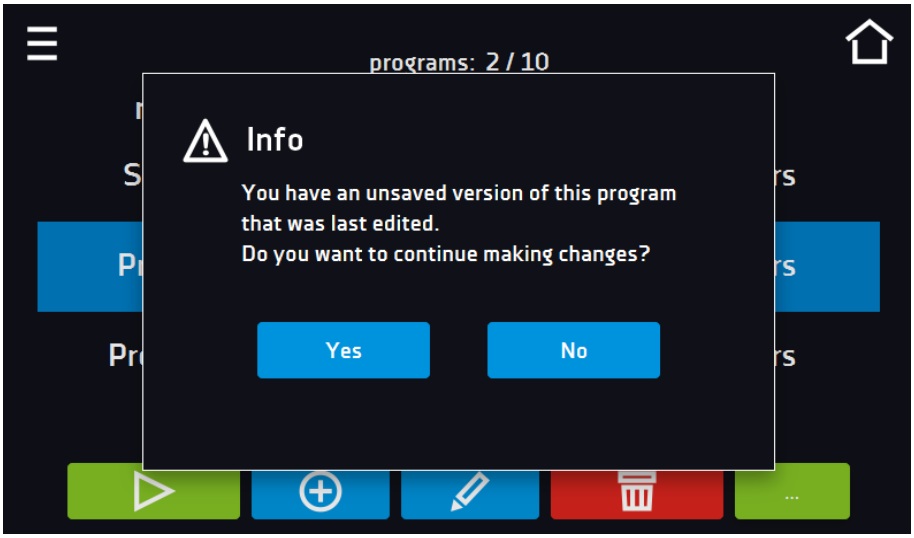


The navigation between: segments, program parameters and summary is done by touching the icon <<< >>>.

	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 switching to the program edition, the information about the possibility of continuing changes in the program settings appears *(Figure 23)*.

Figure 23

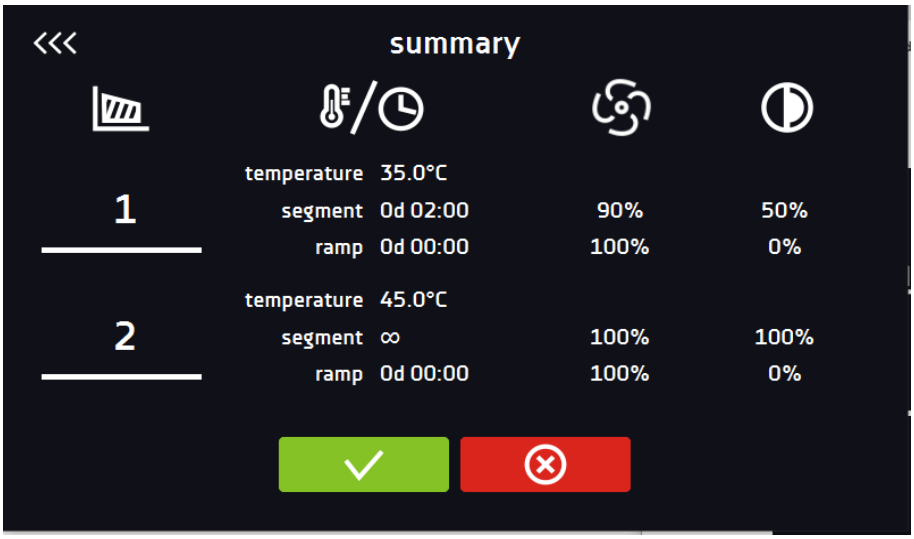


6.7.3. Summary of segments

In the segments summary *(Figure 24)* all segments can be seen along with introduced parameters:

- number of segments,
- temperature, duration time, target time of reaching temperature of a given segment,
- fan efficiency,
- degree of opening of the air-flap.

Figure 24 The summary of the segment



Confirms and saves the changes

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

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

6.7.4. Protection class

The device is factory-equipped with a protection **class 3.1 according to DIN 12880** – over temperature protection - the user programs the protection temperature and once it's exceeded (caused by a failure), the heaters are cut off. When the temperature returns to the allowed range, the device resumes operation.

The set temperature in the segment cannot be higher than the over temperature protection minus 2°C, e.g. the over temperature protection is 50°C, therefore the maximum set temperature in the segment that can be set is 48°C.

Figure 25 Confirmation of protection alarm

6.7.5. Temperature protection

The temperature protection value for protection class 3.1 is:

- from the set temperature + 2°C to the maximum operating temperature of the device + 10°C.

For units with heating, the lower limit of the temperature setting must be considered, i.e. 5°C above the ambient temperature.

6.7.6. 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 countdown 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.

6.7.7. 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. 40°C, time 2 h
segment2: temp. 50°C, time 2 h,
segment3: temp. 60°C, time „∞"

The device will run segment1 and segment2 three times and then will go to segment3 which will last indefinitely. CL incubators and SL drying ovens do not have a cooling system, so the temperature in the chamber decreases naturally.

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"  *(Figure 26)*.
- Then select the program you want to activate and press „start" button  *(Figure 27)*.

Figure 26 Main menu

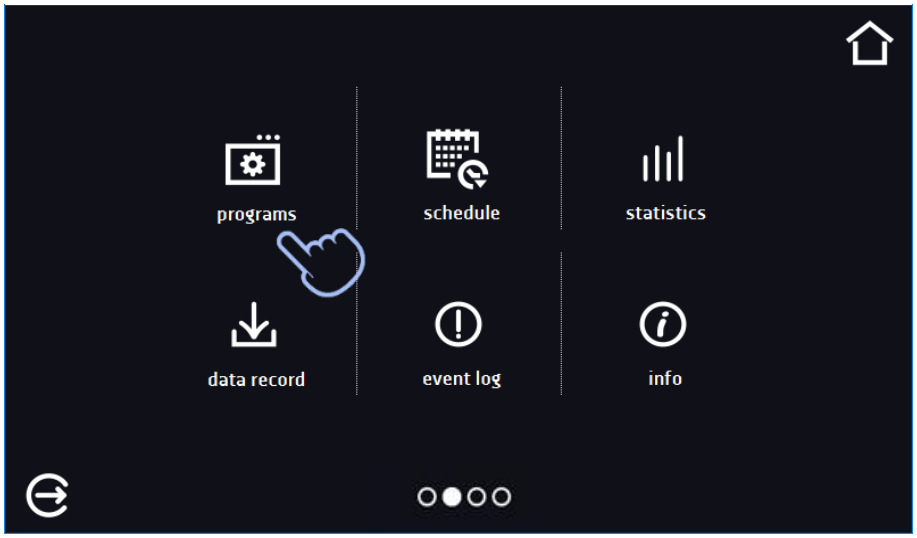
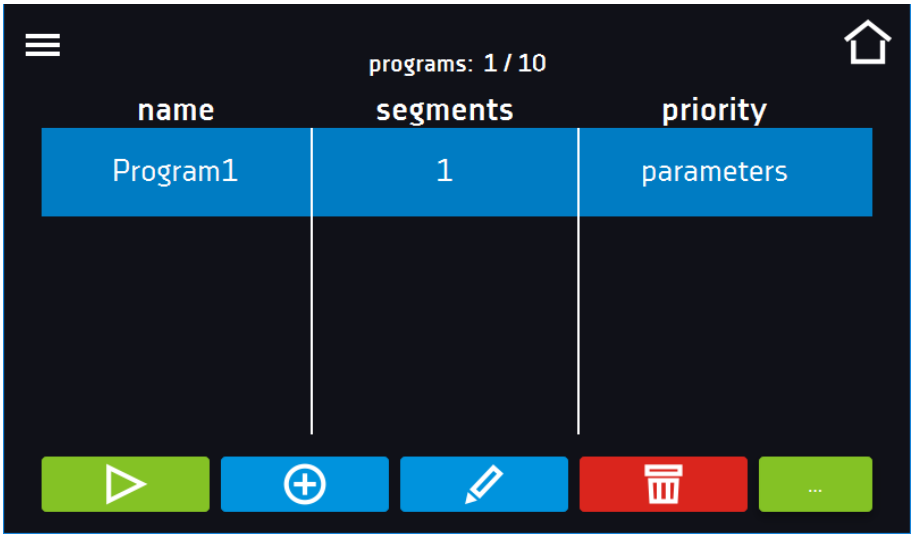
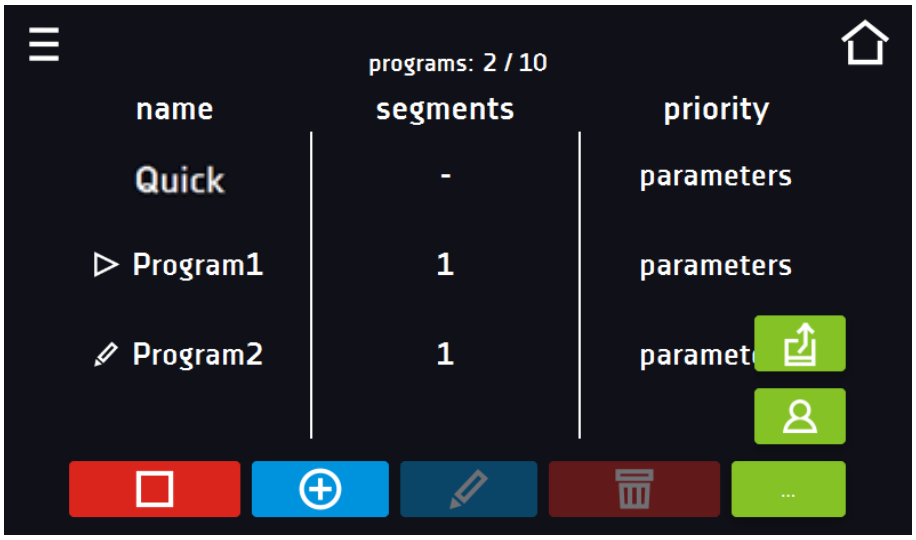


Figure 27 Program management menu



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 28)*.

Figure 28 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 *(Figure 29)*.
- In the upper left corner press „PROGRAM”
- Select the program you want to start *(Figure 30)*. 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 29 Main screen

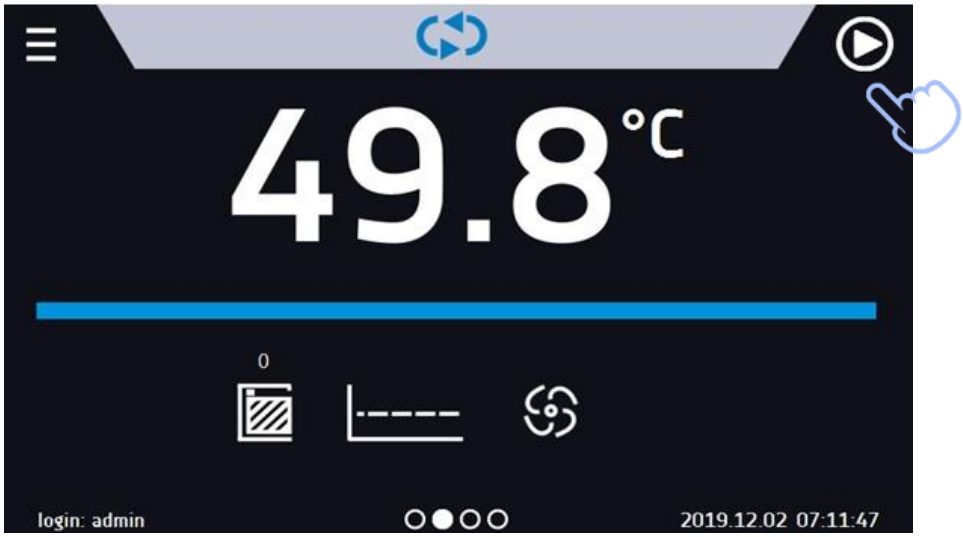
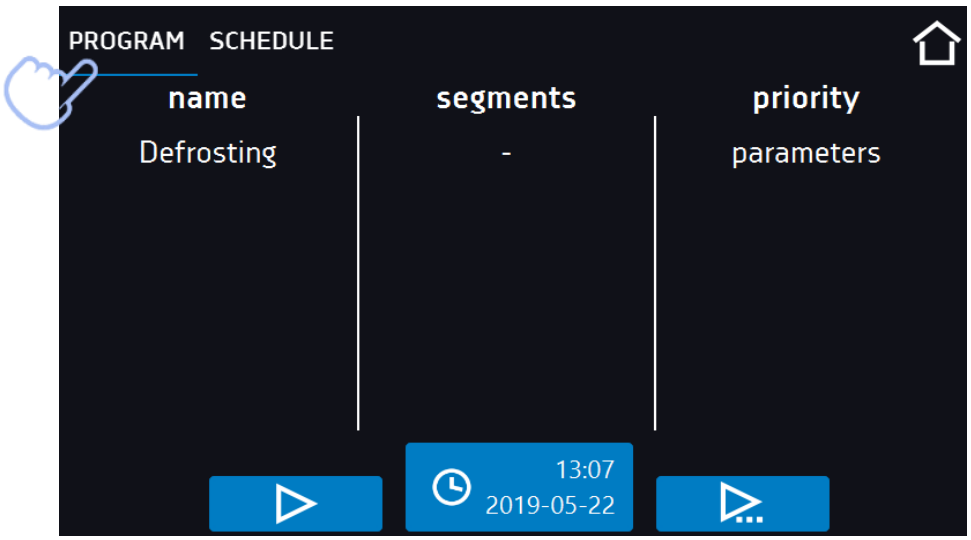


Figure 30 Selection and launch of the program



	A delayed start of backdated program is possible (up to 7 days back). 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

	You cannot make a quick change (of time / temperature) in a running program that belongs to another user. Information about the program owner can be found in the information panel (lower left corner).

	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 *(Figure 31)*. The value of the temperature should be selected by scrolling the list up or down *(Figure 32)*. Click to confirm the change.

The temperature can't be higher than the over temperature protection -2°C.

Figure 31 Quick change of set temperature

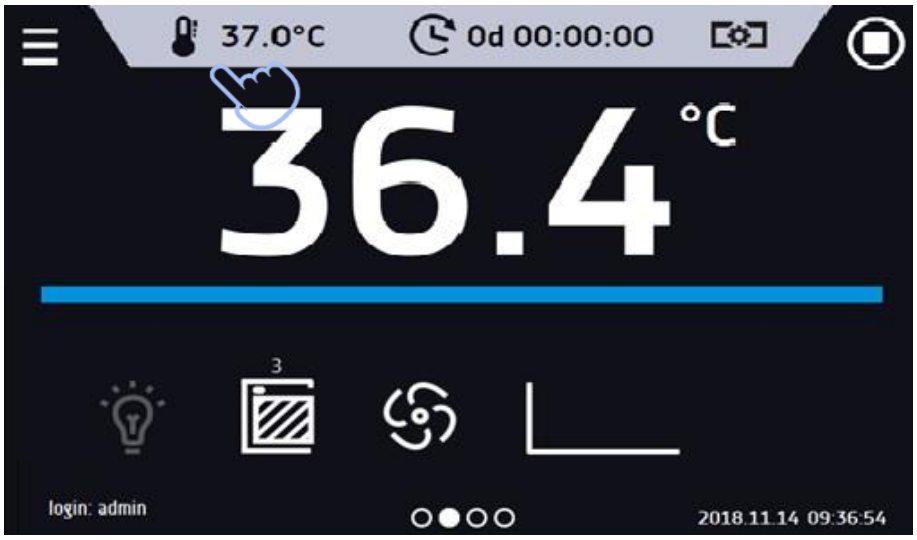
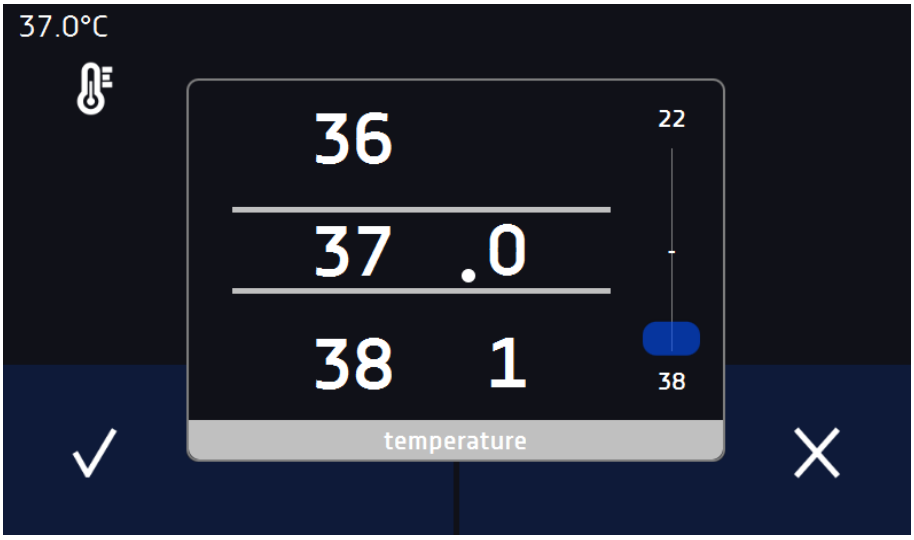


