

# Instruction manual SMART PRO

## CO<sub>2</sub> incubators

model: ILC 180

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

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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/](http://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!

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## 1. SAFETY INFORMATION

ILC SMART PRO CO<sub>2</sub> incubators offer optimal growth conditions for cell cultures, at approx. 37°C. The unit enables a CO<sub>2</sub> control and high humidity inside the chamber which prevent osmolarity increase.

The incubator can be loaded only with materials and substances which cannot explode, burst or ignite (which do not form any toxic or explosive vapours at set temperature). Potentially explosive gas-air mixtures can't be formed, neither in the working chamber nor in the direct vicinity of the incubator. The unit should not be used to sterilize samples. The sterilisation program in the menu only sterilizes the inner chamber.

CO<sub>2</sub> incubator is not classified as a medical device according to Medical Device Directive 93/42/EEC. Do not use it to sterilise medical devices.

### The meaning of information symbols

	<b>CAUTION</b> This symbol indicates a potential risk and alerts you to proceed with caution.
	<b>CAUTION</b> This symbol indicates important information and the recommendations to follow.
	<b>CAUTION</b> This symbol indicates risks associated with hot surfaces.
	This symbol means that a given field / window can be moved in the direction shown in the picture.

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

<b>1.</b>	<p><b><u>The unit cannot be installed:</u></b></p> <ul style="list-style-type: none"> <li>• outside,</li> <li>• in unventilated recesses,</li> <li>• in damp places or places which can be easily flooded,</li> <li>• near flammable or volatile substances (any potentially explosive areas),</li> <li>• near acids or in corrosive environments.</li> </ul>
<b>2.</b>	<p><b><u>It is forbidden to:</u></b></p> <ul style="list-style-type: none"> <li>• store inflammable or explosive substances inside the unit,</li> <li>• touch the inner door and glass door handles, and the inner surfaces after a sterilization process,</li> <li>• touch live parts of the unit,</li> <li>• operate the unit with wet hands,</li> <li>• put water vessels on the unit,</li> <li>• climb or put any objects on the unit,</li> <li>• overload the shelves (the maximum load is described in technical data).</li> </ul>
<b>3.</b>	<p><b><u>You should:</u></b></p> <ul style="list-style-type: none"> <li>• ensure sufficient ventilation,</li> <li>• place samples in such a way to provide proper air circulation in the chamber,</li> <li>• open the door for the shortest period of time to reduce temperature fluctuations,</li> <li>• always check that the doors are closed,</li> <li>• use only earthed mains to avoid electric shocks,</li> <li>• unplug the power cable holding the protective cover and not the cable itself,</li> <li>• disconnect the unit from the mains before undertaking any repairs or maintenance works,</li> <li>• protect the power cable and the plug from any damage,</li> <li>• disconnect the power plug before moving the unit,</li> </ul>

- disconnect the power plug if the unit will not be used for a long period of time,
- disconnect the unit if it has any visual faults.

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.

## **1.1. Avoiding electrical shock**

The electric installation should meet the following conditions:



The unit is powered by AC 220-240V/ 50-60Hz. It must be connected to an earthed mains socket.

The electric installation should be secured by a circuit breaker 16 A characteristics B.

## **1.2. General safety instructions on installing and operating the CO<sub>2</sub> incubator**

### **1.2.1. Indications for using pressure cylinders**



- During the operation of the CO<sub>2</sub> incubator, small amounts of CO<sub>2</sub> enter the room which in high concentration can be life-threatening. The unit does not emit CO<sub>2</sub> when the power supply is switched off and the gas cylinder valves are closed.
- The CO<sub>2</sub> incubator can't be operated near concentrated acids or corrosive vapours.
- The workplace must be properly ventilated.



- **Emergency shutdown of the CO<sub>2</sub> dosing:** close the gas cylinder valve.

The amount of dispensed CO<sub>2</sub> is regulated by a microprocessor controller. If the chamber door is open during CO<sub>2</sub> dosing, the gas will be automatically cut off.

- Together with a pressure cylinder with compressed gas, the user should be given a safety data sheet for the gas and instructions for its use.
- The ventilation performance in the room must ensure level of gas concentrations in the room below the limit values. High concentration of CO<sub>2</sub> (>4 Vol.-%) - risk of death by suffocation.
- During gas intake from the gas cylinder, check the pressure level regularly.

### 1.2.2. Characteristics of carbon dioxide

Carbon dioxide (CO<sub>2</sub>) is a colorless and odorless gas, therefore it is practically imperceptible. CO<sub>2</sub> is heavier than air and soluble in water.

Warning signs on the bottle containing CO<sub>2</sub>:



Non-flammable and non-toxic gases



Pressurised gas

Product ID: Carbon dioxide (100%)

Chemical formula: CO<sub>2</sub>

Application of the substance: General industrial applications

### 1.2.3. Location requirements

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

Observe the occupational exposure limit OEL for CO<sub>2</sub> set by national authorities (formerly maximum permitted workplace concentration). Check compliance when operating all chambers located in the room.



It is recommended to use a control and measurement equipment for measuring CO<sub>2</sub> concentration in rooms with a CO<sub>2</sub> incubator.

### 1.2.4. Hazards when working with CO<sub>2</sub>



Carbon dioxide in elevated concentration causes shortness of breath, circulation problems and ultimately death. Avoid breathing gas.



The bottle with compressed gas may cause cryogenic burns or injury (extremely cold liquid and/or high pressure gas).

### 1.2.5. Personal protection / first aid

**In the event of gas leak:**

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

**Respiratory protection:**

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

**Inhalation problems:**



Move the victim to fresh air. CO<sub>2</sub> gas is heavier than the air and accumulates e.g. at the floor. If breathing has stopped or is difficult, give aided respiration. Oxygen administration may be indicated. In the event of cardiac arrest, a trained person should immediately begin cardiopulmonary resuscitation.

**In life-threatening emergencies:**

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

**1.2.6. User's responsibility**

**The user is obliged to:**

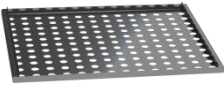
- 1) be familiar and comply with applicable health and safety rules, regulations for handling CO<sub>2</sub> and to train operators properly,
- 2) secure the unit against access by unauthorized persons,
- 3) keep the unit in perfect condition,
- 4) follow the maintenance schedule,
- 5) ensure that operators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

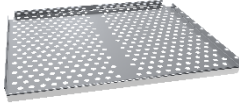




**2. PACKAGE CONTENTS**

CO<sub>2</sub> incubators in SMART PRO version are delivered with:

Description	Quantity
CO <sub>2</sub> incubator	1
rack for shelves	1
water pan	1
stainless steel perforated shelf	3
key to the lock	2
power cable with EU plug	1
3 m pressure hose with pre-assembled hose nozzle for a quick connector and a hose clamp to connect the gas hose to the pressure reducer	1
silicone plug to close the access port	2
Lab Desk program (in the internal memory of the equipment)	1
LAN cable [pcs.]	1
Quality Control Certificate [pcs.]	1
Instruction manual (in the internal memory of the equipment)	1
Quick start guide	1

Additional accessories can be ordered separately.

Options description	Image	Quantity
Additional perforated stainless steel shelf, max shelf load 30 kg		1

Additional reinforced perforated stainless steel shelf (max. shelf load 30 kg)		1
Stacking adaptor		1
Base on castors		1
Support frame on castors (height: 800 mm)		1
Replacement CO <sub>2</sub> gas filter		1

ILC 180 SMART PRO is stackable. Two units can be stacked on top of each other with the **stacking adaptor**, saving valuable space in the laboratory.

The stacking adaptor prevents heat transmission, shocks and vibrations transferring from one chamber to another.

The **base on castors** allows the incubator to be easily moved from one location to another, it is also recommended to avoid dirt from the floor potentially contaminating the chamber.

The **CO<sub>2</sub> gas filter** is a consumable part ([see section 10.7](#)).

### 3. BEFORE THE FIRST USE

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

	<b>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.</b>
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	<b>After transporting the device at a temperature below 10°C, wait at least 2 hours before connecting it to the mains.</b>
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On the surface of unit's components made of stainless steel, slight discoloration may occur. It is a result of the technologies used in the production of metal sheet in accordance with the requirements of PN-EN 10088-2 standard and it is not a defect of the unit.

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

- Ambient temperature between +20°C...+30°C
- Ambient relative humidity < 60%
- Low dust environment
- Appropriately ventilated according to its size
- Placed on a hard and stable surface
- Placed at least 100 mm away from the wall

- Height of the room must be at least 300 mm greater than the height of the unit
- Keep away from direct sunlight
- Kept away from any heat sources
- Not designed to be built-in e.g. within wall recesses
- Placed near a mains socket 220-240V 50-60Hz.

When after storage in a cold location you transfer the chamber to its warmer installation site, condensation may form. Before start up, wait at least one hour until the chamber has attained ambient temperature and it is completely dry.

- **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.

### 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.

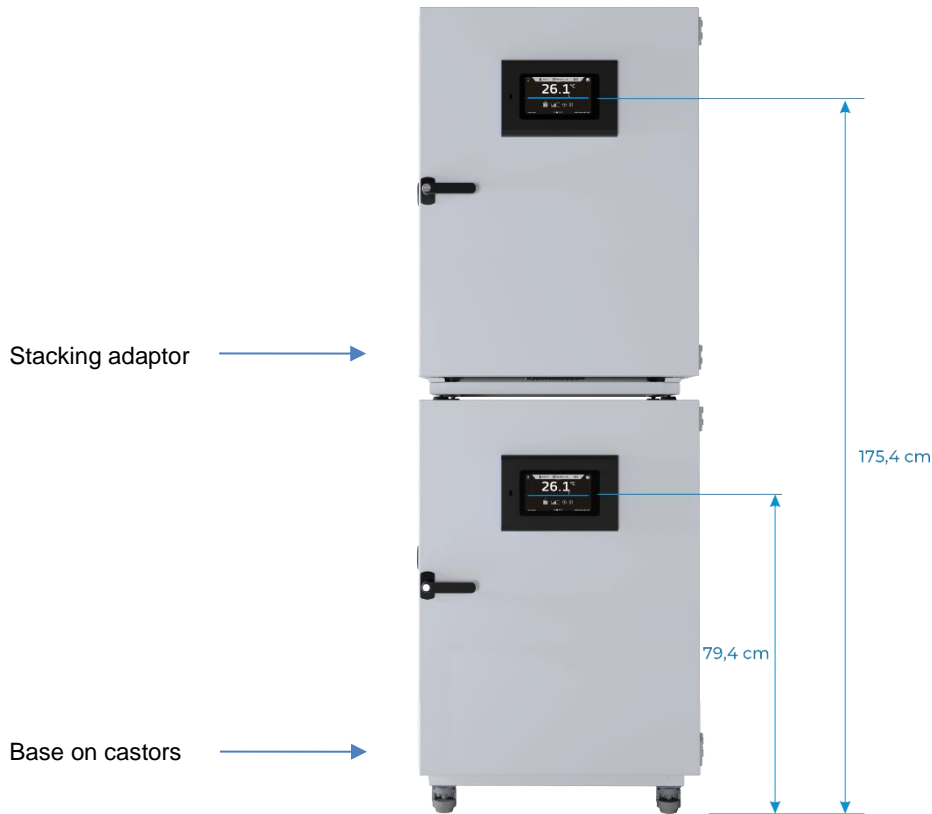
The installation should be protected by a 16A slow-blow fuse and equipped with a residual current device.

### **3.1. Setting up the chamber**

Set up the chamber with a spirit level (not included). The unit has been equipped with levelling feet. Please use them to level the unit after it has been placed in its final location (if needed).

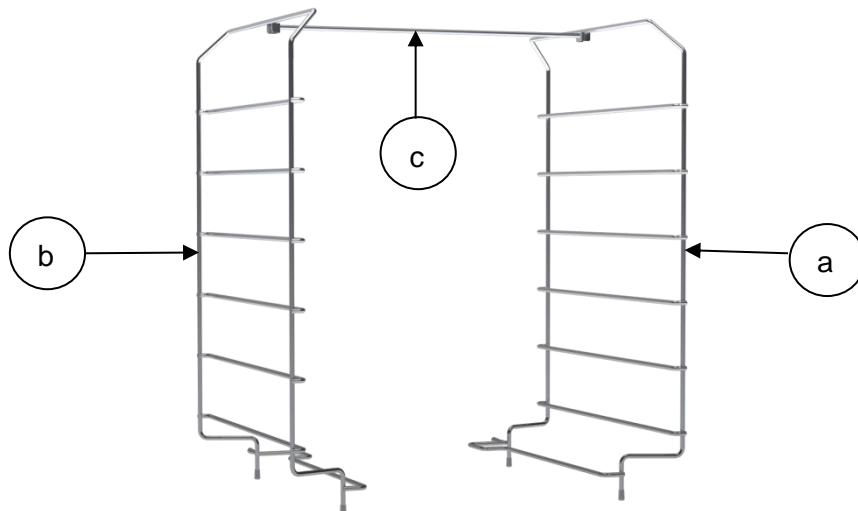


ILC 180 is stackable. You can stack two units with the stacking adaptor and save place in the laboratory.



### **3.2. Shelf / water pan installation**

The unit is equipped with a rack for shelves.



Perform the following steps to assemble the rack for shelves, water pan and adjust shelf height:

1. Install the part (a) of the rack as close as possible to the right wall of the chamber.
2. Install the part (b) of the rack as close as possible to the left wall of the chamber.
3. Connect the part (a) with the connecting rod (c). Note: the pin of the rod must be directed towards the door.
4. Connect the part (b) with the connecting rod (c). Note: to lock the connecting rod rotate the pin downwards.

5. Install the water pan on the bottom and position it equally between the rack.
6. Slide a shelf onto the required frame level. The shelf rack is now correctly installed!



Perform the above steps in reverse order to clean the chamber.

### **3.3. Water pan**

Please make sure that the water pan is placed on the chamber's bottom (equally between the rack). Below the water pan there is a cold spot of the chamber which prevents formation of water condensation.

Fill the water pan only **with deionized (demineralized) water** up to the filling level marked by the pressed inner edge (volume:1,5 liter).



It is recommended to clean and refill the pan 2-3 times a week. For emptying and cleaning remove the water pan.

Operate the chamber only with deionized (demineralized) water. Conductivity from  $1\mu\text{S}/\text{cm}$  up to a maximum of  $20\mu\text{S}/\text{cm}$ . Water which is in equilibrium with the  $\text{CO}_2$  in the air and has a conductivity  $< 1\mu\text{S}/\text{cm}$  (ultrapure water) may cause acid corrosion due to its low pH.

Any corrosive damage that may arise following the use of water of deviating quality or by additives is excluded from the liability agreement.

If required, you can add microbiologically inhibiting substances such as copper chips, copper sulfate or EDTA in a concentration of 1 to 5 mmol/l.

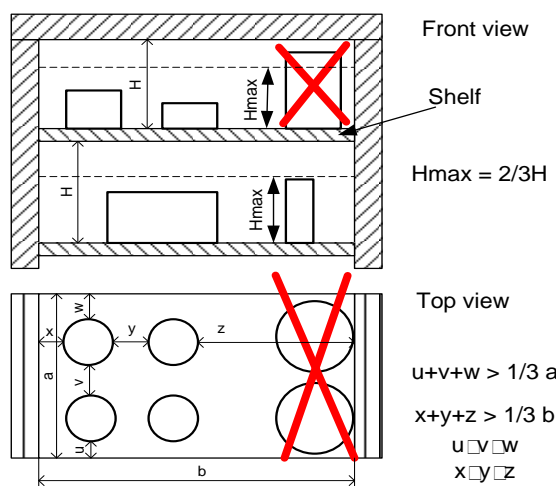
Empty the water pan before moving the unit. In case of the contents spilling, immediately dry the chamber carefully and completely.

### 3.4. 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.

### 3.5. Closing chamber door

The unit has been equipped with a 2-point lock. To close the door, turn the handle to the vertical position, push the door gently then turn the handle to the horizontal position. If the door has not been closed properly, an alarm will sound. Closing the door correctly reduces energy consumption and ensures the specified temperature variation and fluctuation.

### 3.6. Internal glass door

To open or close the internal glass door use the installed plastic handle. Always use safety gloves to protect yourself and minimise the risk of getting burnt when the temperature inside is high.

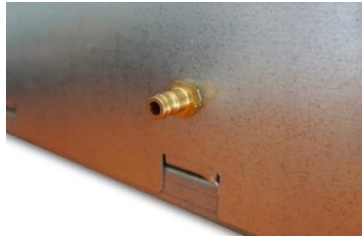
	<p>During sterilization process the inner chamber of the incubator is hot (do not touch the glass door or inner parts of the chamber).</p>
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### **3.7. Connection of the CO<sub>2</sub> gas cylinder**

The manufacturer supplies the unit with a 3m pressure gas hose with pre-assembled hose nozzle for quick connector and a hose clamp. This hose is used to connect CO<sub>2</sub> cylinder.

To establish the gas cylinder connection to the chamber:

1. place the CO<sub>2</sub> cylinder vertically and attach it to the wall with a special clamp, rope or chain,
2. ensure the correct CO<sub>2</sub> output pressure of 1,5-2 bar (use a pressure reducer),
3. connect the supplied gas hose to the pressure reducer of the gas cylinder or central gas supply and secure the connection with the supplied hose clamp,
4. connect the pre-assembled hose nozzle of the gas hose to the quick connector on the chamber rear,



5. slowly unscrew the valve of the gas cylinder while checking low leakage connection.

**Leak test**

It's important that all gas connections will be checked for leaks after the incubator is connected to the gas cylinder. This can be done with a leak spray or with a solution of dilute soap.

	<b>The gas outlet pressure CANNOT exceed the indicated value of 2,5 bar. The pressure above this value will result in chamber damage.</b>
	<b>Before connecting, check the outlet pressure on the pressure reducer of the cylinder. Adjust the outlet pressure to 1,5 – 2,0 bar above the ambient pressure.</b>

Only use the supplied hose nozzle to connect to the quick connector. Otherwise, the quick connector may leak, and/or it may become impossible to connect the original hose nozzle. In this case, please contact POL-EKO Service.

	<b>The CO<sub>2</sub> gas cylinder is <u>NOT</u> supplied with the CO<sub>2</sub> incubator. The purchase, transport and connection is the responsibility of the user.</b>
	<b>The gas connections must be installed by qualified personel who is trained in handling the respective gases and is familiar with the required safety measures.</b>

- Opening the gas cylinder valves is only permitted when the cylinder has been connected to the chamber.
- Pressure level is checked by the controller regularly. When the CO<sub>2</sub> pressure is low, an alarm occurs on the screen ("CO<sub>2</sub> Pressure low Start").

	<b>Open the gas cylinder valve slowly to avoid pressure surges.</b>
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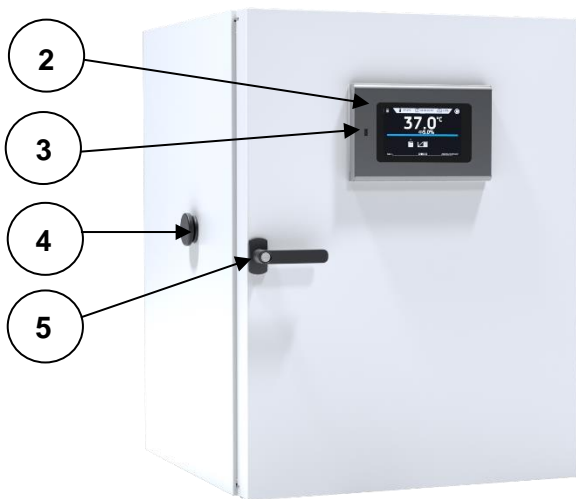
Always close the valve even with apparently empty cylinders; screw on the cap when not in use. Return gas cylinders with closed valve.

## 4. DESCRIPTION OF THE UNIT

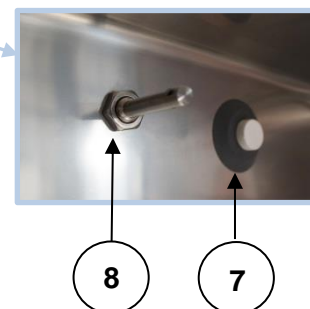
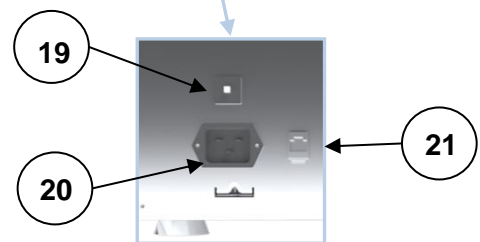
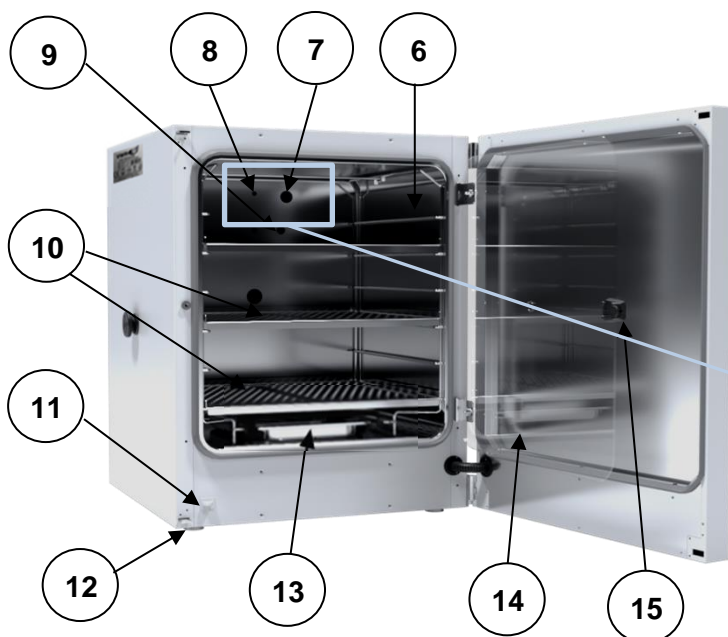
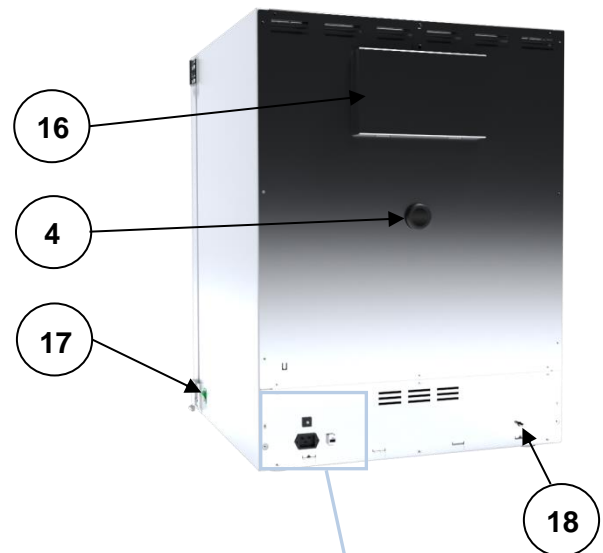
SMART PRO models are equipped with a PID microprocessor temperature controller and a 7 inch colour touch screen with a resolution of 800x480.

