Thermocenter TC160/240/400
User Manual

swiss made

salvisLAB

User Manual Thermocenter TC160, 240, 400

DECLARATION OF CONFORMITY

CE

Declaration of Confirmity

Wir
We **Renggli AG / Salvis-Lab**
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 **TC 160 / 240 / 400**

Konstruktionsjahr 2002

(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)
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Gemäss den Bestimmungen der Richtlinie(n): following the provisions of Directive(s); conformément aux dispositions de(s) Directive(s)
(falls zutreffend) (if applicable) (le cas échéant)

73/23/EWG **89/336/EWG**
EN 60335-1 1988 **EN 55014**

(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)

Rotkreuz, 12.02.2002

Marcel Käppeli
Technical Manager

Important Information

Quick Information for Service

Please fill out all necessary information for your Thermocenter.
It helps you when you contact your Dealer or Service department.

SERIAL NUMBER:	
PHONE NUMBER SERVICE	
PURCHASE DATE	
SOFTWARE VERSION (See Display on Power ON)	

Technical Data Sheet

Technical Data's from the ovens

			TC 160	TC 240	TC 400
Outer Dimension					
Width		mm	800	890	990
Height		mm	720	820	920
Depth		mm	680	720	900
Clearance distance from back wall		mm	250	250	250
Clearance distance from side wall		mm	250	250	250
Inner Dimension					
Width		mm	535	625	725
Height		mm	580	680	780
Depth		mm	475	515	695
Internal Volume		L	160	240	400
Shelf		Stand./max	2/8	2/9	2/9
Max. Load per shelf		Kg	26	20	15
Weight (empty)		Kg	66	78	120
Temperature Range approx. 5 °C over Room temp to		°C	260	260	260
Temperature Variation [1]	at 50 °C	± °C	0.8	0.8	1.0
Temperature Variation [1]	at 150 °C	± °C	1.8	2.1	2.5
Temperature Variation [1]	at 250 °C	± °C	3.0	3.5	4.0
Temperature fluctuation [2]	at 250 °C	± °C	0.4	0.4	0.4
Heating up time [3]	to 70°C	Min	12	16	20
	to 150 °C	Min	30	30	40
	to 250 °C	Min	52	60	70
Recovering time after 30 sec door opening	at 150 °C	Min	6	14	18
Air changes (exhaust flap open)	at 150 °C	x/h	30	24	20
Power supply (±10%) 50/60 Hz		Volt	230/115	230/115	230/115
Nominal Wattage		Watt	1600	1800	2000
Heat radiation	at 150 °C	Watt	550	790	1100
	at 250 °C	Watt	1035	1250	2120
Equipment					
Microprocessor -Temperature Controller LCD Display			Yes	Yes	Yes
Timer		Hours / Min.	999h 59m	999h 59m	999h 59m
Adjustable fan speed		%	60 - 100	60 – 100	60 – 100
Printer – Communication Interface RS 232			Yes	Yes	Yes
Adjustable Print Interval			Yes	Yes	Yes
Programming		Prog./ Step	50 / 15	50 / 15	50 / 15
Ramp function adjustable in steps of		°C	0.1	0.1	0.1

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. We reserve the right to alter technical specifications at all times without prior notice.

Introduction

Overview

The THERMOCENTER are ovens with forced air and an intelligent control of fan-speed in a range between 0-100%. The control of ramping functions allows fast and accurate heating up procedure and therefore more applications available to users
Microprocessor-controller with enhanced Fuzzy-Logic - Allows precise ramping of temperature as well as an excellent reproduction of temperature distribution in the chamber.
Special Insulation - Less heat loss. Saves energy and costs. Ambient temperature of housing surface
Robust Swiss quality design – Made even for scientific applications
Work Chambers are of stainless steel and are provided with fully adjustable chromium plated rod shelves. The chambers have well radiused corners for easy cleaning.
Exterior is of textured powder coated mild steel.

Applications

The THERMOCENTER is an extremely versatile oven. It can be used Research & Development, Quality Control as well industrial applications. Some examples: Drying and sterilization applications in scientific as well as industrial usage suit well for this oven. A must when precise temperature distribution and a high accuracy are needed. 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

Note: The Thermocenter ovens are not built to use as ovens for drying substances which are explosible or let free explosible gases during the drying process.

Controller

Fuzzy-Logic microprocessor controller with digital alphanumeric LCD-Display, real time clock, variable fan speed and temperature ramp.
Intelligent Fan-Speed control IntelliFan - Wide range of temperature ramping functions. More user application. In combination with Fuzzy-logic gives you an excellent stability of temperature distribution and accuracy of programmed ramp.
Brilliant LCD Display for user-dialog and easy to operate keypad for fast programming and operating.
User dialog with controller is displaying your local language. Up to five languages can be selected.
Easy to operate and programming with EasyMenu
It allows the storage of 50 programs and 15 program steps (a step = a ramp, a temperature, a fan-speed and a dwell time=Hold Time). The programs remain stored in memory even without external power (battery buffered).
Holding Time (dwell time) 0 - 999h 59m
The real time clock allows a process to be started at any time – i.e.: on January 6, 2002 at 5 30 in the morning.
RS-232 interface. All data can be protocolled with a printer or computer.

Safety

DIN 12880 class 3.1 In case of over-temperature, a built in safety controller as a back-up circuit takes over the control of the heating and will shutdown the oven.
There is also an additional mechanical over-temperature device which shuts down the oven
High quality accurate PT 100 temperature sensors.
Superior “Swiss Made” manufacturing quality according ISO9001

Getting Started

Parts delivered

Your System will be delivered with following Parts:
1 Thermocenter Unit
2 Shelves
1 Power Cord
1 User Manual

Install requirements

Ensure that following conditions are met before you install the system.
Electric power connection as per type plate on inside of the door must meet your power connector.
For 230 V, 50/60 Hz min
For 115 V, 50/60 Hz min
The ambient temperature is min. +5° C ... max. 35° C (+40° F ... 95° F)
Leave at least 10cm space between system and walls or benches.

Installing

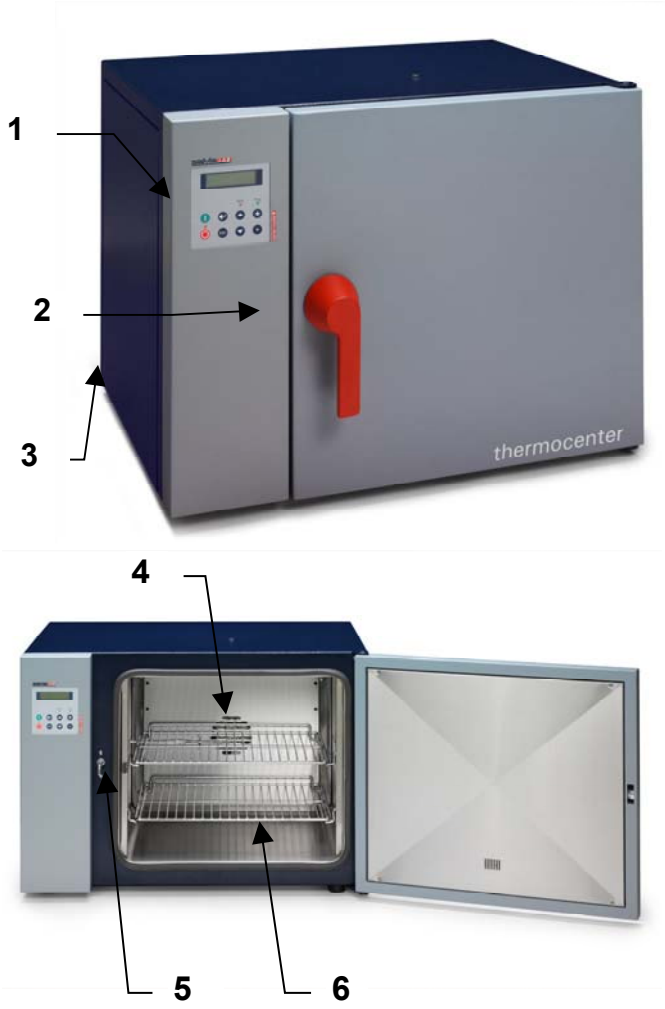
Place shelf in appropriate position.
Plug cord
Close door.
Switch power on
Display shows current Firmware Version see Power On Sequence
To start oven or program it see Chapter Operating Menus