Figure 32 Quick change of set temperature



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 *(Figure 33)*. Select the number of days, hours and minutes by scrolling the list up or down *(Figure 34)*. 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 33 Quick change of set time

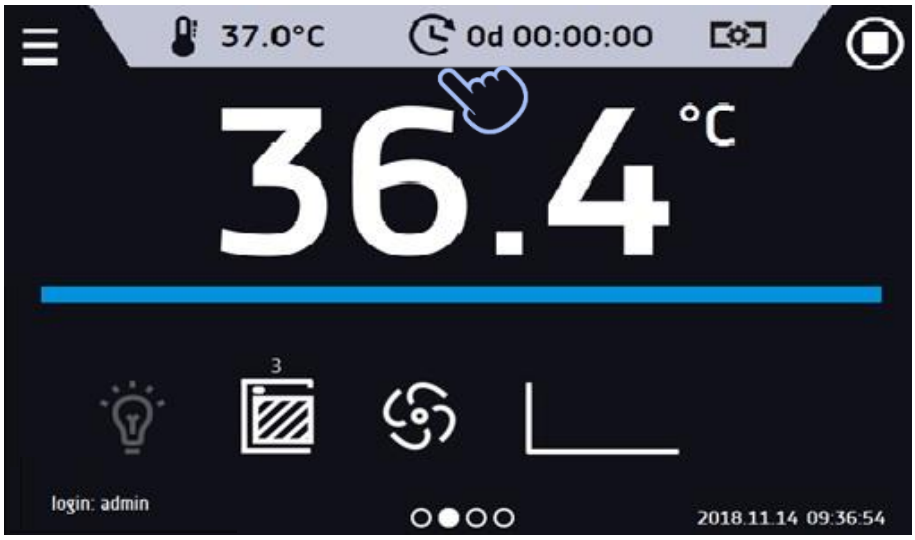


Figure 34 Quick change of set time

6.9.3. Quick change of fan efficiency and/or degree of opening of the air-flap

In order to quickly change the fan efficiency and/or degree of opening of the air-flap press the icon in the main screen *(Figure 35)*. The value should be selected by scrolling the list up or down *(Figure 36)*. Press to confirm the change.

Figure 35 Quick change of fan efficiency

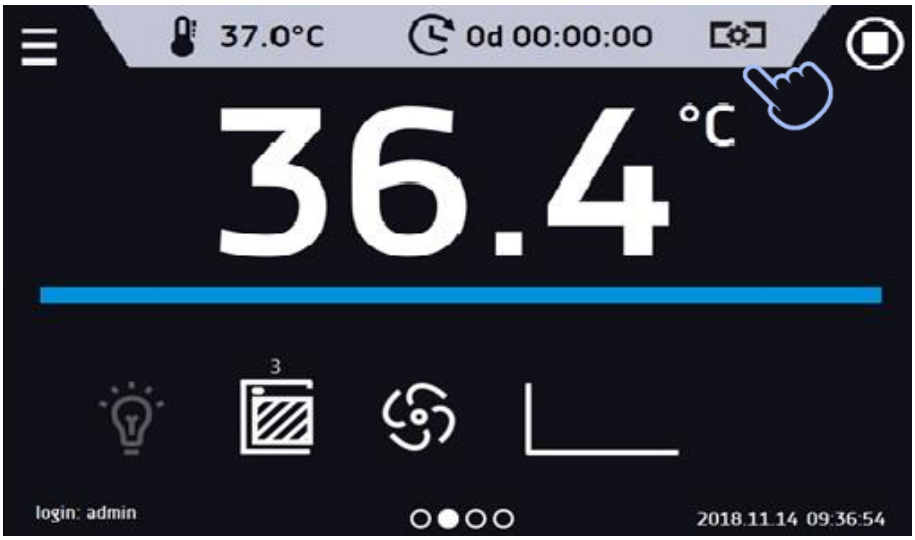
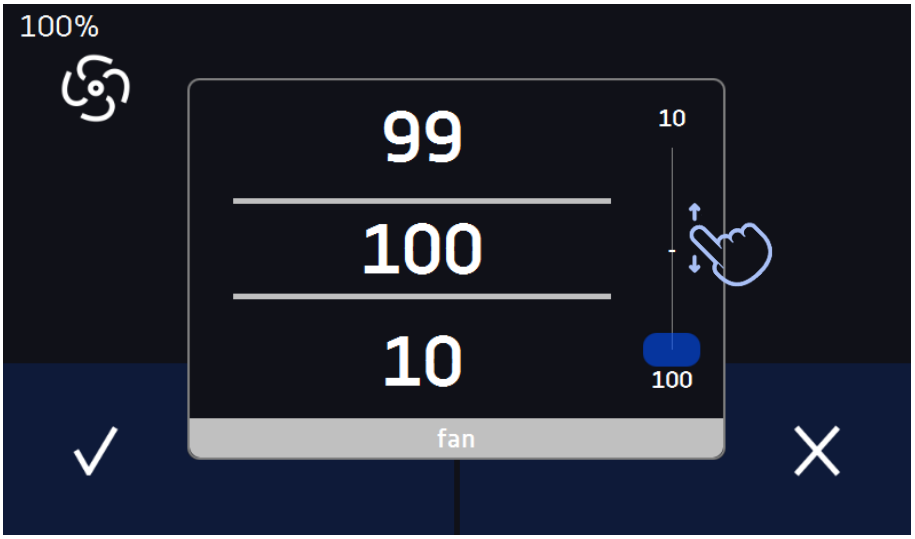


Figure 36 Quick change of fan efficiency



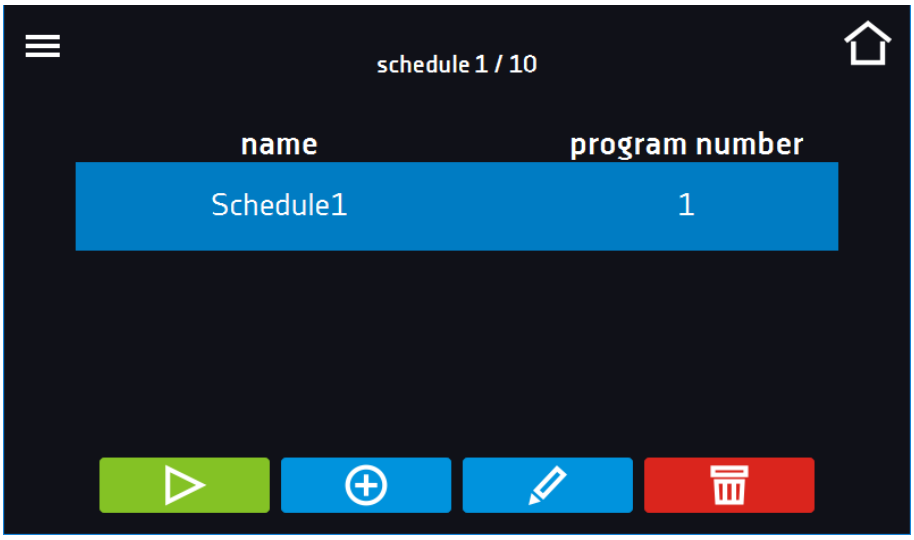
6.10. Schedules

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 *(Figure 37)*.

	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 37 List of schedules



 Start the schedule

 Stop the schedule

 Add the schedule

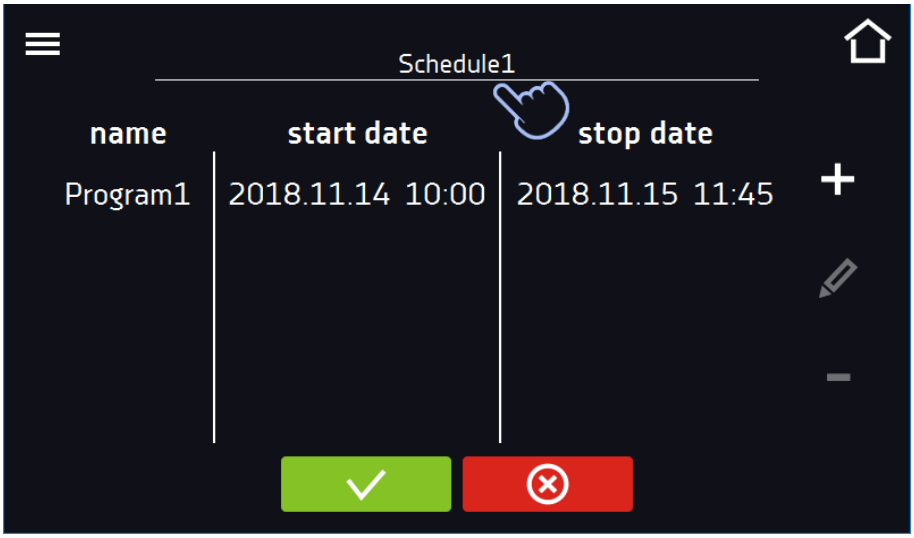
 Edit the schedule

 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 *(Figure 38)*. Press "Schedule" and use the keypad to enter the schedule name. The schedule may consist of up to 10 programs.

Figure 38 Creating / editing a schedule



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

Edit and make changes to the selected position

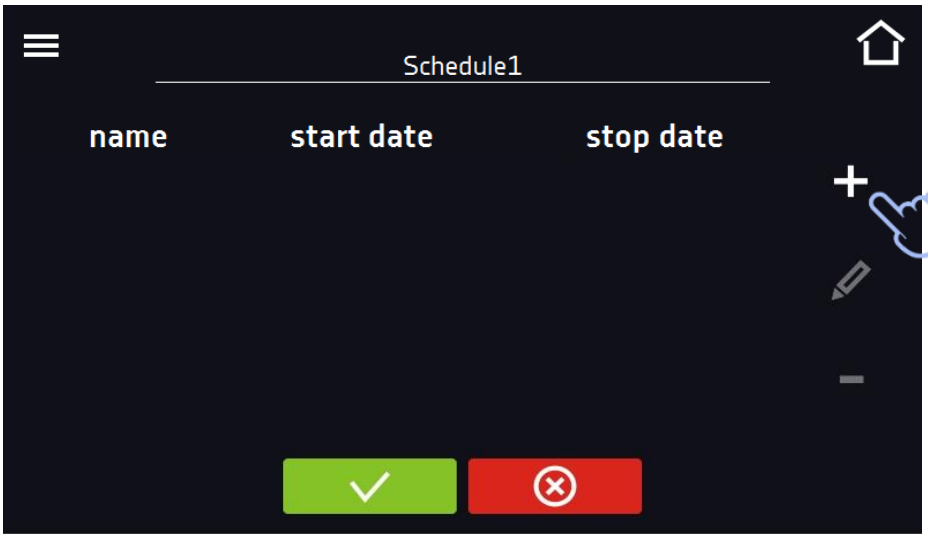
Delete the selected position from the list

Save the schedule

Cancel instroduced changes

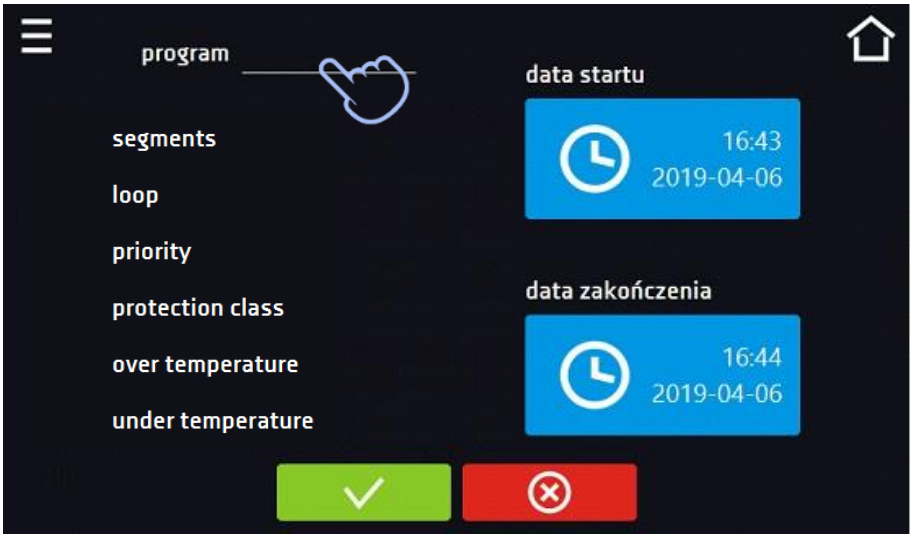
After pressing *(Figure 39)* or a window appears allowing you to select the program and the date and time of its start and end.

Figure 39 Adding a program to the schedule



Select a program from the drop-down list and press on the field next to the inscription "program" *(Figure 40)*. Information about the selected program will be displayed *(Figure 41)*: number of segments, number of cycles, priority, temperature protection, over- and under temperature. This is only a preview of the parameters - it is not possible to change them in this window.

Figure 40 Selection of the program



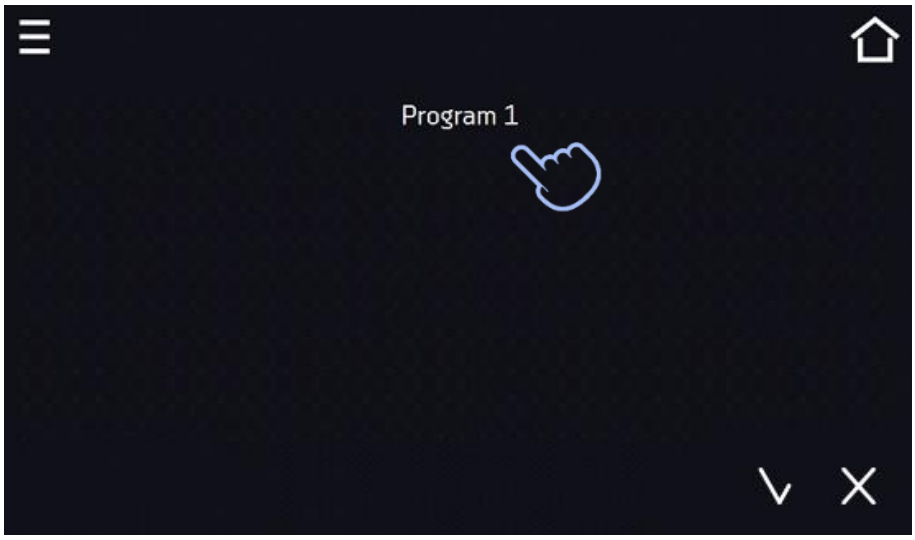
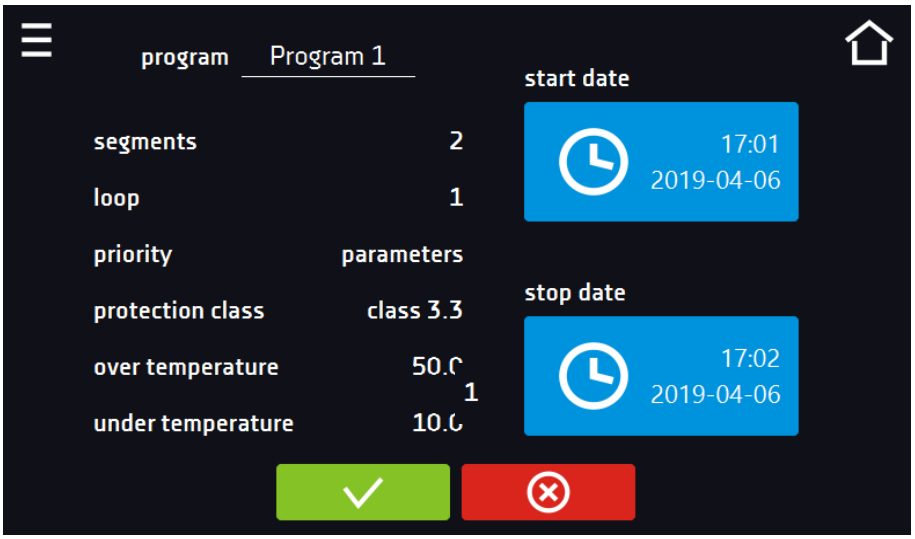
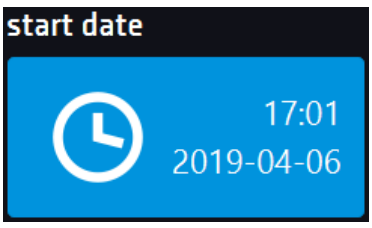


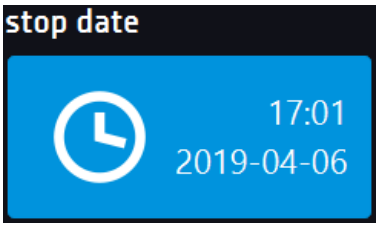
Figure 41 Information about the program



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” *(Figure 42)*.
- Then select the schedule you want to activate and press the start button. *(Figure 43)*.