### 4.1. Design of ILC incubators

Front view



Rear view





- |   |   |
|---|---|
| (1) Nominal plate                       | (12) Height adjustable feet                                 |
| (2) 7" touch screen controller          | (13) Water pan  |
| (3) USB port                            | (14) Inner glass door                                       |
| (4) Access port (φ30 mm)                | (15) Glass door handle                                      |
| (5) Door handle with a key lock         | (16) Inspection cover for CO <sub>2</sub> sensor and filter |
| (6) Rack for shelves                    | (17) Main power switch                                      |
| (7) CO <sub>2</sub> infrared sensor     | (18) CO <sub>2</sub> hose connector                         |
| (8) CO <sub>2</sub> gas mixing head     | (19) 10A fuse   |
| (9) Temperature sensor PT 100           | (20) Main power socket                                      |
| (10) Stainless steel perforated shelves | (21) LAN  |
| (11) Open door sensor                   |   |

## **5. UNIT EQUIPMENT**

### **5.1. Internal glass door**

Internal glass door is a standard equipment in ILC 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 doors, 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.

### **5.2. Door lock**

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




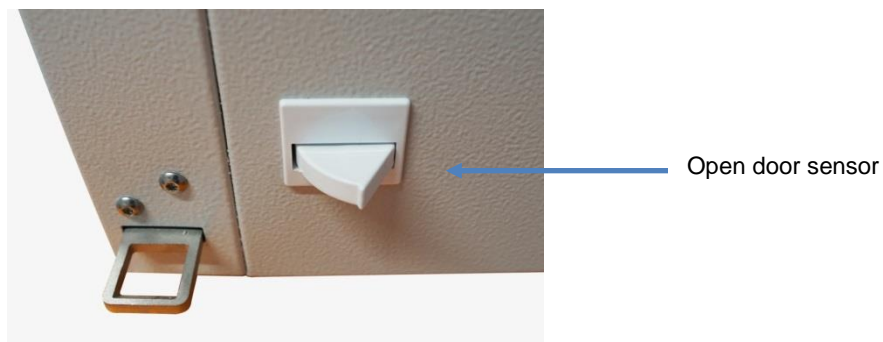
### 5.3. Access ports for external sensor

Two Ø30 mm access ports located on the left wall and on the rear can be used to insert external sensors, which have been secured with silicone plugs. The plugs should cover the access ports while the unit is operating. If multiple cables have been inserted through the access port and if 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 variation and fluctuation within the chamber.







### 5.4. Open door alarm

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 (30 s, 1 min, 2 min, 5 min, 10 min) an acoustic signal, red pulsating alarm bar and „open door” alarm with active status will appear.



### 5.5. USB port

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 \*.plx.
- press . Data has been copied.



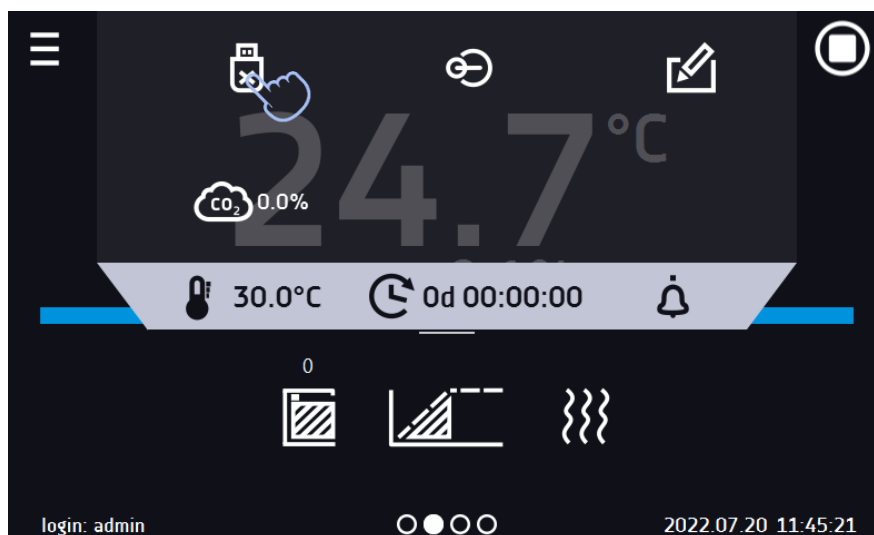
	<p>After copying the data to the USB flash drive, before removing it from the USB socket, it should be unmounted by pressing the icon  in the top drop-down list (Figure 1). If the pendrive is not unmounted after connecting to the computer, a message about pendrive damage may be displayed with a repair proposal, when actually the pendrive is not damaged</p>
---	---

Figure 1 Unmounting USB flash drive



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

### 5.6. LAN port

Each unit can be connected to the Ethernet network or directly to the computer with a LAN cable. Premium Control software enables to create programs and send them to the unit remotely, read data (saved data and event log), create graphs and make reports. With this feature, equipment can be controlled and monitored remotely. It is also possible to connect several units at the same time and control them from one computer.


## 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.

	<p>USB slot is used to connect <b>only</b> 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.</p>
---	--



After copying the data to the USB flash drive, before removing it from the USB socket, it should be unmounted (see [Section 5.5](#)).

## 6.2. First boot

During the first boot, the screen ([Figure 2](#)) will display information about saving the "Download" folder (with instruction manual in pdf format) on the USB flash drive. In order to do it, insert the USB flash drive and wait a second to detect the hardware, then press .


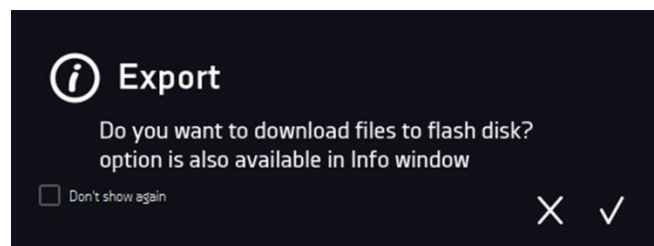
If you press  you quit downloading the folder. The window will appear again during the next boot. You can tick „Don't show again” so that the window will not be displayed after switching on the device. You can always download the „Download” folder in the Info submenu. More information [Section 6.14](#).

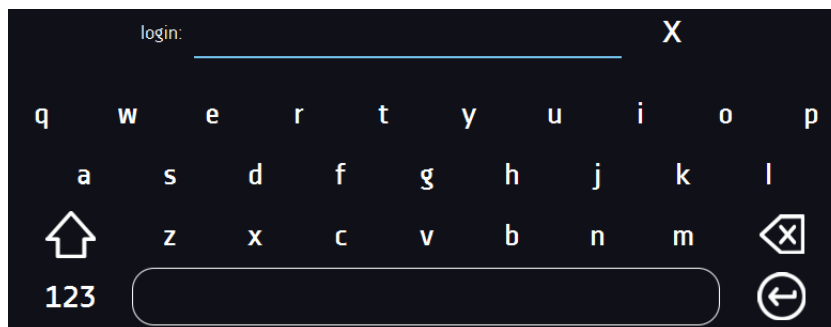
Figure 2 Downloading files



## 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 3](#)). In addition to the standard letters, it contains symbols that correspond to the computer keyboard.

Figure 3 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

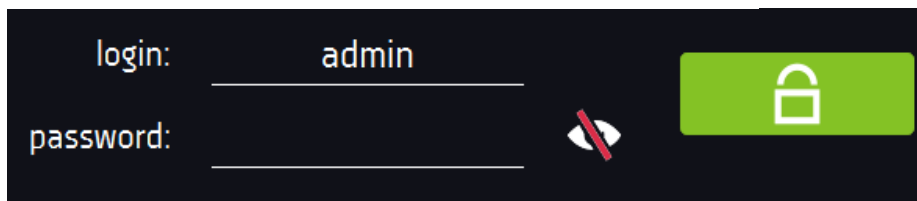
Setting device parameters is only possible by the logged in user. To log in, press  in the main screen. The login window will appear (*Figure 4*):

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 4 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.

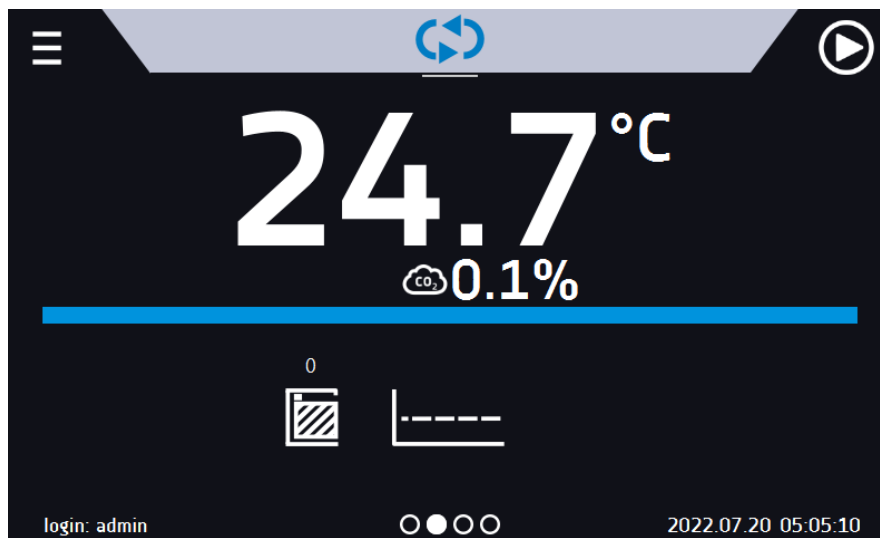
For information on user account types, see [Section 6.15](#).

**Logging out:** press  in the main menu. For automatic logout, go to the [Section 6.16](#).

## 6.5. Main screen

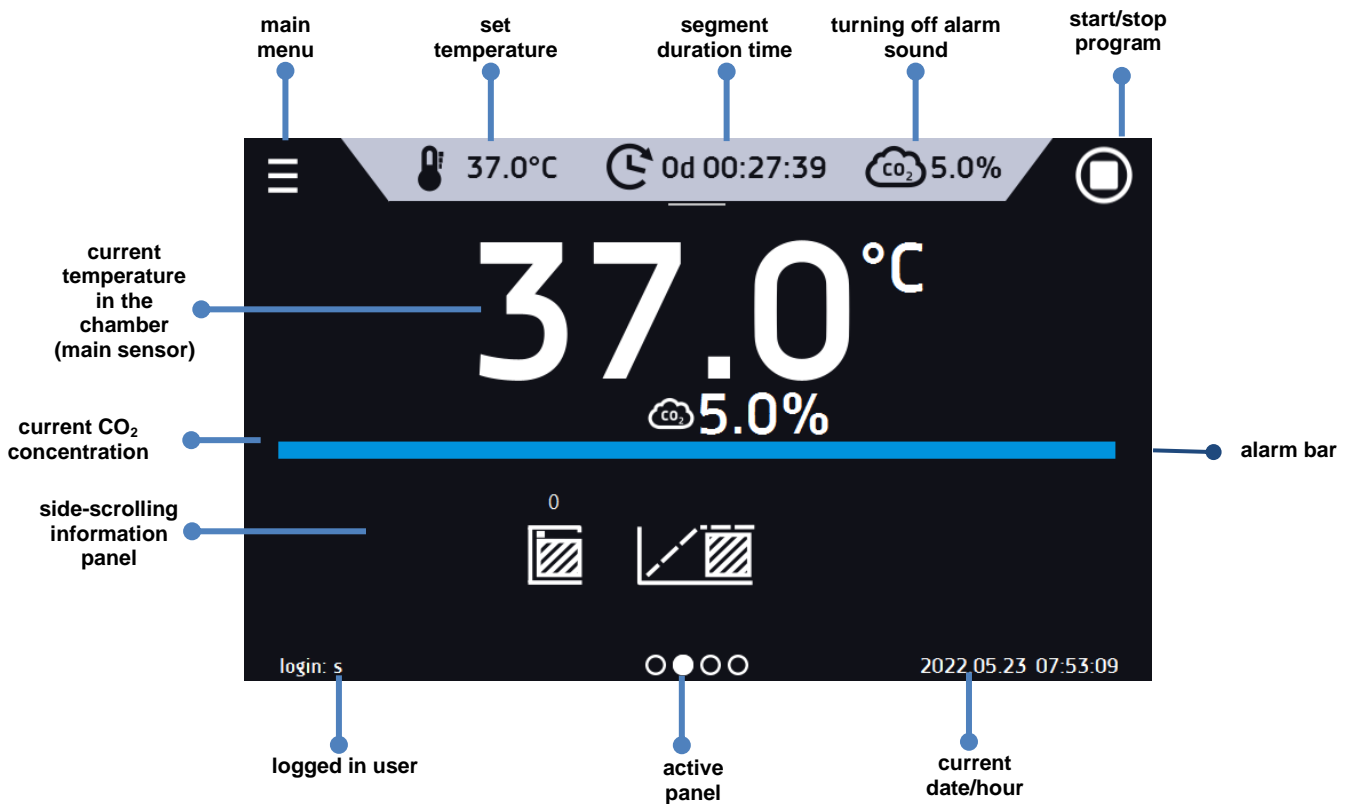
After switching on the device, the main screen (*Figure 5*) appears. It contains the information about the device status. After starting the program, additional information appears on the screen (*Figure 6*).

Figure 5 Main screen (program is switched off, no user is logged in)



From this point, any action requires logging in.

Figure 6 Main screen – running program in ILC



### 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 7 Information panel

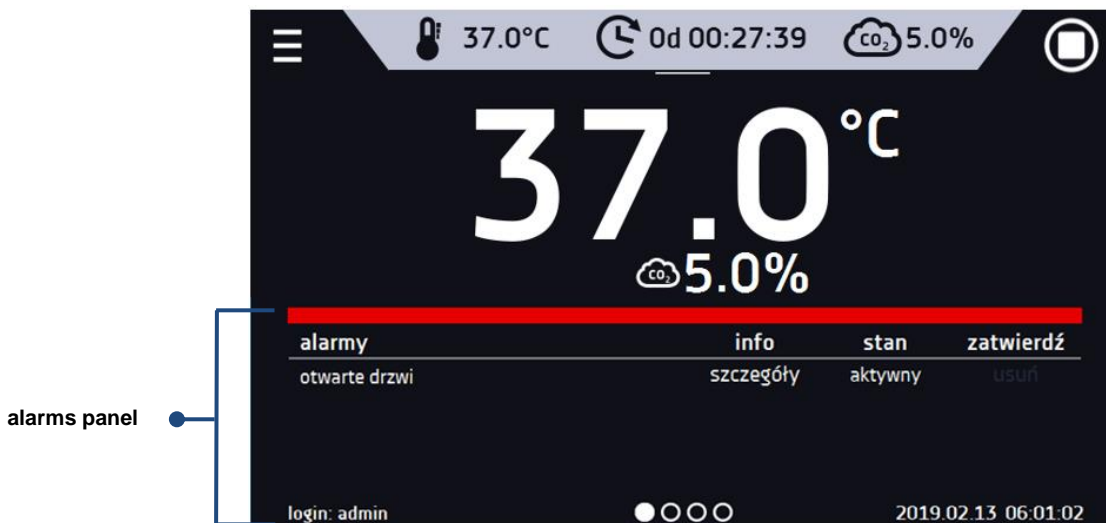


The icon  indicates information about which window is active.

#### 6.5.1.1. Alarms panel

On the first page of the information panel there's alarms panel (Figure 8)

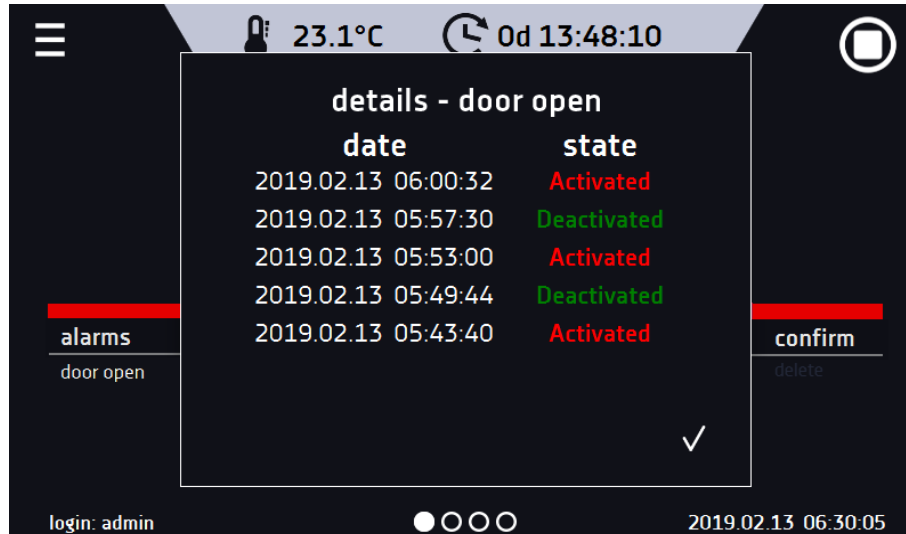
Figure 8 Icon: Alarms panel




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 9).

Figure 9 Alarm details

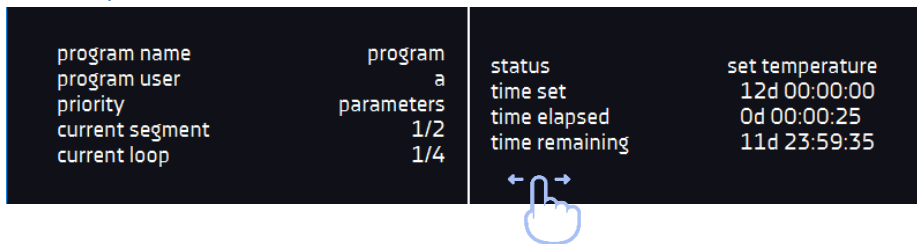


With more alarms, a button  appears on the right side of the list and allows you to enlarge the view to full screen.

### 6.5.1.2. Status panel

The status of the device is displayed descriptively on the third page of the information panel (Figure 10)

Figure 10 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 6.7.1](#). 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.









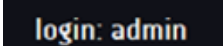
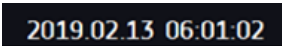
















Figure 11 Status – protection and alarms



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.
	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.
	2018.12.12 16:40 The program will start on the given date / time. Schedule or start delay activated.
	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.
	37.0 °C Current temperature
	5.0% Current CO <sub>2</sub> concentration
	Set temperature, 37.0°C to change, press the icon  or value (for more information, see 6.9.1.)







 Od 00:27:39	Elapsed or remaining time of program, to change, press the icon  or value (for more information, see <a href="#">6.9.2.</a> )
 5.0%	Set CO <sub>2</sub> , to change it, press the icon  or value, (for more information see <a href="#">6.9.3</a> )
	Ramp status: Chamber is currently heating up
	Set temperature is reached.
	Icon is visible only when the chamber is heating up.
	Indicates which window is displayed
	Information about the user currently logged in
	Current date and time
	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. Canceling changes.
	Editing individual program segments (the program can have max. 6 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.

	<p>User message. Clicking on the icon allows you to enter a message.</p>
	<p>The icon appears in the event log and symbolizes entered user message.</p>

### 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, CO<sub>2</sub> concentration, quick note and mute function). These parameters can be quickly changed (Quick Change).

