H401-T-CONTROLLER

Temperature Controller

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Manual

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User Manual Languages

Scan the QR code to access the H401-T-CONTROLLER User Manual in your preferred language.

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1 Preface

The **H401-T-CONTROLLER** is a touch screen digital dual channel temperature controller and data log device allowing temperature set up, control and logging of two separate heating devices. It is a compact and reliable solution to maintain the effective desired temperature of the specimen right on the microscope stage within the range 25-60°C. The H401-T-CONTROLLER allows to set two different temperatures for the two devices.

The H401-T-CONTROLLER comprises the Temperature Controller and a miniaturized water / oil immersible temperature sensor. The temperature sensor allows to calibrate the heating devices with great accuracy, by providing feedback from the temperature of the culture medium contained inside the dish. The heating devices must be purchased separately.

A variety of heating devices can be connected to the H401-T-CONTROLLER, for example: heating plates - both glass and metal for inverted, upright and stereo microscopes, glass heating tables, metal heating pads, stage heating pads or objective heaters. The heating plates –both glass and metal- are designed to fit into the opening of XY stages of upright and inverted microscopes. Several models of glass and metal heating plate inserts can be selected from the Okolab portfolio. Custom solutions are available upon request. The glass heating table can be placed in the optical path of any stereomicroscope and provides a large, flat, clear, warm surface where one or more specimens can be maintained at physiological temperature. The glass heating table is also suitable for small animal surgery. The metal heating pads are temperature-controlled surfaces that can be positioned on any laboratory workbench or desk surface (e.g. table top, cabinet work surface, etc.) to keep Petri dishes, slides, and tubes at the right temperature before microscope observation. The stage heating pads clamp on the XY stage and create a temperature-controlled, flat surface on the entire stage, with the exception of the central part, which can be covered with a glass or metal heating insert. The objective heater is a flexible heated band designed to maintain the desired temperature of the objective body and lenses. This is important when the objective is in contact with the sample during water dipping or oil immersion observation.

The H401-T-CONTROLLER features an intuitive, user-friendly touch screen interface that enables you to perform accurate calibrations in an efficient and simple manner.

The H401-T-CONTROLLER is also equipped with on-board memory for data logging and storage. A simple routine allows to download data to USB drive or to PC.

We recommend reading carefully this manual to familiarize yourself with the functions and the operation of H401-T-CONTROLLER before use.

INTENDED USERS: The intended user is a professional figure such as: laboratory technicians and research doctors.

INTENDED PURPOSE: The device is used to control up to two devices simultaneously and to maintain the desired temperature in the sample placed on the saucer, in a temperature range between 25 and 60°C.

2 Symbol description

This paragraph describes the symbols used in the manual and on the product label.

2.1 Symbols used in this manual

The following symbols identify important information to note:



CAUTION or WARNING: this symbol warns you about the risk of electrical shock.



CAUTION or WARNING or IMPORTANT: this symbol warns you of circumstances or practices that can affect the functionality of the instrument.

Tip ► *Supplies you with helpful suggestions.*

Note ► *Supplies you with important information to successfully setup and use the instrument.*

2.2 Symbols on the product label

The table below describes the symbols included on the device label.

SYMBOLS	DESCRIPTION
	**Manufacturer**
	**Medical Device**
	**Consult instructions for use.**
	**Catalogue Number**
	**Serial Number**
	**Date of manufacture**
	**CE Mark**
	**Weight**
	**Product Disposal**
	**Protection degree against ingress of solids or liquids inside the product**

The device of Okolab are complies with Regulation (EU) 2017/745 on Medical Devices

3 Safety Notes

In order to achieve maximum performance and to ensure proper operation of your new equipment, please read carefully the following safety notes and the instructions. If you have any question, please contact Okolab.

INDICATIONS, CONTRAINDICATIONS AND WARNINGS:



- The equipment must only be used as intended and as described in this Manual.
- Equipment should be operated only by technically qualified personnel.
- Do not start up the equipment if some of its parts are damaged.
- This instrument is not intended for use in locations subject to flammable or explosive gases.
- Transport the equipment with care.
- Equipment and its internal parts can be damaged by dropping and by shock.
- Some equipment parts may reach temperatures above 60°C. Take care when touching it.
- Avoid rapid changes in ambient temperature which may cause condensation, avoid direct air draft from air conditioner, exposure to direct sunlight and excessive heat accumulation.
- Do not disassemble any part of the system.
- Do not disconnect cables while in operation.
- Do not use a volatile solvent such as paint thinner to clean the instrument because deformation or discoloration may occur.
- Use a soft, dry cloth to remove stains from the instrument.
- Do not exceed voltage indicated in this Manual and on the product label.
- Avoid excessive induction noise, static electricity and magnetic fields.
- Do not expose this instrument to rain or moisture.
- Prevent throttling and kinking of cables.



- Do not start up the equipment if the supply cable is damaged.
- Connect the equipment only to grounded mains power socket.
- Before starting, assemble the equipment while unplugged from an outlet.
- Prevent metal fragments or lead wire scraps from falling inside instrument case to avoid electric shock, fire or malfunction.



International caution symbol marks this device. IMPORTANT: read the “Safety Notes” before installing, using and commissioning this device, as the notes contain important information relating to safety and EMC. Not following these instructions can result in damage or breakdown of the device and its accessories.

Where a serious incident occurs in connection with the use of this device, the user and/or patient shall promptly report it to the manufacturer and the Competent Authority of the Member State in which the user and/or patient is established.

- Report to the Manufacturer:
    - Email: info@oko-lab.com
    - Telephone: +39 0818062624
    - Address: Via G. Di Prisco, 152,80044, Ottaviano (NA),Italy

  Reporting to the Competent Authority: For users registered in Italy, reporting to the **National Authority** (Ministry of Health) must be carried out through the official channels established on the Ministry's institutional portal. For users registered outside Italy the report must be forwarded to the **local Competent Authority** of the State where the accident occurred, following the procedures and forms provided for by the national legislation of the country in question.We reserve the right to make technical modifications.

IN NO EVENT OKOLAB S.R.L. SHALL BE LIABLE FOR ANY DIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY NATURE, OR FINANCIAL LOSS RESULTING FROM IMPROPER USE OF THE PRODUCT.

4 Supplied equipment

1 **Controller.** Dual channel temperature controller. See pointer 1 in Figure 1.

2 **T Sensor.** Fine gauge immersible thermocouple, which can be used to calibrate the heating devices connected to the Controller and to meter temperature, as needed. See pointer 2 in Figure 1.

3 **Power feeder and power cord.** 24V DC-60 W power feeder. See pointer 3 in Figure 1.

4 **MINI-USB-OTG.** Mini USB OTG cable to connect a USB drive to the H401-T-CONTROLLER for data download. See pointer 4 in Figure 1.

5 **Alarm screw terminal.** Contact closure alarm. See pointer 5 in Figure 1.

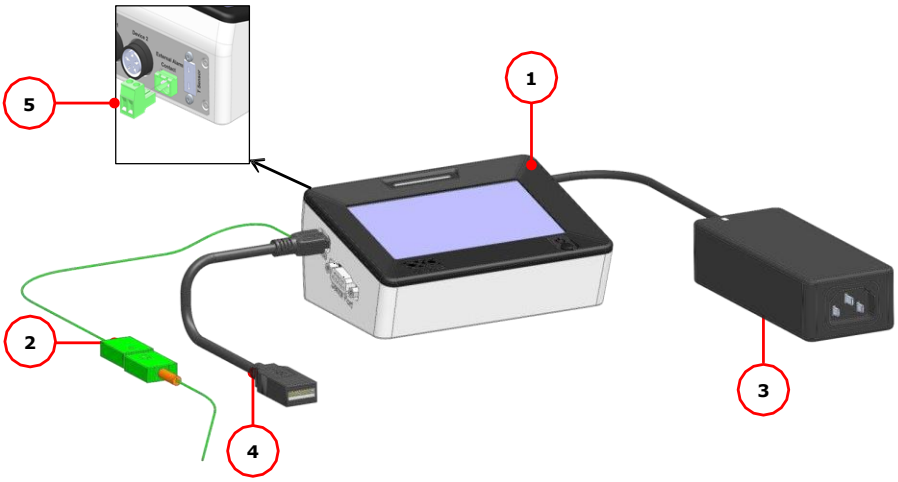


Figure 1. H401-T-CONTROLLER – Components.

5 Optional Equipment

1 **DATA-LOG (Optional-to be purchased separately**). Software used to log, view, and store data from a PC. It may be used to change parameters of the controllers via PC. Data can be exported in .xlsx format.

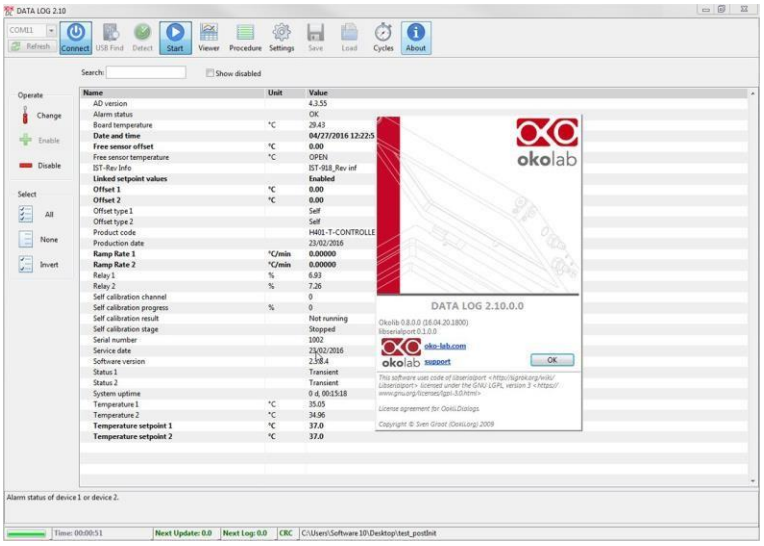


Figure 2. DATA-LOG software.

6 Equipment Description

The **H401-T-CONTROLLER** is a touch screen digital dual channel temperature controller and data log device allowing temperature set up, control and logging of two separate heating devices. It is a compact and effective solution to reliably maintain the desired temperature of the specimen right on the microscope stage within the range 25-60°C. The H401-T-CONTROLLER allows to set two different temperatures for the two devices.

The H401-T-CONTROLLER comprises the Temperature Controller and a miniaturized water / oil immersible temperature sensor which allows to calibrate the heating devices with great accuracy, by providing feedback from the temperature of the culture medium contained inside the dish. The heating devices must be purchased separately.

A detailed description of the H401-T-CONTROLLER is provided in the following list, which refers to the pointers in Figure 3:

1 **24 VDC Power Input**

2 **Device 1 port**

3 **Device 2 port**

4 **External Alarm Contact Closure**

5 **T Sensor port**

6 **Mini USB port**

7 **Serial port**

8 **Power switch**

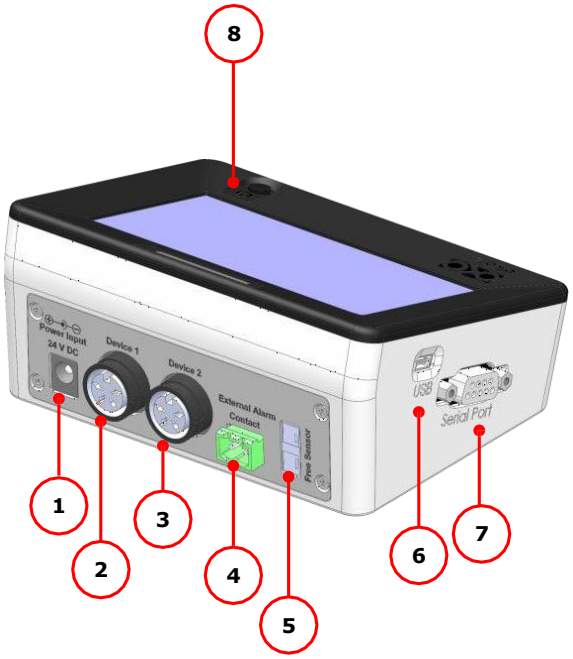


Figure 3. H401-T-CONTROLLER – Equipment description.

7 Installation

H401-T-CONTROLLER can control the temperature of up to two heating devices at the same time. Set point temperature of the heating devices can be different.

7.1 Compatibility

H401-T-CONTROLLER is compatible with the following Okolab heating devices' categories:

1 H401-T-Glass insert

2 H401-T-Metal insert

3 H401-T-PAD series

4 H401-STAGE-T-Pad series

5 Objective Heater series

For a detailed list of compatible heating devices, see Annex 1 of this Manual or refer to: www.oko-lab.com.

7.2 Connections of the heating devices

Do not turn on the device until you have completed and checked all connections.

Follow the instructions below to connect the heating devices to H401-T-CONTROLLER.

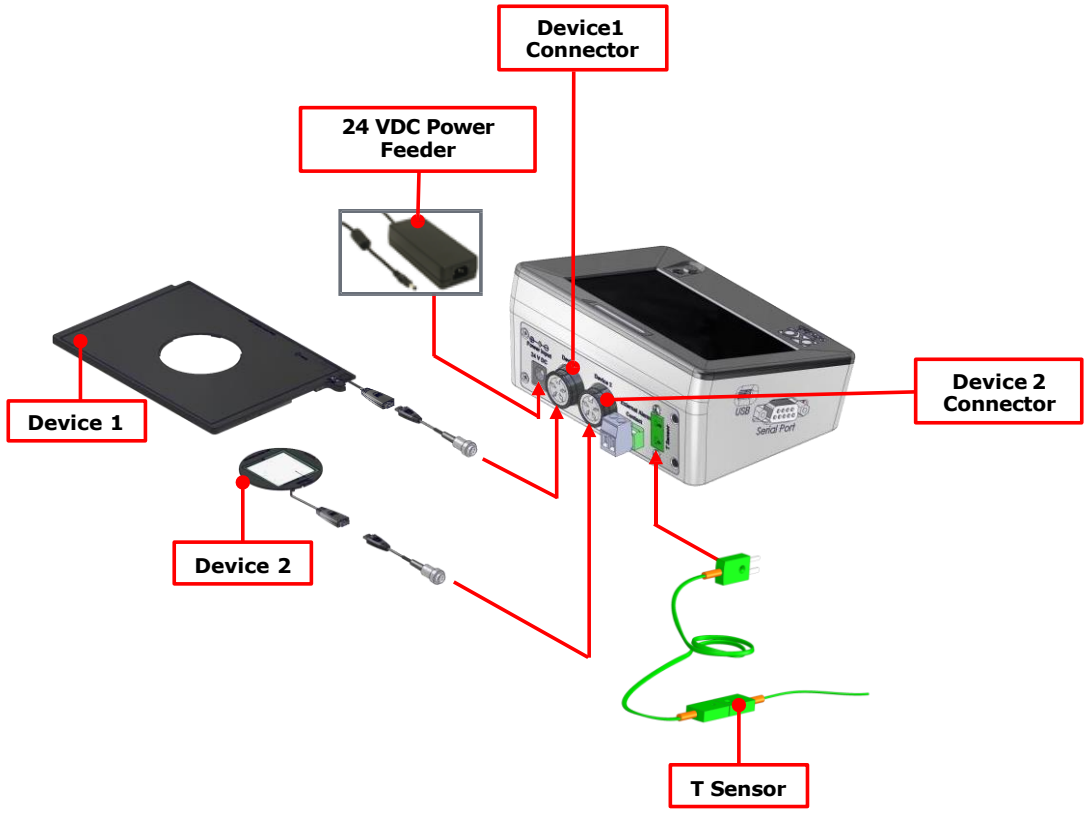


Figure 4. Connection of the heating devices

1 Connect one heating device to the Device 1 connector on the rear panel of H401-T-CONTROLLER (see Figure 4 and pointer 2 in Figure 3).

2 Connect the other heating device (if available) to the Device 2 connector on the rear panel of the H401-T-CONTROLLER (see Figure 4 and pointer 3 in Figure 3).

3 Connect the T Sensor to the T Sensor connector on the rear panel of H401-T-CONTROLLER (see Figure 4 and pointer 5 of Figure 3).

4 Connect the Power Feeder to the Power Input (see Figure 4).

Tip ► *Okolab provides the correct power adapter compatible with the devices configuration selected by the user in the purchase order. The majority of configurations use a power adapter with Rating Power of 60 W, while for other configurations a power adapter with Rating Power of 120W is required. Table 1 reports a non-exhaustive list of possible configurations that require a power adapter with Rating Power of 120 W.*

Heating devices connected to the H401-T-CONTROLLER	Power required
#2 H401-T-PAD	120 W
#2 H401-GLASS-TABLE	120 W
#2 H401-T-STAGE-PAD	120 W
#1 H401-T-GLASS/METAL insert	120 W
#1 H401-GLASS-TABLE+#1 H401-T-PAD	120 W
#1 H401-GLASS-TABLE+#1 H401-T-STAGE-PAD	120 W
#1 H401-T-PAD+#1 H401-T-STAGE-PAD	120 W

Table 1. Some heating devices that require a power adapter with Rating Power 120 W.



Use only the power adapter provided by Okolab or a power adapter for the recommended wattage, as reported in Table 1, to prevent system instability, random reset, unexpected shutdown, or problems due to insufficient power.
For assistance, contact Okolab at support@oko-lab.com
Do not connect AC power supply to your device until you have completed all the connections including the connection of the DC power supply cord to the rear panel of the H401-T-CONTROLLER as shown in Figure 4

7.3 MINI-USB port

The MINI-USB port allows the H401-T-CONTROLLER to be connected with the outside world.

7.3.1 Connection of a USB drive

Use MINI-USB-OTG cable to connect a USB Drive (not supplied) to H401-T-CONTROLLER, as shown in Figure 5.

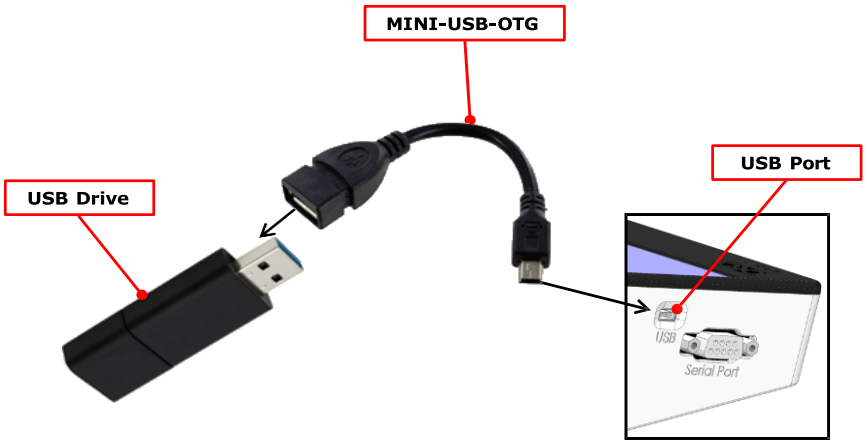


Figure 5. USB drive connection.