Figure 42 Main menu

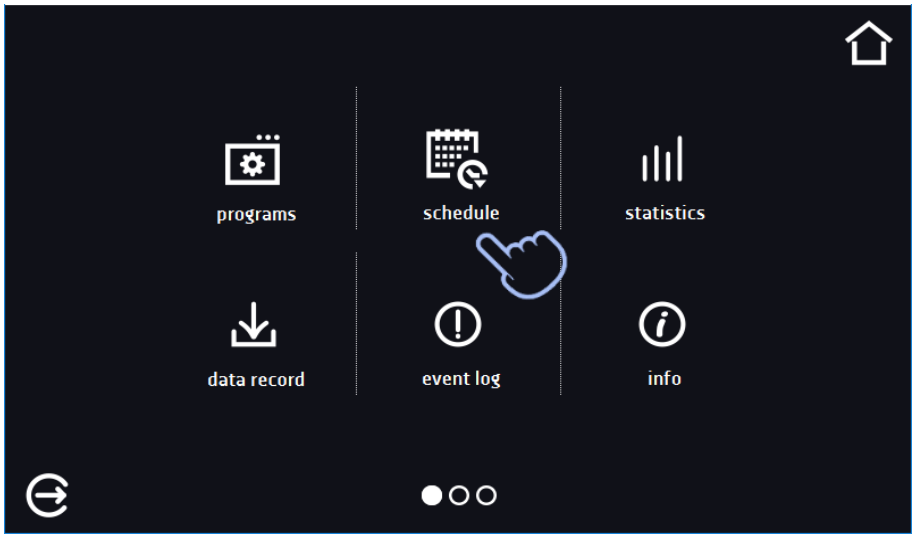
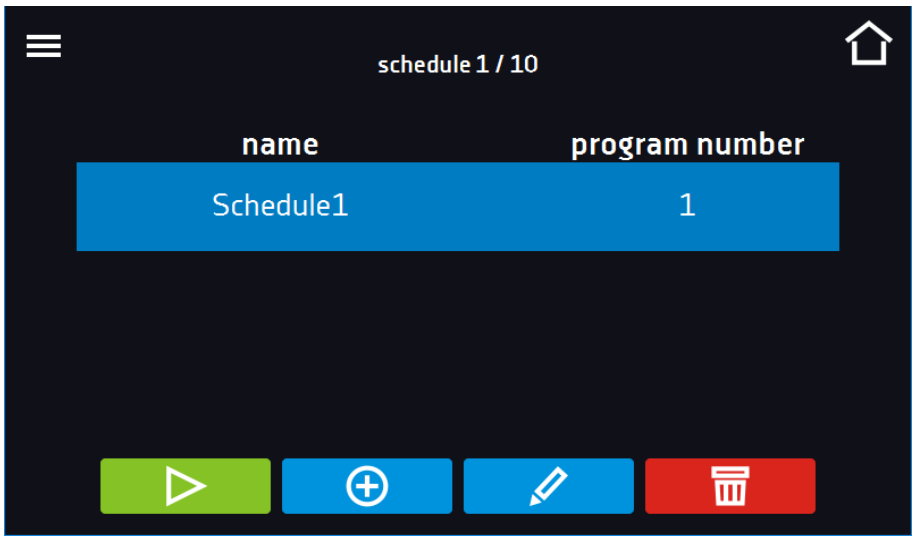


Figure 43 List of schedules



 Start the schedule

6.10.2.2. The second way

- In the main screen press the icon  *(Figure 44)*, then press the SCHEDULE inscription. The schedule selection window will be displayed *(Figure 45)*.
- 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 44 Main screen

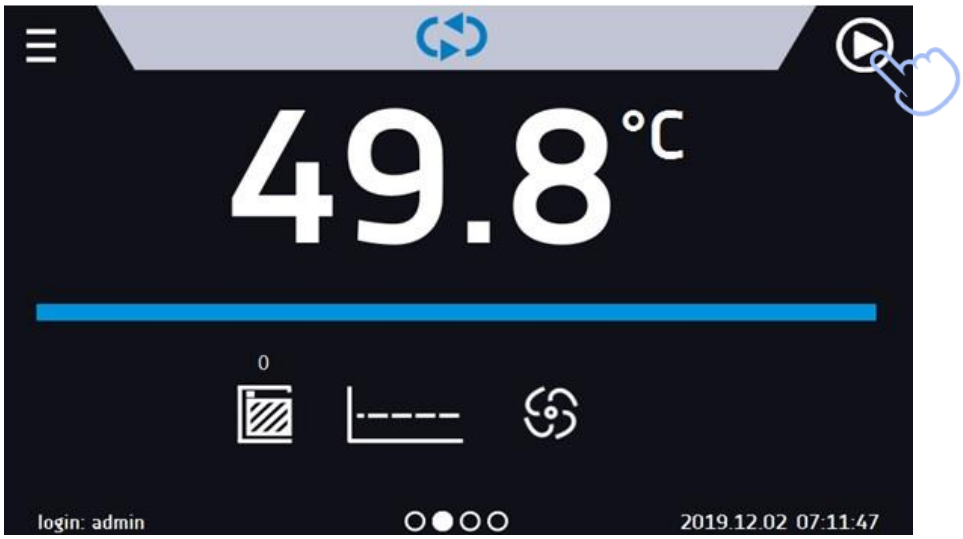
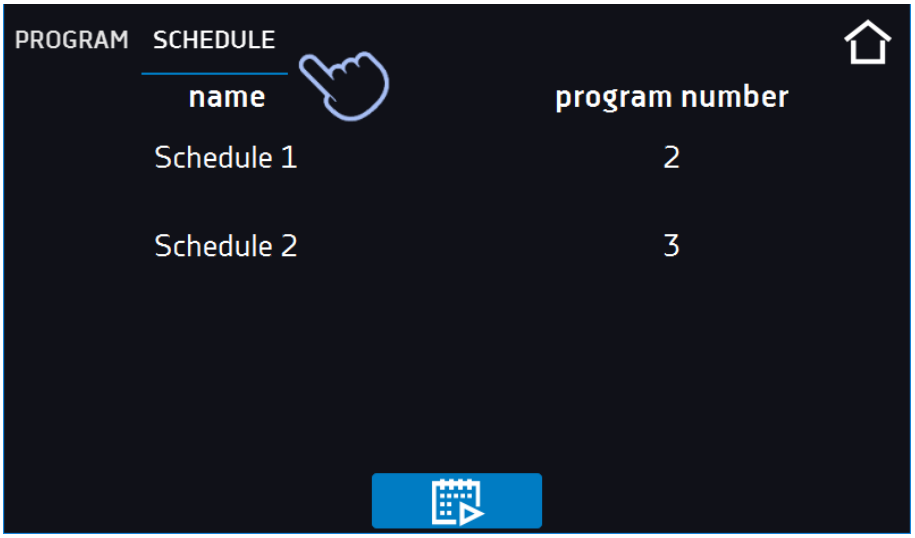


Figure 45 Selection of the schedule



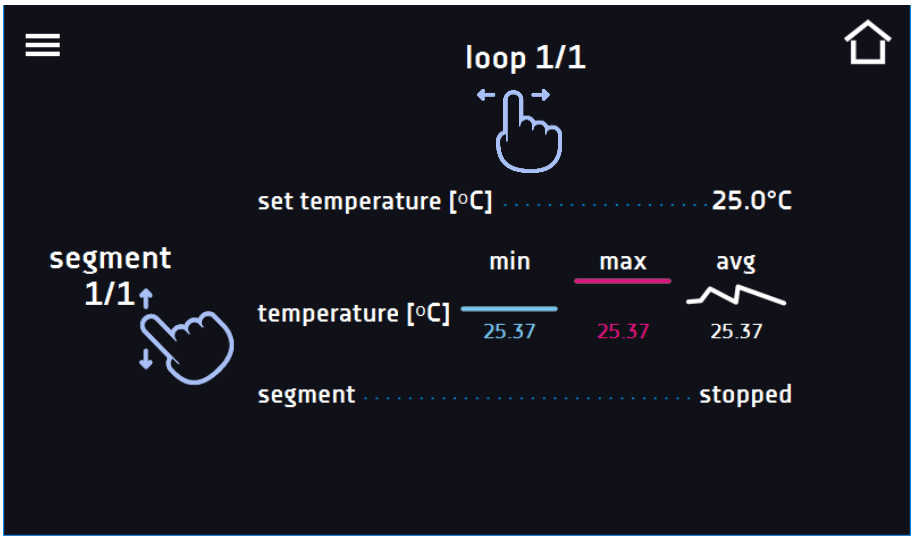
6.11. Statistics

Go to the main menu and press the icon . This panel *(Figure 46)* displays statistics of the currently running program or program that has ended 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 46 Statistics



6.12. Data record

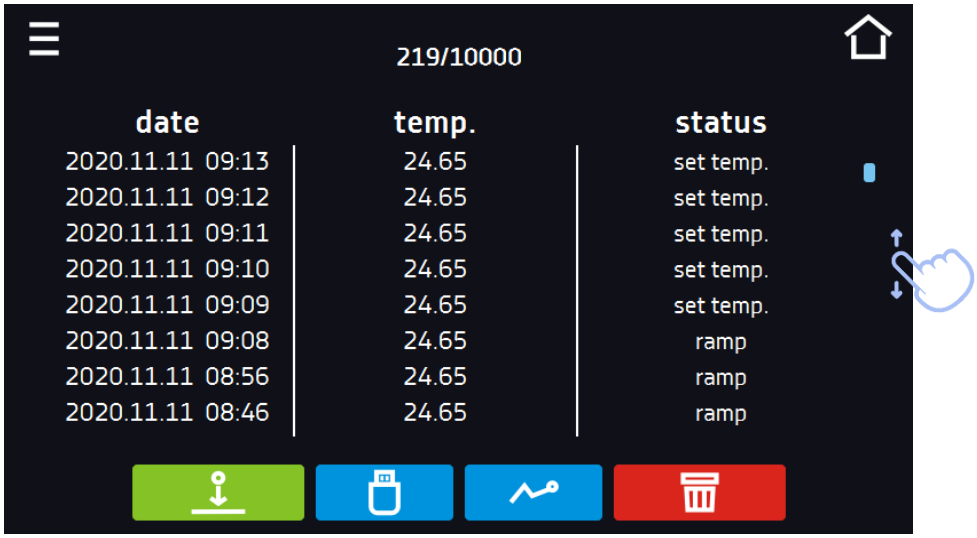
Go to the main menu and press the icon . Data record window *(Figure 47)* contains the following information:

- 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 47 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 5.9.*

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 *(Figure 48)*

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

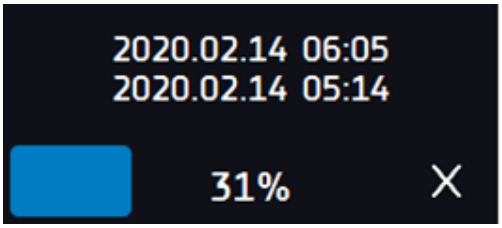
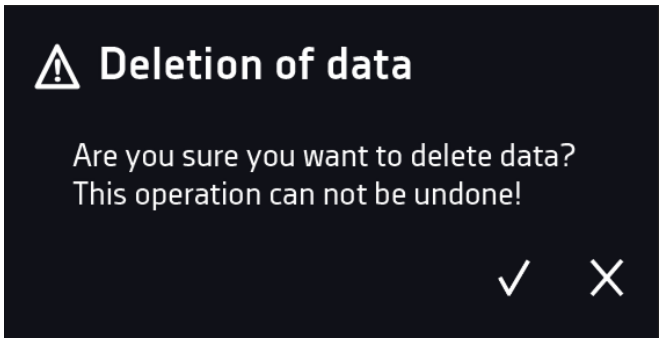


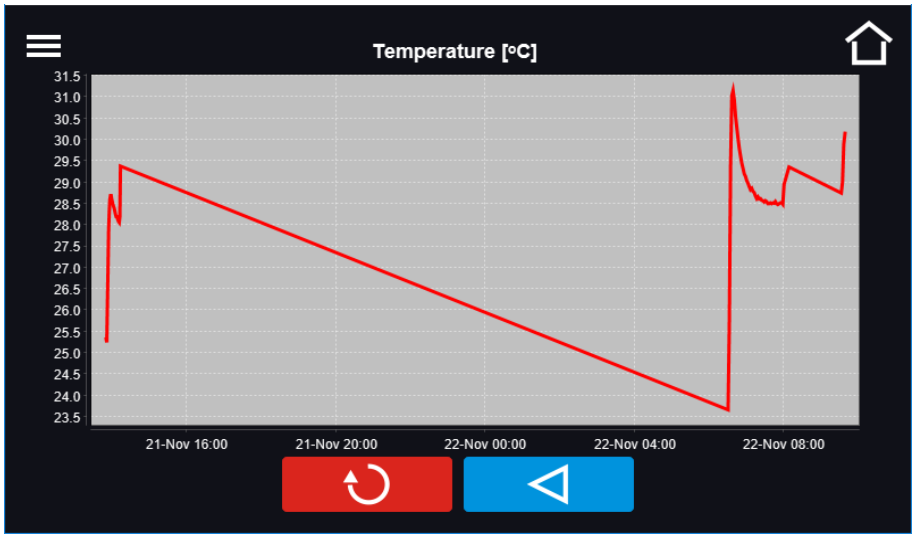
Figure 48 Deleting data

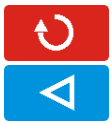


6.12.1. Graph

A graph can be generated from the data stored in the data register *(Figure 49)*. 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 49 Temperature graph





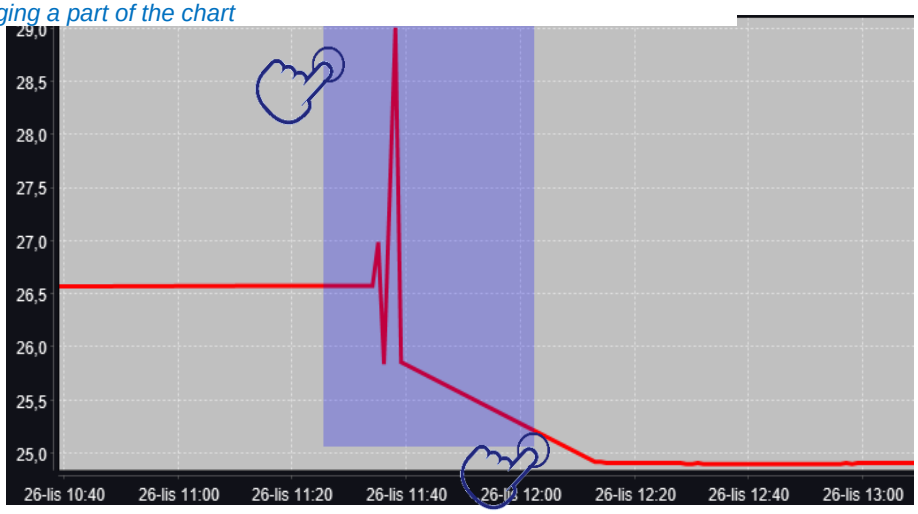
Returns to displaying the entire chart (undo all magnifications) / returns to the list of charts.

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 *(Figure 50)* - enlarge in the same way as it is done on a smartphone. Swipe left to return the chart to normal size.

