# B SCIENCE

## USER / SERVICE MANUAL

# B-ULT 100

# B-ULT 400 / B-ULT 550

# B-ULT 650 / B-ULT 850

## VDW
### Crucial Temperature Solutions

Dear User
To have efficient use of our product, which has been under quality control, please read the whole user manual carefully before taking the appliance into use. Save and keep the manual until the abolition of the appliance.

**For the specific unit.**

Model name: _____

Serial number: _____

Date of installation: _____

# Table of Content

Updated 19. April 2021

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# Chapter 1: Introduction

Congratulations on the purchase of a B Science ULT Freezer. We trust that this unit will serve you for many years to come. To gain optimal benefits from your Freezer, please read the following instructions thoroughly and act accordingly.

The ULT Freezer Premium Line offers many unique features to enhance safety, performance and ergonomic. To take full advantage of the features, please read this manual firmly and keep it safe for future reference. If you are unfamiliar with how ULT Freezers operate, please review Chapter 4: Refrigerant Safety Precautions before you start working with the ULT Freezer. Even if you are an experienced user of ULT Freezers, please read all the user manual firmly.

## 1.1 Intended use.

The ULT range –86°C freezer described in this manual are high performance units for professional use. These products are intended for use as cold storage in research use and as a general-purpose laboratory freezer, storing samples or inventory at operating temperatures between –40°C and –86°C. It is not considered a medical device and has therefore not been registered with a medical device regulatory body. That is, it has not been evaluated for the storage of samples for diagnostic use or for samples to be re-introduced to the human body. This unit is not intended for use in classified hazardous locations, nor to be used for the storage of flammable inventory.

**This Manual and other technical information is available in PDF format through email:**

info@bscienceglobal.com

or

Service@bscienceglobal.com

 **NOTICE:** Only use this product for its intended purpose.

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# Chapter 2: Precondition

Before you install the ULT Freezer, you need to prepare the site for installation. Examine the location where you intend to install the Freezer. You must be certain that the area is level and of solid construction.
In addition, a dedicated source of electrical power must be located near the installation site.

Carefully read this chapter to learn:

- Storage requirements.
- Location requirements.
- Electrical power requirements.
- Space requirements.
- Service utility requirements.
- Environment Requirement.

## Storage.

If the Freezer will be stored for a period without power, the door and inner doors should be kept open for free circulation of air inside the cabinet to avoid corrosion of the inner liner.

## Environmental protection and disposal.

The packaging is designed to protect the appliance and its components during transportation, and it is made of recyclable materials.

- Please return the packaging to an official collection point for recycling.
- Old appliances contain reusable materials and should not be disposed off together with household refuse.
- Remove the spring-action hinges from the appliance, to prevent children from being entrapped in the appliance.
- Ensure that no part of the refrigeration tubing is damaged as the refrigerant in the appliance risks leaking to the environment.
- Information about refrigerant type and amount will be found on the Rating plate on the rear of the appliance (Fig. 1).

| | | | |
|---|---|---|---|
| **B SCIENCE** | | CE | |
| Model | B-ULT 400 | Temp. Range ° C | -86° / -40° |
| Serial no. | | Rated Voltage | 230V / 50Hz |
| Compressor 1 | NT2110U | R290 | 210 Gr |
| Compressor 2 | NT2110U | R290/R1150 | 62 Gr / 120 Gr |
| Weight | 235 Kg | Amp. | 7,4 |
| Climate Class | 3 | Capacity | 406 L |
| Prod. No. | | | |

Warranty Period 1 (one)Year. Device life span 10(ten) years.
Warranty expires if unauthorized person interfered.

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*Figure: 1*

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## Safety instructions.

- To prevent injuries and or damage of the appliance, it should be unpacked and set up by minimum two people.
- If upon unpacking the appliance damage is detected, do not connect to the mains, but contact the supplier.
- Interference with or repair to the appliance should only be carried out by authorized personnel, to avoid any injuries. (contact the supplier for further information)
- Never use open flames or other ignition sources inside the appliance.
- Never touch the Freezers interior or products in the Freezer when the Freezer is operating. Use gloves or alike to avoid injuries (frostbite).
- Keep the key to the doors away from the appliance, and out of the reach of children.

# Chapter 3: Getting Started

## Connection to the mains.
- For safety reasons, the appliance must be earthed. If you are in any doubt, please contact an authorized electrician.
- The appliance should be left OFF for 1 hour before it is connected to the mains. If the appliance is connected before that, there is a risk of damaging the compressor.
- If for any reason the appliance is disconnected from the mains, please wait 10 minutes before re-connecting. The electronic starting device needs this time to cool down before a safe re-start can be made.

## Before use.
- Before use, the interior of the appliance should be cleaned with a mild soap solution and wiped off with a dry clean cloth.

**NOTE! Never use any kind of solvent or other chemicals.**

## Setting up the Freezer.
The Freezer should not be placed where it might be splashed with water, in extreme high humidity or in direct sunlight. Any of these factors may lead to a reduction in performance and shorten the life span of the components. The Freezer should be placed on a horizontal level and should not be placed close to a heating appliance or heating tubes. Allow a minimum of 50 mm (2") clearance on the sides, and 100 mm at the back side, to allow the heat from the compressor motor to dissipate. Underneath the appliance there should be a gap of 15 mm approx. (1⁄2"). On a soft surface, e.g. carpet, it may be necessary to ensure the correct distance by means of spacers.

## Electrical supply.
The electrical supply should always be in accordance with the Rating label on the left side of the cabinet or at the bottom when you open the door to the chamber.

The supply must always be in accordance with the law and regulations regarding electrical safety, if any doubts contact your supplier.

## B SCIENCE    CE

| | | | |
|---|---|---|---|
| Model | B-ULT 400 | Temp. Range ° C | -86° / -40° |
| Serial no. | | Rated Voltage | 230V / 50Hz |
| Compressor 1 | NT2110U | R290 | 210 Gr |
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| Prod. No. | | | |

Warranty Period 1 (one)Year. Device life span 10(ten) years.
Warranty expires if unauthorized person interfered.

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# Chapter 4: Refrigerant Safety Precautions

## Refrigerant

In the ULT Freezer there are used two type of refrigerants. The cooling system is Cascade cooling. Carefully read the below description of the refrigerants: R290 and R1150

*__Demand for information__: Personnel working with these refrigerants mentioned above and below must be educated to know about these safety sheets.*

## Field of application:

R290 is used as refrigerant in first stage of the cooling system. R290, is refrigerant grade propane, a natural, refrigerant suitable for use in a range of refrigeration and air conditioning applications. The use of R290 is increasing due to its low environmental impact and excellent thermodynamic performance. It is non-toxic with zero ODP (Ozone Depletion Potential) and very low GWP (Global Warming Potential).

R1150 (+ R290) are used in the second stage of the cooling system.

R1150 Ethylene is refrigerant grade ethylene (ethene), a natural refrigerant suitable for use in very low temperature refrigeration applications, such as those found in LNG liquefaction processes. R1150 is non-toxic, with zero ODP (Ozone Depletion Potential) and very low GWP (Global Warming Potential). It is a flammable refrigerant and therefore not suitable for retrofitting existing fluorocarbon refrigerant systems.

If needed, ask for safety data sheet from your supplier.

# Chapter 5: Using the ULT Freezer

## Startup process.

In case the compressors do not start when the Freezer has been plugged in, the electrical supply may not be in order. Check if there is an electricity supply to the plug or if the fuse is blown.

Before starting the unit, you must check and decide below parameters:

1. SET TIME: Must change to local time zone.
2. SET TEMP: Change the set point for the desired temperature in the chamber.
3. ALARMS: Change High and Low temperature alarm level.
4. ALARM DELAY: Change the time delay from the temperature reach High or Low Temperature alarm level, to the alarm will be activated.
5. DOOR OPEN ALARM: Enable the door open alarm and the delay for the alarm will be activated.

During the Freezer is starting up from Ambient level (RT +20°C), the High Temperature alarm will be activated several times before the temperature reach the High temperature alarm level.

## Operating the Freezer

The Empty Freezer should be switched ON for cooling down the chamber, for at least 8-10 hours, prior to loading ballast into the chamber of the Freezer.

Please note: After the door has been opened, there will be a vacuum created inside the Freezer due to the low temperatures. Wait a few moments before trying to reopen the door otherwise the handle or gaskets could be damaged.

## Temperature control ULT Freezers.

The temperature inside the Freezer is controlled by the electronic controller in the top panel. The controller has a digital readout of the temperature inside the cabinet, and the option of changing the temperature inside the cabinet.

## Backup Battery. (For temperature logging and Alarm, during Power cut)

The battery should be exchanged every two years.

Please note! When commissioning the Freezer, the Battery must be checked for correct connection.

# Controller

## 1. Main Menu
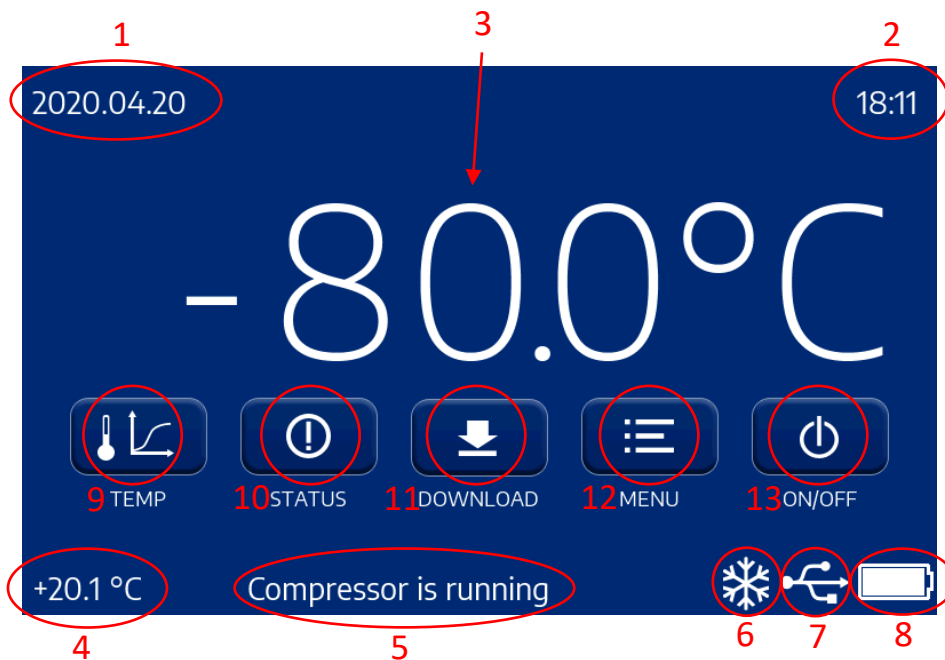


**DISPLAY SHOWS**

1. Date
2. Time
3. Temperature inside the cabinet
4. Room Temperature (Ambient)
5. Shows if compressor is running
   (it will not be visible if the compressor is not running)
6. Compressor is running/defrost
7. USB is connected
8. Battery status

**DISPLAY GIVES ACCESS TO**

9. Temperature graph
10. Status
11. Download
12. Menu
13. ON/OFF

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# 1. Temp. (Temperature graph)
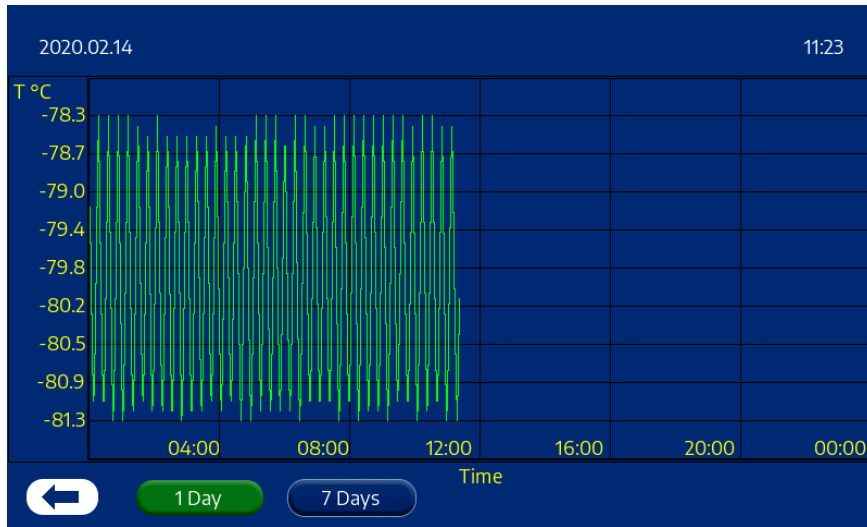


*Temperature graph for 1 day*

*First picture will show the temperature mapping of the current day.*
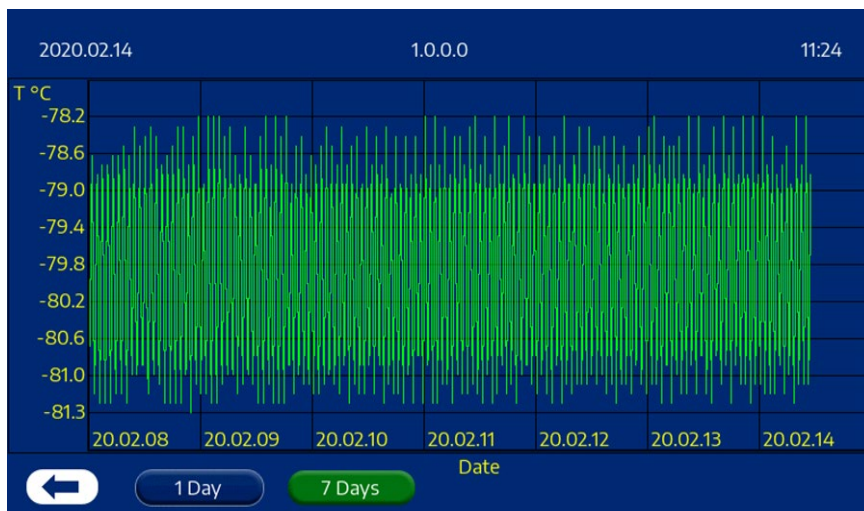


*Temperature graph for 7 days*

You can select a Temperature Map for either 1 or 7 days

The second picture show the last 7 days (1 Week) temperature mapping.