Cleaning

To clean the system use mild detergents. No Acid or similar detergents should be used.

System Components

1 Controller
2 Door Handle
3 RS232 Connector (rear)
4 Fan
5 Door Lock
6 Shelf



Controller

To control the system the controller has few “easy to use” buttons on a foil keypad. Simply press desired button.
All information is displayed on a Liquid Crystal Display (LCD) with backlit.
LED Indicators for status of Power, Heat and Program are used to indicate the main process status.

Buzzer (not visible) is indicating audible Status or Alarm

Keypad & Display

Buttons

	▲	Up	You can scroll through the menu structure
	▼	Down	You can scroll through the menu structure
	↵	Enter	Confirm a menu selection, Confirm a value input or an answer choice
	**ESC**	Escape	Cancel actual operation, Go back in Menu Structure, Quit actual state ….
	**+**	Plus	Increase a value in flashing input fields , Select multiple Choices; Input Value must flash to make + button operable
	**-**	Minus	Decrease a flashing value, Select multiple Choices; Input Value must flash to make + button operable
		ON/OFF	Switch ON or OFF your System. When on LED is lit

LED Indicators

When **lit**: Heat Power is on

When **lit**: You are running a program
When **flashing**: A delayed start for program operation was entered.

Operating

How to interpret displays described in this manual...

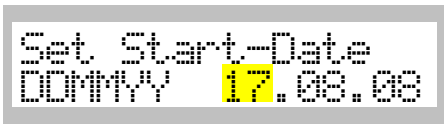
Power ON Sequence

By pressing the power-on button, the display will show the software version. All standard, pre-setted or saved information will be loaded during this process. After a while display will show first Main Menu Point

Input Field

A input value which is underlayed with yellow(grey) background means this value is flashing on the real display.

Multiple Input Fields



If you reach a multiple input display first time, the first part (… of 3 in this example) of the input field is flashing to indicate input here.. Flashing input fields are changed with +/- keys

Multiple Choice Fields

In a multiple choice field the last actual setted (pre-set) option will flash. Change option with + or – and confirm with ↵

Definitions of terms

What is a Set Temperature?

A Set Temperature is the target temperature you want operate the system with.

What is a Gradient?

A Gradient is the slope of the heating up process to the specific set temperature.
It is indicated as ºC / Minute. Negative Gradients are not allowed. The maximal value of a gradient is system depending and has a range and is pre-defined by factory. A system specific curve of gradient corridors see

What is a Fan Speed?

The Fan-Speed is a percentage of a range of rounds per minute. The minimal or maximal RPM Value is system depending. The % Value is based on this min/max range.

What is a Holding Time?

A timer is used to specify how long a set temperature has to be hold. The timer starts counting back when the set temperature is reached. The maximal time you can set is: 999 hours and 59 minutes. This equals a max time of 41 days 15 hours and 59 minutes

What is a Start Date/Time

If you are using a start date or time you will be able to set a future date/time to start the system with pre-setted parameters i.e. temperature, Gradient, Fan Speed, Timer

Main Menu Overview

General operation buttons

In general you can scroll through the menu points with the ▼ or ▲ button.
Select the desired menu point with ↵

1 Temperature & Options

Manual operation with a set temperature. You can select options like gradient, hold-time (dwell-time), fan speed, pre-setted start date/time.
Press ↵to select ➔ **1.1**
ESC returns to ➔ **1**

2 Program

The menu Program is divided in menus for creating, editing, deleting and printing programs.
Press ↵to select ➔ **2.1**
ESC returns to ➔ **1**

3 Configuration

This menu point allows you to configure the system
Press ↵to select ➔ **3.1**
ESC returns to ➔ **1**

4 Service Mode

This menu point is protected by an access-code and is available only for trained Service-Technicians.
Press ↵to select ➔ **4.1**
ESC returns to ➔ **1**

1 Main Menu Temp & Options

Manual operation with a set temperature. You can select options like gradient, hold-time (dwell-time), fan speed, pre-setted start date/time.
Press ↵to select ➔ **1.1**
ESC returns to ➔ **1**

1.1 Set Temperature

+/- change desired value.
↵confirms and saves value ➔ **1.2**
ESC restores the old value or returns to ➔ **1**

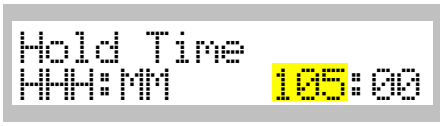
1.2 Select Quick Start or Start with Options

+/- Select desired answer
↵confirms and saves value
If **Now** selected: System will start immediately ➔ **6**
If **Option** selected ➔ **1.3**
ESC cancels and returns to ➔ **1**

1.3 Set Gradient

+/- Change value
↵confirms and saves the value ➔ **1.4**
ESC restores the old value or returns to ➔ **1**
Note: A value of **0,0** means maximal possible gradient value!

1.4 Set Holding Time (dwell time)



+/- Change value
↵confirm value and skips to the next input field (HH ➔ MM) or stores the time and go to ➔ **1.5**
ESC restores the old value and skips back one input field (MM➔HH) or goes back to ➔ **1**
Note: A value of 0:00 means endless holding time

1.5 Set Fan Speed

+/- Change value
↵confirms and saves the value ➔ **1.6**
ESC restores the old value or returns to ➔ **1**
Note: The minimal Fan Speed is depending on the system and is factory set.

1.6 Set Start-Date

+/- Change desired value
↵confirm value and skips to the next input field (DD ➔ MM, MM➔YY) or stores the date and go to ➔ **1.7**
ESC restores the old value and skips back one input field (YY➔MM, MM➔ DD) or goes back to ➔ **1**
Note: The pre-set date is the actual date from the real-time clock.

1.7 Set Start Time

+/- Change desired value
↵confirm value and skips to the next input field (HH ➔ MM) or stores the time and go to :
If the Start Date and/or Start Time is in the **past**, the display will return back to ➔ **1**
If your Start Date and/or Start Time is in the **future** you will see the operating display ➔ **5**
ESC restores the old value and skips back one input field (MM➔HH) or goes back to ➔ **2.1**
Note: The pre-set time is the actual time from the real-time clock.