7.3.2 PC Connection via USB

Use a standard MINI-USB cable to connect H401-T-CONTROLLER to a PC, as shown in Figure 6. You can communicate with H401-T-CONTROLLER via PC by using:

- DATA-LOG software. The software allows to log and analyze the data provided by H401-T-CONTROLLER via PC. Refer to DATA-LOG user manual for more info.
- SDK (OKOLAB API) for integration in third party software http://www.oko-lab.com/support#soft_int_tools.

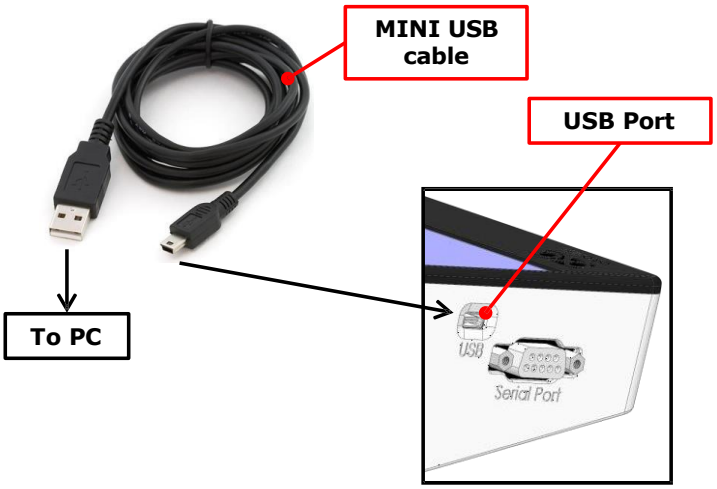


Figure 6. PC connection via USB.

7.4 RS232 port – PC connection via RS232

Use a standard RS232 cable to connect H401-T-CONTROLLER to a PC as shown in Figure 7. This option is advisable when the PC is at a distance greater than 10 meters from the H401-T-CONTROLLER.

You can interface with H401-T-CONTROLLER via PC by using:

- DATA-LOG software. The software allows to log and analyze the data provided by H401-T-CONTROLLER via PC. Refer to DATA-LOG user manual for more info.
- SDK (OKOLAB API) for integration in third party software http://www.oko-lab.com/support#soft_int_tools.

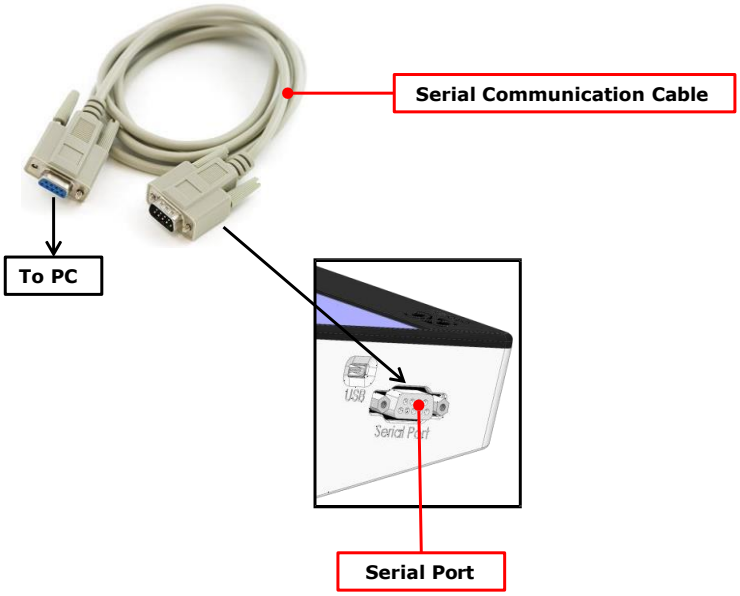


Figure 7. PC connection via RS232.

Without a serial port COM, to install the Serial Communication cable to your PC, you need to install a USB to serial converter following the manufacturer instructions. If you want to log, you have to use the COM port number that Windows assigned to the drive.

7.5 Alarm screw terminal

Connect the Alarm screw terminal to the real panel, as indicated in Figure 8(a).

Safety extra low voltage powered alarm equipment, not exceeding stated contact rating, may be connected to the screw terminal. Refer to Figure 8(b) for alarm contact rating.

Tip ► *The Screw Terminal is a contact closure alarm, which closes its circuit if H401-T-CONTROLLER triggers on alarm.*

The contact closure alarm does not close its circuit if H401-T-CONTROLLER is not powered.

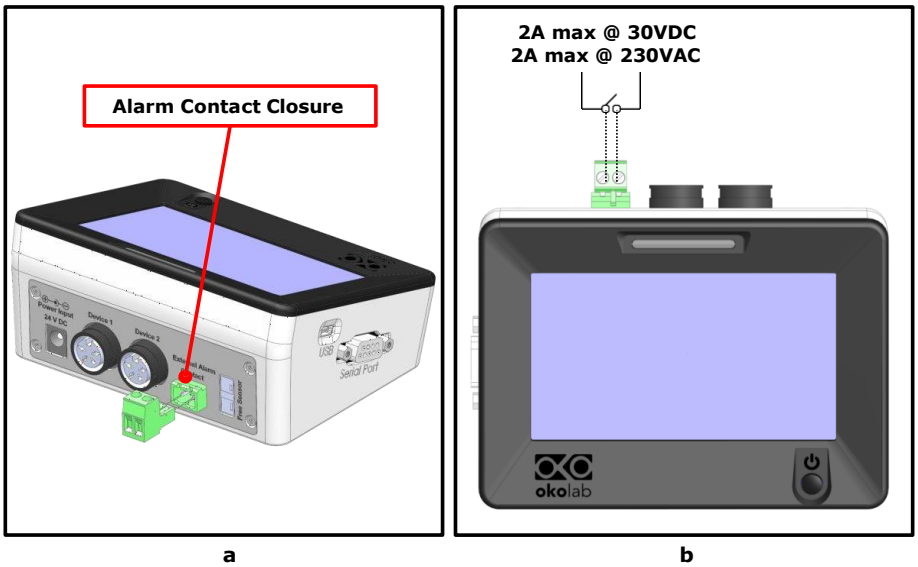


Figure 8. Alarm contacts (a) Alarm Screw Terminal; (b) Contact rating.

8 User Interface

This chapter describes the user interface of the H401-T-CONTROLLER.

8.1 Homepage

Figure 9 shows the main control panel, in particular it highlights 16 pointers detailed below.

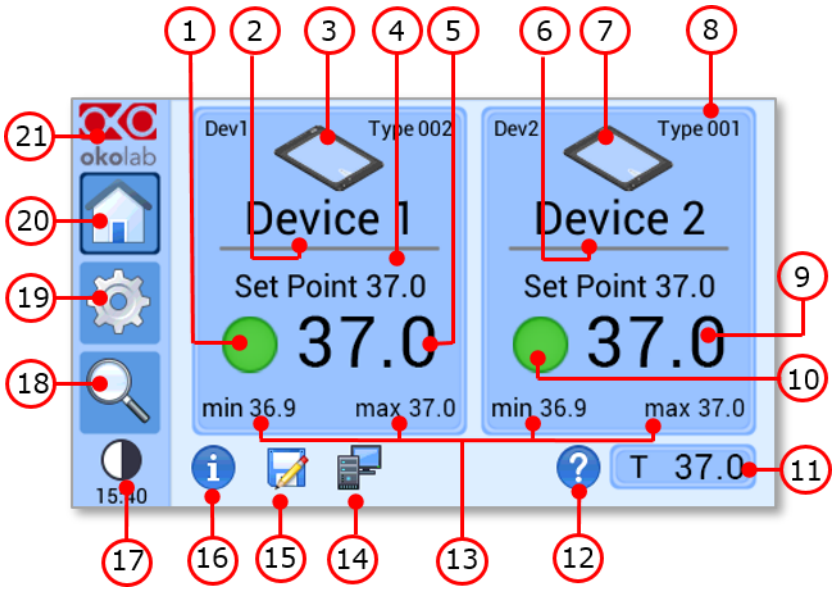


Figure 9 Home page.

1 Device 1 status LED

2 Device 1 name (see 8.2.1.2 to learn how to input device name)

3 Device 1 image (see 8.2.1.1 to learn how to input the device type)

4 Device 1 temperature set point (see 8.1.1 to learn how to change the set point value)

5 Device 1 temperature current value

6 Device 2 name

7 Device 2 image

8 Device 2 type

9 Device 2 temperature current value

10 Device 2 status LED

11 T Sensor current value

12 Support. Touch here to learn how to contact OKOLAB

13 Device 1 and Device 2 min/max temperatures within the time-frame set in the *Options subpage*

14 PC connection

15 Internal memory logging icon

16 Calibration summary

17 Display mode. Touch here to switch display mode

18 Overview page

19 Settings. Press here to access system options and settings

20 Home. To open the homepage

21 Product info. Press here to know generic info about H401-T-CONTROLLER and running time

Note ► *The H401-T-CONTROLLER allows to set different temperature set points for the two heating devices. See paragraph 8.2.1.1 for more info.*

Tip ► *The Touch Screen is pre-set with a set point Temperature of 37°C. Once turned on it will start operating to reach this set-point value.*

Note ► *Homepage will appear as in Figure 10(a) if the two heating devices are connected and as in Figure 10(b), if only one device is connected.*

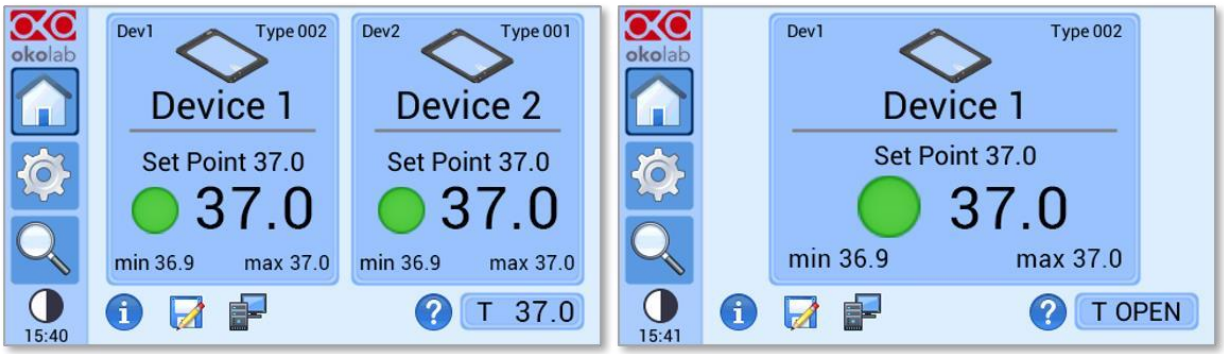


Figure 10. Home Page. (a) Two devices connected; (b) One device connected.

Each rectangle reports the temperature set point of the device, its current temperature value and the minimum (on the left) and maximum (on the right) temperature values reached within a defined time frame, previously selected by the operator, as reported in paragraph 8.2.5.1.

A status indicator (colored dot) is reported on the left of the current temperature. In this example the status indicator is green. The color of the status indicator changes according to the status of the controller. See paragraph 8.1.2 for a description of the possible controller status and of the relative color assumed by the status indicator.

8.1.1 How to enter the set point temperature

To input a new set-point temperature for a heating device, touch the corresponding tab, as indicated in Figure 11 (a).

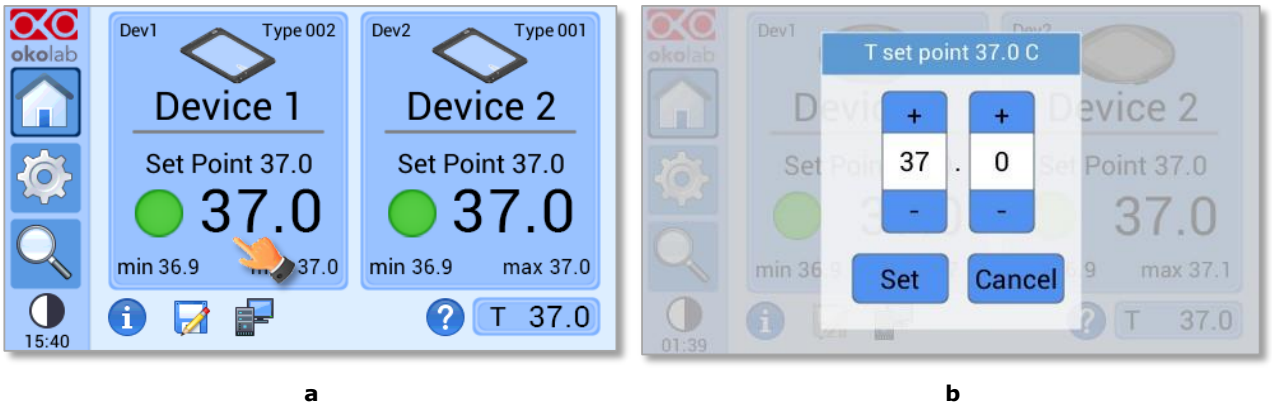


Figure 11. Definition of the set point. (a) Selection of the device; (b) Input of the set point value.

The set point regulation page will appear as in the Figure 11 (b). You can modify the set point by clicking on + and –. Once you have input the new set point temperature, press *Set* to save or *Cancel* to undo.

Tip ► *After any change in the set point value the controller enters into a transient regime, the Status Indicator and the Top LED turn yellow (see paragraph 8.1.2). During the transient regime, the controller will not trigger on alarm. The maximum length of the transient regime is set by the operator as indicated in paragraph 8.2.4.*

8.1.2 Controller Status: colours and meaning

The H401-T-CONTROLLER can assume four different status, which are represented by the colors assumed by the Status Indicator (pointer 1 in) and by the TOP LED (if enabled, as indicated in paragraph 8.2.5.5):



The GREEN color indicates that the set-point value has been reached (within the tolerance defined in the alarm subpage, see paragraph 8.2.4) and that the system is working properly.

Controller Status: NORMAL



The YELLOW color indicates that the controller is in transient regime. The Yellow light will appear after the controller is turned on and after any set point chance. The system is working properly, it is not in alarm and no action is needed. As soon as the H401-T-CONTROLLER stabilizes the temperature of the heating devices, the Controller Status changes to NORMAL and the color turn GREEN. If the H401-T-CONTROLLER cannot stabilize the temperature of one or both heating devices within the maximum time defined by the operator (see paragraph 8.2.4), the Controller Status changes to ALARM and the color turn ORANGE.

Controller Status: TRANSIENT

Note ► *If two heating devices are connected to the controller and the set point of only one is changed, the corresponding LED turns yellow and other LED remains green. The controller enters in transient regime and will not trigger in alarm for both devices.*



The ORANGE colour indicates that the current Temperature value is out of the tolerance defined in the alarm subpage (see paragraph 8.2.4). The controller triggers in Alarm.

Controller Status: ALARM



The RED color indicates that there is a problem with the unit itself (for example a Temperature sensor is broken). The system is in alarm. Turn the system off, wait for 5 minutes, and turn it back on. If the color is still red, contact Okolab at www.oko-lab.com for support.

Controller Status: ALARM

Note ► *If the heating device is not properly connected to the H401-T-CONTROLLER, the colour of the Status Indicator and of the Top LED turns red and the text OPEN appears. If you have only one heating device, make sure that the channel not connected to any heating device is disabled, as indicated in paragraph 8.2.1.1.*

Tip ► *The Top LED (see Figure 12) follows the same color code as the status LED.*

To activate the Top LED, follow the instructions reported in paragraph 8.2.5.5.



Figure 12. Top LED.

8.2 Settings

Press on *Settings* icon  to enter the *Settings* menu, as shown in Figure 13. The settings menu has 7 items, as shown in Figure 14.



Figure 13. How to enter in the Settings menu

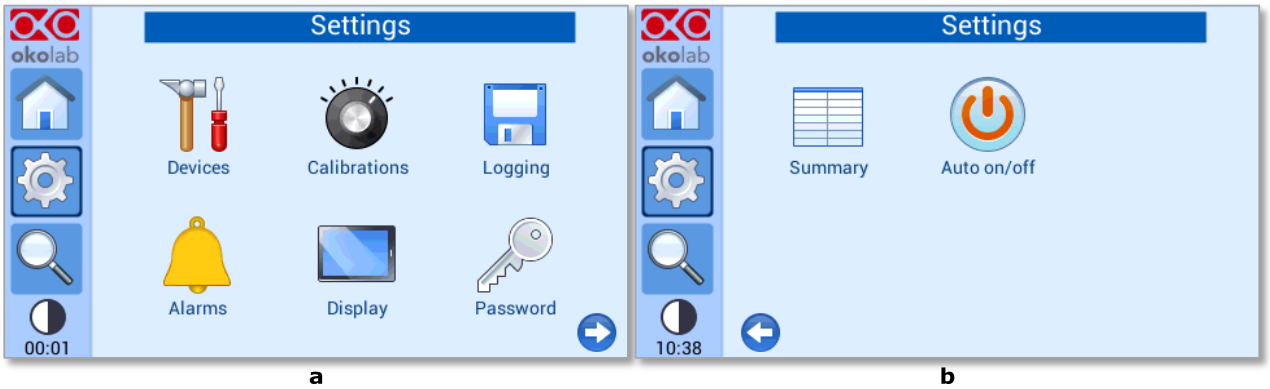


Figure 14. Settings Menu

8.2.1 Device configuration

The Device menu allows the definition of the types of heating devices connected to the H401-T-CONTROLLER as well as the definition of a label and of the maximum heating rate for each device.

To enter in the Device Configuration menu, press on *Devices* icon  , as indicate in Figure 15(a). The Device Configuration menu contains three icons as shown in Figure 15(b).