Figure 50 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* and *Figure 61*. 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 *5.9. 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

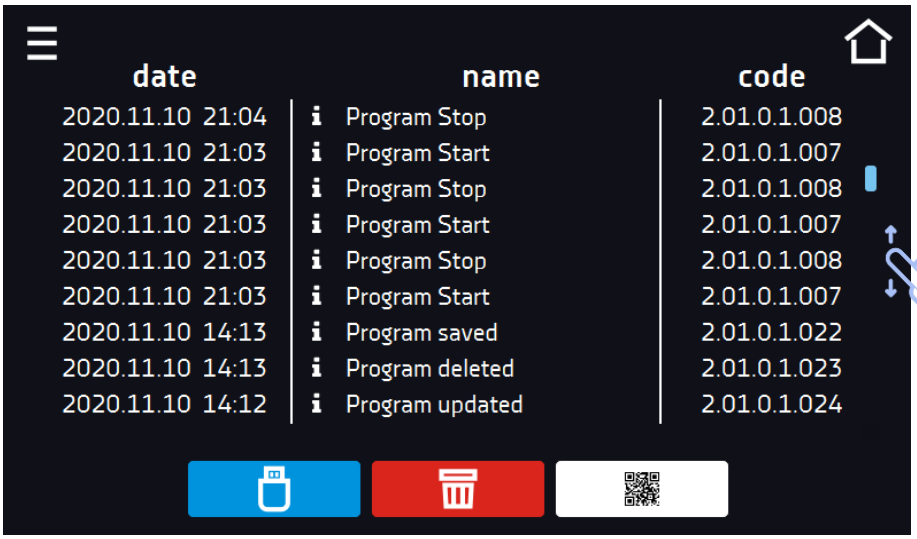
6.13. Event log

Data available for:

- **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.

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

Figure 51 Event log (Super Admin view)



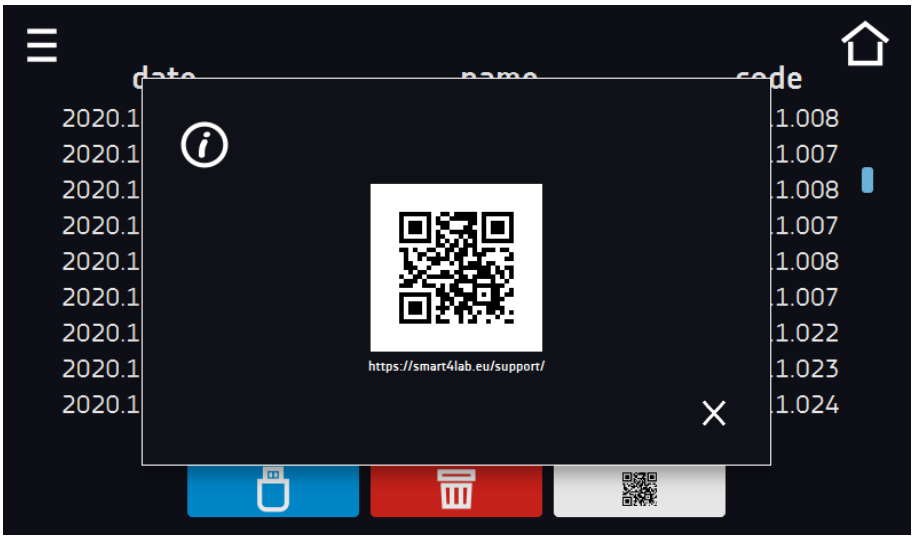
Recording data onto the USB flash drive. .csv files are available - separated by semicolon when opening e.g. with a spreadsheet, .plkx - opening with the LabDesk application

Before removing the USB flash drive from the USB port, it must be unmounted, see *Section 5.9.*

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 52 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 5.9.*

Information signs in the event log:

- Information event
- Message entered by the user
- Alarm event
- Error
- Warning

Possible events:

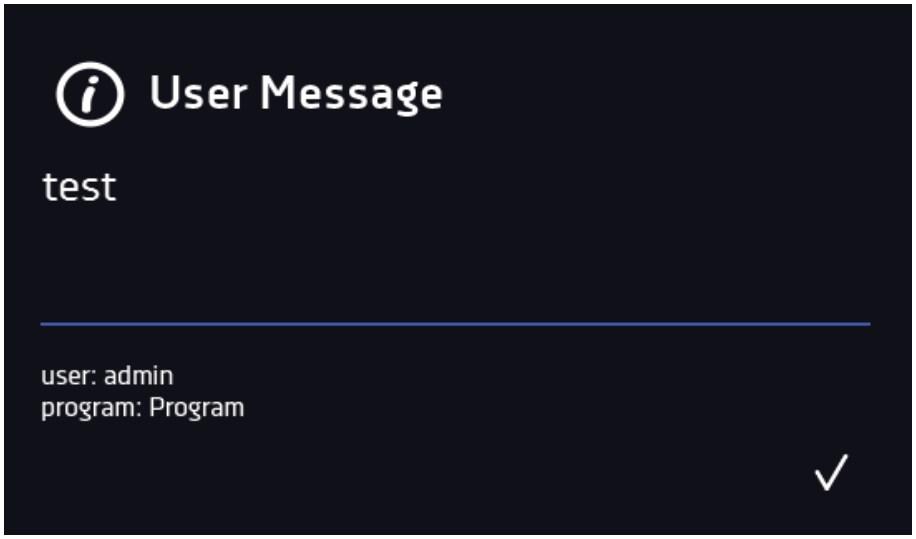
Program Start	starting the program
Program Stop	stopping the program
Program Edit	changing the program parameters
Program End	program is completed
DeviceOn	the device is switched on (on the main switch)
DeviceOff	the device is switched off (on the main switch)
Door opened	the door is opened
Open door 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
Upper temp. alarm Start	over- temperature protection has been activated
Upper temp. alarm End	over- temperature protection has been deactivated

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 saved	new program has been saved
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
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

Quick note

To view message details, click User Message. In this window *(Figure 53)* 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 53 Details of user's message



6.14. Info

Go to the main menu and press the icon . The panel contains the following information:

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

Figure 54 Info window (example)

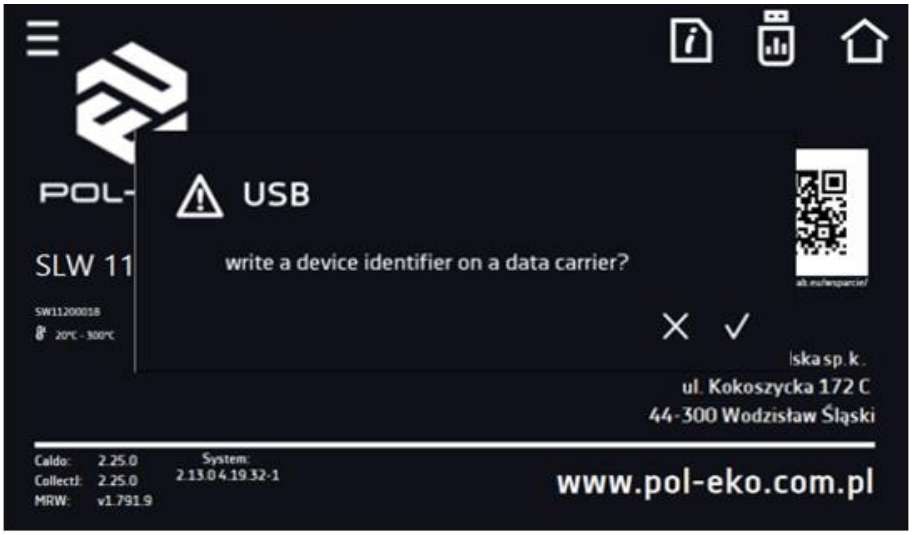
* lower operating temperature limit is not lower than 5°C above ambient temperature

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 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 *(Figure 55)*. This file is used to create an offline program in the Lab Desk application.

Figure 55 Saving configuration file

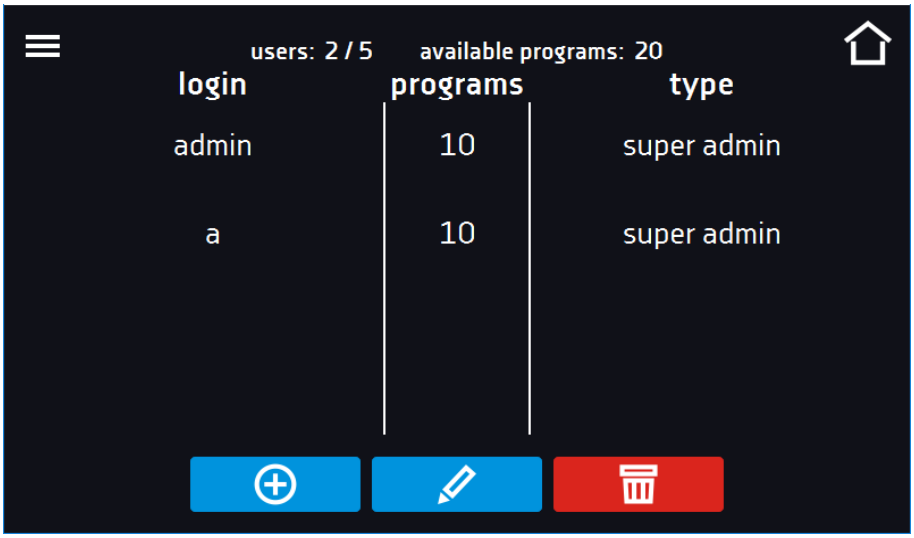


Before removing the USB flash drive from the USB port, it must be unmounted, see *Section 5.9.*

6.15. Users

Go to the main menu and press the icon . In this panel *(Figure 56)* you can add a new user, edit an existing one or delete it.

Figure 56 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 *(Figure 56)* 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.

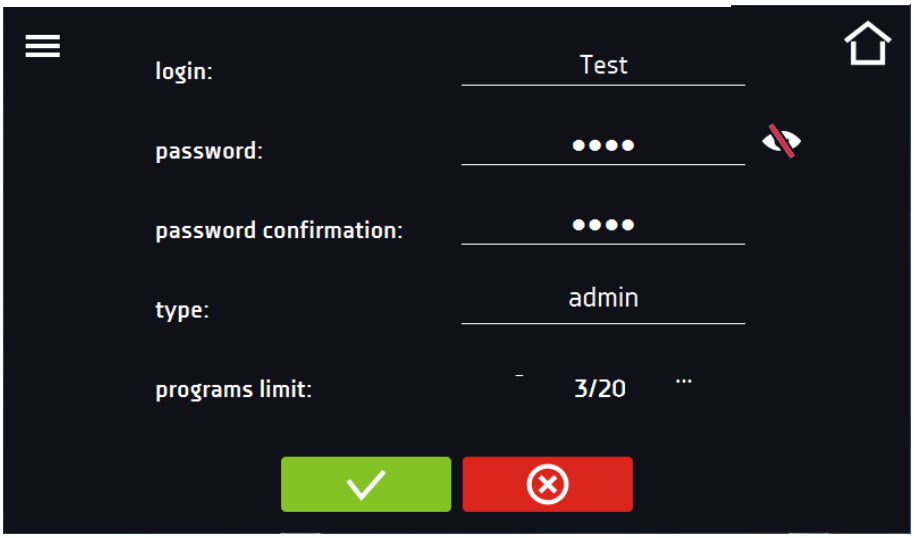
6.15.1. Creating / editing a user

To add or change user settings, press the button  or  , a panel with user data will be displayed *(Figure 57)*.

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).

Figure 57 Editing a user



 Confirms and saves the user

 Cancels introduced changes and returns to the users list

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

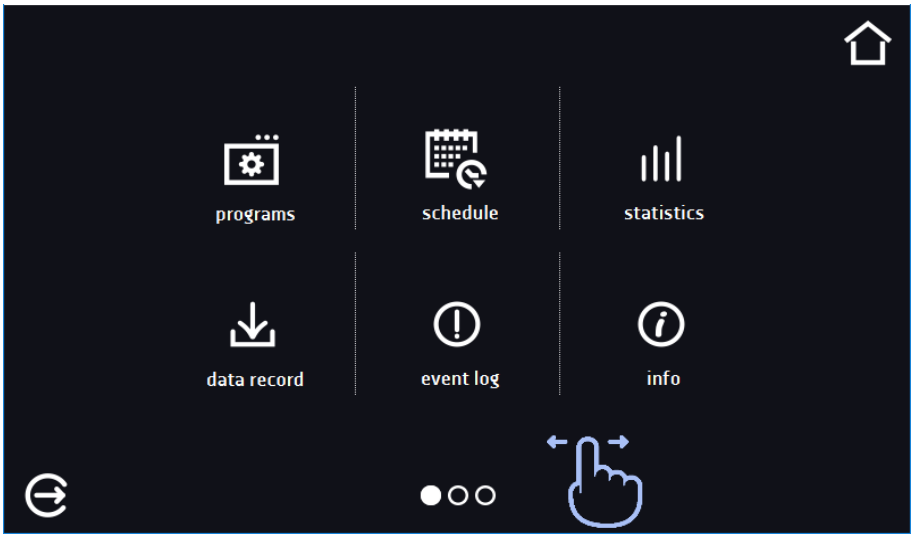
Table 1 Right and limitations of the users

	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 58 Menu available for Super Admin

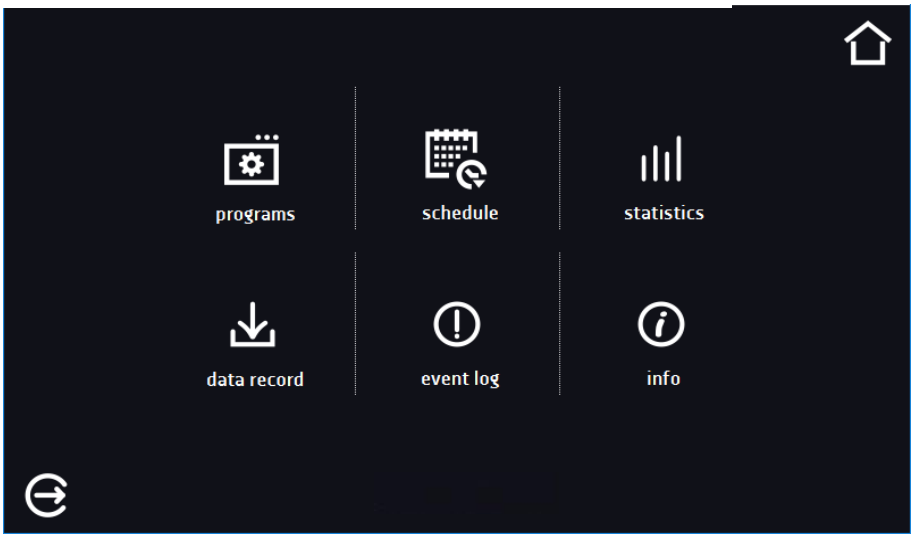


Information about the currently displayed window indicates  .

