Salvislab Thermocenter TC40/100

User Manual

swiss made

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User Manual Salvislab Thermocenter TC40/100

CE DECLARATON OF CONFORMITY

CE

Declaration of Conformity

Wir
We **Renggli AG / SalvisLab**
Nous

(Name des Anbieters) (supplier's name) (nom du fournisseur)

Birkenstrasse 31, CH-6343 Rotkreuz

(Anschrift) (address) (adresse)

erklären in alleiniger Verantwortung, dass das Produkt
declare under our sole responsibility that the product
déclarons sous notre seule responsabilité que le produit

Drying Oven	**TC40/100**
Year of Construction	**2015**

(Bezeichnung Typ oder Modell, Los-, Chargen- oder Seriennummer, möglichst Herkunft und Stückzahl)
(name, type or model, lot, batch or serial number, possibly sources and numbers of items)
(nom, type ou modèle, no de lot, d'échantillon ou de série, éventuellement sources et nombre d'exemplaires)

auf das sich diese Erklärung bezieht, mit der/den folgenden Norm(en) oder normativen Dokument(en) übereinstimmt
to which this declaration relates is in conformity with the following standard(s) or other normative document(s)
auquel se réfère cette déclaration est conforme à la (aux) norme(s) ou autre(s) document(s) normatif(s)

(Titel und/oder Nummer sowie Ausgabedatum der Norm(en) oder der anderen normativen (Dokumente)
(title and/or number and date of issue of the standard(s) or other normative document(s)
(titre et/ou no et date de publication de la (des) norme(s) ou autre(s) document(s) normatif(s)

Gemäss den Bestimmungen der Richtlinien; following the provisions of directives; conformément aux dispositions des directives; (falls zutreffend) (if applicable) (le cas échéant)

Safety EN 61010-1:2001	**Safety EN 61010-2:2003**
Low voltage directive 2006/95/EC	**EMC directive 2004/108/EC**

(Ort und Datum der Ausstellung) (Place and date of issue) (Lieu et date)	(Name/Unterschrift oder Kennzeichnung des Befugten) (name and signature or equivalent marking of authorised person) (nom et signature du signataire autorisé)

Alain Frenguelli

Rotkreuz · CH, 31.10.2015

Alain Frenguelli
Technical Manager

1 General

1.1 Purpose of this document

This document describes the use of the newly developed warming cabinets and control regulation unit of Renggli AG /Salvislab. Observation of the operating instructions can ensure safe, proper and economical use of the device.

! This manual contains information relevant to end customers. This document is not to be provided to third parties without the permission of Renggli AG/Salvislab

1.2 Description

Warming cabinets are used for tempering of laboratory samples or other items in medical and general laboratory environments.

1.3 Copyright

1.4 Presentation of safety advice

The following symbols indicate safety tips and other general information:

! Indicates a danger that may lead to physical injury or to irreversible loss of data.

i Indicates additional information and tips.

2 Safety

2.1 Observe safety advice

Read all safety advice in this document carefully as well as all warning signs attached to the device. Pay attention to the legibility of the warning signs and replace them immediately when they become damaged.

2.2 General safety advice

Check the device for operation safety before each use.

2.3 Intended use

Thermocenter units are not built to be used as ovens for drying substances which are explosive or release explosive gases during the drying process. Any use other than the one the units are intended for is forbidden.

The warming cabinet controller is built with state of the art technology and satisfies all recognized safety regulations. Use this device only in the manner described in this manual. No guarantee can be made with regard to the properties and safety of the device in the event of improper use.

3 Important information

3.1 Quick Informations for Service

Dear customer,

Thank you for purchasing our Salvislab Thermocenter drying oven.
Please fill out all the necessary information of your Thermocenter in the form below and keep it ready in case you will need to contact for assistance your Dealer or Service department.

SERIAL NUMBER	
TYPE OF OVEN	☐ TC40 ☐ TC100
SERVICE PHONE NUMBER	
PURCHASE DATE	
SOFTWARE VERSION (Settings Menu_Informations)	
FIRMWARE VERSION (Settings Menu_Informations)	

Notes:

4 Technical data

		[unit]	TC40	TC100
Outer Dimension				
Width		mm	460	570
Height		mm	507	620
Depth		mm	525	656
Clearance distance from back wall		mm	100	100
Clearance distance from side wall		mm	100	100
Inner Dimension				
Width		mm	340	450
Height		mm	370	500
Depth		mm	328	456
Internal Volume		L	40	100
Shelf		standard/max	1/8	1/8
Shelf dimension (WxD)		mm	295x324	437x425
Distance between shelf		mm	35	50
Max. load per shelf		kg	20	20
Max. load per oven		kg	40	50
Weight oven (empty)		kg	30	50
Temperature range approx. 5°C > T_r to		°C	200	200
Temperature deviation [1]	at 50°C	± °C	0.4	0.4
Temperature deviation [1]	at 100°C	± °C	1.0	1.0
Temperature deviation [1]	at 150°C	± °C	1.5	1.7
Temperature fluctuation [2]	at 150°C	± °C	0.2	0.2
Heating up time [3]	to 70°C	min	10	15
	to 150°C	min	24	35
	to 200°C	min	34	45
Recovering time after 30 sec door opening [3]	at 100°C	min	4	7
Air changes (exhaust flap open)	at 100°C	x/h	59	29
Power supply (±10%) 50/60 Hz		Volt	115/230	115/230
Nominal Wattage		Watt	1100	1100
Energy consumption	at 100°C	Watt	145	230
	at 150°C	Watt	300	544
Recommended ambient values	T	°C	15 - 25	15 - 25
	ϕ	%	20 - 60	20 - 60
Equipment				
SalvisTEQ controller with predictive regulation		-	Yes	Yes
Capacitive touch display		inches/pixels	5.7"/640x480	5.7"/640x480
Linear/logarithmic heating gradient		-	Yes	Yes
Adjustable fan speed		%	60 - 100	60 - 100
Multi user levels		-	Yes	Yes
Program mode		programs/steps	99/99	99/99
USB host interface for data import/export		-	Yes	Yes
Ethernet port		-	Yes	Yes
Preselectable restart procedure in case of power failure		-	Yes	Yes
Timer and counter		hours/min	0-999/59	0-999/59

1) Measured with 3 temperature probes on horizontal level / divided in 1/3 of the chamber size
2) maximum temperature deviation in time for one temperature probe
3) to 98% of set temperature

All technical specification are specified for units with standard equipment at an ambient temperature of 25 °C (77 °F) and a voltage fluctuation of ±10 %. The temperature data are determinated in accordance to following DIN 12880, part 2 respecting the recommended wall clearances of 10 % of the height, width and depth of the inner chamber. All indications are average values, typical for units produced in series. Differing ambient temperatures or variances in the design of individual equipment may produce different performance. We reserve the right to alter technical specifications at all times without prior notice.

*We reserve the right to alter technical specifications at any time without prior notice.

5 Introduction

5.1 Overview

- The THERMOCENTER TC40/100 is an oven with a patented design
- Robust "SwissTEQ" quality design
- Thermocenter ovens ensure effective drying without damaging the material being dried
- All functional elements are integrated in the door
- High grade stainless steel chamber
- Standard unit provided with one aluminium shelf
- Chamber has rounded edges which allows easy cleaning
- Minimized heat losses due to low thermal conductivity insulation
- Exterior textured powder coated steel
- SalvisTEQ controller with dynamic regulation and improved efficiency
- Forced Air with an intelligent control of fan speed in a range between 60 and 100%
- Capacitive touch display, intuitive and user-friendly
- Multiple user levels
- Drag&drop user lock function

5.2 Applications

- The Thermocenter line is designed for all purposes of drying in a variety of laboratory fields
- Controller with capacitive touch display and unlimited programming capabilities
- A must when precise temperature distribution and a high accuracy are needed
- Temperature range up to + 200°C/392°F
- It can be used for research & development, quality control as well as for a wide range of industrial and laboratory applications
- Examples of usage: color fastness test for textiles, ageing test for plastics and foils, quality control of electronic circuits, food analysis, dry sterilization in hospitals

5.3 Construction

- Due to extremely compact all-in-door construction the Thermocenter saves valuable space in lab
- Electro-polished stainless steel inner chamber, chemical resistant and highly durable
- All edges rounded for easy cleaning and maintenance
- Maximized shelves area (in comparison to inner volume): up to 8 shelves
- Door seal easily removable for cleaning or replacing
- Door handle fully integrated in the door
- No hot surfaces

5.4 Controller

- SalvisTEQ controller with dynamic regulation
- The regulation unit controls the heating with a predictive regulation
- Multi-point temperature calibration (up to 10 points)
- Self identification of heating gradient
- Real time clock with process times
- Calendar-settable programs start (date/time)
- Hold time (process-end shown as date/time): 0 - 999h 59m
- Enhanced program mode (up to 99 programs and 99 steps per program)
- Scheduler
- Programs remain stored in memory even without external power
- Import/export of programs over USB - optional: LAN
- Real time visualization of current program´s process data
- Export process data over USB - optional: LAN
- Preselect restart procedure in case of power failure
- Interal DU memory expandable via micro SD card up to 32GB - optional
- Log of process data for 300.000 entries (approx. 400 hours at a sampling rate of 5s)

- Log of system data for the last 50.000 events
- Adjustable log interval
- Export Log-data over USB - optional: LAN
- Hardware and software self-test
- Reset to factory settings
- Base commands in remote access mode under Java Script Object Notation (JSON) - optional
- Software updates/upgrades over USB - optional: LAN
- User identification with USB-dongle - optional
- Import process-diagrams over USB - optional: LAN

5.5 Regulation

- The regulation unit works on a STM32 microcontroller
- The regulation unit controls the heater with a predictive controller
- Settable heating gradient (linear or logarithmic)
- Separate temperature guard (Class 3.3 according to DIN 12880)
- Select input for target temperature
- Communication between regulation and display unit works with SPI bus
- Error handling
- PT100 interface has 4 wires-circuit
- Internal system voltage

5.6 Display

- Capacitive touch Display 5.7”
- Resolution of 640x480 pixels
- Landscape format
- User friendly and intuitive graphic user interface
- Graphic accelerator
- Internal system voltages
- Display regulation unit works with a microcontroller ARM Cortex A8 Processor
- Storage of persistent parameters and log files
- Display includes a protective glass cover

5.7 General Settings

- Selectable Temperature units: °C or °F
- Adjustable time and time zone
- Adjustable date
- Available menu languages: EN, GE, IT, FR, ES - optional: CN
- Acoustic alarms for key tones, program end and errors
- Acoustic alarm for door open with adjustable delay (default 30s)
- User administration (user ID) protected by password
- Dynamic IP address
- Counter for operating hours - optional

5.8 Multi user levels

This new feature allows more than one user on a single device by separating their accounts, application data and access rights.

User*	It is the lowest user level. This user level allows to run the unit, define custom programs, set date and time, temperature measurement unit, restart procedure, process data sampling time, check for unit errors and access to the basic informations of the unit.
Calibrator*	The Calibrator level includes the user level capabilities and integrates the unit calibration.
Administrator**	The Administrator level includes the User level capabilities. In addition it allows to perform tests on the critical components of the unit, update software, access to the system log, reset the user's database and run a sterilization program. It also guarantees the ability to modify some key working parameters of the unit such as upper and lower deviation, DHCP, max adjustable temperature and buzzer delay. It provides User administration rights.
Service***	It is the highest level. This access is granted only to qualified factory technicians for service and upgrades.

5.9 Data connection

- USB 2.0 Port
- LAN-Port, RJ45 10/100 Mbit - optional

5.10 Door alarm

- The door is monitored by a mechanical switch
- It is not possible to start a manual process when the door is open; the message "door open" will appear on the display
- The heating process is interrupted when the door is opened during a manual process (heating off), as soon the door is closed the heating process will start again (heating on)

5.11 Safety / Power Cut-Off

- Independent temperature safety device class 3.3 according to DIN 12880:
  - + Integrated digital under- and over-temperature protection which automatically follows the set point value at a preset tolerance range, and switches the heating off in case of over- or under temperature deviations
  - + A built in safety controller takes over if the first protection is in state of error and shuts the oven down in case of over-temperature
  - + A mechanical over-temperature device provides additional safety
- After power cut-off controller restarts automatically and last stored values remain in memory
- High quality accurate PT100 temperature probes
- Integrated door switch interrupts heater when opening the door

6 Getting started

6.1 Parts delivered

Your System will be delivered with the following parts:

- 1 Thermocenter unit
- 1 Shelf
- 1 Power cord

6.2 Install requirements

- For your safety be sure your oven is installed properly by a qualified installer or service technician
- This appliance must be supplied with the proper voltage and frequency. See rating plate located on the back of the oven frame to determine the rating of the product
- Leave at least 10 cm space between system and walls or benches
- Max. 1 Thermocenter can be stuck on top (for stacking adapter see options list)
- If you install a ducting to exhaust system then please contact your dealer for more information

6.3 Installing

- Place shelf in appropriate position
- Plug in the power cable
- Close the door
- Switch power on
- Display shows Salvislab logo during boot
- The device is ready for use when the SalvisTEQ Home menu appears on screen
- For information on how to operate and navigate properly through the GUI, refer to chapters 9-16

SalvisTEQ Home Menu

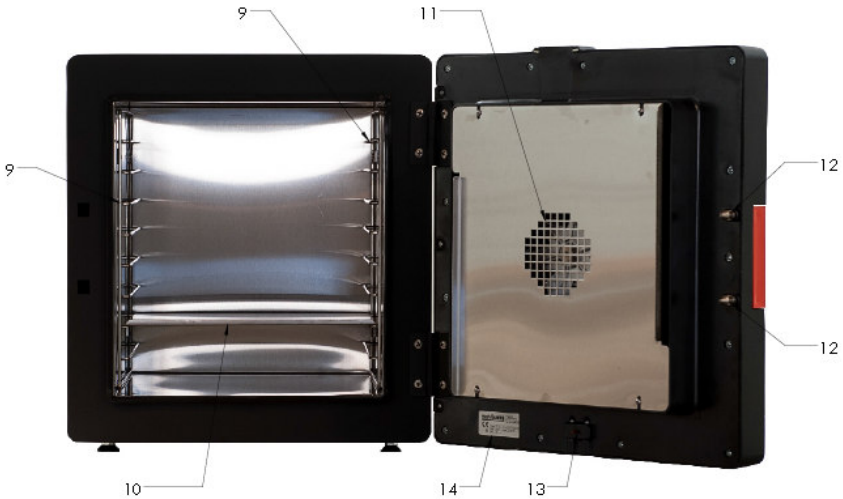
6.4 Cleaning

- Use mild detergents for cleaning oven surfaces (no acid/alcohol based or similar detergents)
- Use microfiber cloths for cleaning the display
- Never use abrasive cloths, paper towels, or tissue paper, which can scratch the touchscreen. If any water at all is necessary, power off your device ahead of time
- Never press too hard while cleaning the screen. This can damage the display

7 System Components

1 SalvisTEQ touch display
2 USB Port
3 LAN Port
4 Main on/off switch
5 Air inlet
6 Door handle
7 Air flap
8 Air exhaust
9 Shelf support
10 Shelf
11 Fan outlet
12 Spring loaded door lock
13 Door switch
14 Rating plate

Thermocenter front view - closed door



Thermocenter front view - open door

8 Operation

8.1 Definitions of terms

Set temperature

- "Target" temperature oven should operate with

Gradient

- Slope of heating up process to specific set temperature (indicated in ºC/min or °F/min)
- Negative gradients not allowed
- Maximal value of gradient depends on system and has a range which is predefined by manufacturer

Hold time

- Duration a set temperature has to be hold (build-in timer is starting to count back as soon as set temperature is reached)
- Maximal set time is 999 hours and 59 minutes

Start date / time

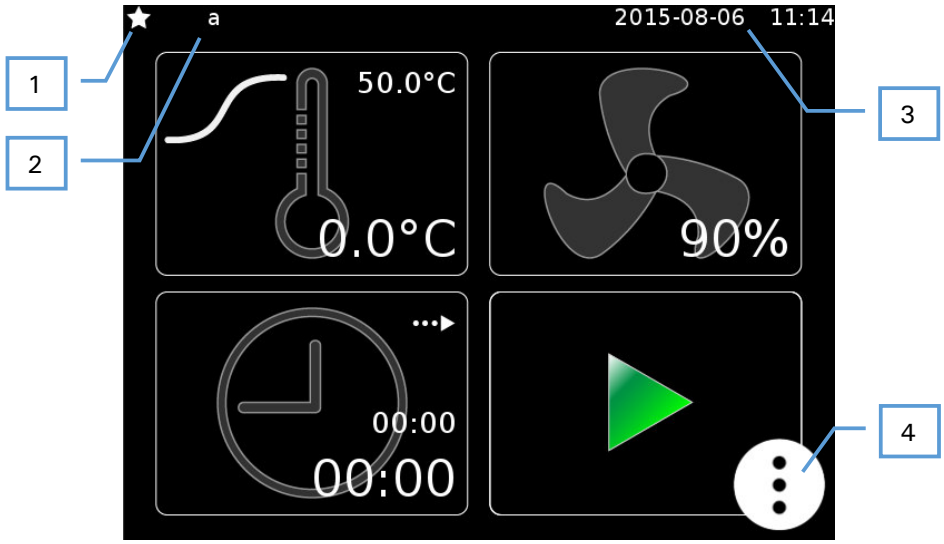
- Future date/time to start process or program

9 SalvisTEQ Graphic user interface: First steps

Ensure that the device is in a mechanically sound state before connecting the power. Connect the power cable. Turn on the device using the main power switch on the side of the device.

9.1 Startup screen

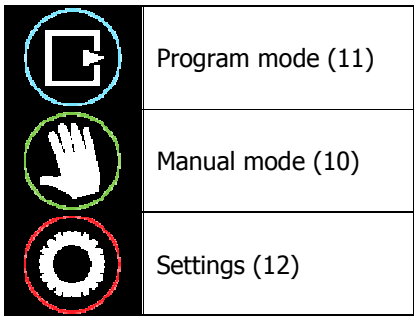
The device starts in manual mode. The settings available in this mode are described in chapter 10. Program mode is described in chapter 11.