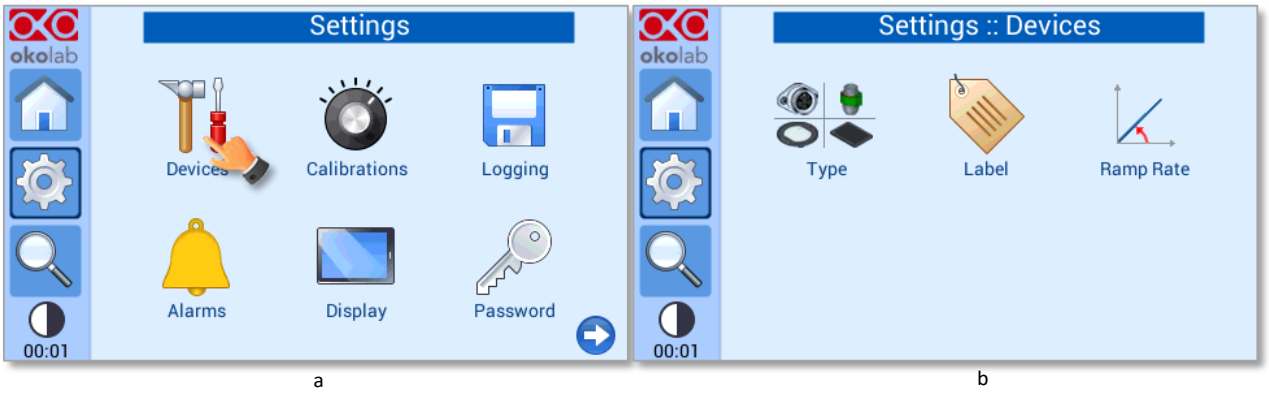
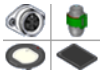


Figure 15. Device Configuration. (a) How to enter the Device Configuration menu; (b) Device Configuration menu

8.2.1.1 Device Type

To select the type of the heating device that you intend to connect to the H401-T-CONTROLLER, follow the instructions below:

1 Press on *Type* icon  to enter the Device configuration submenu, see Figure 16(a). Flag the box to select how many devices you want to connect, see Figure 16 b).

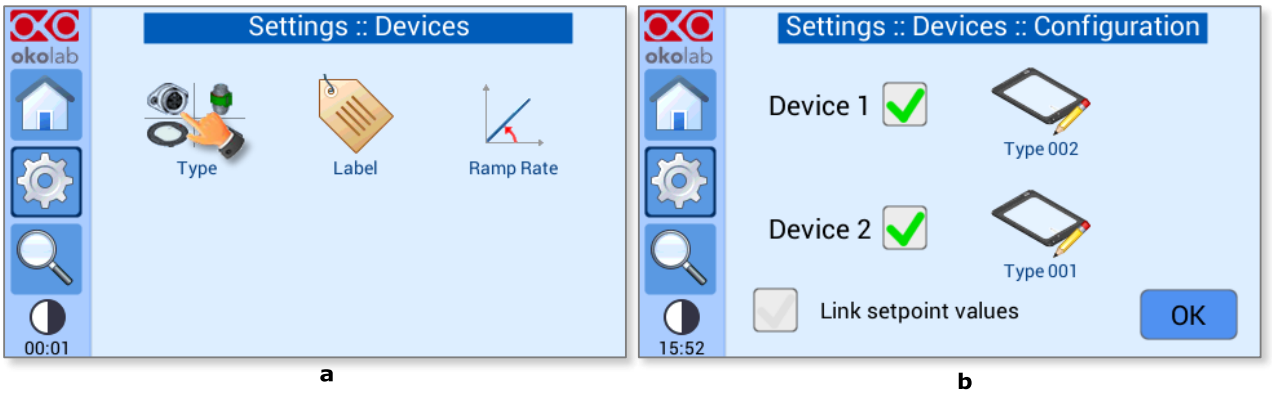


Figure 16. Devices submenu – Configuration submenu (a -b).

Note ► *If only one heating device is connected, do not flag the box of Device 2. The device will be automatically disabled (see Figure 17).*

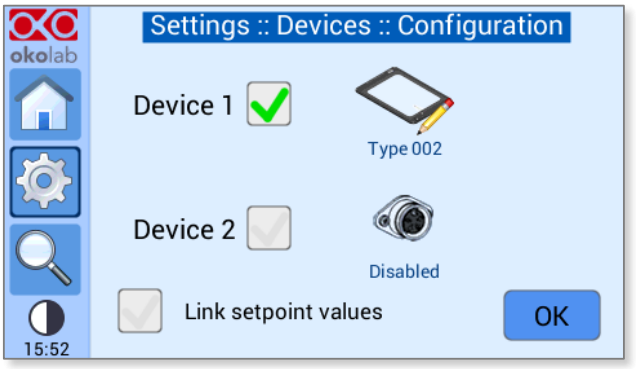
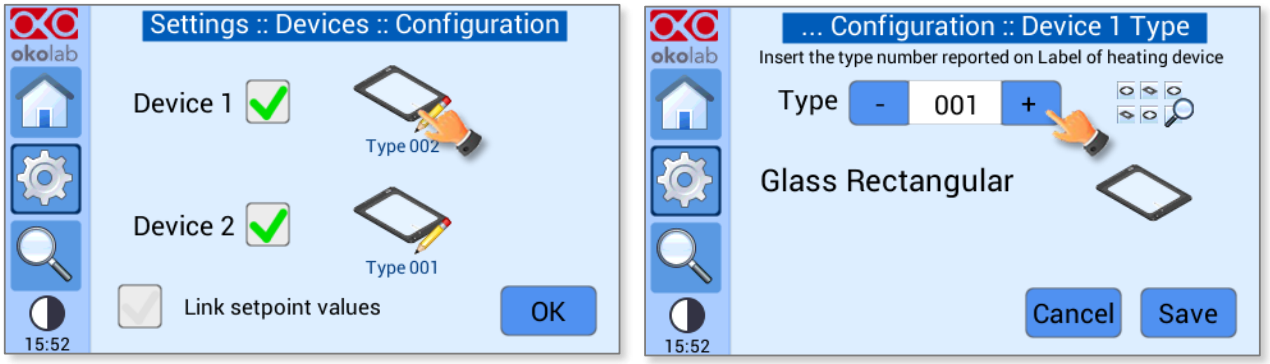


Figure 17. Selection of one heating device.

2 Press on Device icon to choose the connected device type, see Figure 18 a. Select the type number of the device (see Figure 18 b). You can read the device type number on the label of the heating device (see Figure 19).



a **b**

Figure 18. Device Type Configuration menu (a – b).

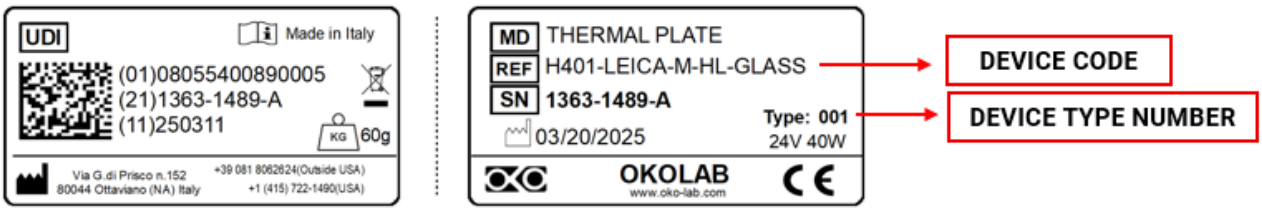


Figure 19. Heating device label.

3 Press on *Save* button to confirm or *Cancel* button to undo (see Figure 20).

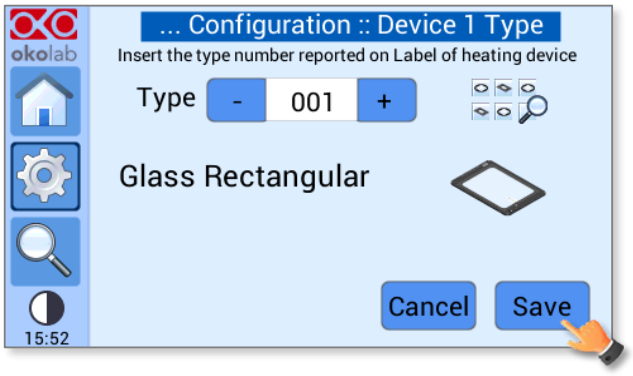
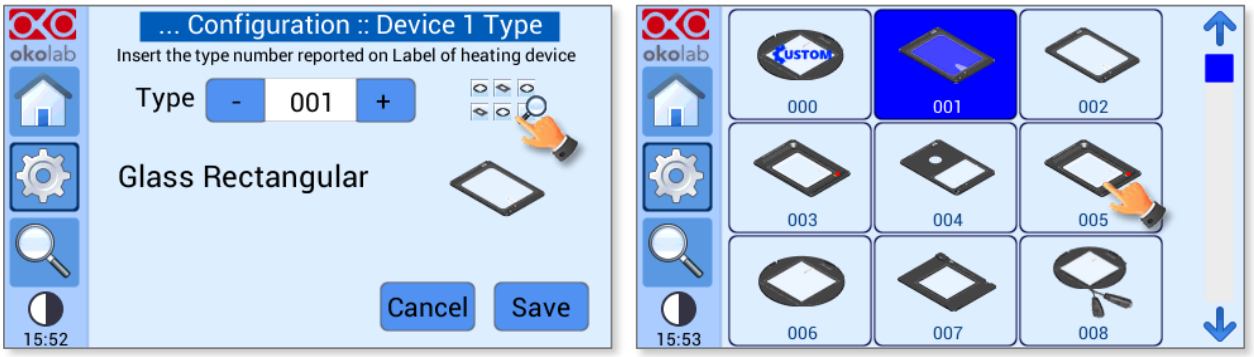


Figure 20. Selection confirmation.

The device type can be selected also by pressing:

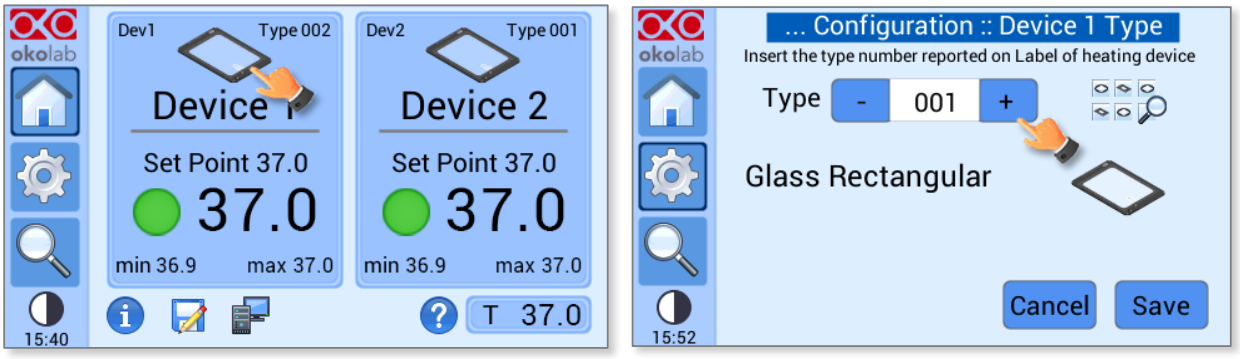
- the icon  (see Figure 21 a). Select the proper heating devices using the arrows, see Figure 21 b)



a **b**

Figure 21. Device Type selection (a -b).

- the Device icon on homepage (see Figure 22 a). Device Type configuration submenu will appear (see Figure 22 b).



a **b**

Figure 22. Device Type selection from Homepage (a b).

If a custom heating device (type number 000) is connected, insert the type number in Device Type configuration submenu and press *Save* (see Figure 23 a). Insert PID parameters as reported in *Thermal plate PID parameters* document, received with the shipment of the heating device and press *Save* (see Figure 23 b). Press *Cancel* to undo.

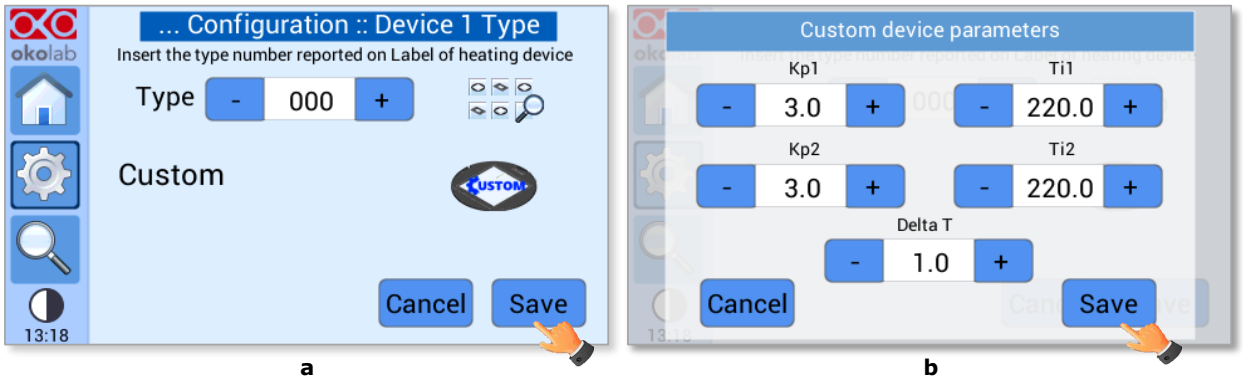


Figure 23. Custom device selection – PID parameters setting (a - b).

If a glass/metal heating device is connected, insert the type number in Device Type configuration submenu and choose the right side of the heating device connected to Device connector on the rear panel of H401-T-Controller (see Figure 24).

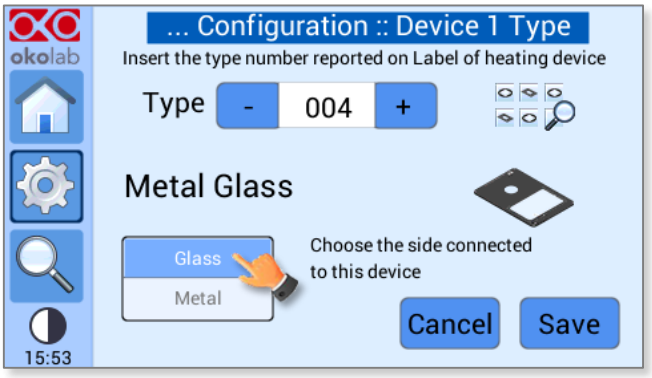


Figure 24. Selection of heating device with glass/metal insert.

If a glass dual channel heating device is used, connect Glass side of the heating device to DEVICE 1 connector and Metal side to DEVICE 2 connector on the rear panel of H401-T-Controller. Insert the type number of the heating device in Device Type configuration submenu (see Figure 25). After pressing Save button, Device 2 will be automatically disabled.



Figure 25. Heating device with glass dual channel.

Note ► *The selection of the device type provides to the H401-T-CONTROLLER with the proper parameters for optimal temperature control.*

Tip ► *If you have connected two devices and you want both of them to operate at the same set point value, flag the box Link set-point values (see Figure 26). If you do not flag the box labeled with Link set-point values, H401-T-CONTROLLER allows you to define different set point values for the two devices.*

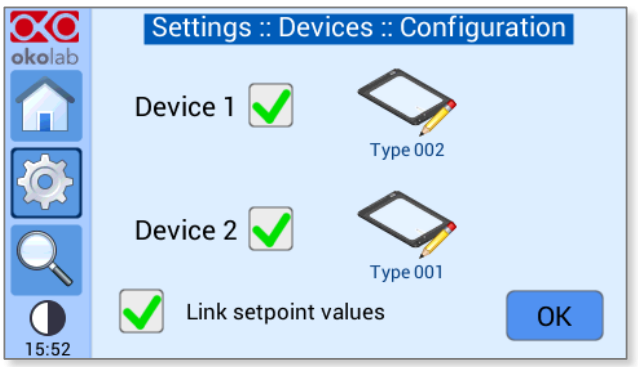


Figure 26. Link setpoint values.

Tip ► *See Annex 1 of this User Manual for the complete list of heating devices with indications of type number, commercial code and icon reported on H401-T-CONTROLLER.*

8.2.1.2 Device Label

It is possible to attribute a label to the heating devices as it follows:

1 Press on the Label icon , see Figure 27.

2 Press on Dev1 or Dev2 icon in the subpage that will open as Figure 28(a).

3 Enter the desired label by using the keyboard that will appear, as shown in Figure 28(b). Press *save* or *cancel* to undo.