## 2. Status
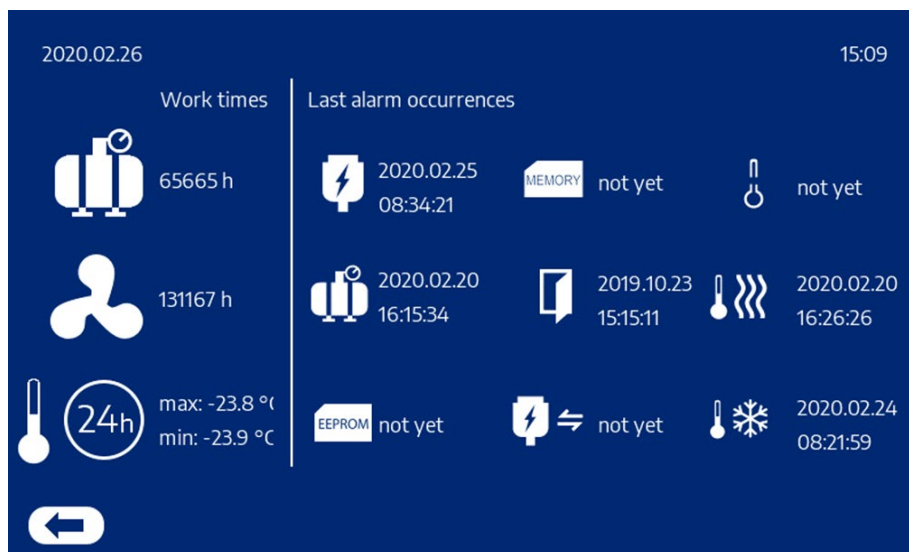


1. It shows the working hours of the compressor and the fan.
2. It also shows when the last alarms have been activated.

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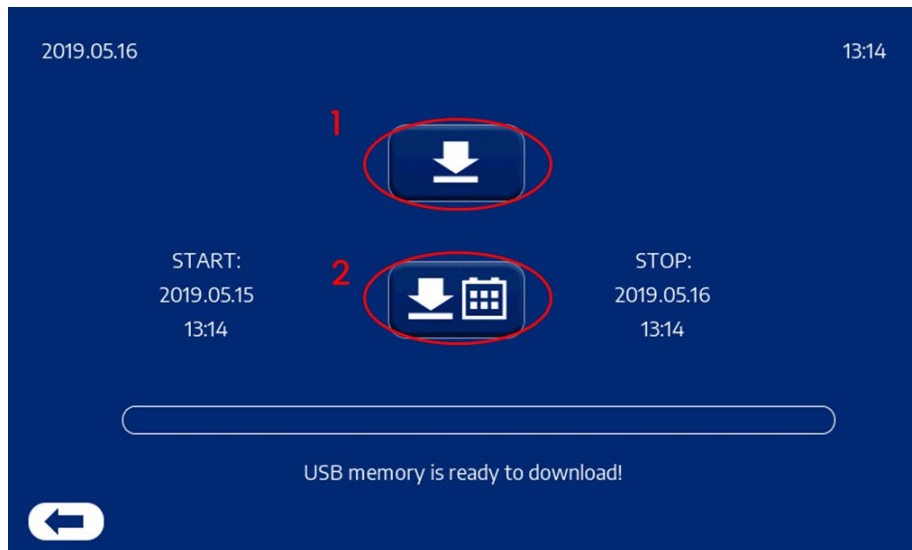
# 3  Download



1. Download button - push to download data
2. Select period of data to download

Every time you download data, you will receive 2 CVS files, a file with temperature data and a file with the parameter list.

In the USB key, you will find the 2 files under folder "History"

## 3.1  Select Download Period
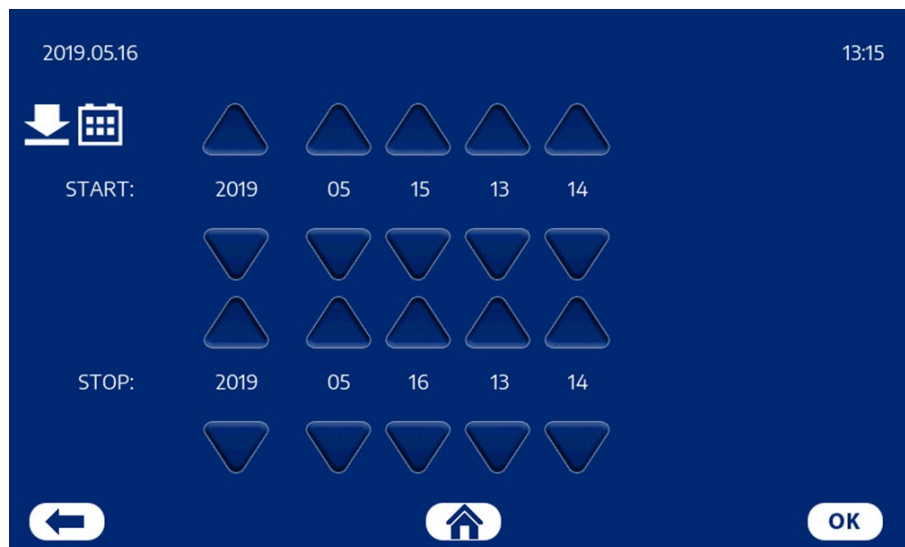


1. Select a period that you want to download and press ok.
   1. Use arrow up or down to change the value.
   2. To save the changed data click on the OK button.
2. Then return to download menu and push the Download button.

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# 4. Menu
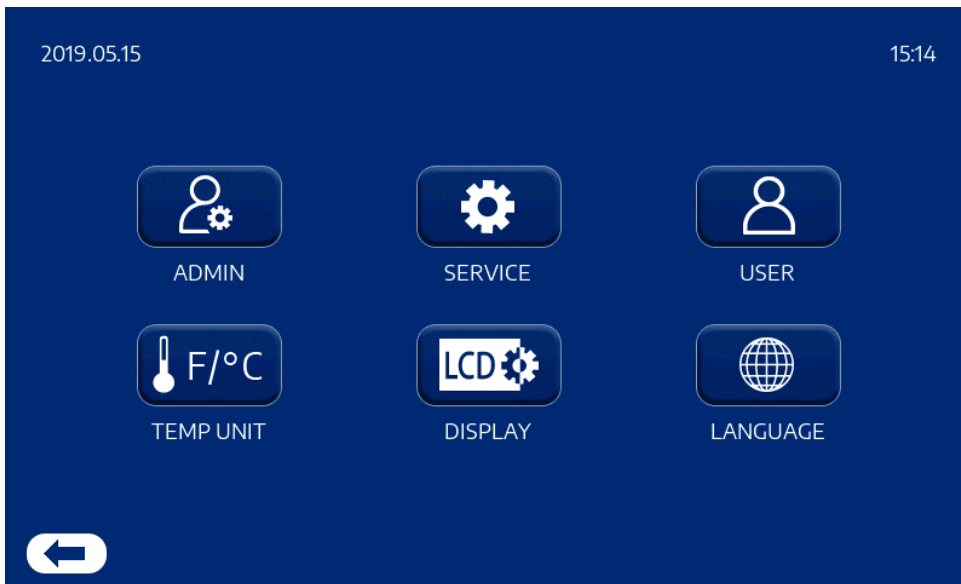


From menu you can gain access to.

1. Admin menu (Only access to authorized personal approved by B Science)
2. Service menu Standard pin code: 0215
3. User menu Standard pin code: 0000
4. Temp unit
5. Display
6. Language (this option is under development) Only English is available.

## 2. Service Menu
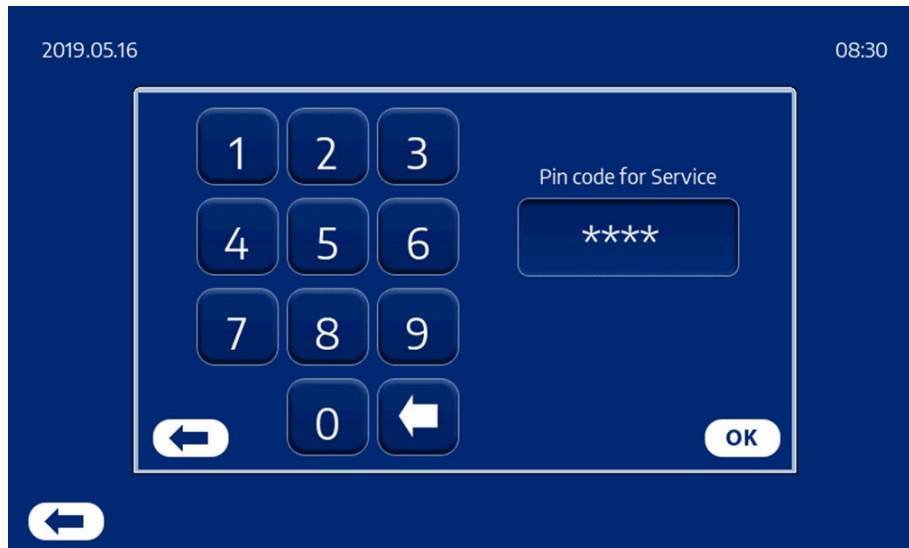


For access to service menu enter pin code.

1. Select Pin code and click on the OK button.

## 2. Service Menu
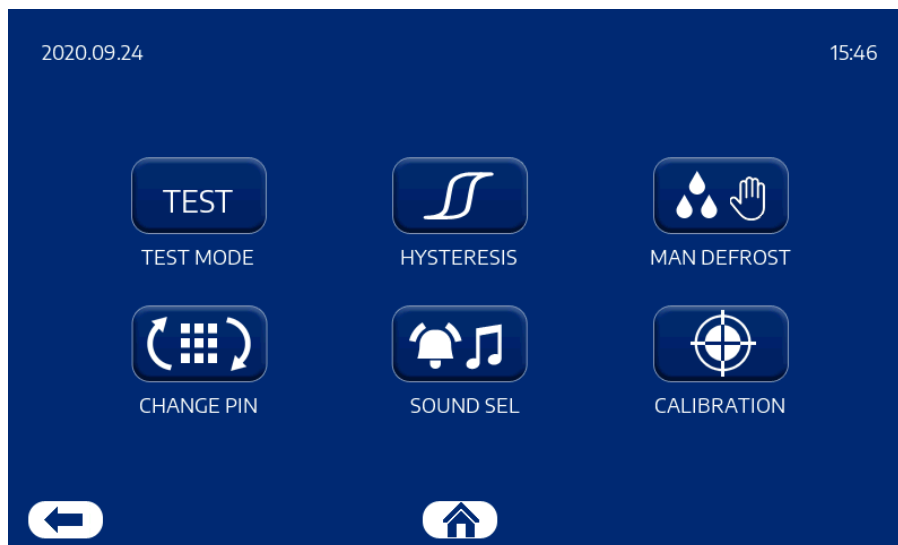


Service menu gives access to

1. Test Mode
2. Hysteresis
3. Manual defrost. (Not use in Ultra Low Temperature freezers)
4. Change pin
5. Sound sel.
6. Calibration

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# Test Mode when unit is running
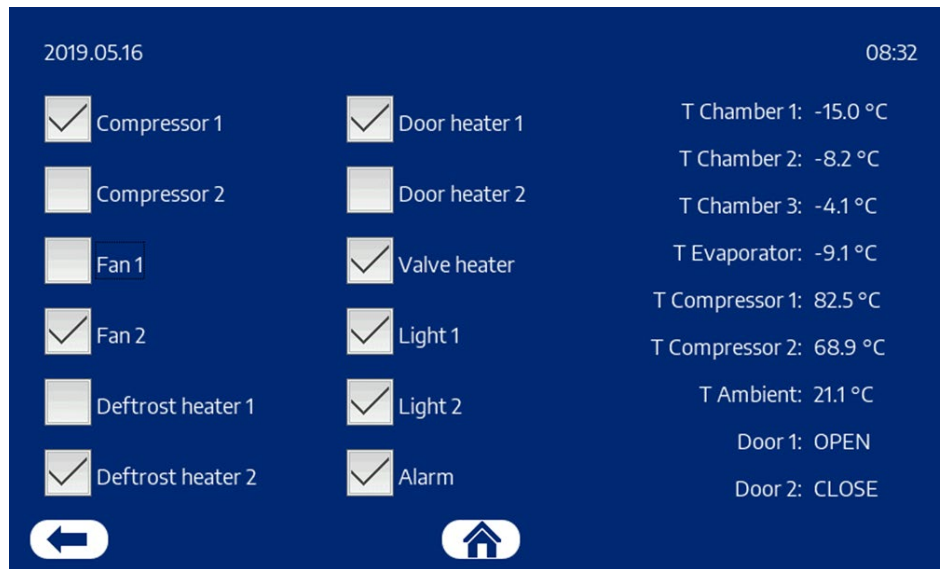
When the unit is Switched ON and running, you can see which relays are ON or OFF and the temperature of each sensor.

In this example:

The Compressor 1 and Fan 2 is running.

The Defrost heater 2, Door heater 1, Light 1 and Light 2 are ON

Door 1 is open, that is why Fan 1 is OFF and Light 1 and 2 is ON

(Fan stops when door is open.)

## 1. Test Menu when unit is OFF (for troubleshooting)
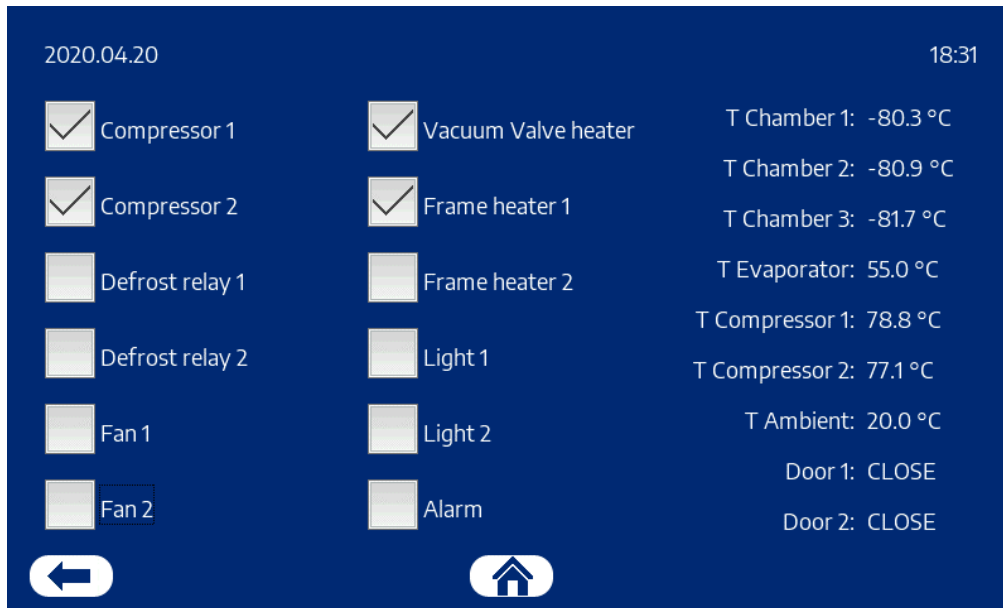


When the unit is Off, you can simulate each relay by pushing the square field, for testing each kind of device. (Compressor, Light, Fan motor etc.) Very good feature for service and maintenance use.
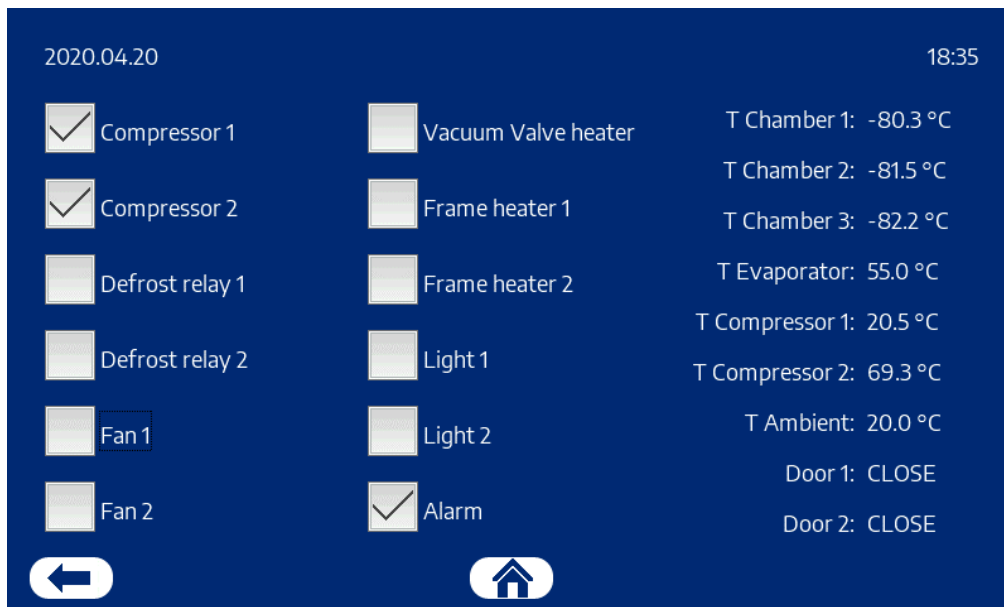


In case above the Relays for both Compressors are activated, and the remote Alarm Relay. You should be able to hear both Compressors are running and check that the Remote Alarm are activated.