2 Main Menu Program

The menu Program is divided in menus for creating, editing, deleting and printing programs.
Press ↵to select ➔ **2.1**
▼/▲ to scroll through the Main Menu
ESC return to ➔ **1**

2.1 Menu Program - Start

Start an existing program
↵confirm menu choice➔ **2.1.1**
▼/▲ scroll through the Menu.
ESC return to ➔ **2**

2.2 Menu Program - New

Create a new program
↵confirm menu choice ➔ **2.2.1**
▼/▲ scroll through the Menu.
ESC return to ➔ **2**

2.3 Menu Program - Edit

Edit an existing program
↵confirm menu choice ➔ **2.3.1**
▼/▲ scroll through the Menu.
ESC return to ➔ **2**

2.4 Menu Program - Delete

Delete an existing program
↵to select [Delete Program] ➔ **2.4.1**
▼/▲ scroll through the Menu.
ESC return to ➔ **2**

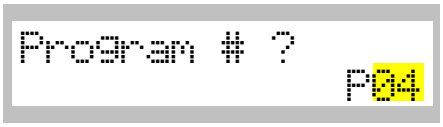
2.5 Menu Program - Print

Print a program
↵to select [Print Program] ➔ **2.5.1**
▼/▲ to scroll through the Menu.
ESC return to ➔ **2**

2.1 Menu Program Start

Start an existing program
↵confirm menu choice➔ **2.1.1**
▼/▲ scroll through the sub-menu.
ESC returns to ➔ **2**

2.1.1 Select Program



+/- select desired program number
↵confirm value ➔ **2.1.2**
ESC returns to ➔ **2.1**

Note: Only stored only program numbers with content will appear in the display. If no program exist a beep-message will displayed.

2.1.2 Choose type of program start

+/- select type of program start
↵accept choice
If **Now** selected: System starts immediately ➔ **6**
If **Delayed** selected :➔ **2.1.3**
ESC returns to ➔ **2.1**

2.1.3 Set Start Date

+/- Change desired value
↵confirm value and skips to the next input field (DD ➔ MM, MM➔YY) or stores the date and go to ➔ **2.1.4**
ESC restores the old value and skips back one input field (YY➔MM, MM➔ DD) or goes back to ➔ **2.1**
Note: The pre-set date is the actual date from the real-time clock.

2.1.4 Set Start Time

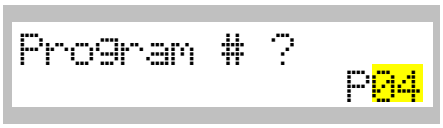
+/- Change desired value
↵confirm value and skips to the next input field (HH ➔ MM) or stores the time and go to :
If the Start Date and/or Start Time is in the **past**, the display will return back to ➔ **2.1.2**
If your Start Date and/or Start Time is in the **future** you will see the operating display ➔ **7**
ESC restores the old value and skips back one input field (MM➔HH) or goes back to ➔ **2.1**
Note: The pre-set time is the actual time from the real-time clock.

2.2 Menu Program New

The storage capacity is 50 Programs with 15 Steps/Program. Each Step contains of a Set-Temperature, a Gradient, a Hold-Time and a Fan-Speed.
The sample here assumes creating a program #4 with 2 Steps

Create a new program
↵confirm menu choice ➔ **2.2.1**
▼/▲ scroll through the Menu-Program.
ESC returns to ➔ **2**

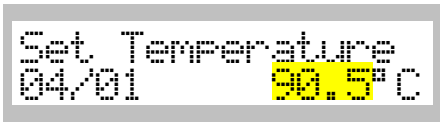
2.2.1 Create a new program



+/- select desired program number
↵confirms the choice ➔ **2.2.2**
ESC returns to ➔ **2.2**

Note: Only free program numbers will appear in the display.

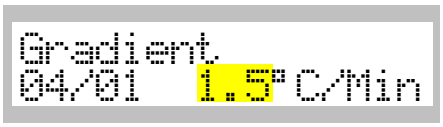
2.2.2 Set Temperature – Step 1



+/- change desired value. Pre-set value is the last used value in manual mode.
↵confirm and saves ➔ **2.2.3**
ESC restores the old value or returns to ➔ **2.2** and the step 1 as well as selected program number is not stored !

Note: Display 04/01 means actual program/step number.

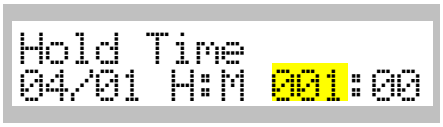
2.2.3 Set Gradient – Step 1



+/- change desired value
↵confirms the value ➔ **2.2.4**
ESC restores the old value or returns to ➔ **2.2** and the step 1 as well as selected program number is not stored !

Note: A value of 0:0 means maximal gradient

2.2.4 Set holding time (dwell time) – Step 1



+/- Change desired value
↵confirm value and skips to the next input field (HH ➔ MM) or stores the time and go to ➔ **2.2.5**
ESC restores the old value and skips back one input field (M➔H) or goes back to ➔ **2.2** and the step 1 as well as selected program number is not stored !

Note: A value of 0:00 means endless holding time

2.2.5 Set Fan Speed – Step 1

+/- change desired value
↵confirm value ➔ **2.2.6**
ESC restores the old value or returns to ➔ **2.2**

Note: The minimal Fan Speed is depending on the system and is factory set.

2.2.6 Choose if a additional step is required

+/- Select desired answer
↵accept
If **Yes** selected: step number will increment with 1➔ **2.2.7**
If **No** selected: ➔ **2.2.12**

2.2.7 Set Temperature – Step 2

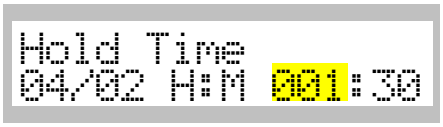
+/- change desired value
↵confirm the value ➔ **2.2.8**
ESC restores the old value or **if in step 2 and higher** returns to ➔ **2.2.6** but the actual step will not be saved !

Note: Display 04/02 means actual program/step number

2.2.8 Set Gradient – Step 2

+/- change desired value
↵confirm the value ➔ **2.2.9**
ESC restores the old value or **if in step 2 and higher** returns to ➔ **2.2.6** but the actual step will not be saved !

2.2.9 Set Holding Time – Step 2

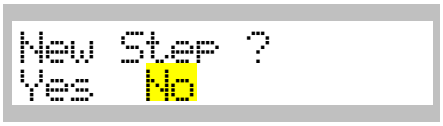


+/- Change desired value
↵confirm value and skips to the next input field (HH ➔ MM) or stores the time and go to ➔ **2.2.10**
ESC restores the old value and skips back one input field (M➔H) or **if in step 2 and higher** returns to ➔ **2.2.6** but the actual step will not be saved !
Note: A value of 0:00 means endless holding time

2.2.10 Set Fan Speed - Step 2

+/- change desired value
↵confirm the value ➔ **2.2.11**
ESC restores the old value or **if in step 2 and higher** returns to ➔ **2.2.6** but the actual step will not be saved !