After swiping your finger down (*Figure 12*) you will see icons for all parameters which can be quickly changed (see *Section 6.9*). Among the options available in the bar you will find the following icons:

-  USB flash drive unmounting – more information [Section 5.5](#).
-  Quick Note – more information [Section 6.5.4](#).
-  mute option. Critical alarms (i.e. damage to the temperature sensor, temperature protection, etc.) continue emitting a sound, see [Section 6.18.2](#).
- Quick Change (more information [Section 6.9](#)) of:
  -  program duration time
  -  set temperature
  -  set CO<sub>2</sub> concentration

*Figure 12 Upper expandable menu when the program is running*

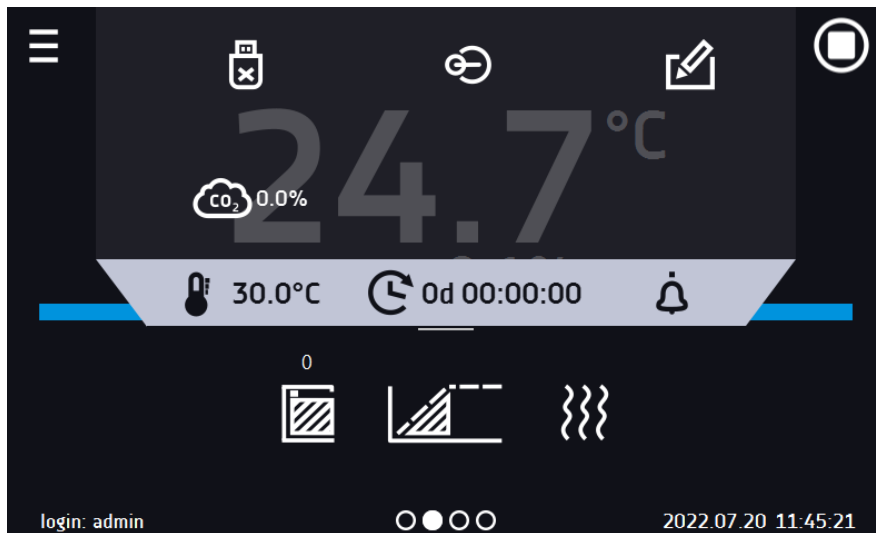
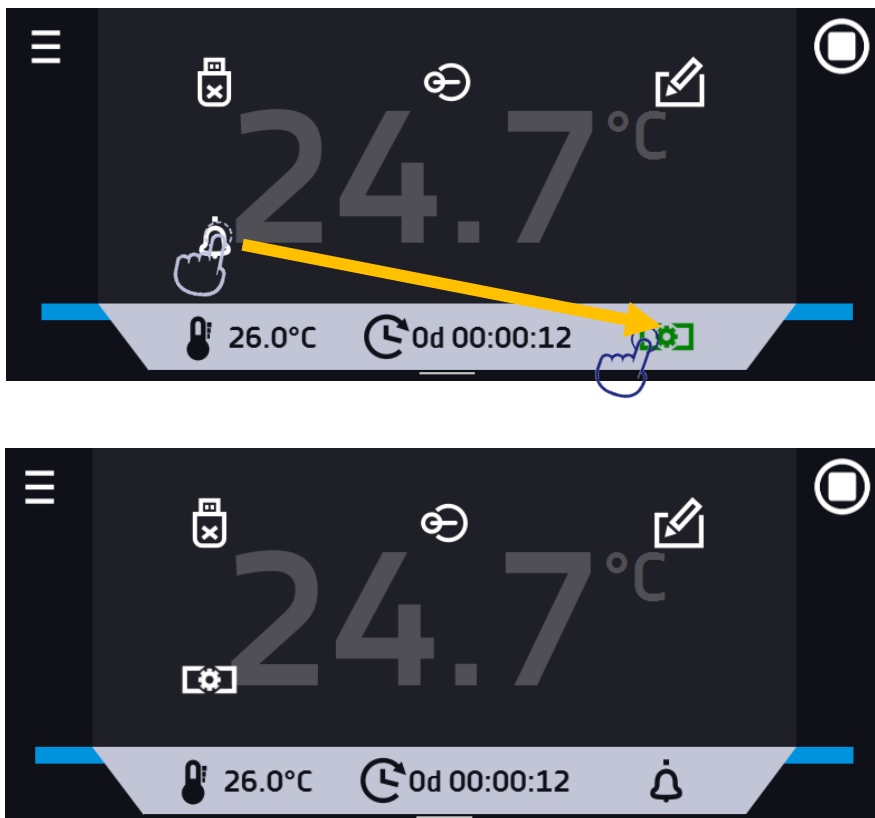


Figure 13 Upper expandable menu when the program is stopped



Positions available on the upper bar can be personalized. Just drag the selected icon to a new location ( Figure 14).

Figure 14 Changing icon's position



### 6.5.4. Quick Note – user’s message




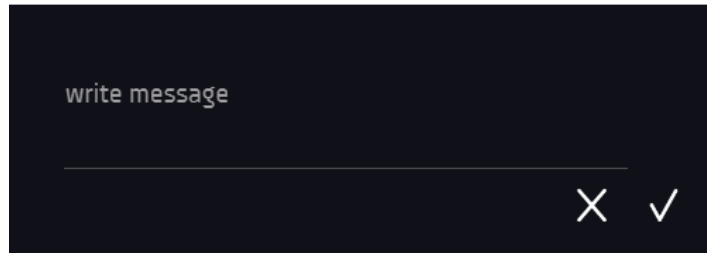
During equipment’s operation, the user can save messages in unit’s memory with information about: the date of inserting a new sample, observed changes in the samples, the place of sampling, etc. To enter a message you must first log in and then press the icon  in the main screen in upper menu. Click on „Write a message” (Figure 15). 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 15 User’s message



### 6.5.5. Alarm bar

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

 – blue - the device is working properly

 – red bar and pulsating frame – active alarm

## 6.6. Quick Program

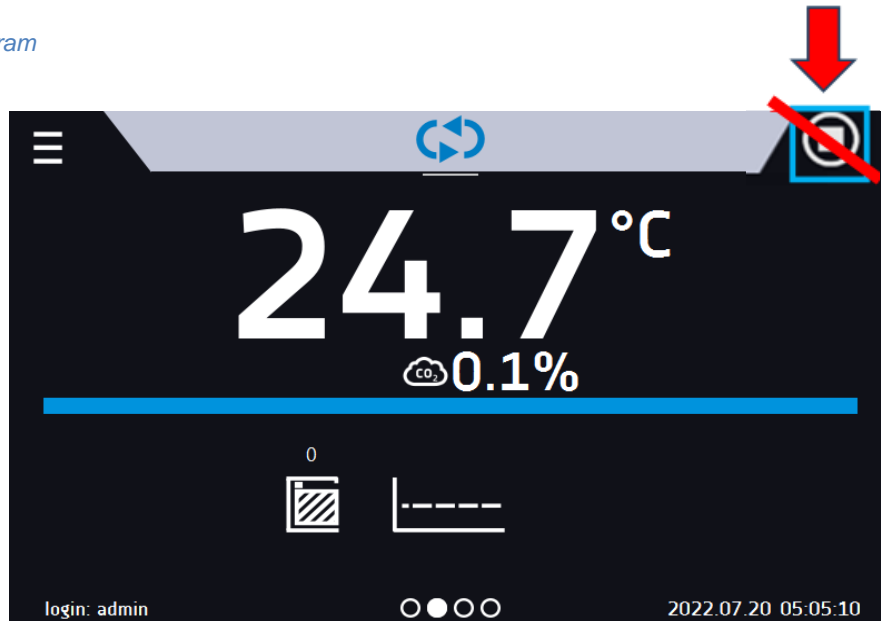
Quick program allows you to quickly start the program from the main screen position without having to enter to the menu





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 16).

Figure 16 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  the temperature. (Figure 17)


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

Figure 17 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 configuration of the Quick Program, it appears in the programs list ([Figure 18](#)). 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 18 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  $\leq 15^{\circ}\text{C}$ : lower protection = set temperature  $- 2^{\circ}\text{C}$ , upper protection =  $30^{\circ}\text{C}$
- set temperature  $> 15^{\circ}\text{C}$ : lower protection = set temperature  $- 5^{\circ}\text{C}$  (max  $20^{\circ}\text{C}$ ) , upper protection = set temperature  $+ 5^{\circ}\text{C}$  (min.  $30^{\circ}$ )

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

## 6.7. Programs

Press the icon of main menu , and then press . In this panel ([Figure 19](#)) 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.






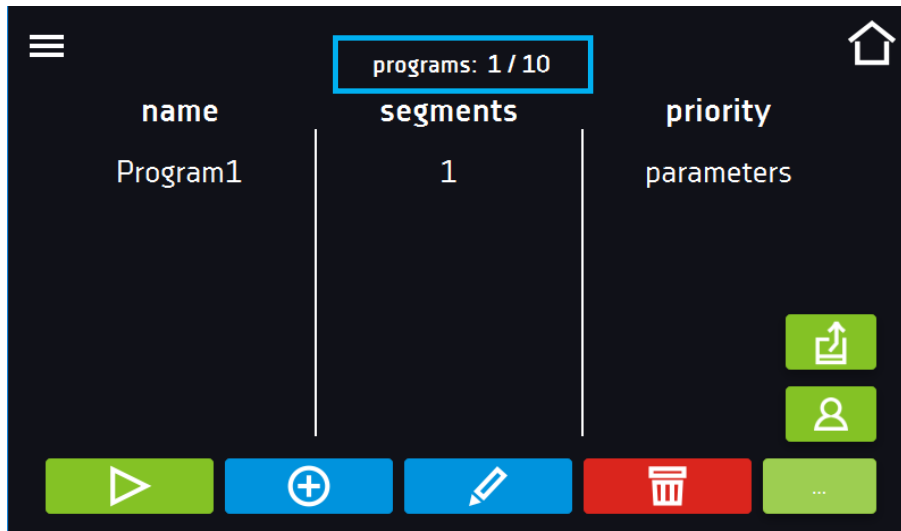


-  Add a new program.
-  Edit the selected program.
-  Delete the selected program.
-  Download program from USB flash drive.
-  Share the selected program with the user type account.

Figure 19 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

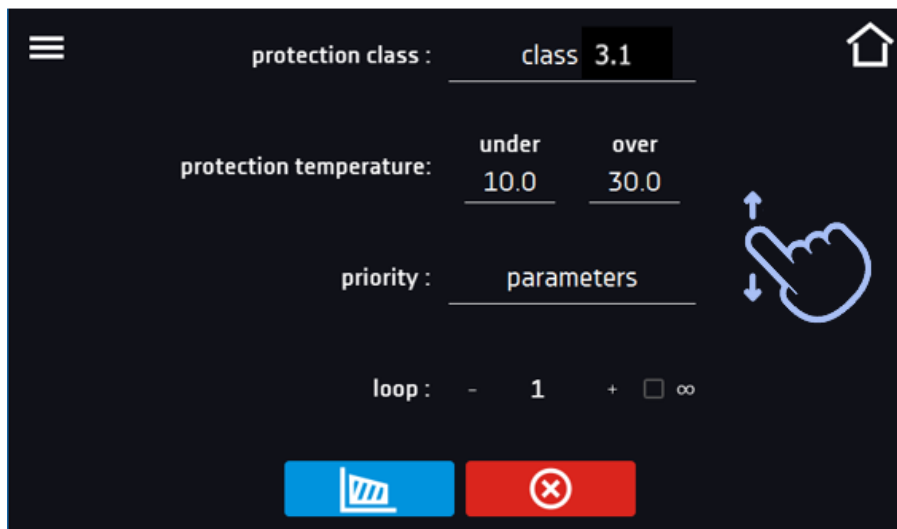
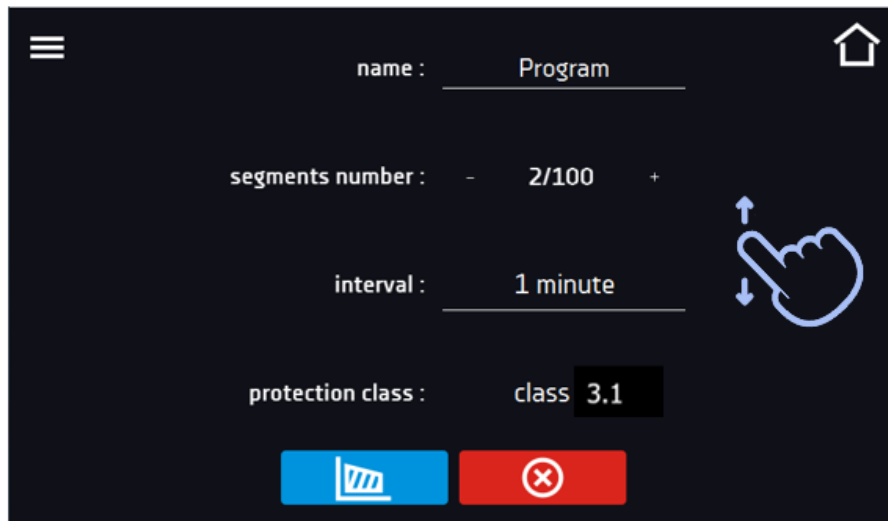
Press the button  or  and a panel with program parameters will appear (Figure 20).

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.](#)
- **Priority** – the priority of time or parameters, more information [Section 6.7.5.](#)
- **Loop** – the number of program repetitions, more information [Section 6.7.6.](#)



Figure 20 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. 30°C, time 2 hours (after reaching the temperature 30°C, it is maintained for 2 hours)

segment2: temp. 40°C, time 3 hours (after reaching the temperature 40°C, it is maintained for 3 hours)

segment3: temp. 50°C, time 3 hours (after reaching the temperature 50°C, it is maintained for 3 hours)


segment4: temp. 40°C, time 2 hours (after reaching the temperature 40°C, it is maintained for 2 hours)

Press the button  and the first program segment will appear.

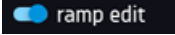
In this window you can set:


- **temperature** – target temperature which the device is to achieve in this segment (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,
- **CO2** - CO<sub>2</sub> concentration to be achieved in the segment,
- **ramp time** – the time of reaching the set temperature ([d hh:mm]) in days, hours, minutes.

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



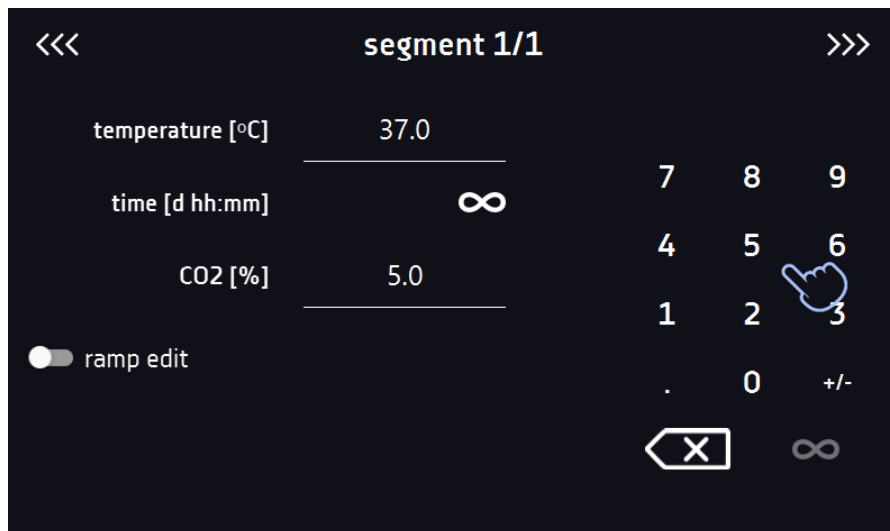
**Ramp time** - setting a short time will not accelerate reaching the ramp, but the ramp will be reached in the shortest possible time depending on the set temperature, ambient conditions and the possibilities of the cooling or heating system in the device.



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 ramp edition field  and set your own values.




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

Figure 21 Program segment edition



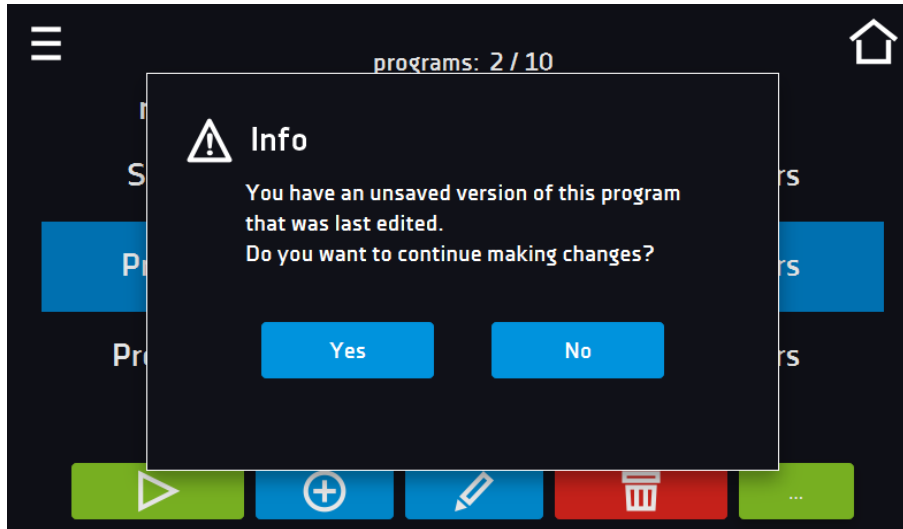
The navigation between: segments, program parameters and summary is done by touching the icon  .



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 22).

Figure 22

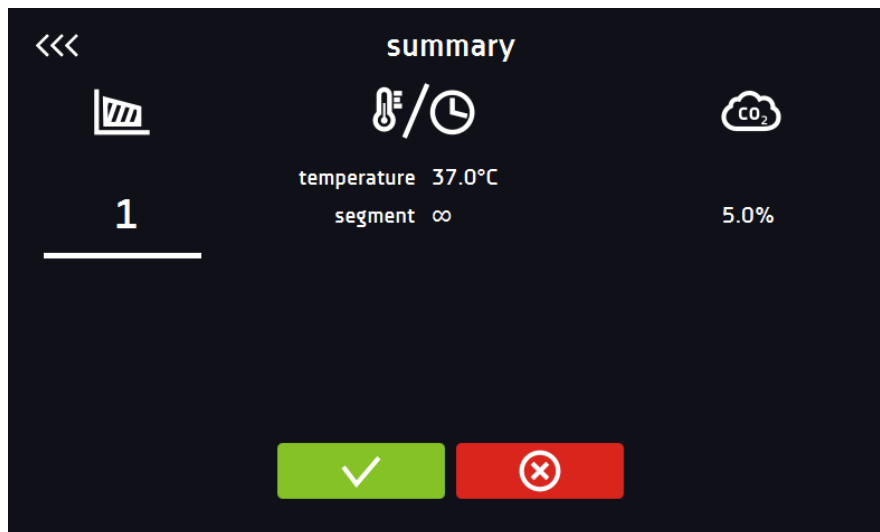


### 6.7.3. Summary of segments

In the segments summary (Figure 23) all segments can be seen along with introduced parameters:

- number of segments,
- temperature, duration time, target time of reaching temperature of a given segment,

Figure 23 The summary of the segment



Confirms and saves the changes.



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



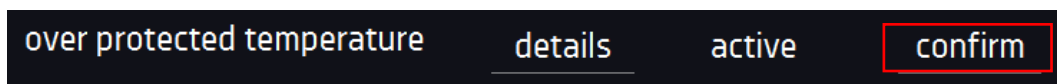
The fan efficiency is factory set to 100% and it cannot be changed.

### 6.7.4. Protection class

The device is factory-equipped with a protection **class 3.1 according to DIN 12880**. The user can set the temperature protection (upper limit) by himself and when the set temperature falls outside of this range, the power heater is switched off. When the temperature returns to within normal parameters, the equipment continues to work normally.

The set temperature in the segment cannot be higher than the over temperature protection minus 2°C, e.g. the over temperature protection is 39°C, therefore the maximum set temperature in the segment that can be set is 37°C.

Figure 24 Confirmation of protection alarm



### 6.7.5. 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.

### 6.7.6. 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. 30°C, time 2 h  
 segment2: temp. 35°C, time 2 h,  
 segment3: temp. 40°C, time „∞”

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

## 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 25).


- Then select the program you want to activate and press „start” button .

Figure 25 Main menu

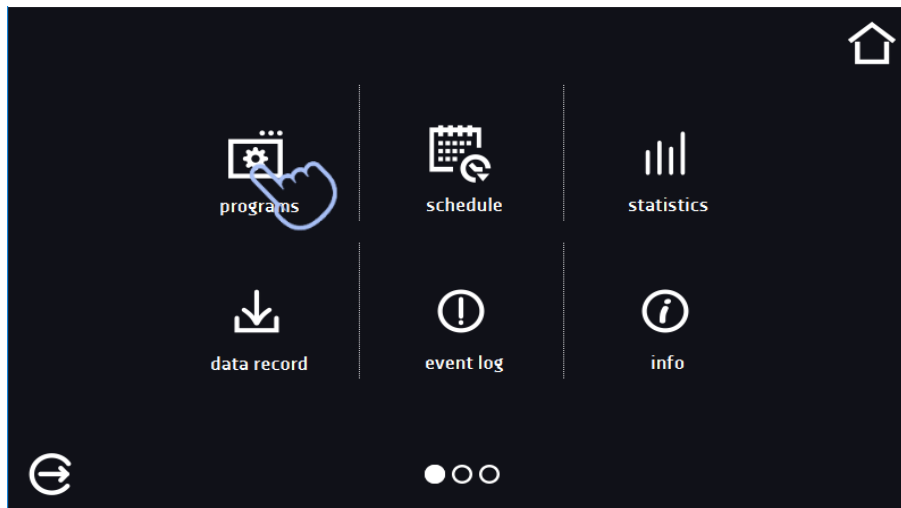
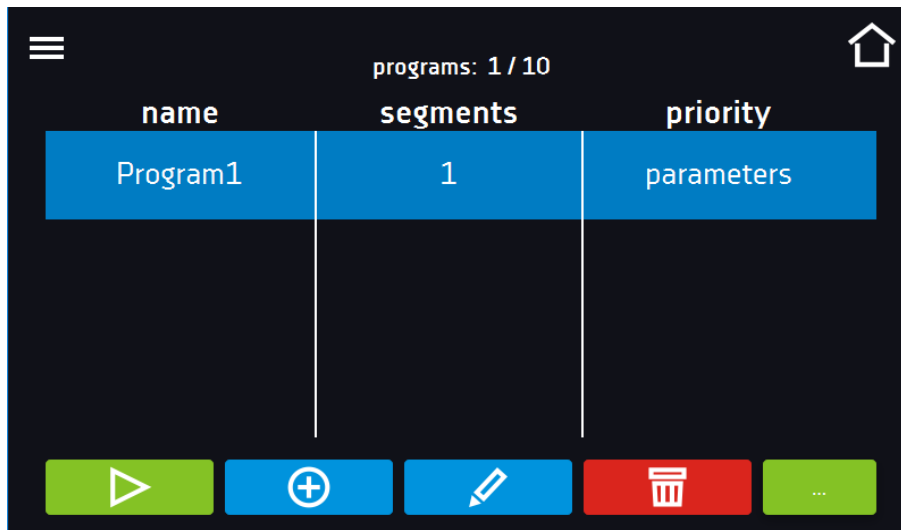


Figure 26 Program management menu





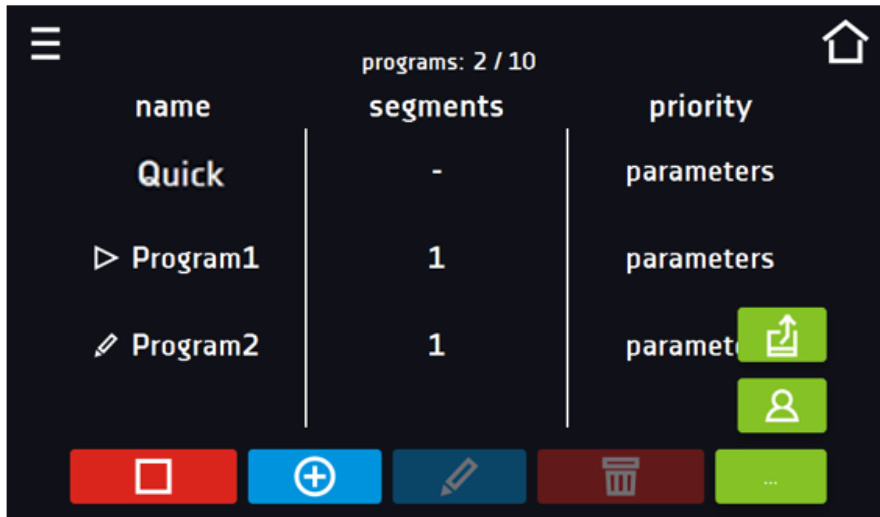

If the program is running, the symbol  appears next to the program name on the list. The symbol  means that the program has been edited, but the changes have not been confirmed.