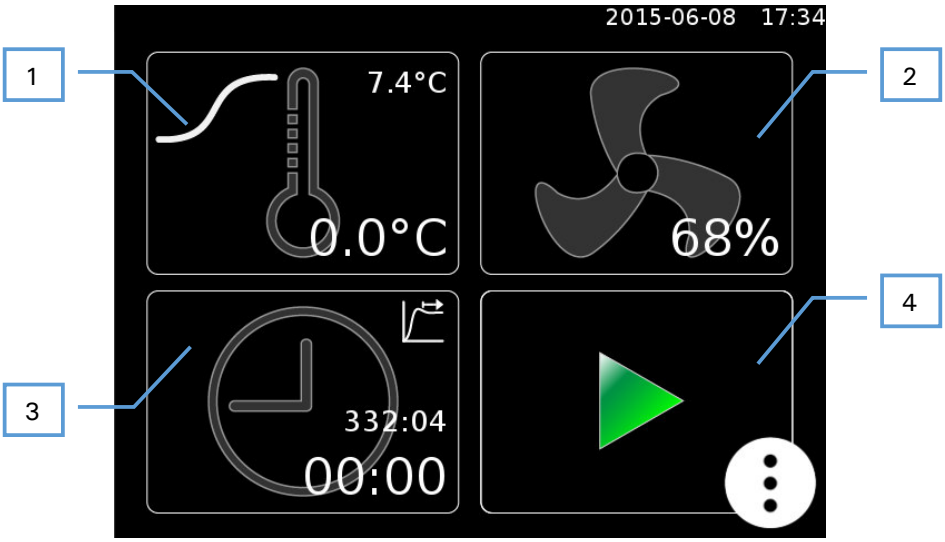
1 User level
2 Logged on users
3 Date and time display
4 Open menu

9.2 Menu

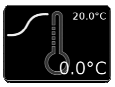
Pressing the tool button [4] opens the device menu.



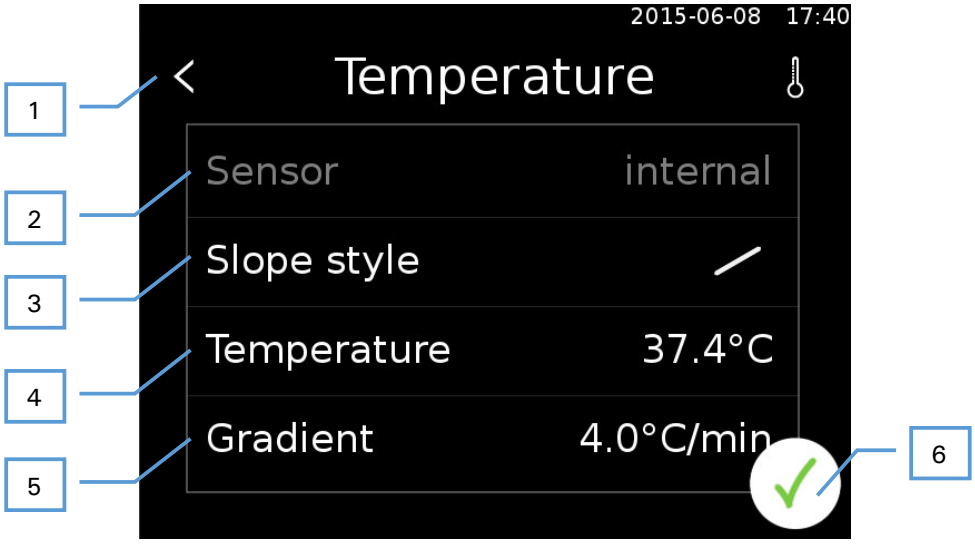
10 Manual mode



1 Temperature settings (10.1)
2 Device-specific settings (10.2)
3 Time settings (10.3)
4 Play button, starts the warming process using the selected settings.

10.1 Temperature settings 

This menu contains all settings in relation to the internal temperature of the device.



1 Back to main screen
2 Sensor selection for temperature measurement.
Internal: the internal sensor is located inside the device.
External: the external sensor is inserted into a port on the device and can be placed at the point where the set temperature should be reached (optional).
3 Select the type of heating curve.

Linear heating using the set gradients

Exponential heating, the target temperature is approached with the largest possible gradient.

4 Target temperature
5 Gradient (for linear heating processes only)
6 Confirm input

10.2 Device-specific setting options 

10.2.1 Fan settings

This menu provides options for controlling the fan.

1 Back
2 Fan rotation speed. The fan speed can be set between 60 - 100%.
3 Confirm input

The fan is always required to ensure even internal heating. The speed can therefore be reduced, but the fan cannot be turned off completely.

10.3 Time settings

The time menu provides options for configuring start and stop times.

1 Back to main screen
2 Select start mode

	Start in:	Start delay (10.3.1)
	Start at:	Start at specified time (10.3.2)
	Hold for:	Heat up and hold for specified time (10.3.3)

3 Time settings, dependent on selected mode
4 Confirm input

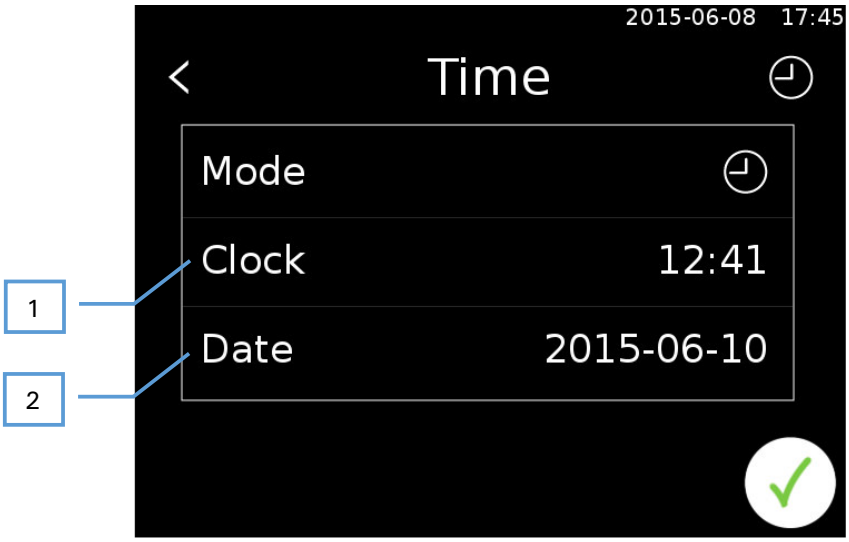
10.3.1 Start in

Start of the heating process is delayed by the set time.

> A time of 000:00 indicates an immediate start.

10.3.2 Start at

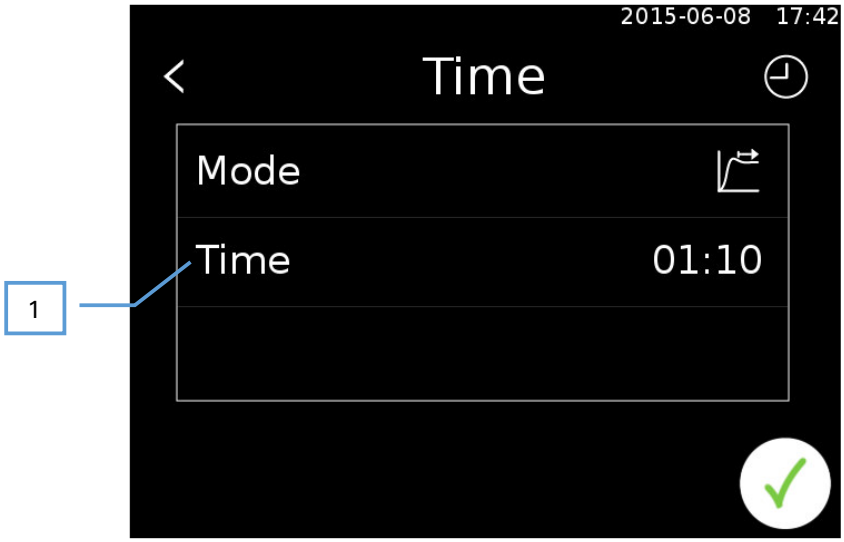
The date and time to start the process is selected.



1 Time
2 Date

10.3.3 Hold for

Hold the target temperature for a specific length of time. The hold time begins once the target temperature has been reached.



1 Time for which the target temperature should be held.

11 Program mode

If the user presses the program mode symbol in the menu, then the second level of the menu opens. This provides the user with the following menu options:

	Load a program from a USB stick (11.3)
	Program list (11.2)
	Create new program (11.1)

Existing programs can be modified once they have been loaded (11.5).

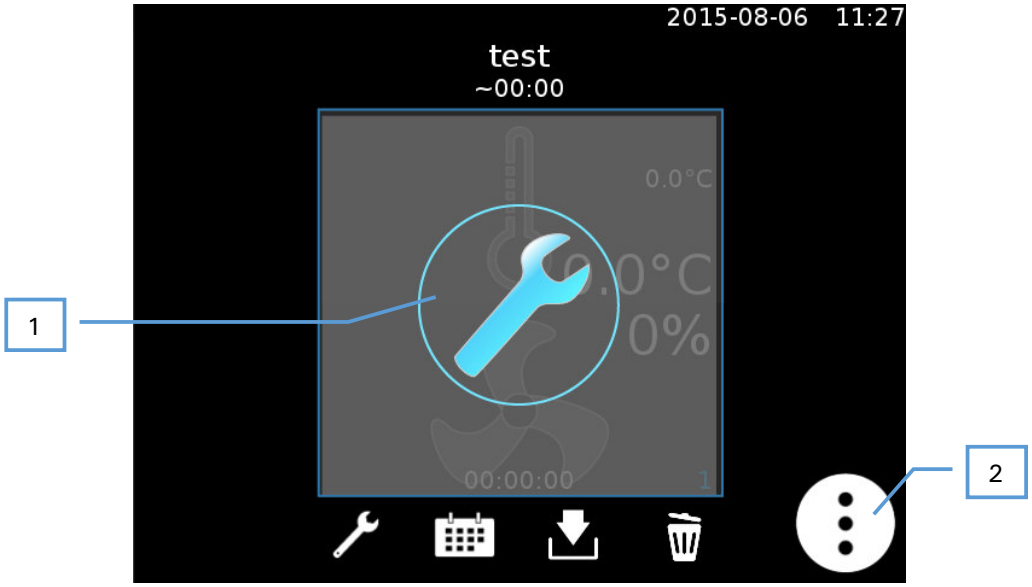
11.1 Create new program

To create a new program you first need to enter a name for it.

> The name you enter cannot be changed later.

1 Back to main screen
2 Confirm input

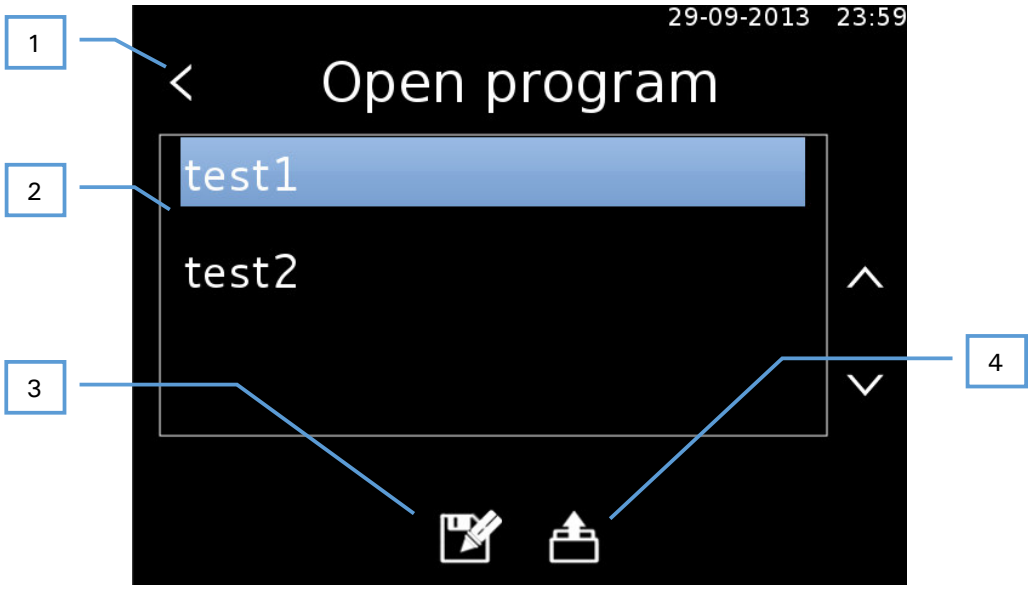
After the name has been confirmed, the user is asked to create the first program step.



1 Edit / create program (11.5)
2 Menu

11.2 Program list

This screen contains a list of all existing programs on the device.



1 Back
2 Program list
3 Save program as (11.2.2)
4 Load program from device (11.2.1)

11.2.1 Load program from device

Open the selected program for editing or other actions.

11.2.2 Save program as

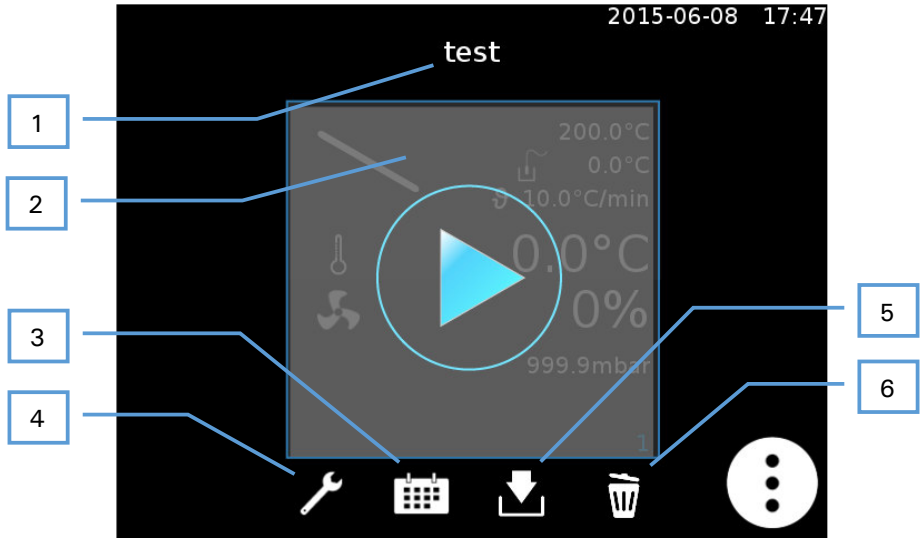
The selected program will be stored on the device with a new name. Therefor the keyboard (13.1) appears.

11.3 Load a program from a USB stick

If you have programs on a USB stick, then it is possible to load these onto the device. Insert the USB stick in to the device and select "Load from USB" from the menu.

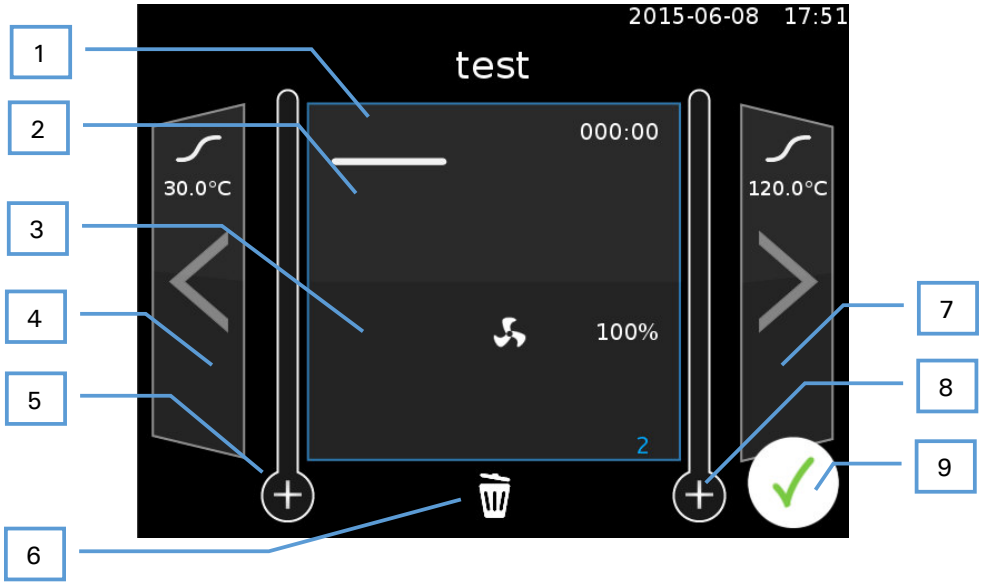
11.4 Program options

An overview of the program is displayed once it has been loaded. Several actions are available.



1 Program name
2 Start
3 Terminate (11.6)
4 Edit (11.5)
5 Export (11.7)
6 Delete (11.8)

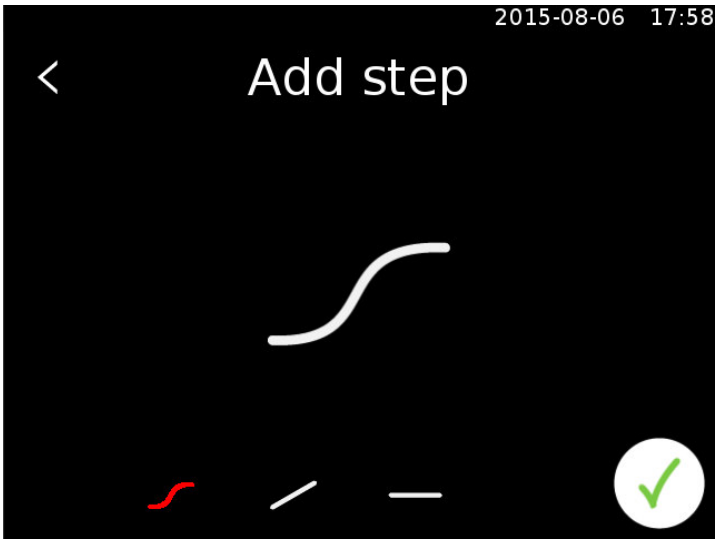
11.5 Edit program

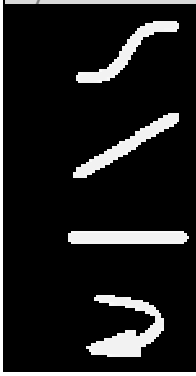


1 Current program step
2 Temperature / general step settings (11.5.2)
3 Fan settings (10.2.1)
4 Previous program step
5 Insert new program step before current step (11.5.1)
6 Delete program step
7 Next program step
8 Insert new program step after current step (11.5.1)
9 Finish editing

11.5.1 Create new program step

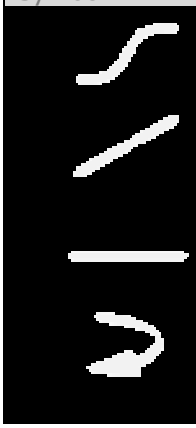
The user can choose between four different step types. Touching the symbols on the screen switches through the different program steps. The following table describes the four program steps.