Tip ► *If two devices are connected, you must repeat step 2-3 for each device.*

Note ► *Labels are particularly useful to relate the logged data to the heating device. Indeed, the label will be reported in the logged data. See paragraph 8.2.3 for more info on the logging features of the H401-T-CONTROLLER.*

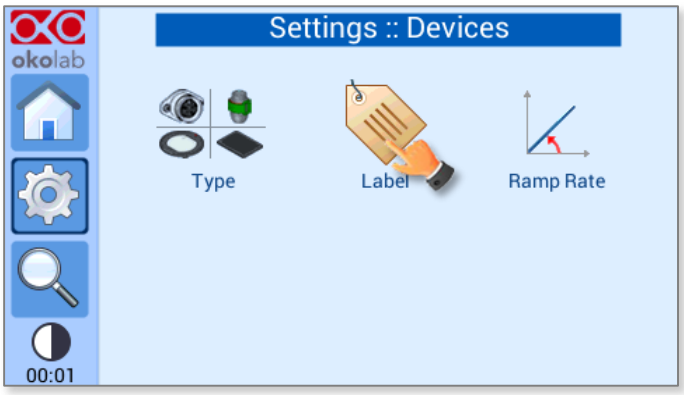


Figure 27. How to attribute a label to a device

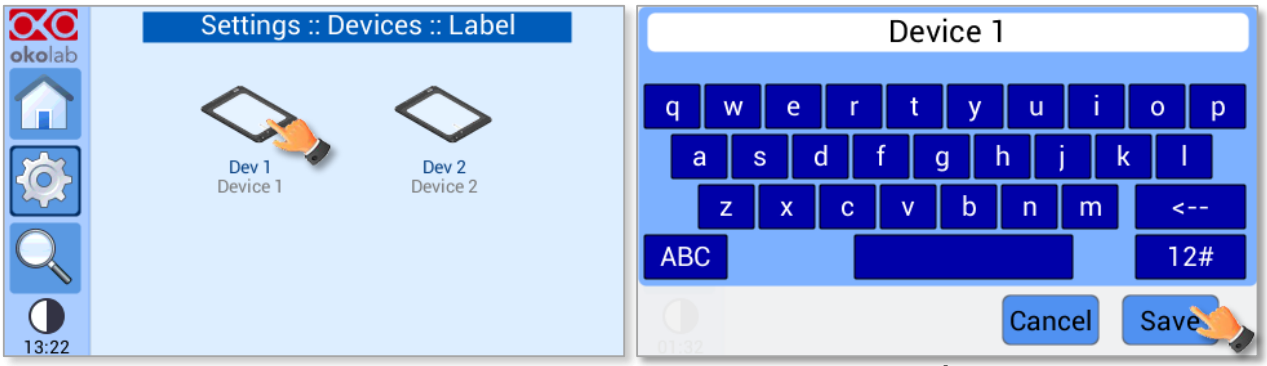


Figure 28. Device Label (a) Selection of the device; (b) Input of the label

8.2.1.3 Device Maximum Heating Ramp Rate

It is possible to define the maximum heating rate for each device, as it follows:

1 Press on the *Ramp Rate* icon  , see Figure 29(a)

2 Use the slide bar or the + and – icons to select the maximum heating rate (in °C/min) for each device and save, see Figure 29 (b)

Tip ► *It is particularly indicated to use a low heating rate in case of Objective Heater acting on a very sensitive objective. Check with the objective manufacturer.*

Tip ► *The ramp rate can be defined in the range 0.1-1.5°C/min. Above 1.5°C H401-T-CONTROLLER attributes the value MAX to the ramp rate.*

Note ► *If MAX is selected for a device, the controller will operate without constraint on the maximum heating rate for that device. The actual heating rate experienced by the device depends on the type of device.*

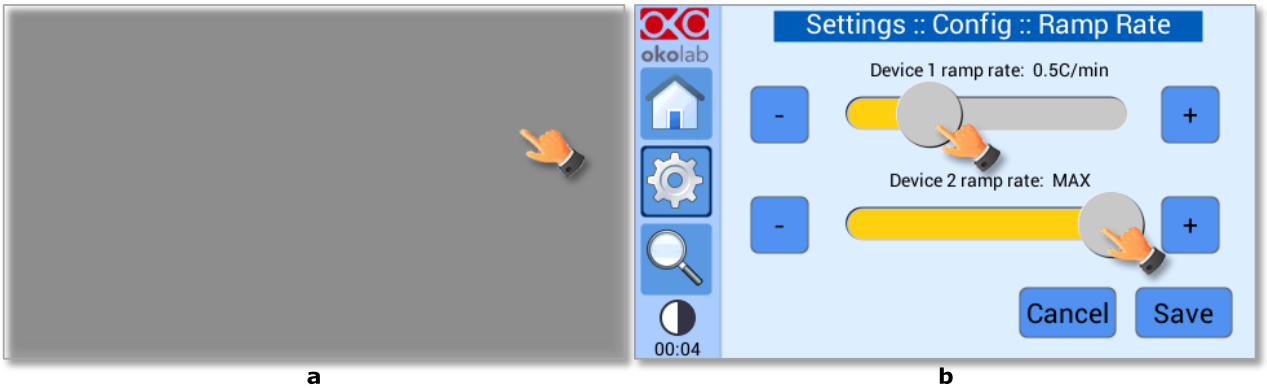


Figure 29. Ramp Rate. (a) How to enter the ramp rate menu; (b) Definition of the ramp rate

8.2.2 Calibration routines

The H401-T-CONTROLLER features automatic algorithms to calibrate the heating devices and to calibrate the Temperature Sensor.

To enter in the Calibration Menu press on *Calibration* icon  , as shown in Figure 30(a). The Calibration menu reported in Figure 30(b) will appear.



Figure 30. Calibration. (a) How to enter in the calibration menu (b) Calibration menu

Tip ► *Calibration of the Heating Devices is recommended during the first installation of the instrument and whenever the temperature in the room has changed by more than 1 °C.*

Tip ► *If two heating devices are connected, each one of them must be calibrated independently.*

Tip ► *Calibration of the T sensor should be performed once per year. We recommend protecting this feature with a Password (see 8.2.6).*

8.2.2.1 Heating Device Calibration

The H401-T-CONTROLLER allows you calibrate to the connected Heating Devices manually or automatically. In both cases the outcome of the calibration is an Off-Set value between the temperature of the liquid inside the sample holder (Petri Dish, Chambered Glass Slide, etc.) and the temperature of the Heating Device.

To perform the calibration it is necessary to measure the temperature of the liquid inside the sample holder. For this reason, the H401-T-CONTROLLER is equipped with a fine gauge temperature sensor, which can be immersed in water and oil (see pointer 2 of Figure 1).

To enter in the Heating Device Calibration menu, press on the *Heating Devices* icon  , as shown in Figure 31(a) and select the heating device that you intend to calibrate, as shown in Figure 31(b).

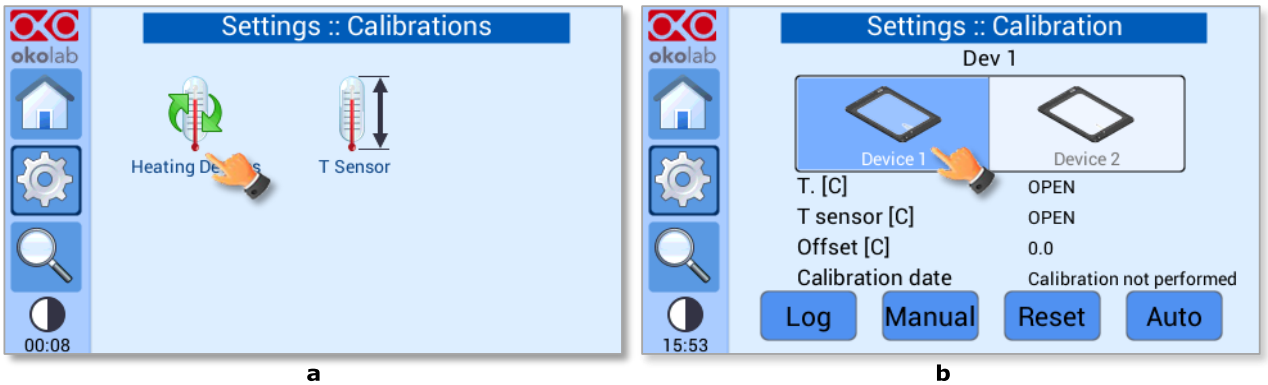


Figure 31. Device Calibration. (a) How to enter in the device calibration menu; (b) Selection of the device to calibrate

To start the calibration procedure, follow these instructions:

1 Make sure the T Sensor is connected to the H401-T-CONTROLLER (see Figure 4 and pointer 5 of Figure 3).

2 Secure with commercial adhesive tape the T Sensor to the bottom of the sample holder you use during standard operation (Petri dish, Chambered Glass Slide, etc.) as shown in Figure 32. Do not cover the tip of the T-Sensor.



Figure 32. T Sensor secured inside a 35mm Petri Dish

3 Fill the sample holder with water or oil to the level used during standard operation. Make sure the tip of the T Sensor is immersed in the liquid.

4 Cover the sample holder with the lid or leave it open, according to the protocol followed during standard operation.

5 Place the petri-dish on the heating device under calibration, at the center.

Tip ► *You can also OKOLAB SENSOR LID-# to hold the T sensor in the sample holder. Okolab SENSOR LID (available for purchase) secures the T Sensor in place during calibration as shown in Figure 33.*

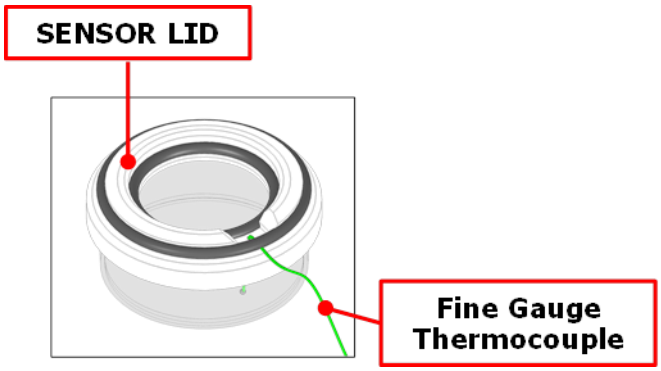


Figure 33. SENSOR LID-35. For 35 mm Petri-dish

Sensor lids are available for the following: 35 mm, 60 mm petri-dish, chamber slide and chambered cover glass. Sensor Lids must be ordered separately using the codes in following table

SENSOR LID CODES	
SENSOR LID-35	To be used in specimen feedback in a 35 mm Petri Dish
SENSOR LID-60	To be used in specimen feedback in a 60 mm Petri Dish
SENSOR LID-GS	To be used in specimen feedback in chamber slides and chambered cover glass

Table 2. Table of sensor lid codes

Note ► *It is important to monitor room temperature during the calibration, if room temperature is unstable, it the calibration will not be successful.*

Note ► *To improve accuracy, reduce air drafts and forced convection. If possible divert from the system any draft coming from the air conditioning system in the room.*

Note ► *The procedure can be performed both on Device 1 and on Device 2, but only on one device at time, since it requires the use of the T Sensor.*

Automatic Calibration

This procedure modifies the temperature of the Heating Device under calibration, until the temperature measured by the T Sensor placed inside the sample holder reaches set point temperature and remains stable with a user defined maximum tolerance (accuracy).

After having completed step 1-5 above, you can start the automatic calibration, by pressing on Auto as shown in Figure 34 and by typing your name in the dialog box, as shown in Figure 35.

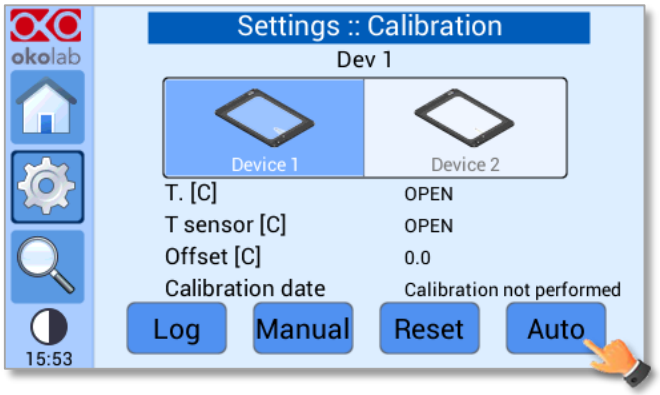
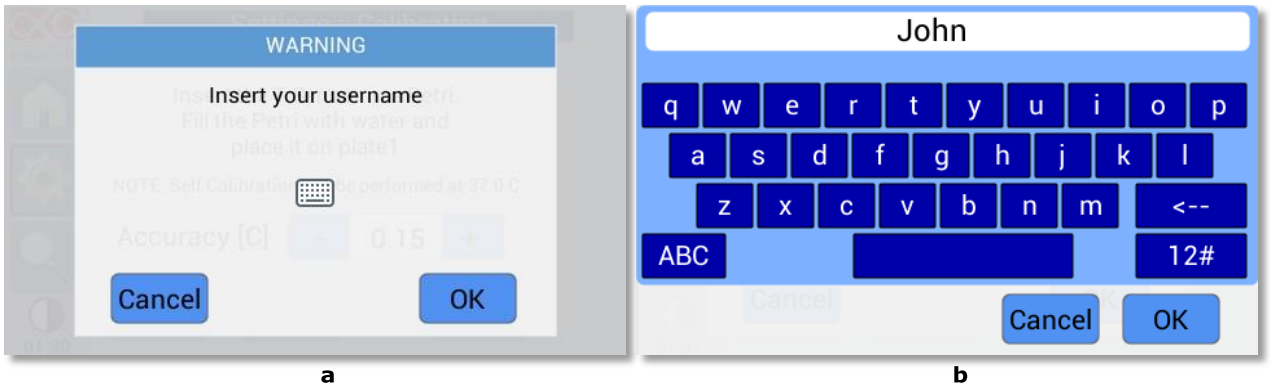


Figure 34. Heating device auto calibration. How to start auto calibration



a b

Figure 35. Username insertion. (a) Selection of the keyboard; (b) Operator name Input

Note ► *If you have inserted a protection password, you will be asked to type in the password before your name, as shown in Figure 36.*



a b

Figure 36. Password insertion (a) Selection of the keyboard; (b) Input of the password

Insert the accuracy that you would like to achieve in the dialog box that opens, see Figure 37(a) and press *OK* button to start the calibration. The H401-T-CONTROLLER will show the process bar, as shown in Figure 37(b).



a **b**

Figure 37. Self-calibration starting. (a) Automatic calibration accuracy; (b) Automatic Calibration progress page

Note ► *The calibration will be completed when, for 20 minutes, the Temperature measured by the T-Sensor remains stable at the set point value, within the accuracy introduced by the operator.*

- Auto-calibration procedure may take 1-2 hours to complete; the average calibration time is 90 minutes.
- Auto-Calibration will not be successful, if room temperature changes by more than 1°C during the calibration time or if air draft blows directly on the heating device.
- If room temperature changes by more than 1°C, you will not be able to achieve an accuracy in the liquid of ± 0.3°C.

The Automatic calibration is completed when the H401-T-CONTROLLER displays the offset value of the heating device, as shown in Figure 38.



Figure 38. Example of a successful self-calibration procedure

Note ► *It is possible to use the touch screen while the calibration is ongoing. Once the calibration will be completed the screen in will automatically appear regardless of the screen previously displayed*

Once the *Self-calibration* is completed you can remove the T Sensor from the petri dish and start your using the device.

Manual Calibration

This procedure allows to modify manually the temperature of the heating device under calibration and until the temperature of the T sensor reaches the set point value. The manual procedure is usually less accurate than the Automatic procedure, because it is operator dependent.

To start the manual calibration, follow the instructions below:

1 Make sure that the system has reached the steady state, i.e. the status indicator is green (see 8.1.2)

2 Press on *Manual* as shown in Figure 39

3 Insert the offset value clicking on + or - on the *Offset* tab as shown in Figure 40 to adjust the Device offset value and press on *Save.*

4 Type your name in the dialog box, as shown in Figure 41

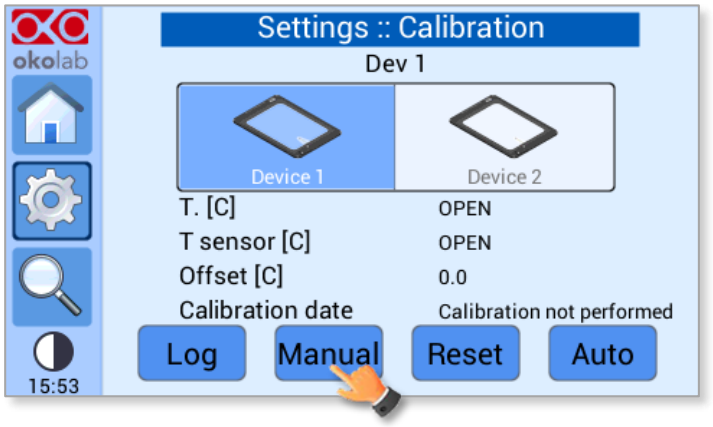


Figure 39. Heating device manual calibration. How to start manual calibration

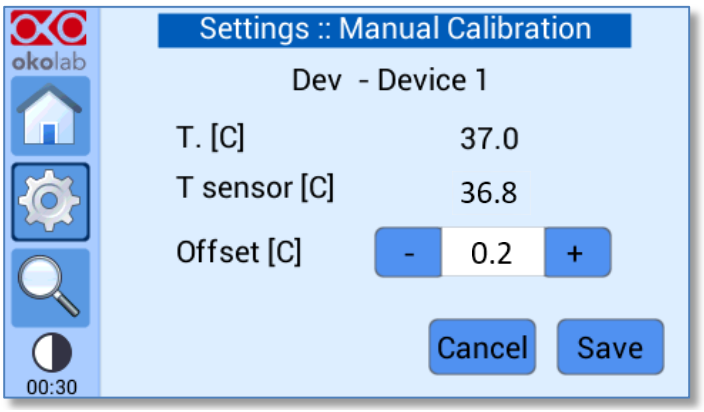


Figure 40. Manual Calibration. How to introduce the offset value

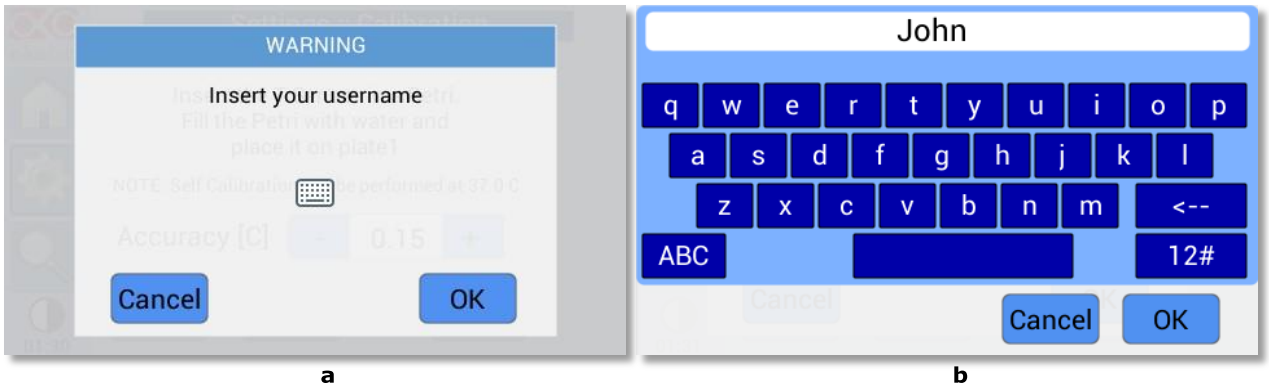


Figure 41. Username input. (a) Selection of the keyboard; (b) Operator name Input

Tip ► *Okolab recommends starting with an offset value corresponding to the difference between the set point temperature and the actual temperature measured by the T Sensor. In Figure 40, the desired temperature is 37.0 °C while the sensor reading states 36.8 °C, hence, in this case the offset to be applied is 0.2 °C.*

5 Wait until the temperature measured by the T Sensor is stable.

6 If the temperature measured by the T Sensor is close to the set point, you can consider the Manual Calibration as completed. Otherwise, repeat the steps above until the temperature measured by the T Sensor reaches the set point temperature.

Note ► *If you have inserted a protection password, you will be asked to type in the password before your name, as shown in Figure 42.*



Figure 42. Password insertion. (a) Selection of the keyboard; (b) Input of the password

Note ► *After changing the offset, it is advisable to wait at least 10-20 minutes to ensure that the temperature inside the sample holder is stable.*

7 Once the manual calibration is completed you can remove the T Sensor from the petri dish and start your experiment

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– If room temperature changes by more than 1°C during the calibration time or if air draft blows directly on the heating device you will not be able to achieve an accuracy in the liquid of ± 0.3°C.

How to recall a previous calibration

You can view previous calibrations by pressing on Log, as shown in Figure 43. Use the arrows to scroll up and down the table.