2.2.11 Choose if a additional step is required

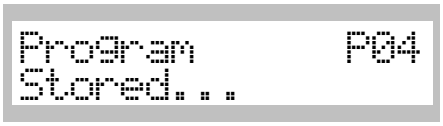


+/- Select desired answer
↵accept
If **Yes** selected: step number will increment with 1➔ **2.2.7**
If **No** selected: ➔ **2.2.12**

2.2.12 End of programming sequence

+/- Select desired answer
↵accept
If **Yes** selected: ➔ **2.2.13**
If **No** selected: ➔ **2.2.11**

2.2.13 Confirming & Saving the new program



Displays confirmation that the new program has been stored.
After a few seconds the display will return to ➔ **2.2**

2.3 Menu Program Edit

The example assumes to edit the program #4 with 2 steps

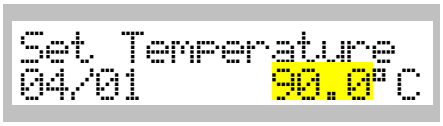
Edit an existing program
↵confirm menu choice ➔ **2.3.1**
▼/▲ scroll through the Menu.
ESC returns to ➔ **2**

2.3.1 Choose program to edit

+/- select desired value
↵confirms the value and skips to the next field (P➔S) or ➔ **2.3.2** (to the selected Step Number respective)
ESC returns to ➔ **2.3**

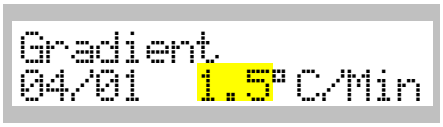
Note: Only used program and step numbers will appear in the display

2.3.2 Edit Temperature – Step 1



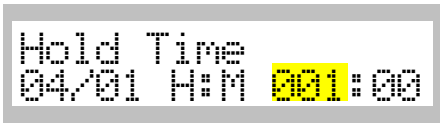
+/- change desired value. Pre-set value is the last used value in manual mode.
↵confirms and saves the value ➔ **2.3.3**
ESC restores the old value or returns to ➔ **2.3**
Note: Display 04/01 means actual program/step number.

2.3.3 Edit Gradient – Step 1



+/- change desired value
↵confirms and saves the value ➔ **2.3.4**
ESC restores the old value or returns to ➔ **2.3**

2.3.4 Edit Holding Time – Step 1



+/- Change desired value
↵confirm value and skips to the next input field (HH ➔ MM) or stores the time and go to ➔ **2.3.5**
ESC restores the old value and skips back one input field (M➔H) or returns to ➔ **2.3**

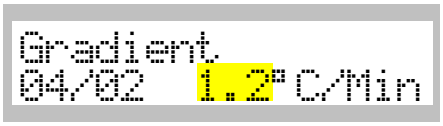
2.3.5 Edit Fan Speed – Step 1

+/- change desired value
↵confirms and saves the value ➔ **2.3.6 (next step)**
ESC restores the old value or returns to ➔ **2.3**

2.3.6 Edit Temperature – Step 2

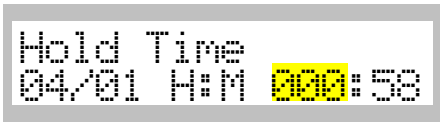
+/- change desired value. Pre-set value is the last used value in manual mode.
↵confirms and saves the value ➔ **2.3.7**
ESC restores the old value or returns to ➔ **2.3**
Note: Display 04/01 means actual program/step number.

2.3.7 Edit Gradient – Step 2



+/- change desired value
↵confirms and saves the value ➔ **2.3.8**
ESC restores the old value or returns to ➔ **2.3**

2.3.8 Edit Holding Time – Step 2

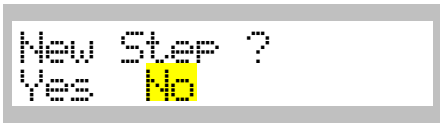


+/- Change desired value
↵confirm value and skips to the next input field (HH ➔ MM) or stores the time and go to ➔ **2.3.9**
ESC restores the old value and skips back one input field (M➔H) or returns to ➔ **2.3**

2.3.9 Edit Fan Speed – Step 2

+/- change desired value
↵confirms and saves the value ➔ **2.3.10 (next step)**
ESC restores the old value or returns to ➔ **2.3**

2.3.10 Decide if a new step must be added

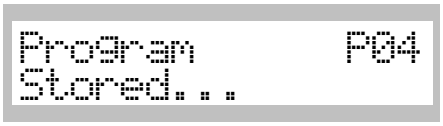


+/- Select desired answer
↵accept
If **Yes** selected: step number will increment with 1➔ **2.3.6**
If **No** selected: ➔ **2.3.11**

2.3.11 Confirm end of editing program

+/- Select desired answer
↵accept
If **Yes** selected: ➔ **2.3.12**
If **No** selected: ➔ **2.3.10**

2.3.12 Save program display

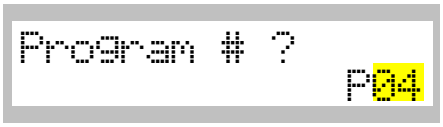


Displays confirmation that the new program has been stored.
After a few seconds the display will return to ➔ **2.3**

2.4 Menu Program Delete

Delete an existing program
↵select menu ➔ **2.4.1**
▼/▲ scroll through the menu.
ESC returns to ➔ **2.4**

2.4.1 Choose program # to be deleted



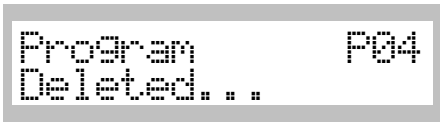
+/- select desired program number
↵accept ➔ **2.3.2**
ESC returns to ➔ **2.4**

Note: Only used program numbers will appear in the display

2.4.2 Deletion confirmation will be displayed

+/- Select desired answer
↵accept
If **Yes** selected: ➔ **2.4.3**
If **No** selected: ➔ **2.4**

2.4.3 Deletion confirmation will be displayed



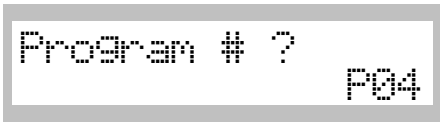
Display confirms that the selected program has been deleted.
After a few seconds it will go to ➔ **2.4**

If you delete a program means you delete all steps associated to this program number. After deleting, the number is now available in the list of free program numbers.

2.5 Menu Program Print

Print a program
↵to select [Print Program] ➔ **2.5.1**
▼/▲ to scroll through the Menu.
ESC return to ➔ **2**

2.5.1 Choose program # to be printed



+/- select desired program number
↵accept ➔ **2.5.2**
ESC return to ➔ **2**

Note: Only used program numbers will appear in the display

2.5.2 Displaying print in progress

Display confirms that the program has been printed. After a few seconds it will return to ➔ **2.5**

For an example of printout and printer connection refer section Printer Operation

3 Main Menu Configuration

Configuration of the system by the user

In this menu point you can define and set system options
Press ↵to select ➔ **3.1**
▼/▲ scroll through the menu.

3.1 Select language

+/- Select the desired language
↵confirm selection ➔ **3.2**

Attention:
After confirmation the selection all subsequent dialogs are displayed in the selected language.