Symbol	Mode	Description
	Fast	The set temperature will be reached as quickly as possible
	Linear	The set temperature is approached linearly
	Hold	The current temperature is held for a set period of time
	Repeat	The program jumps to a selected program step

11.5.2 Temperature / general step settings

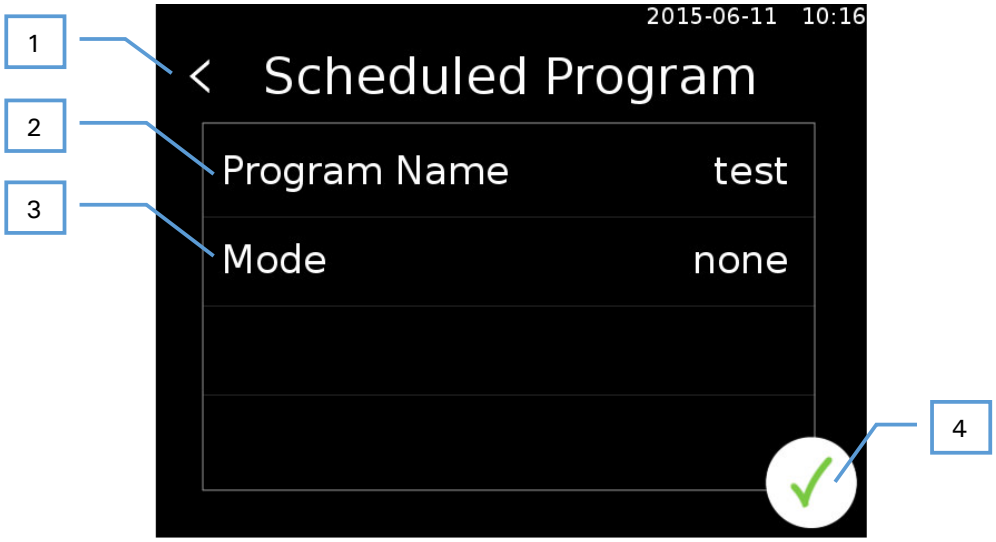
Setting options for individual steps vary depending on the type of the step.

Symbol	Settings	
	Temperature:	The user selects the desired target temperature.
	Temperature:	The user selects the desired target temperature.
	Gradient:	Specifies the temperature change per minute.
	Time:	How long to hold the temperature from the previous program step.
	Jump to:	The step to which the program should jump.
	Repeat:	How often should this step be repeated when reaching this program step.

11.6 Schedule program

A selected program can be terminated. The user has the option of setting a program to start at a defined date and time.

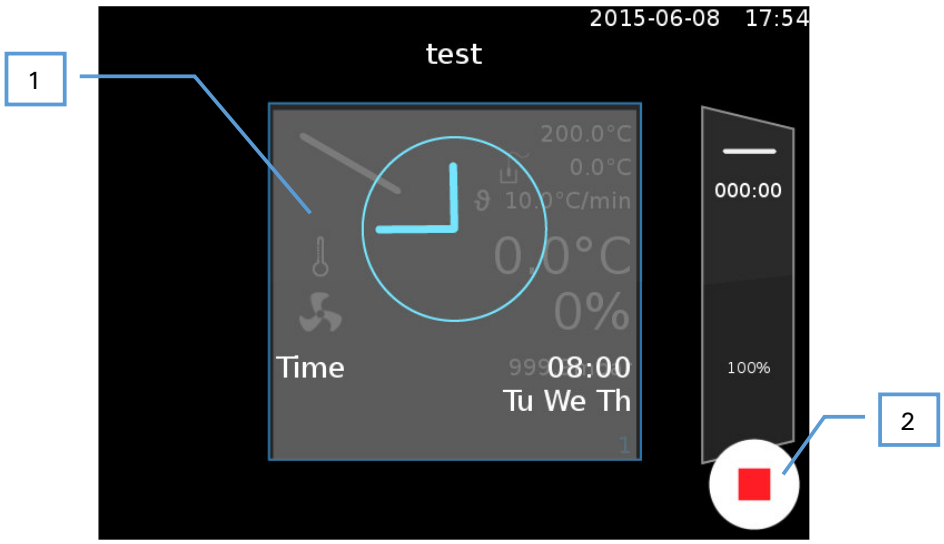
Programs can also be set to be regularly repeated. Only one individual program can be scheduled.



1 Back
2 Program name
3 Repetition type
- Daily (11.6.1)
- Weekly (11.6.2)
- Never (no repetition)

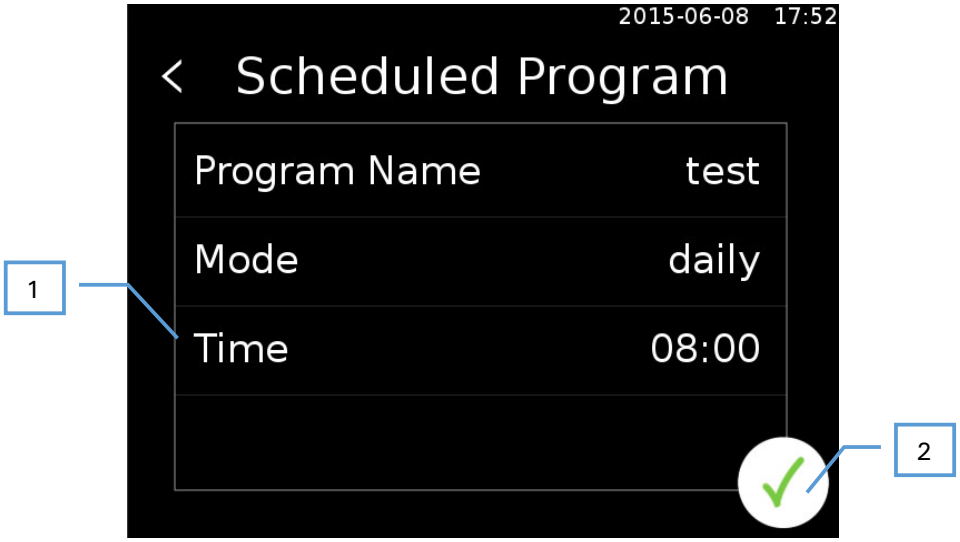
4 Confirm input

If a specific time is set for the program to run then the scheduler is automatically started.



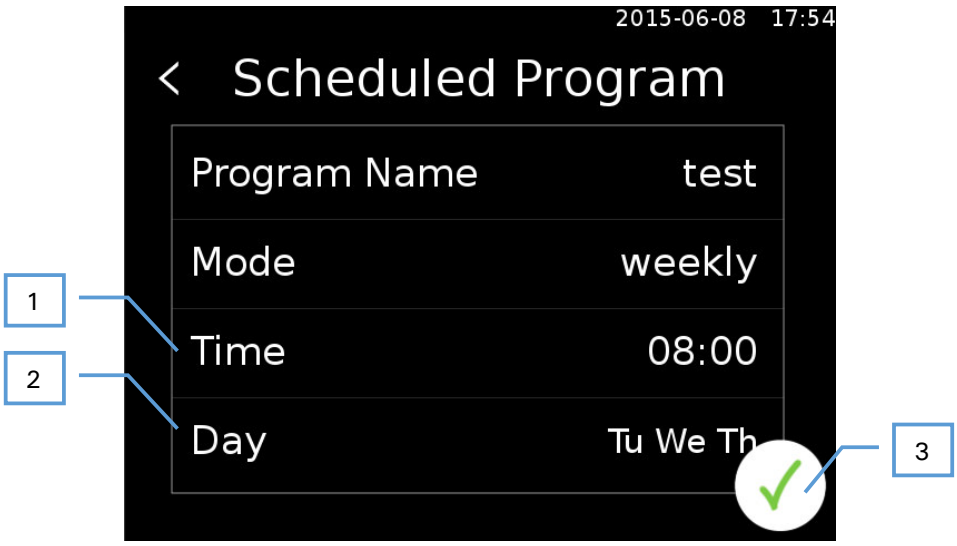
1 Execution time display
2 Cancel scheduler

11.6.1 Daily repetition



1 Execution time
2 Confirm input

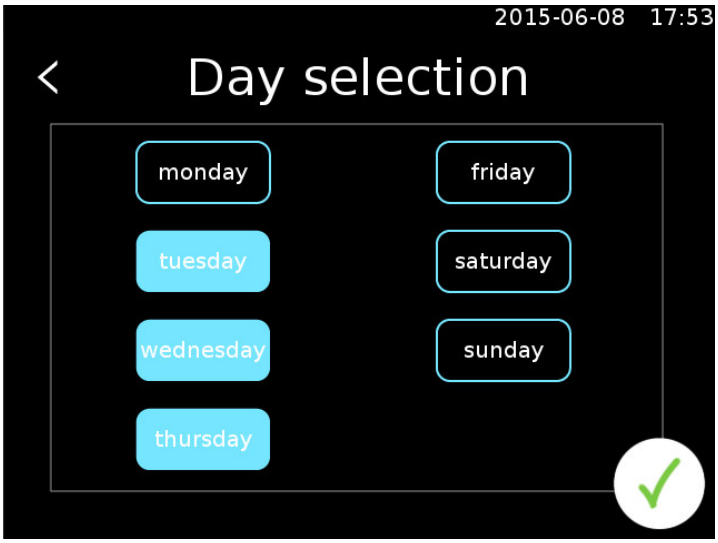
11.6.2 Weekly repetition



1 Execution time
2 Selected weekday (11.6.2.1)
3 Confirm input

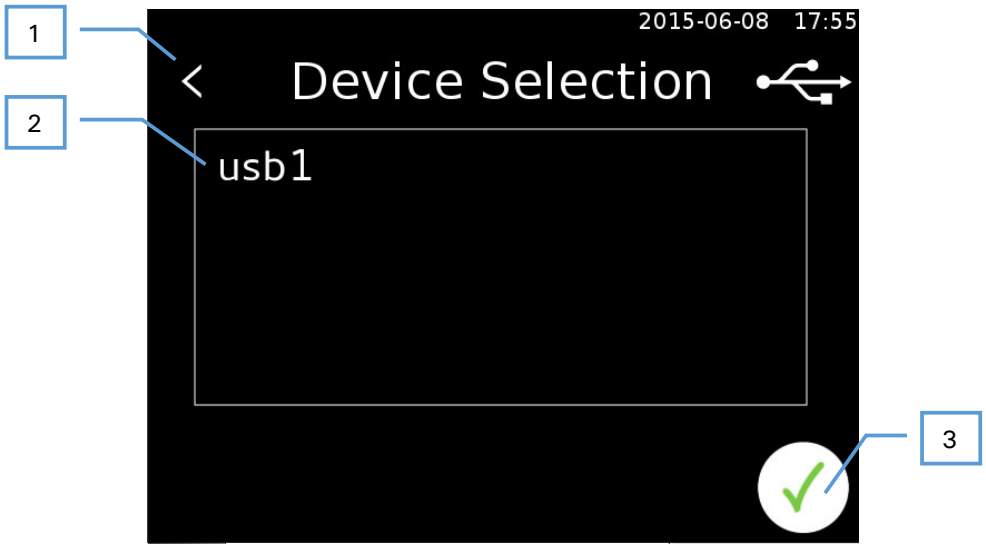
11.6.2.1 Select day

The corresponding buttons are used to the select the desired days for the program to be started.



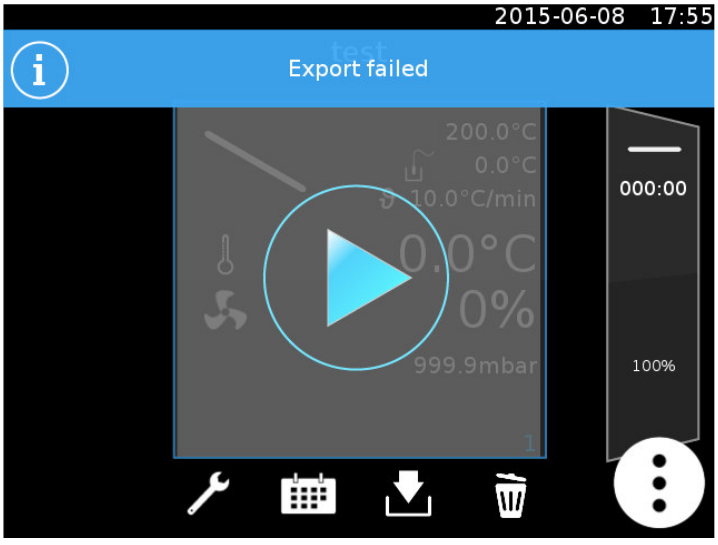
11.7 Export program

The selected program can be exported to a USB stick. A program can only be exported after a USB stick has been inserted into the device.



1 Back
2 Export target
3 Export

You are informed via an information bar after the program has been successfully exported or if an error occurred during the export process.

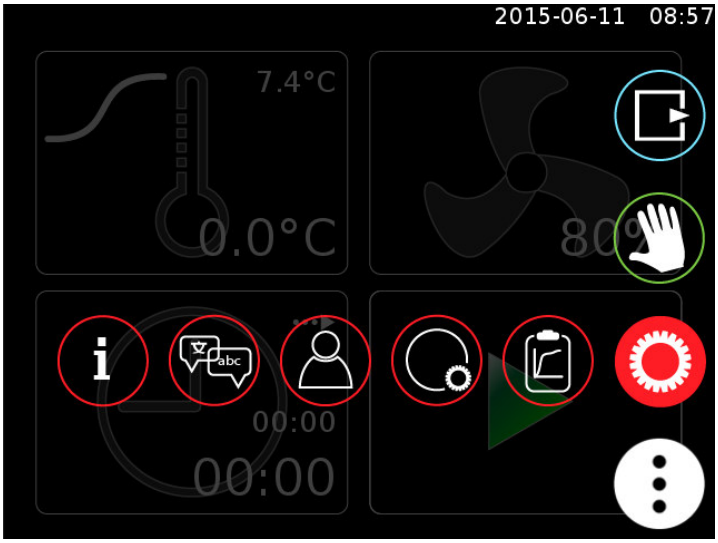


11.8 Delete program

The loaded program can be deleted from the device. This action must then be confirmed.

1 Back
2 Confirm deletion

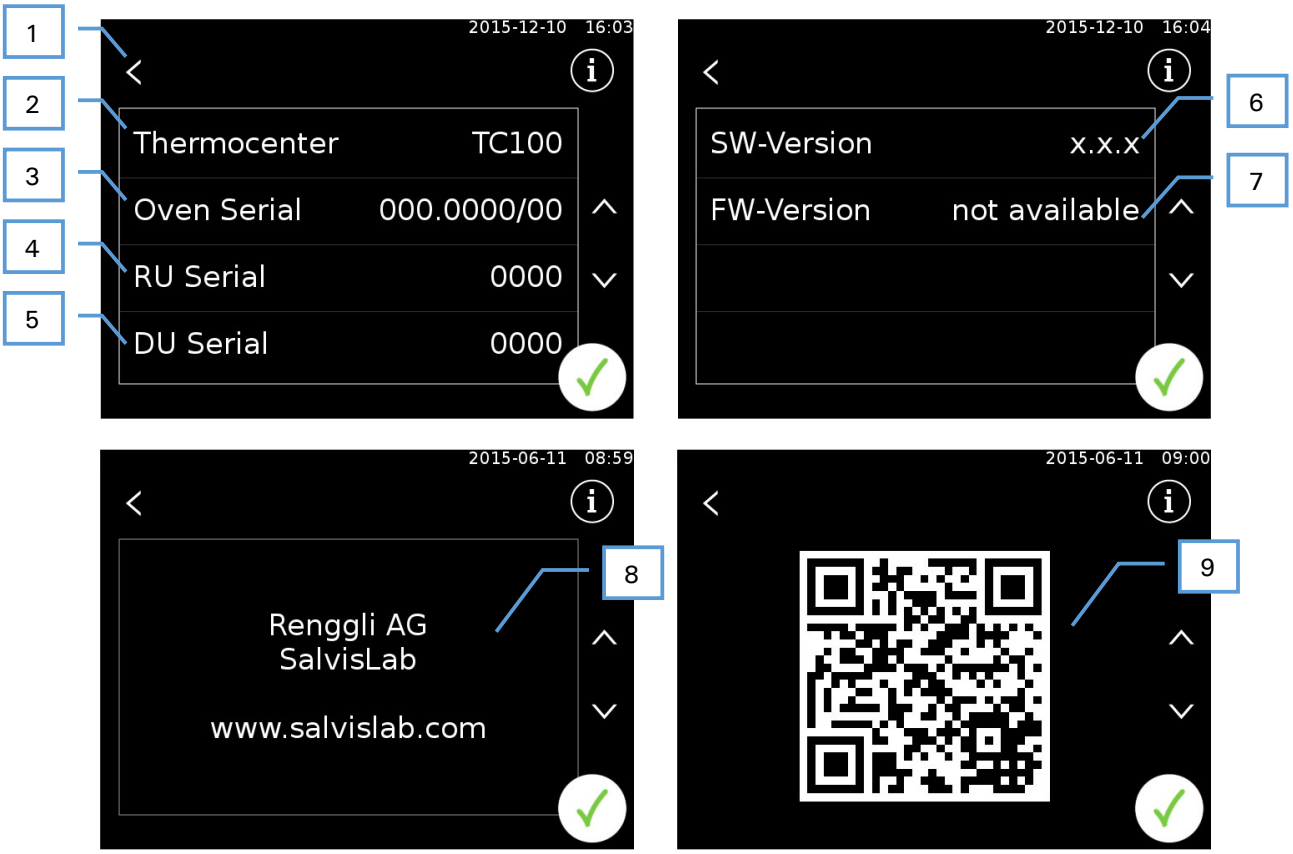
12 Settings



	Information (12.1)
	Language (12.2)
	Users (12.3)
	General settings (12.6)
	Logging (12.7)

12.1 Information

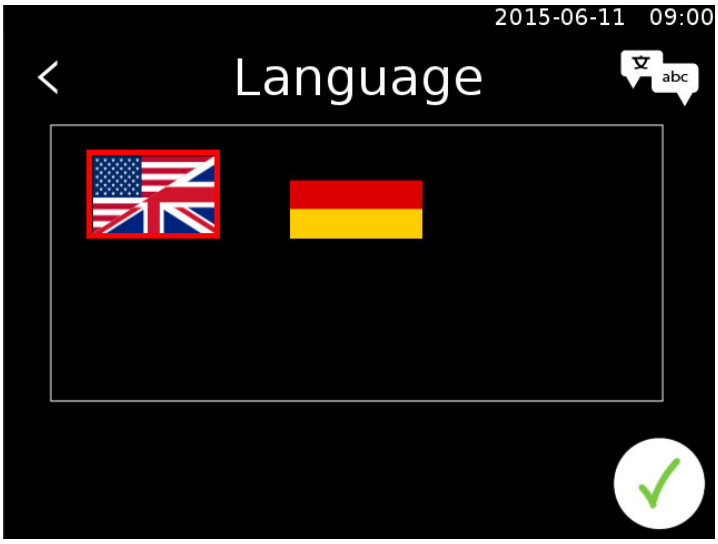
All important product information as well as the address of the manufacturer are displayed in an information window. The info screen also contains a QR code that can be scanned to directly access the manufacturer's website.



