Elastocon®

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Manual
Ageing Oven EB 04-II

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Contents

Technical documentation supplied on USB flash drive

1. Setting up the Ageing Oven

Place the Ageing Oven on a stable and horizontal bench.
Connect the oven to a grounded mains outlet, according to the type label
on the oven. We recommend the use of an Earth Leakage Detector.
To keep stable environment in your laboratory, place the oven under an exhaust.
Note! The exhaust must not be closer to the chimney than 150 mm.

2. Running the Ageing Oven

## 2.1 Starting

Switch on the power (red switch).
Reset the power failure and alarm, see 2.3.4.
Set the temperature on the PLC, see 2.3.1.

2.2 Screen layout

Touch screen. All buttons and input controls are accessed by a tap directly on the screen. The touch screen can be operated by using a finger, but a stylus pen is also included. Using a stylus pen will make it easier to access smaller items on the screen.

Note: Do not use sharp objects to touch the screen. This can cause damage on the screen.
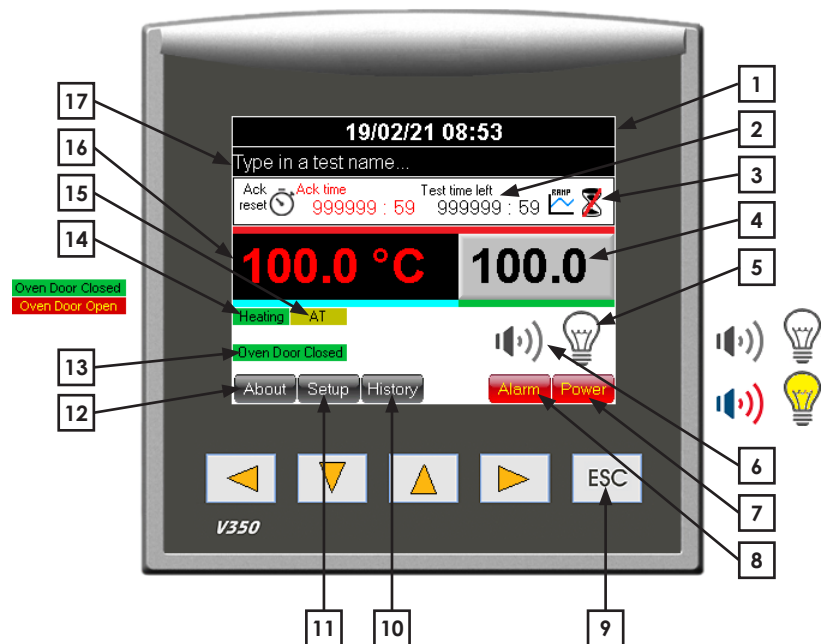
1. **Date & time.** See chapter 2.3.6 for description and settings.

2. **Total test timer.** See chapter 2.3.3 for description and settings.

3. **Total test timer on or off** (hour glass symbol). (set to off in this illustrating picture).

4. **Set value (SV).** Oven set temperature. See chapter 3.2.1 for description and settings.

5. **Light** (optional). Tap on this symbol to toggle the inner test chamber light on and off.

6. **Alarm Sound.** Tap on the alarm sound symbol to toggle between sound on and off.

7. **Power.** See chapter 2.3.4 for description and settings.

8. **Alarm.** See chapter 2.3.7 for description and settings.

9. **ESC key** (physical key). Use this key to return to the previous screen.

10. **History.** Tap this button to see a list of old acknowledged alarms presented in the order of occurrence.

11. **SetUp.** See chapter 2.3.6.

12. **About.** Will display information about software version etc.

13. **Door** status indicator. See chapter 2.3.5.

14. **Oven heater** status indicator.

15. **Auto tuning (AT).** See chapter 2.3.6 for description and settings.

16. **Process value (PV).** Shows the present temperature inside the test chamber.

17. **Test name.** Type in a test name for the currently running test. See chapter 2.3.2 for description.

2.3 Quick guide to run the oven

1. Make sure that no packing material is in the oven (first run) or any other waste material. Open the oven door and check the condition.

2. Press the power switch on the instrument panel to power up the oven. Wait for the main screen to show after a few seconds.

3. If the red alarm button is flashing, press this alarm button and try to identify the cause for the alarm.
See chapter 2.3.7 Alarm.

4. Set the oven temperature on the SV control.
See chapter 2.3.1 Temperature settings.

5. Set a test name.
See chapter 2.3.2 Test name.

6. Set a test time.
See chapter 2.3.3 Test time – Set a test time.

7. Load the oven with samples according to relevant test method or standard.
See chapter 2.5 Start the test.

8. Press the test time hour glass symbol to start the test time countdown (see illustration 2.2 Screen layout, point 3).

2.3.1 Temperature setting

Tap on the "SV" box (Set value) to set the test temperature (Fig 2.3.1a)

A numeric keyboard will show. Type in the set temperature with the numeric keyboard and finish with a tap on the return button. The "PV" box is an indicator and shows the present temperature in the oven. (Fig 2.3.1b)

2.3.2 Test name

Press the grey box labeled Test name, on the main screen.Type the test name from the touch screen keyboard. One test name row on the screen can hold up to 40 characters.

1. Use the white arrow keys on the upper left corner to swap between different keyboard character layouts.

2. Tap on the Enter key to finalize the test name input.

3. To re-enter any character on the same test name row, it is possible to correct any character in the test name with a tap on any of the white left or right arrow buttons in the lower left and right corner on the screen.

4. To cancel any input changes, tap on the ESC key and return to the previous screen.
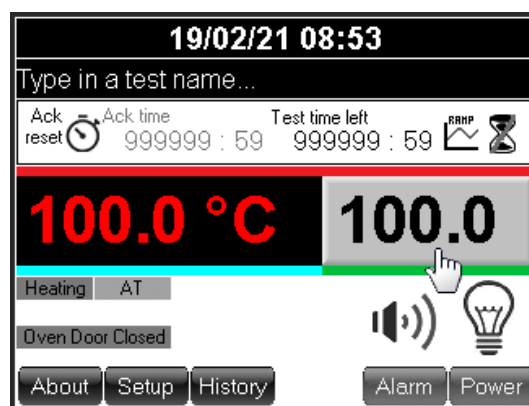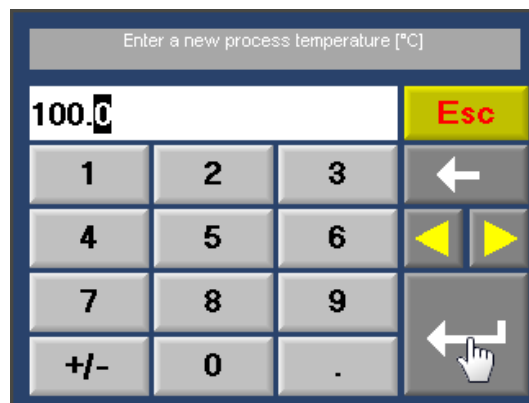

Fig 2.3.1a

Fig 2.3.1b

Fig 2.3.2

2.3.3 Test time

Features

Test time is only active when the the operator has switched the count timers to run. There are two test time counters visible on the main screen. (Fig 2.3.3a). These two timers are described here below.