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This feature is for service and maintenance use. By this Test mode, you can check all relays and door contacts and check the temperature sensors.



Switch OFF the unit by the display ON/OFF button.
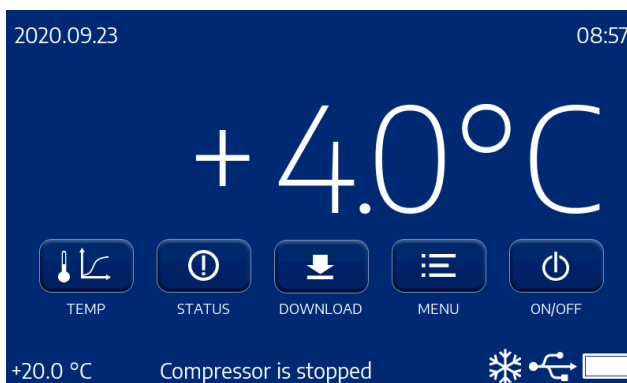
Type in the pin code for one of the pin codes levels, and push the OK button.
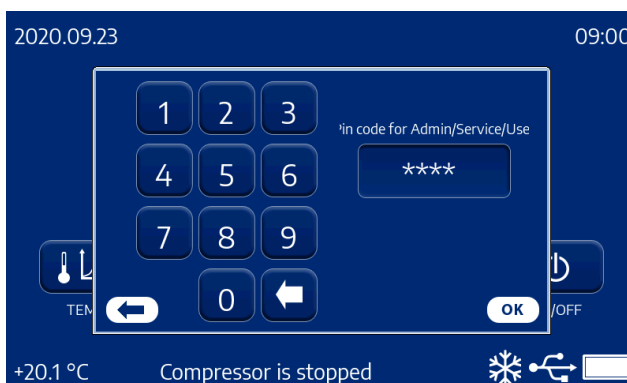


The display will now be in OFF mode.

Click on the MENU button.
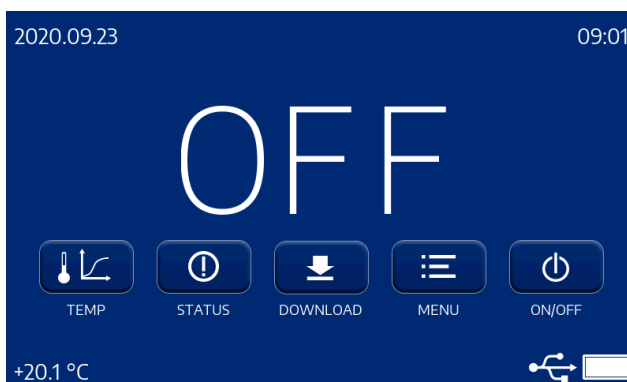


Click on the SERVICE button

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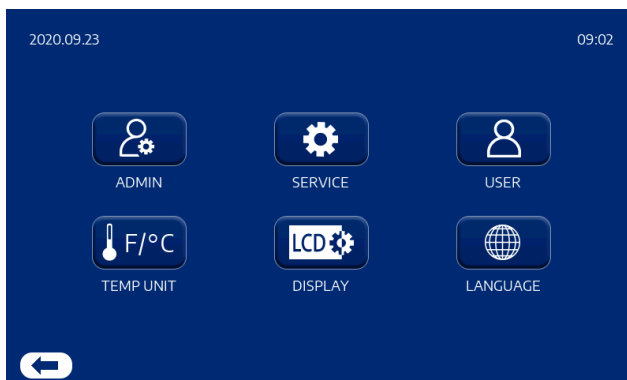
Type in the pin code for Service level,
and push the OK button.
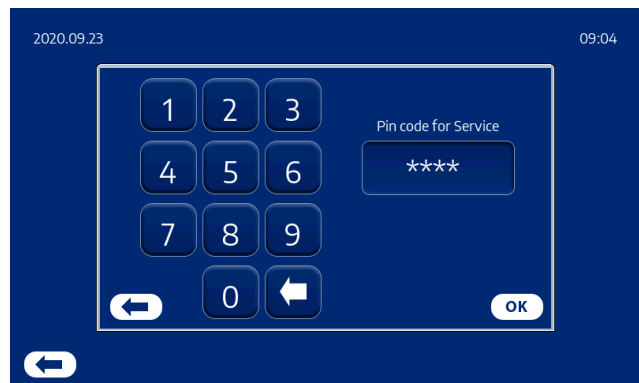


Click on the TEST MODE button.
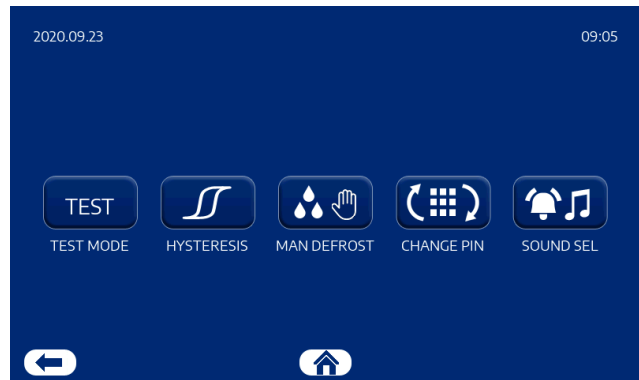


By clicking on each white square angle, the relay
for the specific component will be activated.
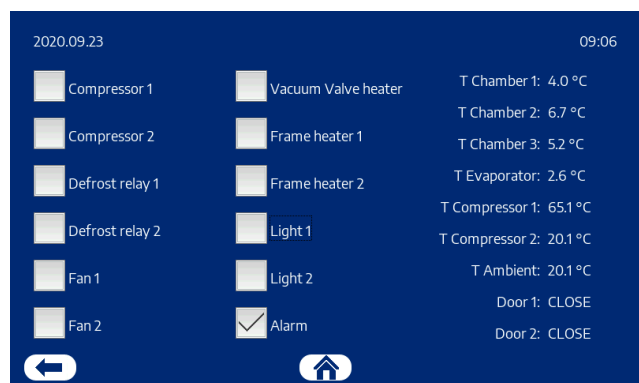


In this example, the relay for Compressor 1,
Defrost relay 1, Fan 1, Frame heater 1 and Light 1 are ON.
Alarm output has change from NC to NO or opposite.
The door no. 1 is open.
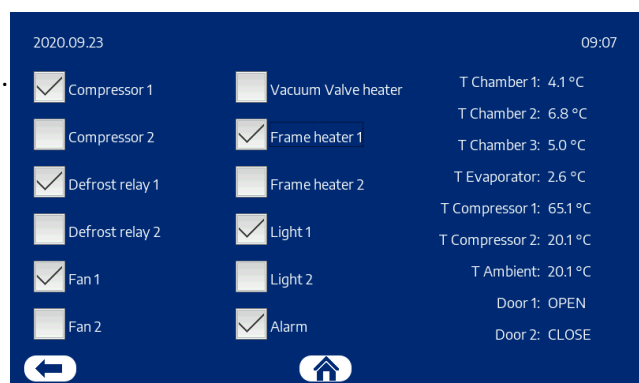
When finished testing relays, click the HOME button,
for returning to Main screen.

If you do not touch the display, the Test Mode will
automatic stop after 5 minutes for safety reason.

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For remote connection for Alarm, the connection is on the backside of the unit.

Remove the back cover, and you will find the remote alarm connection.

The Remote alarm, is a Dry contact (Voltage free)
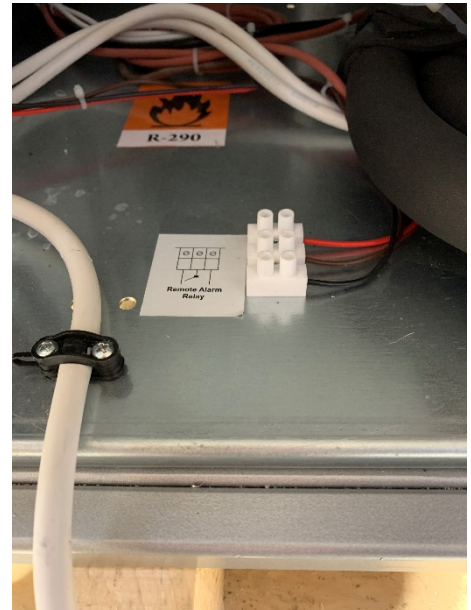



## 2. Hysteresis
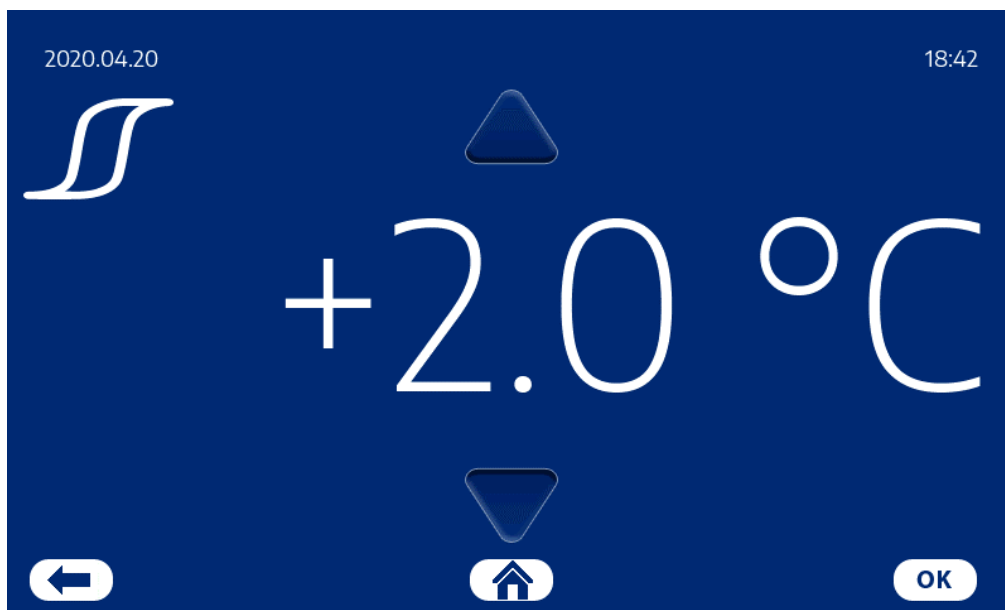


Hysteresis settings: The temperature between start and stop of the Compressor.

1. Use arrow up or down to change the value.
2. To save the new hysteresis value click on the OK button.

# 3. Manual Defrost

The ULT Freezer do not have any automatic cycles, course the temperature will raise too much during the defrost process.
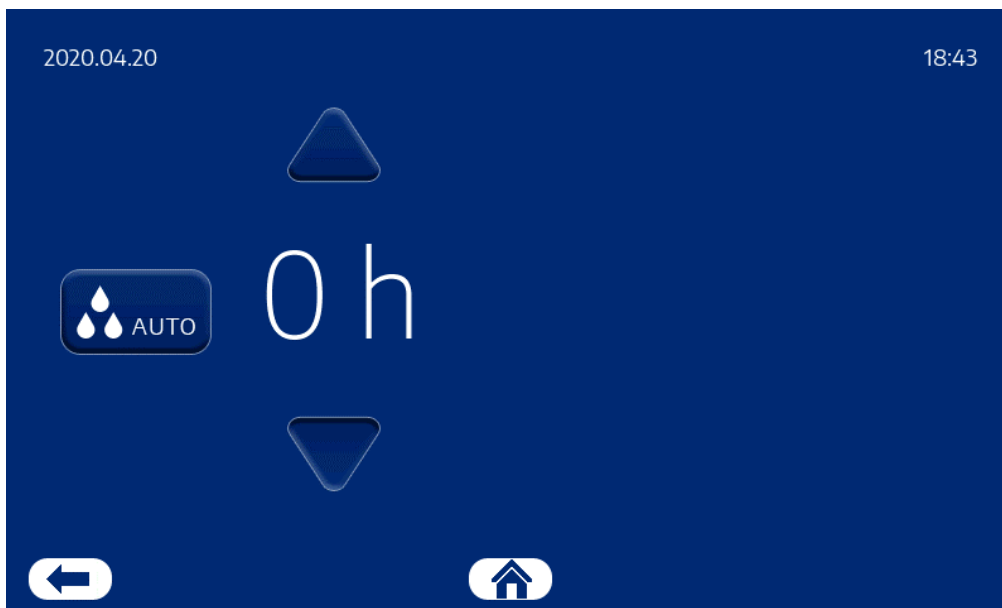


Setting for the ULT Freezer is 0 h, means the controller will never perform Automatic Defrost Cycle

Process for Manually Defrost:

1. Move all the samples to another ULT Freezer.
2. Open the door and inner doors for the ULT Freezer which need the Defrost
3. Switch OFF the unit by the Display
4. Remove the Main plug, so the unit if out of power
5. Now the melting process starts.
6. To speed up the melting process, you can spray hot water on the Evaporator pipes.
   NEVER USE SHARP OBJECTS TO SCRAP AWAY THE ICE!
   THIS COULD PERMANENTLY DAMAGE THE FREEZER!
7. Once the ice has completely melted you need to make sure the freezer is completely dried out, so ice does not form once the freezer is plugged back in.
8. Close the doors, connect Main Plug and switch ON the unit.
9. Once your freezer has reached the set temperature, you may now return your sample inventory back into the freezer.