1 Back
2 Device type
3 Serial number
4 RU serial number
5 DU serial number
6 Control unit software version
7 Regulator firmware version
8 Manufacturer address
9 QR code, contains link to manufacturer´s website

12.2 Language

The user can select the interface language by pressing on the flag for the desired language.

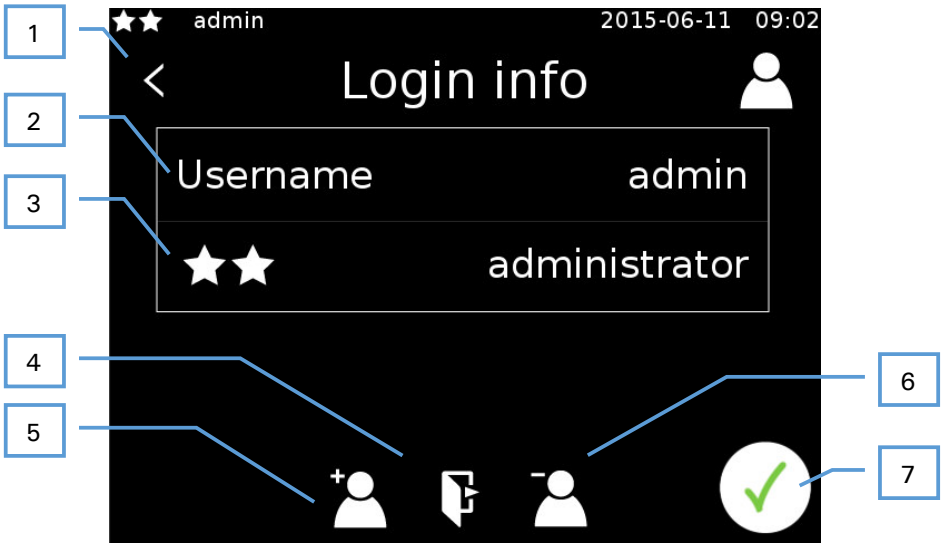


The language setting is applied after pressing the OK button.

12.3 Users

An administrator must be logged on to access this menu. Additional users can then be created.
Each user needs a user name, a password and an access permission type. The administrator can create additional administrators as well as users.
The user level is indicated using stars:

★	User
★	Calibrator
★★	Administrator
★★★	Service technician

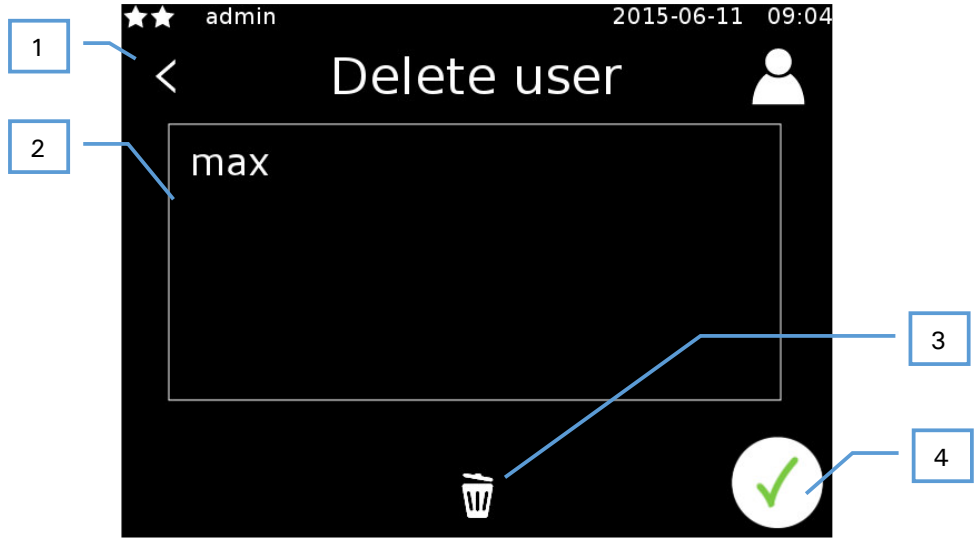


1 Back
2 Username
3 User level
4 Log out
5 Create new user (12.3.1)
6 Delete user (12.3.2)
7 Confirm input

12.3.1 Create user

1 Back
2 Enter username
3 Enter password
4 Select role
5 Confirm input

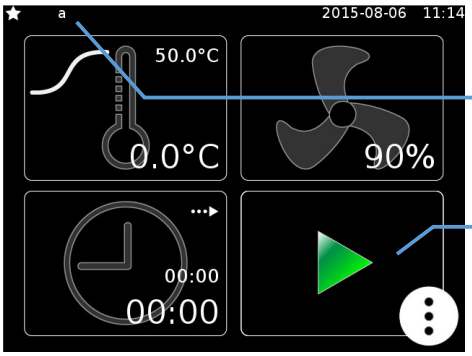
12.3.2 Delete user



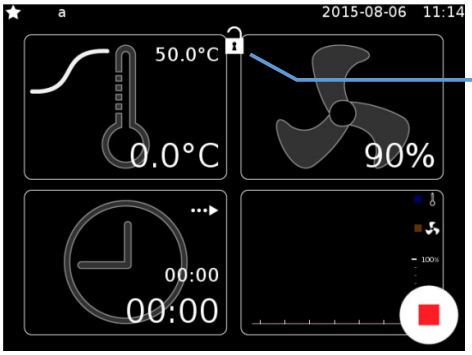
1 Back
2 User list (select a user by clicking)
3 Delete selected user
4 Back

12.4 Lock the screen

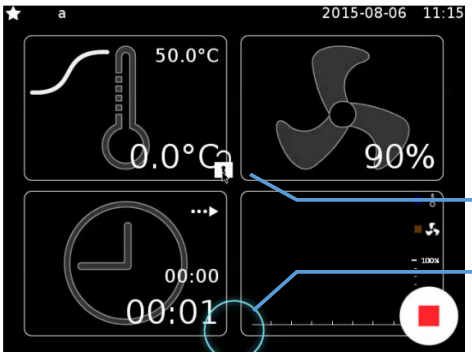
If the user administration option is enabled, then the currently running process can be locked by a user. This requires the user to first log in. Once the user is logged in, they can start the oven or program in manual mode. A small lock now appears on the display. The screen can now be locked by using your finger to drag the lock into the circle that appears on screen.



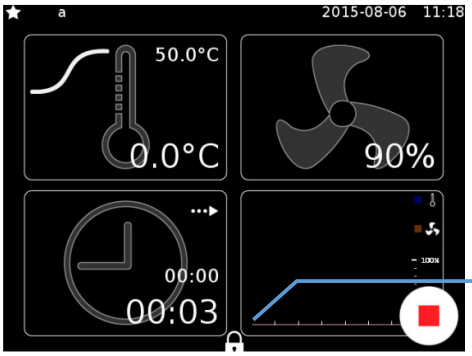
1 User is logged on
2 Start heating process



3 Open lock appears



4 Drag lock
5 Circle appears

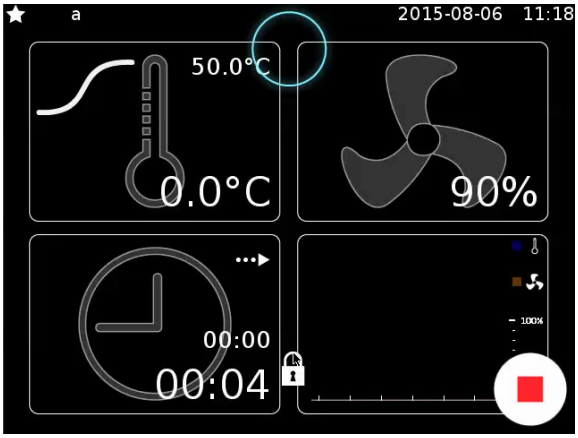


6 Drag lock into circle, the oven is now locked

12.4.1 Unlock screen

To unlock the screen it is necessary to drag the closed lock again. As soon as you start dragging the lock, a circle appears. Dragging the lock into the circle brings up the login screen. The operator who originally locked the oven needs to log in again here in order to unlock it.

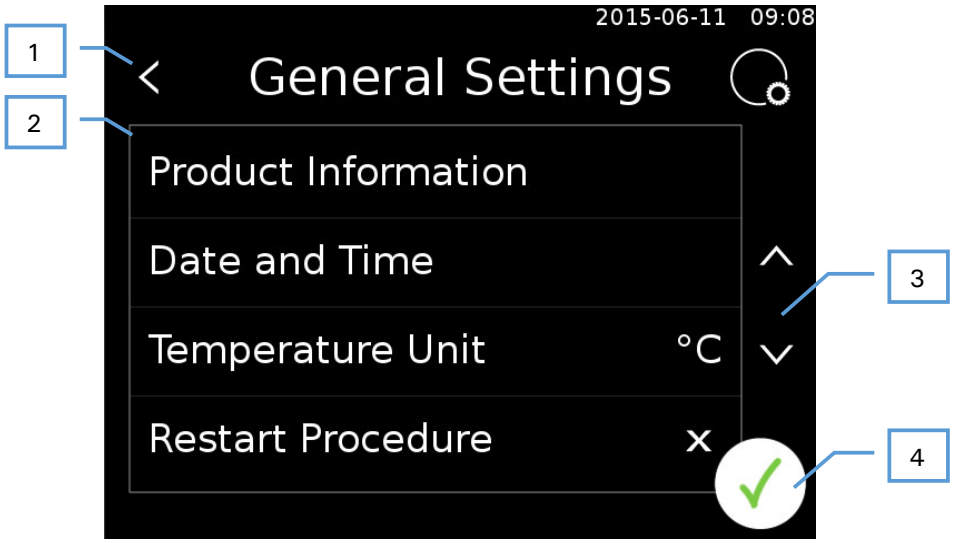
> The screen can be unlocked at any time by an administrator or service technician. Other users cannot unlock the oven.



12.5 Screen saver

A screensaver appears after 30 minutes of standby time. This screen will only be activated, if no regulation is in progress. Touch the display on any position to deactivate the screensaver and return to the last screen.

12.6 General settings



1 Back
2 List of options
3 Scroll
4 Back

12.6.1 System restart process

This option controls the behavior of the system when restarted. Depending on the settings, the process being worked on beforehand will be:

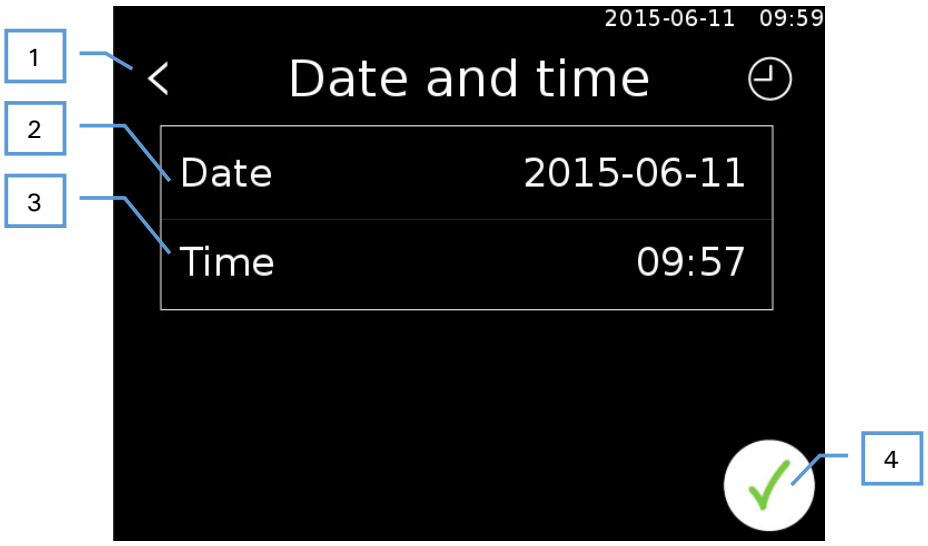
- stopped
- resumed
- newly restarted

12.6.2 Calibration

The internal and external temperature sensors can be calibrated with the help of this menu.

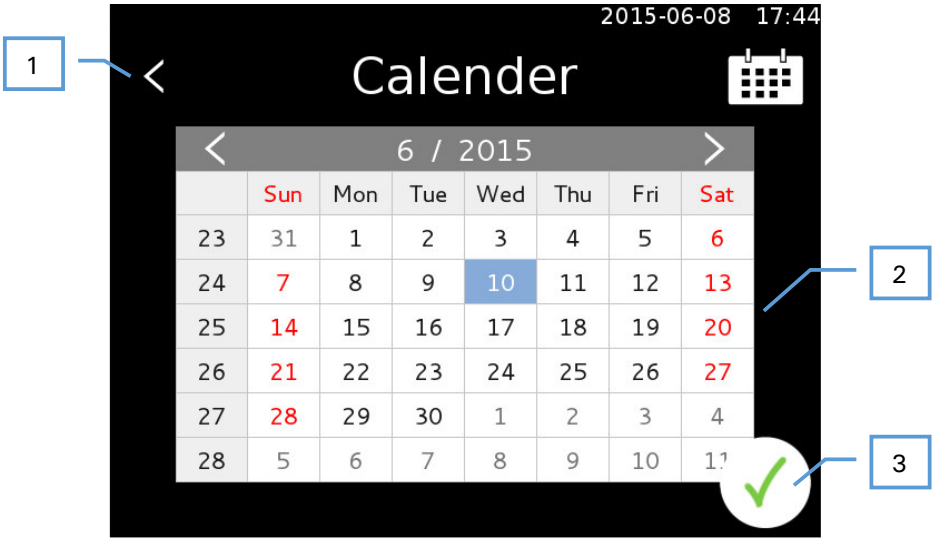
> Calibration is secured using a password or can be done only by the service technician.
> For more detailed information, please contact the manufacturer.

12.6.3 Date and time



1 Back
2 Set date
3 Set time
4 Confirm input

12.6.3.1 Set date

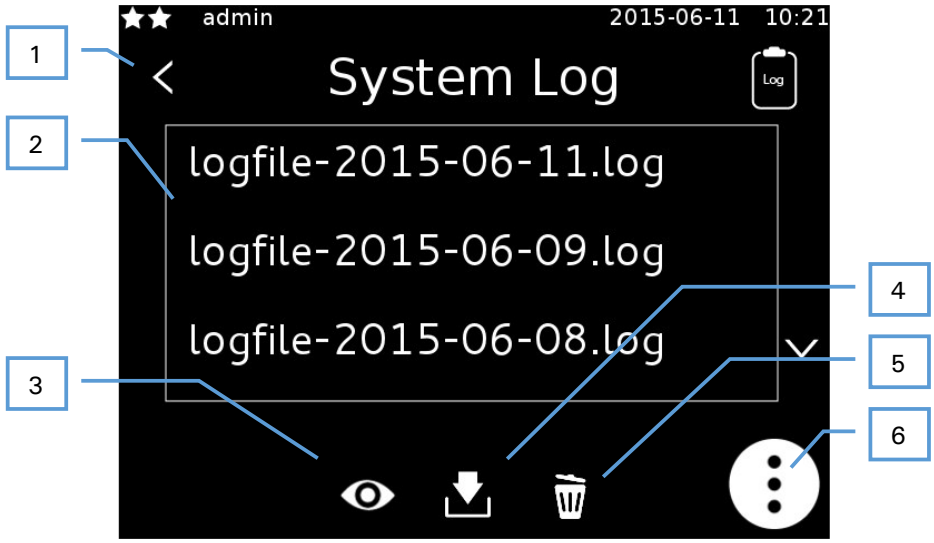


1 Back
2 Select date
3 Confirm input

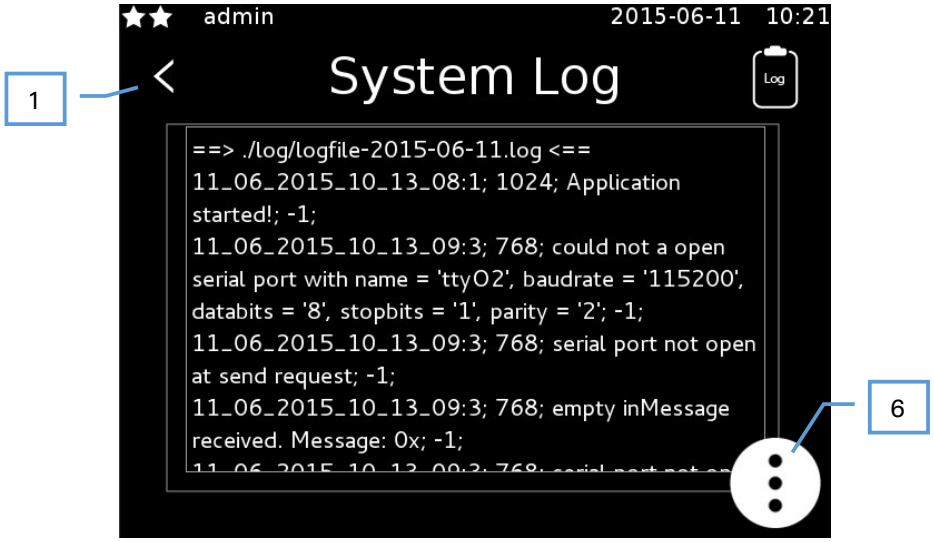
12.6.4 System log

The system log can be viewed here. All important events are logged by the controller here and displayed.