1. Total test timer – next to the clock symbol. (Fig 2.3.3b) This time is the total time for the test. It will count as long as the oven is running and the count time is switched to run. This timer can be reset manually with a tap on *Ack reset* timer symbol when the hour glass symbol is inactive (crossed). This timer will count up.

2. Test timer – next to the hourglass symbol. (Fig 2.3.3c) This time is fed in by the user and is the time stated for the test. Tap on the hour (left side of :) and/or minutes (righ side of :) to set a test time.

An on screen keyboard will ask for a value. Type in a value in hours and if necessary also repeat the same procedure for the minute input. (Fig 2.3.3d)

This timer will count down when test timer symbol is toggled on. When this timer has count down, a green frame will blink inside the boarder of the test timers. The oven will continue to control at set point and only the total test timer will continue to count.

If a standby temperature was set in the setup screen, the oven temperature will at this point go to the preset standby temperature.

See chapter 2.3.6 Set up screen (user) – Standby temperature.

Start/stop the test timer

To start/stop the test time counters, tap on the hourglass symbol. (Fig 2.3.3a)

It is possible to force a stop to the ongoing time counters. To do so, tap and hold the hour glass symbol pressed for >2 seconds and until the hour glass symbol changes to a symbol with a red cross. Use a stylus pen for a better tap precision.
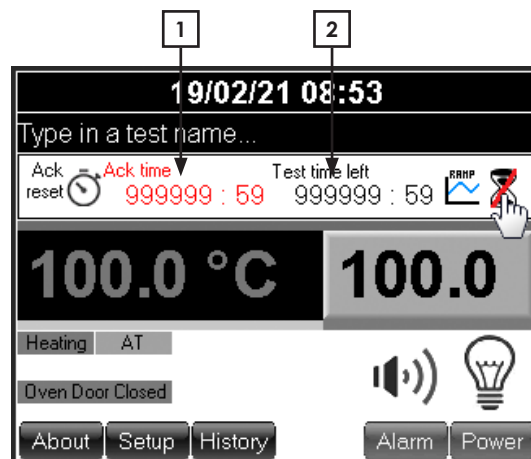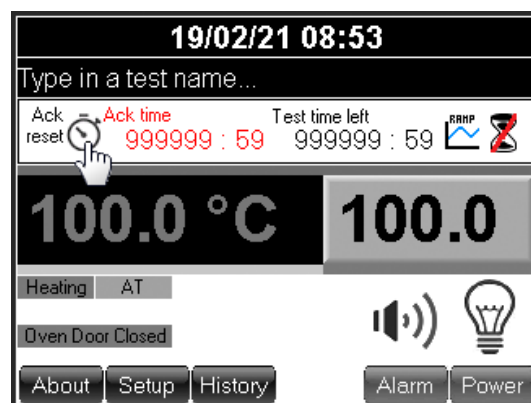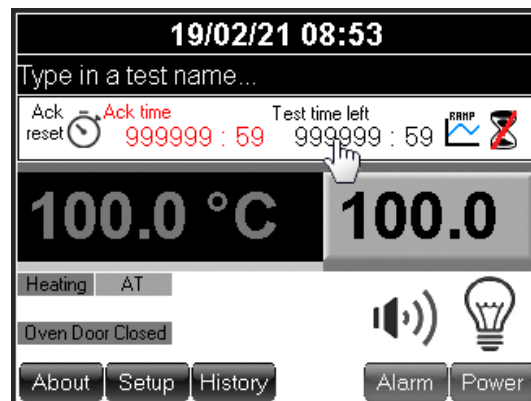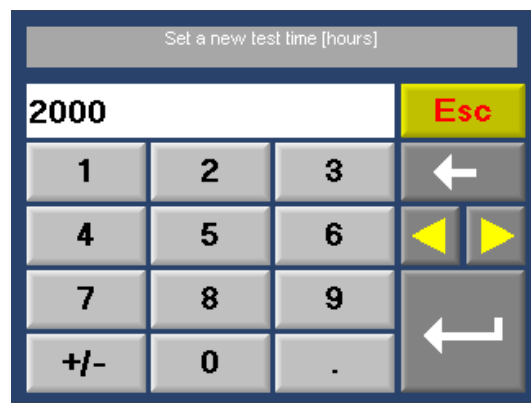

Fig 2.3.3a

Fig 2.3.3b

Fig 2.3.3c

Fig 2.3.3d

2.3.4 Power failure

Power failure during a test

If the test time is counting when a power failure occurs, the oven temperature and test time counters will continue from the time when the power failure occurred, when the power is resumed.

Power failure indicator

When the power is resumed after a power failure during a test with temperature control at set point and test timer running, the screen will lit up a power failure button.

Tap on the *Power Failure* button to see more information and reset the button. (Fig 2.3.4a)

A new screen will show. (Fig 2.3.4b)
This feature will give the operator information about duration of the power failure and temperature drop caused by the power failure. The power failure button will remain until the button *Clear & Exit* is tapped.

2.3.5 Oven door safety switch (option)

When the oven door is opened the following will occur.

a) Oven fans will shut down and remain in that state until the oven door is closed again.

b) Oven lamp will be shut off, even if the switch is set to on. Oven lamp will switch on again as soon as the oven door is closed again.