3.2 Set actual date for internal real-time clock (this is a sample)

+/- change value
↵accept value and skips to the next input field ((DD ➔ MM, MM➔YY) or saves the date and goes to ➔ **3.3**
ESC restores the old value and/or skips back one input-field (YY➔MM, MM➔ DD)

3.3 Set actual time for internal real-time clock (this is a sample)

+/- change value
↵accept value and skips to the next input field ((HH ➔ MM) or saves the time and goes to ➔ **3.4**
ESC restores the old value and/or skips back one input-field (MM➔HH)

3.4 Set allowed max Temperature

Set the maximal possible temperature value for manual operation.
+/- change value
↵accept value➔ **3.5**
ESC restores value

3.5 Set print interval for printer log via serial RS232 Interface

Set the Print Interval time. A value of 00:00 will disable printout of operating values.
+/- change value
↵accept value and skips to the next input field ((HH ➔ MM) or saves the time and goes to ➔ **3.4**
ESC restores the old value and/or skips back one input-field (MM➔HH)

3.6 Set automatic interval to scroll status displays

Select if operation displays will switch automatically instead of manually switching by ▼/▲ keys
+/- toggle answer
↵accept ➔ **3.7**

3.7 Select Baud Rate for serial RS232 Interface

Available Baud Rate are1200/2400/4800/9600.
+/- select value
↵accept ➔ **3.8**

3.8 Set Program End Buzzer

Buzzer sends a signal if a program has finished signal.
+/- toggle option
↵accept ➔ **3.9**

3.9 Set Safety Alarm-Buzzer

In any case of an over temperature alarm situation, the Buzzer will give an audio signal.
+/- toggle option
↵accept ➔ **3.10**

3.10 Set LCD Display contrast

+/- change value
↵accept ➔ **3.11**
ESC restores value

3.11 Set Offset between internal PT100 Sensor and actual display

Offsets the internal PT100 sensor with the actual displayed temperature. Calibrate with an external temperature sensor.
+/- change value
↵accept ➔ **3.12**
ESC restores value

3.12 Confirmation display of storing entered values

The Display confirms that the Configuration has been Stored.
After a few seconds it will return to ➔ **3**

4 Menu Service Mode

This menu point is protected by a code and is only available for trained Service-Technicians.

Operating Displays

General

Change the display with ▼/▲ keys or set Display Interval to yes in Menu Configuration to let change the display automatically every 10 sec.

5 Operating Display: Manual Mode Delayed Start

Here you can see the actual Start Date and Time.
Press ▼ to get next set of operating displays.

Here you can see the Set Temp and the Hold Time (dwell time).
Press ▼ to get next set of operating displays.

Here you can see the Fan-Speed and gradient
Press ▼ to get next set of operating displays.

6 Status Display: Normal Mode Running

Here you can see the Set Temp and the Actual Temp. Press ▼ to get more information's of the Operating Display.

Here you can see the Fan Speed and the Timer. Press ▼ to get more information of the Operating Display.

Here you can see the actual Date and Time. This is the last information of the Operating Display. Press the ▼ button to see first display again

7 Status Display: Program mode Delayed Program Start

If the programmed Start Date/Time has archieved the Display switches to ➔ **8**

The „Prog“ LED is on during a programmed operation

Here you can see the actual Start Date and Time. Press ▼ to get more information of the Operating Display.

8 Status Display: Program mode Program Running

Here you can see the Set Temperature and the Actual Temperature of the Program Step. Press ▼ to get more information of the Operating Display.

Here you can see the Program Number and the Step. Press the ▼ button to get more information of the Operating Display.

Here you can see the Fan Speed and the Gradient. Press the ▼ button to get more information of the Operating Display.

Here you can see the Hold Time and actual Date and Time in the format DD.MM.YY. This is the last information of the Operating Display. Press the ▼ button to see first display again

If the programm has ended a beep tone (5x) will sound and following display will shown:

Status Message can be confirmed by pressing the ↵key.

9 Cancel a running process by ESC Key

A running system is stopped by pressing ESC.

9.1 Safety question when stopping a running system

+/- Select desired answer
↵accept
If **Yes** selected: ➔ **9.2**
If **No** selected: ➔ **Back to running status**

9.2 Conformation of canceling a process

Display confirms that the running process has been canceled. After a few seconds it will return to Main Menu ➔ **1**

10 Messages and Errors

The messages and Errors are announced with a beep tone (5x) and can be confirmed by pressing the ↵Key. Errors are severe system failures and must fixed by trained service people.

Messages

Message: No Program	**Indicates that no program is in memory**
Message: Memory Full	**Indicates that the program memory is full**
Message: Door Open	**Indicates that the door is open while you try to start the system (TC40,TC100 only)**

Errors

Error: PT100	**PT100 Sensor or cable defect. Call Service**
Error: Safety Bond	**Safety Controller was active. Call Service**
Error: Tmp out of range	**Temperature exceeded security range level. Cool down oven. If error persist call Service**
Unexpected Error	**Call Service**

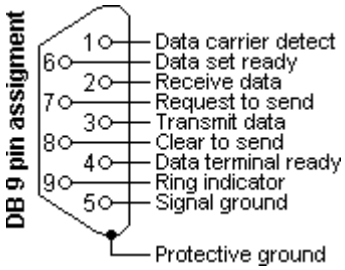
Printer Operation

Connecting a Printer

Printer Requirements

In order to connect a printer with the serial RS232 Interface of the System following requirements must be fulfilled : Serial RS232 Interface, Min. 1200 Baud Transfer Rate

Pin Layout RS232 DB9 Connector System:



Used Pins: 2:TxD , 3:RxD and 5:Signal Ground
Data format: 8 Data Bits, 1 Stop Bit, No Parity

Sample printout of a stored program

See also [Print Program] ➔ **2.5**

```
    Program #1

    Step:  1
    Set Temperature:      130,0  °C
    Gradient                1,5  °C/Min
    Hold Time:             2:30  HHH:MM
    Fan Speed               100  %

    Step  2
    Set Temperature:      180,0  °C
    Gradient                1,5  °C/Min
    Hold Time:             0:45  HHH:MM
    Fan Speed                80  %

.....
.....
```

Sample printout of a running log

See also Print Interval ➔ **3.5**

```
    10.04.03,  09:34

    Set Temperature:      130,5  °C
    Act Temperature:      130.6  °C
    Gradient                1,5  °C/Min
    Hold Time:             1:00  HHH:MM
    Fan Speed                94  %


    10.04.03,  09:35

    Set Temperature:      130,5  °C
    Act Temperature:      130.5  °C
    Gradient                1,5  °C/Min
    Hold Time:             1:00  HHH:MM
    Fan Speed                94  %

.....
.....
```