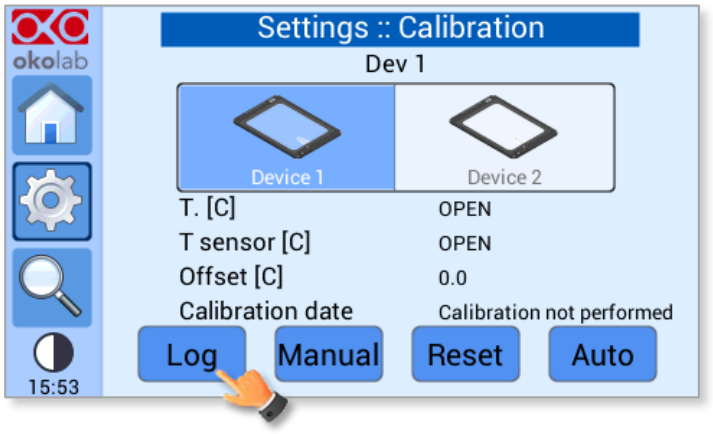


Figure 43. How to recall the stored calibrations

In the Offset column (A) stands for Automatic Calibration and (M) stands for Manual Calibration.

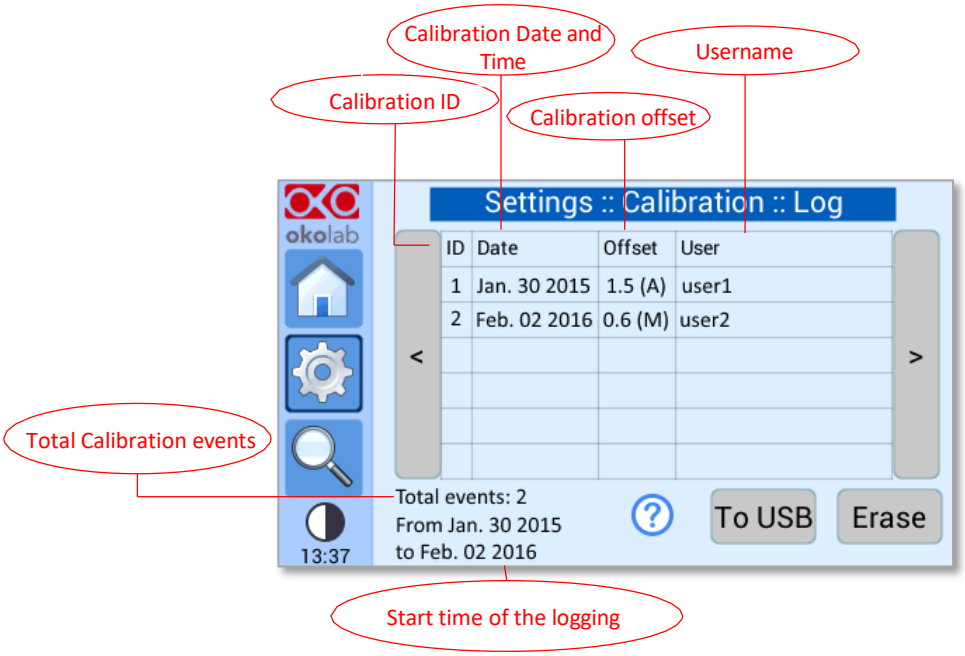


Figure 44. Logging of calibration data

You can recall any calibration by pressing on the corresponding row, as shown in Figure 45(a) and you will be asked if you want to apply the stored offset on the selected channel, as shown in Figure 45(b).

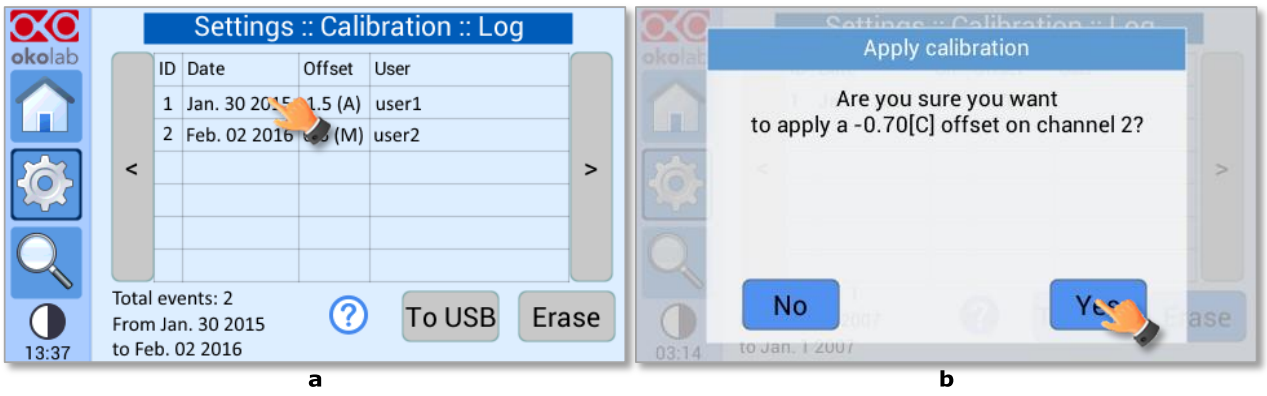


Figure 45. How to apply a previous calibration

Press on *To USB* if you want to download the calibration data on the USB drive or on *Erase* if you want to delete them.

Tip ► *We recommend protecting this feature with a Password (see 8.2.6).*

How to Reset Offset

You can reset current offset value by pressing on *Reset*, as shown in Figure 46.

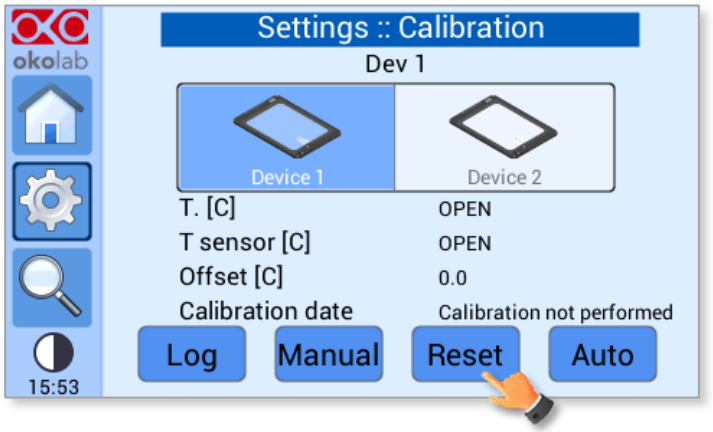


Figure 46. How to reset the offset.

8.2.2.2 T Sensor Calibration

The T Sensor of H401-T-CONTROLLER is calibrated in Okolab at three different temperatures, i.e. 35.0, 37.0 and 40.0°C. To view the factory calibration data, press on the T sensor calibration icon  as shown in Figure 47(a) and then on the tab labeled *Factory* as shown in Figure 47(b); the page with the calibration data will open, as shown in Figure 48.

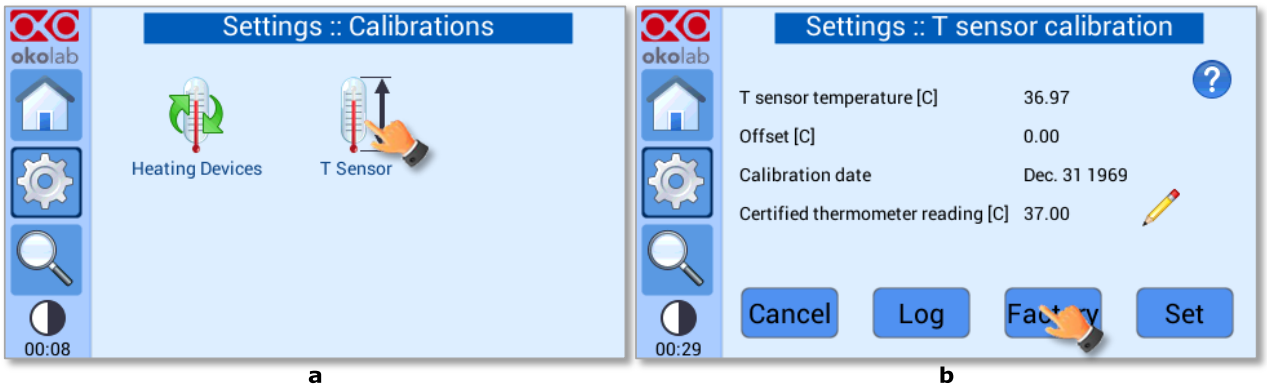


Figure 47. Calibration data. (a) T sensor calibration page selection; (b) T sensor calibration page

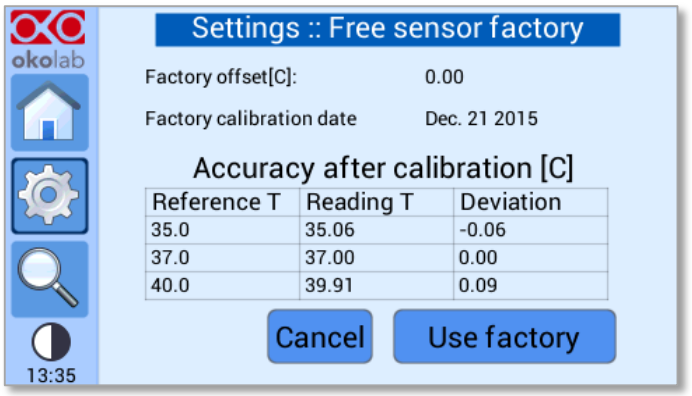


Figure 48. Free sensor factory offset

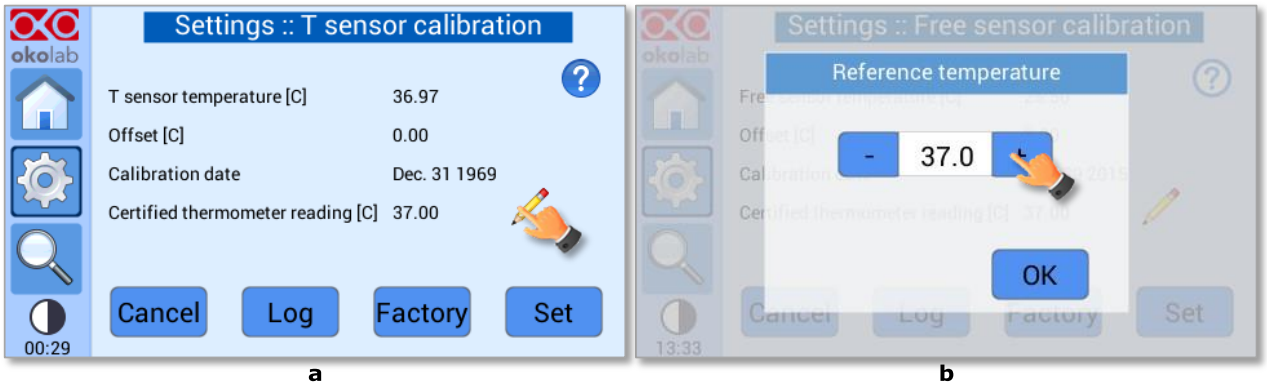
To re-calibrate the T sensor, follow the instructions below.

1 Set a water bath to the temperature you use as set point for the heating devices during standard operation (most of the times it is 37°C).

2 Measure water temperature by immersing the T-Sensor and a Certified Thermometer.

3 Type in the reading of the certified thermometer by pressing on the pencil , as shown in Figure 49(a)

4 Press on *Set* to adjust to reading of the T-Sensor against the reading of the certified thermometer, as shown in Figure 49(b).



a b

Figure 49. How to re-calibrate the T sensor

Tip ► *Press on icon to receive instructions on how to calibrate the T-Sensor.*

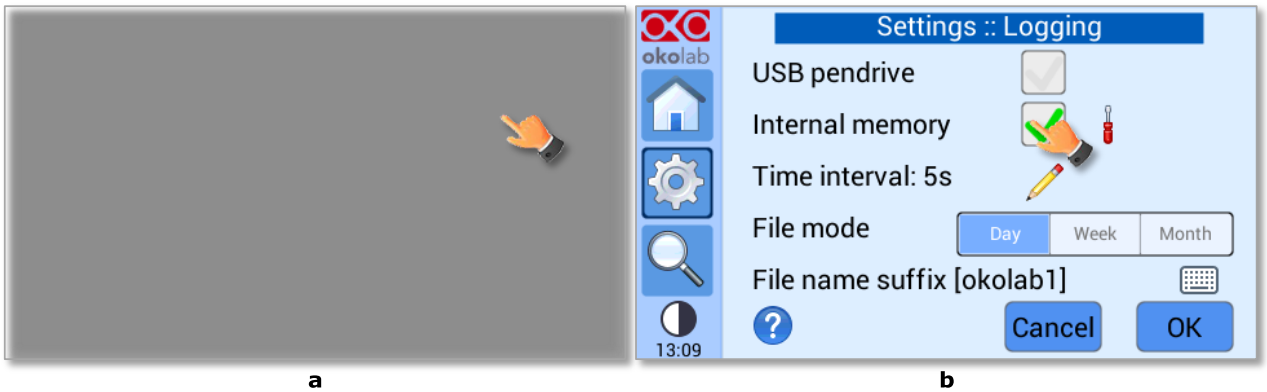
Tip ► *Okolab recommends using a certified thermometer as external reference*

8.2.3 Data Logging

H401-T-CONTROLLER is equipped with local memory to store the temperature and calibration data on its internal memory. These data can be then downloaded on a USB stick at user request. In order to activate the logging, follow the steps indicated below:

1 Press on *Logging* icon and flag *Internal memory* in the page that appears, see Figure 50.

Tip ► *When activating the logging on the internal memory, you can access the Logging page also by pressing the activated logging icon on the Homepage, as shown in Figure 51*



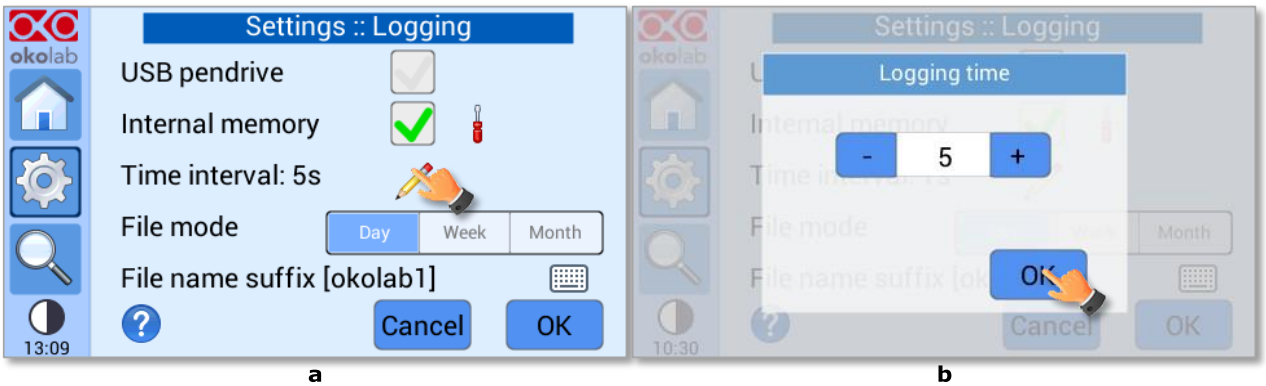
a b

Figure 50. Logging. (a) How to enter in the logging menu; (b) logging in internal memory



Figure 51. How to access the Logging page from the Homepage

2 Press on the icon to insert the logging time, see Figure 52. You can change this time in the range 1-60 seconds.



a **b**

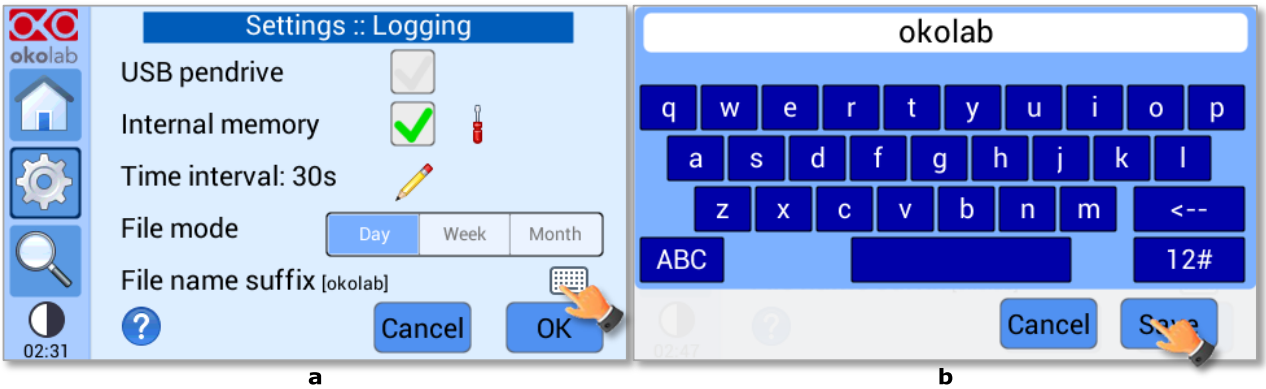
Figure 52. How to set the logging time

3 Choose how you want to split the data when downloaded, by pressing on *Day*, *Week* or *Month*, see Figure 52 (a).

Tip ► *If you select Day, the data will be split in files, each one containing the data on one day. If you select Week, the data will be split in files, each one containing the data on one week.*

4 Write the file name suffix to be reported in the downloaded files by pressing on the keyboard icon , see Figure 53(a). Then press on *Save*, see Figure 53(b).