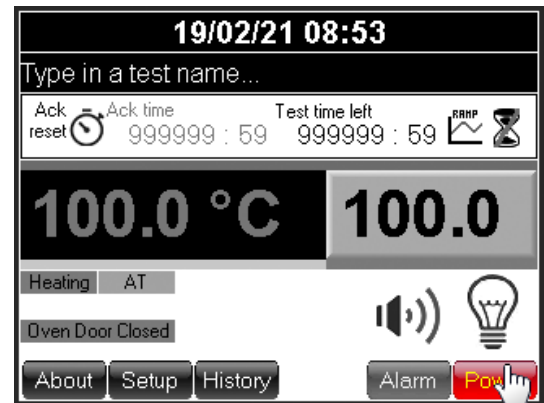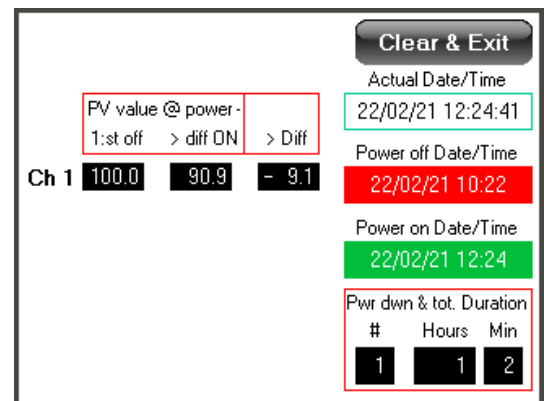**c)** Oven door will be indicated as *Door open* on the main screen.

Fig 2.3.4a

Fig 2.3.4b

2.3.6 Set up screen (user)

Password

A password is needed to enter the set up mode.

Tap on the *Setup* button on the main screen to enter the password screen for set up.

Default password is: 1111

IP-address

In the Set up mode an IP-address can be typed in to establish a communication with a PC-software e.g. monitoring program. Tap on the *IP addr.* field to enter an IP address.

The *IP addr.* field is divided into smaller fields.

In the set up mode the offset is adjusted according to calibration. When a re-calibration is done, values may have to be adjusted again.

An individual offset value can be added to both the temperature-indicator and -controller.

Standby temperature

It is possible to set a standby temperature. That means when the test timer has reached 0:00, the oven will be set to this pre-set temperature.

To access the standby temperature setting, tap on the control box below *Stdby*.

0 (zero) value in this control means that it is not active and after the test timer timeup the oven will remain at the same temperature as during the test.

A higher value than 0 (zero) represents the temperature in °C. Eg. If the operator sets the standby control to 30, the oven will go to 30 °C after the test time has reached the end. This standby value can be set between 1 and maximum set value for the oven. A temperatur control within oven specification is however not possible for temperatures below 30 °C. Minimum set value (SV) for the oven is 30 °C.

The oven has no cooling. The temperature will just cool off naturally. The cooling time depends on the ambient room temperature.

Password

IP-address

Standby temperature
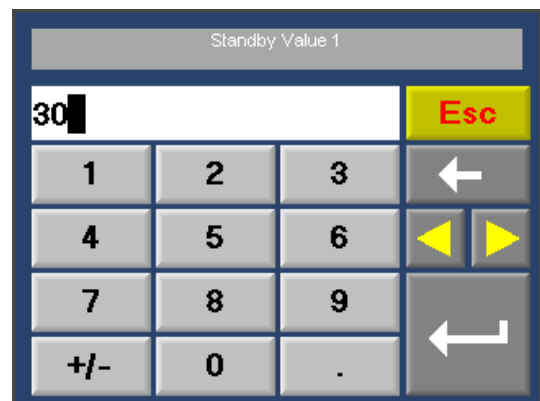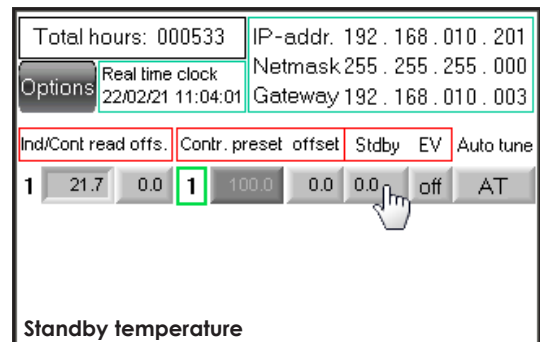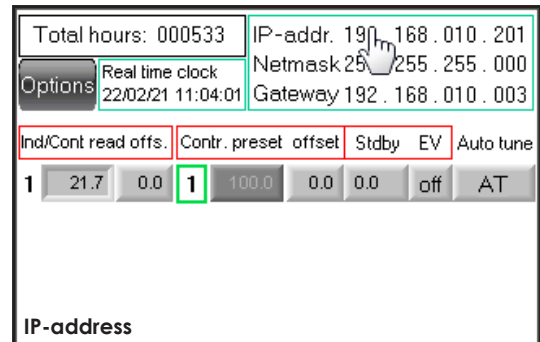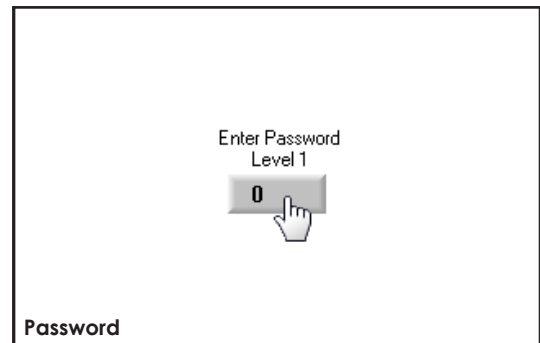
Auto tune [AT]

The auto tune button is used when the ambient conditions where the oven is placed deviates in such high level that it affects the temperature control. In such case the auto tuning can compensate for this. A very strong indication of very different ambient conditions would be if the process temperature fluctuates very much from set point or that the process temperature is controlling with a fix offset from set point that is more than ± 0,5 °C. That is if the set point is set to 100,0 but the process temperature will tune in at 99,5 °C or 100,5 °C and remain there.