Figure 27 List of programs with the selected status



### 6.8.2. The second way

- In the main screen (Figure 28) press the icon in the upper right corner .
- Select the program you want to start (Figure 29). 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 28 Main screen

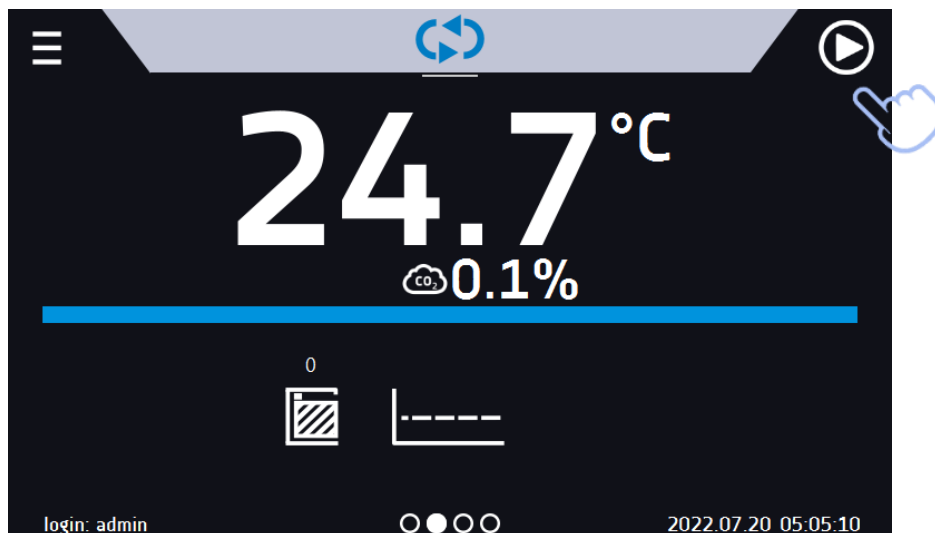
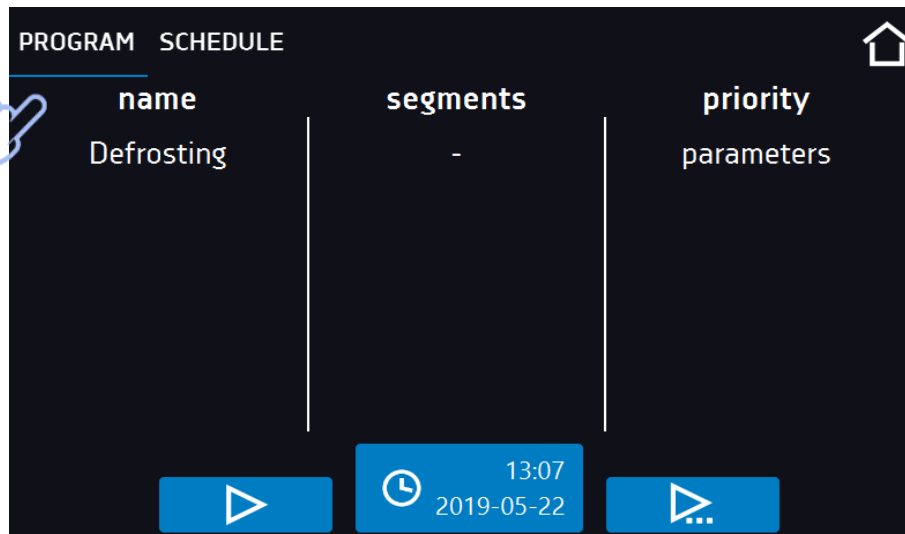




Figure 29 Selection from the program list




 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 / CO<sub>2</sub>) 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 30). The value of the temperature should be selected by scrolling the list up or down (Figure 31). Click  to confirm the change. **The temperature can't be higher than the over temperature protection -2°C.**

Figure 30 Quick change of set temperature

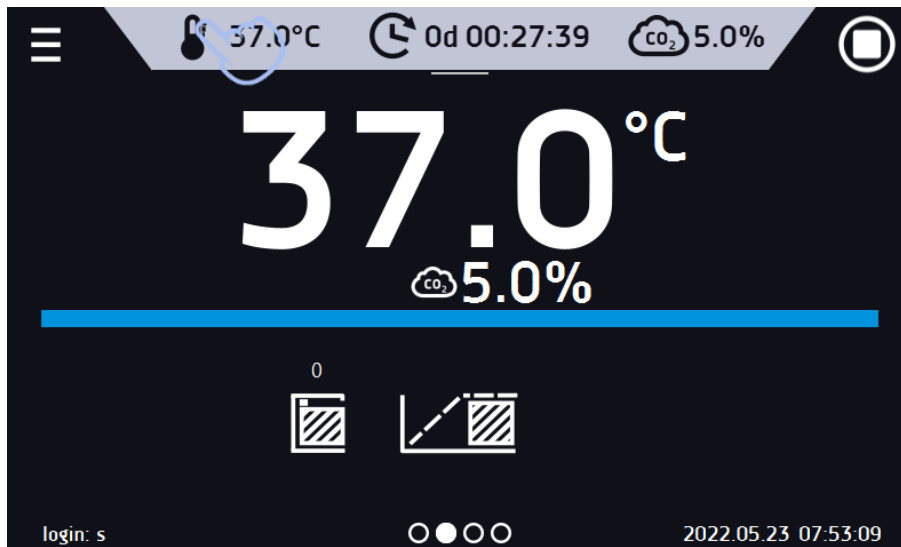
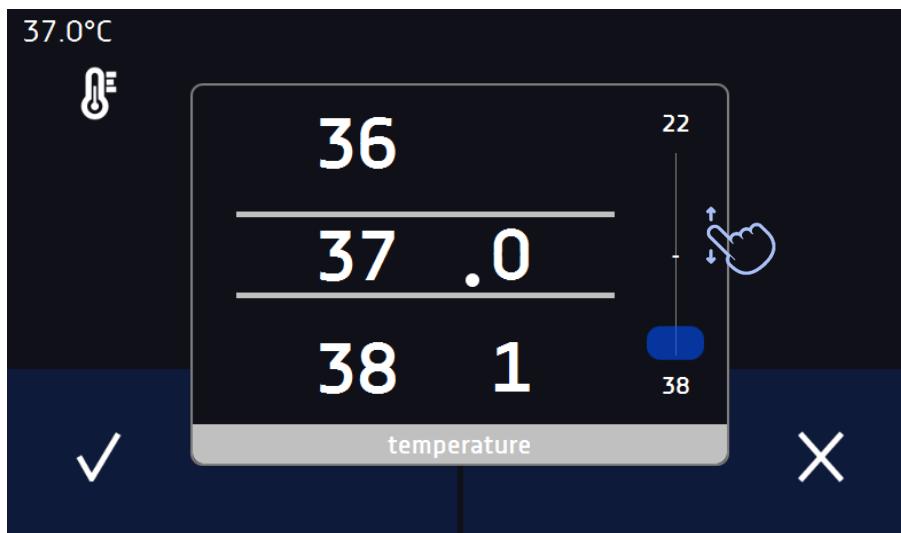





Figure 31 Quick change of set temperature





### 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 32).

Select the number of days, hours and minutes by scrolling the list up or down (Figure 32). 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 32 Quick change of set time

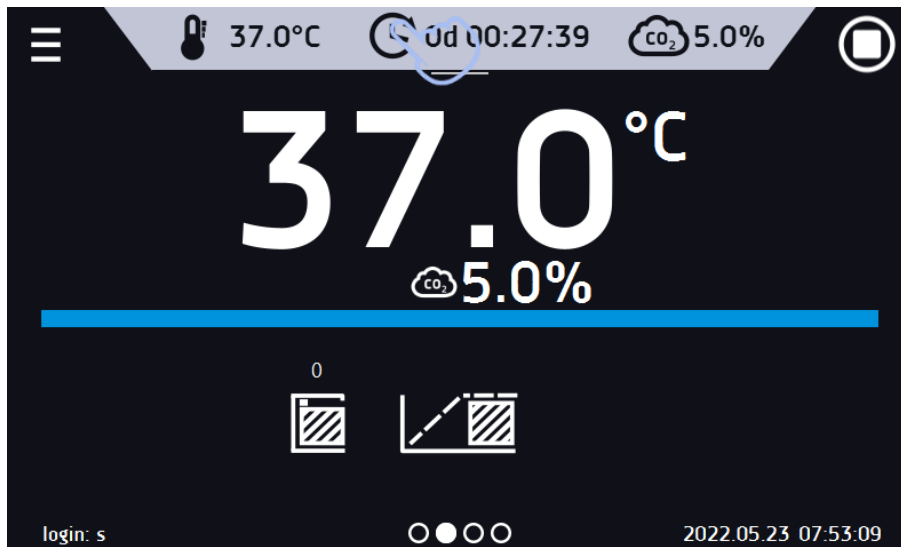
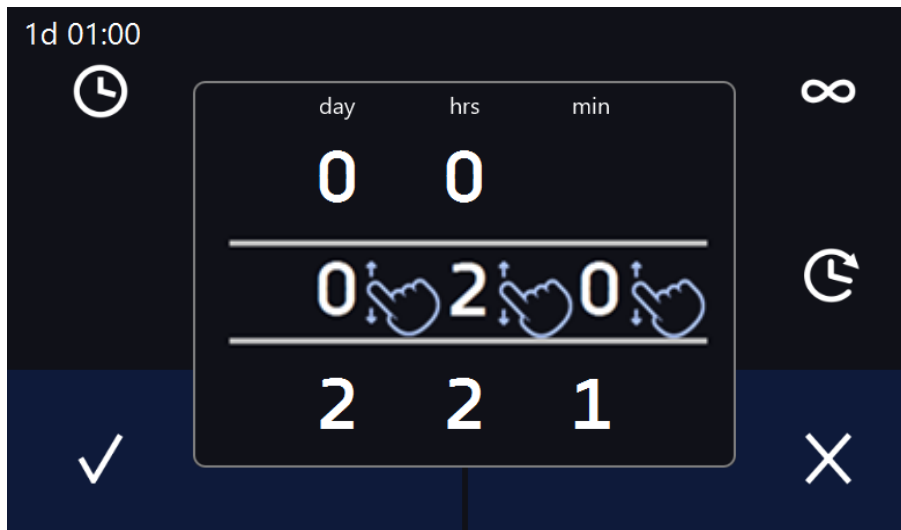



Figure 33 Quick change of set time



### 6.9.1. Quick change of set CO<sub>2</sub> concentration

In order to quickly change the set CO<sub>2</sub> concentration, press the  icon in the main screen (Figure 34). Select the required CO<sub>2</sub> concentration by scrolling the list up or down (Figure 35).


Confirm the change by pressing .

Figure 34 Quick change of set CO<sub>2</sub> concentration

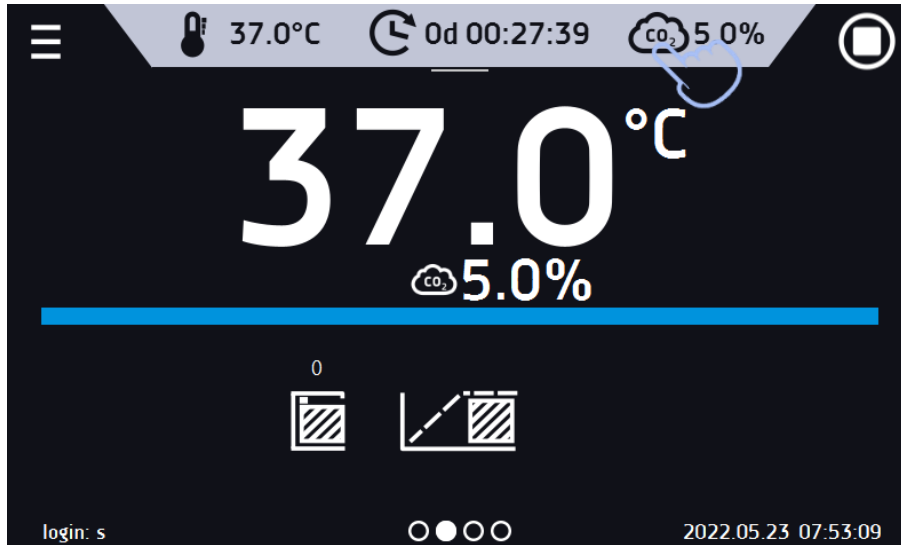


Figure 35 Quick change of set CO<sub>2</sub> concentration



## 6.10. Schedules

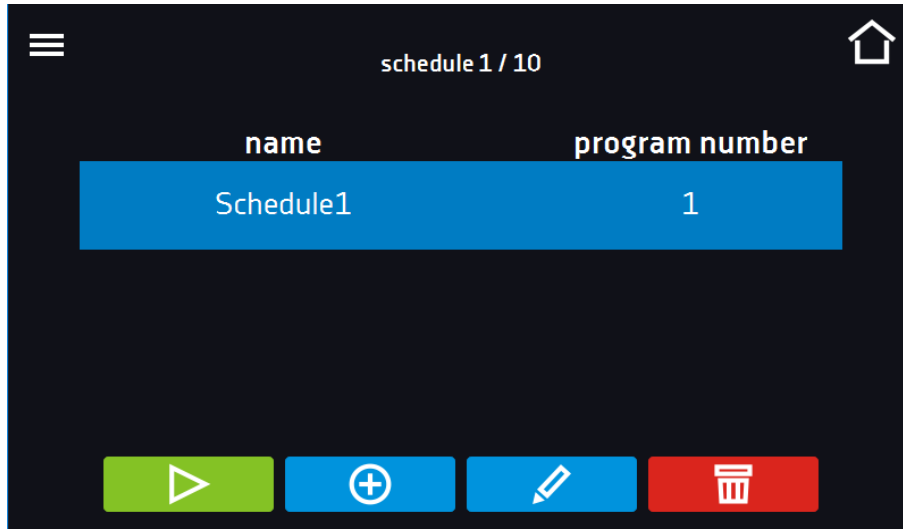
The option allows creating a list of programs to be implemented in a given time. You can create several independent schedules. The schedules window contains a list of all created schedules of the logged-in user.



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

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

Figure 36 List of schedules



Start the schedule



Stop the schedule



Add the schedule



Edit the schedule



Delete the schedule

### 6.10.1. Creating / editing a schedule



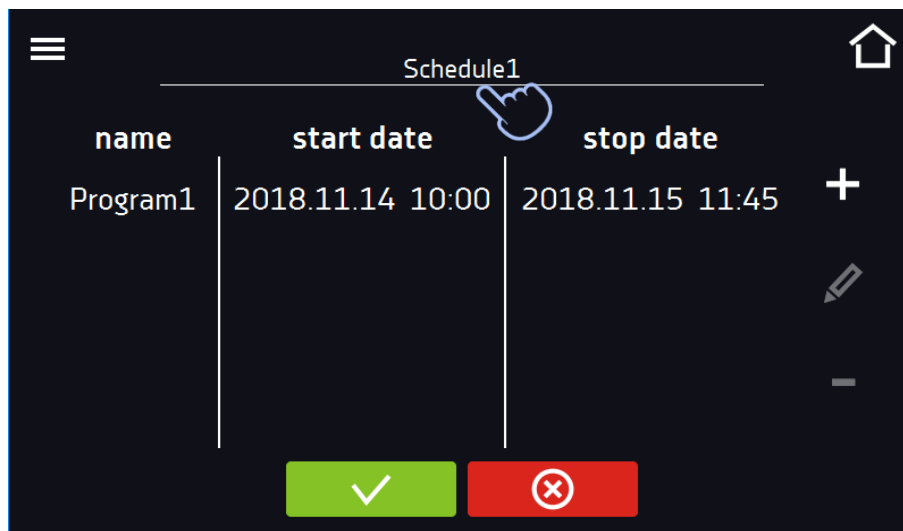






To create / edit a schedule, press the button  or . The panel with schedule parameters will appear on the screen (Figure 37). Press "Schedule" and use the keypad to enter the schedule name. The schedule may consist of up to 10 programs.

Figure 37 Creating / editing a schedule

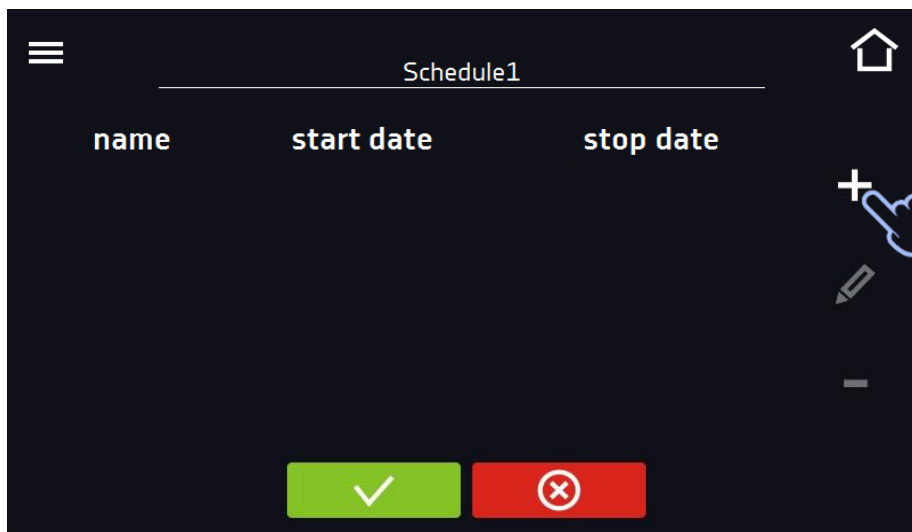


Add a new program to the queue (program must be previously created)

-  Edit and make changes to the selected position
-  Delete the selected position from the list
-  Save the schedule
-  Cancel introduced changes

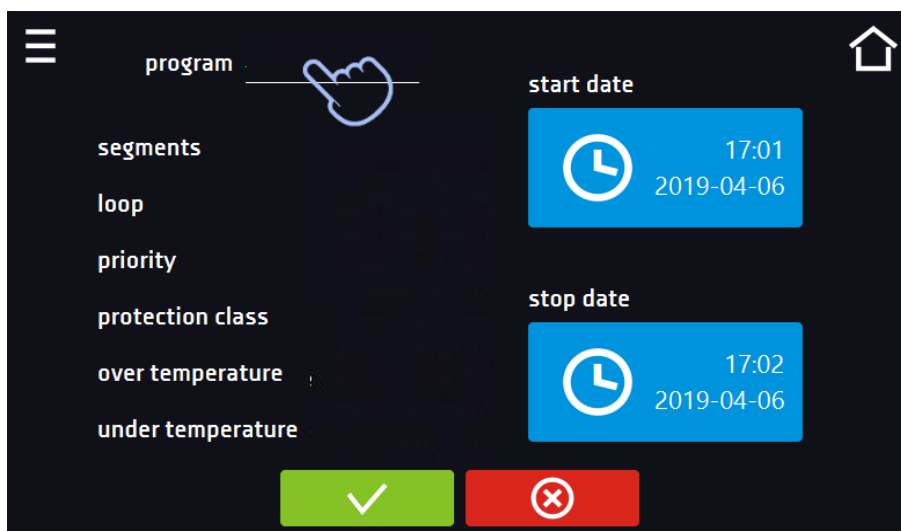
After pressing  (Figure 37) or  a window appears allowing you to select the program and the date and time of its start and end (Figure 38).

*Figure 38 Adding a program to the schedule*



Select a program from the drop-down list and press on the field next to the inscription "program" (Figure 39). Information about the selected program will be displayed (Figure 40): number of segments, number of cycles, priority, temperature protection, upper protection, lower protection. This is only a preview of the parameters - it is not possible to change them in this window.