Tip ► *With the selections done in Figure 52 and in Figure 53, the data will be downloaded in the USB drive as shown in Figure 54.*



a **b**

Figure 53. Data Logging. How to define the suffix for the downloaded files

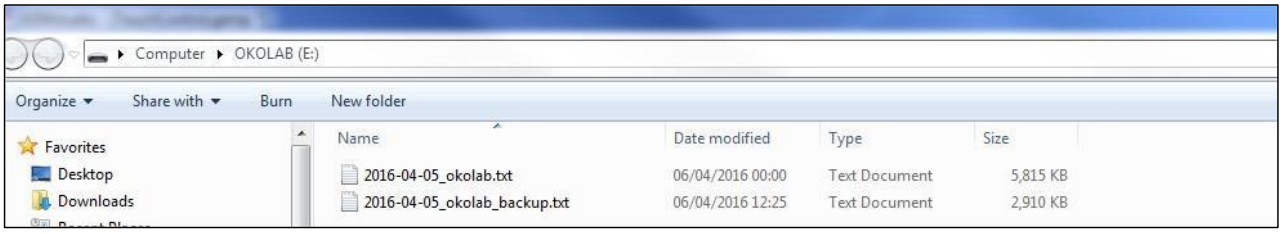
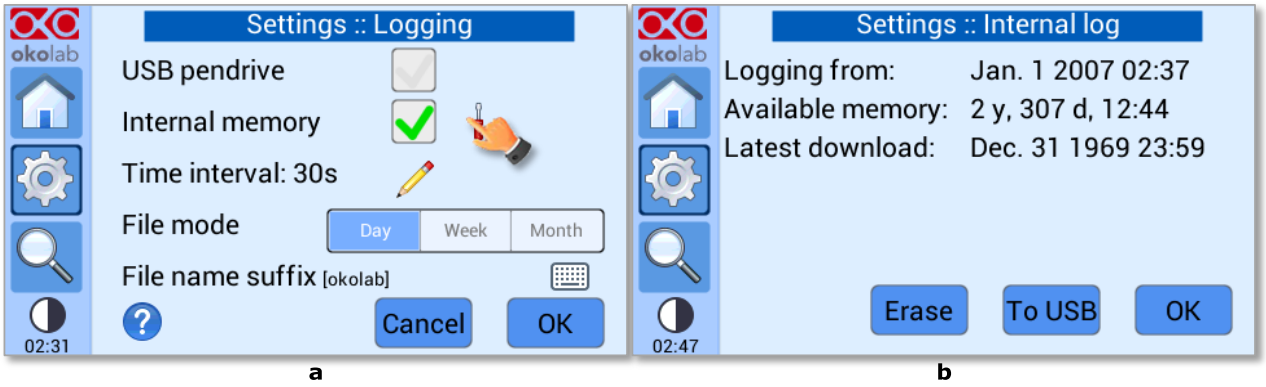


Figure 54. Downloaded files on the pen drive

Note ► *If you press on the screwdriver*  *, see Figure 55(a) you can view the logging starting date, the available memory and the latest download, see Figure 55(b).*

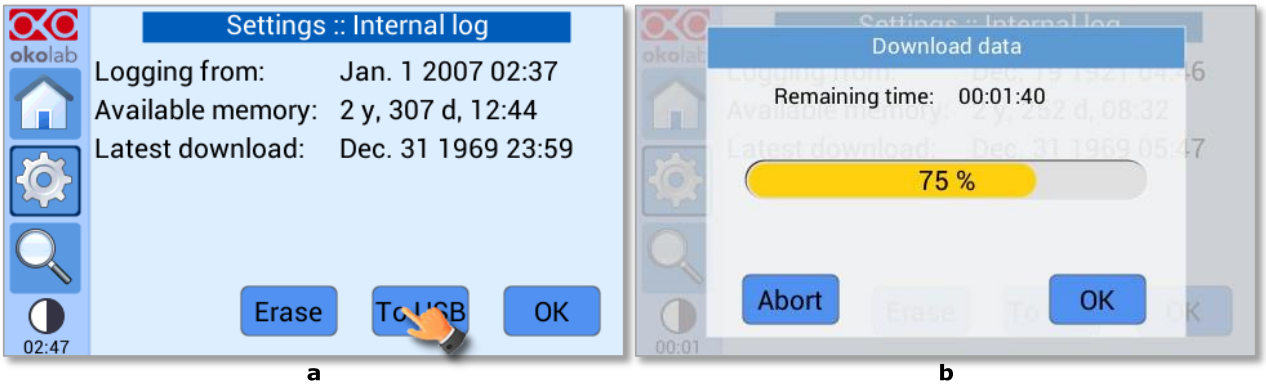
Note ► *The available memory depends on the time interval you have inserted in the Logging page. The default logging time is 30 seconds.*



a b

Figure 55. Internal memory status. (a) Logging page settings; (b) Internal log page settings

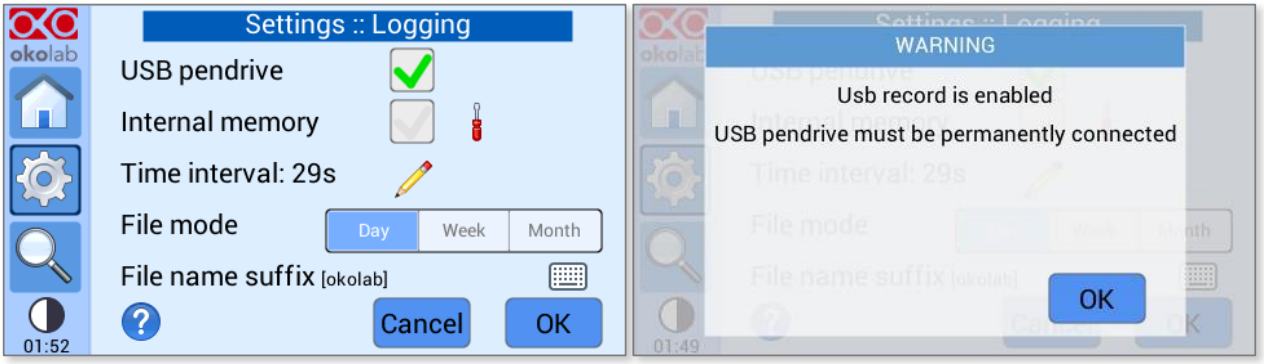
To download the data, press on *To USB* or on *Erase* if you want to delete them, see Figure 55(b).



a b

Figure 56. Download to USB

You can activate the logging also on the *USB stick*, by flagging on *USB pen drive*, see Figure 57(a).



a b

Figure 57. Logging on USB drive. (a) USB drive selection; (b) Reminder to connect the USB drive

In this case, H401-T-CONTROLLER advices you that a pen drive must be connected to the USB port, see Figure 57(b), and will store the data on the USB drive.

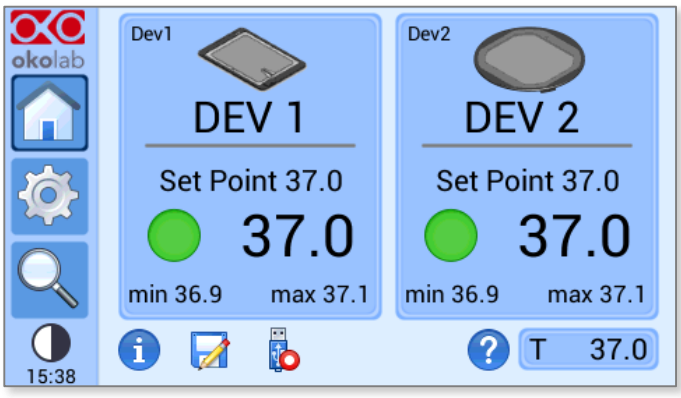


Figure 58. Logging to USB pendrive

Note ► *When connecting the USB stick to the H401-T-CONTROLLER, a pendrive icon*  *appears on the Homepage. If you activate the logging on USB drive, a red dot appears on the pen drive, to remind that the USB pendrive should not be disconnected from the H401-T-CONTROLLER, see Figure 58.*

8.2.4 Alarms

When H401-T-CONTROLLER triggers on alarm, the contact closure closes its circuit (see Figure 8). Safety extra low voltage powered alarm equipment, not exceeding stated contact rating, may be connected to the screw terminal. Refer to Figure 8 for alarm contact rating.

H401-T-CONTROLLER also allows activating visual and audible alarms.

To set the alarms specifications, press on the Alarms icon  ; see Figure 59(a) then follow the indications below:

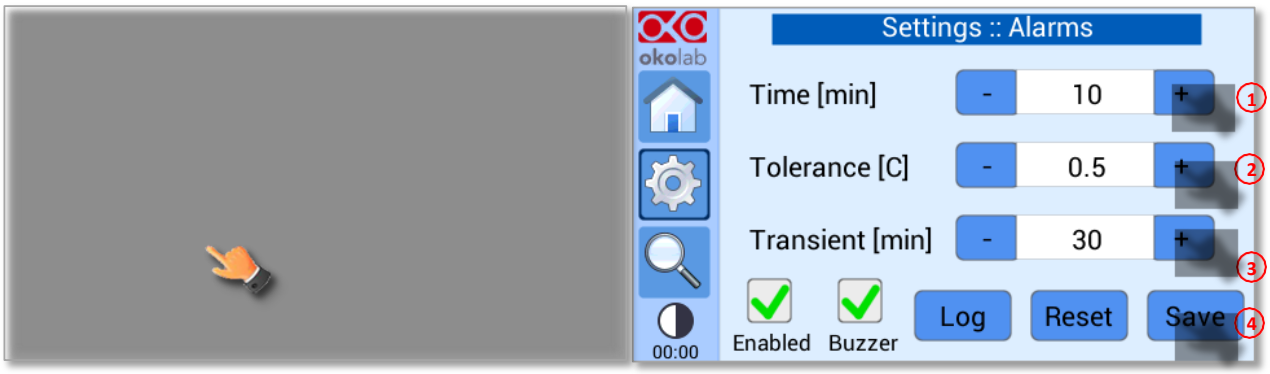
1 Insert the alarm time; i.e. the time for which the temperature of the Heating Devices may remain outside the allowed tolerance before the controller triggers in alarm, see 1 in Figure 59(b)

Note ► *The alarm time range is 5-20 minutes.*

2 Insert the *Tolerance* value, see 2 in Figure 59(b). This value defines the allowed tolerance form the set point.

Note ► *The tolerance value range is 0.1-2.0 °C*

3 Insert the transient time; i.e. the maximum time that the system can take to reach a new set point, without triggering the alarm, see 3 in Figure 59(b).



a **b**

Figure 59. Alarms settings. (a) How to enter the Alarm setting menu; (b) Alarm configuration

Note ► *The transient time range is 30-240 minutes.*

Note ► *The transient time should be twice time the typical time to get the thermal plate in temperature at the set point. So if the thermal plate reaches the set point temperature stably after 10 minutes, let me suggest to set the transient time to 20 minutes.*

Tip ► *After any change in the set point value the device enters into a transient regime.*

4 Flag the tab labeled *Buzzer* if you want the alarm to be acoustical, additionally to being visual, see Figure 59(b)

5 Flag the tab labeled *Enabled* to enable the Alarms logic, see Figure 59(b)

6 To disable the visual and acoustical alarms, remove the flag from the tab labeled *Enabled*. In this case the Alarms page becomes as shown in Figure 60

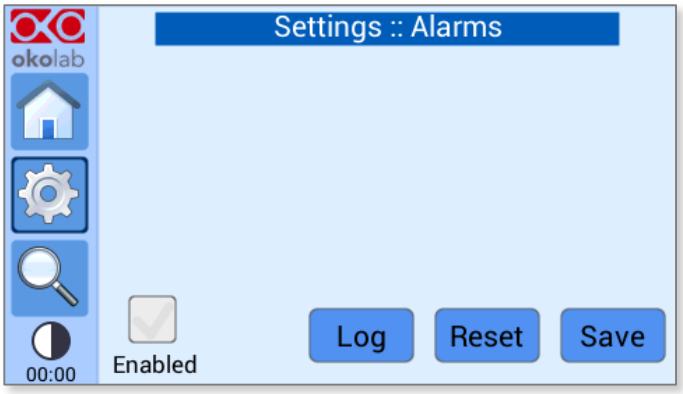


Figure 60. Alarms page when the alarms are disabled

Tip ► *When disabling the alarms, H401-T-CONTROLLER goes into alarm condition only when the status LED becomes red (for example is a device is accidentally disconnected)*

Note ► *By Pressing on Log (see Figure 61), you can view all the times that the status LED of the two devices have changed color (see Figure 62).*

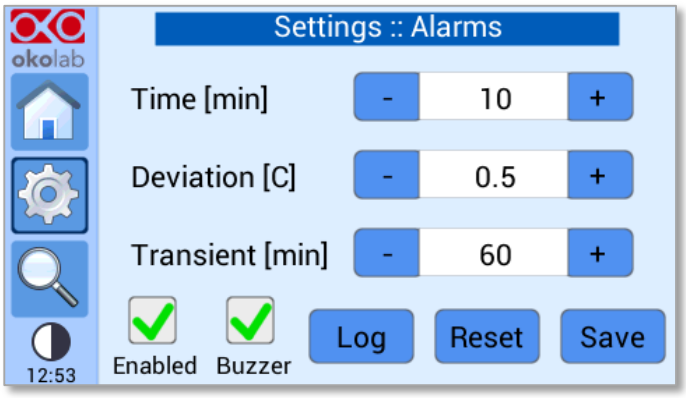


Figure 61. How to enter in alarms logging page

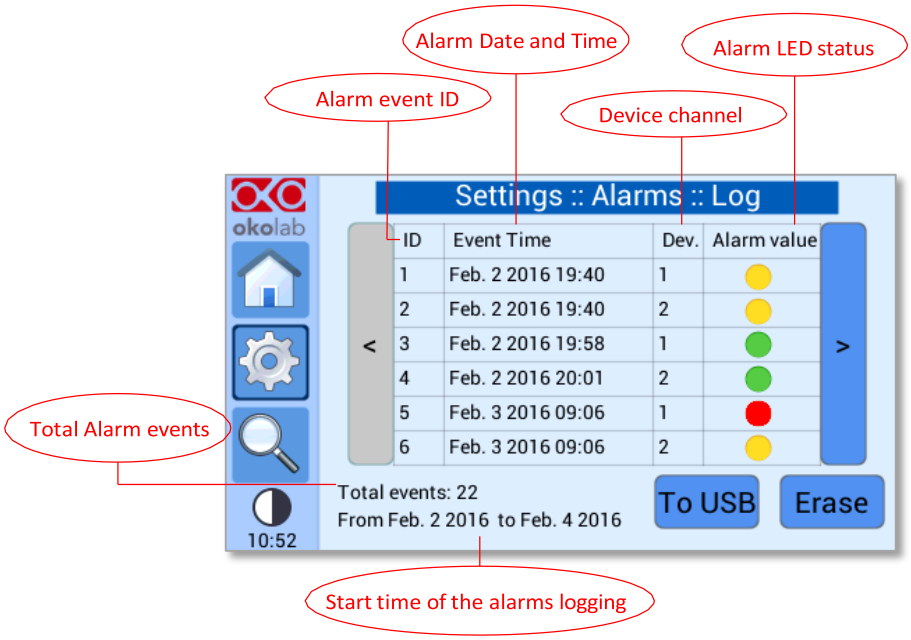


Figure 62. Logging alarms page

Press on *To USB* if you want to download the alarms data to a USB drive or on *Erase* if you want to delete them.

8.2.5 Display configuration

To enter in the Display configuration menu, press on the icon , as shown in Figure 63(a) and the Display page shown in Figure 63(b) will appear.

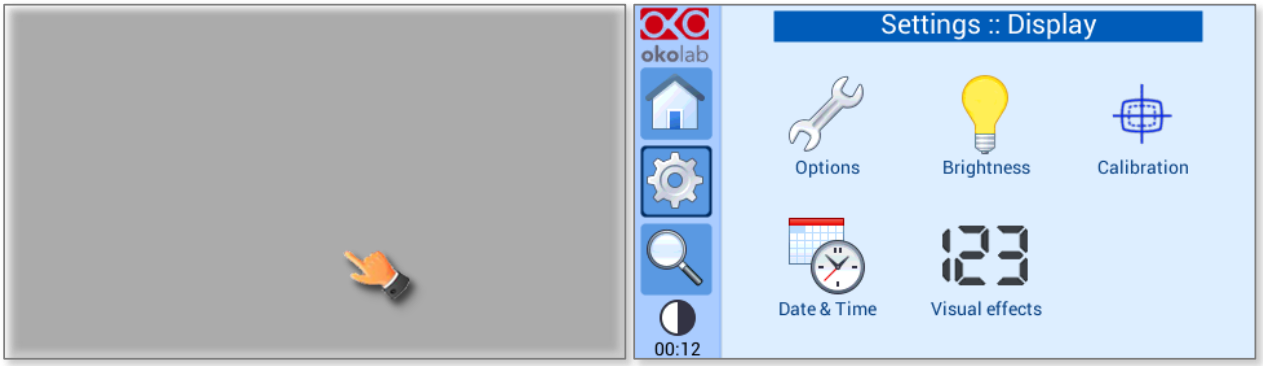


Figure 63. Display settings page. (a) How to enter the Display menu. (b) Display menu

8.2.5.1 Display Options

The Display Options menu allows setting the time frame in which the minimum and maximum temperature values are collected. To insert the time frame, press on the icon  and slide your finger along the *Displayed time frame* bar or click the +/- icons, then press *Save*, see Figure 64.

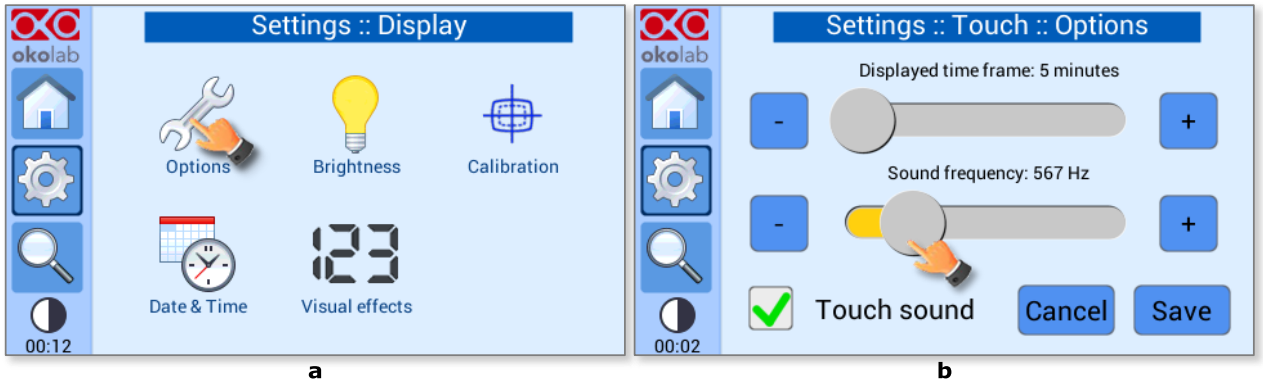


Figure 64. Options subpage configuration. (a) Select options; (b) Setting display options

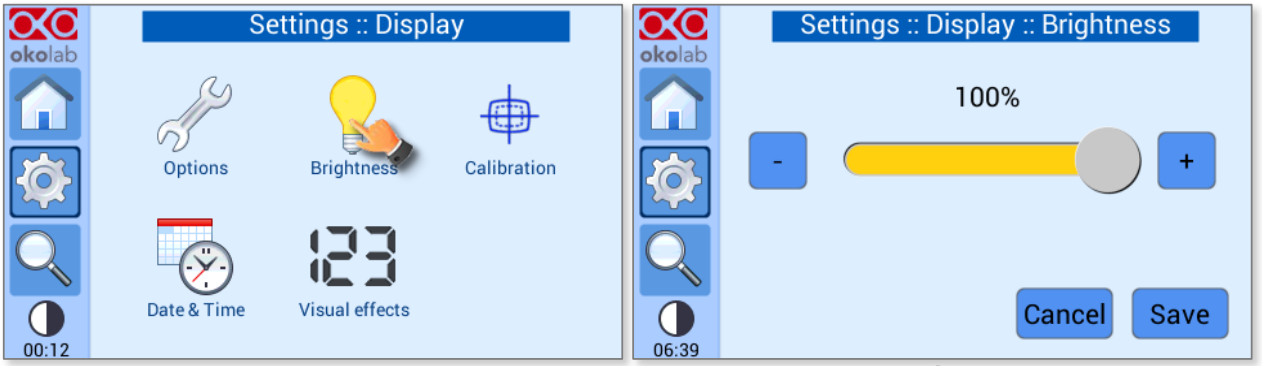
Note ► *The max and minimum temperature value will be displayed in the heating devices tabs on the Homepage (see pointer 12 in Figure 9)*

To change the touch sound frequency press and slide your finger along the setting bar indicated with *Sound frequency*, then press *Save*, see Figure 64(b)

Note ► *To activate a sound at each touch, flag the tab labeled Touch Sound*

8.2.5.2 Display Brightness

To modify display *Brightness* press the icon  and scroll the bar or press the +/- icons in the page that opens, as shown in Figure 65.



a b

Figure 65. Brightness display page

Set the required configuration and then press on *Save* to obtain the right configuration of *Brightness,* see Figure 65(b).