To run the auto tuning function, set the oven temperature set point to 100,0 °C and wait for the temperature to be reached. Then wait an additinal 10 minutes before a tap is done on the AT button. When the autotuning is activated, the AT button will change text to "Tuning" and also change color to yellow. The AT indicator will blink on the main screen for as long as the auto tuning is running. Once the autotuning is performed the AT indicator will stop blinking.
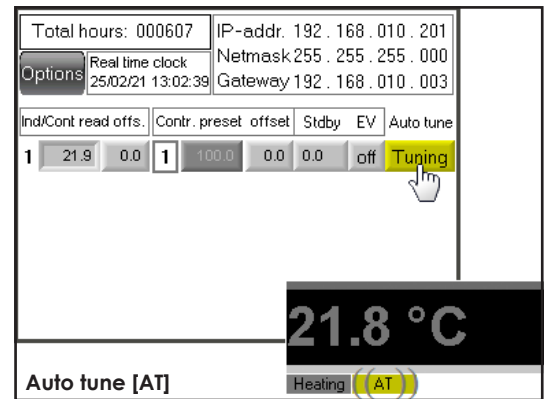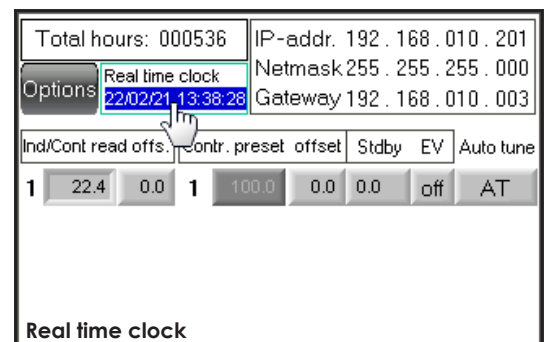
Real time clock

Tap on the real time clock control to set time and date.

This is the system time and date and this time/date stamp will be included to all alarm and time critical information visible on the screen.

Use the numeric keyboard to set a new date.

This system clock and date will be presented on the top banner of the main screen.

2.3.7 Alarm

Any alarm described in this chapter will show as a flashing Alarm button on the main screen and if preset also on the screen saver (cell ovens) when an alarm is active. Tap on the Alarm button to view the active alarm list.

Alarm is activated at:
• high temperature in the test chamber,
  +1 °C from set value

• low temperature in the test chamber,
  -1 °C from set value
• high temperature of the controller,
  +5 °C from set value [1]

[1] This alarm will be reset automatically when the temperature is within tolerance from set value again.

The alarm button will also lit up and blink for the following alarms given in the table below.

Error code	Problem cause	Remedy
000	No voltage to outputs	Check fuse F4 inside the electronics enclosure.
001	Melt fuse broken	The alarm will be reset when the alarm has been acknowledged and the fuse replaced. There is an absolute high temperature safety relay. This can be reset on the back of the oven. [2]
007	Temperature difference between set value and process value ±1 °C	Wait until the temperature is within range and acknowledge the alarm.
014	Shinko Communication Timeout	Contact support.
015	Low battery	Replace backup battery in OPLC (contact support).
016	Loop break controller #	Broken temperatur sensor call for service.
022	Temperature difference between set value of controller and actual value +5 °C	Acknowledge the alarm. When temperature is within range the alarm will be reset. If the alarm is not reset contact support.

Coloured lines on PV and SV display indicates alarm status.
• A red line above PV display = PV temperature differs +1°C from SV temperature.
• A light blue line below PV = PV temperatures differs −1°C from SV temperature.
• A red line above SV = SV differs +5 °C from actual controller temperature.
• A green line below SV = PV temperature is within ±1°C from SV temperature.

SV temp. diff. alarm to general alarm collection list and flashing alarm button will only be active for running channels (active count down meter).

[2] Ovens up to 200 °C have a reset button on the back side, that requires a high force when the reset button is pressed. A click should sound when reset. Ovens with a working temperature above 200 °C have a smaller reset button that requires lower force when reset.

Alarm will activate a buzzer and/or a flashing red Alarm button.

Alarm

The buzzer can be switched on and off by a tap on the buzzer symbol.

If the alarm button starts to flash, go through the check list in the beginning of this chapter to identify the alarm and address the problem for proper action.

Buzzer on   **Buzzer off**

Acknowledge any alarm

To acknowledge any alarm, tap on the button Alarm.

Fig 1. All active alarms can be seen on this screen. Press the magnifying glass to the right side of the alarm ID 00 in the alarm group list to view all active alarms in that group.

This oven will present all active alarms in the group named ID 00.

All the alarms in this group are divided into two levels depending on how serious the alarm is.

First level will reset the alarm automatically, but still requires an acknowledgement to be cleared from the alarm list.

Second level must always be acknowledged by the operator manually.

Fig 2. To acknowledge an alarm, press the magnifying glass to the right of the chosen alarm.

Fig 3. Press the button *Ack* and the alarm will be reset.

Any alarm that is reset automatically will remain in the alarm list until a normal condition is met. The red *Alarm* button will however switch from flashing to a fixed state.

Alarm that still persists will show up again after the acknowledge procedure.

Press the *Esc* button several times to return to main screen.

History

The *History* button will show a record of all previous alarm.

Fig 1

Fig 2

Fig 3

2.4 Set the air change rate

The oven should be connected to a compressed air supply of 5 to 7 Bar for the air exchange. The connector on the oven is found on the back of the oven. Connect it with a 6 mm hose for compressed air with a push in connector.

A standard particle filter and water trap should be installed before the oven connection. This filter should be inspected regularly and drained for water.

Inside the oven there are two particle filters, one fine filter and one sub-micro filter with water traps. These filters should be inspected annually. Inside the oven there is also a pressure controller, set at 1 Bar.

According to standards the air has to be changed during the test.

ISO 188 Accelerated ageing method A, requires 3 to 10 air changes an hour.

IEC 811 Ageing of cable insulation, requires 8 to 20 changes an hour.

The oven has a volume of 60 or 120 l and is equipped with flow meters. This gives the following flow of air through the flow meters:

| | air exchange | |
| | 60 l | 120 l |
changes/h	l/min	l/min
5	5	10
10	10	20
20	20	40

For ageing of rubber we suggest to set the flow meter to 6 to 8 changes/min.

For ageing of cable insulation we suggest to set the flow meter to 8 to 10 changes/min.

Read the flow of the flow meter at the center of the float. The float shall rotate slowly to show the correct reading. If the float does not rotate properly, check if the oven is placed horizontally.

2.5 Start the test

When the temperature is reached, the samples can be put on the shelves or hang them on the rods according to relevant test method or standard. Standards may refer to specific distances between the samples and the inner walls.