Appendix A

Menu Structure & Input Fields

❋ = Menu Point ⊡ = Input Field ◇ = Decision Input ⊙ = Display only

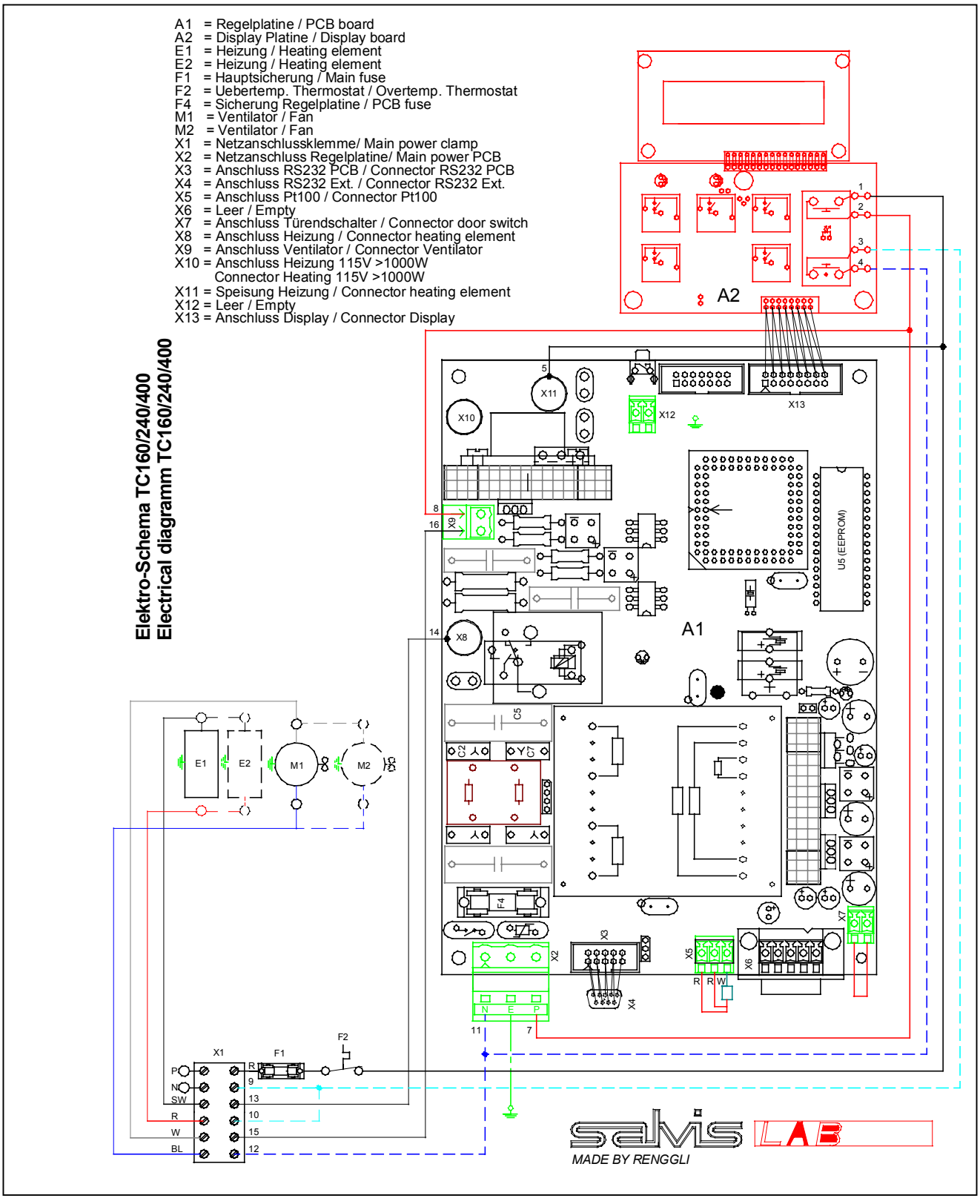
	Pt		To pt
❋	1	Main Menu Temp & Options	
⊡	1.1	Set Temperature	1.2
◇	1.2	Quick Start? Now Options	 6 1.3
⊡	1.3	Gradient	1.4
⊡	1.4	Hold Time	1.5
⊡	1.5	Fan Speed	1.6
⊡	1.6	Start Date	1.7
⊡	1.7	Start Time	6 or 7

	Pt		To pt
❋	2	Main Menu Program	
❋	2.1	Start Program	
⊡	2.1.1	Select Program	2.1.2
◇	2.1.2	Start Program? Now Delayed	 6 2.1.3
⊡	2.1.3	Set Start Date	2.1.4
⊡	2.1.4	Set Start Time	8
❋	2.2	New Program	2.2.1
⊡	2.2.1	Select Program	2.2.2
⊡	2.2.2	Set Temperature	2.2.3
⊡	2.2.3	Gradient	2.2.4
⊡	2.2.4	Hold Time	2.2.5
⊡	2.2.5	Fan Speed	2.2.6
◇	2.2.6	New Step? Yes No	 2.2
◇	2.2.7	End of Program Yes No	2.2 2.2.6
⊙	2.2.8	Program stored..	2
❋	2.3	Edit Program	2.3.1
⊡	2.3.1	Select Program / Nr	2.3.2
⊡	2.3.2	Set Temperature	2.3.3
⊡	2.3.3	Set Gradient	2.3.4
⊡	2.3.4	Set Hold Time	2.3.5
⊡	2.3.5	Set Fan Speed	2.3.6
◇	2.3.6	New Step? No Yes	 2.3.7 2.3.1
◇	2.3.7	End of Program No Yes	 2.3.6 2.3
⊙	2.3.8	Program stored..	2
❋	2.4	Delete Program	2.4.1
⊡	2.4.1	Select Program	2.4.2
◇	2.4.2	Delete Program Yes No	 2.4.3 2.4.1
⊙		Program Deleted	2.4
❋	2.5	Print Program	2.5.1
⊡	2.5.1	Select Program	2.5.2
⊙	2.5.2	Program Printing	2.5

	Pt		To pt
	3	Main Menu Configuration	
⊡	3.1	Language	3.2
⊡	3.2	Date	3.3
⊡	3.3	Time	3.4
⊡	3.4	Max. Temp	3.5
⊡	3.5	Print Interval	3.6
⊡	3.6	Disp Interval	3.7
⊡	3.7	Rs232 Baud Rate	3.8
⊡	3.8	Buzzer Prog End	3.9
⊡	3.9	Buzzer Safety	3.10
	3.10	Display Contrast	3.11
⊡	3.11	Sensor Offset	3.12
⊙	3.12	Configuration stored	3