Admin account

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

Figure 59 Menu available for Admin

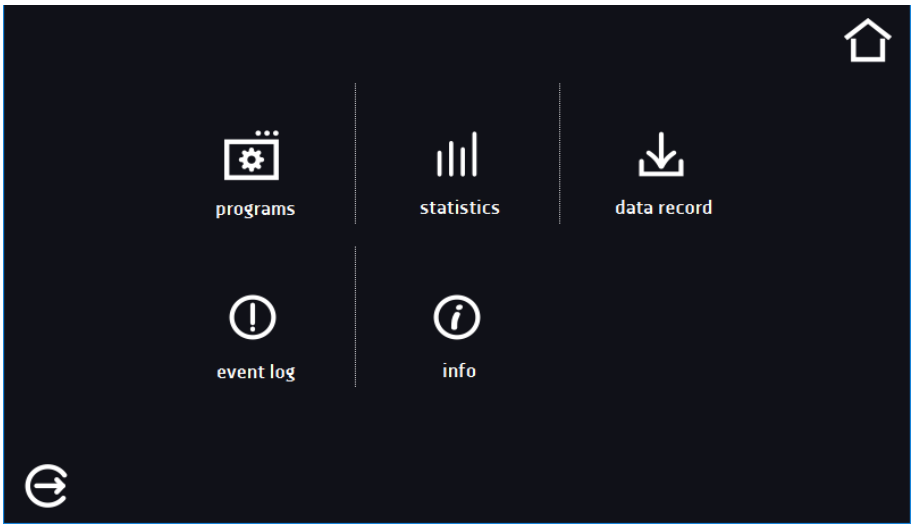


User account:

- 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 (**events 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 60 Menu available for User



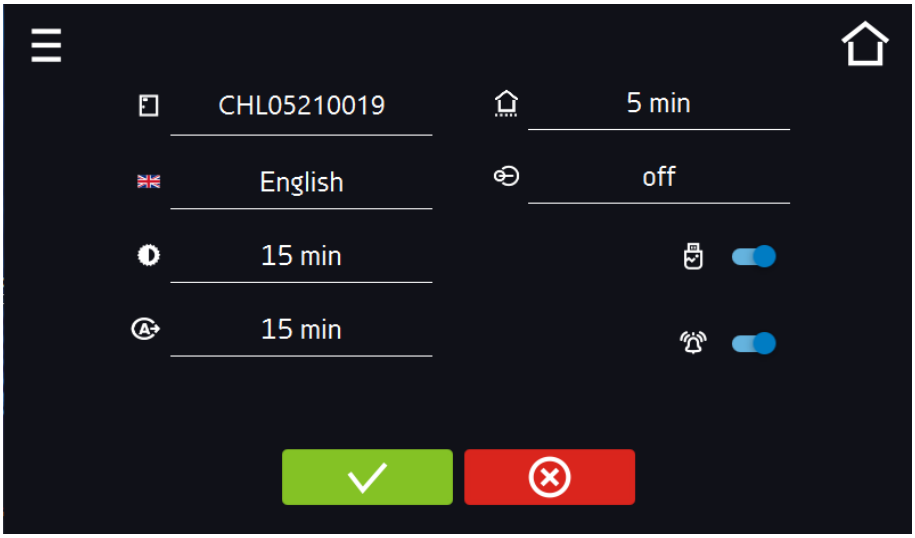
6.16. User settings panel (language, dimmed screen, etc.)

Go to the main menu and press the icon . In this panel *(Figure 61)* 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 61 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 62 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.

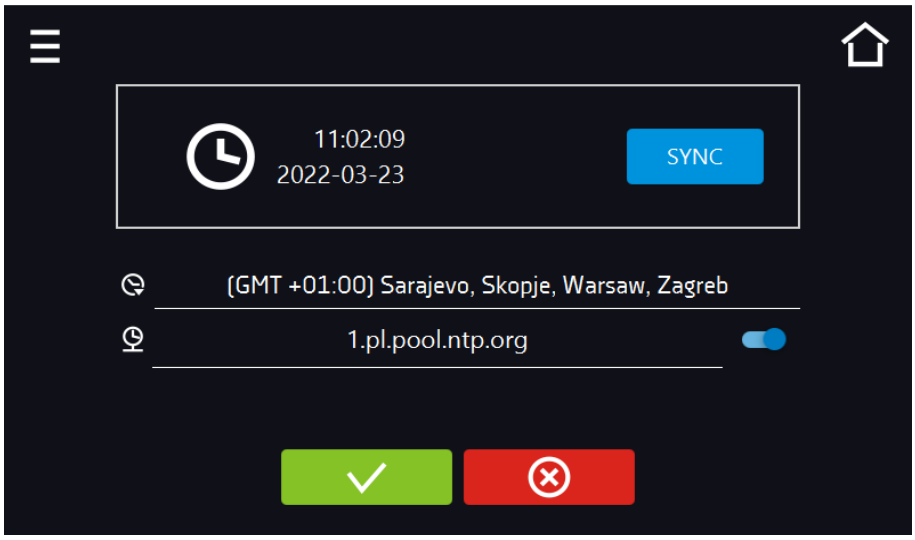
Change of the date / system time

	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 *(Figure 63)*. The window will appear and you will be able to make changes *(Figure 64)*.

Figure 63 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 64 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 *(Figure 63)*. 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.

	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.

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

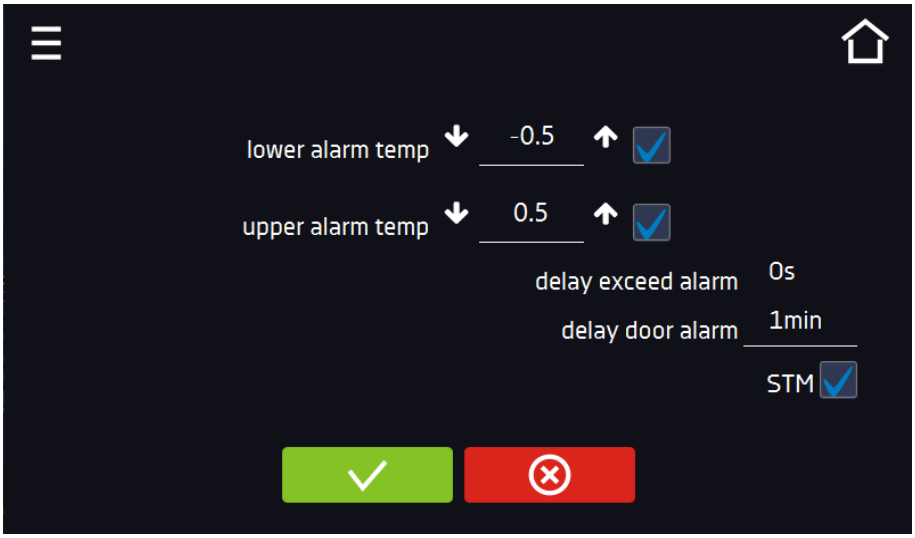
- **delay temp alarm:**

  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 65 Alarms



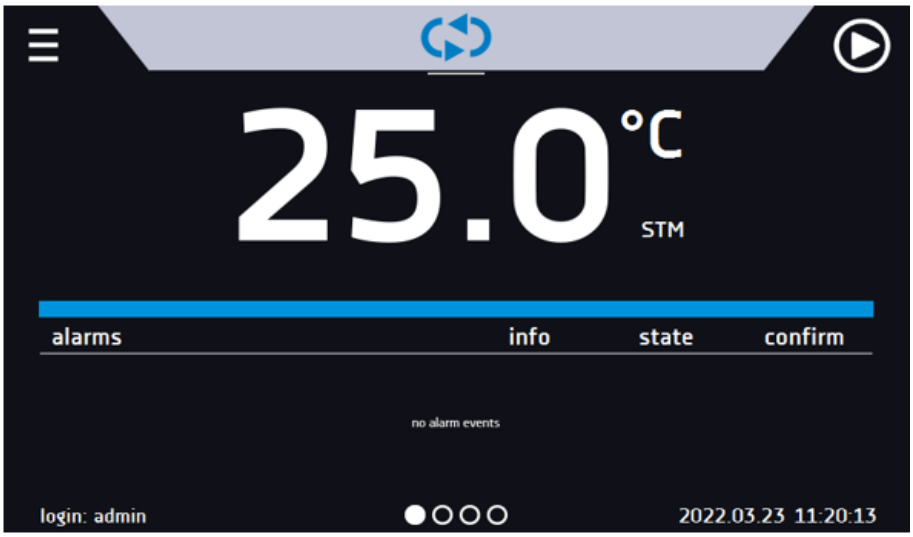
Confirms changes

Cancels the entered changes

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 *(Figure 66)*. If the STM function is on, the STM symbol will appear on the screen next to the temperature of the main sensor.

Figure 66 Option enabled, the program is stopped



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 67 Option enabled (temperature monitoring), the program is running

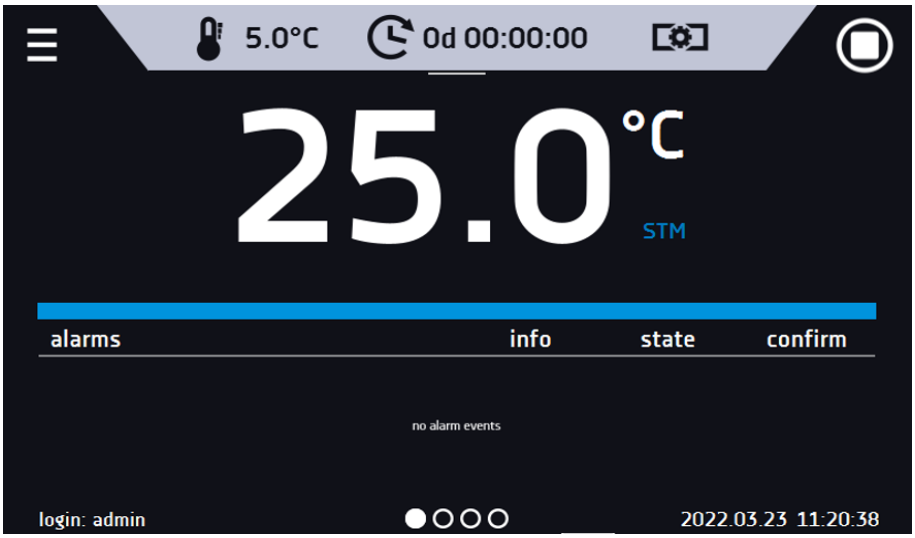
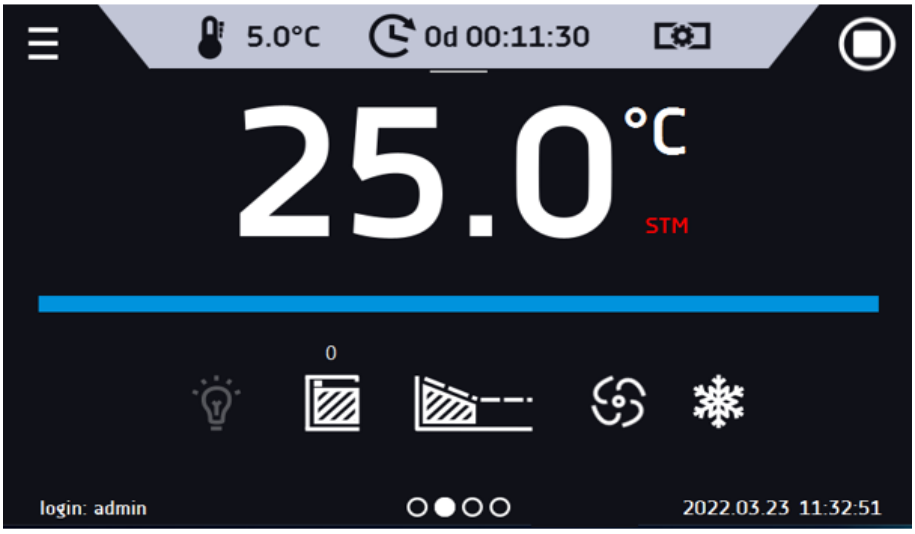


Figure 68 Option enabled, warning about problems with reaching / maintaining the temperature



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.

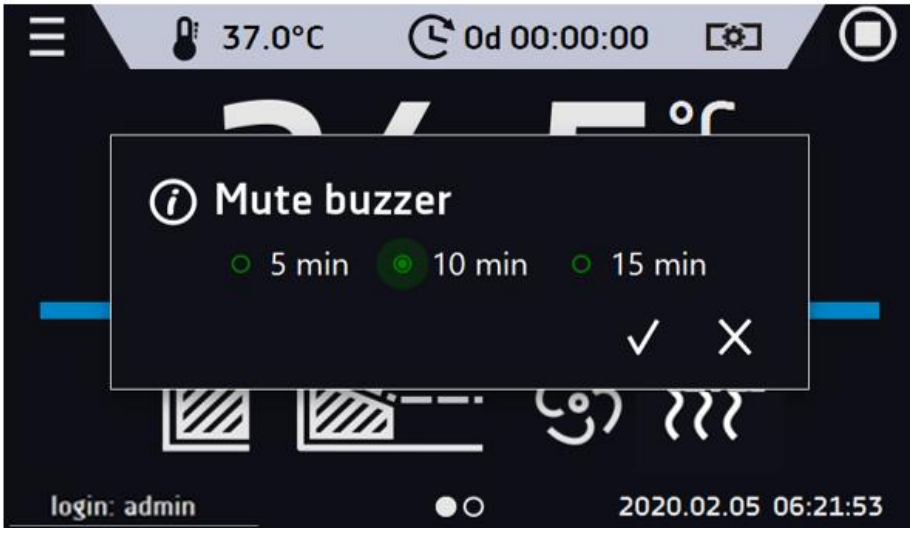
In case of activation of the function (detection of problems with reaching / maintaining the temperature):

- 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  *(Figure 13)* 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. There are options to turn off the sound for 5, 10 and 15 minutes *(Figure 69),* however, the sounds of critical alarms (e.g. damage to the temperature sensor, over- and under-temperature protection) will be still emitted.

Figure 69 Setting the time of 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:

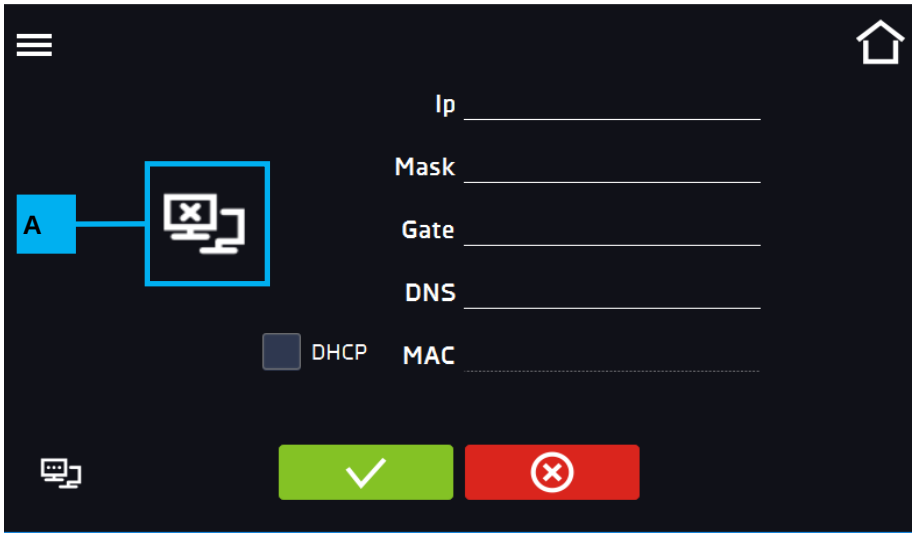
- **IP** – the device's IP address
- **Mask** – an Ethernet network mask to which the device is connected
- **Gate** – Server's IP address or router's that manages the Ethernet network
- **DNS** – IP address of the domain name system
- **MAC** – the address of the network card, read-only
- **DHCP** – 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 70 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,
- **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 71 WiFi settings

Confirms changes

Cancels the entered changes

6.20. E-mail reports

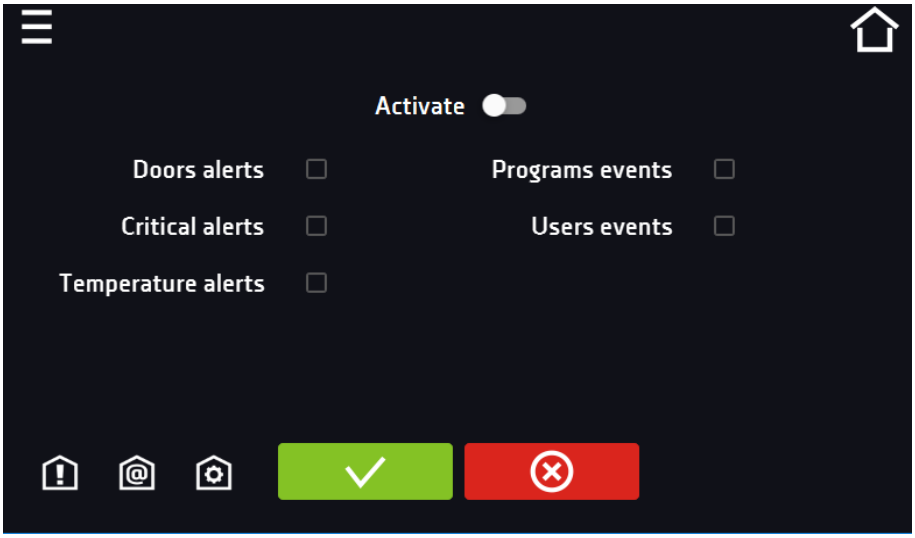
Go to the main menu and press the icon . In this window you can set the parameters needed to activate e-mail notifications.