8.2.5.3 Display Calibration

To calibrate the touch display, press the icon  , as shown in Figure 66. The calibration procedure will start asking the user to touch three points on the display one after another, in order to recalibrate the touch interface.

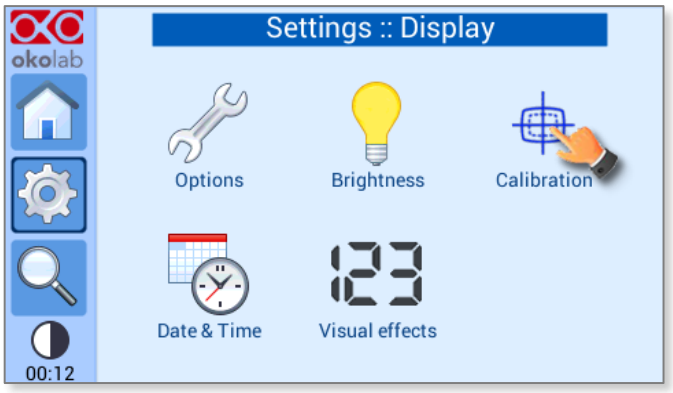


Figure 66. Display calibration.

Tip ► *If the touch screen becomes not clickable because it lost its original calibration, the display calibration procedure can start also by holding the power button for 10 seconds.*

8.2.5.4 Date & Time

To set Date & Time, follow the instructions below:

1 Press the *Date & Time* icon , see Figure 67(a)

2 Set the values, as shown in Figure 67(b)

3 Click on *Save* to save or *Cancel* to undo

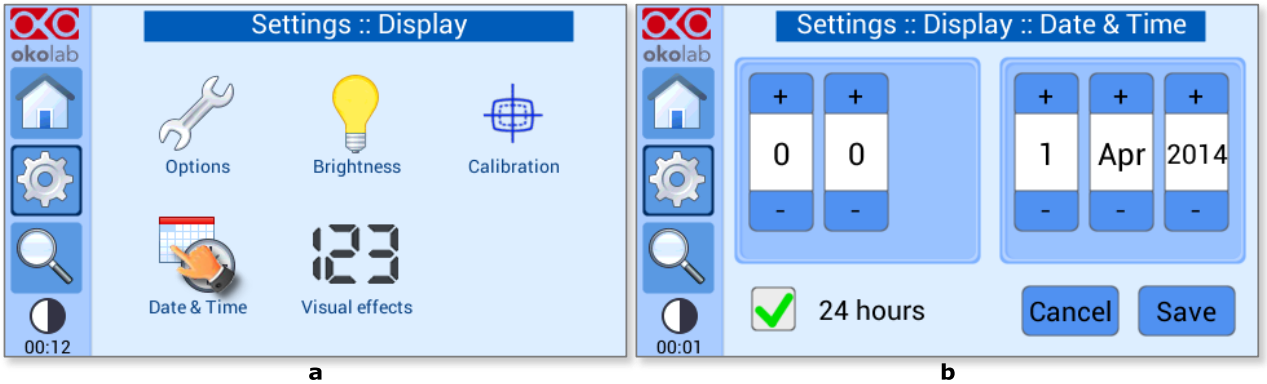


Figure 67. Select Date&Time configuration

Tip ► *Flag the 24 hours box, if you want to use the hour format based on 24 hours.*

8.2.5.5 Display Visual Effects – icon and glance mode

To enter in the Display visual effects menu, press on the icon , see Figure 68 (a).

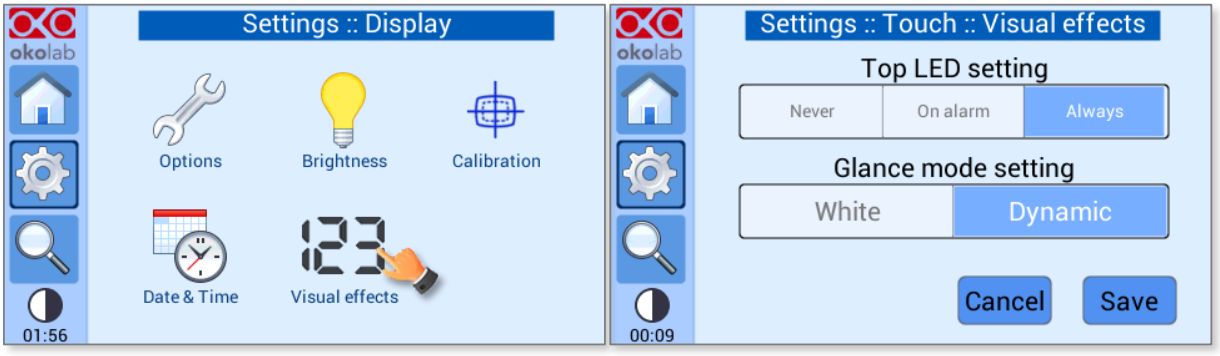


Figure 68. Display Visual Effects. (a) How to enter in Visual Effects menu; (b) Visual Effects menu

Top LED Setting

If you select *Never*, the Top LED (see Figure 69) will never illuminate, if you select On Alarm, the Top LED will illuminate only when theH401-T-CONTROLLER is in Alarm Status (see paragraph 8.1.2), if you select Always, the Top LED will always illuminate.

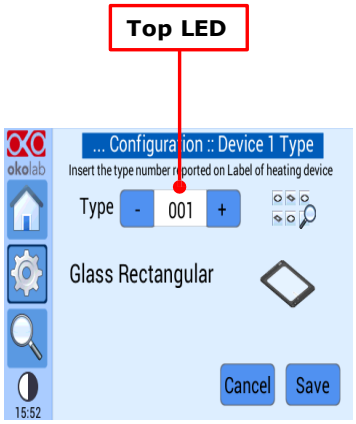


Figure 69. Top LED

Glance Mode Setting (see also paragraph 8.4)

The Glance mode setting defines the color of the Top LED and of the digits displayed in Glance Mode. If you select *White*, the Top LED illuminates in white color (according to the criterion selected in Top LED setting) and the digits displayed in Glance Mode are white. If you select *Dynamic* the color of the Top LED and the color of the digits in Glance Mode follow the color coding reported in paragraph 8.1.2.

Tip ► *To swap between Icon and Glance mode press on the icon* .

8.2.6 Password

With the H401-T-CONTROLLER, as well as with many Okolab's products, the user has the chance to secure his laboratory setups by using a password. The password, when enabled, will be asked, in the following procedures:

- Heating devices calibration procedures
- T sensor calibration
- Data download
- Data erase

To enable the password protection, follow the steps below:

1 Press on the *Password* icon , see Figure 70(a)

2 Flag the tab *Password enabled* as shown in Figure 70(b)

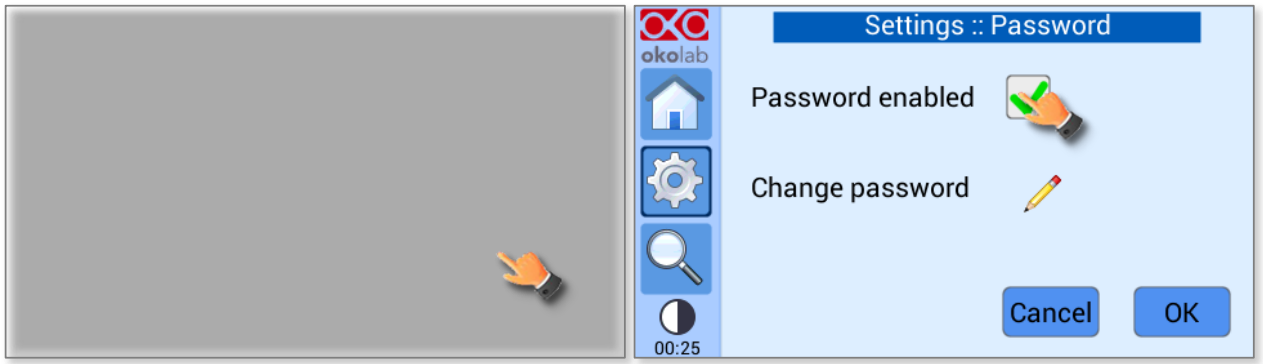


Figure 70. Password. (a) Password settings menu; (b)password subpage

Note ► *The default password is okolab, and it is disabled. Okolab recommends changing this password.*

3 To change the password press on the icon and follow the indications that will appear

Note ► *If you forgot the password, use the restore password reported on the certificate attached to H401-T-CONTROLLER.*

8.2.7 Summary

The Summary Page reports technical information. To enter the Summary menu, press on the settings icon , as shown in Figure 71(a) and (b), then press on Summary icon . The page reported in Figure 72 will appear.

Note ► *This page is useful essentially for technical/control reasons. During a support case the engineers of Okolab' s team may ask you to read some of the data reported in Summary page*

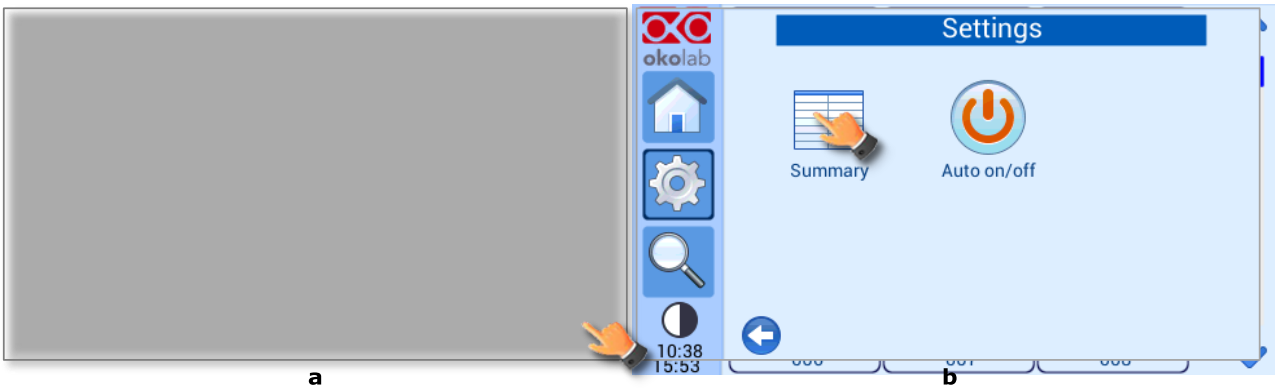


Figure 71. Summary (a) How to select the Summary Icon; (b) how to enter in the Summary menu

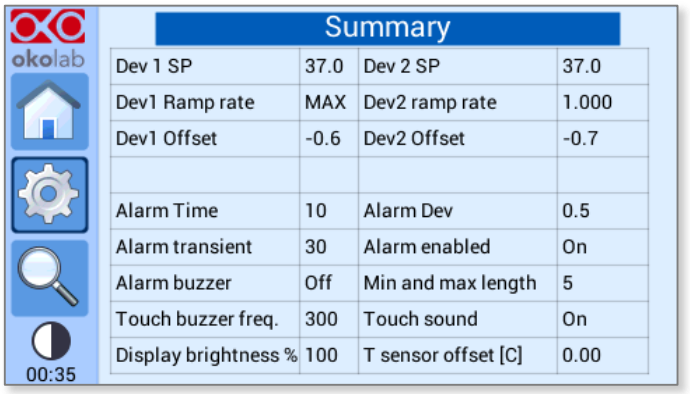


Figure 72. Summary menu

8.2.8 Auto on/off

H401-T-CONTROLLER can be programmed to turn on and/or turn off automatically at specific times. Press *Auto on/off* icon to enter *Auto on/off* menu.

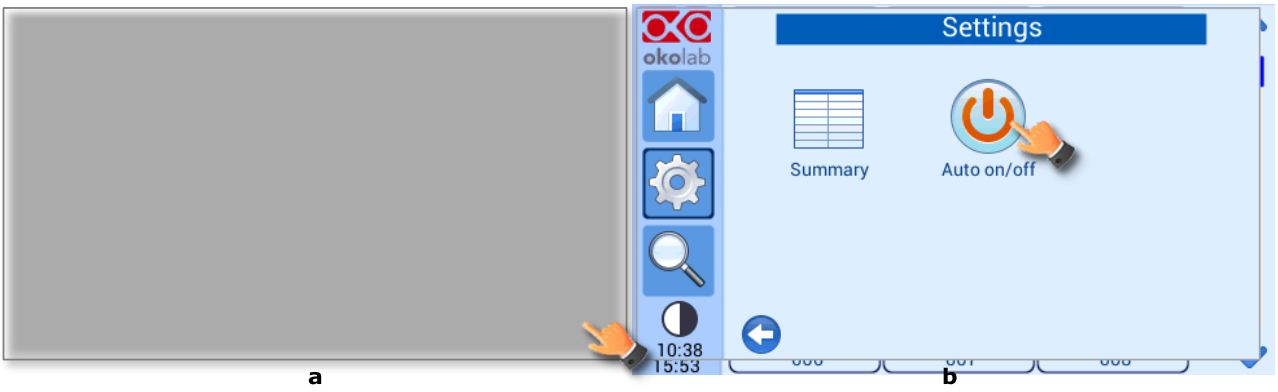


Figure 73. How to enter in the Auto on/off menu (a – b).

Press on *Auto turn on* icon to enter in *Auto Turn on* menu (see Figure 74 a). Set the switching on time, the first number is for setting hour (from 0 to 23), the second number is for minutes. If you select:

- *Disable*: H401-T-CONTROLLER will not turn on automatically,
- *Every day*: H401-T-CONTROLLER will turn on automatically every day at set time,

– *Specific days*: H401-T-CONTROLLER will turn on automatically at set time on selected days- Flag the desired days and press *OK* (see Figure 74 c).

Click on *Save* to confirm or *Cancel* to undo.

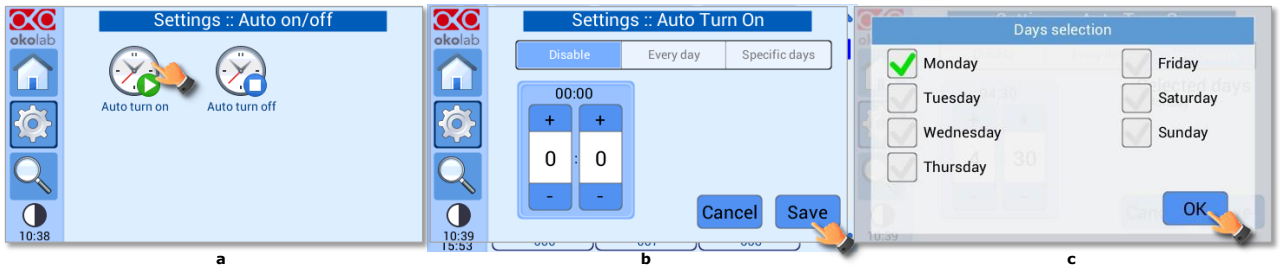


Figure 74. Auto Turn on menu (a – b -c).

Press on *Auto turn on* icon to enter in *Auto Turn on* menu (see Figure 74 a). Set the switching on time, the first number is for setting hour (from 0 to 23), the second number is for minutes. If you select:

– *Disable*: H401-T-CONTROLLER will not turn on automatically,

– *Every day*: H401-T-CONTROLLER will turn on automatically every day at set time,

– *Specific days*: H401-T-CONTROLLER will turn on automatically at set time on selected days- Flag the desired days and press *OK* (see Figure 74 c).

Click on *Save* to confirm or *Cancel* to undo.

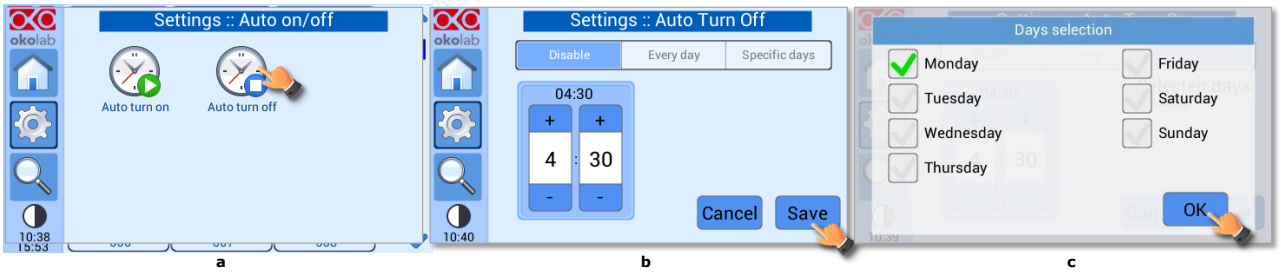


Figure 75. Auto Turn Off menu (a – b – c).

8.3 Overview Status page

To open the status page, press on the icon , as show in Figure 76(a).