> **!** The controller deletes the oldest file after a certain period of time. If you want to permanently save the log data, then you will need to do a regular export operation.



You can swipe up and down to scroll through the system log.



1 Back
2 List of log files
3 Open log
4 Export log
5 Delete log
6 Back

12.6.5 Temperature unit

The temperature unit can be switched between Celsius and Fahrenheit.

! The unit only becomes active when pressing the confirm button upon closing the general settings menu.

12.6.6 Upper temperature limit

The upper temperature limit can be set between 2 and 20 degrees Celsius. If the target temperature for the oven is set above this limit then the safety regulator is activated.

! When regulating using the external sensor, the oven temperature is monitored with this value. Errors may occur if the limit is too narrowly set.

i The limits do not define the precision of the regulator. They define only when the safety regulator is activated.

12.6.7 Lower temperature limit

The lower temperature limit can be set between 2 and 20 degrees Celsius. If the target temperature in the oven drops lower than the set temperature then the safety regulator is turned on.

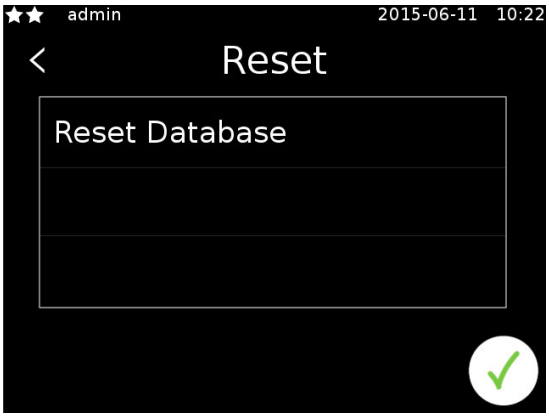
! When regulating using the external sensor, the oven temperature is monitored with this value. Errors may occur if the limit is too narrowly set.

i The limits do not define the precision of the regulator. They define only when the safety regulator is activated.

12.6.8 Reset

Administrative users are able to reset the database.

> ! This will delete all current parameters, programs and users.



12.6.9 Test

The test screen allows all sensors and actuators to be monitored and tested. The test screen is explained in more detail in chapter 16.2.

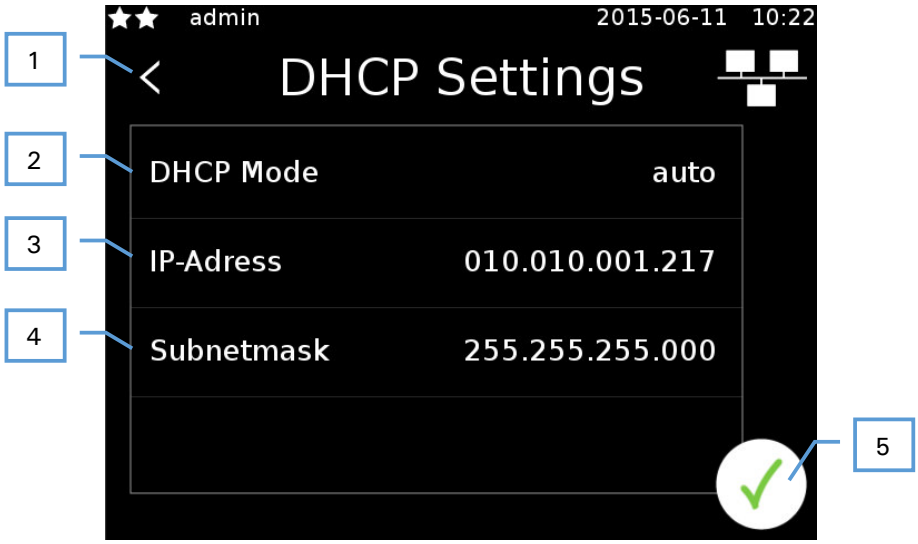
12.6.10 Update

The user can run a software update from here. The new software first needs to be loaded onto a USB stick. This is then inserted into the device. For further detail please refer to chapter 16.1.

12.6.11 Network settings

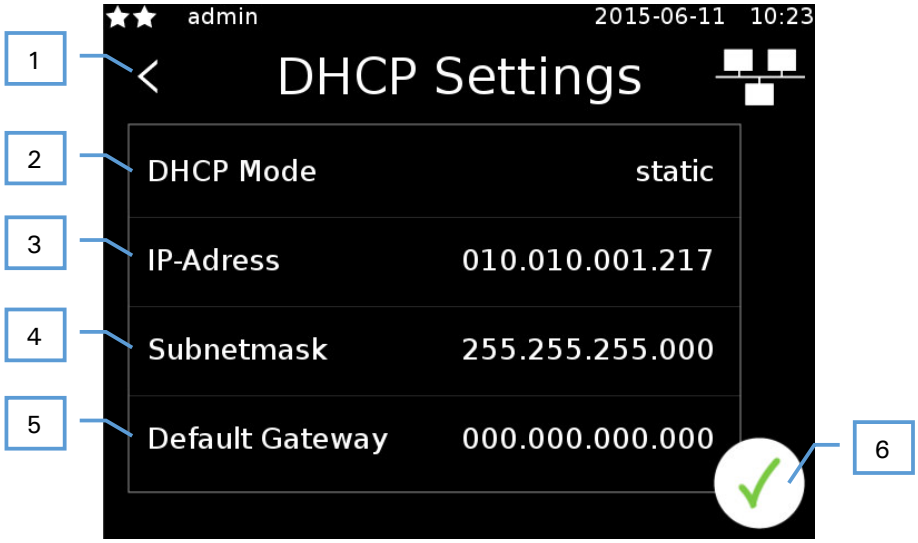
This menu item allows the network address to be set. The IP address is automatically assigned by default, whereby the controller is automatically assigned an IP address by the network. This can be manually set using "static" mode.

12.6.11.1 Automatic



1 Back
2 Mode (change by clicking)
3 Current address (assigned by the network)
4 Current subnet mask (assign by the network)
5 Confirm input

12.6.11.2 Manual



1 Back
2 Mode (change by clicking)
3 Set address
4 Set subnet mask
5 Set gateway
6 Confirm input

It can take a little time for the IP address to be assigned, as the controller must first check whether the set address is already in use on the network before setting the new address.

12.6.12 Buzzer delay

A warning buzzer will sound, if the door is opened whilst a process is running. The delay before the buzzer sounds can be set between 30s and 5 minutes.

12.6.13 Sterilization

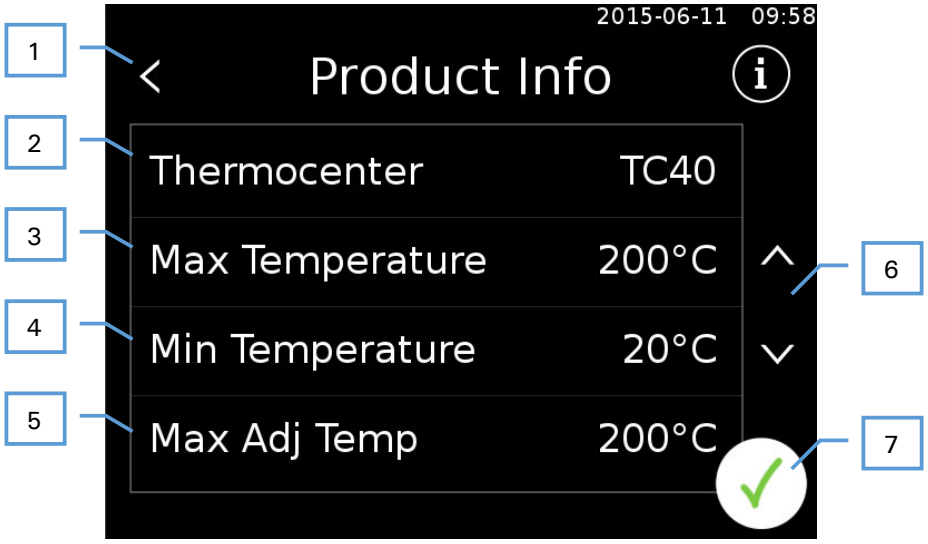
The oven can be sterilized using the sterilization option. This raises the temperature to 180°C and holds it at this temperature for 30 minutes in accordance with WHO guidelines. Devices that can reach a maximum of 160°C are held at this temperature for 180 minutes.

If the sterilization procedure is interrupted, then it is considered as invalid. This is saved in the oven. Successful sterilization is recorded with the date and time in the oven in order to show that the last successful sterilization was run.

12.6.14 Product information

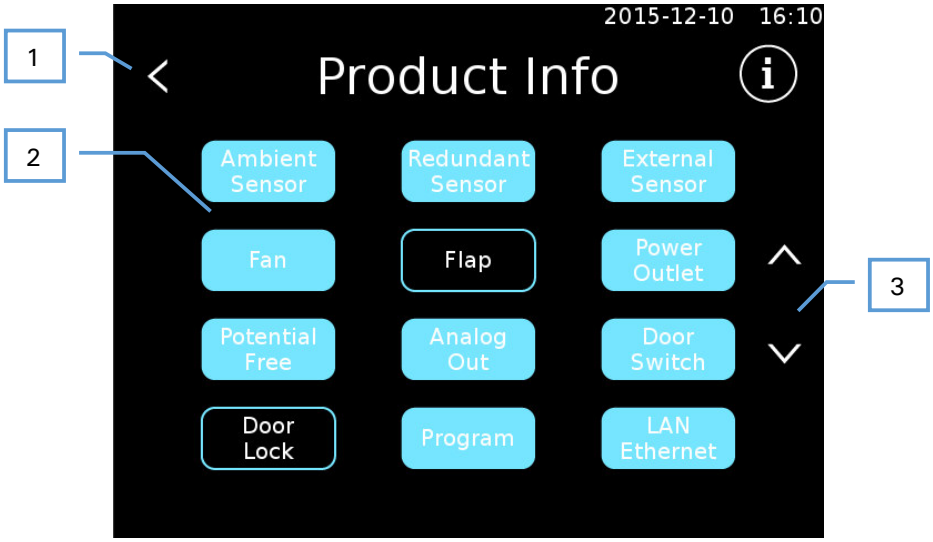
This menu option brings up the oven settings.

12.6.14.1 Oven data



1 Back
2 Oven type
3 Maximum temperature (operational)
4 Minimum temperature (operational)
5 Maximum temperature (calibration)
6 Scroll
7 Back

12.6.14.2 Options



1 Back
2 Options (sensors, actuators)
3 Scroll

12.6.15 Maximum temperature

This menu option allows the temperature to be limited. The maximum temperature is fixed by the oven, but depending on the requirements of the process that the oven is being used for, can be lowered.

! Please check all of your programs (if any) after setting the temperature. Existing programs are not automatically adjusted.

12.6.16 Process log time

This allows you to set the interval for logging process data. The value can be set between 2s and 5min.

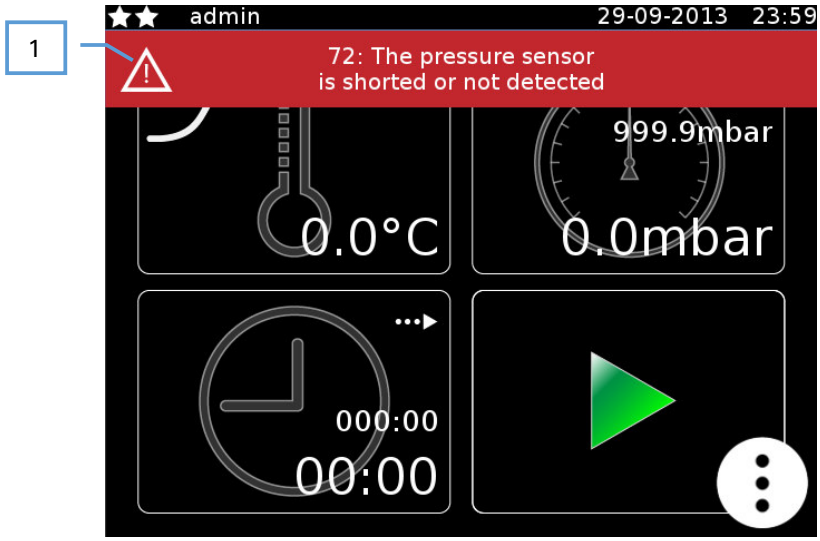
i Longer sample times allow process data to be recorded over longer periods.

12.6.17 System error

This menu displays system errors which have appeared.

12.6.17.1 Appearance of an error

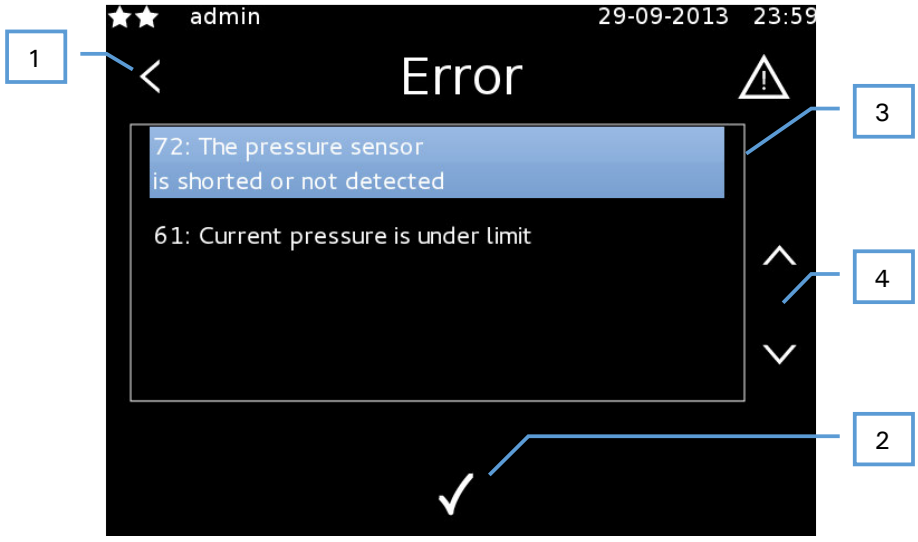
If an error appears, a red bar will show information error information.
The system error screen appears if the red bar is touched.



1 Information about the occurred error

12.6.17.2 System error screen

This screen can be accessed by clicking on an error popup bar or in the general settings window.



1 Back
2 Acknowledge the marked error
3 List of appeared errors
4 Scroll

If you acknowledge an error who is gone, it will be automatically deleted from the list. If the error condition is still met, the error will reappear.

12.6.17.3 Alarm contact

The potential free contact is used for the alarm contact. This contact is closed in an error-free condition. If an error appears, the contact is opened. The contact will stay open as long as the user acknowledges all errors in the list.

> This feature is only available with the corresponding option.

12.6.18 DAC

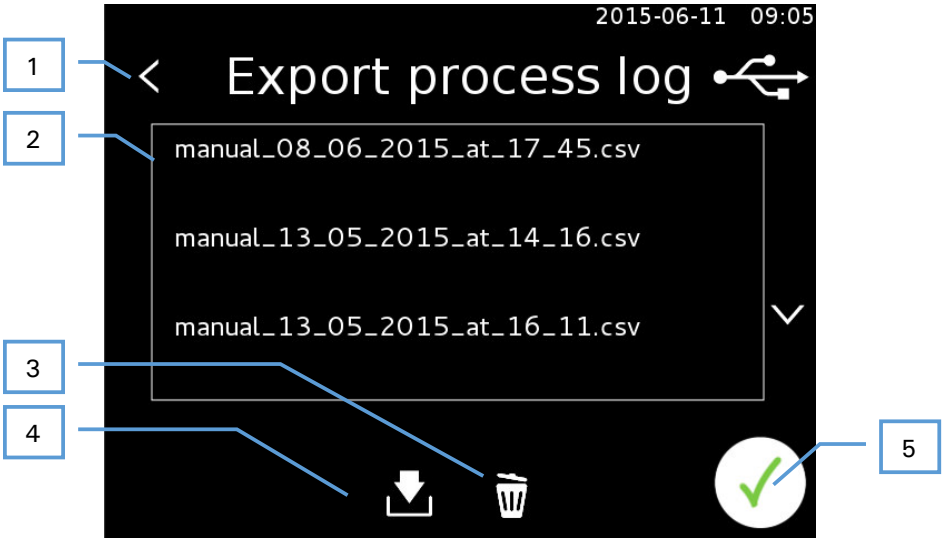
The device has two analogue outputs. They can be mapped to the system sensors.
The following options are possible:

Sensor	Formula
Temperature internal	Voltage [V] = temperature [°C] * 30 +1V
Temperature external	Voltage [V] = temperature [°C] * 30 +1V
Temperature ambient	Voltage [V] = temperature [°C] * 30 +1V
Fan speed	Voltage [V] = fan speed [%] / 10

> Only available with the corresponding option.

12.7 Logs

Users have the option to export or delete logged process data.