Close the oven door and let the oven reach test temperature again and tap on the alarm sound button to toggle the button on (see illustration 2.2 Screen layout, point 6).
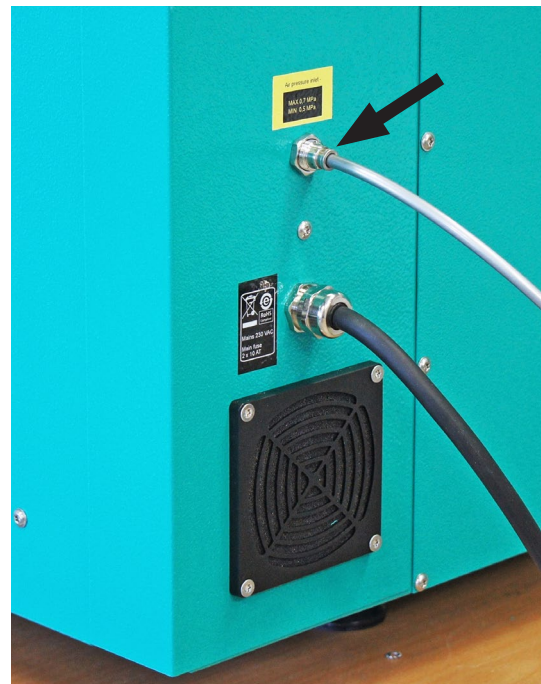

Figure 2.4 – The arrow shows the connection for compressed air. Connect it with a 6 mm hose for compressed air with a push in connector.

3. Programming of ramp with cycling temperatures

Programming of cycling temperatures/ramp is an additional option except for:

1. **EB 17**
2. **ES 07-II**

These exceptions will have the ramp option as default.

If this addition is included in the oven the ramp button will be visible on the main screen.

A temperature cycle is divided into segments. Each segment is known in this chapter as a ramp.

The ramp can be set within the same temperature interval as specified for the oven. The ramp is built up by 2 break points known as legs. There are 50 legs available to build ramps and create a full temperature cycle. See illustration on the next page (Leg-Ramp-Cycle).

Each leg can be used to set a new temperature or maintain the same temperature over a time period (duration). Duration up to 999 hours and 59 minutes, can be set to each leg.

Ramp button

Press the ramp button to enter the ramp function.

This button can be found on the main screen.

Legs

Ovens with more than one individually controlled temperature cell or chamber will have 50 legs available for each temperature cell or chamber.

Each leg consists of a time control (Time h:m) and one temperature set point control (Final Temp). An optional button [ON/off] is included to some ovens. The *ON/off* buttons will be described further on.
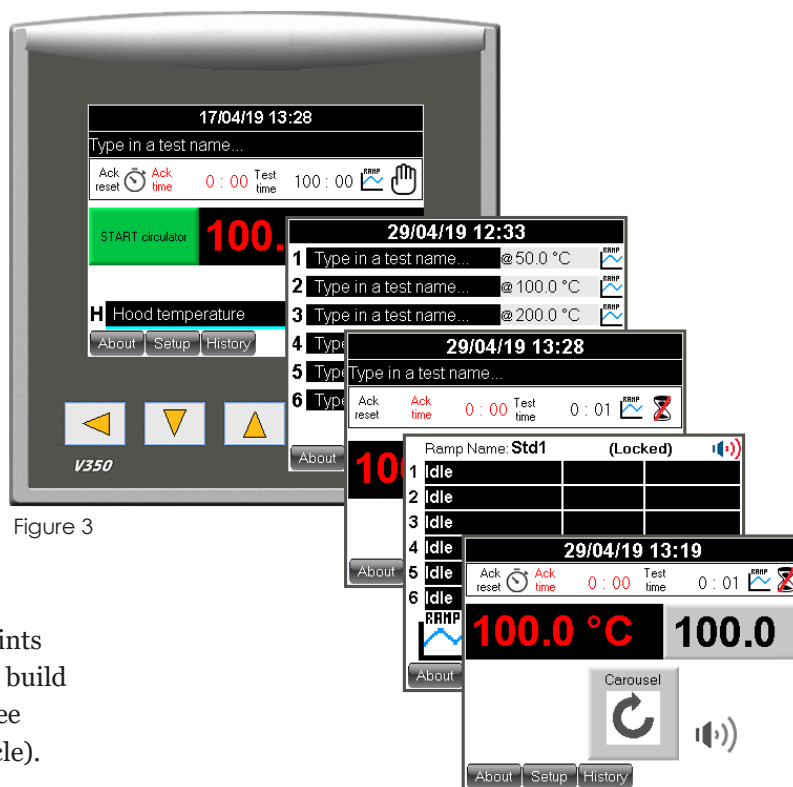

Figure 3

Leg at start of temperature cycle

If the temperature in the header (Temp) for the instrument is equal to the temperature set point in **leg 1**, that same temperature will be kept over the time duration set in **leg 1**.

On the other hand, if the temperature set value for the oven is lower or higher than the first temperature set point in **leg 1**, the temperature will increase/decrease towards the temperature set point typed in the **leg 1** control. The temperature increase/decrease-speed will be calculated to last over the time duration set in **leg 1**.

3.1 Leg when temperature cycle is running

When the ramp is started, each leg filled with information will be processed. Legs with time settings 0:00 will not be processed and will be skipped.

If the temperature set value in a leg (Final Temp) is equal to the temperature set point in the **following leg**, the same temperature will be kept over the time duration set in the **following leg**.

On the other hand, if the temperature set value for the leg is lower or higher compared with the following leg, the temperature will increase/decrease towards the temperature set point typed in the **following leg** control. The temperature increase/decrease -speed will be calculated to last over the time duration set in the **following leg**.

Ramp speed tolerances can be found in the specifications for the instrument.

The essential part of the leg function is that if the following leg is set with a different temperature (set value) than the previous leg, a ramp in temperature will be created. The duration for the ramp is always controlled by the following leg.

Button next

Press the button *Next* to show additional 13 legs available for the same temperature cell/chamber. There are three *Next* screens. A total of 50 legs are available.

Button [ON/off] (optional)

This button is available on some instruments that require any type of mechanical action such as open/close valves for additional cooling or heating. These buttons are not visible if the instrument does not have this option. The button is included to each leg cluster and will only take action when the specific leg is running and a time has been set for that leg.

Press the button to give it a fix state.