## 3. Change Pin code for User Menu
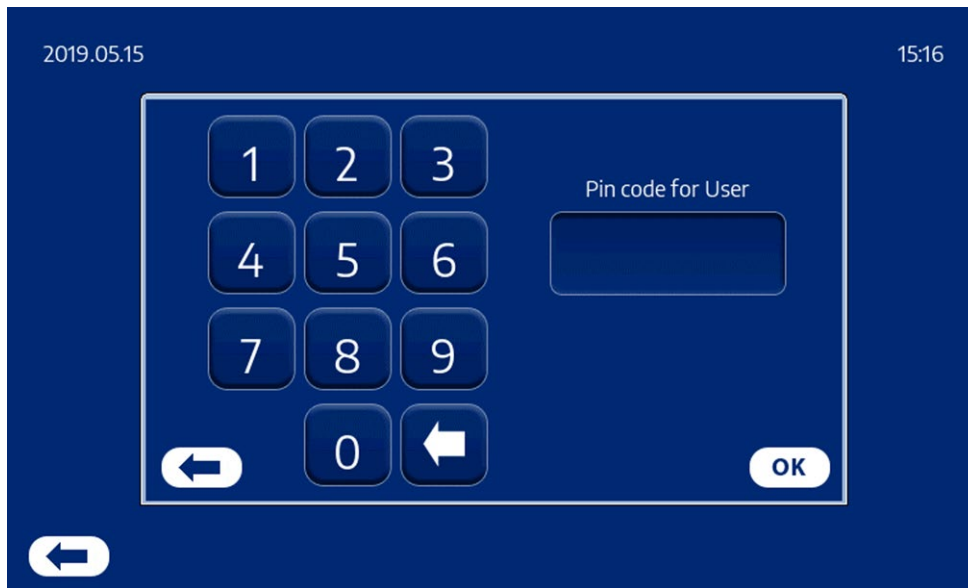


Enter pin code to access User menu

1. Put in Pin code and click on the OK button.

## 4. Change Pin
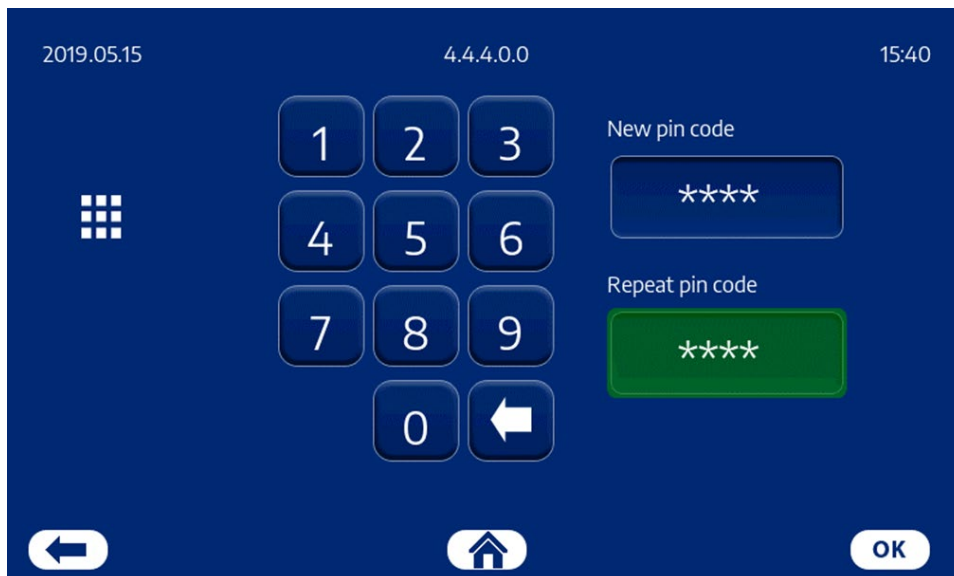


If needed the user pin code can be changes under Change Pin.

1. Put in New 4 numbered code.
2. Repeat new pin code.
3. Click the OK button to save change.

## 5. Sound selection

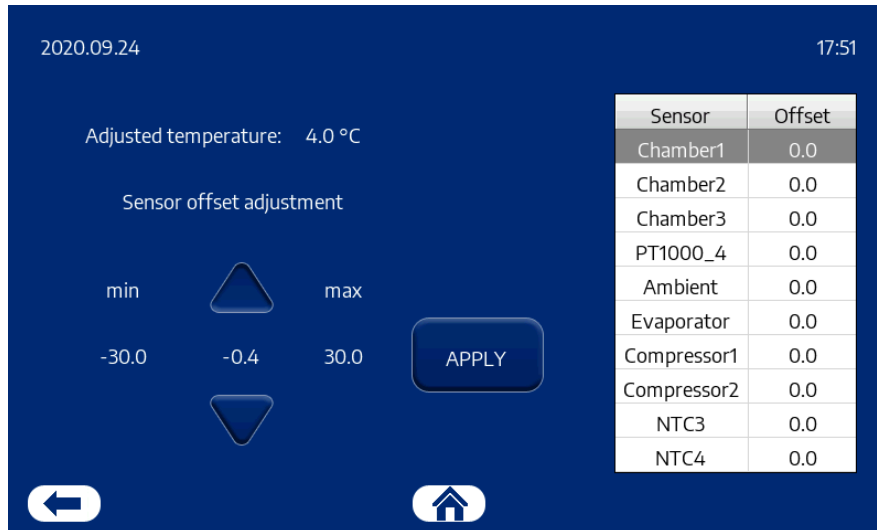Not available yet. Coming in the future.

## 6.CALIBRATION
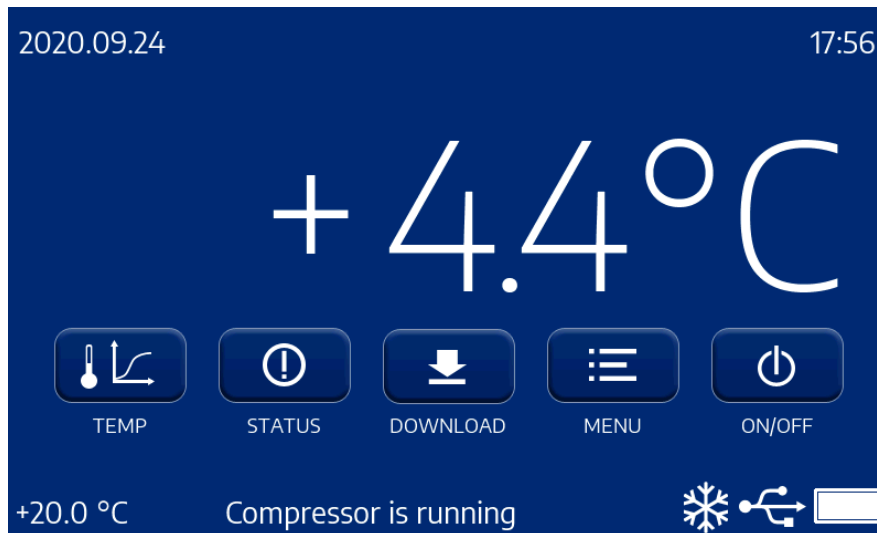


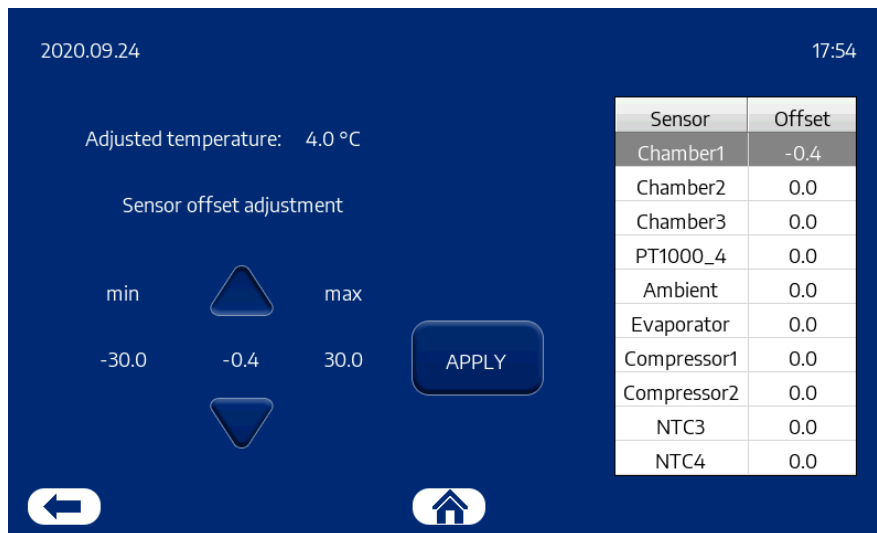If main Screen shows incorrect temperature, the sensors can be adjusted in the Calibration menu.
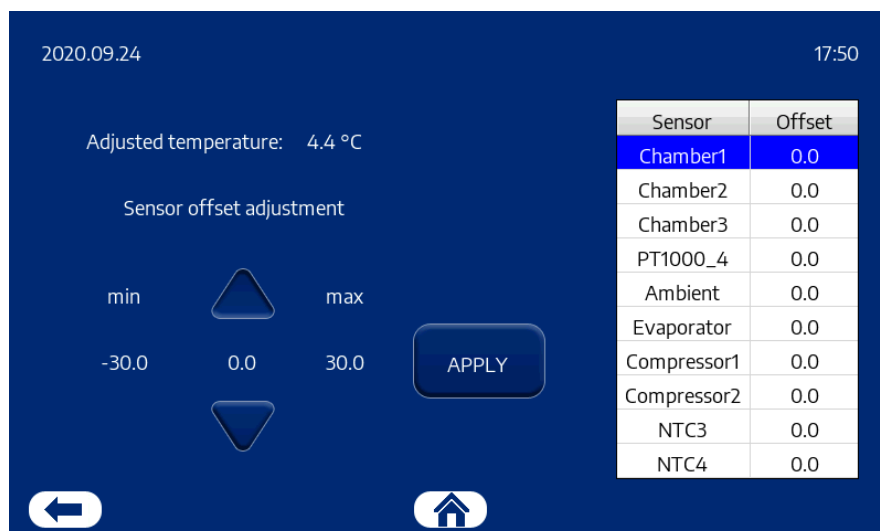


Adjusted temperature is the actual temperature for the chosen Sensor.

In this example Chamber 1 is showing +4,4°C and need to be adjusted to +4,0°C.

Use the arrow down button to go -0,4 degrees down in temperature, and click Apply button.



The adjusted temperature will now show +4,0°C. and the Chamber sensor will show it has been adjusted -0,4°C.

Same procedure can be performed with the other sensors in the list to the right.
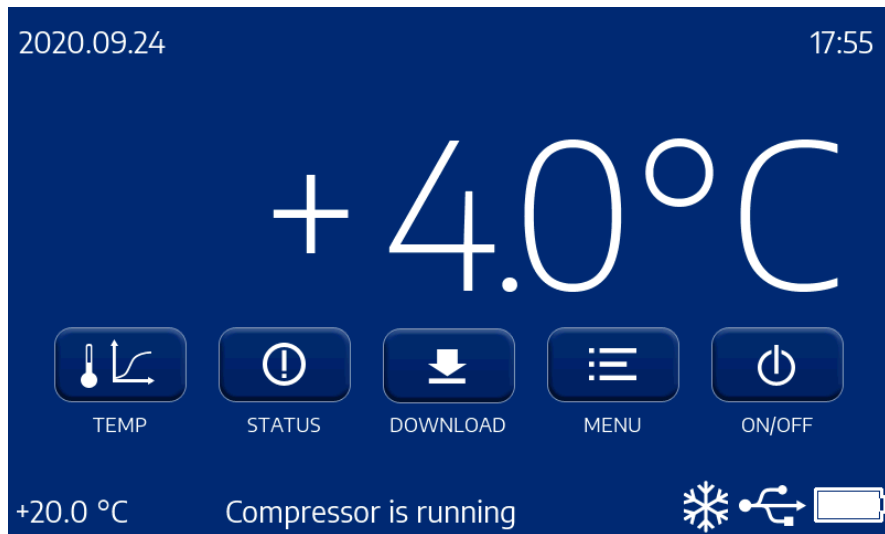
**The main screen will now show the correct temperature in the chamber.**

# 3. User Menu
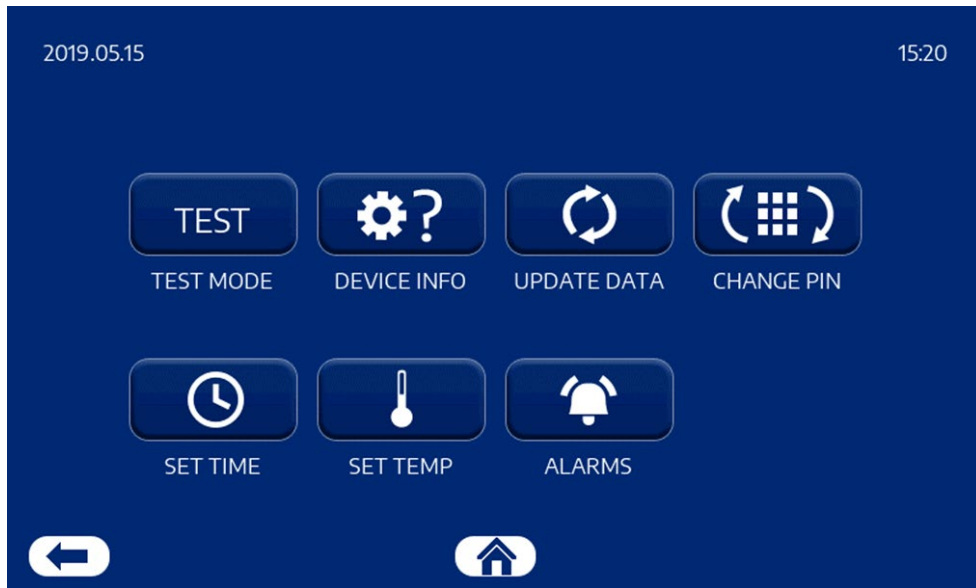


In user menu you can get access to.

1. Test Mode
2. Device Info
3. Update Data
4. Change Pin
5. Set Time
6. Set Temperature
7. Alarms

## 1. Test Mode when unit is running
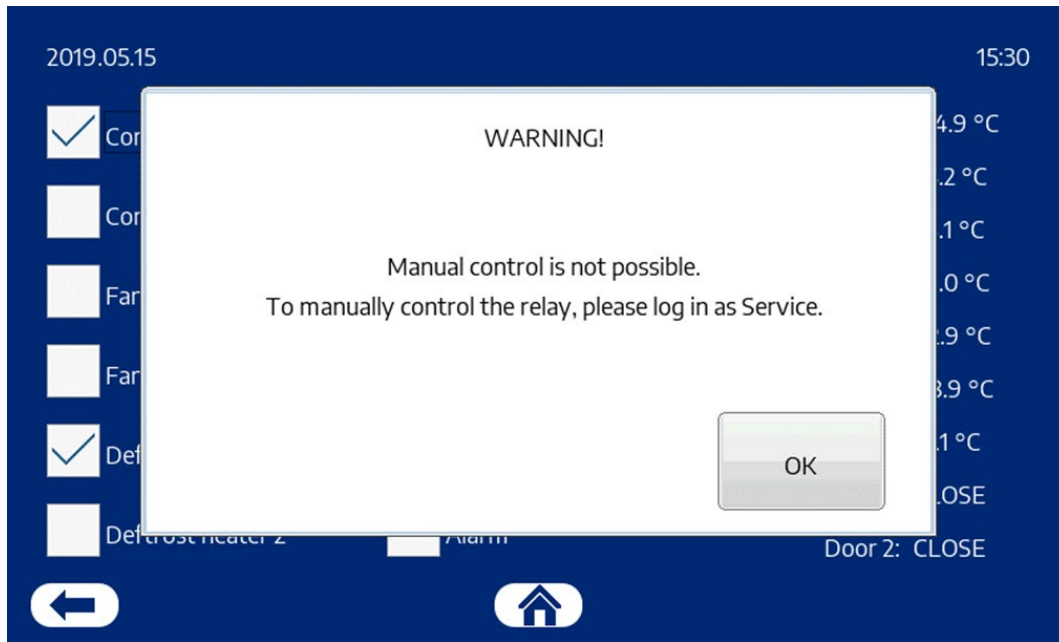


Test mode when the unit is switched ON.