*Figure 39 Selection of the program*



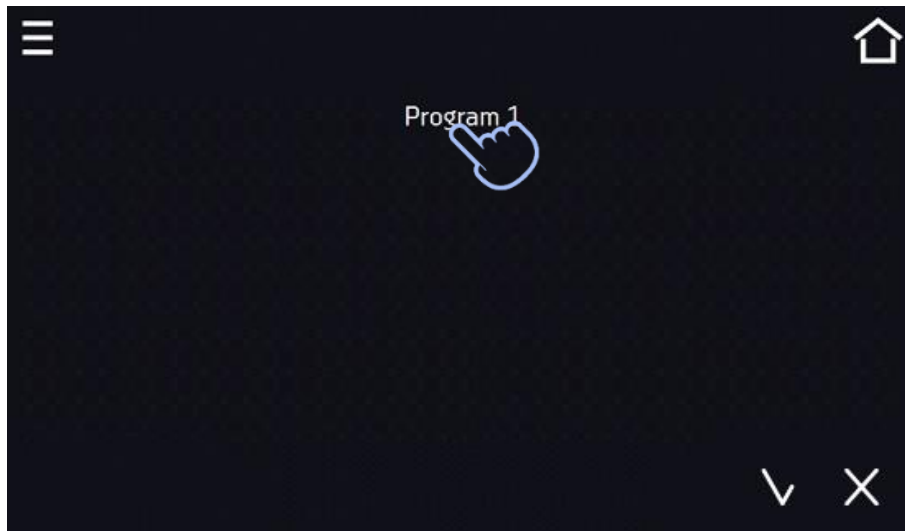
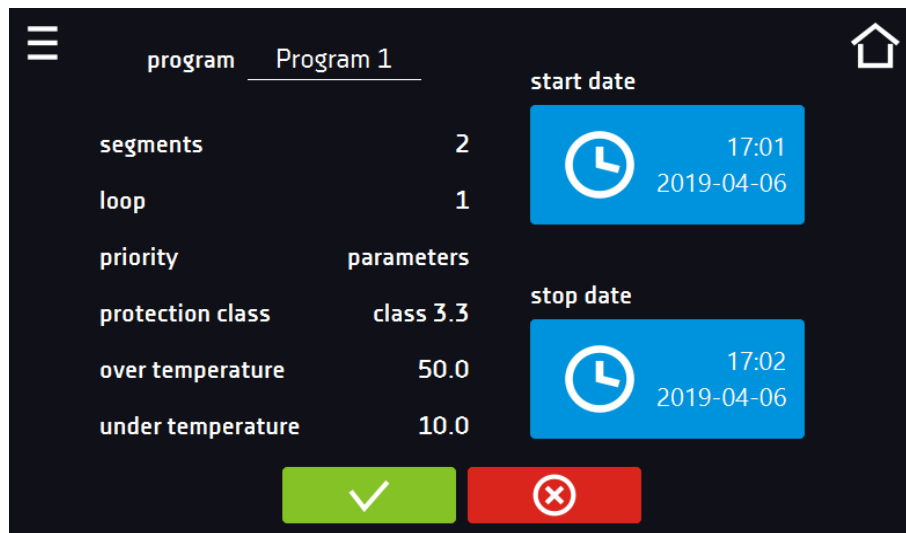
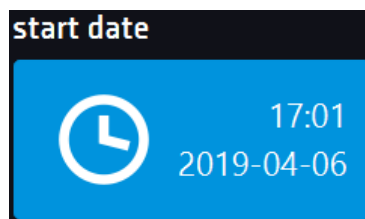


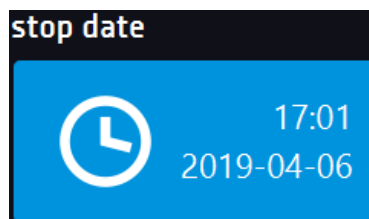
Figure 40 Information about the program



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



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





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

When creating a schedule, consider the following restrictions:

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



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

### 6.10.2. Starting a schedule

The schedule can be started in two ways:

#### 6.10.2.1. The first way




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

Figure 41 Main menu

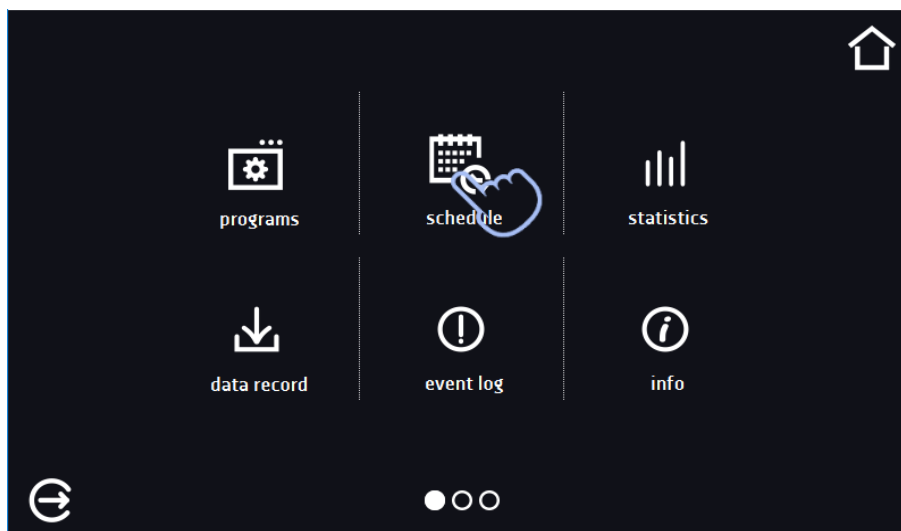
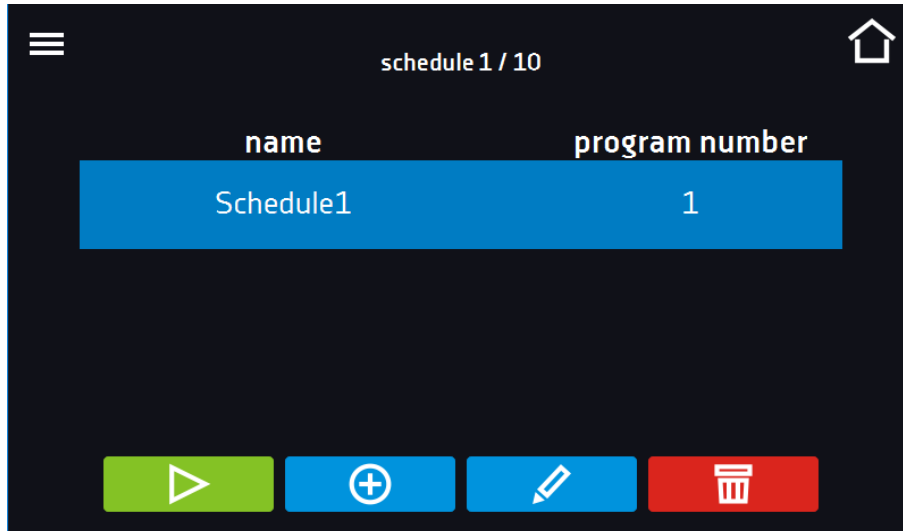




Figure 42 List of schedules



Start the schedule

### 6.10.2.2. The second way

- In the main screen press the icon  (Figure 43), then press the SCHEDULE inscription. The schedule selection window will be displayed.
- Then select the schedule you want to activate and press the button .



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

Figure 43 Main screen

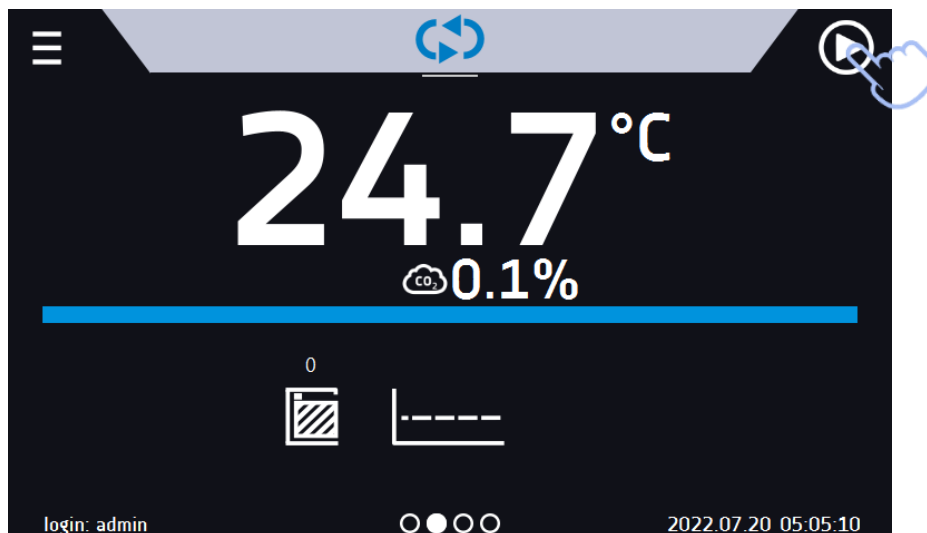
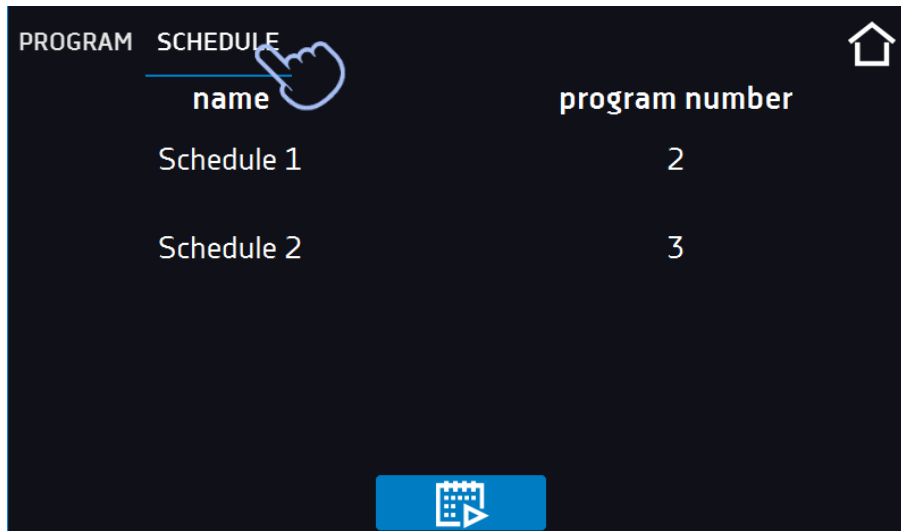




Figure 44 Selection of the schedule



## 6.11. Statistics

Go to the main menu  and press the icon . This panel 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:

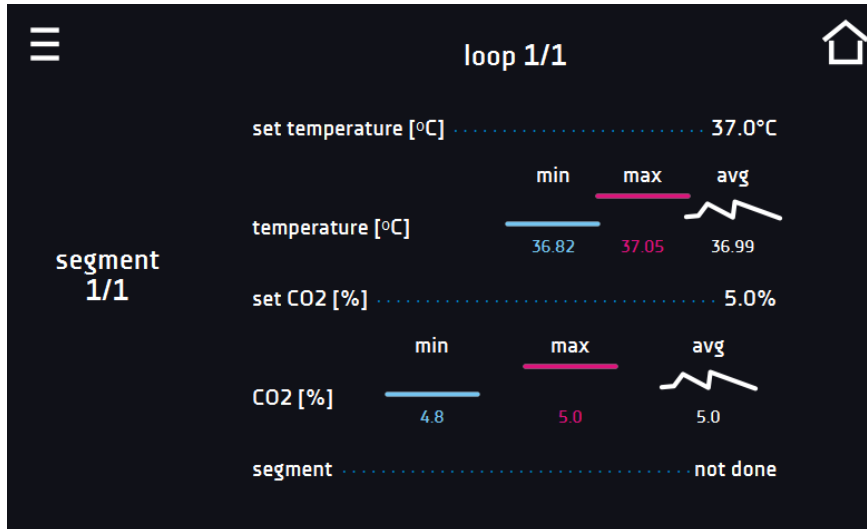
- **set temperature [°C]** – set temperature in the segment,
- **minimum temperature [°C]** – the lowest recorded temperature,
- **maximum temperature [°C]** – the highest recorded temperature,
- **minimum CO<sub>2</sub> [%]** – the lowest recorded CO<sub>2</sub> concentration,
- **maximum CO<sub>2</sub> [%]** – the highest recorded CO<sub>2</sub> concentration,
- **average CO<sub>2</sub> [%]** – average CO<sub>2</sub>,
- **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 overwiewing 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 overwiewing cycle / number of the currently performed or completed cycle. Navigating between the cycles is done by swiping your finger left or right.



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



Figure 45 Statistics




## 6.12. Data record

Go to the main menu  and press the icon . Data record window contains the following information:

- time and date of sample registration [date],
- temperature value measured with the main sensor in the chamber [temp.].
- CO<sub>2</sub> concentration value [CO<sub>2</sub>],
- status of the unit.

Each user can 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.




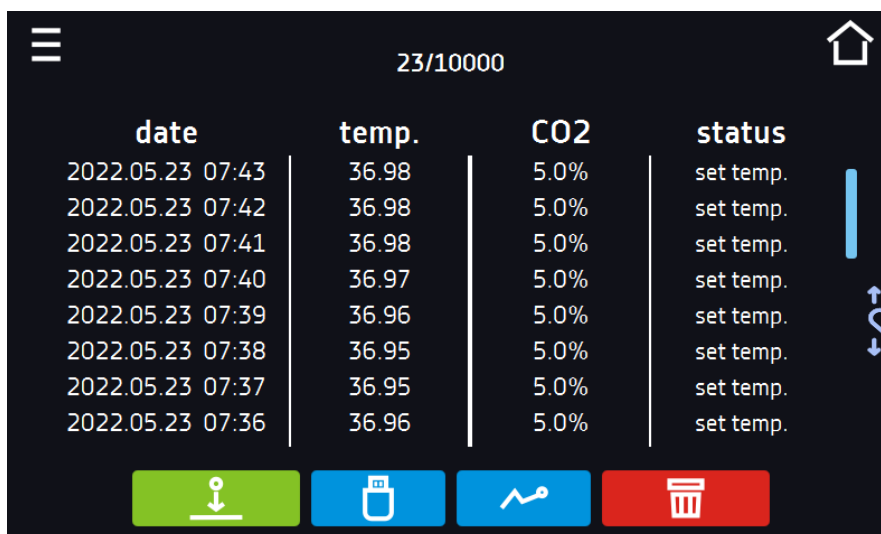
When opening the data record, all data is downloaded. If the data download is interrupted by the user, press  to continue downloading of the rest of the data.

Figure 46 Data record





Press to continue downloading data



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



Before removing the USB flash drive from the USB port, it must be unmounted, see [Section 5.8](#).



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 47](#))

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

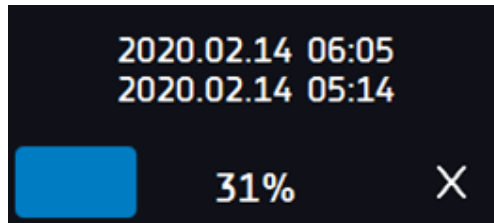
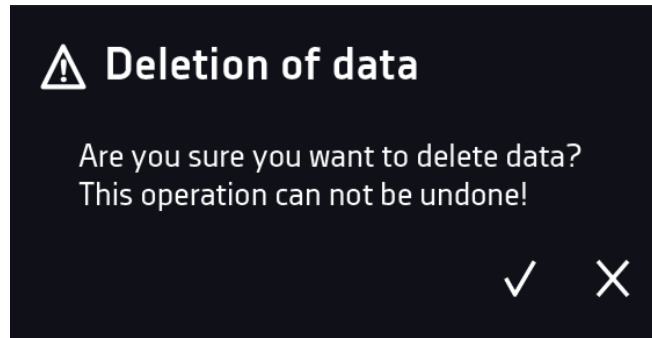


Figure 47 Deleting data



### Graph

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

Figure 48 Temperature and CO<sub>2</sub> concentration graph

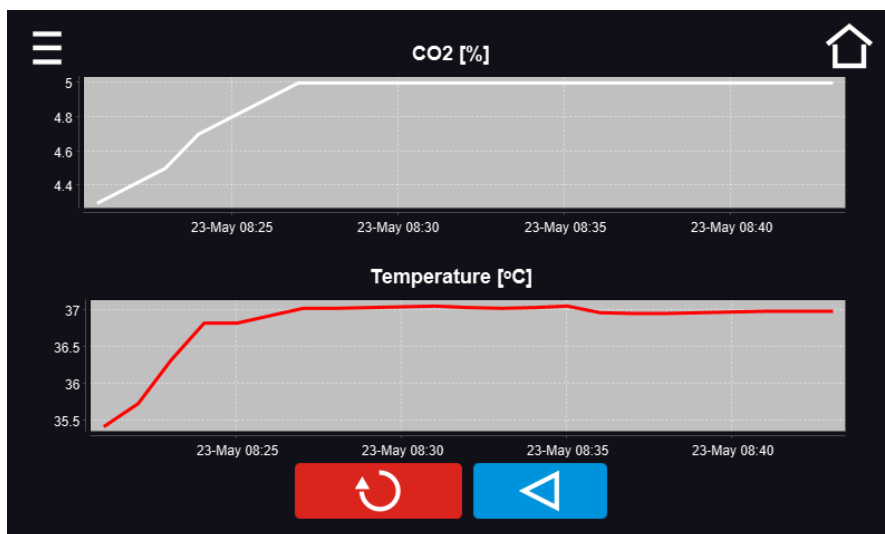
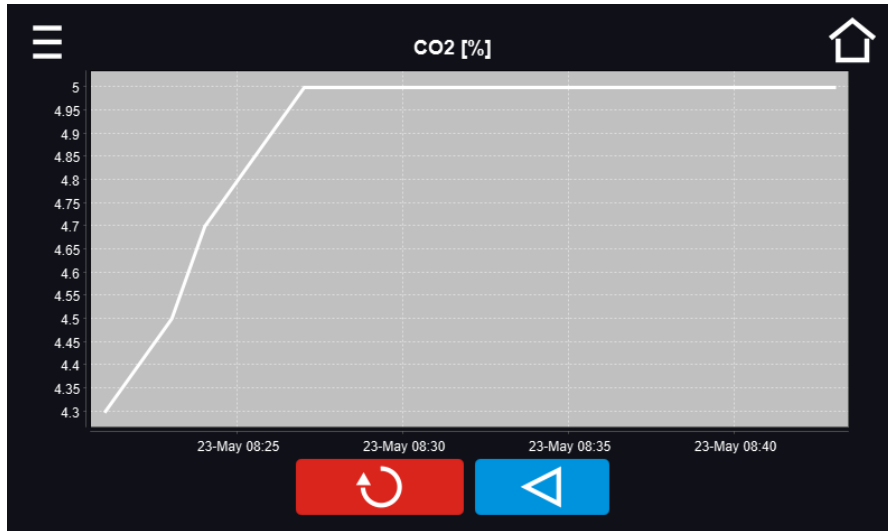


Figure 49 CO<sub>2</sub> concentration graph



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



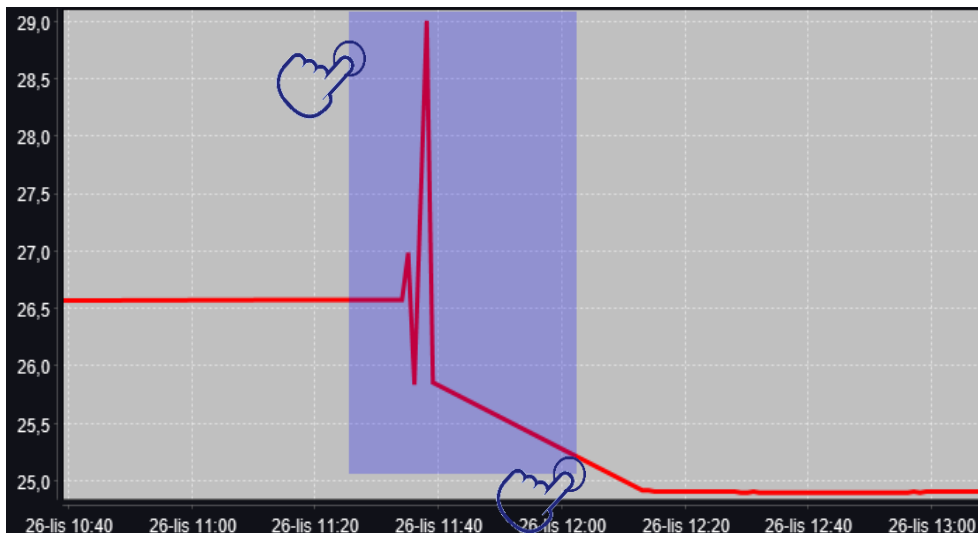
Returns to data register



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



### 6.12.1. **Data storage directly on a USB flash drive**

The saved data (temperature, CO<sub>2</sub> concentration, 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 5.8. [USB port](#),
- registration is continued after reinserting the USB flash drive,
- a folder with the name consistent with the serial number of the device is created on the flash drive, all files are saved in it. The files are saved in the csv format (separated by semicolons), which can be read in a spreadsheet or notebook

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

- the current measurement is saved to a file named measurements.csv,
- if the size of the current file exceeds 513 kB or the calendar month is changed, the current file is named in the format yyyy-mm\_ measurements\_0.csv, where 0 means the file number in the month, e.g. 2021-05\_measurements\_0.csv

### 6.13. **Event log**

Data available for the following users ([see Section 6.15 Users](#)):

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



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)

date	name	code
2020.11.10 21:04	Program Stop	2.01.0.1.008
2020.11.10 21:03	Program Start	2.01.0.1.007
2020.11.10 21:03	Program Stop	2.01.0.1.008
2020.11.10 21:03	Program Start	2.01.0.1.007
2020.11.10 21:03	Program Stop	2.01.0.1.008
2020.11.10 21:03	Program Start	2.01.0.1.007
2020.11.10 14:13	Program saved	2.01.0.1.022
2020.11.10 14:13	Program deleted	2.01.0.1.023
2020.11.10 14:12	Program updated	2.01.0.1.024



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




Before removing the USB flash drive from the USB port, it must be unmounted, see [Section 5.5](#).