ON = will activate the output (valve or control will be switched on when this leg is running).

off = no action will be taken and the output will remain off (valve or control will be switched off when this leg is running).
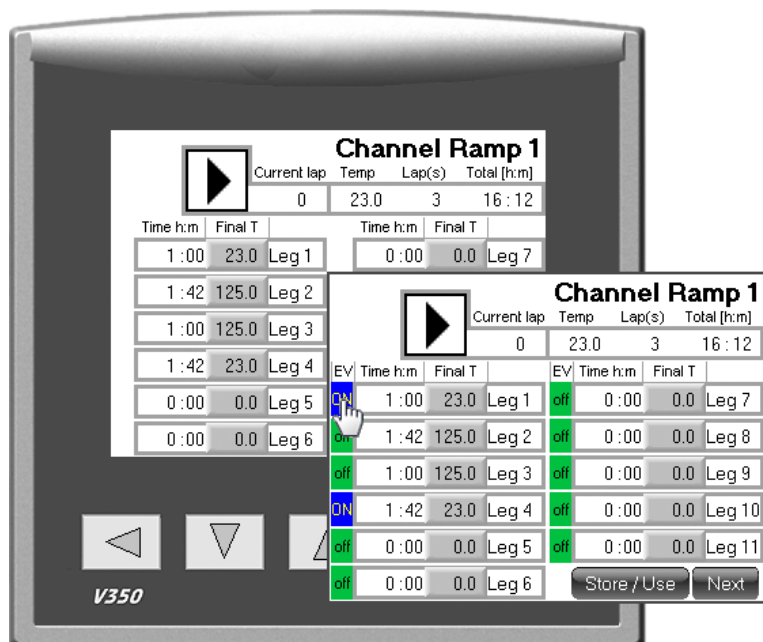
Ramp view header

The header is located on the first ramp screen. The header consists of one *Play (start)* button, *Current lap*, *Temp*, *Laps* and *Total [h:m]*.

The **PLAY (start)** button will execute the full temperature cycle(s). To start the temperature cycle, press the button *PLAY*. The play button will change it appearance to a stop button.

An additional button will now also appear. This button is the *PAUSE* button. Press the *Pause* button to pause the ramp. In this state the temperature will stop at the current processed set value. Press the *Pause* button again and the temperature ramp will continue.

To stop the ongoing cycle, press and hold the *STOP* button pressed until the process is stopped (about 3 seconds).

Current lap is an indicator.This indicator will show the current lap that is beeing processed.

When the temperature cycle is started, the *Current lap* indicator will show the current processing lap.

The **Temp** control is the same control as the set value (SV) control on the main screen of the instrument.

This control will also act as an indicator when the temperature cycle is started. The operator can then follow the temperature in this control as the cycle proceeds.

The **Lap(s)** is a control where the operator can set up a number of repetitions for the cycle.

Total [h:m] will calculate the total time of the temperature cycle. The time settings for each leg will be summed up. This time value is then multiplied by the number of laps typed in the header control laps to give the total time for the temperature cycle(s). The *Total [h:m]* indicator will show the remaining time for the full temperature cycle(s), when the temperature cycle is running.

For some software versions, the total time cannot show more than 9999 hours. In these cases, the indicator will show xxxx. The function will remain normal, but the total time is not possible to show.

Play

Pause   **Stop**
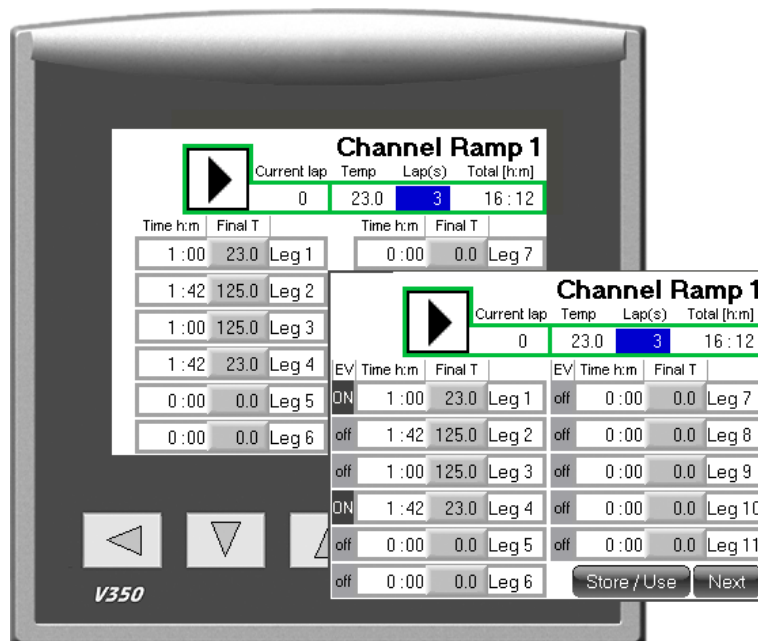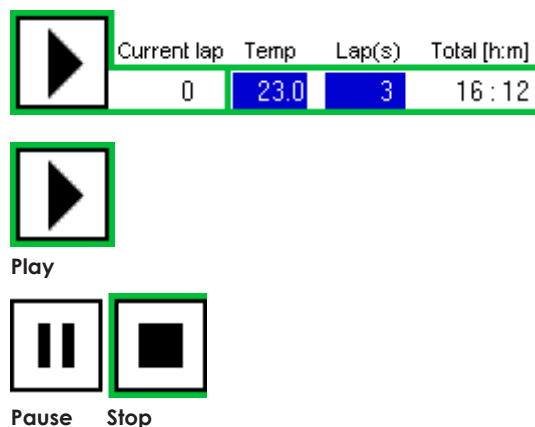
3.2 How to Store/Use a programmed ramp

The total ramp generated can be stored into a memory *Bank*.

There are six individual memory banks to choose from.

Any stored ramp can be used for any heater cell/ chamber in the same oven, **if the oven has more than 1 heater cell/chamber**.

The ramp program is write-protected and must be temporary unlocked to edit the ramp data or store a programmed ramp to file.

ES 07-II
Locked state is indicated with the word *Locked* on the main screen.

Any other oven
Locked state is only indicated by disabled input controls on the ramp screen.

In the locked state, any pre-stored ramp can still be selected when the ramp screen is opened. Refer to point *USE* in this chapter.

The ramp edit mode will remain open until the ramp screen is closed and 1 minute has passed.

Store

Notice that the file name for the stored ramp is fixed and the file names are always "RampDat1 for Bank 1", "RampDat2 for bank 2" and so on.

The store button will save the current ramp into a file on the onboard SD micro card.

If the file is locked, then read the description below from point 1.

If the file is un-locked, then read the description below from point 5.

1. From the main screen, press the button *Setup*.

2. Enter password 1111+*Enter*.

3. Press the button *Options* (not for instrument EB 17).

4. Tick the box *Temporary unlock Ramp Store/Use* button.

5. Return to the main screen and press the *RAMP* button.

6. Prepare the ramp as wanted with temperature and time.

   The temporary unlock will stay unlocked while stepping between any of the four Channel Ramp# screens.

   When changing to another screen except these, the temporary unlock will be cancelled and after 2 minutes the *Store/Use* button will then be locked automatically.