In the panel there are three windows:

Selection of event types for which notifications should be sent *(Figure 72)*:

- **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 72 E-mail: events



Confirms changes

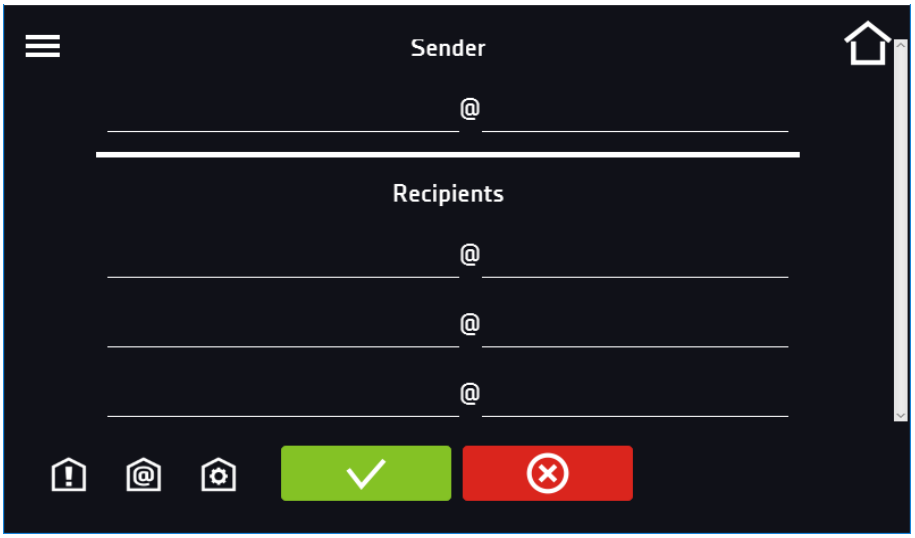
Cancels the entered changes

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

Sender and recipients *(Figure 73)*

- **Sender** – sender's e-mail address
- **Recipients** – recipients e-mail addresses, maximum 3

Figure 73 E-mail: Sender – Recipients



Confirms changes

Cancels the entered changes

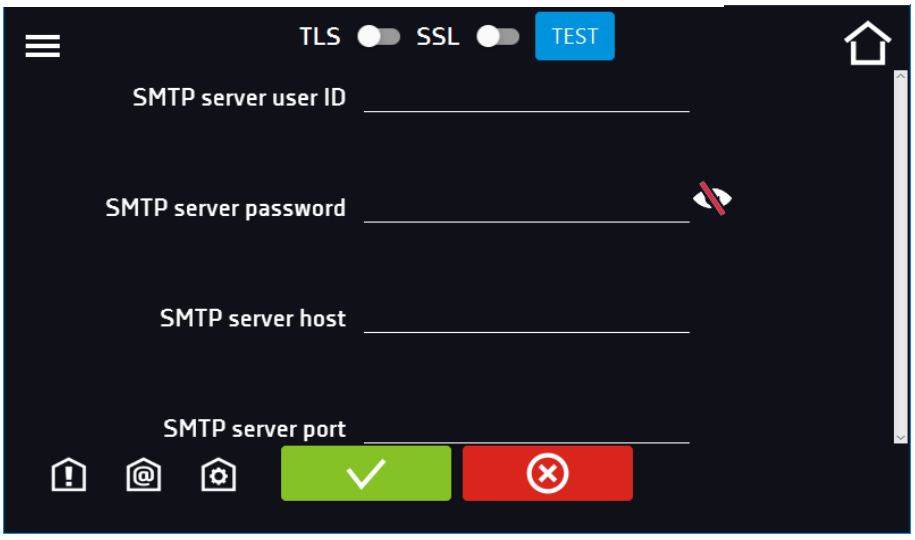
Configuration of the sender's e-mail account *(Figure 74)*

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

Go to the main menu and press the icon . In this panel *(Figure 75)* you can set parameters related to the temperature measurement in the equipment using an additional temperature sensor.

Additional sensor

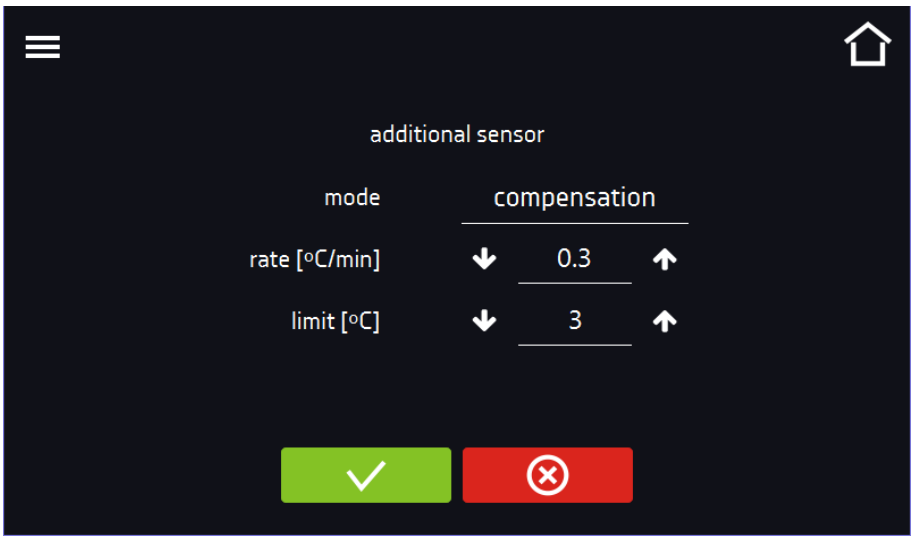
The following parameters can be set relative to the additional temperature sensor:

- **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 75 Temperature measurement settings with an additional sensor



Confirms changes

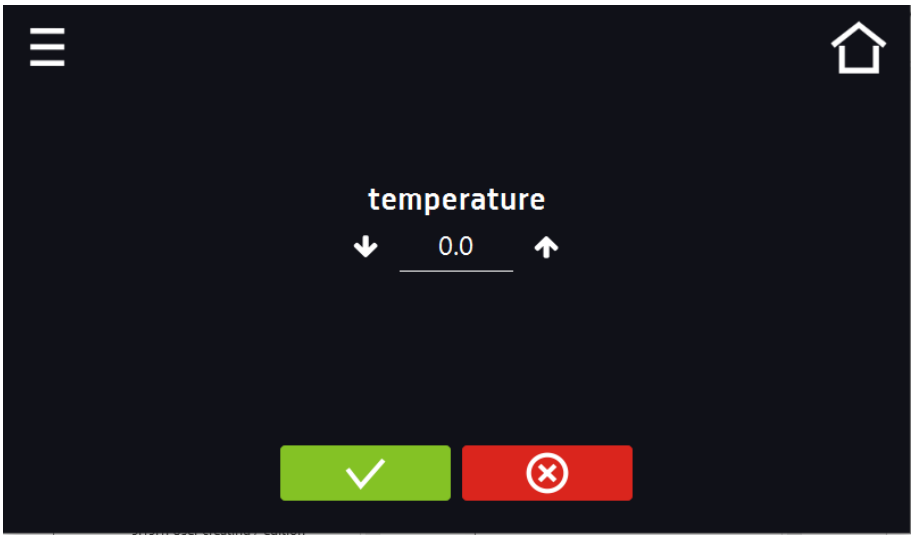
Cancels the entered changes

6.22. Corrections

Go to the main menu and press the icon . In this window *(Figure 76)* 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 40,0°C and the average temperature measured by independent, external sensor indicates 40,5°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.

	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 76 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 6.19*)
- port: 502

register INPUT REGISTERS function READ_INPUT_REGISTERS (0x04)				
Modbus adres	Offset	Type	Multiplier	Description
30000	0	int	10	temperature from the main sensor
30001	1	int	10	temperature from the additional sensor (option)

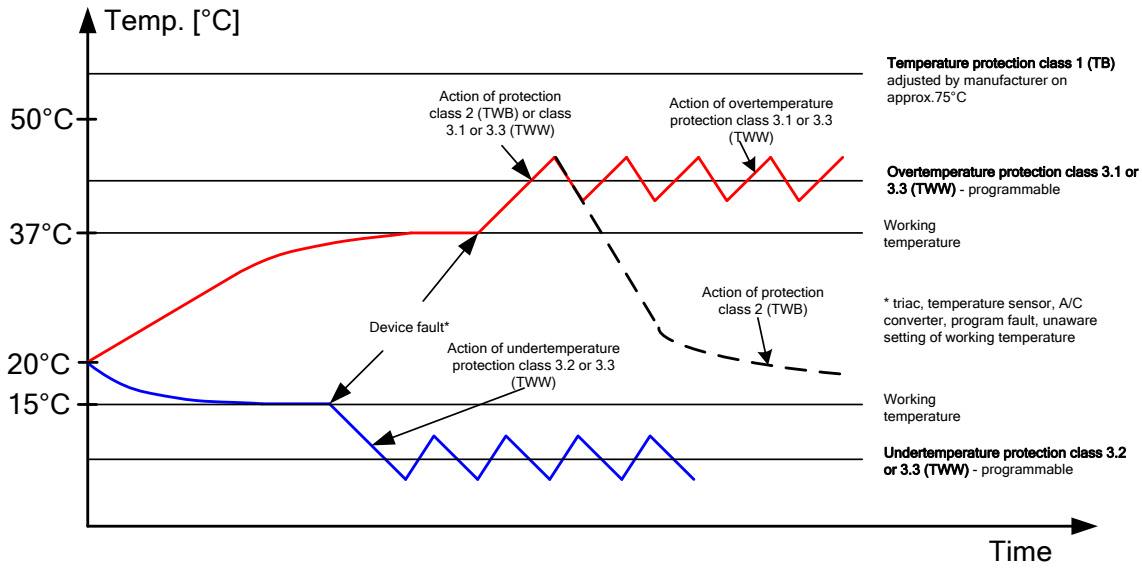
30003	3	bool	-	open door
30004	4	bit	-	b0 – door alarm b1 – upper temperature alarm b2 – lower temperature alarm b3 – over Protection b5 – main sensor error b6 – additional sensor error b7 – protection sensor error b8 – temperature sensors error b10 – hardware error b11 – MRW error

8. TEMPERATURE PROTECTION

The device is factory fitted with sample protection - temperature protection. If any of the elements responsible for maintaining the set temperature is damaged or the user sets the temperature unconsciously, the set protection will work.

8.1. Temperature protection class

Standard equipment in the CL and SL devices is protection class 3.1 according to DIN 12880. The user programs the protection temperature and once it's exceeded (caused by a failure), the heaters are cut off. When the temperature returns to the allowed range, the device resumes operation.



9. SLWN DRYING OVENS WITH NITROGEN BLOW

According to the requirements of the **PN-ISO 589:2006** norm which refers to the determination of total moisture in hard coal requires that coal, the samples susceptible to oxidation should be dried at a temperature of + 105°C in a drying oven with a nitrogen flow. Requirements for the use of the equipment are given in point 6 of the norm. A drying oven with nitrogen flow should be used to control the temperature in the range of + 105°C to + 110°C with the additional possibility of blowing with a stream of dry nitrogen at a flow rate of about 15 volumes of the drying oven per hour.

Drying ovens with nitrogen blow are available in two versions:

1. **SLWN1** – laboratory oven with dry nitrogen blow system of the chamber; the kit includes connections, valves and a laboratory rotameter which can be calibrated

2. **SLWN2** – laboratory oven with dry nitrogen blow system of the chamber; the kit includes connections, valves and a tech rotameter which can't be calibrated

The nitrogen cylinder is not included in the kit.

	**SLWN drying ovens can work only in well ventilated rooms.**

9.1. Description of the kit

Depending on the model, the drying ovrn may be equipped with one of the following nitrogen connection kits:

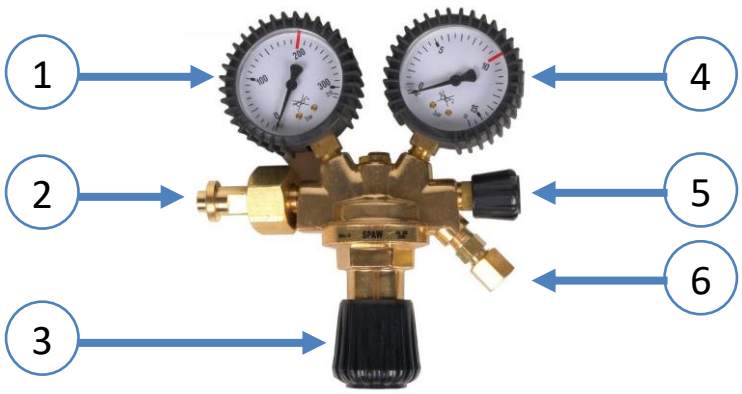
Kit A for SLWN2 (with tech rotameter which can't be calibrated)

The kit includes:
1. two-stage cylinder reducer with a rotameter for technical gases
2. connection hose 2 m long
3. inox hose clamps 2 pcs.

1. inlet pressure gauge (high pressure)
2. connector to connect to the cylinder
3. technical rotameter
4. shut-off valve knob
5. end for the hose connection

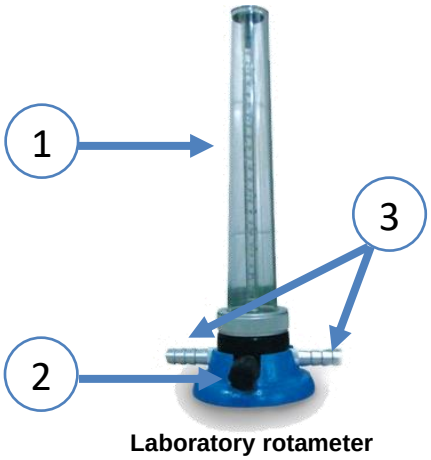
Kit B for SLWN1 (with laboratory rotameter which can be calibrated)

The kit includes:
1. one-stage cylinder reducer
2. laboratory rotameter
3. connection hose 4 m long
4. inox hose clamps 4 pcs.



1. inlet pressure gauge (high pressure)
2. connector to connect to the cylinder
3. pressure adjustment screw
4. outlet pressure gauge (low working pressure)
5. shut-off valve
6. end for the hose connection

Reducer



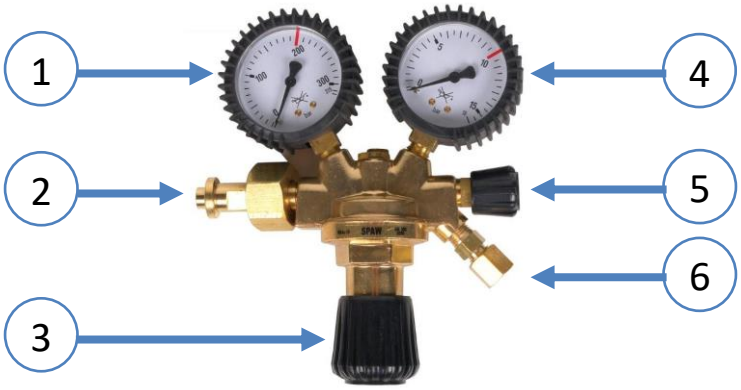
Laboratory rotameter

1. scale of the pressure gauge
2. flow control valve knob
3. end for the hose connecti

Kit C for SLWN2 (with tech rotameter which can't be calibrated)

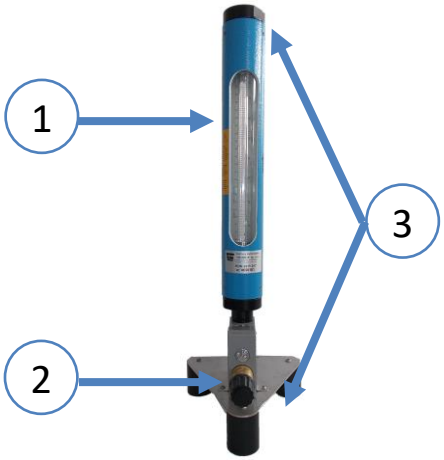
The kit includes:

1. one stage cylinder reducer
2. technical rotameter
3. connection hose 4 m long
4. inox hose clamps 4 pcs.