Deleting data

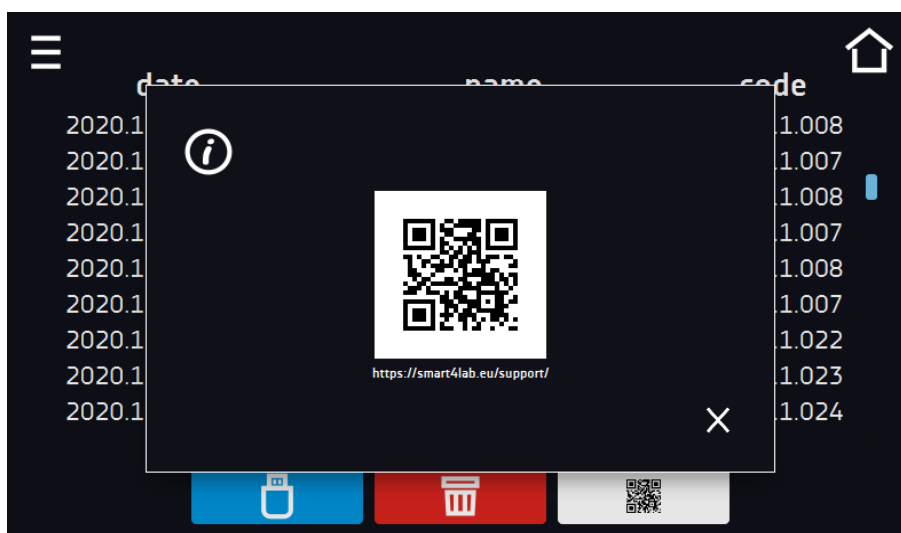


QR code – opens smart4lab.eu (in the "Support" tab there are explanations of some of the

information appearing in the event log). Press the symbol  and enlarge the code QR, and then scan it with your smartphone






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.

Figure 52 QR code



Before removing the USB flash drive from the USB port, it must be unmounted, see [Section 5.8](#).

Information signs in the event log:

	Information event
	Message entered by the user
	Alarm event
	Error
	Warning

Possible events:

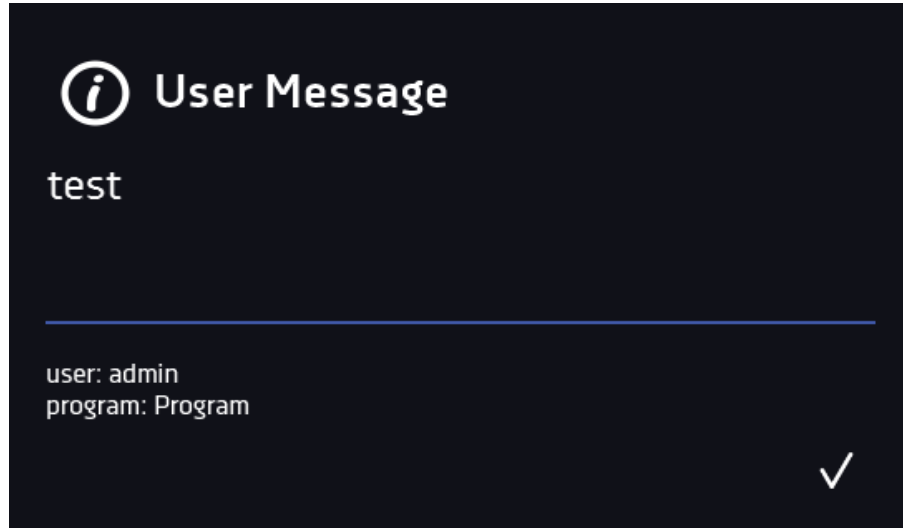
- **Date/time change** – data/time were changed
- **Device On** – the incubator is switched on (on the main switch)
- **Device Off** – the incubator is switched off (on the main switch)
- **Door closed** – the door is closed
- **Door opened** – the door is opened
- **Open door alarm start** – open door alarm has been activated
- **Open door alarm stop** – open door alarm has been deactivated
- **Over Protection Start** – over-temperature protection has been activated
- **Over Protection Stop** – over-temperature protection has been finished
- **Program Edit** – changing the program parameters
- **Program End** – program is finished
- **Program Restarted** – program has been restarted after power failure
- **Program Start** – starting the program
- **Program Stop** – stopping the program
- **Lower temp. alarm Start** – lower temperature alarm has been activated
- **Lower temp. alarm End** – lower temperature alarm has been finished
- **Upper temp. alarm Start** – upper temperature alarm has been activated
- **Upper temp. alarm End** – upper temperature alarm has been finished
- **Deleted Measurement** – user measurements have been deleted
- **Deleted All Measurement** – 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
- **Lower CO<sub>2</sub> alarm Start** – lower CO<sub>2</sub> concentration alarm has been activated
- **Lower CO<sub>2</sub> alarm End** – lower CO<sub>2</sub> concentration alarm has been finished
- **Upper CO<sub>2</sub> alarm Start** – upper CO<sub>2</sub> concentration alarm has been activated
- **Upper CO<sub>2</sub> alarm End** – upper CO<sub>2</sub> concentration alarm has been finished
- **CO<sub>2</sub> Pressure low Start** – low CO<sub>2</sub> pressure alarm has been activated
- **CO<sub>2</sub> Pressure low Stop** – low CO<sub>2</sub> pressure alarm has been finished
- **Sterilization program start** – sterilization program has been started
- **Sterilization program failed** – error or sterilization program has been stopped / interrupted (incomplete sterilization)
- **Sterilization program successful** – successful sterilization at 180°C for 2 hours has been finished
- **Sterilization program completed** – sterilization program has been finished (37°C in the chamber)
- **Start program cancelled, door is open** – sterilization start has been cancelled, the door is open



## 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)




Press icon  to save the "Download" folder (with instruction manual) on the USB flash drive. After inserting the flash drive into USB port wait few seconds until the information "Flashdrive connected" will appear on the display - for more

information go to the [Section 6.1](#). Press the icon  to write the service data on the USB flash drive – contact the service department for more information. Press the icon  to see additional information about software version.

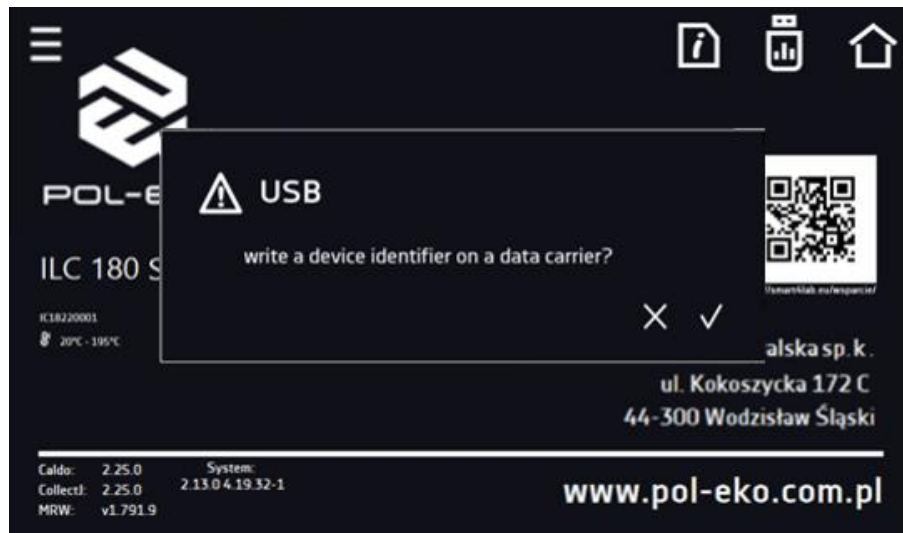
Press  to go to the main screen.

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





Before removing the USB flash drive from the USB port, it must be unmounted, see [Section 5.5](#).

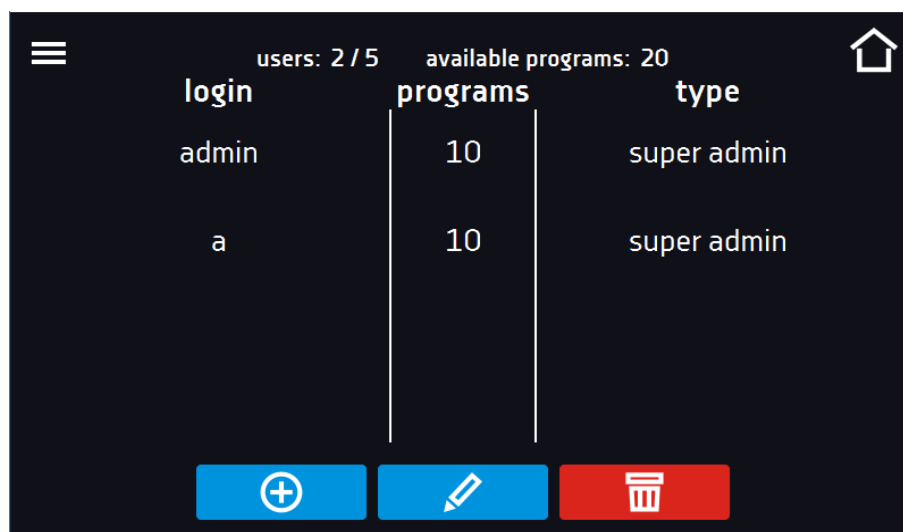
*Figure 55 Saving configuration file*



## 6.15. Users

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

*Figure 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 you can see information about:

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

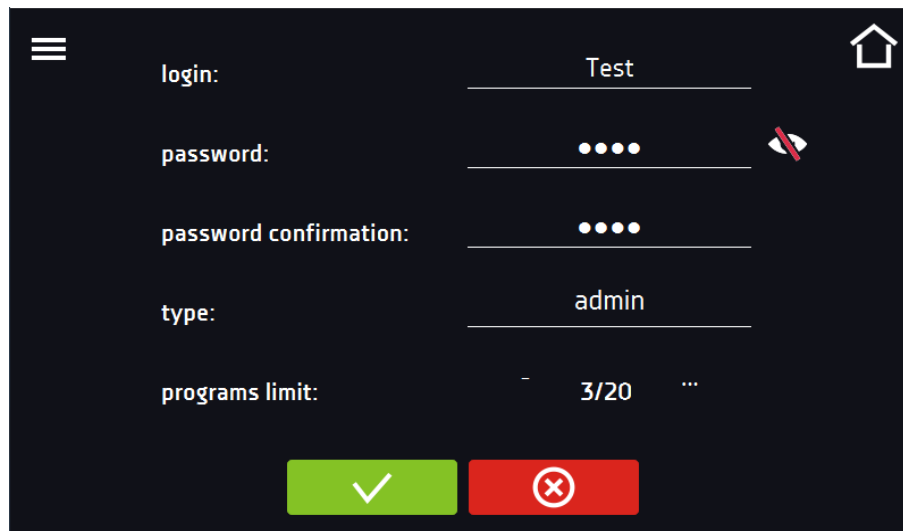
### 6.15.1. Creating / editing a user

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

You have to enter:

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

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](#).

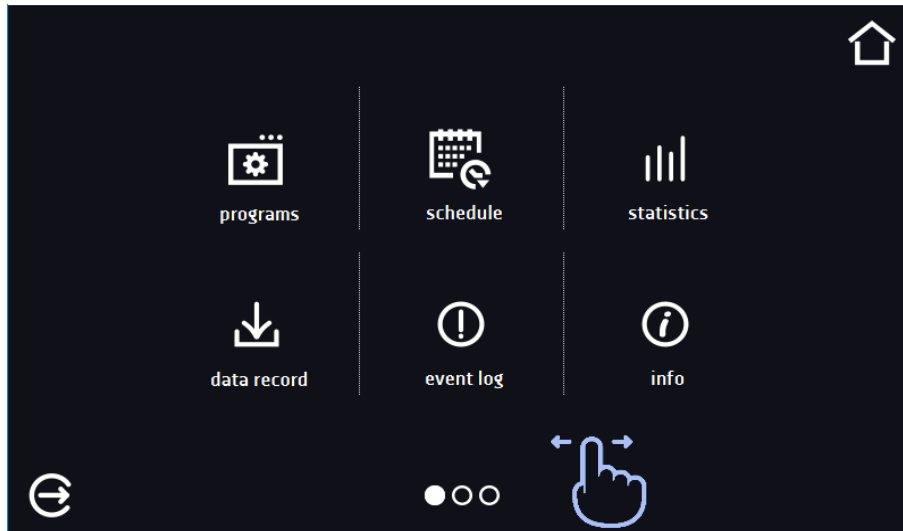
*Table 1 Right and limitations of the users*

	<b>Super Admin</b>	<b>Admin</b>	<b>User</b>
Creating programs	✓	✓	X
Editing programs	✓	✓	X
Stopping your own program	✓	✓	✓
Stopping a program of another user	✓	X	X
Quick program	✓	✓	X
Quick change of set time	✓	✓	X
Quick change of set temperature	✓	✓	X
Assigning a program to a user of the user type	✓	✓	X
Creating a schedule	✓	✓	X
Editing a schedule	✓	✓	X
Defrost control	✓	X	X
Management of the illumination shelves in the unit (FIT version)	✓	X	X
Setting temperature measurement parameters	✓	X	X
Temperature value correction	✓	X	X
Setting the alarms	✓	X	X
Temporarily silencing the alarms	✓	✓	✓
Enabling / disabling the sound	✓	X	X
Saving a Quick Note	✓	✓	✓
Creating users accounts	✓	X	X
Changing user's settings	✓	X	X
Changing equipment's name	✓	X	X
Setting a time zone	✓	X	X
Changing the language	✓	X	X
Setting the automatic logout time	✓	X	X
System information preview	✓	✓	✓
Statistics preview	✓	✓	✓
WiFi settings	✓	X	X
LAN settings	✓	X	X
Setting e-mail reports	✓	X	X
Access to the archive	✓	X	X
Events preview	✓	✓	✓
Deleting events	✓	X	X
Copying data to a pendrive	✓	✓	X
Data preview	✓	✓	✓
Copying data to a pendrive	✓	✓	✓
Displaying data as a graph	✓	✓	✓
Deleting your own data	✓	✓	✓
Deleting all data	✓	X	X
Resetting the open door counter	✓	X	X

### 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


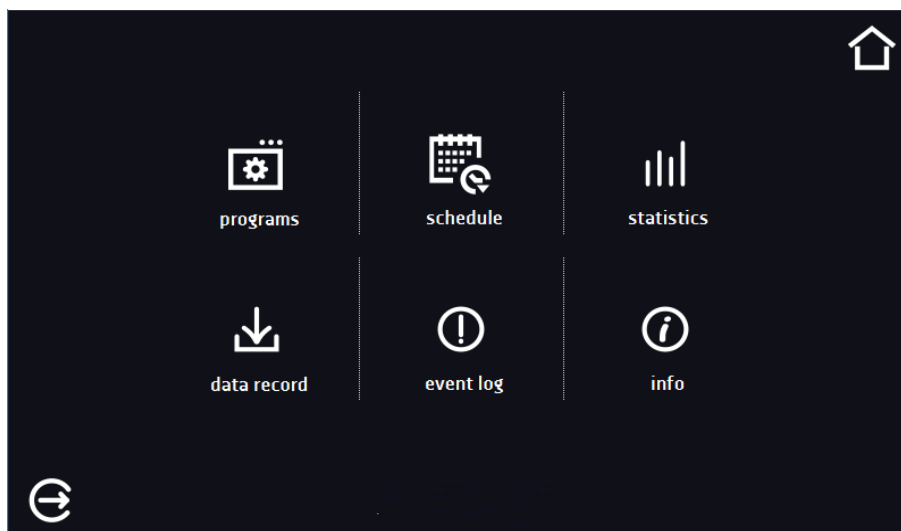

Has access to **programs menu**  and has rights and limitations in accordance with [Table 1](#).

Figure 59 Menu available for Admin

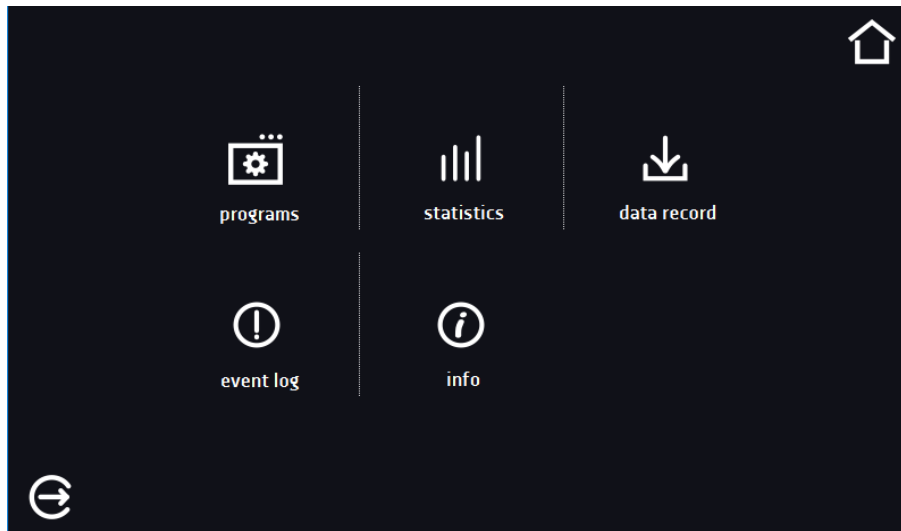


### User account:



- 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 (**event log**) and the information about the system (**info**),
- can't create his own programs and schedules but start those which has been assigned to him by Super Admin,
- can't stop or edit a program or schedule which wasn't started by him,
- doesn't have access to create or edit schedules,
- the program started by the User can be stopped by a user with Super Admin privileges.









Other rights and limitations of the User type account are shown in [Table 1](#).

Figure 60 Menu available for User



## 6.16. User settings panel

Go to the main menu  and press the icon . In this panel you can:

	Change the name of the equipment – by default, the device serial number is entered.
 English	Change the language in the equipment's menu.
	Set the time after which the screen will be dimmed.
	Turn on/off the sound . Critical alarms will continue emitting a sound.
	Set the time after which the user will be automatically logged out. Available settings: off, 1 min, 3 min, 5 min, 10 min. Factory setting: enabled.
	Set the time after which the user will return to the home screen. Available settings: off, 1 min, 3 min, 5 min, 10 min.
	Set the automatic screen lock. Available settings: off, 5 min, 15 min, 30 min, 60 min. Factory setting: disabled.
	Enable / disable data register on a USB flash drive (connected to the USB port on the front of the unit).


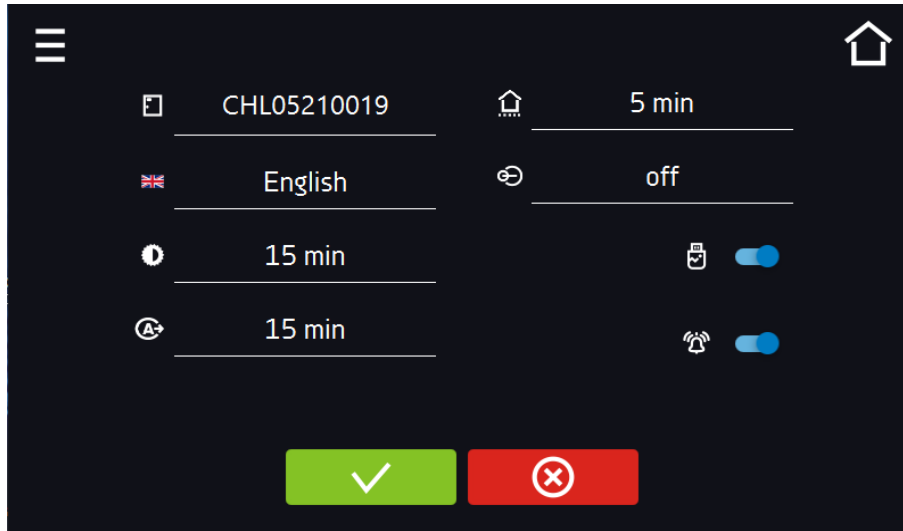
 Only one feature can be enabled at the same time: automatic logout or automatic screen lock.