7. Press the button *Store/Use*.

8. If any memory *Bank* is empty, type in a new filename and press its *Store* button.

   If a memory *Bank* is occupied, Press its *Store* button and choose to "overwrite" the old file.

   A new file name can be given at all time before pressing the *Store* button.

Use

The *Use* button will connect any of the ramps stored in any of the six memory banks to the Channel ramp in use.

If the oven has more than one temperature cell/chamber, any of these cells/chambers can be connected to any of the memory banks.

1. From the Ramp screen press the button *Store/Use*.

2. Press the button *Use* on any of the memory Banks.

3. Press the physical key *ESC* to return to the Ramp screen.

4. The file selected will now be loaded to the Channel in use.

If the oven has more than one cell or chamber a matrix will be visible on the right side of the *Store/Use* buttons.

This matrix will show each channel and if it is connected to a ramp.

The maximum number of cells/chambers is six.

The example below shows that oven cell 1 was edited (Administrate Ramp for Channe1) and ramp in "Bank1" is currently in use for this oven cell and so is the oven cell 6.

Oven cell 2 is using ramp data from "Bank2" and so is oven cell 4, oven cell 3 is using ramp data from "Bank3", oven cell 5 is using ramp data from "Bank5".
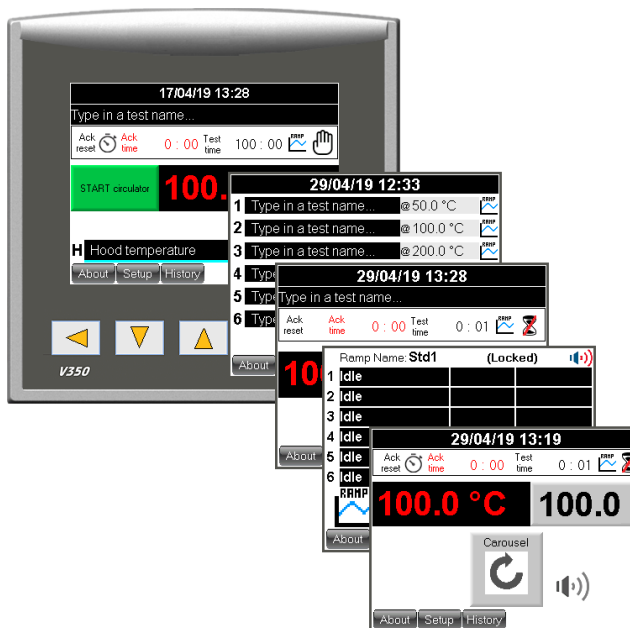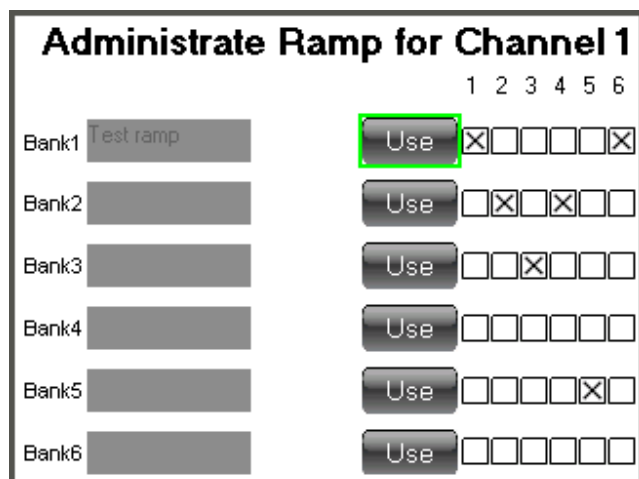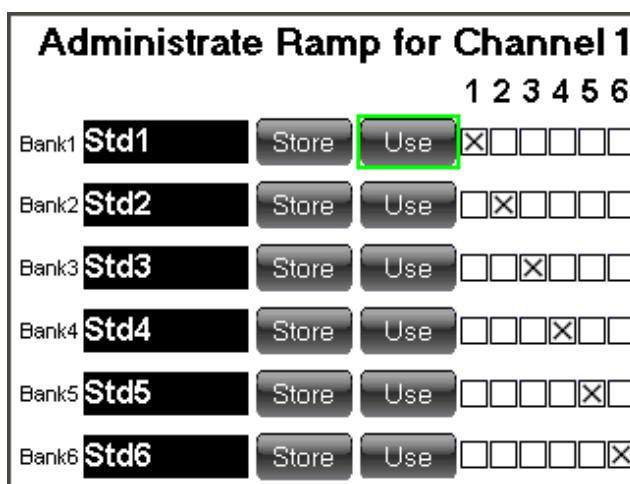
Quick guide to initiate a ramp (temperature cycle) and run it.

1. From the main instrument windows press the ramp button symbol.

2. Fill in the header controls **Temp** and **Laps**. *Temp* is the standby temperature before the ramp (temperature cycling) is started and *Laps* multiplies the number of cycles to run.

3. Fill in the *Time* and *Final temp* for a number of legs to build all individual ramps in a full temperature cycle. Nine legs are available in the first ramp screen. Another 13 legs can be initiated in the next ramp screen. Press the button *Next* to enter the next ramp window. Four screens are available. First screen has 11 legs and the following screens have 13 legs per screen. 50 legs in total.

   Event buttons [EV]
   (visible on instruments with this option)
   To activate the event output, click and set the event *ON* for each leg that is supposed to activate the event output. Instruments with the LTP option will open the cooling water valve on any leg that has this option set to *ON*. This option is only available on the first temperature cell/chamber, if the instrument has more than one temperature cell/chamber.

4. When the full cycle has been programmed with all legs necessary, the total time will be calculated and shown in the header indicator ***Total [h:m]***.

5. The temperature cycle can now be started. To start the temperature cycle, press the header button ***PLAY*** (Start).

6. The ramp symbol will start to blink on the main screen, when the main screen is restored automatically after two minutes or if the operator presses the ESC key below the screen to restore the main screen.

Example of a temperature cycle:

Header Temp is set to 23 °C (or the standby temperature of your oven).

	Time	Temp	Option	Description
Leg 1	1:00	23	ON	' Temp will be kept at 23 °C for 1 hour. Option is ON to run an optional event.
Leg 2	1:42	125	off	' During 1 h and 42 min the temperature will rise to 125 °C. That represents a ramp speed of 1 °C/min. 125 - 23 = 102 -> 102 minutes = 1 h and 42 minutes. Option is off to hold an optional event.
Leg 3	1:00	125	off	' The temperature will be kept at 125 °C for 1 hour. Option is off to hold an optional event.
Leg 4	1:42	23	ON	' During 1 h and 42 min the temperature will drop from 125 °C to 23 °C. That represents a ramp speed of 1 °C/min. 125 - 23 = 102 -> 102 minutes = 1 h and 42 minutes. Option is ON to run an optional event.