1 Back
2 List of process logs
3 Delete selected process data
4 Export selected process data
5 Back

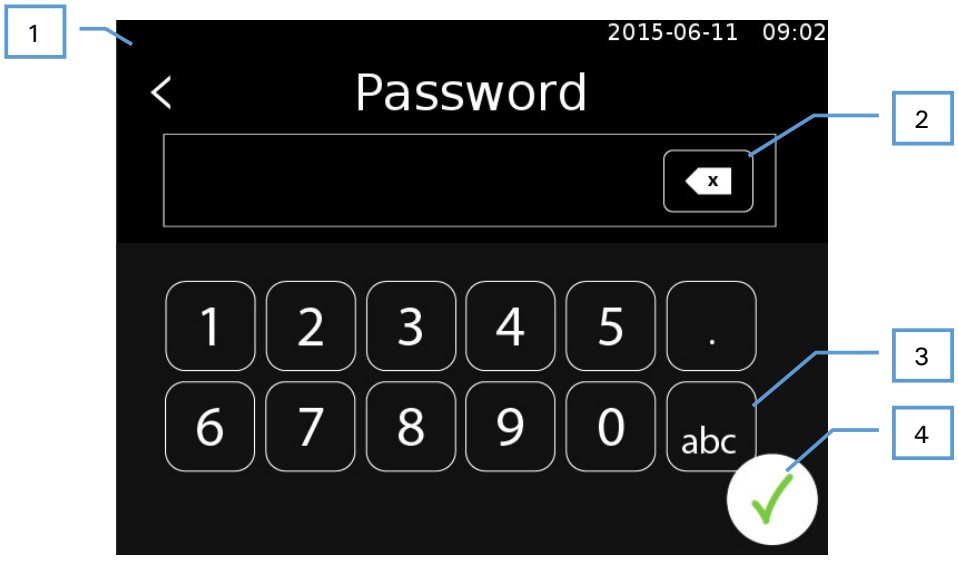
13 Keyboard

The keyboard can be switched between text (QWERTZ) and number input.

13.1 QWERTZ

1 Back
2 Switch to numeric keyboard
3 Delete last character
4 Confirm input

13.2 Numeric



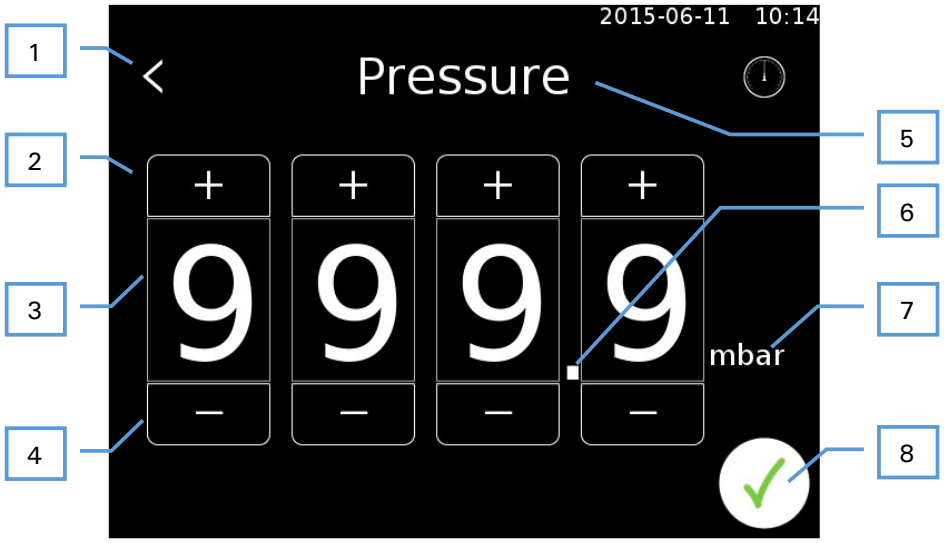
1 Back
2 Delete last character
3 Switch to QWERTZ keyboard
4 Confirm input

13.3 Special input errors

All settings such as temperature, fan speed, etc. are set in their corresponding screen using a unified user interface.

The respective maximum and minimum values cannot be exceeded.

13.3.1 Input using number keys



1 Back
2 Increase the respective digit
3 Clicking on a number opens up the keyboard input (13.3.2)
4 Lower the respective digit
5 Name of the value to set
6 Decimal point, position varies depending on value/value range
7 Unit
8 Confirm input

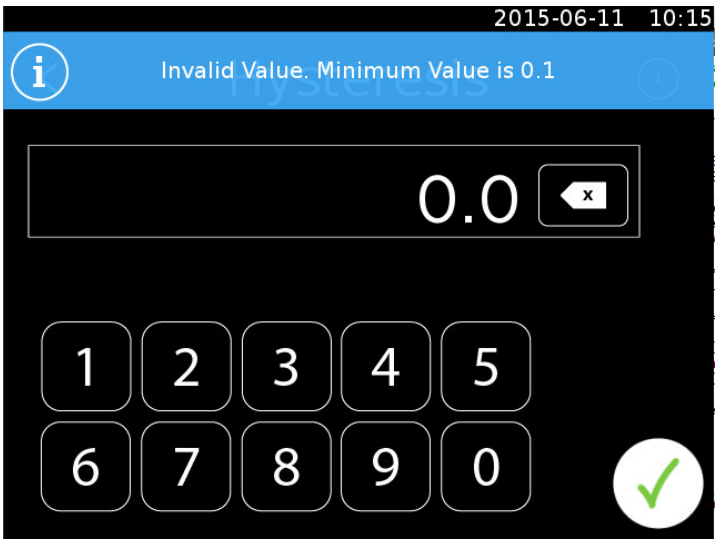
13.3.2 Keyboard input

This input method allows the value to be entered directly.

Input uses a fixed decimal point location. This means, for example, to set a temperature of 120°C, you need to press [1], [2], [0], [0].

1 Back
2 Name of the value to set
3 Delete last digit
4 Confirm input

If an invalid value is entered, then the user is prompted to enter a valid value.

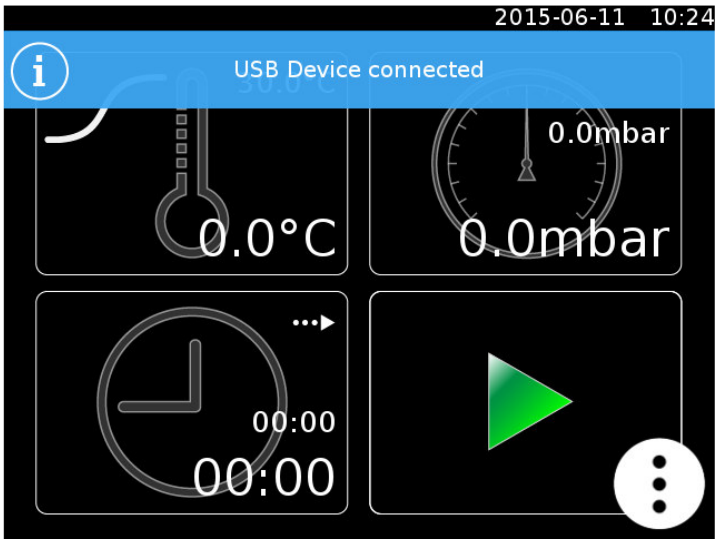


14 USB

14.1 Export/Import with USB-Stick

The controller allows data to be exported to and imported from a USB stick. It is necessary for the USB to be detected by the controller for this to be done.

The controller determines for itself if a USB stick is available. A message is provided on an information bar if a suitable stick is detected:



It is possible that not all USB sticks will be recognized by the controller. Please contact the manufacturer to determine a suitable type.

15 Ethernet

The current status of the device can be called up over the Ethernet interface. A TCP/IP connection with the following properties is created for this:

Port: 1234

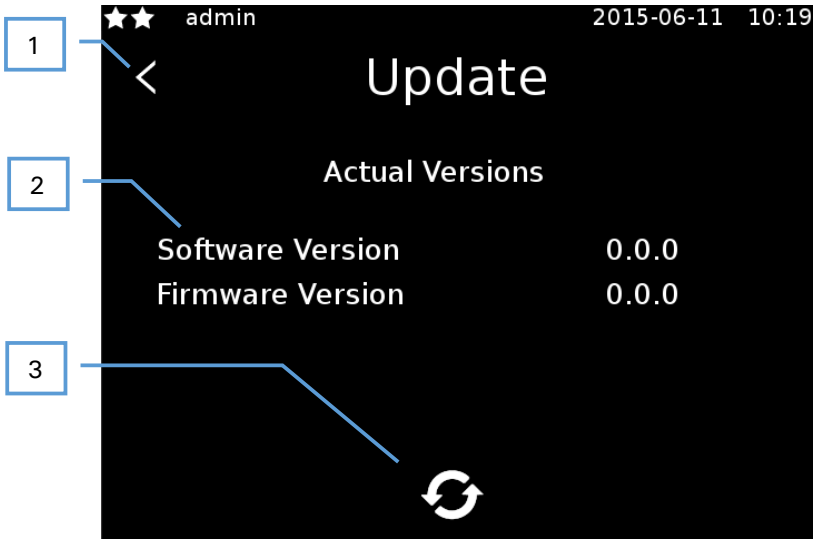
IP: IP address of the device

More detailed information can be found in document [Host Interface Specification].

16 Admin features

The features described in this chapter can only be used with the admin user. For further informations please contact your dealer.

16.1 SW Update



1 Back
2 List of which software version and firmware is installed.
3 Check for updates

Insert USB stick to continue

It is possible that not all USB sticks will be recognized by the controller. Please contact the manufacturer to determine a suitable type.

Clicking on the button [3] searches the USB stick for the appropriate files. This may take a moment. The file can then be selected and the update starts.

The pre-set file name of the update may not be changed on the computer.

An update may take several minutes. The controller will restart during the update. Please ensure to follow all instructions on the screen and never turn off the device.

Only remove the USB stick once the update has completed and the device has restarted.

16.1.1 Unlock options

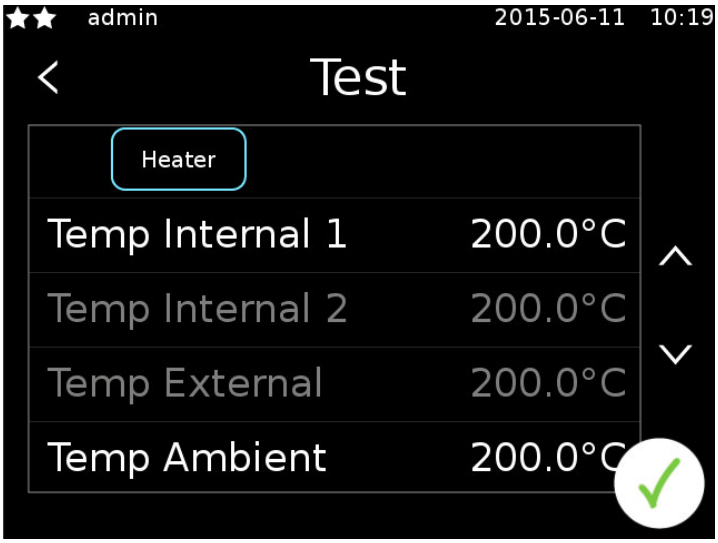
Options can be installed via the software update. The corresponding file needs to be saved on the USB and selected and to do this.

!	The pre-set file name of the update may not be changed on the computer.

!	An update may take several minutes. The controller will restart during the update. Please ensure to follow all instruction on the screen and never turn off the device.

!	Only remove the USB stick once the update has completed and the device has restarted.

16.2 Test screen

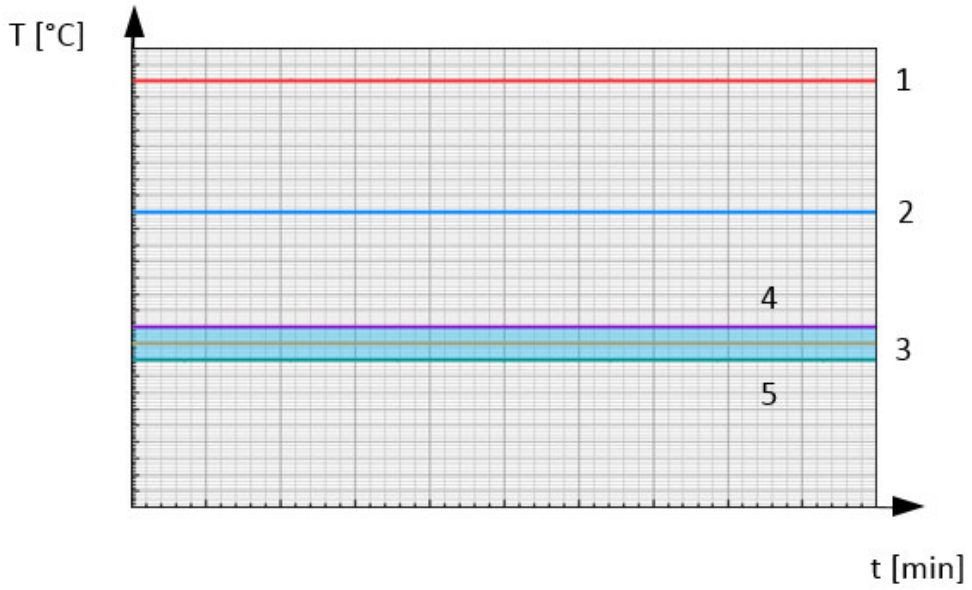


The test screen allows all features and sensors of the device to be checked.

Appendix A

Graphs of temperature limits, gradient and program run

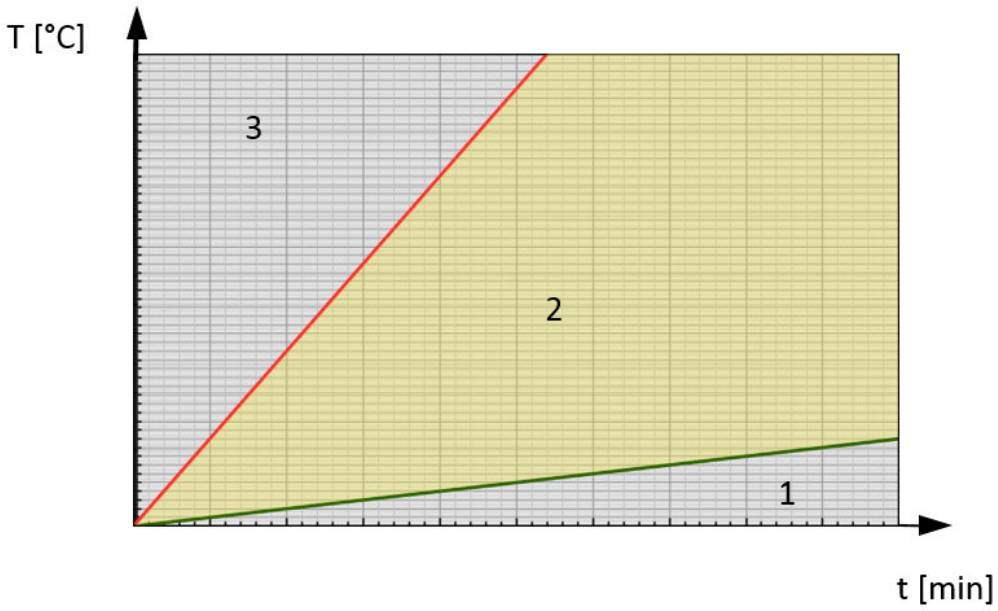
Temperature limiter & safety controlling



Thermal levels of a Thermocenter unit.

ID	Color ID	Param.	Description	Typ. value [°C]
1		T_B	Mechanical temperature limiter	260
2		T_{WB}	Electronical temperature limiter	≤200
3		T_{sp}	Set point temperature	$(T_r - T_{WB}]$
4		$T_{WW, max}$	Electronical over-temperature protection	$[T_{sp} ; T_{sp}+10]$
5		$T_{WW, min}$	Electronical under-temperature protection	$[T_{sp}-10 ; T_{sp}]$

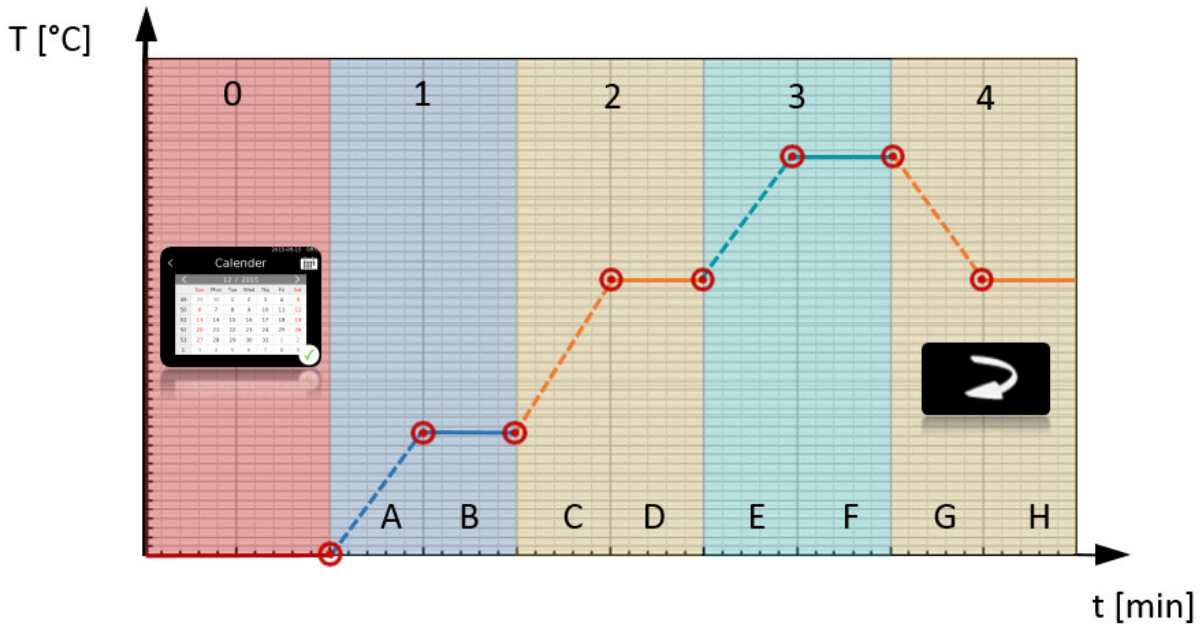
Range of allowable heating gradients



1. Lower gradient range. No working points allowed
2. Gradient can be set in this range
3. Upper gradient range. No working points allowed

Graphical presentation of a program run

This example shows a custom user program defined in the custom programs section with 4 steps and a pre-set calendar start date/time. For further detail please refer to chapter 11 "Program mode".