Figure 61 User settings panel



Confirms changes

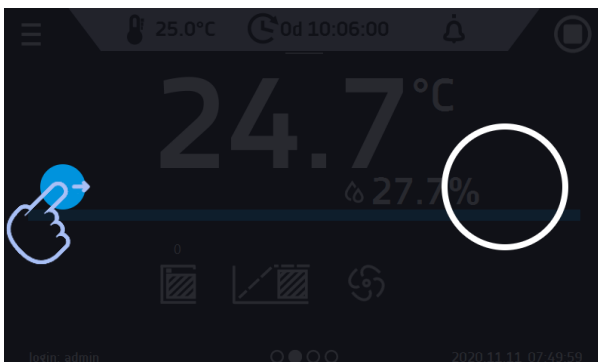


Cancel the entered changes



### 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

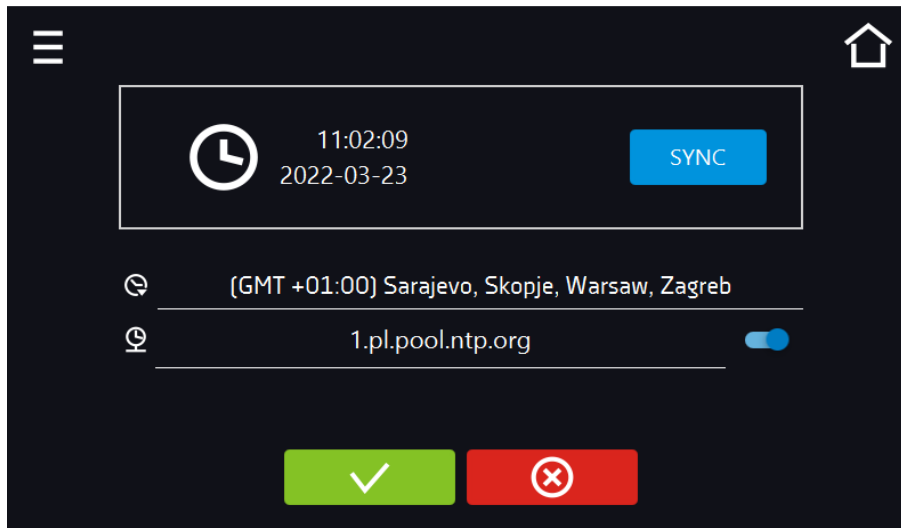


If the date / system time is changed to the later date / time comparing with the data and events which are stored in the memory, they will remain in the register. If the date / system time is changed to the earlier date than the date / time which is stored in the memory, they will be transferred to the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




Confirms changes and restarts the device



Cancel 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 button  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



Cancel 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.
- **lower alarm CO<sub>2</sub>** – an alarm will be generated if the CO<sub>2</sub> concentration drops below the value given in this field
- **upper alarm CO<sub>2</sub>** – an alarm will be generated if the CO<sub>2</sub> concentration rises over the value given in this field

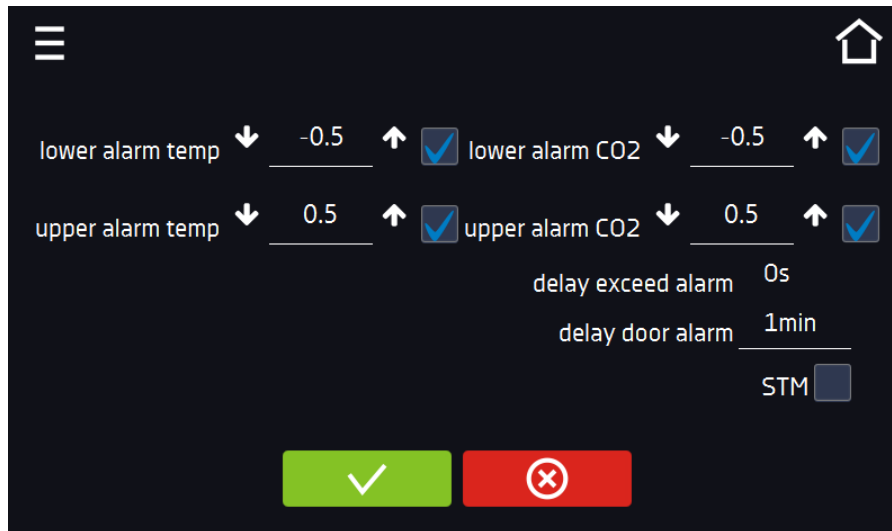


In the field "lower alarm temp" you can set a value of -0,5°C to - 5°C and in the field "upper alarm temp" you can set a value of +0,5°C to +5°C.

The lower and upper alarms 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

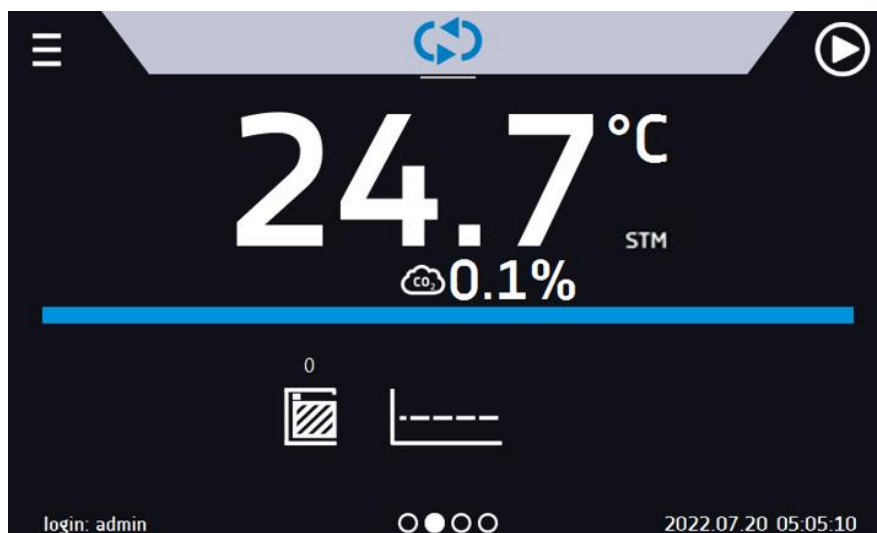


Cancel the entered changes

### 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

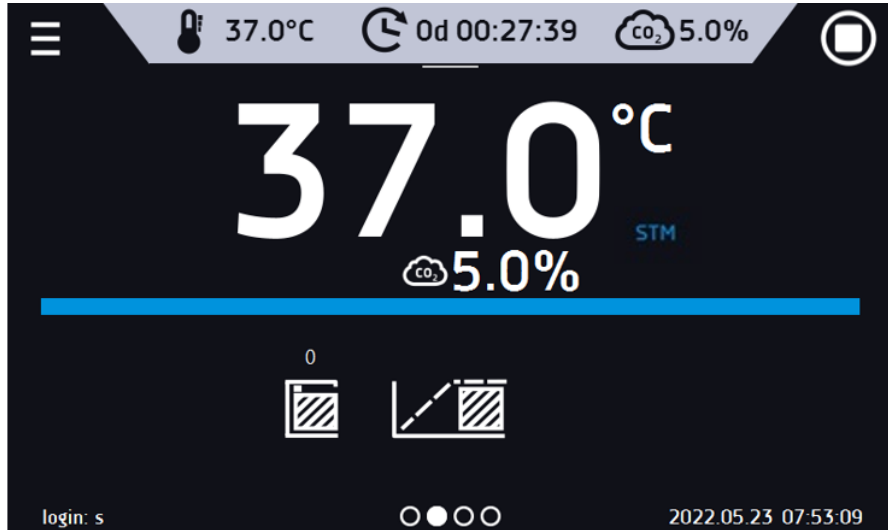
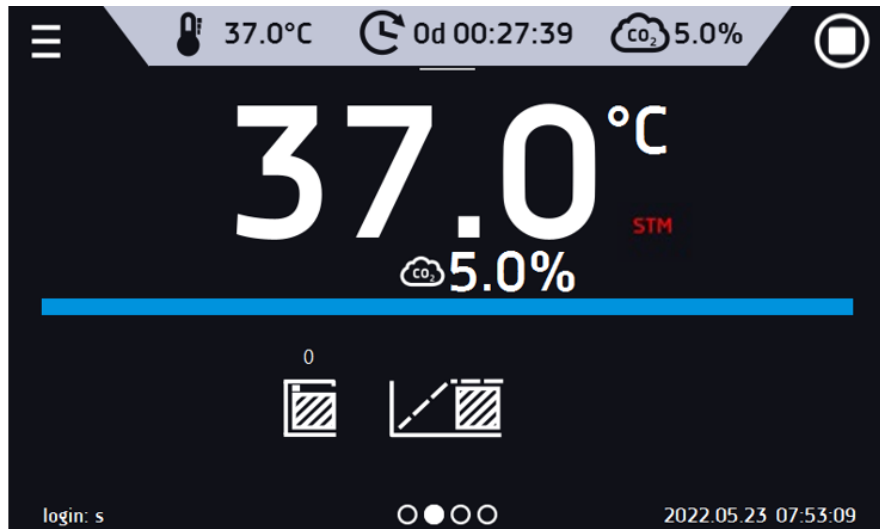


Figure 68



Possible causes:


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

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

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

- the warning 4.00.0.1.009... appears in the event log
- the color of the STM inscription changes to red and remains as long as the failure occurs, the segment is changed or the program is turned off
- when the status changes from red to blue, an entry about the end of the function 4.00.0.1.010 appears in the event log

### 6.18.2. Mute option

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


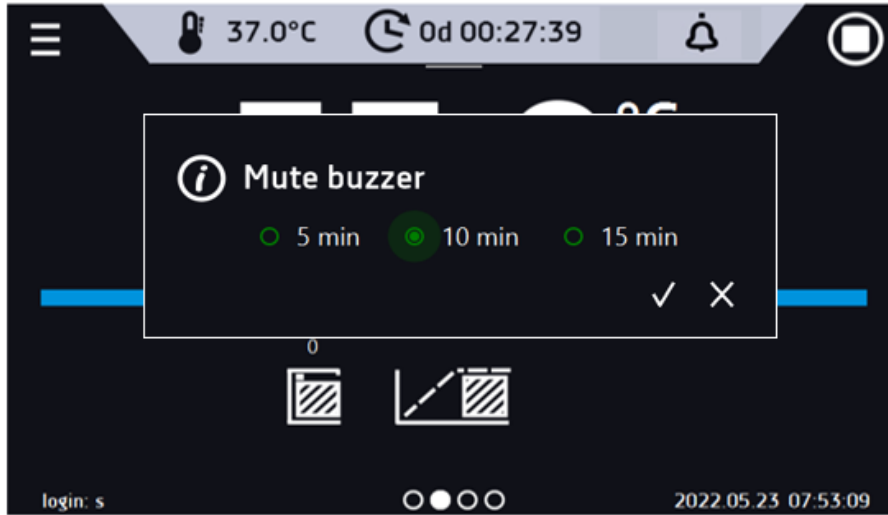




To set the mute time, press the icon  and choose: 5, 10 or 15 minutes (Figure 69), however, the sounds of critical alarms (e.g. damage to the temperature sensor, over- and under-temperature protection) will be still emitted.

Figure 69 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

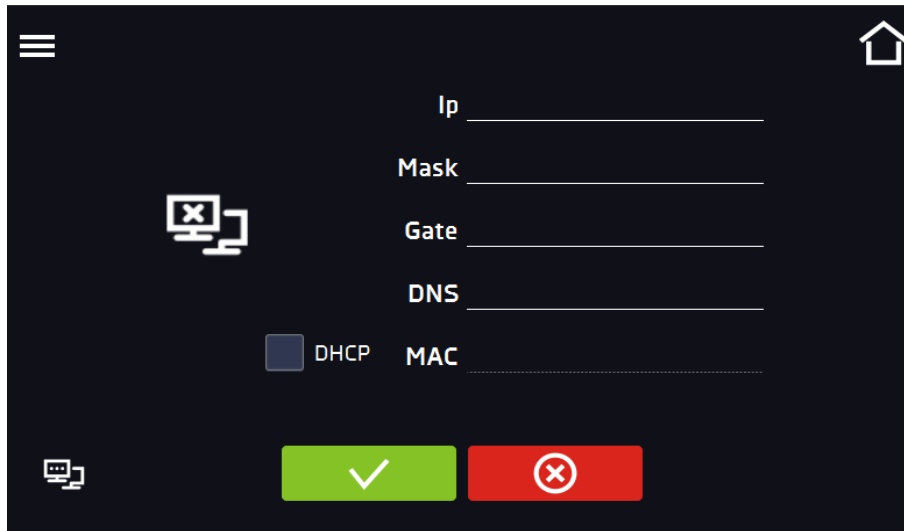


Device connected to the network



Device disconnected from the network

Figure 70 LAN settings



Confirms changes



Cancels the entered changes

WiFi settings:


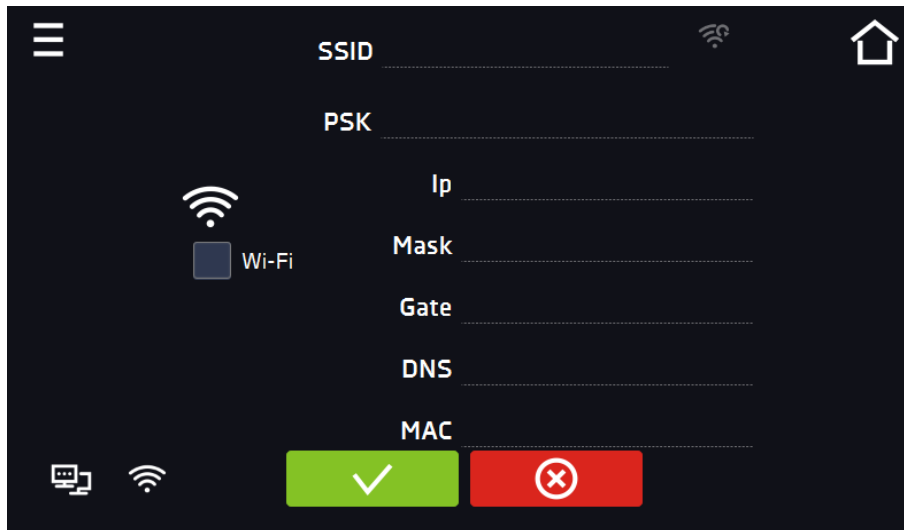
-  – press to refresh network list,
- **SSID** – press to select network from the drop-down list,
- **PSK** – network password,
- **IP, Mask, Gate, DNS** – after a successful connection to the network these fields are automatically completed,
- **MAC** – physical address of the network card, read-only.

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.

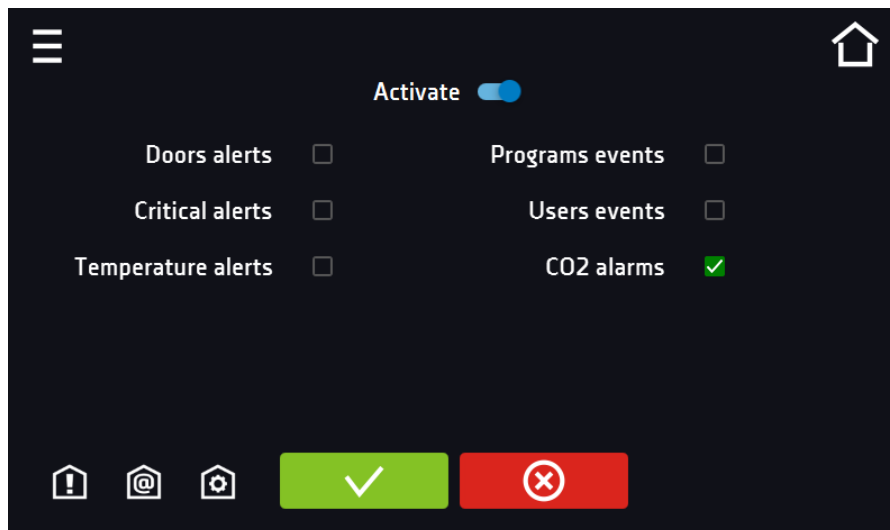
In the panel there are three windows:



Selection of event types for which notifications should be sent.

- **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).
- **CO<sub>2</sub> alerts** - alarms caused by too high or too low CO<sub>2</sub> concentration

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



Cancel 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

-  TEST 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. Corrections

Go to the main menu  and press the icon . In this window you can correct temperature value indicated on the display by adding the correction value. The set correction value applies to the whole temperature range of the device. For example, if the average temperature displayed by the device indicates 37,0°C and the average temperature measured by independent, external sensor indicates 37,5°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.


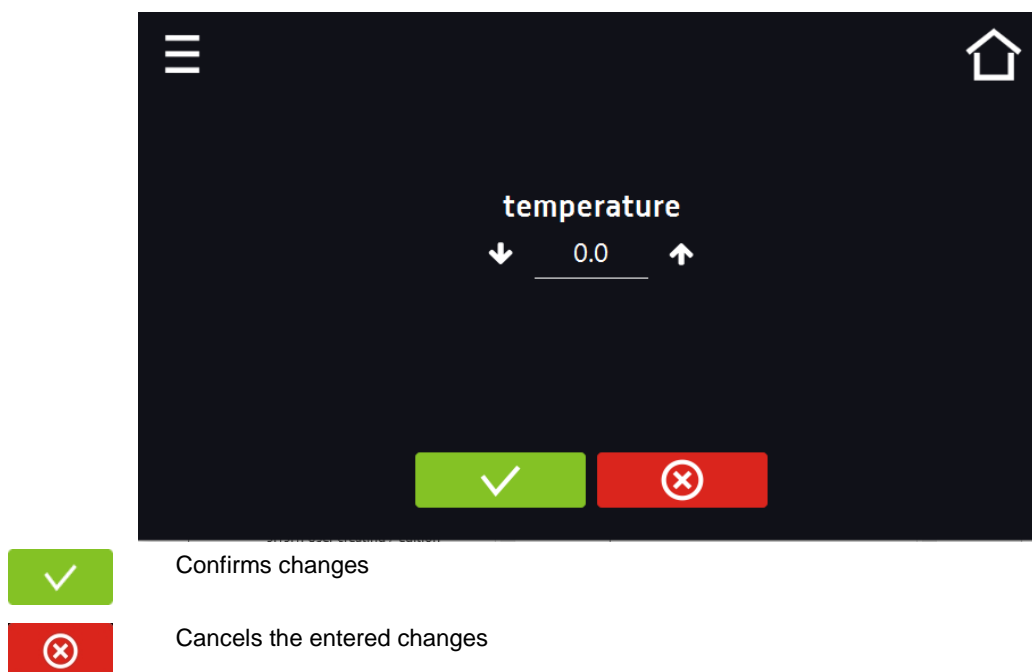




 The device has been calibrated by the manufacturer in accordance with applicable norms. The temperature shown on the display corresponds with a great accuracy to the temperature near chamber's sensor. For the correct operation of the device it is not necessary to use User's calibration. The user is performing 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 75 User's correction



## 6.22. Hot-air sterilization program

	<p>Before starting hot-air sterilization: the entire interior must be <b>clean and dry</b>. No residue of e.g. samples, plastic or water can remain inside the chamber, empty the water pan (the rack, shelves, water pan and CO<sub>2</sub> sensor can stay inside the chamber, the blue plastic caps at the rack system are heat resistant and don't need to be removed), close the inner glass door and the outer chamber door.</p>
	<p><b>During hot-air sterilization do not touch the internal components and glass door, as there is a risk of burns. Use protective gloves to avoid burns from hot components.</b></p>
	<p>First sterilization processes may cause an odour. It is not a quality defect. It is recommended to ventilate the room well during sterilization.</p>

The CO<sub>2</sub> incubator is equipped with an automatically controlled hot-air sterilization program. The program is in the main screen under the  button (upper right corner).

The start of the program can be immediate or delayed.






Immediate start of the program



Scheduled program start according to the set date and time

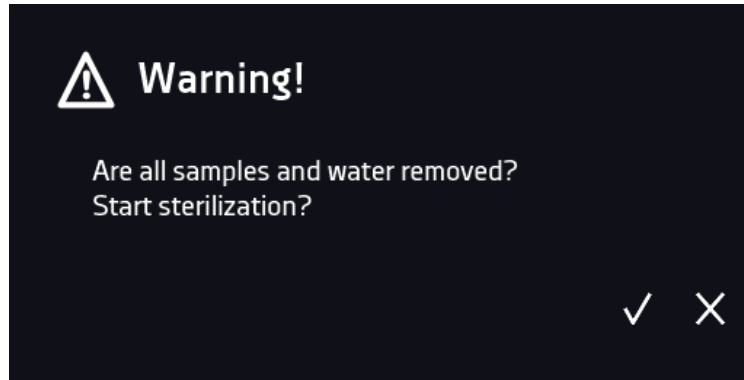
Figure 76 Sterilization program

PROGRAM		SCHEDULE	
name	segments	priority	
Program	1	parameters	
STERILIZATION	-	parameters	

Before running the program a confirmation prompt is displayed. Make sure that the water pan was emptied and all samples were removed from the chamber. Confirm the message. The program starts immediately or when the program delay time is over.

Figure 77 Confirmation window



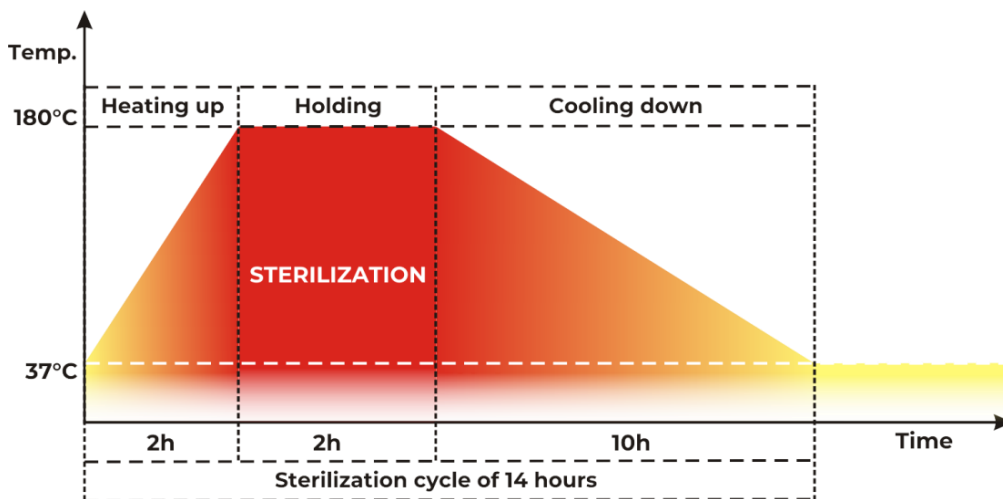
The program will take approx. 14 hours and consists of the following steps:

- **Heating up phase:** the inner chamber is heated up as fast as possible to the sterilization setpoint temperature
- **Holding phase:** setpoint temperature is kept for 2 hours

The sterilization setpoint temperature is set to 180°C. The duration of the heating up and holding phase is in total 4 hours. This ensures that the effective sterilization temperature is maintained on all internal surfaces for 2 hours.

- **Cooling down phase:** it takes around 10 hours until 37°C is reached.

Figure 78 Setpoint profile during the sterilization cycle



The phase of the cycle is indicated at the bottom of the screen by icons shown below.