## 1. Test Mode
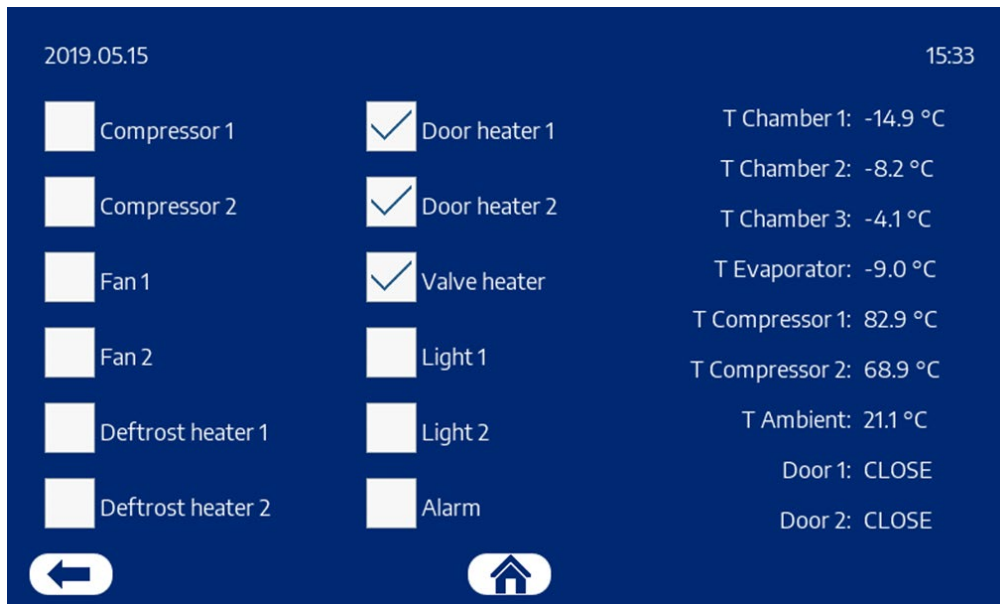


Test Mode for when the unit is switched ON.

You can see which relay are ON or OFF, and the sensors temperature.

## 2.  Device  Info
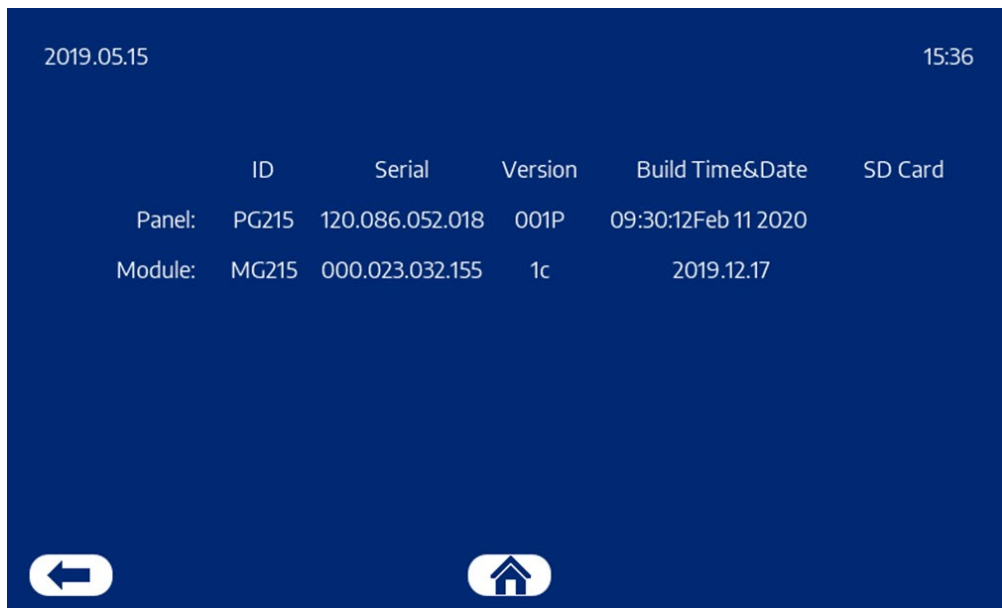


In  Device  info  you  get  all  the  information  of  the  controller's  software  versions.

## 3.  Update  Data
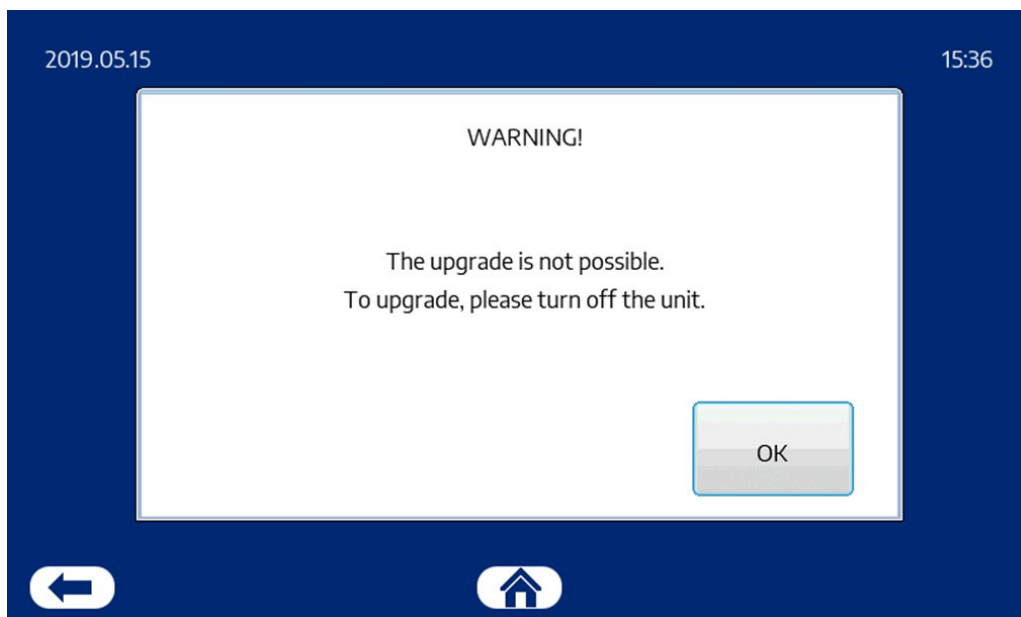


⚠ Update  can  only  be  executed  when  unit  is  switched  OFF

# Guide how to update firmware in the Controller.

**Note:** Updating firmware or new parameter, will **not** delete the history in the memory of the Controller. But we do recommend downloading important data from the Controller before updating firmware and parameter.

Unpack the Drev_D.zip file and copy the contents of Drev D directory to the main directory of USB memory stick.

Must be look like this when the files are unpacked.
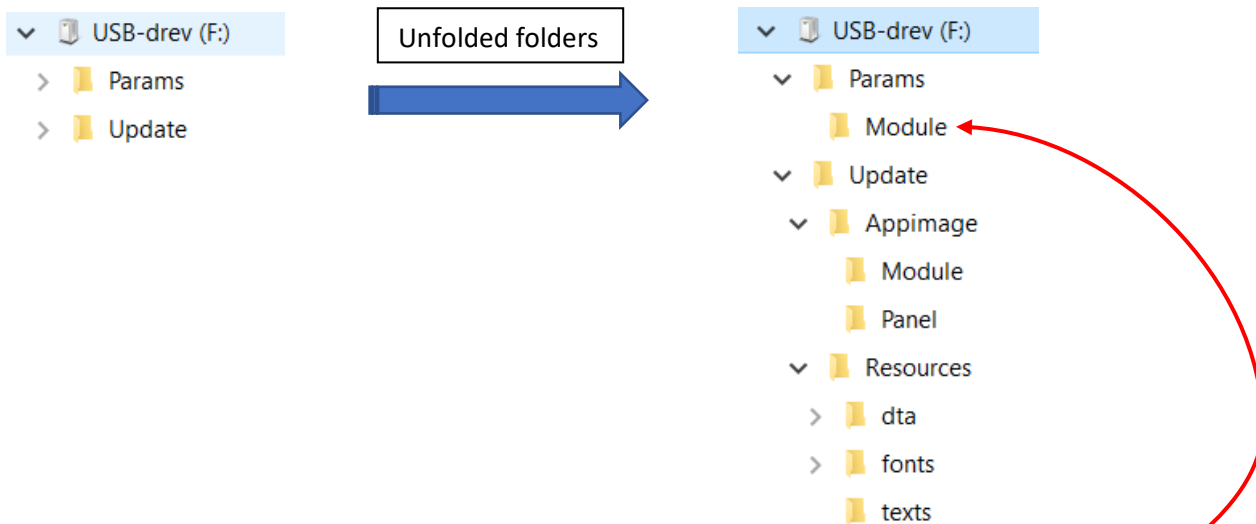


If new parameter file is needed, this could as example look like this: B-ULT -85.BSP

Note: You are not able to open this kind of file.

Copy the file B-ULT -85.BSP into this folder.

**NOW YOU ARE READY TO UPDATE THE CONTROLLER WITH NEW FIRMWARE.**

Insert the USB stick in the USB port for the Controller port.



Here ⭕ you should be able to see
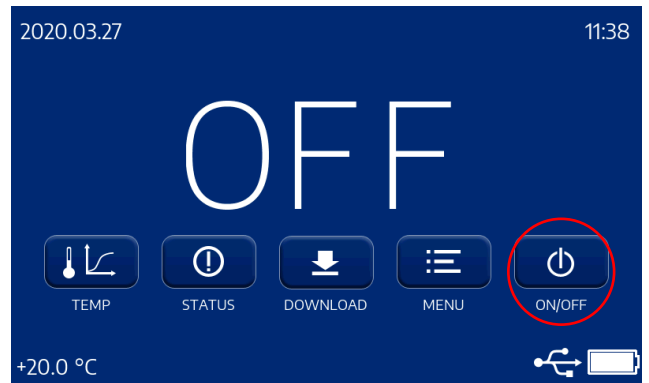if there is a USB stick connected.

If the USB stick are not detected, try to remove main power plug,
wait 10 seconds and connect main power plug again.
If there is still no USB stick detected or
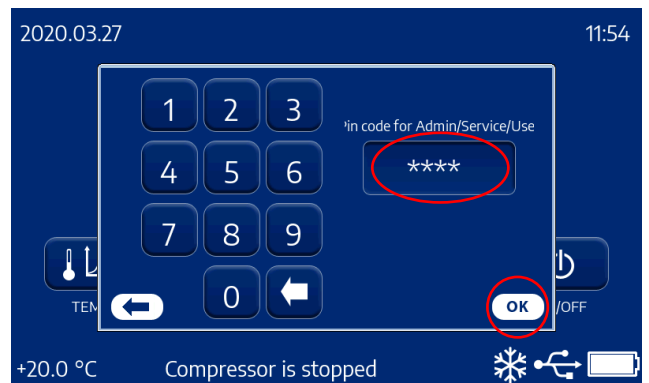the update is not working, try with another type of USB stick.

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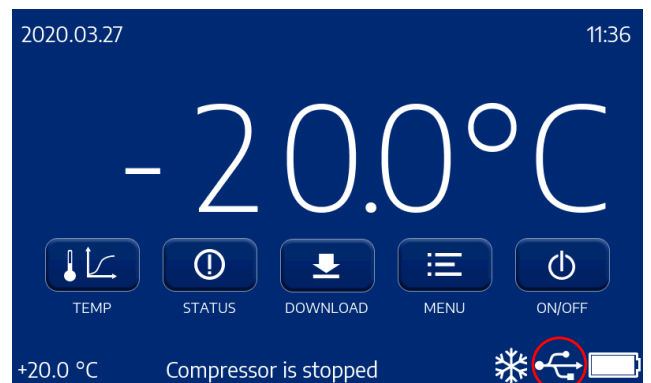
**Step 1.**

The Controller must be switch OFF,
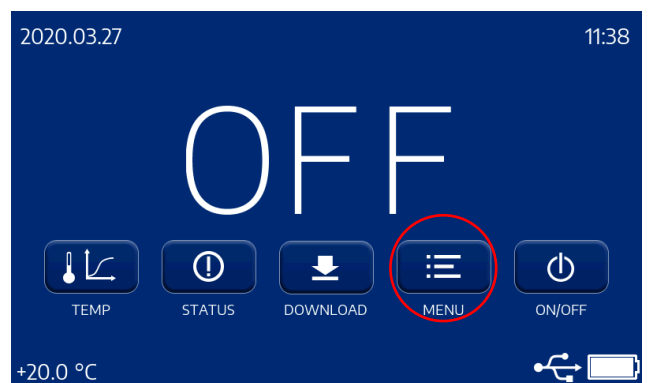since you are only able to update in OFF mode.

**Step 2**

If the controller is pass code protected, you can use
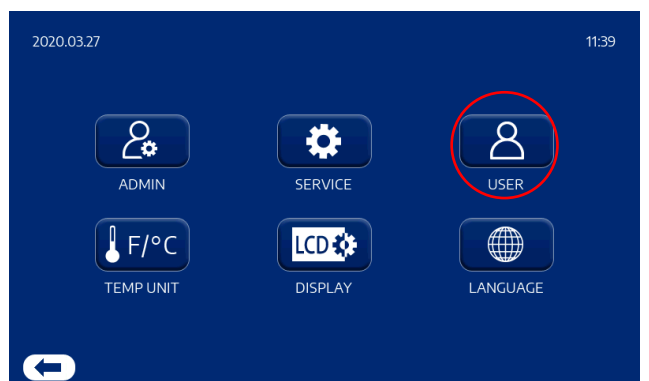the same code as for USER, SERVICE or ADMIN.

Press 4 numbers in and press OK.
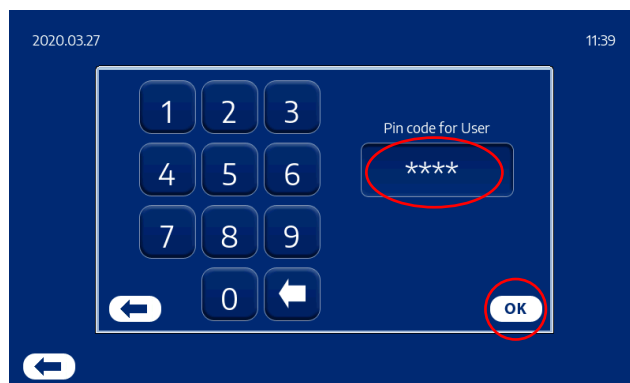
**Step 3**

Press the MENU button to enter the next menu.