Repeat this cycle three times: When *leg 4* is completed, the cycle will start over on leg 1. The total time for all cycles will be 16 hours and 12 minutes. The number of laps and remaining time can be followed on the indicators **Current lap** and **Total [h:m]**. After this time the ramp will stop and the temperature will remain on the last leg temperature set value if no standby temperature was set. In this example the oven will keep 23 °C when the ramp is complete.

This is how the ramp window should look like according to the example above.

It is possible set a standby temperature, if the last leg has a high temperature set point and the operator would like to end the temperature cycle with a low temperature. This can be done from the *Setup* screen.

See chapter 2.3.6 Set up screen (Standby temperature).

4. Temperature calibration

The instrument is calibrated according to the attached calibration certificate at the delivery. The sensor for the indicator can be removed for calibration in a block calibrator.

Calibration should be done annually.

5. Service and maintenance

The oven shall be cleaned on both the outside and inside, at regular intervals. The oven can be cleaned with water and a detergent or ethanol on the outside.

To clean the window open the door until it stops. Unscrew the screw in the top and the two screws on the sides of the inside of the door. This will make the inner plate with the window come loose. Place the plate on a table with the glass plate downwards. Unscrew the screws holding the panes together, take them apart and clean. Also clean the fixed glass pane in the door and the glass pane which is mounted in the inner panel.
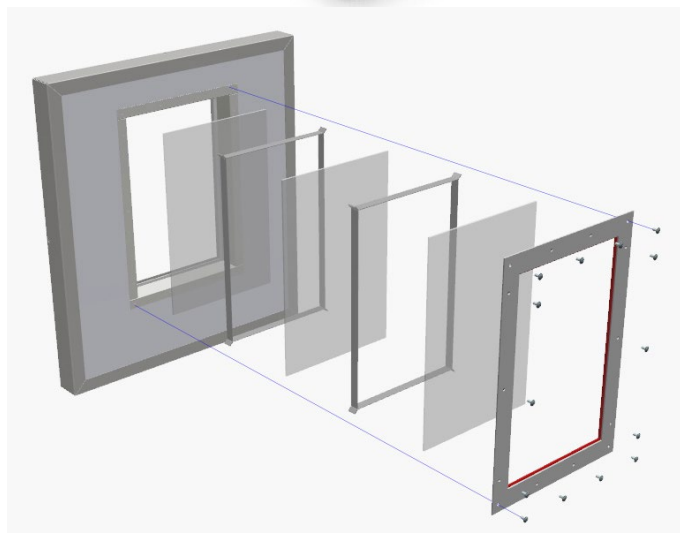
6. Troubleshooting

When the oven does not work properly,
check the following.

Problem	Problem cause	Remedy
No power	No main power	The main fuse, 10 AT, is placed in the connector for the mains lead on the back of the oven.
	Broken main power	Check power supply socket.
Alarm button flashing	Any alarm	See chapt 2.2.4 Alarm.

Check electric schematics for fuses. Before changing a defective fuse,
check for any possible short circuit, causing the fuse to burn.

7. Safety

Note! Use gloves when the samples are placed in or removed from the oven. Be aware of the hot air coming from the chimney.

Important! For the best performance of the instrument, we recommend the following working environment:

- Standard laboratory temperature of either 23 °C ± 2° or 27 °C ± 2°.
- Humidity not more than 90 % RH – non condensing.
- Other environmental aspects: Pollution degree 2 – Laboratory environment.

8. Technical specification

Temperature range, °C:	+40 to +200
HT-version, °C:	+40 to +300
Temp. control, +40 to +100 °C, °C:	± 0,5
+101 to +200 °C, °C:	± 1,0
+201 to +300 °C, °C:	± 1,5
Temp. variation in time, °C:	± 0,25
Temp.variation in space, %:	± 0,5
Temperature sensors:	Pt 100, 1/3 DIN
Air speed, m/s:	<0,002
Air changes, changes/hour:	3 to 20
Useful volume, l:	60 (120)
Dimensions, inner, w × h × d, mm:	450 × 450 × 300
	(550 × 550 × 400 – 120 l)
Dimensions, external, w × h × d, mm:	810 × 720 × 620
	(910 × 820 × 720 – 120 l)
Dimension, window, 4 glass, mm:	200 × 300 (option)
Illumination of the inner chamber:	24 V, 10 W halogen[*1]
Sample rod positions:	15 (24 – 120 l)
Sample rods:	10 (12 – 120 l)
Shelf positions:	3
Shelves:	2
Weight, kg:	87 (115 – 120 l)
Voltage, V/phase/freq:	220 to 240/1/50–60
Power, W:	2 100 (3 100 – HT and 120 l)
Standards:	ISO 188 method A, IEC 60811-1-2, IEC 60216-4-1

[*1] *only available with the window option*

Common specifications:

- The oven perform well inside the apparatus requirements in ISO 188 method A, IEC 60811-1-2, IEC 60216-4-1 and other equivalent standards.

- Special design with controlled air exchange rate and low or high air speed.

- The casing consists of steel, painted with epoxy powder paint in bluegreen colour.

- The inner chamber is made of stainless steel.

- Temperature controller with 0,1 °C setpoint (PLC).

- Solid state relay for safe control.

- Temperature indicator with sensor in the inner chamber.

- Fixed over temperature fuse.

- Fixed set air exchange rate of 5 to 20 changes per hour (adjustable via flow meter).

- The air speed is low and is dependent on the air exchange rate only, as specified in ISO 188 method A and IEC 60811-1-2.

- Cooling channels in the casing for low surface temperature.

- Controlled cooling fan for the electronics cabinet.

- Indication of power failure (PLC).

- Run-time meter (PLC).

- Countdown timer (PLC).

Optional accessories

EB-P, ramp function for temperature setting in the PLC.

Option **HT**, with temperature range up to +300 °C.

EC 11, monitoring software.

EB 04-AP, Access Port.

EB 04-IIW, four glassed window and lamp illuminating the inner chamber.

EB 04-IIDS, door sensor that turns off fan and heating when door is opened.

ED 04, computer, pc.

ED 06, UPS 1000 VA double converter.

Network cables.

Support

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