Reducer

1. inlet pressure gauge (high pressure)
2. connector to connect to the cylinder
3. pressure adjustment screw
4. outlet pressure gauge (low working pressure)
5. shut-off valve
6. end for the hose connection



Technical rotameter

1. scale of the pressure gauge
2. flow control valve knob
3. end for the hose connection

9.2. Connection

Before using:

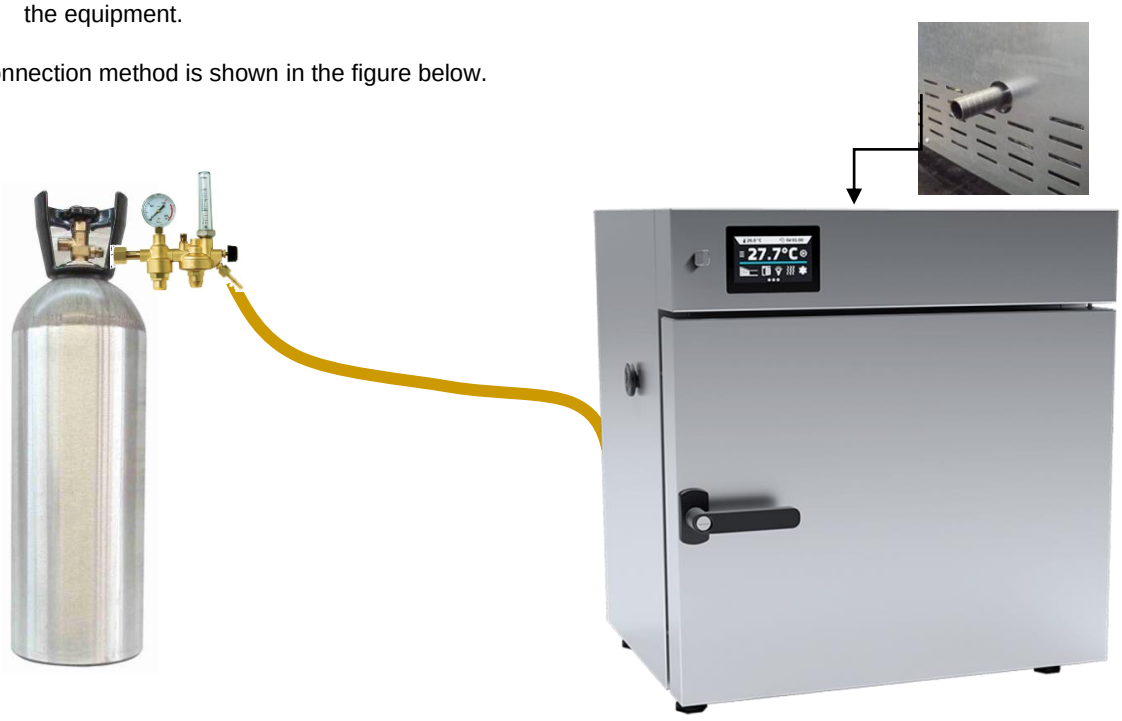
- check carefully the condition of the reducer, especially the inlet fitting, connecting nut, pressure gauge, rotameter and safety valves,
- check the condition of the valve on the cylinder and then, standing on the side of the outlet nozzle, blow the valve by opening it temporarily,
- in the event of impurities of the valve, reducer or connector in the equipment, clean and degrease these places, and replace damaged gaskets with a new ones.

9.2.1. Connection of the Kit A

In order to connect the Kit A you have to:

1. Connect the reducer with the rotameter to the cylinder valve.
2. After connecting the reducer to the cylinder valve, slowly open the valve and with the closed shut-off valve at the reducer outlet, check the tightness of the cylinder valve, its connection with the reducer, sealing of the 1st and 2nd stage reduction systems, safety valves and shut-off valve by lubricating with soapy water. A sign of leakage of the 1st stage reduction system may be an increase in the intermediate pressure above the allowable pressure, causing the opening of the safety valve for this pressure. Similarly: a symptom of leakage of the 2nd stage reduction system may be a pressure increase causing the opening of the pressure safety valve at the outlet.
3. Attach a rubber hose to the end and put the hose clamp on and tighten it. To facilitate insertion, you can temporarily put the hose in hot water or lubricate the end with soapy water. The rubber hose should have an internal diameter in accordance with the technical data of the reducer and should be able to withstand the maximum outlet pressure. Hoses should be in good condition and can't be contaminated. New hoses should be blown out.
4. Put the other end of the hose onto the connector of the equipment (located at the bottom back of the drying oven). Put the hose clamp on and tighten it.
5. After connecting the hose to the ends of the reducer and the equipment, open the shut-off valve on the reducer and check by lubricating with soapy water the tightness of the hose, its connections to the reducer and to the equipment.

The connection method is shown in the figure below.

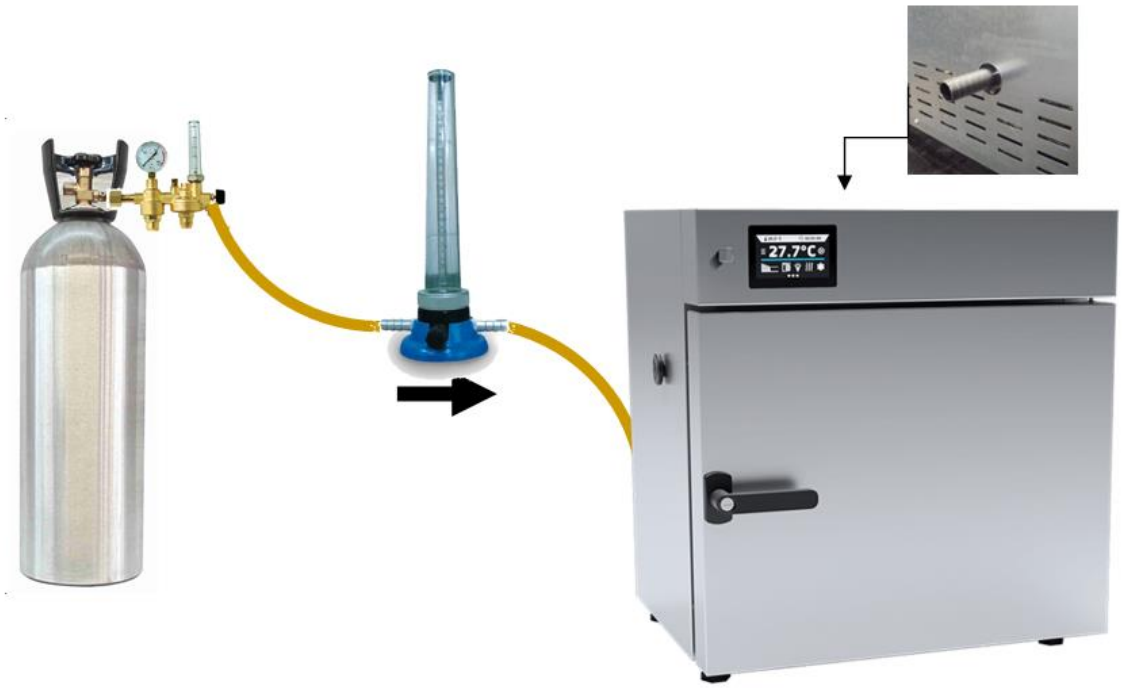


9.2.2. Connection of the Kit B

In order to connect the Kit B you have to:

1. The supplied hose cut into two parts, the length should be chosen so it will be possible to connect the cylinder with the rotameter and the rotameter with the equipment.
2. Connect the reducer to the cylinder valve. Attach a rubber hose to the end and put the hose clamp on and tighten it. To facilitate insertion, you can temporarily put the hose in hot water or lubricate the end with soapy water. The rubber hose should have an internal diameter in accordance with the technical data of the reducer and should be able to withstand the maximum outlet pressure. Hoses should be in good condition and can't be contaminated. New hoses should be blown out.
3. Put the other end of the hose onto the connector of the rotameter (pay the attention to the flow direction marked on the basis of a rotameter). Put the hose clamp on and tighten it.
4. Place the end of the second part of the hose on the connector in the rotameter. Put the hose clamp on and tighten it.
5. Insert the other end of the second part of the hose onto the connector of the equipment (located at the bottom back of the drying oven). Put the hose clamp on and tighten it.
6. After connecting the hose to the ends of the reducer and the equipment, open the shut-off valve on the reducer and check by lubricating with soapy water the tightness of the hose, its connections to the reducer and to the equipment.

The connection method is shown in the figure below.



9.2.3. Connection of the Kit C

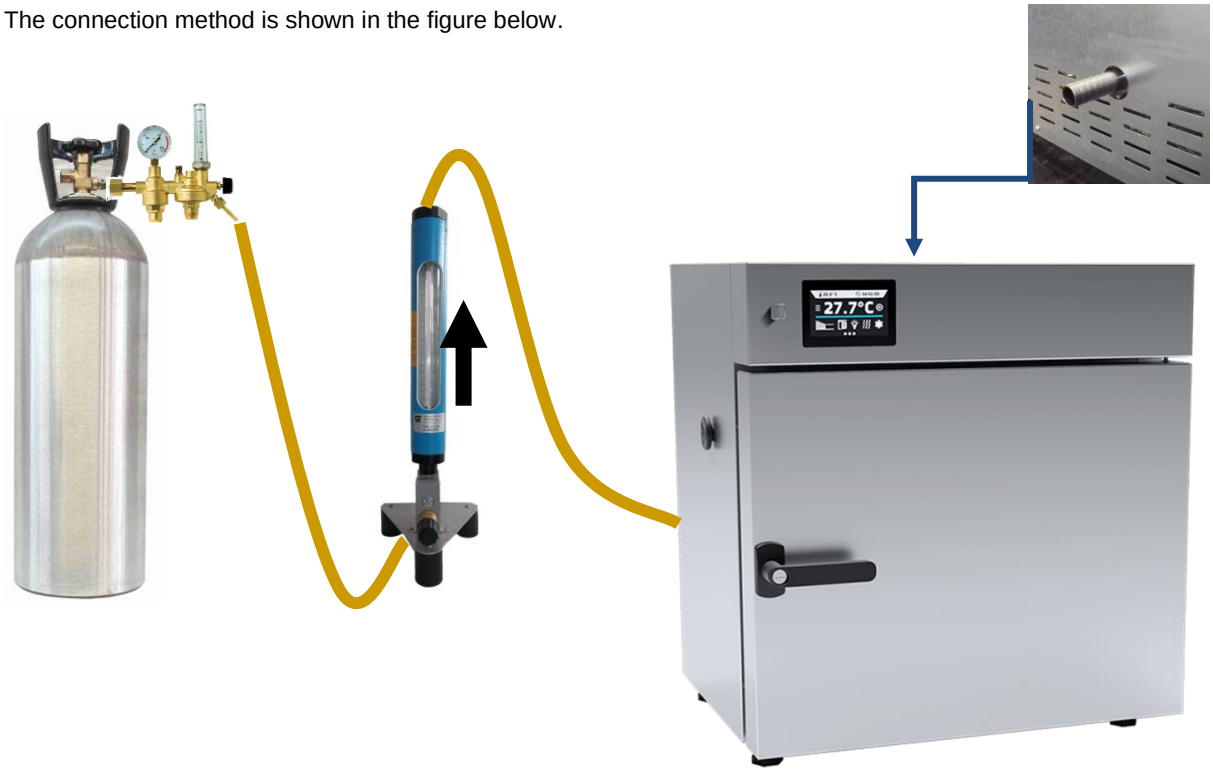
In order to connect the Kit C you have to:

1. The supplied hose cut into two parts, the length should be chosen so it will be possible to connect the cylinder with the rotameter and the rotameter with the equipment.
2. Connect the reducer to the cylinder valve. Attach a rubber hose to the end and put the hose clamp on and tighten it. To facilitate insertion, you can temporarily put the hose in hot water or lubricate the end with soapy water. The rubber hose should have an internal diameter in accordance with the technical data of the reducer

and should be able to withstand the maximum outlet pressure. Hoses should be in good condition and can't be contaminated. New hoses should be blown out.

3. Put the other end of the hose onto the connector of the rotameter (pay the attention to the flow direction marked on the basis of a rotameter). Put the hose clamp on and tighten it.
4. Place the end of the second part of the hose on the connector in the rotameter. Put the hose clamp on and tighten it.
5. Insert the other end of the second part of the hose onto the connector of the equipment (located at the bottom back of the drying oven). Put the hose clamp on and tighten it.
6. After connecting the hose to the ends of the reducer and the equipment, open the shut-off valve on the reducer and check by lubricating with soapy water the tightness of the hose, its connections to the reducer and to the equipment.

The connection method is shown in the figure below.



9.3. Shut-off solenoid valve for gas supply (optionally)

The solenoid valve opens the gas supply to the equipment at the beginning of the program and closes it when the program is finished. If the program has been started with a delay, while waiting for the start of the first segment of the program, the gas supply is closed.

The connection is made through rubber hose connector with an external thread 1/4 (or 1/8 depending on the solenoid valve). The flow direction is indicated by an arrow symbol. To the output of the solenoid valve we connect the input to the equipment, and to the input-output of the rotameter.

9.4. Operation and maintenance of the dry nitrogen blow system

The nitrogen flow rate should be calculated according to the methodology given in *Section 9.5.*

Before starting to work with the drying oven with dry nitrogen blow, set the correct pressure and flow as described below.

Kit A
Open the cylinder valve slowly and constantly observing the indications on the rotameter, adjust the valve knob on the reducer until the required flow rate is achieved.
Kit B and C

	**Do not set a pressure higher than 4 bar on the low-pressure working gauge with the adjustment screw. It can damage the rotameter.**

1. Close the control valve on the rotameter (turning clockwise).
2. Set the minimum pressure on the reducer with the adjustment screw (turning left).
3. Close the shut-off valve (if applicable) on the reducer.
4. Slowly open the cylinder valve.
5. Using the adjustment screw on the reducer, set the pressure of 3 bar on the low-pressure working gauge.
6. After correctly set pressure on the reducer, unscrew the shut-off valve (if applicable).
7. Adjust the valve on the rotameter until the required flow is achieved.

During long-term breaks in use, close the cylinder valve.

During operation, check the tightness of the reducer and its connections once at month, using soapy water.

If the reducers operate at low temperatures, they can freeze from the inside. Frozen reducers should be thawed with hot water or steam. You can also use electric or water heaters on permanent basis.

9.5. Methodology for calculating the nitrogen flow rate in the drying oven

Calculation of nitrogen flow rate in drying ovens intended for drying oxidizing coals.

Depending on the capacity of the drying oven, calculate the flow rate (set on the rotameter). An example of how to calculate the flow rate for the SLWN 115 at the temperature of 105ºC is given below.

Description of variables:

V_k - **total** capacity of the chamber
- SLWN 15: V_k = 28,6 l = 0.0286 [m^3]
- SLWN 32: V_k = 50 l = 0.0500 [m^3]
- SLWN 53: V_k = 83 l = 0.0830 [m^3]
- SLWN 115: V_k = 152 l = 0.1520 [m^3]
- SLWN 180: V_k = 180 l = 0.180 [m^3]
- SLWN 240: V_k = 314 l = 0.3140 [m^3]
- SLWN 400: V_k = 543 l = 0.5430 [m^3]
- SLWN 750: V_k = 935l = 0.9350 [m^3]
- SLWN 1000: V_k = 1200 l = 1.200 [m^3]

Q_h - required flow per hour [l/h]
Q_{ma} - required flow per minute for atmospheric pressure [l/min]
Q_{mr} - required flow per minute for reduced pressure [l/min]
V_r - gas volume on the rotameter [m^3]
p_r - gas pressure on the rotameter [bar]
p_k - pressure in the chamber (atmospheric) [bar]

Calculations:

required gas flow per hour:

$$Q_h = V_k * 15\ [1/h]$$

required gas flow per minute for atmospheric pressure:

$$Q_{ma} = \frac{Q_h}{60} = \frac{V_k * 15}{60}$$

For e.g. SLWN 115 V_k = 152 [l]

$$Q_{ma} = \frac{152 * 15}{60} = 38\ [l/min]$$

NOTE: (applies to RUG rotameters, which are accessories of a two-stage cylinder reducer with a rotameter type 2RBAz-0,3R):

If there are „**dm³/min N_2 / T = 293 K / P = 392,3 kPa / T_0 = 273 K / P_0 = 101,3 kPa**" markings next to the scale on the rotameter, the result obtained in the calculations should be divided by the correction factor kv = 1.14.
The correction factor should be taken into account because the rotameter is scaled in normal liters for 3.923 [bar] working pressure, and the reducer works at a pressure of 3 [bar].

$$Q_{mr} = \frac{Q_{ma}}{1{,}14} = \frac{38}{1{,}14} = 33{,}33\ [l/min]$$

If the change in gas volume is taken into account with the increase of its temperature in the chamber, then the ideal gas equation should be used (assuming constant pressure during heating):

$$\frac{p_k * V_k}{T_k} = \frac{p_r * V_r}{T_r}$$

where:

T_r - gas temperature on the rotameter: T_r = 273,15 + t_r = 273,15 + 25 = 298,15 [K]
T_k - gas temperature in the chamber, in this case t_k =105ºC: T_k = 273,15 + t_k = 273,15 + 105 = 378,15 [K]

Calculation for the temperature in the chamber t_k = 105 [ºC] :

$$\frac{1 * V_k}{378{,}15} = \frac{1 * V_r}{298{,}15}$$
$$V_r = 0{,}79 * V_k$$

analogously:

$$Q_{mr} = 0{,}79 * Q_{ma}\ [l/min]$$

For e.g. SLW 115 the result was:

$$Q_{mr} = 0{,}79 * 38 = 30{,}02\ [l/min]$$

For reducers with inbuilt RUG rotameters taking into account correction factor:

$$Q_{mr} = 0{,}79 * 33{,}33 = 26{,}33\ [l/min]$$

Data for each equipment.