- heating up phase



- holding phase



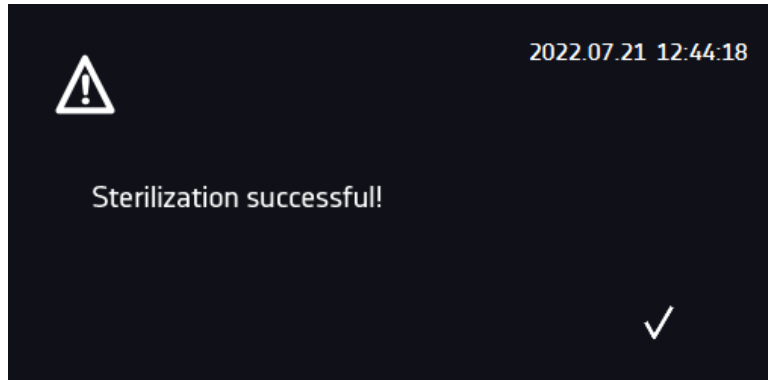
- cooling down phase

Temperature and time of the sterilization process cannot be changed. The CO<sub>2</sub> sensor can be hot-air sterilized inside the chamber.

After holding the temperature inside the chamber for 2 hours at 180°C the sterilization process is automatically finished. The information of successfully performed process pops up on the controller display (Figure 79).



Figure 79 Successful sterilization





The total cycle of sterilization finishes when the temperature inside the chamber cools down to 37°C. Then, the information of completed sterilization appears (Figure 80). Confirm the message with the  button.

Figure 80 Sterilization completed



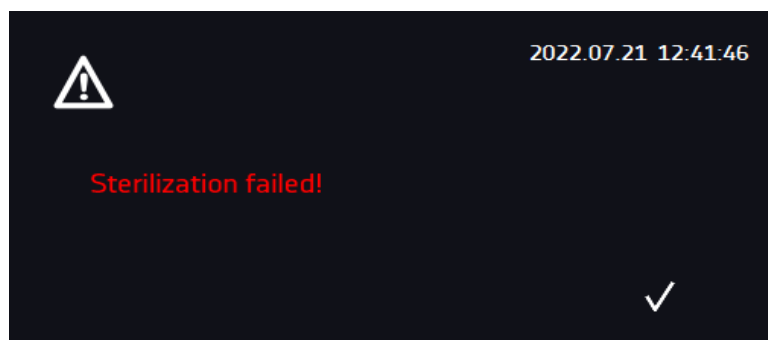
If during the heating up and holding phase:

- the program is stopped by pressing the  button,
- the external door is opened,
- the unit is turned off with the main power switch or in case of power failure,
- the unit's error occurs,

the sterilization is prematurely terminated. The information of incompletely performed sterilization pops up on the display and the event is registered in the Event log ("Sterilization failed").

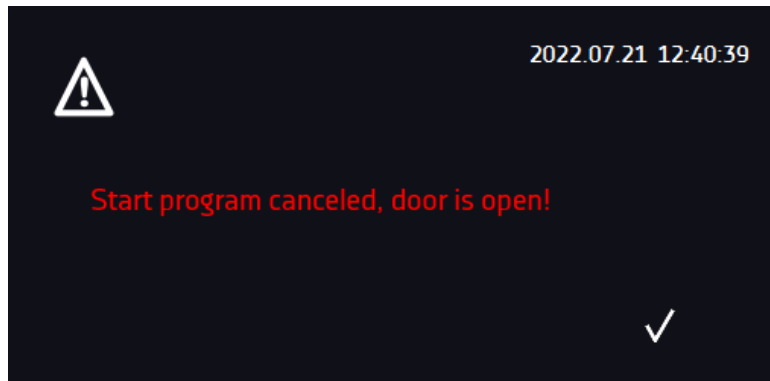
If the sterilization cycle was terminated prematurely, the germs inside the chamber might not be killed totally. It is recommended to repeat the sterilization.

Figure 81 Sterilization failed



If the door is open when the sterilization program is starting, the program won't start. The information of cancelled sterilization pops up on the controller display (*Figure 82*). Close the door and run the sterilization program again.

*Figure 82 Sterilization start cancelled*



	Do not touch the glass door and the inner surfaces for approx. 10 hours after the prematurely terminated sterilization cycle.
	CO <sub>2</sub> control is deactivated during the sterilization process and will only be activated when temperature has cooled down to a value below 55°C.

The chamber during sterilization process can have negative impact on the other chamber. Therefore it is recommended to use the original stacking adaptor.

## 7. INTERFACE

### 7.1. MODBUS TCP

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

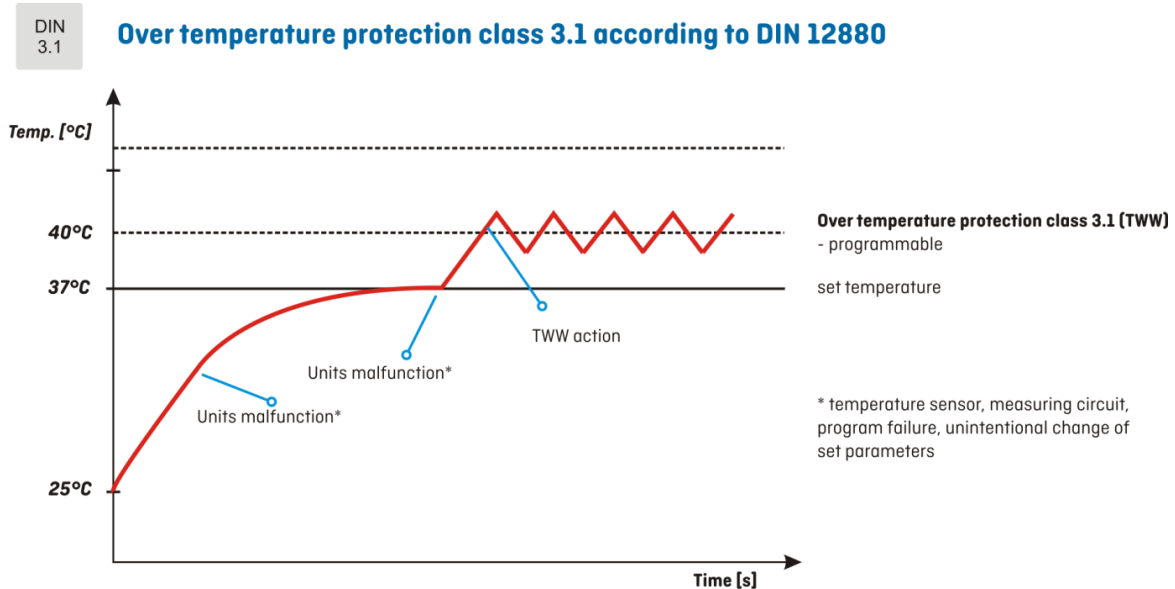
Connection parameters:

- IP address: same as device's (set in the panel [Section 6.19.](#))
- port: 502

register INPUT REGISTERS			
function READ_INPUT_REGISTERS (0x30001)			
Address	Type	Multiplier	Description
0	int	10	temperature from the main sensor
3	bool	-	Open door
4	bit	-	b0 – door alarm b1 – upper temperature alarm b2 – lower temperature alarm b3 – over Protection b4 - under Protection b5 – main sensor error b6 – additional sensor error b7 – protection sensor error b8 – temperature sensors error b10 – hardware error b11 – MRW error
5	bit	-	b8 – error CO2 sensor b9 – communication error with CO2 sensor b10 – lower CO2 alarm b11 – upper CO2 alarm

## 8. TEMPERATURE PROTECTION

Temperature protection is included as standard. If damage occurs to the temperature controller or the user changes the temperature settings outside the limit, temperature protection will activate. Protection class 3.1 is a standard. The figure below shows how this works.



## 9. CONNECTING THE DEVICE TO A COMPUTER

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

## 10. CLEANING AND MAINTENANCE OF THE DEVICE



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

Maintenance (cleaning of the housing and the chamber) should be carried out at least once a week (depending on the environmental conditions in the workplace).

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



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

### 10.1. Replacing the CO<sub>2</sub> gas filter

The incoming gas passes through a sterile inlet filter when the device is in operation. This aseptic filter (particle size 0,2 µm) has a filtration efficiency of 99,99%. The gas cylinder and the supply hose can be a source of dirt. The filter prevents this dirt from accumulating in the gas inlet valve and in the hoses leading into the chamber.

POL-EKO recommends to change the CO<sub>2</sub> gas filter once per year when using gas with a technical grade of 99,5%. The changing intervals should be shorter when gas with less pureness is used.

A safe CO<sub>2</sub> gas filter replacement should be performed according the following procedure:

1. Turn off the unit and remove the cover on the chamber rear.
2. Remove the gas filter on both sides from the gas hoses and then install a new filter.
3. Check gas connections for leaks (e.g. with leak spray or diluted soap solution). Run an exemplary program, adjusting 5% of CO<sub>2</sub> concentration. When no gas bubbles are observed after few valve openings, that can be heard (max. 1 minute of the program), the hoses are connected properly. Stop the program.
4. Reinstall the cover on the chamber rear.



### 10.2. 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 <b>the touch screen</b> using a soft cloth or a foam for cleaning touch screens.
6.	<b>USB port</b> can be cleaned with a vacuum cleaner to prevent accumulation of dirt inside the port.

### 10.3. 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.
6.	To assure septic environment in the chamber it is recommended to clean the inner gasket with a 70% isopropylene.

### 10.4. Disinfection of the CO<sub>2</sub> sensor

The disinfection of the sensor can only be performed when the CO<sub>2</sub> incubator is turned off. POL-EKO recommends to wipe the sensor head with a lint-free cloth soaked with disinfectant. The disinfectant must be a non-corrosive, acid and chlorine-free alcohol based surface disinfectant or 96% pure alcohol. To sterilize the entire chamber use the hot air sterilization routine.


	<p><b>NOTICE :</b> Do not spray the sensor with any cleaning detergents or disinfectants which are not recommended by POL-EKO!</p>
	<p><b>NOTICE:</b> An unsuitable disinfection procedure can damage the CO<sub>2</sub> sensor.</p>
	<p><b>NOTICE:</b> It's forbidden to spray the disinfectant directly on the CO<sub>2</sub> sensor.</p>

### 10.5. 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.

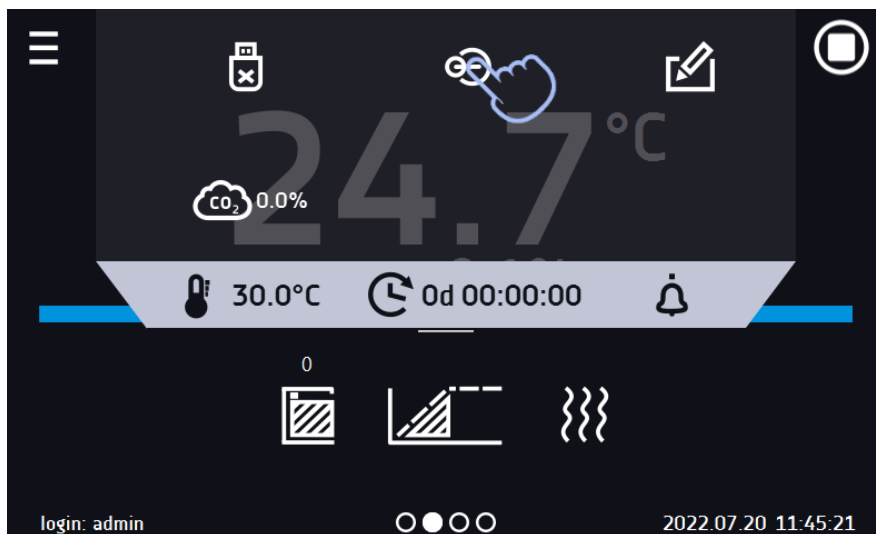
	<p>Before using the cloth, <b>make sure that on the surface there are no crumbs or particles.</b> During cleaning, they can act like sandpaper and <b>scratch the surface of the screen.</b></p>
--	--

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

	<p>Do not use paper towels to clean the screen as it may cause microdamages.</p>
---	--

Before cleaning, lock the screen by pressing  on the top drop-down list (Figure 83).

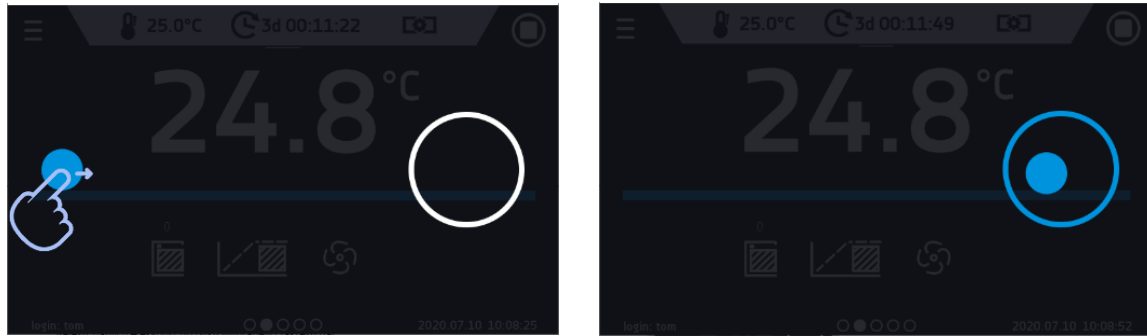
Figure 83 Locking the screen



The screen is ready to be cleaned.

To unlock the touch screen, slide the blue circle into the white circle (Figure 84).

Figure 84 Unlocking the screen



## 10.6. Advice on how to safely store the device

1.	Close the CO <sub>2</sub> pressure cylinder valve and disconnect the CO <sub>2</sub> gas hose.
2.	Remove load from the chamber.
3.	Clean the chamber and empty the water pan.
4.	Before disconnecting the unit from the mains, the chamber <b>must be dried</b> (e.g. by door opening, chamber ventilating or chamber heating without the water pan). Turning the unit off without drying will cause water condensation in CO <sub>2</sub> sensor and its malfunction.
5.	Disconnect the incubator from the mains.
6.	Leave the inner/ outer doors and access port open to allow adequate ventilation.
7.	Store in temperature between 10°C and 50°C and relative humidity maximum of 70%.

## 10.7. Consumables

Consumables during normal operation are:

- silicone door seal - in all units,
- replacement of CO<sub>2</sub> gas filter

## 11. 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](http://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](http://www.pol-eko.com.pl)

### 11.1. 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
CO <sub>2</sub> measurement malfunction	Check if water is not condensed in the measuring tip of CO <sub>2</sub> sensor.	Remove the white filter from the measuring tip of CO <sub>2</sub> sensor (in the chamber) and let the tip to dry or run the program without water pan e.g. 50°C till the sensor is dry.  
CO <sub>2</sub> concentration is not rising	Check if the gas cylinder is not empty.	Replace the CO <sub>2</sub> cylinder.
	Check if the gas hose is not curved too much.	Straighten out the gas hose.
	Check if the CO <sub>2</sub> gas filter is not clogged.	Replace the filter.
	Check if the CO <sub>2</sub> gas filter was replaced according to schedule.	
Check the CO <sub>2</sub> pressure on the pressure regulator (approx. 1,5-2 bar).	Adjust the pressure regulator for proper CO <sub>2</sub> pressure (approx. 1,5-2 bar).	

## **12. 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>

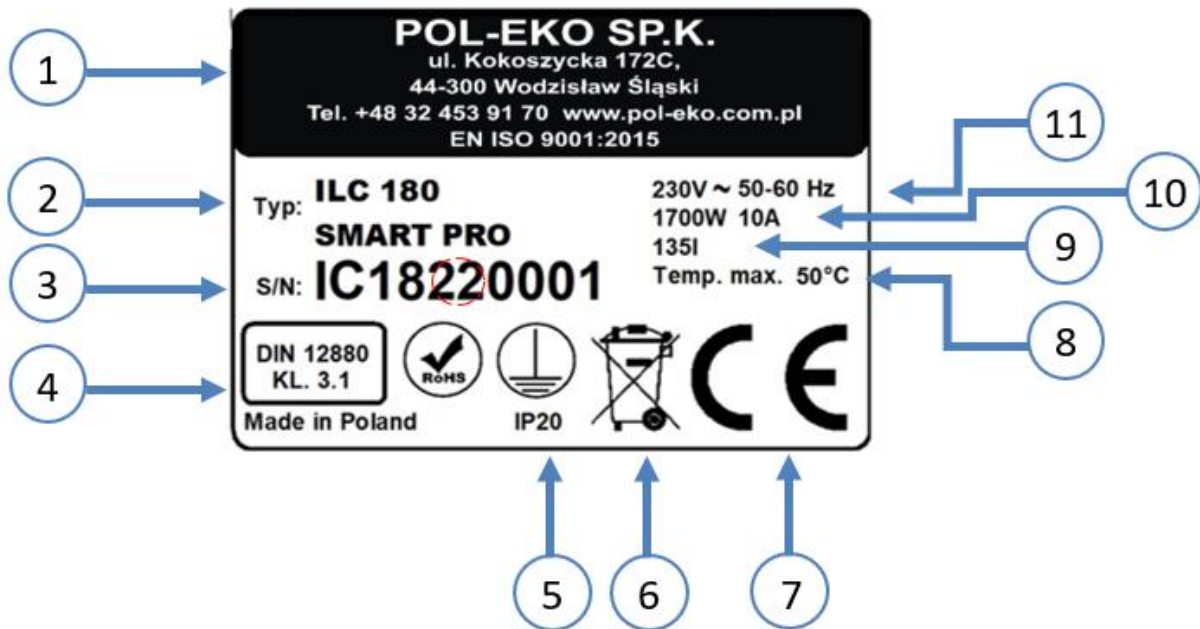
### **Compliance with local laws and regulations**

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.



### 13. 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 the device - capacity of the chamber
10. Information about the device - maximum power consumption,
11. Acceptable range of voltage and frequency of mains supply

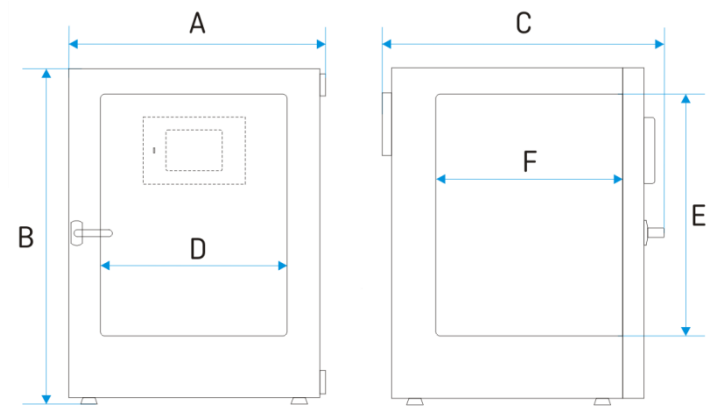
## 14. TECHNICAL DATA

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


		<b>ILC 180 SMART PO</b>
		
Air convection		natural (fan-less)
Chamber capacity [l]		182
Working capacity <sup>1)</sup> [l]		135
Door type		double (external solid, internal glass)
Temperature range [°C]		+5°C above ambient temperature...+50
Temperature resolution [°C]		every 0,1
Humidity range [% rH]		90-95
CO <sub>2</sub> range [Vol.-% CO <sub>2</sub> ]		0-20
CO <sub>2</sub> resolution [Vol.-% CO <sub>2</sub> ]		every 0,1
CO <sub>2</sub> measurement		IR
Controller		microprocessor with a large 7" full colour touch screen
Interior		stainless steel to DIN 1.4301
Housing		powder coated sheet
Overall dims <sup>2)</sup> [mm]	A width	700
	B height	920
	C depth	780
Internal dims [mm]	D width	560
	E height	650
	F depth	500
Max shelf workload [kg]		10
Max unit workload [kg]		30
Nominal power [W]		1700
Weight [kg]		96
Temperature fluctuation <sup>3)</sup> at 37°C [°C]		< $\pm 0,1$
Temperature variation <sup>4)</sup> at 37°C [°C]		< $\pm 0,3$
Recovery time after 30 seconds door opening at 37°C [min]		6
CO <sub>2</sub> recovery time after 30 seconds door opening at 5 Vol.-% CO <sub>2</sub> [min]		10
Energy consumption at 37°C [Wh/h]		66
Power supply		230V 50-60Hz
Sound level [db(A)]		42
Shelves (std./max.)		3/6
Warranty		24 months

- 1) does not include rack space
- 2) depth doesn't include 50 mm of power cable
- 3) fluctuation measured in the geometric center of the chamber
- 4) in space, variation (K) calculated for chamber as:

$$K = \pm \frac{\bar{T}_{max} - \bar{T}_{min}}{2}$$



15. DECLARATION OF CONFORMITY

 <b>DEKLARACJA ZGODNOŚCI UE</b> <b>EU DECLARATION OF CONFORMITY</b>		 <b>POL-EKO</b>	
<b>Produkt:</b>	Inkubator CO <sub>2</sub>	<b>Product:</b>	CO <sub>2</sub> Incubator
<b>Model:</b>	ILC 180		<b>Model:</b>
<b>w wersjach (in version):</b>	SMART PRO		
<b>Nazwa i adres producenta:</b>	POL-EKO A.Polok-Kowalska sp.k. ul. Kokoszycka 172 C 44-300 Wodzisław Śląski Polska/Poland		
<b>Niniejsza deklaracja zgodności wydana zostaje na wyłączną odpowiedzialność producenta.</b>	<i>This declaration of conformity is issued under the sole responsibility of the manufacturer.</i>		
<b>Wymieniony powyżej przedmiot niniejszej deklaracji jest zgodny z odnośnymi wymaganiami unijnego prawodawstwa harmonizacyjnego:</b>	<i>The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:</i>		
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		
<b>Odniesienia do odnośnych norm zharmonizowanych, które zastosowano lub do innych specyfikacji technicznych, w stosunku, do których deklarowana jest zgodność:</b>	<i>References to the relevant harmonised standards used or references to the other technical specifications in relation to which conformity is declared:</i>		
LVD	PN-EN 61010-1:2011 PN-EN IEC 61010-2-010:2020-10 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

W imieniu producenta podpisał:

  
 Małgorzata Szafarczyk  
 Dyrektor Generalny (CEO)

## Instruction manual ILC SMART PRO

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 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

### 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



AP 115



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