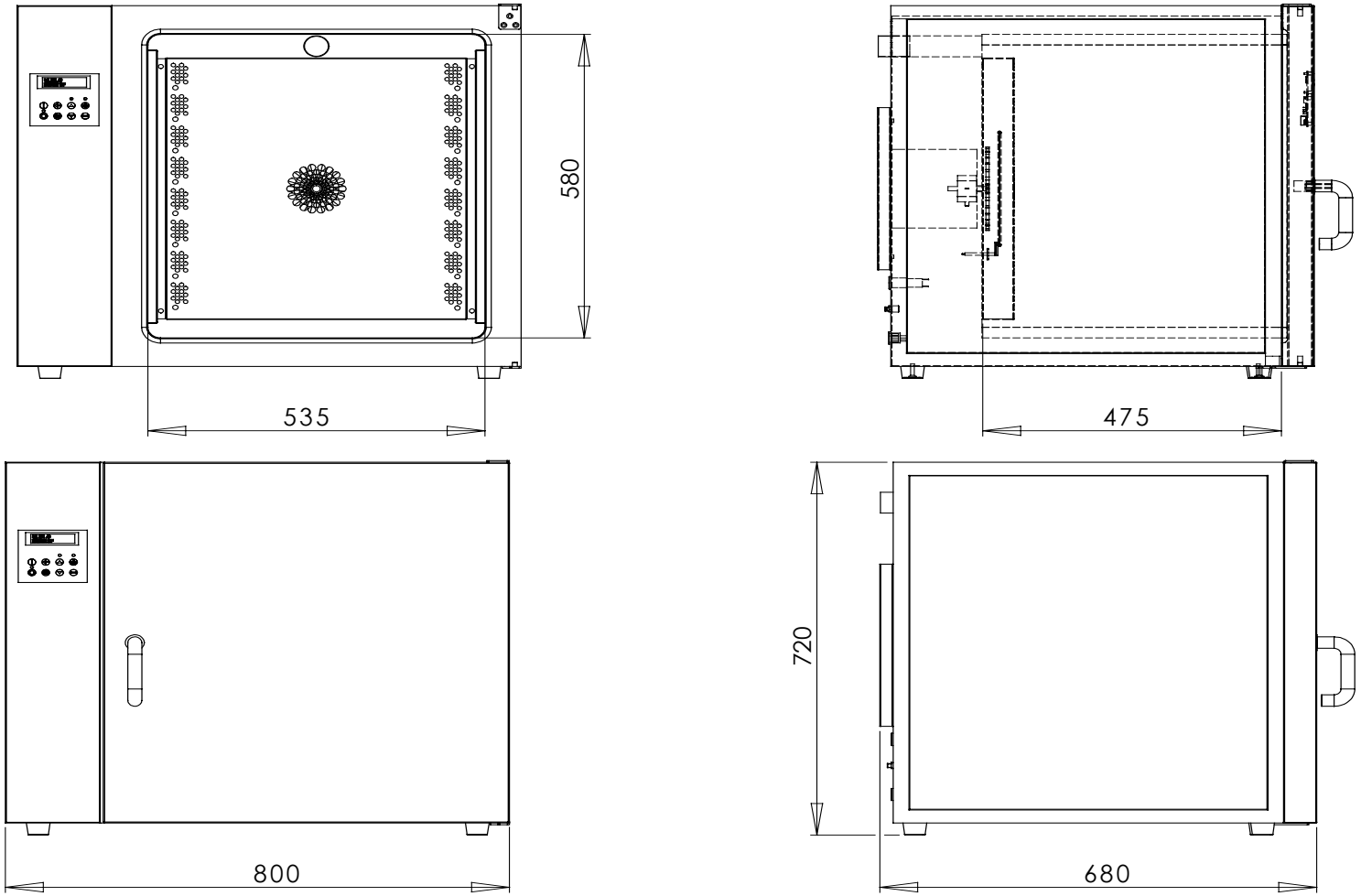
Appendix B

Wiring diagramm



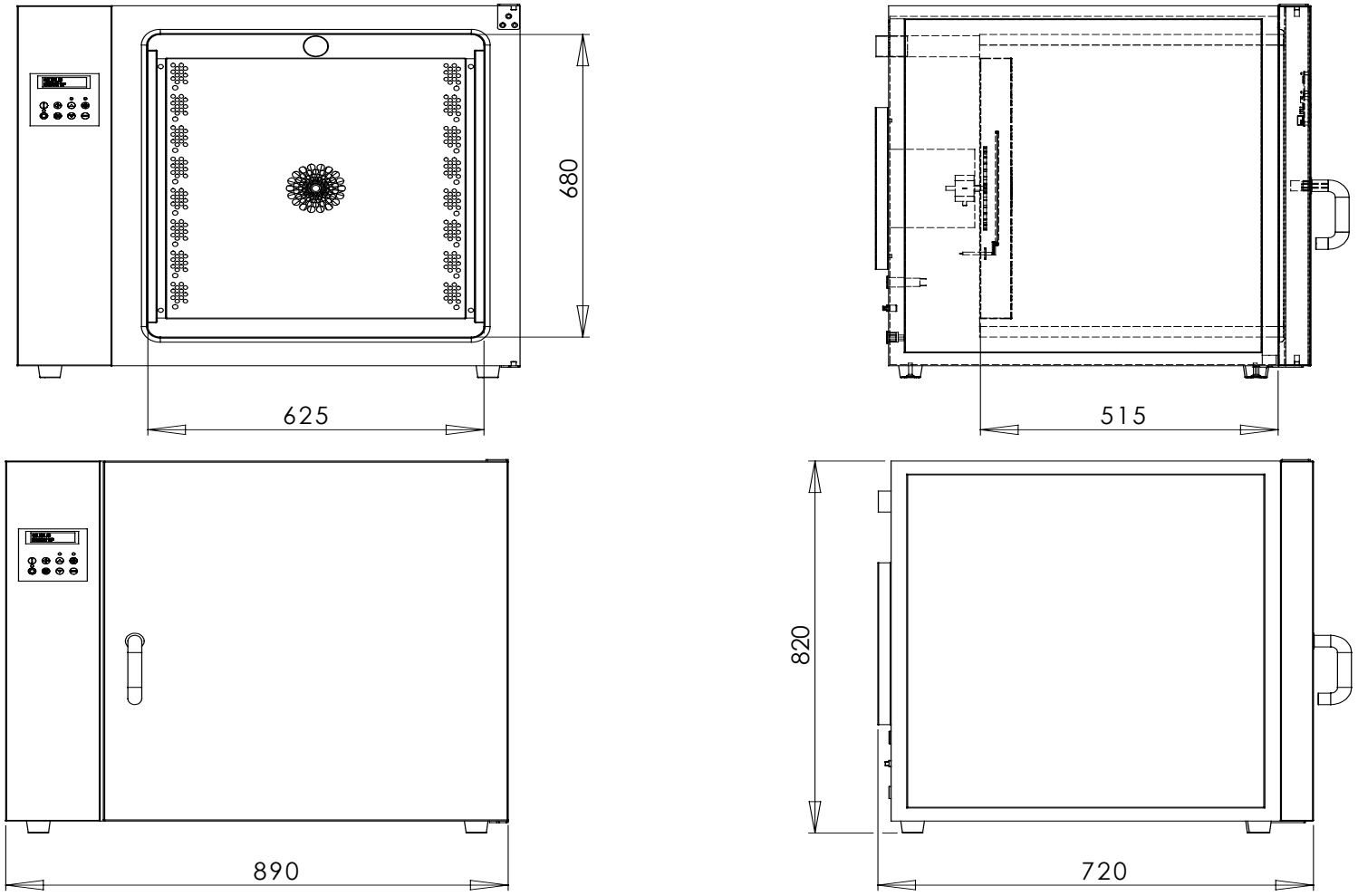
Appendix C

Drawing Thermocenter TC 160



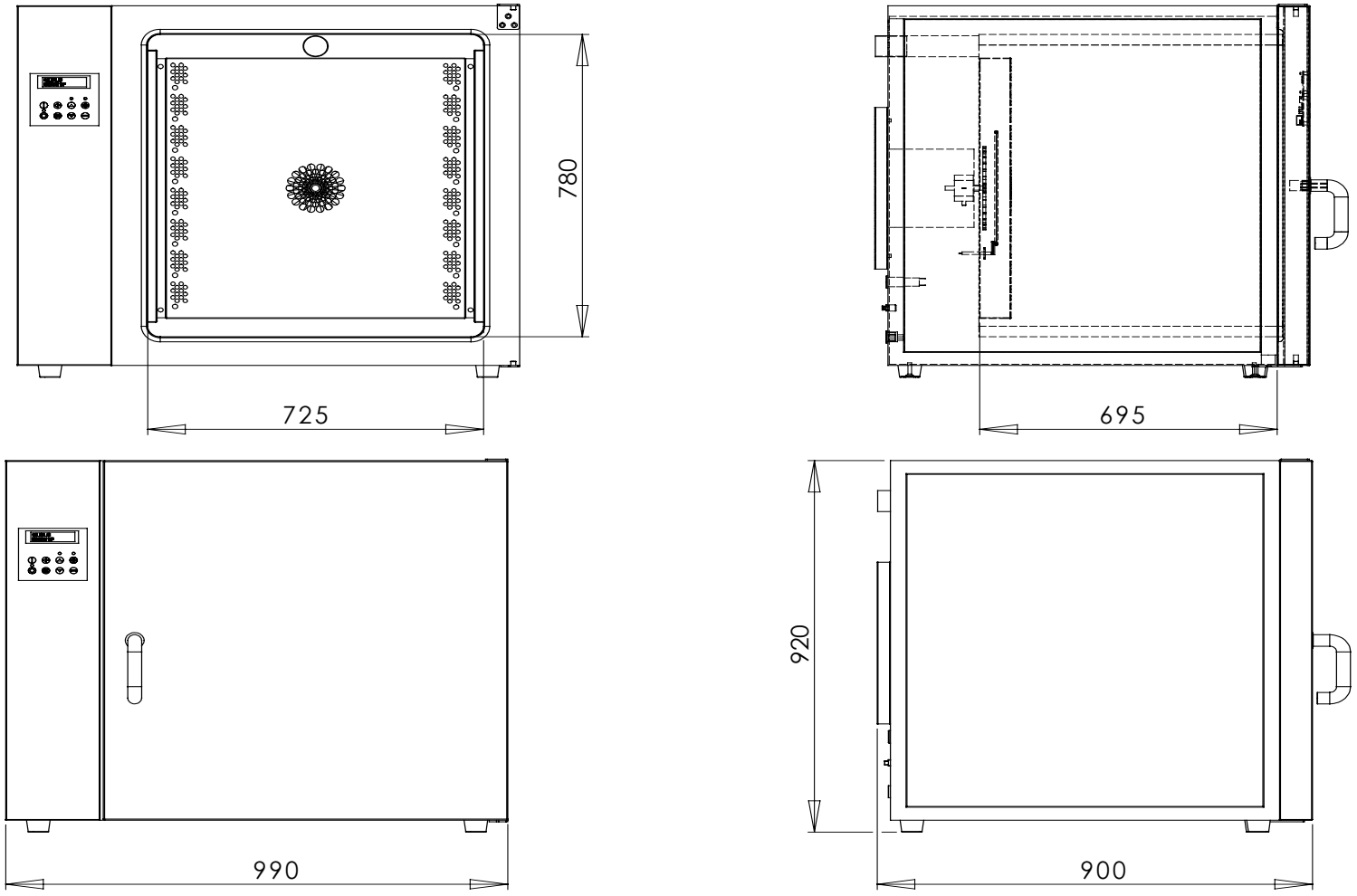
Appendix D

Drawing Thermocenter TC 240



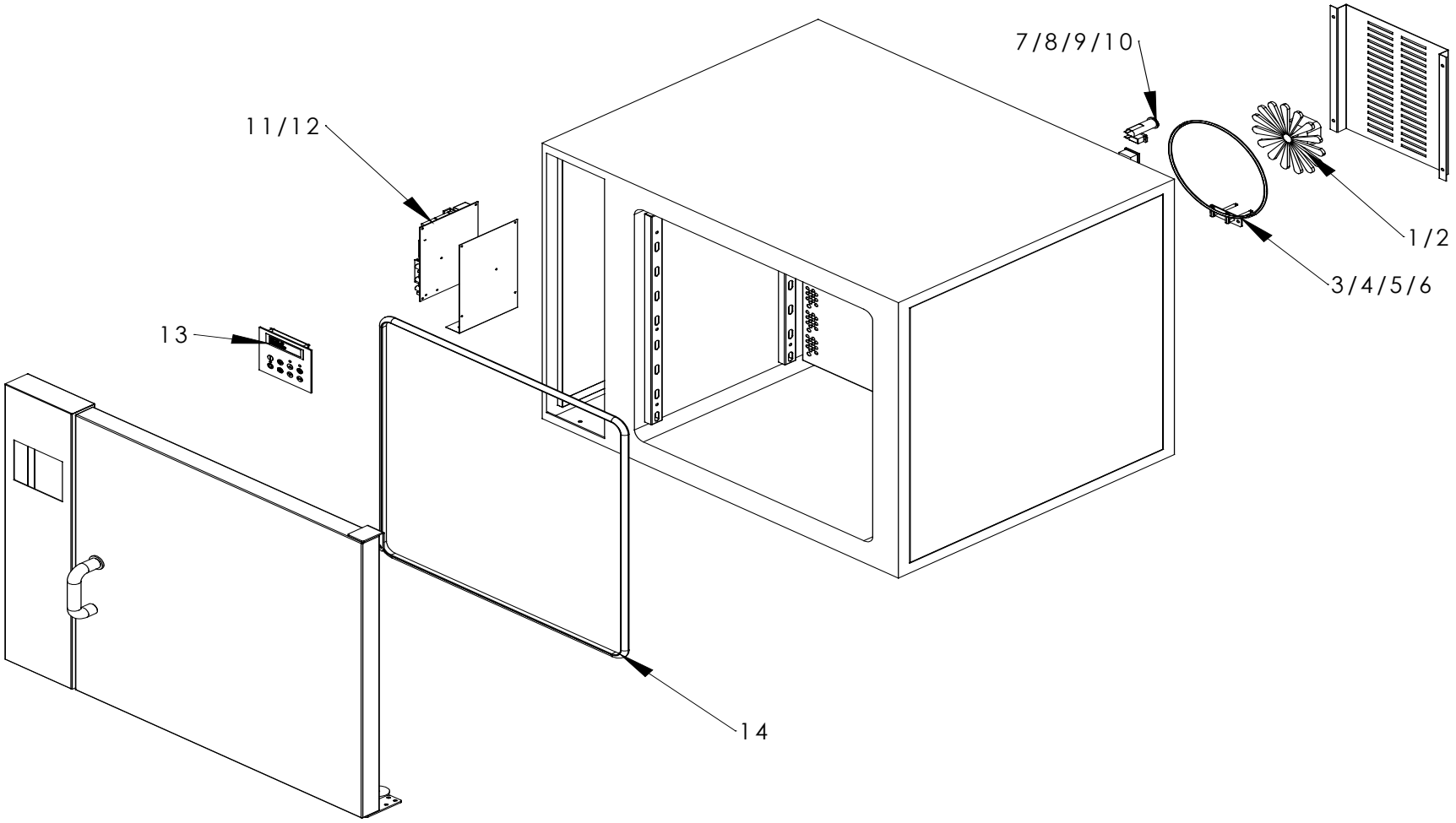
Appendix E

Drawing Thermocenter TC 400



Appendix F

Drawing Spare Parts



Appendix G

Spare Part Numbers

Position	Part Nr.	Description
1	31W04810013	Ventilator 230 Volt
2	31W04810026	Ventilator 115 Volt
3	31W04810005	Heating element TC 160 / TC 240 / 230 Volt
4	31W04810004	Heating element TC 400 / 230 Volt
5	31W04810011	Heating element TC 160 / TC 240 / 115 Volt
6	31W04810024	Heating element TC 400 / 115 Volt
7	31W04881007	Fuse holder
8	31W04881008	Closing cap to fuse holder
9	31W04881010	Fuse 10 A / 230 Volt
10	31W04881011	Fuse 16 A / 115 Volt
11	31W04144150	Main PCB 10 A / 230 Volt
12	31W04144149	Main PCB 16 A / 115 Volt
13	31W04144152	Display / Touch Panel 115Volt / 230Volt
14	31W04810014	Door seal