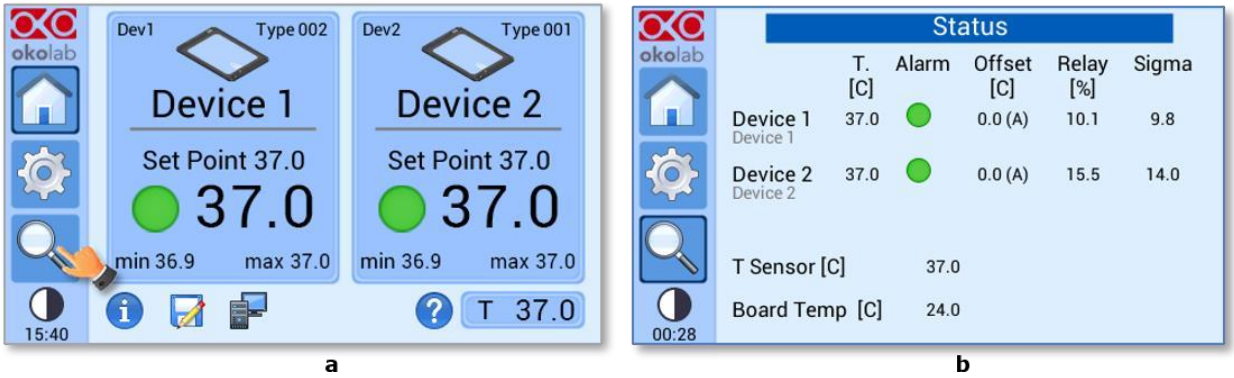


Figure 76. Overview Status page. (a) How to enter in the Overview Page (b) Overview Status Page

Note ► *This page contains data useful for technical/control reasons. In case you requested support from one of Okolab engineers you may be asked for some of these data*

8.4 Icon and Glance Mode View

The H401-T-CONTROLLER features two display modalities: Icon mode and Glance Mode, as shown in Figure 77(a) and (b). You can swap between the two display modalities by pressing on icon .

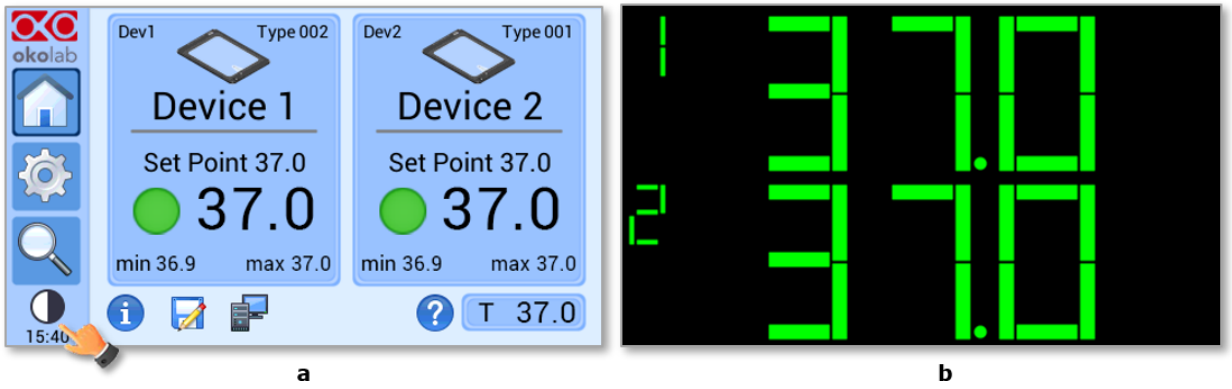


Figure 77. Display modalities. (a) Icon Mode; (b) Glance Mode

8.5 Info page

Press the icon okolab to access the Info Page, as shown in Figure 78. This page contains the information related to the H401-T-CONTROLLER version.



Figure 78. Info page selection

Tip ► *Please have this information handy when contacting Okolab for support.*

9 Cleaning & Maintenance

9.1 H401-T-CONTROLLER

Cleaning

Please, follow the instructions below to clean the H401-T-CONTROLLER:

- Turn H401-T-CONTROLLER off and unplug all connecting cables
- Use a polishing cloth or dry cloth to wipe off dust and dirt.
- Do not pour or spray any liquid directly on the H401-T-CONTROLLER.

Maintenance

- Verify periodically the status of all cables. If some cable is damaged, contact Okolab to receive assistance.
- Verify periodically the status of the T Sensor. If the T Sensor is damaged, contact Okolab to receive assistance.
- – Calibrate the T Sensor once a year.

9.2 Heating Devices

Cleaning

Please, follow the instructions below to clean the Heating Devices:

- Turn H401-T-CONTROLLER off and unplug all connecting cables.
- Let the Heating Device cool down.
- To clean the metal and the glass of the Hating Device, wipe with a soft micro-fiber cloth. For stubborn smudges, you can damp a soft micro-fiber cloth with ethyl alcohol (product code UN1170).
- Do not pour or spray any liquid directly on the Heating Device.
- Avoid getting liquid seep into the small gap between glass and metal frame.
- Gently wipe any glass surfaces. Do not apply strong force to the surface of the glass because it can be damaged.
- Keep acid solvents away from the Heating Device. They might cause corrosion and discoloration.
- Do not use a compressed air gun.



Glass Heating Devices are coated with a thin layer of indium tin oxide (ITO).
ITO is electrically conductive and optically transparent. Use care when cleaning Glass Heating Device to avoid damaging the ITO coating.

Maintenance

- Verify periodically the status of all cables. If some cable is damaged, contact Okolab to receive assistance.
- Verify periodically the status of the temperature sensor. If the temperature sensor is damaged, contact Okolab to receive assistance.

Contact Okolab in case you need assistance with the cleaning procedure or in case of doubt concerning the compatibility of the cleaning products.

10 Support

To contact one of our engineers please write to support@oko-lab.com or contact us through the live chat in www.oko-lab.com. You can request a remote support session anytime.

Please, do not hesitate to contact Okolab should you need any further commercial information or technical support.

For HARDWARE SUPPORT: sibillo@oko-lab.com
Phone +39 081 806 3470
Fax: +39 081 876 4410
Mobile: +39 348 96807 18

For COMMERCIAL SUPPORT WORLDWIDE: lanzaro@oko-lab.com
Phone +39 081 806 2624
Fax: +39 081 876 4410
Mobile: +39 348 96807 17

For COMMERCIAL SUPPORT US&CANADA: petrak@oko-lab.com

For COMMERCIAL SUPPORT CHINA: tong@oko-lab.cn

Tip ► *By pressing on icon*  *in the Homepage, see Figure 91 (a), the page in Figure 91 (b) will open. Here you can see the Italian and US Okolab contacts; moreover you can use the QR code in order to connect you to the Okolab site.*

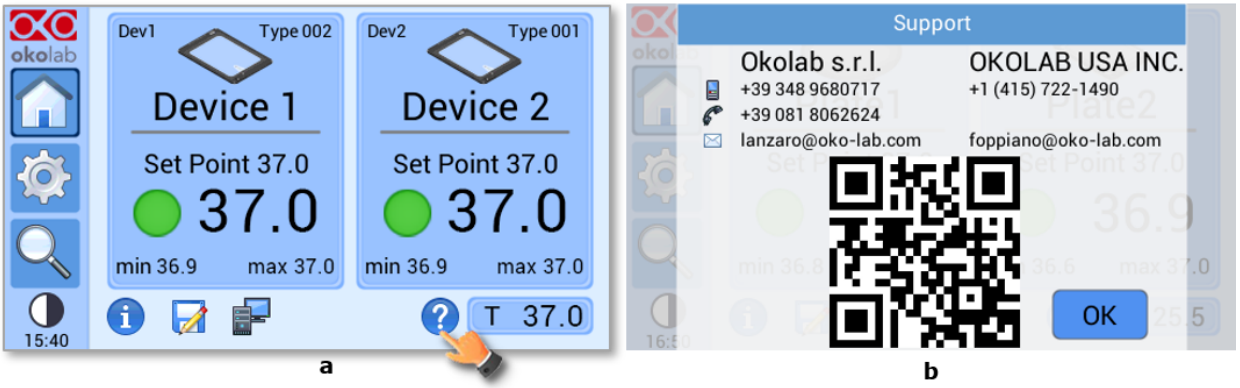


Figure 79. Support Page. (a) How to reach the support page (b) Support page.

11 Technical Specifications

The data below refer to the H401-T-CONTROLLER

TECHNICAL SPECIFICATIONS	
Temperature	Range: 25-60°C Step size: 0.1°C Accuracy: c 0.3°C on specimen Temperature, if room temperature remains within ±0.3°.
Operating Temperature	0°C ~+55°C
Storage Temperature	5°C ~ +60°C
Operating Humidity	0-70%
Supply voltage	24V-DC
Power Consumption	120 W max
Weight	350 g
Shelf-life	10 years (DO NOT USE beyond the indicated shelf-life)

Table 3. Technical specifications.

12 Troubleshooting: Undesirable Side Effects and Precautions

We have collected in the table below some frequently asked questions, please contact Okolab if you need support.

Symptom	Probable cause	Remedy
Device is off	Devices wrong connections	Properly connect the cables to the devices
	Devices cables damaged	Substitute the cables
Device is cold	Low set point value	Change the set point
	Cable disconnected	Connect the cable
	Cable damaged	Replace the cable
Alarm rings	Actual temperature far from the Set Point temperature	Check for air draft blowing directly on the heating device
	Cable disconnected	Connect the cable
No device temperature dispayed: E_#	E_1. Error on Device sensor measure	Contact Okolab to receive assistance
	E_4. Error on thermocouple measure	Check the Thermocouple position Contact Okolab to receive assistance
	E_5. Communication between the main board and the temperature acquisition module fails or Acquisition module error	Contact Okolab to receive assistance
	E_6. Temperature read by Thermal plate sensor too high or too low	Contact Okolab to receive assistance
	E_7. Generic Error	Contact Okolab to receive assistance
No device temperature dispayed: OPEN	Device not connected or sensor broken	Connect the device or Contact Okolab to receive assistance
No T Sensor temperature dispayed: OPEN	Free Sensor not connected or sensor broken	Connect the Free Sensor Contact Okolab to receive assistance
Data download doesn't start	USB pendrive is not correctly formatted	Make sure that USB pendrive is FAT32 formatted
	USB pendrive is damaged	Format your USB pendrive using FAT32 file system
Calibration/alarm events are not logged	Internal memory is full (a warning icon in homepage is present)	Erase the full memory. If you need this information, download it before erasing the data
The screen does not respond properly or not at all	The display is not calibrated	Press and hold the power button for more than 10 seconds and the touch calibration will start
I check the previous troubleshooting but I cannot solve the problem		Contact Okolab to receive assistance

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14 Table List

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15 Manual Revision Table

Revision Number	Addition of changes	Date
01	Redaction	February 2016
02	New redaction	April 2016
03	Added H401-T-CONTROLLER-OEM	April 2016
04	Minor Revision	August 2016
05	Major Updates	May 2019
06	Cleaning & Maintenance	September 2020
07	Emission compliant with Regulation (EU) 2017/745 on Medical Devices. Removed H401-T-CONTROLLER-OEM	October 2026
08	Updated warranty period	November 2026

16 Annex 1: List of Heating Devices

TYPE	DEVICE CODE	DEVICE ICON ON H401-T-CONTROLLER
000	CUSTOM	 Custom
001	H601-K-FRAME-GLASS-FLAT	 Glass Rectangular
001	H601-NIKON-TI-SAM-GLASS	 Glass Rectangular
001	H401-GLASS-200x200	 Glass Rectangular
001	H401- UP- GLASS	 Glass Rectangular
001	H401-LEICA-M-HL-GLASS	 Glass Plate
002	H401-230x110-GLASS-FLAT	 Glass Rectangular
003	H601-K-FRAME-GLASS-RECESSED	 Glass Rectangular
003	H601-MCL-Z100/500-GLASS	 Glass Rectangular
004	H601-K-FRAME-METAL/GLASS	 Metal Glass

TYPE	DEVICE CODE	DEVICE ICON ON H401-T-CONTROLLER
005	H601-PRIOR H117-GLASS-RECESSED	 Glass Rectangular
006	H401-LEICA-R88-GLASS	 Glass Round
007	H401-LEICA-TL-220x170-GLASS	 Glass Rectangular
008	H601-NIKON-TI-SR-GLASS/FRAME	 Glass dual channel
008	H601-OLYMPUS-IX3-SVR-GLASS/FRAME	 Glass dual channel
008	H601-NIKON-TI-S-ER-GLASS/FRAME	 Glass dual channel
009	H401-NIKON-TI-SR-GLASS	 Glass Round
010	H601-NIKON-TS2R-GLASS	 Glass Rectangular
011	H401-NIKON-SMZ-180-GLASS	 Generic
012	H401-NIKON-SMZ25-GLASS	 Glass Plate

TYPE	DEVICE CODE	DEVICE ICON ON H401-T-CONTROLLER
013	H401-NIKON-SMZSL-GLASS	 Glass Plate
014	H401-NIKON-SMZSS-GLASS	 Glass Plate
015	H601-OLYMPUS-IX-SUSP-GLASS/FRAME	 Glass dual channel
016	H401-OLYMPUS-IX-SUSP-GLASS	 Glass Round
017	H401-OLYMPUS-SZX2A-GLASS	 Glass Plate
018	H401-OLYMPUS-SZX2B-GLASS	 Glass Plate
019	H401-EUROMEX-IF-GLASS	 Glass Round
020	H401-GLASS TABLE	 Glass Table
021	H401-GLASS-90	 Glass Round
022	H401-GLASS-90-RTD1000	 Glass Round

TYPE	DEVICE CODE	DEVICE ICON ON H401-T-CONTROLLER
023	H601-M-FRAME-GLASS	 Glass Rectangular
024	H401-R120-GLASS	 Glass Round
025	H401-NIKON-TI-SR-T-PAD	 Stage T-PAD
026	H401-NIKON-TS2R-T-PAD	 Stage T-PAD
027	H401-OLYMPUS-IX-SUSP-T-PAD	 Stage T-PAD
028	H401-K-FRAME-METAL-FLAT	 Metal Rectangular
029	H401-K-FRAME-METAL-RECESSED	 Metal Rectangular
030	H401-NIKON-NZ100/200/500-N-METAL	 Metal Rectangular
031	H401-PRIOR-H117-METAL-RECESSED	 Metal Rectangular
032	H401-LEICA-R88-METAL	 Metal Round

TYPE	DEVICE CODE	DEVICE ICON ON H401-T-CONTROLLER
033	H401-NIKON-TI-SR-METAL	 Metal Round
034	H401-NIKON-TI-S-ER-METAL	 Metal Rectangular
035	H401-NIKON-TS2R-METAL	 Metal Rectangular
036	H401-NIKON-TI-SAM-METAL	 Metal Rectangular
037	H401-NIKON-NI-S-E-METAL	 Generic
038	H401-OLYMPUS-IX-SUSP-METAL	 Metal Round
039	H401-EUROMEX-IF-METAL	 Metal Rectangular
040	H401-UP-METAL	 Metal Rectangular
041	H401-T-PAD-SMALL	 T-PAD
042	H401-T-PAD-MEDIUM	 T-PAD

TYPE	DEVICE CODE	DEVICE ICON ON H401-T-CONTROLLER
043	H401-T-PAD-LARGE	 T-PAD
044	H601-NIKON-TS2R-METAL/GLASS	 Metal Glass
045	H401-OLYMPUS-SZX2A-GLASS/METAL	 Metal Glass
046	H401-NIKON-SMZ25-GLASS/METAL	 Metal Glass
047	H401-NIKON-SMZSS-GLASS/METAL	 Metal Glass
047	H401-NIKON-SMZSL-GLASS/METAL	 Metal Glass
047	H401-OLYMPUS-SZX2B-GLASS/METAL	 Metal Glass
048	H601-NIKON-TI-SR-GLASS	 Glass Round
048	H401- LEICA10447342-ROUND-GLASS	 Glass Round
049	H601-OLYMPUS-IX-SUSP-GLASS	 Glass Round

TYPE	DEVICE CODE	DEVICE ICON ON H401-T-CONTROLLER
054	H401-OLYMPUS-IX3SVR-RO-T-PAD	 Stage T-Pad
055	Objective Heater	 Objective Heater

16.1 Annex Revision Table

Revision Number	Addition of changes	Date
01	First Emission	May 2019
02	Insert new device	July 2019
03	Insert new device	September 2019
04	Insert H401-LEICA10447342-ROUND-GLASS	December 2019
05	Insert H401-LEICA-M-HL-GLASS	January 2020
06	Insert H601-MCL-Z100/500-GLASS	January 2021
07	Insert H401 – UP- GLASS	June 2022

17 PRODUCT DISPOSAL

The product at the end of its useful life must be disposed of following the current rules relating to separate disposal and cannot be treated as simple urban waste.

The symbol



indicates that the product meets the requirements of the new directives introduced to protect the environment (2011/65/EC, 2012/19/EC) and that it must be disposed of appropriately at the end of its life cycle.

The equipment at the end of its life must be disposed of at suitable separate collection centres for electrical and electronic waste, or must be returned to the dealer or manufacturer, in the event that the product is to be replaced with another new equivalent.

Adequate separate collection helps to avoid possible negative effects on the environment and health and promotes the reuse and recycling of the materials from which the equipment is made: ask local authorities for information regarding waste disposal areas.

Anyone who does not dispose of the product following the instructions in this paragraph responds according to the current rules.

18 WARRANTY

Okolab S.r.l. warrants the “H401-T-CONTROLLER” to be free of defects in materials and workmanship for a period of two years starting from invoice date. If the unit malfunctions, it must be returned to the factory for evaluation. If the equipment has to be returned to the factory, please ensure that is carefully and properly packed. Okolab S.r.l. accepts no responsibility for damage due to unsatisfactory packing. Upon examination of Okolab S.r.l., if the unit is found to be defective, it will be repaired or replaced at no charge. This warranty does not apply to defects resulting from any actions of the purchaser. Components which wear are not warranted. Okolab S.r.l. neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by Okolab S.r.l. Okolab S.r.l. warrants only the parts manufactured by it will as specified and free of defects. Okolab S.r.l. makes no other warranties or representations of any kind whatsoever, express or implied, except that of title, and all implied warranties including any warranty of merchantability and fitness for a particular purpose are hereby disclaimed. LIMITATION OF LIABILITY: the total liability of Okolab S.r.l. shall not exceed the purchase price of the component upon which liability is based. In NO event shall Okolab S.r.l. be liable for consequential, incidental or special damage.