Required flows for the temperature in the chamber t_k = 105 [ºC]:

Equipment	Q_h [l/h]	Q_{mr} [l/min]
SLWN 15	338,91	5,65
SLWN 32	592,50	9,88
SLWN 53	983,55	16,39
SLWN 115	1801,20	30,02

SLWN 180	2891,40	48,19
SLWN 240	3720,90	62,02
SLWN 400	6434,55	107,24
SLWN 750	11079,75	184,66
SLWN 1000	14220,00	237,00

Required flows for the temperature in the chamber t_k = 105 [ºC] and for reducers with inbuilt RUG rotameters taking into account correction factor k_v = 1,14:

Equipment	Q_{mr} [l/min]
SLWN 15	4,95
SLWN 32	8,66
SLWN 53	14,38
SLWN 115	26,33
SLWN 180	42,27
SLWN 240	54,40
SLWN 400	94,07
SLWN 750	161,98
SLWN 1000	207,89

NOTE: the above calculations refer to the empty chamber of the drying oven. In laboratory conditions, the total volume of the chamber Vk should be corrected by the volume of dried material. Depending on the capacity of a drying oven, the calculations should be modified accordingly.

10. 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.

11. 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.**

11.1. 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.

11.2. Interior cleaning

1.	Before cleaning the interior of the device, empty the chamber.
2.	Open the door of the device, if necessary wait till the chamber has cooled down, take out the shelves and start cleaning of the device
3.	Only water or water with mild detergent should be used.
4.	Having finished cleaning, you should allow the device to dry fully and instal all parts removed before cleaning.
5.	During cleaning you should make sure not to damage the temperature sensors which are located inside the chamber.

11.3. 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.

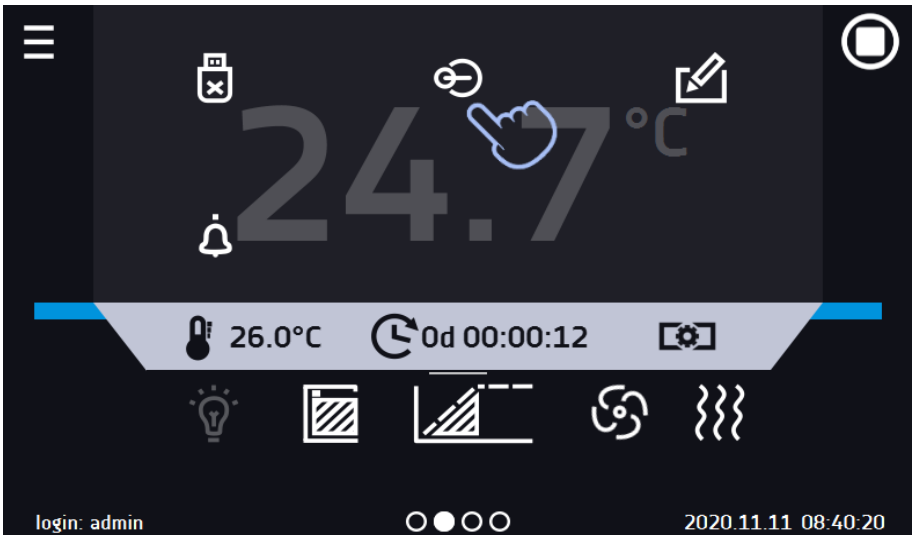
	Before using the cloth, make sure that on the surface there are no crumbs or particles. During cleaning, they can act like sandpaper and scratch the surface of the screen.

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 77)*.

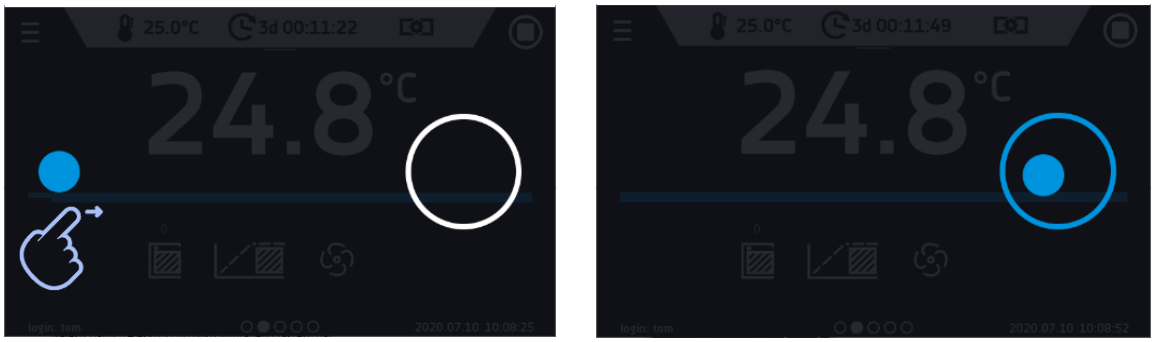
Figure 77 Locking the screen



The screen is ready to be cleaned.

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

Figure 78 Unlocking the screen



11.4. 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.

12. 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%.

13. 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

13.1. 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 heating up	Check if the door of the unit is closed properly	Clean the gasket
	Check if the fan is turned on	Set the fan operation in the program
	Check if the ambient temperature is within the permissible values given in the technical data table?	Adjust the ambient temperature to the value given in this manual
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.

14. 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 date of the invoice. If a defect is present, POL-EKO will, at its option and cost, repair, replace, or refund the purchase price of this product to the customer, provided it is returned during the warranty period. 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.

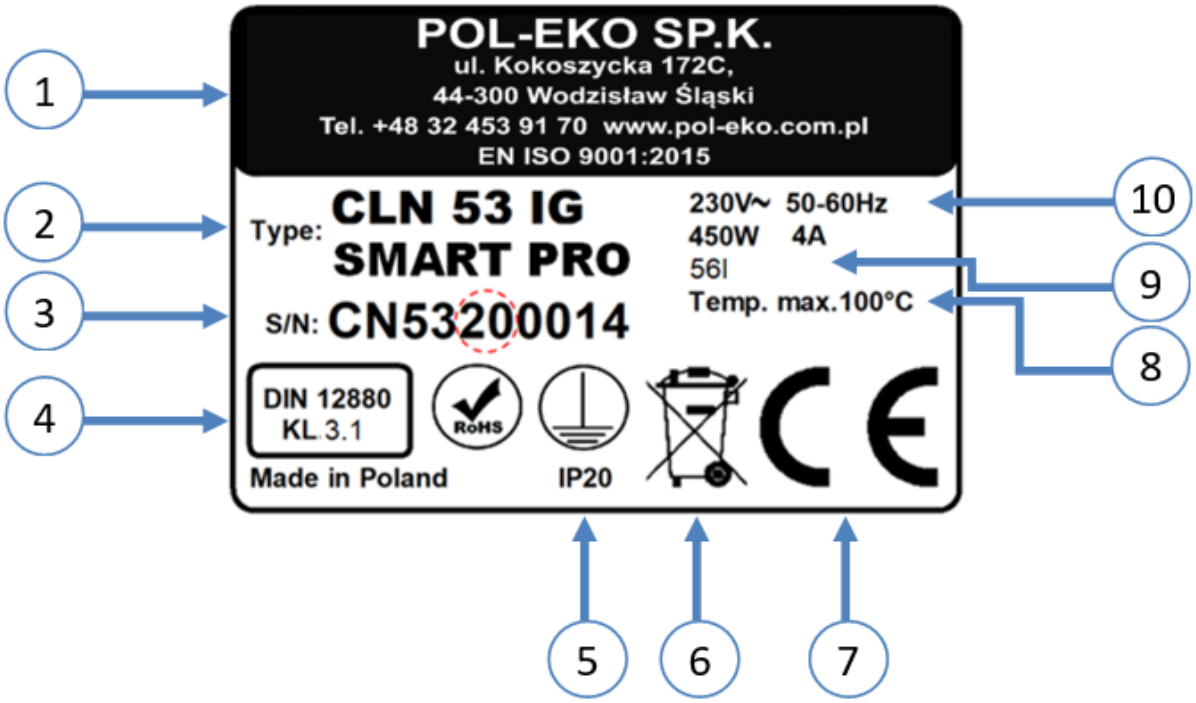
The device that is being returned must be secured by the customer in the event of any damage or loss. The warranty will be only limited to the situations listed above. IT IS EXPRESSLY AGREED THAT THIS WARRANTY WILL BE IN LIEU OF ALL WARRANTIES OF FITNESS AND IN LIEU OF THE WARRANTY OF MERCHANTABILITY.

All complaints should be reported using the form available on the website **http://www.pol-eko.com.pl/en/service**

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.

15. RATING PLATE

The rating plate is located on the left side wall in the upper left corner. Below there is an example of a rating plate:



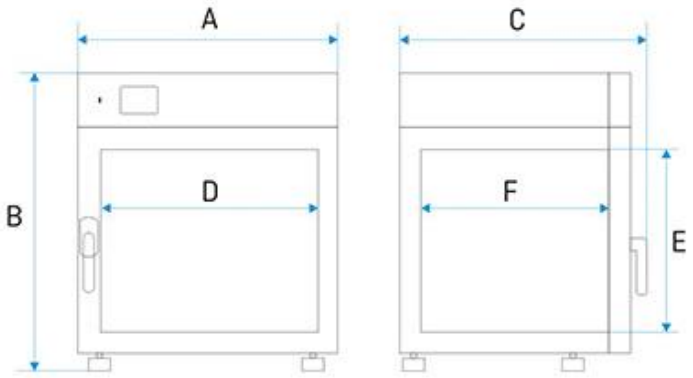
1. Manufacturer's data
2. Type of device
3. Serial number (the two marked digits indicate the year of manufacture of the device)
4. Temperature protection class according to DIN 12880
5. Degree of protection against electric shock (class I: protection against indirect contact) and IP enclosure protection rating
6. Disposal of used device according to WEEE2
7. CE marking as confirmation of compliance with the directives
8. Temperature range of the device
9. Information about cooling system (gas type and quantity)
10. Capacity of device
11. Acceptable range of voltage and frequency of mains supply

16. 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).

Parameter		CL/SL 53	SL 75	CL/SL 115	CL/SL180	CL/SL 240	CL/SL 400	CL/SL 750	CL/SL 1000
Air convection		natural (N) / forced (W)					forced (W)		
Chamber capacity[1] [l]		56	74	112	180	245	424	749	1005
Door		solid				solid/with viewing window (option)			
Temperature range	CL	+5°C above ambient temperature…+100°C							
		+41°F above ambient temperature … 212°F							
Temperature range	SL	+5°C above ambient temperature …+300°C							
		+41°F above ambient temperature …572°F							
Temperature resolution [°C]		every 0,1							
Controller		microprocessor with external touch screen							
Interior		acid-proof stainless steel according to DIN 1.4301							
Housing	-	powder coated sheet							
	INOX/G	stainless steel linen finish							
Overall dims[2] [mm]	A width	590	590	650	650	810	1010	1260	1260
	B height	700	850	850	1030	1200	1430	1600	2000
	C depth	620	570	710	820	770	780	870	880
Internal dims [mm]	D widith	400	400	460	470	600	800	1040	1040
	E height	390	530	540	720	800	1040	1200	1610
	F depth	360	350	450	560	510	510	600	600
Max shelf workload[5] [kg]	-	25	25	25	25	25	25	-	-
	version PW[3]	50	50	50	50	100	100	100	100
Max unit wor-kload [kg]	-	40	40	60	75	90	120	140	-
	version W[4]	80	80	120	120	300	300	300	300
Nominal power [W]		consult rating plate of the device							
Weight [kg]		50	56	65	94	126	174	260	330
Temp. protection		class 3.1 according to DIN 12880							
Power supply	SL	230 [V] ±10% / 50 [Hz]					400 [V] ±10% / 50 [Hz] 3P+N+PE		
	CL	230 [V] ±10% / 50 [Hz]							
Shelves fitted/max		2/5	2/5	2/7	3/9	3/10	3/14	5/16	6/22
Warranty		24 months							
Manufacturer		POL-EKO							

1. working chamber is always smaller
2. depth does not include 50mm of power cable
3. reinforced shelf
4. reinforced version
5. on uniformly loaded surface



CL, SL

17. DECLARATIONS OF CONFORMITY

CE

DEKLARACJA ZGODNOŚCI UE

EU DECLARATION OF CONFORMITY

POL-EKO

Produkt:	***Product:***
Cieplarka laboratoryjna	*Laboratory incubator*
Model:	***Model:***
CLW 15; CLW 32; CLW 53; CLW 115; CLW 180; CLW 240; CLW 400; CLW 750; CLW 1000 CLN 15; CLN 32; CLN 53; CLN 115; CLN 180; CLN 240	
w wersjach:	***in version:***
SMART; IG SMART; SMART PRO; IG 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:***
LVD 2014/35/UE EMC 2014/30/UE RoHS 2015/863 WEEE 2012/19/UE	LVD 2014/35/EU EMC 2014/30/EU RoHS 2015/863 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:***
LVD	PN-EN 61010-1:2011 PN-EN 61010-2-010:2015-01 PN-EN 60529:2003/A2:2014-07
EMC	PN-EN IEC 61326-1:2021-10
RoHS	PN-EN IEC 63000:2019-01

Wodzisław Śl. 02.01.2023

CE

DEKLARACJA ZGODNOŚCI UE

EU DECLARATION OF CONFORMITY

POL-EKO

Produkt:	***Product:***
Suszarka laboratoryjna	*Drying oven*
Model:	***Model:***
SLW 15; SLW 32, SLW 53; SLW 75; SLW 115; SLW 180; SLW 240; SLW 400; SLW 750; SLW 1000 SLN 15; SLN 32; SLN 53; SLN 75; SLN 115; SLN 180; SLN 240	
w wersjach:	***in version:***
SMART; IG SMART; SMART PRO; IG 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:***
LVD 2014/35/UE EMC 2014/30/UE RoHS 2015/863 WEEE 2012/19/UE	LVD 2014/35/EU EMC 2014/30/EU RoHS 2015/863 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:***
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EMC	PN-EN IEC 61326-1:2021-10
RoHS	PN-EN IEC 63000:2019-01

Wodzisław Śl. 02.01.2023

CE

DEKLARACJA ZGODNOŚCI UE

EU DECLARATION OF CONFORMITY

POL-EKO

Produkt:	***Product:***
Suszarka laboratoryjna z możliwością przedmuchiwania azotem	*Drying oven with nitrogen blow*
Model:	***Model:***
SLWN1 15; SLWN1 32; SLWN1 53; SLWN1 115; SLWN1 240; SLWN2 15; SLWN2 32; SLWN2 53; SLWN2 115; SLWN2 240.	
w wersjach:	***in version:***
SMART; IG SMART; SMART PRO; IG 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:***
LVD 2014/35/UE EMC 2014/30/UE RoHS 2015/863 WEEE 2012/19/UE	LVD 2014/35/EU EMC 2014/30/EU RoHS 2015/863 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:***
LVD	PN-EN 61010-1:2011 PN-EN 61010-2-010:2015-01 PN-EN 60529:2003/A2:2014-07
EMC	PN-EN IEC 61326-1:2021-10
RoHS	PN-EN IEC 63000:2019-01

W imieniu producenta podpisał:

Małgorzata Szafarczyk
Dyrektor Generalny (CEO)

Wodzisław Śl. 02.01.2023

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

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

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

AP 115

POL-EKO
Perfect Environment

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