0 Timeframe of the start date/time
1 Step 1: start of custom program
2 Step 2: new parameters setting where used
3 Step 3: new parameters setting where used
4 Step 4: repeat step 2 with auto-adjusted parameters setting (after end of step 4 program ends)

Program step 0 can be set through calendar. Program steps 1-3 can be set up in relation to the following parameters: Set temperature, gradient, hold time. Program step 4 repeats program step 2.

The program steps 1-4 contain respectively:

1	A	Positive gradient (adjustable)
	B	Hold time (adjustable)
2	C	Positive gradient (adjustable)
	D	Hold time (adjustable)
3	E	Positive gradient (adjustable)
	F	Hold time (adjustable)
4	G	Negative gradient (given)
	H	Hold time (according to program step 2)

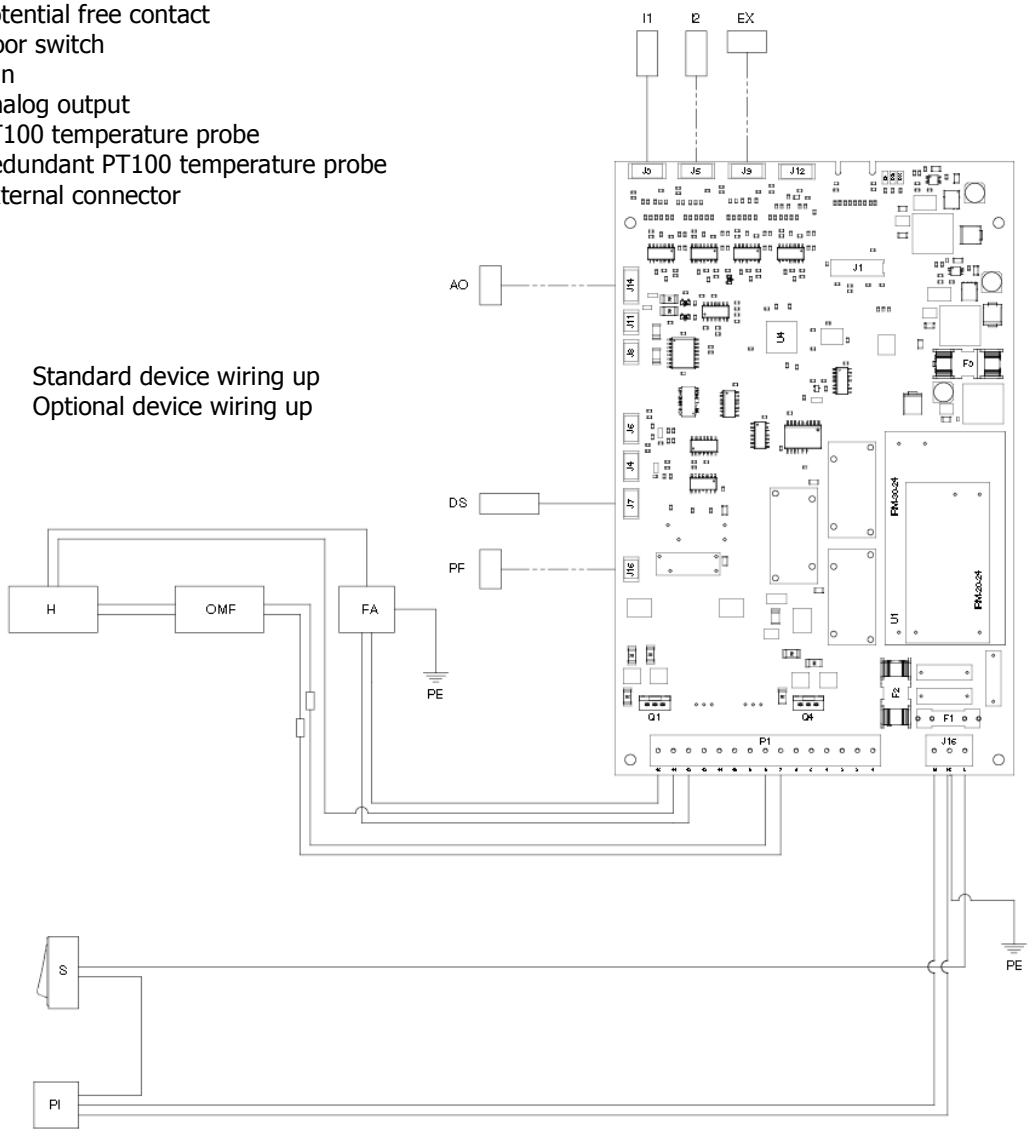
Appendix B

Wiring diagram TC40/100

ID	Description
PI	Power inlet
S	Device main switch (power on/off)
PE	Protective earthing
OMF	Over-temperature melting fuse
H	Heating element
PF	Potential free contact
DS	Door switch
FA	Fan
AO	Analog output
I1	PT100 temperature probe
I2	Redundant PT100 temperature probe
EX	External connector

———— Standard device wiring up

- - - - - - Optional device wiring up

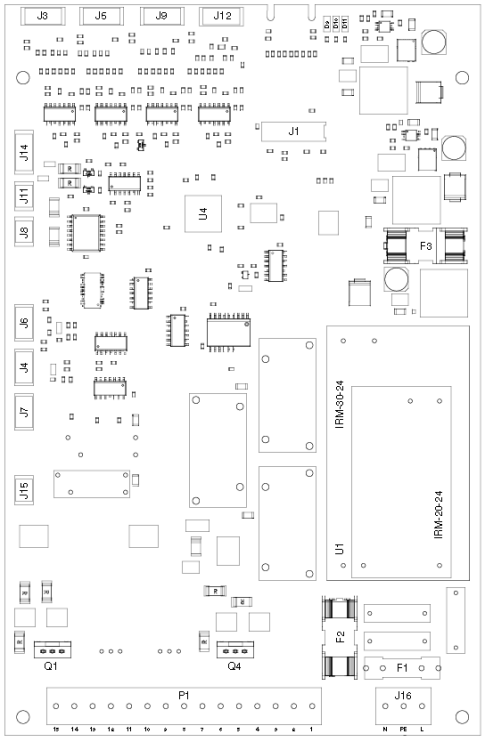


Wiring diagram Salvislab Thermocenter TC40/100

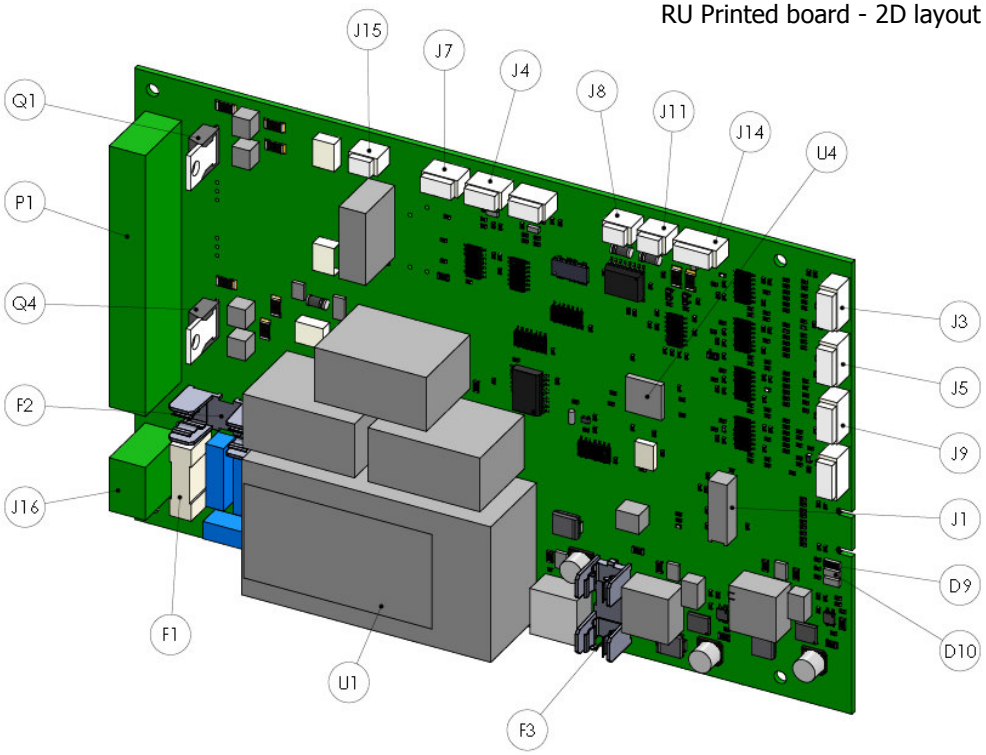
Appendix C

SalvisTEQ RU printed board

ID	Description
D9	Power indicator
D10	Command processing
F1	Main fuse 115/230V = T10AL 250V AC
F2	24V Power supply protection T2AL 250V AC
F3	Sensors / 24V T2AL 250V AC
J1	Connection to display unit
J3	PT100 temperature probe
J4	Connection for pressure transducer
J5	Redundant PT100 temperature probe
J7	Connection for door switch
J8	Vacuum valve
J9	External connector
J11	Connection for ventilation valve
J14	External connector, analogue output
J15	Potential free contact
J16	Connection for main switch
P1	Connection for heating, fan
Q1	Power stage heater
Q4	Power stage fan
U1	Voltage converter
U4	Hardware controller/microprocessor



RU Printed board - 2D layout

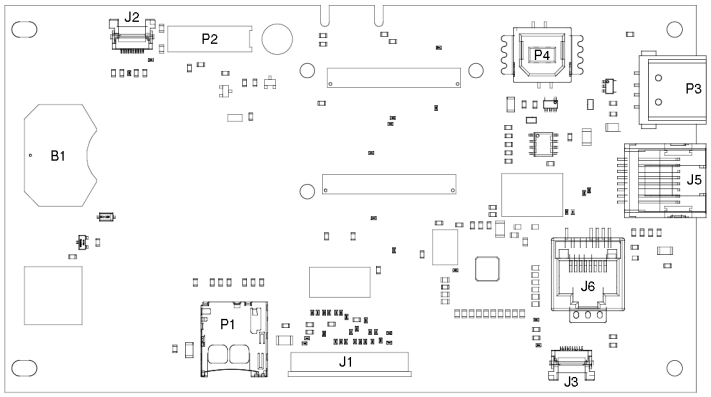


RU Printed board - 3D view

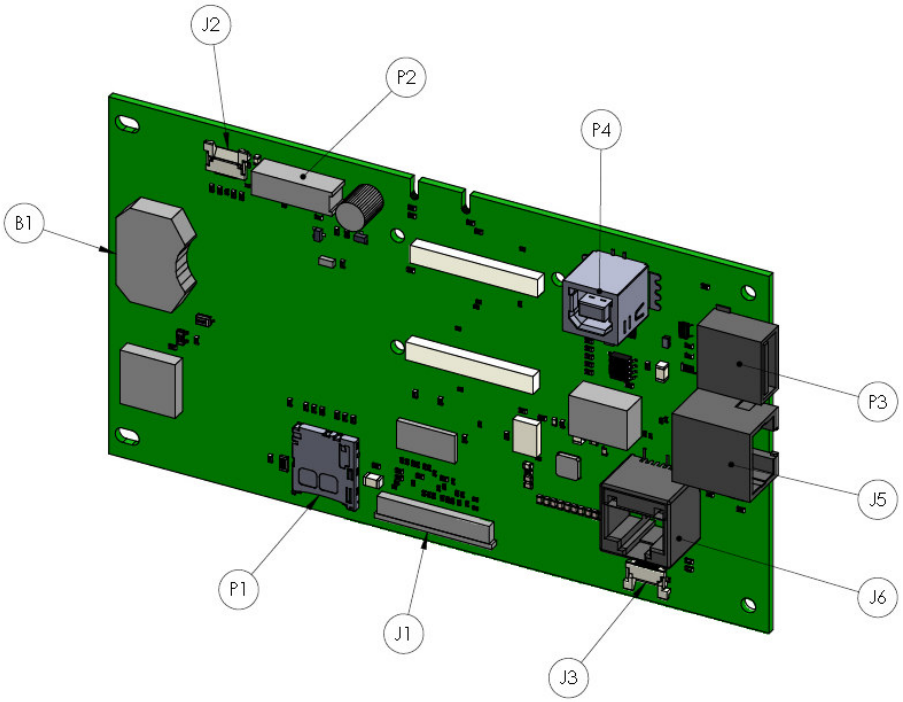
Appendix D

SalvisTEQ DU printed board

ID	Description
P2	Connection to regulation unit
J2	Power supply
B1	Battery 3V 225 mAh
P1	SD card slot
J1	Display connection
J3	Power supply
P3	USB Port
J5	Ethernet Port
P4	USB extension
J6	LAN extension



DU Printed board - 2D Layout



DU Printed board - 3D view

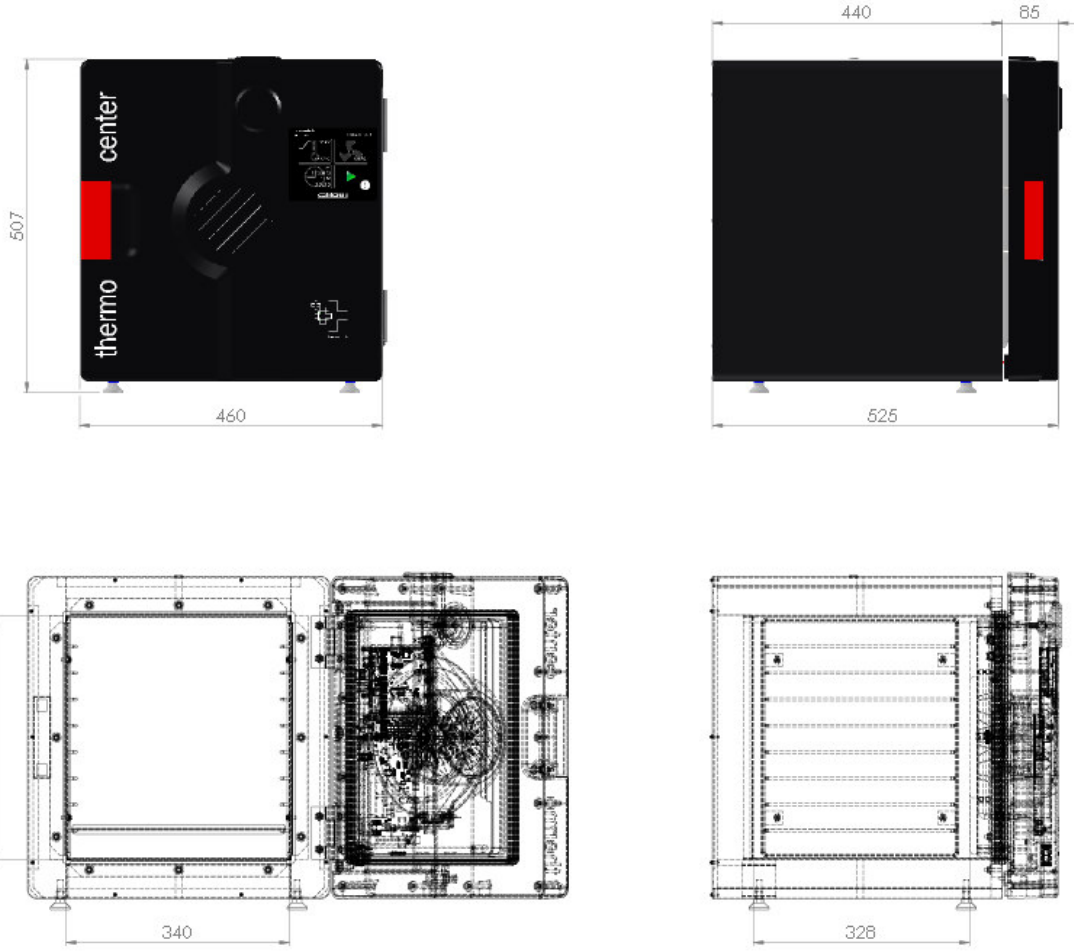
Appendix E

Legend

Wiring diagram main elements	ID	Description	Standard	Optional
	PI	Power inlet	x	
	S	Device main switch (power on/off)	x	
	PE	Protective earthing	x	
	OMF	Over-temperature melting fuse	x	
	H	Heating element	x	
	PF	Potential free contact	x	
	DS	Door switch	x	
	FA	Fan	x	
	AO	Analog output		o
	I1	PT100 temperature probe	x	
	I2	Redundant PT100 temperature probe		o
	EX	External connector		o
RU Main outputs	**ID**	**Description**	**Standard**	**Optional**
	D9	Power indicator	-	-
	D10	Command processing (on while command is executed)	-	-
	F1	Main fuse 115/230V = T10AL 250V AC	-	-
	F2	24V Power supply protection T2AL 250V AC	-	-
	F3	Sensors / 24V T2AL 250V AC	-	-
	J1	Connection to display unit	-	-
	J3	PT100 temperature probe	-	-
	J4	Connection for pressure transducer	-	-
	J5	Redundant PT100 temperature probe	-	-
	J7	Connection for door switch	-	-
	J8	Vacuum valve	-	-
	J9	External connector	-	-
	J11	Connection for ventilation valve	-	-
	J14	External connector, analogue output	-	-
	J15	Potential free contact	-	-
	J16	Connection for main switch	-	-
	P1	Connection for heating, fan	-	-
	Q1	Power stage heater	-	-
	Q4	Power stage fan	-	-
	U1	Voltage converter	-	-
	U4	Hardware controller/microprocessor	-	-
DU Main outputs	**ID**	**Description**	**Standard**	**Optional**
	P2	Connection to regulation unit	-	-
	J2	Power supply	-	-
	B1	Battery 3V 225 mAh	-	-
	P1	SD card slot	-	-
	J1	Display connection	-	-
	J3	Power supply	-	-
	P3	USB Port	-	-
	J5	Ethernet Port	-	-
	P4	USB extension	-	-
	J6	LAN extension	-	-