**Step 4**

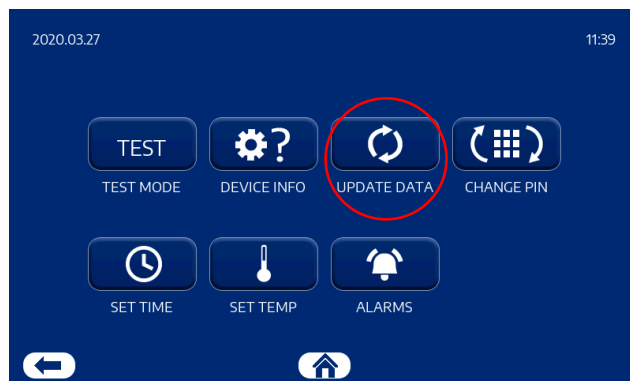Press the USER button to enter the next code menu.

## Step 5

Use pin code 0000 to enter the USER menu
and press OK.

## Step 6

Press on the UPDATE DATA button to enter the next menu.
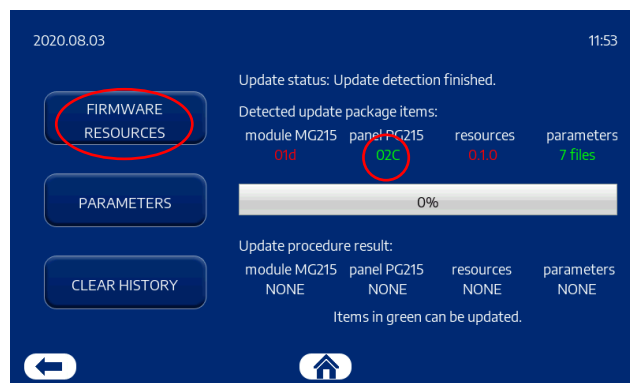
## Step 7

In this UPDATE MENU, you can see new detected firmware
which are in green color.
Press the FIRMWARE RESOURCES button to update firmware.

When the controller is finished updating firmware,
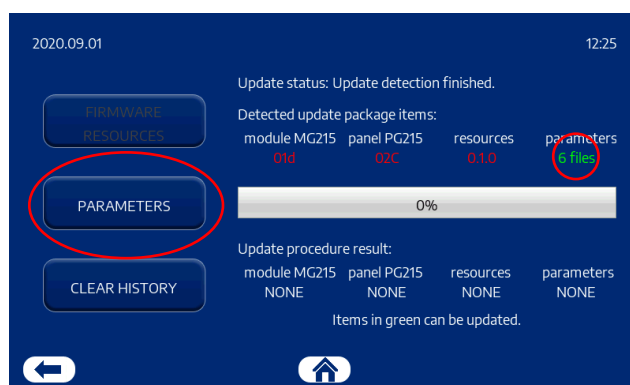the controller will perform a rebooting.

## Step 8

For uploading new parameter file,
you need to go from Step 3 to step 6 again
In this UPDATE MENU, you can see new detected parameters
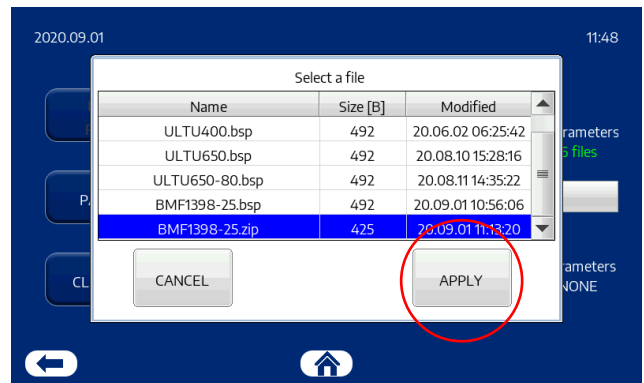which are in green color.
Press the PARAMETERS button to upload the new parameter.

PS. If the Controller does not detect any new files,
please check that you have copied the files into the correct
folder in the USB stick.
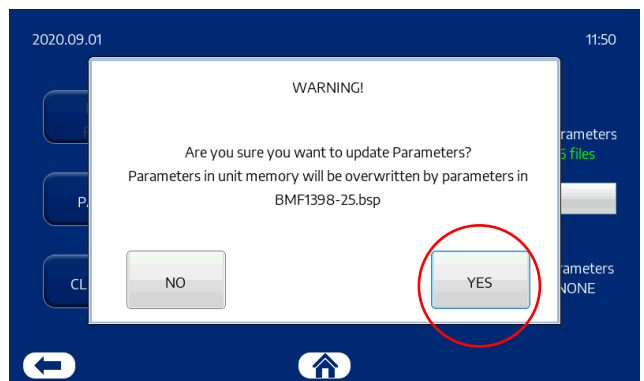
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Select the parameter file which fits to the unit.

Press the APPLY button.

You will now get a Warning.

If you are sure to update the Parameter file,
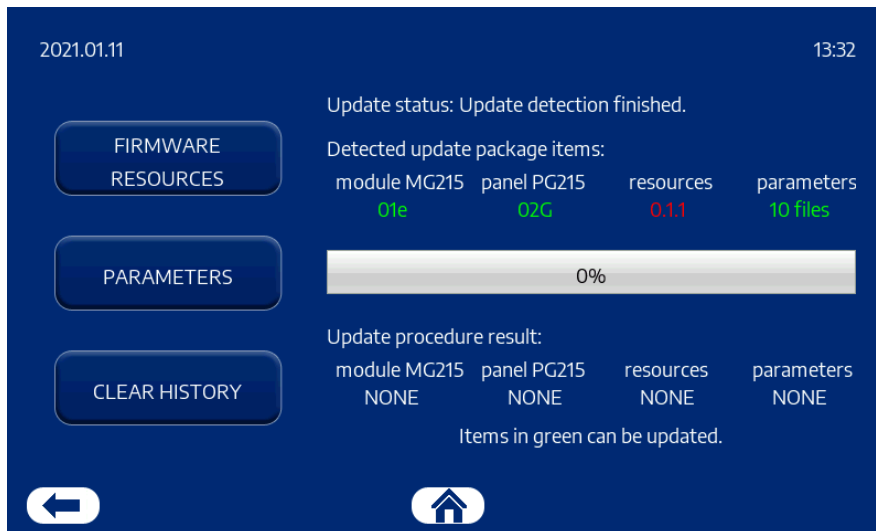
press the YES button.

When the controller is finished uploading parameter, the controller will perform a rebooting.

**Important!**

When you have updated all firmware and parameter, remove the USB stick and switch ON the unit, and always check the main parameters such as the **Set point** and **Alarm settings**.
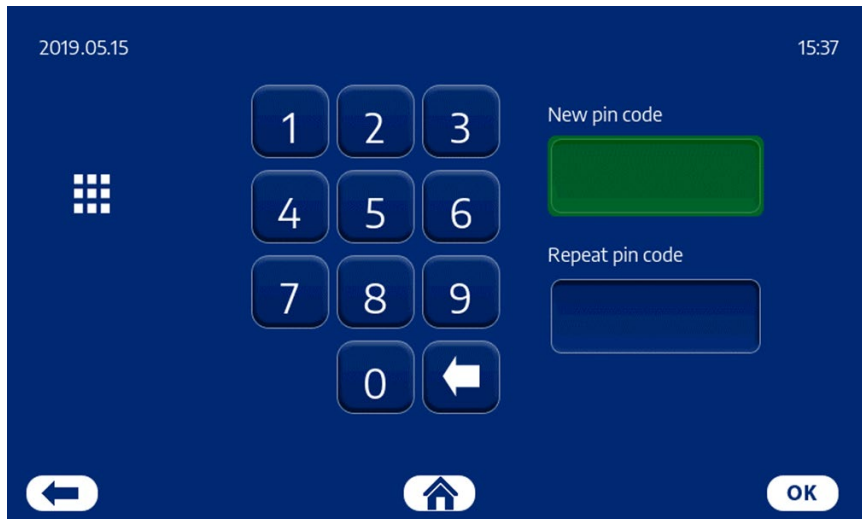
Updated 19. April 2021
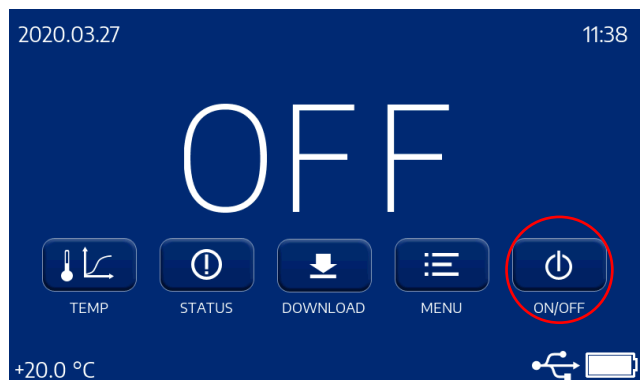
In Update Data the different Firmware and software versions can be updated from here.

The temperature history can also be deleted from this menu.

New updated Parameters setting can also be uploaded from this menu.

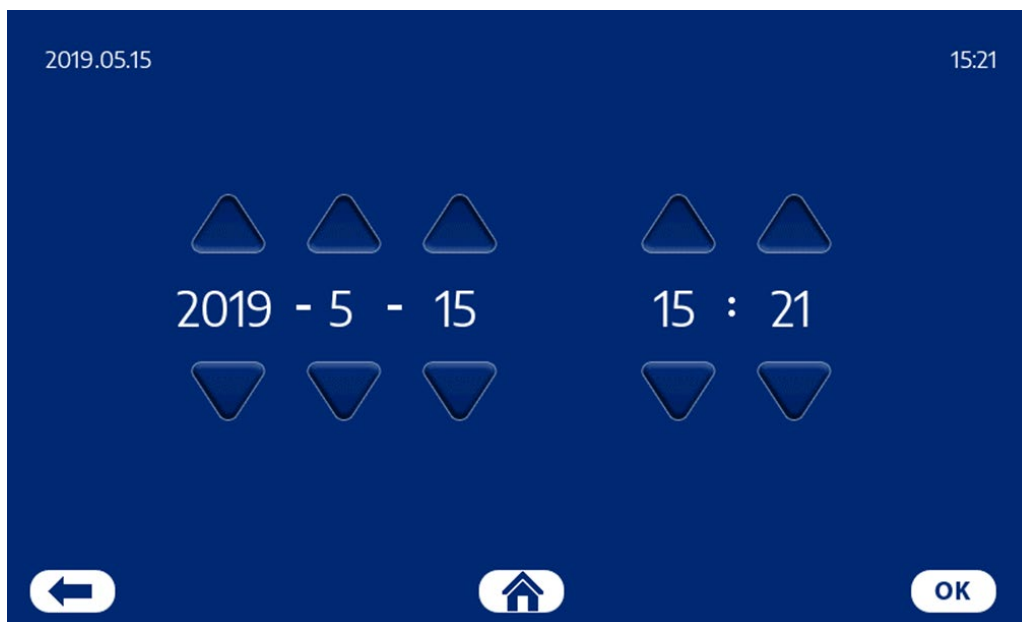⚠ Updates can only be executed when unit is switched OFF (see next slide)

## 4. Change Pin



If needed the User Menu´s pin code can be changed under Change Pin

1. Put in New 4 numbered code.
2. Repeat new pin code.
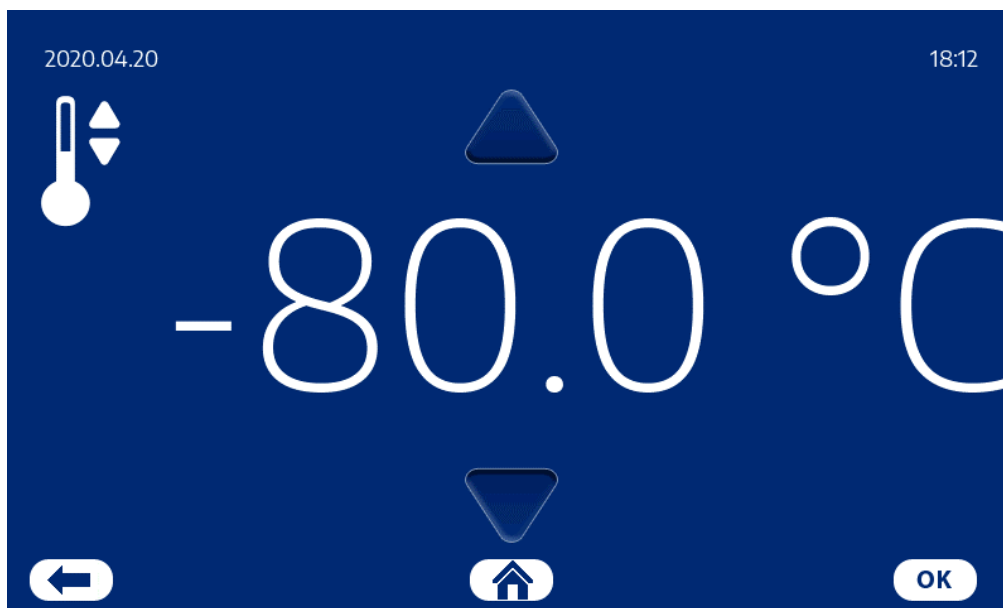3. Click the OK button to save change.

## 5. Set Time & Date



Setting the Date and Time.

1. Use arrow up or down to change the value.
2. To save the changed data click on the OK button.

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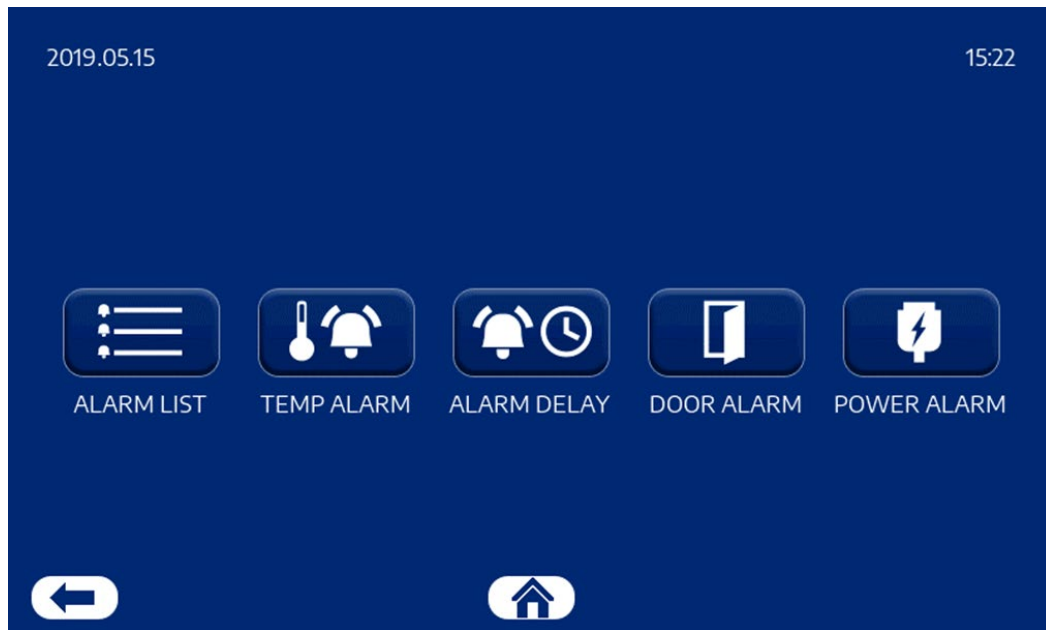
# 6. Set Temperature



To set the setpoint for the temperature in the cabinet.