Appendix F

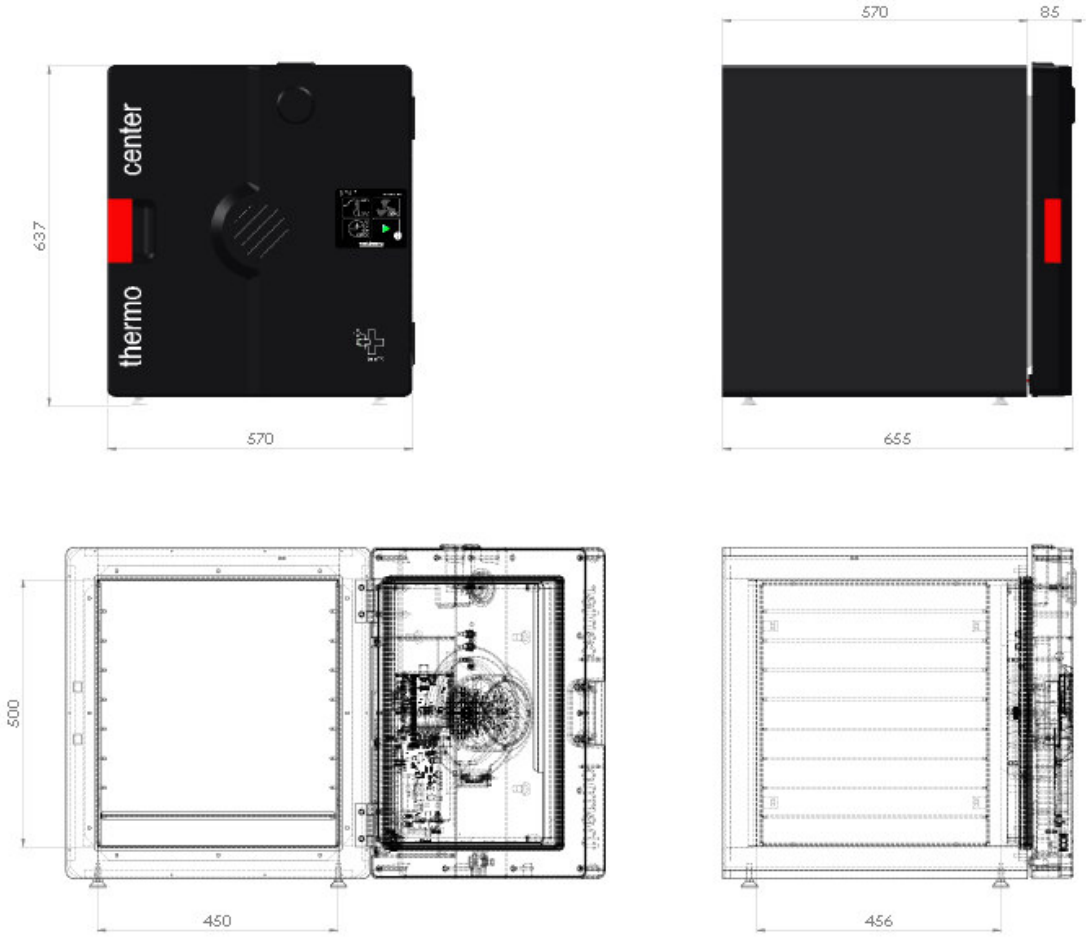
Drawing Salvislab Thermocenter TC40



* Renggli AG / SalvisLab reserves the right to change technical specifications and dimensions without prior notice.

Appendix G

Drawing Salvislab Thermocenter TC100



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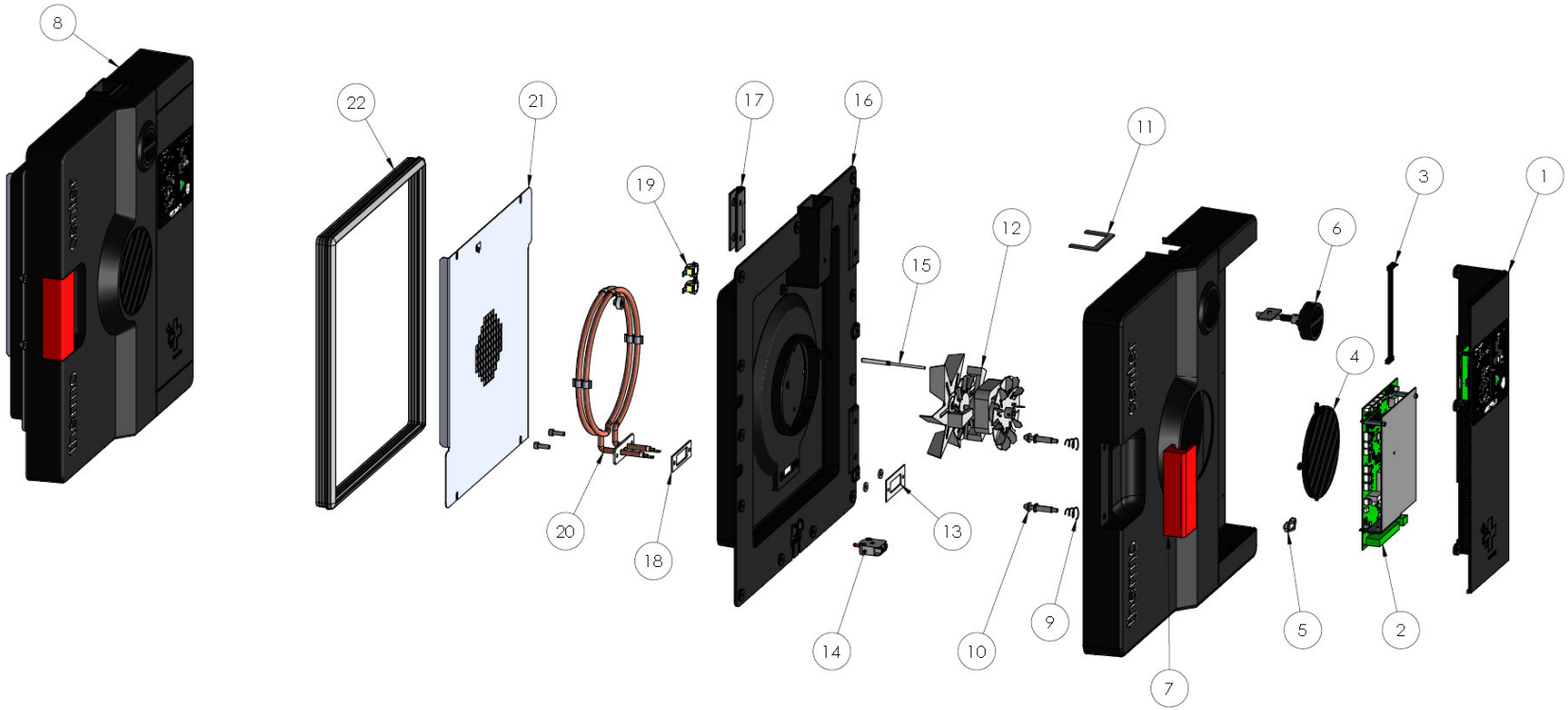
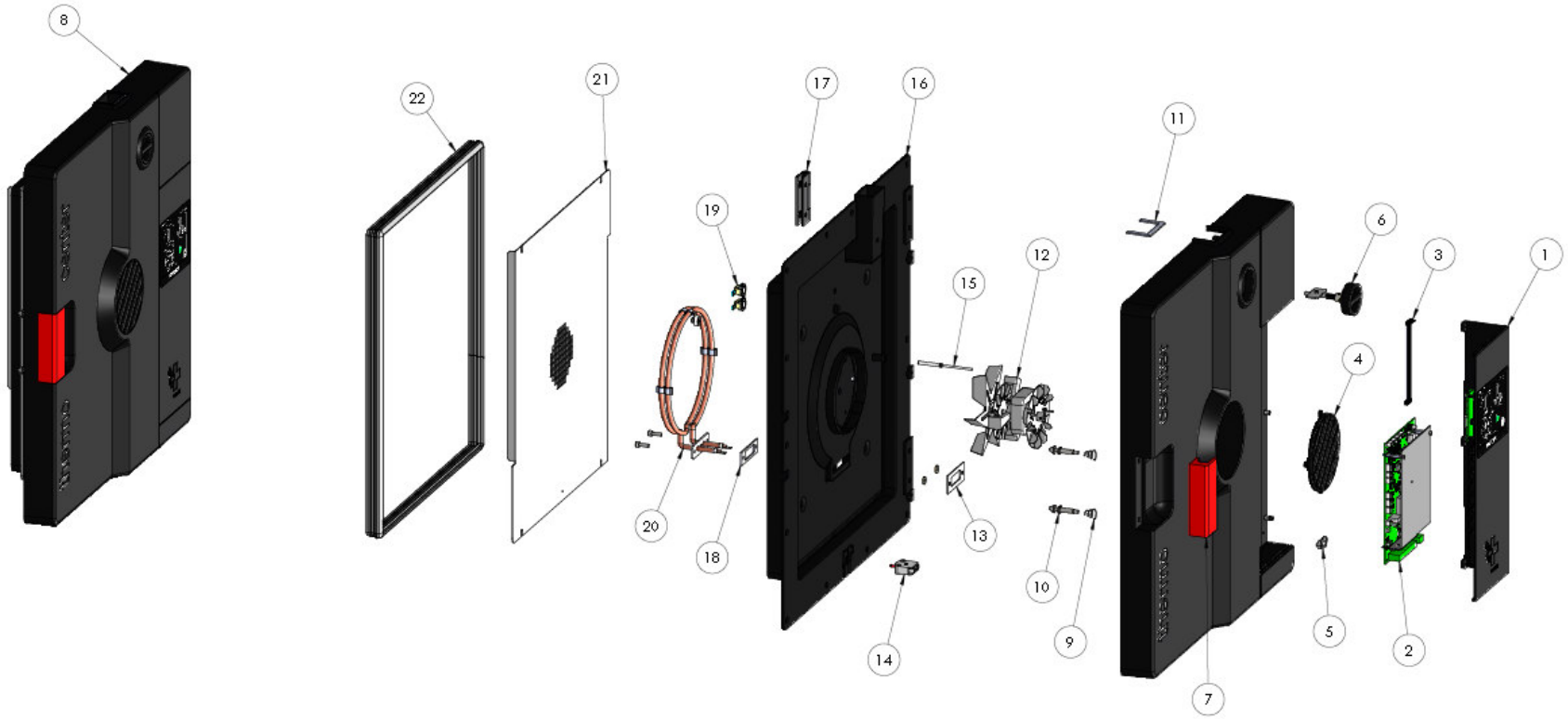
Appendix H

Drawing spare parts TC40



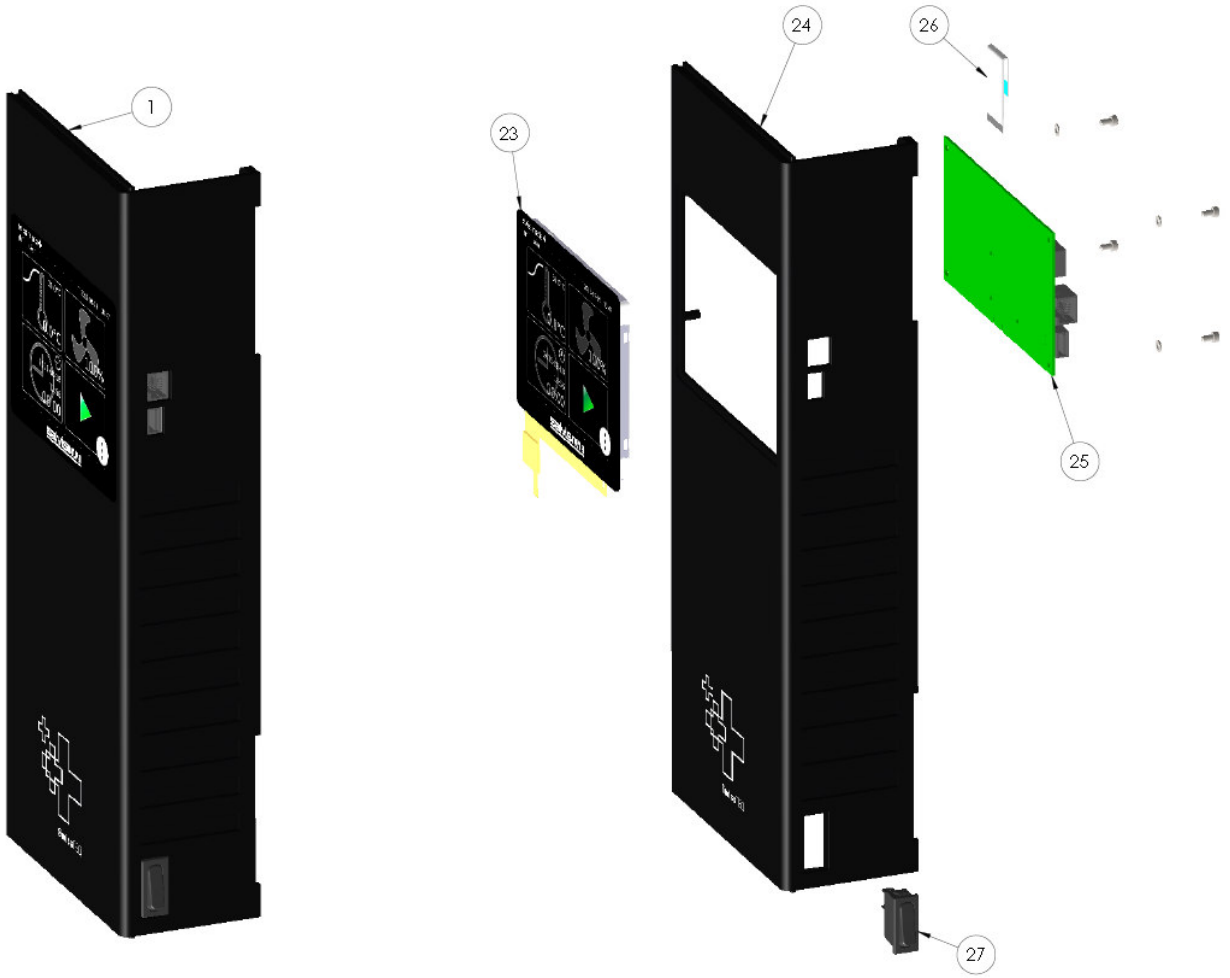
Appendix I

Drawing spare parts TC100



Appendix J

Drawing spare parts panel TC40/100



Appendix K

Spare parts and optionals

Position	Part number	Description	Standard	Optional
1	31W04810075	Panel complete TC40/100	x	
2	31W04144182	PCB RU SalvisTEQ	x	
3	31W04144189	PCB RU - PCB DU cable	x	
4	31W04142008	Air inlet protection cover	x	
5	31W04144013	Power cable clamp	x	
6	31W04144022	Exhaust turning knob	x	
7	31W04144014	Door handle	x	
8	31W04141031	Door complete TC40 115V	x	
	31W04141030	Door complete TC40 230V	x	
	31W04141025	Door complete TC100 115V	x	
	31W04141024	Door complete TC100 230V	x	
9	31W04144015	Locking bolt spring	x	
10	31W04144016	Locking bolt	x	
11	31W04144017	Exhaust U-insulation	x	
12	31W04143019	Fan 230V	x	
	31W04143053	Fan 115V	x	
13	31W04144026	Mounting strap heating element	x	
14	31W04960700	Door switch	x	
15	31W04144128	PT100 temperature sensor 4-wires circuit	x	
16	31W04140002	Door inner case TC40	x	
	31W04140000	Door inner case TC100	x	
17	31W04144002	Door hinge	x	
18	31W04144009	Heating element insulation	x	
19	31W04962509	Over-temperature melting fuse	x	
20	31W04144110	Heating element 115V	x	
	31W04144012	Heating element 230V	x	
21	31W04143107	Air ventilation plate TC40	x	
	31W04143108	Air ventilation plate TC100	x	
22	31W04943203	Door gasket TC40 1.5m	x	
	31W04943203	Door gasket TC100 2.0m	x	
23	31W04144184	Display SalvisTEQ	x	
24	31W04141006	Panel TC40/100	x	
25	31W04144183	PCB DU SalvisTEQ	x	

Position	Part number	Description	Standard	Optional
26	31W04144185	PCB DU - Display cable	x	
27	31W04142015	Main switch	x	
28	31F04008	Wire shelf TC40	x(1)	o
29	31F04010	Wire shelf TC100	x(1)	o
30	31F04005	Shelf stainless steel TC40		o
31	31F04006	Shelf stainless steel TC100		o
32	31F04007	Shelf perforated, stainless steel, TC40		o
33	31F04009	Shelf perforated, stainless steel, TC100		o
34	31F04029	Stacking adapter		o
35	31F04020	Wall bracket		o
36	31F04030	Fresh air filter		o
37	31F04015	Exhaust air adapter TC40		o
38	31F04016	Exhaust air adapter TC100		o
39	31F04700	Program and user software upgrade		o
40	31F04701	Process graph software upgrade		o
41	31F04702	Product temperature controller software upgrade and interface		o
42	31F04703	Product temperature probe PT100 with special connector		o
43	31F04706	LAN interface software upgrade		o
44	31F04707	Redundant PT100 temperature probe		o
45	31F04713	Analog output programmable		o
46	31F04717	Potential free contact		o
47	31F04025	Entry port 20mm		o
48	31F04026	Entry port 40mm		o
49	31F04714	Internal memory upgrade up to 32 GB (micro SD)		o
50	31F04715	Calibration certificate for one desired temperature and point (1st certificate)		o
51	31F04716	Additional calibration certificate for one desired temperature and point (2nd to 10th certificate)		o
52	31F04750	IQ/OQ draft paper, 3 hard copies		o

Glossary

ID	Variable	Description	Unit	Typ. value
1	ϕ	Relative humidity	%	40-60
2	T_B	Mechanical temperature limit	°C	260
3	T_r	Standard room temperature	°C	25
3	T_{sp}	Set point Temperature	°C	$(T_r - T_{WB}]$
4	T_{WB}	Electronical temperature limit	°C	≤200
5	$T_{WW, max}$	Electronical over-temperature limit	°C	$[T_{sp} ; T_{sp}+10]$
6	$T_{WW, min}$	Electronical under-temperature limit	°C	$[T_{sp}-10 ; T_{sp}]$

Renggli AG / Salvislab
Industrie-Ost
CH-6343 Rotkreuz
Switzerland
T +41 (0)41 798 14 14
F +41 (0)41 798 14 40
www.salvislab.com
salvislab@renggli.com