1. Use arrow up or down to change the value.
2. To save the changed setpoint, click on the OK button.

In this example the setpoint is -80,0°C and the Hysteresis is 2,0°C.

That means the controller will start the Compressors at -79,0°C and stop at -81,0°C.

# 7. Alarms



Under Alarms get access to

1. Alarm List
2. Temp Alarm
3. Alarm Delay
4. Door Alarm
5. Power Alarm

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# 1. Alarm List

Under alarm list it is shown which type of alarms are occurring. The Button will be red when the failure is activated, and the remote alarm relay will be active until you click on the red button to deactivate the alarm.
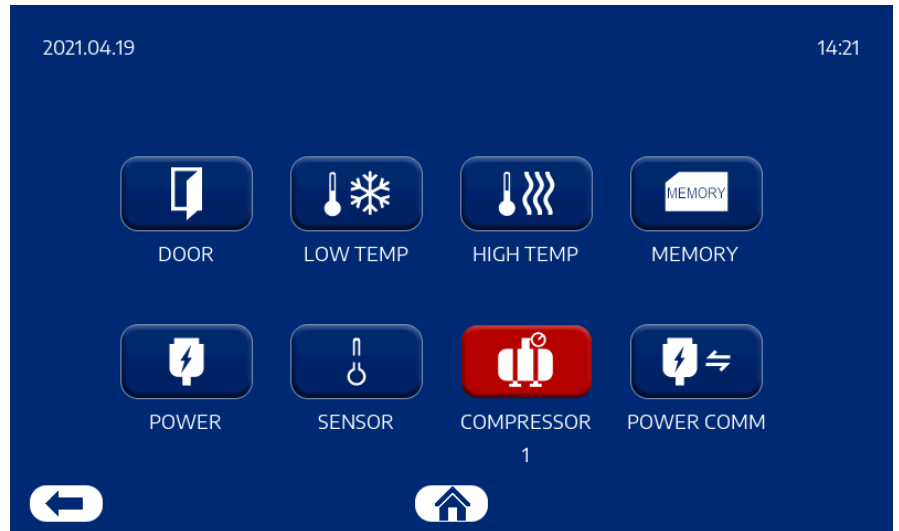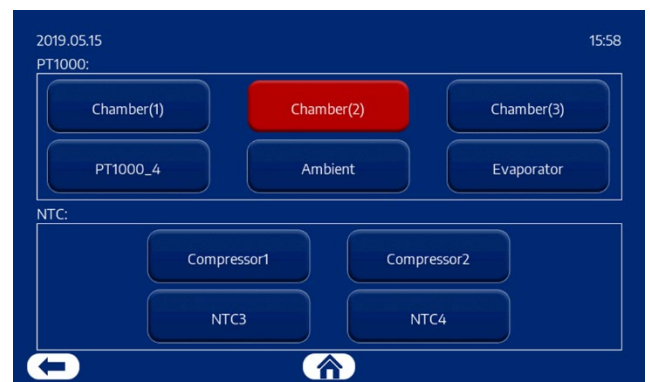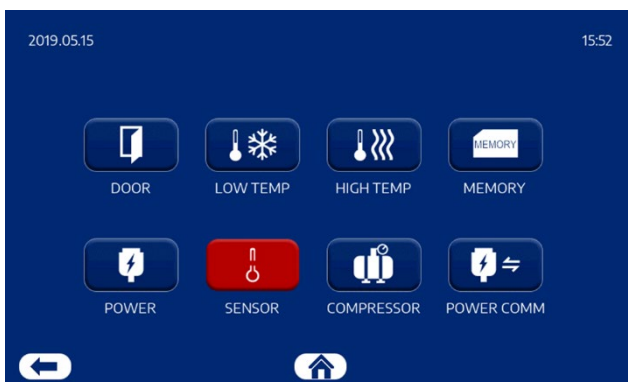


*Pay special attention if you get a Compressor alarm:*
The controller has switched OFF the Compressor relay, and the unit must be restarted, by Switching OFF and then ON again to make a reboot. If this Compressor alarm occurs again, contact a technician to check why the Compressor alarm occurs.

**Under the Sensor menu.**

## Sensor Menu



When a Sensor alarm occurs, you can see which alarms are in failure.
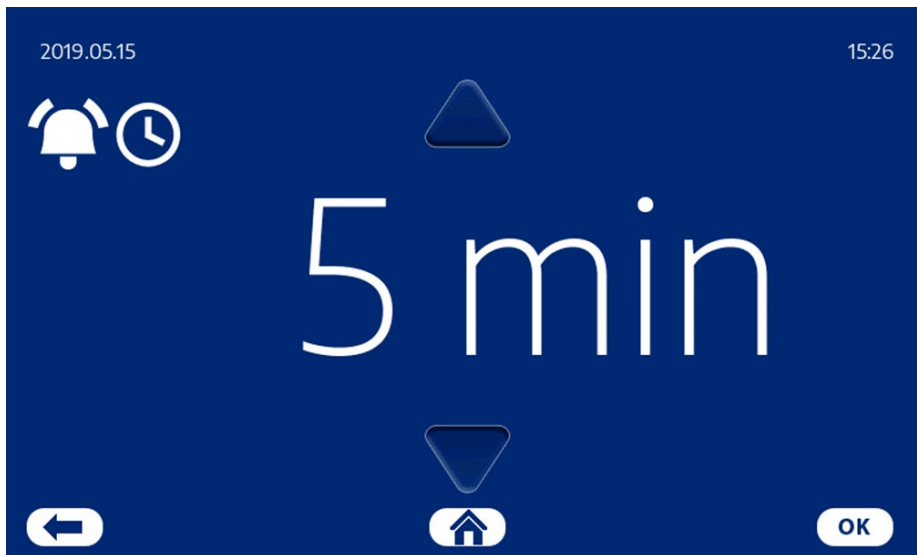Click on the red button to deactivate the alarm.

## 2. Temperature Alarm settings



To set up the High and Low temperature alarm.

1. Use arrow up or down to change the value.
2. To save the changed data click on the OK button.
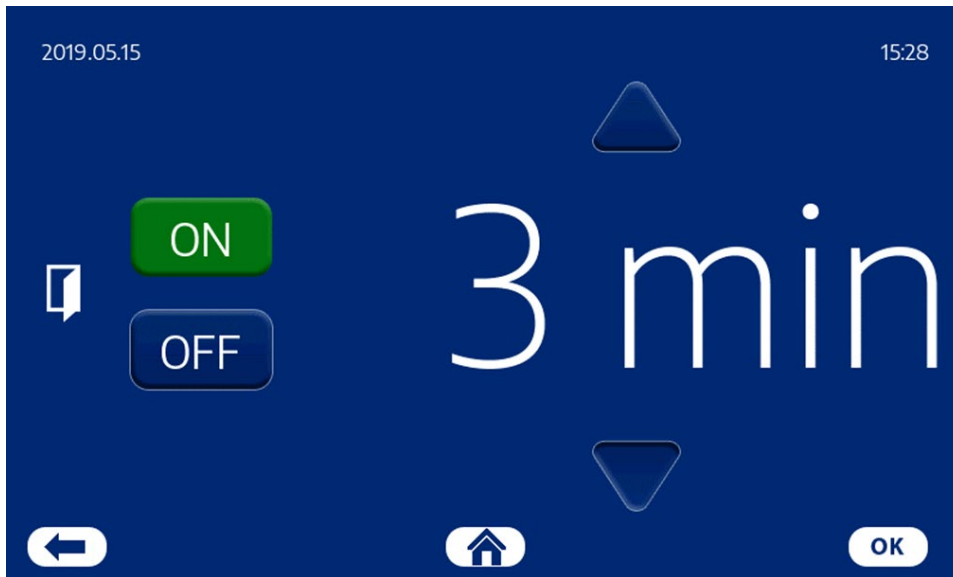
## 3. Temperature Delay



To set up the time for alarm delay.

1. Use arrow up or down to change the value.
2. To save the changed data click on the OK button.
3. When the high or low temperature level are reached, this alarm delay timer will start counting.

In this example, where the high temperature alarm level is reached, and the temperature inside the chamber is not starting to fall under the high temperature alarm level within 5 minutes, the High temperature alarm will be activated. You will both see and hear an alarm.

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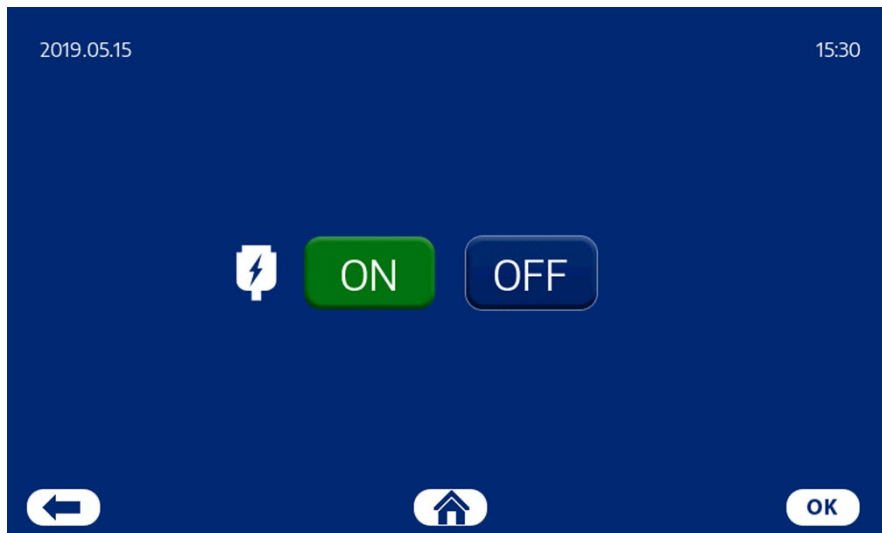
## 4. Door Alarm / Delay



To set alarm for Door alarm delay.

1. Use arrow up or down to change the value.
2. To save the changed data click on the OK button.

If the Door is left open for more than 3 minutes, the Door open alarm will be activated.

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## 5. Power Alarm



Setting for Power Alarm.

1. You can enable or disable the Power failure alarm. Push ON or OFF.
2. To save the changed data click on the OK button.

In case of Power cut, the Power failure alarm will be activated.

In case of Power Failure, the display will turn black to save Battery power, and the controller will give a beep every 1 minute.

To see the actual temperature, press your finger somewhere in the display shortly, and the display will light up and show the Power failure alarm, and the actual temperature in the chamber.  After few seconds, the display will turn black again, just for saving battery power.
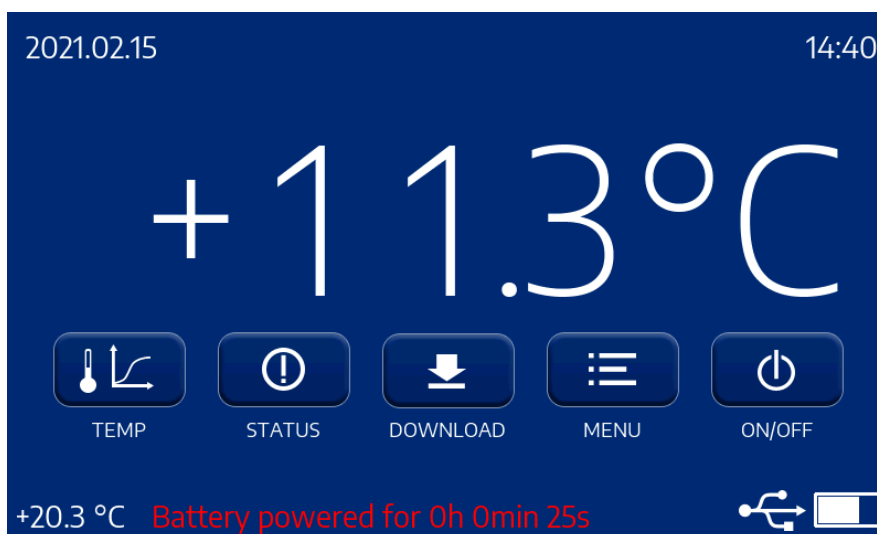
## Main Menu Alarm Screen
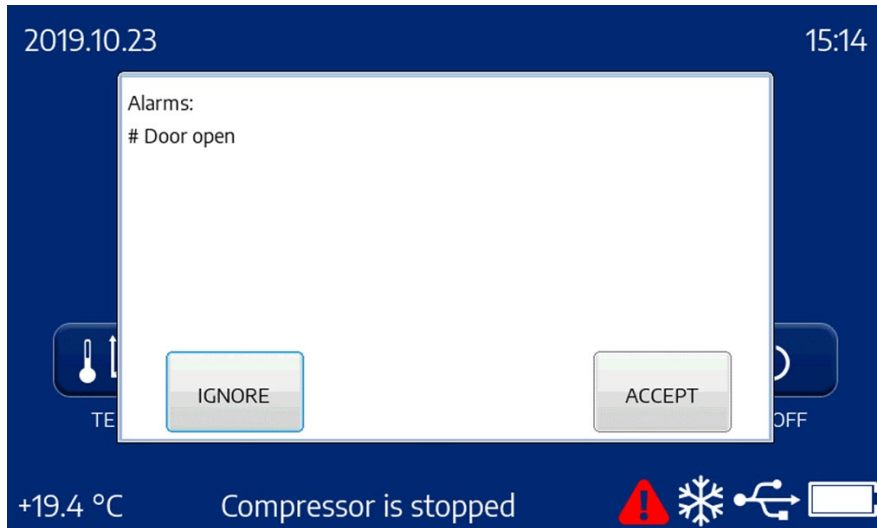


When an alarm occurs, you can choose to IGNORE or ACCEPT the alarm.

When you accept the alarm, you are automatically taken to the Alarm List Menu.

Click on the Activated alarm (red button) to accept and deactivate the Alarm.
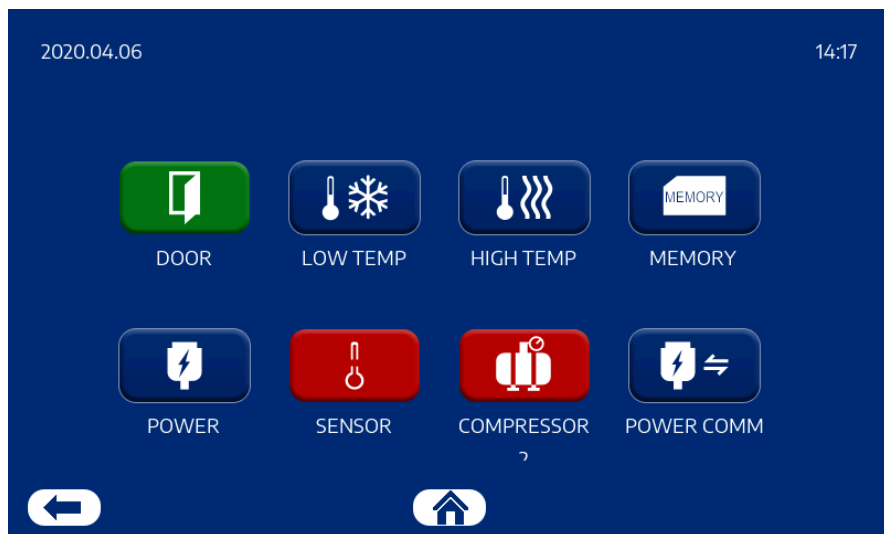


If you choose to IGNORE the alarm, you are temporarily ignoring the alarm and a red triangle will be visual on the main menu.
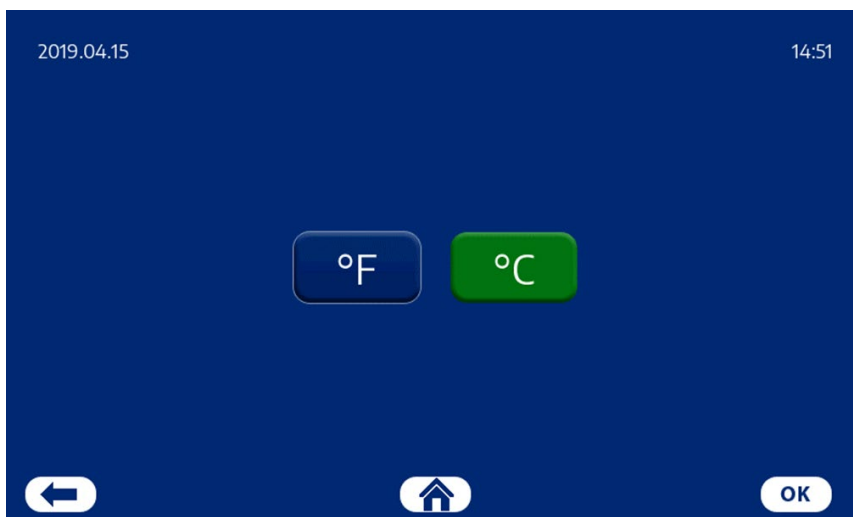
## Main Menu Alarm Screen
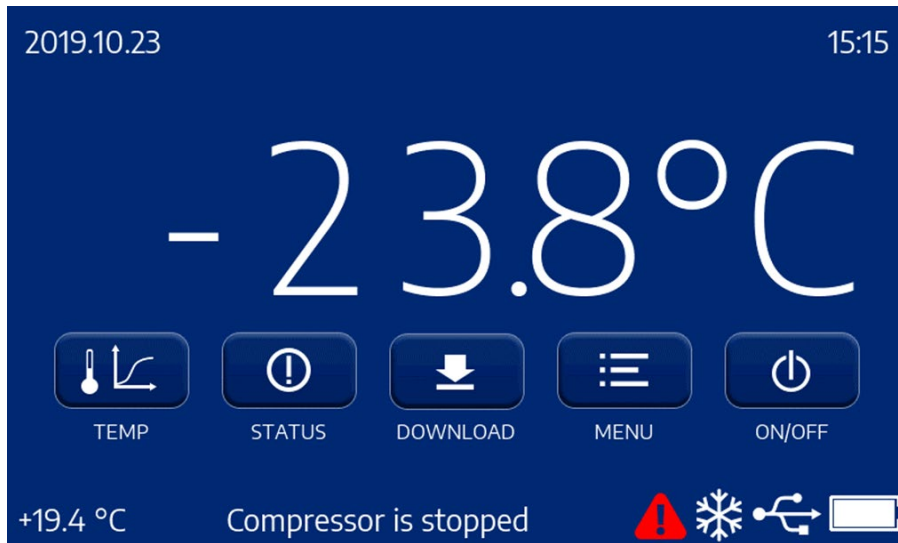


If you choose to IGNORE the alarm, you are temporarily ignoring the alarm and a red triangle will be visual on the main menu.

**The Red triangle (Alarm indicator) will not disappear until it has been accepted in the Alarm List Menu**
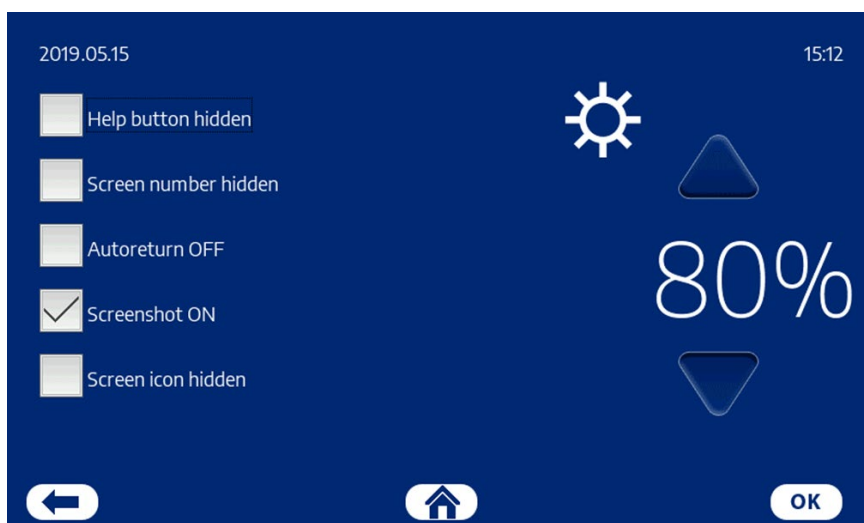
## 4. Temp. Unit



Under Temp. Unit, you can select if you want the temperature range to be in Fahrenheit or Celsius degrees.

1. Push °F or °C, the selected will turn green.
2. To save the changed data click on the OK button.

## 5. Display



Display Settings:

To the Right you can change Light brightness.

1. Use arrow up or down to change the value.
2. To save the changed data click on the OK button.

The squares to the left.

1. Help button (future option)
2. Screen number (used for screen identification)
3. Auto return (Auto return to main menu within 30 sec. if switched ON)
4. Screenshot (if switched ON, you can take a screenshot)
5. Screen icon (future option)

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## Chapter 6: Maintaining the ULT Freezer

**Note:** **This manual cover operations and maintenance operations for the owners/users of the ULT Freezer. Complete certification procedures and specifications are published in a separate publication Technical Manual: ULT Freezer Procedure Stations. This manual is available for trained and service person authorized by B Science. A complete certifier service kit is available to qualified certifiers from B Science.**

### Cleaning

Cleaning should be done when needed. When used in a dirty environment it might be necessary to remove the compressor compartment front panel cover and clean the condenser eventually with a vacuum cleaner.

If the cleaning process is neglected there is a risk that the performance of the Freezer will be affected, and even damage to the compressor could occur due to overheating.

**Check list for every 1 year:**

Check the Battery condition**.**

Check the Condenser fan is free of dust, and the wing can move freely around the fan cover.
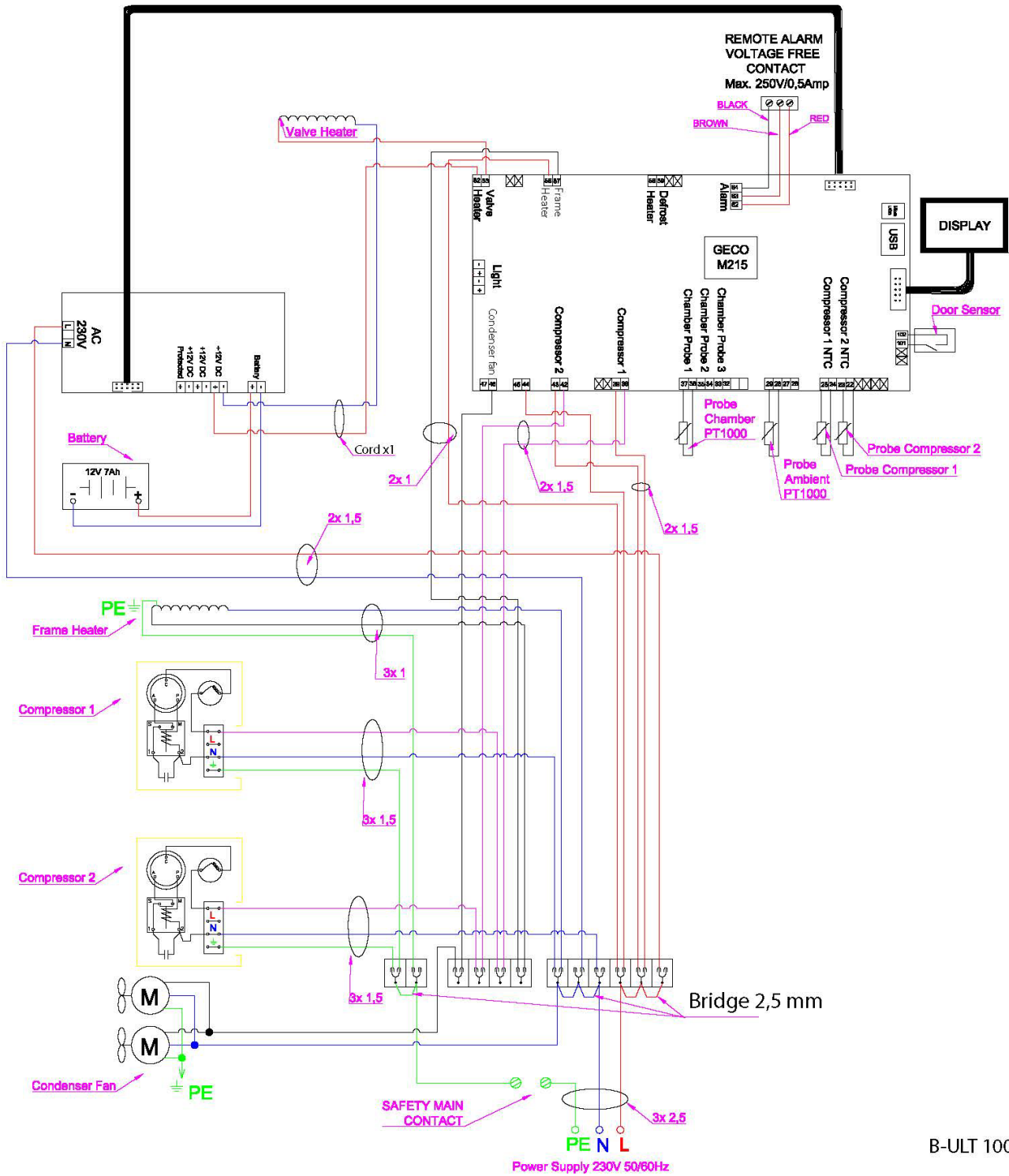
Check and adjust the sensor in the chamber.

Check the door gasket is in good condition.

### Manual  Defrosting.

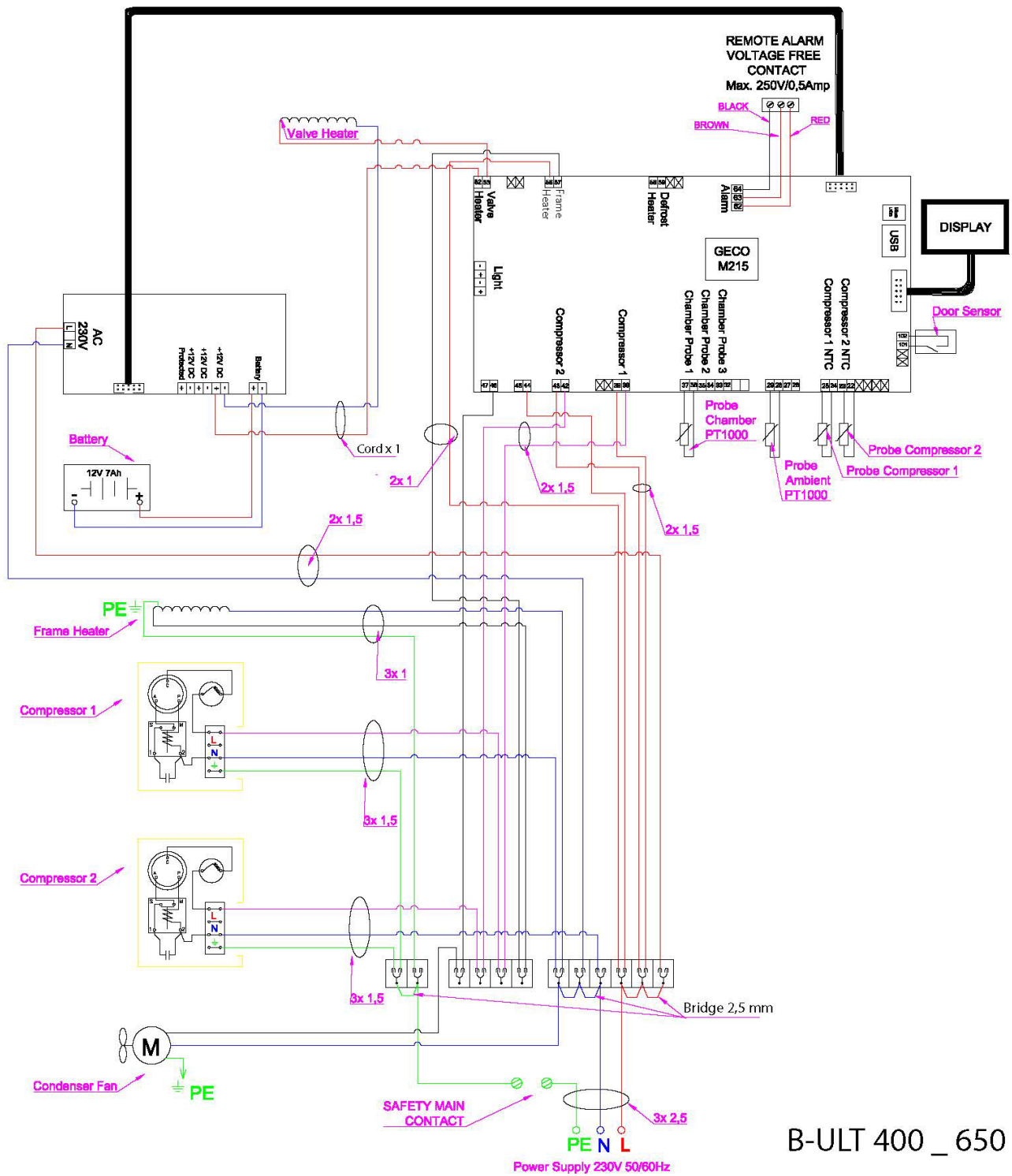This ULT Freezer does not have an Automatic Defrosting system.

See section with Manual Defrost process

Updated 19. April 2021

# Wire diagram B-ULT 100

Updated 19. April 2021

# Wire diagram B-ULT 400 & 650



B-ULT 400 _ 650

Updated 19. April 2021