Elastocon®

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Manual
Ageing Oven EB 26

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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

Index of chapter 2

2.1 Screen layout

1. 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 touch pen is also included. Using a touch pen will make it easier to access smaller items on the screen.

Note! Do not use sharp objects on the touch screen. This could scratch and damage the screen surface.

2. ESC key (physical key). Use this key to go back one step between screen layouts. A press on this key will cancel any inputs made on the current screen.

3. Arrow keys (physical keys). These keys can be used to navigate and increase/decrease an input value just the same way as navigation and increase/decrease of an input value can be done directly on the screen.
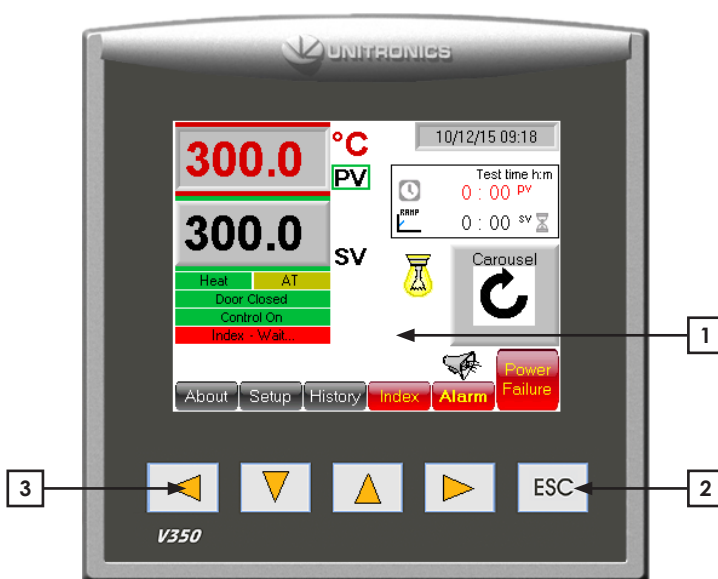

Fig 2.1

2.2 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. Make sure that the emergency button is released. **See chapter 2.2.6 Emergency stop button.**

4. The red button labelled *Index* will start to blink in the display. Make sure that the oven door is closed and then tap on the index button. "Index – Wait…" will start to blink – wait for the indicator "Index – wait…" to disappear and for the carousel button to show.
See chapter 2.2.1 Screen index button.

5. Station 1A and 1B are now in the front position behind the oven door. Open the oven door and load samples to station 1A and 1B.

   To keep track of the station numbers, look on the touch screen and carousel screen – highlighted *Test name* position in blue.

   Two rods (A and B) represent one test name on the touch screen test names 1–6.

   Station 1A and 1B belongs to test name 1, station 3A and 3B belongs to test name 2 etc… up to station 6A and 6B.

6. Close the oven door and tap on the carousel button. Select the station number and position this station according to **chapter 2.2.3 Carousel test names and control buttons – Position to another station rod.**

7. Wait until the station is positioned and then open the oven door.

8. Load samples to these two rods (rows).

9. Close the oven door.

10. Repeat point 6–8 until all stations are loaded with samples.

11. Press the ESC key on the touch screen physical key or wait for the main screen to show.

12. Set the oven temperature on the SV control. **See chapter 2.2.2 Temperature settings.**

13. Set a test time. **See chapter 2.2.4 Test time – Set a test time.**

14. Set a standby temperature if needed. **See chapter 2.2.8 Set up screen (user) – Standby temperature.**

15. Tap on the carousel button and start the rotation of the carousel. Select to reset the test time counter or not. **See chapter 2.2.3 Carousel test names and control buttons – Activate the rotation of the carousel.**

Note! As long as the carousel is running, the oven temperature cannot be changed. Turn the carousel rotation off to change the process temperature (PV).

See chapter 2.2.3 Carousel test names and control buttons – Stop the rotation of the carousel.

If the carousel buttons does not respond to any touch, please restart the oven with the power switch.

2.2.1 Screen index button

The Index button will blink when…

a) The oven power is switched on but the oven was not in a test mode with a rotation on the carousel.

b) If the emergency stop button was pressed and then released.

A tap on the Index button must be performed at this point. The index function will search for station 1 and this must be carried out before it is possible to position a station.
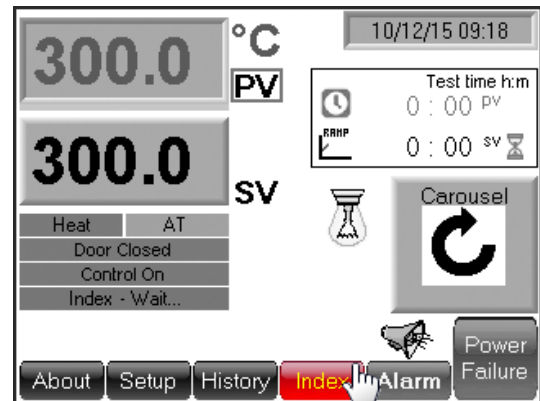
2.2.2 Temperature setting

Tap on the "SV" box (Set value) to set the test temperature (Fig 2.2.2a)

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 2.2.2b)

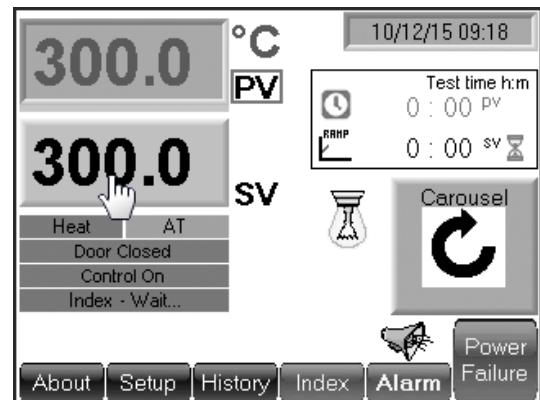Or use the panel keys to mark the SV display and adjust the temperature setting.

Press the arrow down or up to mark the PV box and then use the arrow key left and right to adjust the value.

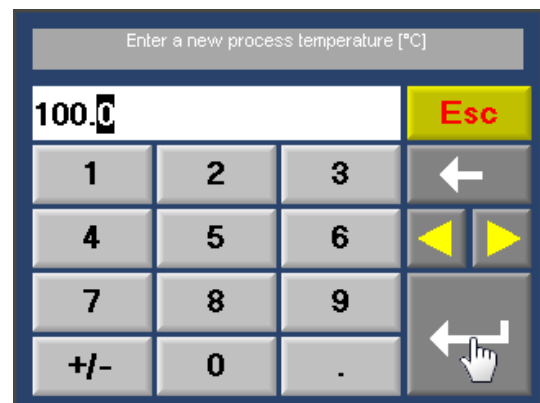Fig 2.2.1

Fig 2.2.2a

Fig 2.2.2b

2.2.3 Carousel test names and control buttons

The button carousel will be visible after a successful index search.

Tap on the button Carousel to show the test names and carousel control buttons.

Tap on any of the six (1–6) test name input rows to input a test name for this row.

One test name row on the PLC screen will represent two physical station rods (rows) in the carousel, stations xA and xB, where the x is the number of a station. Each mechanical station is individually engraved with a number (1–6) and A or B, to separate them.

To keep track of the station numbers, look on the touch screen and in the carousel screen. A highlighted test name on the screen represents a station in load position (straight behind the oven door).

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.

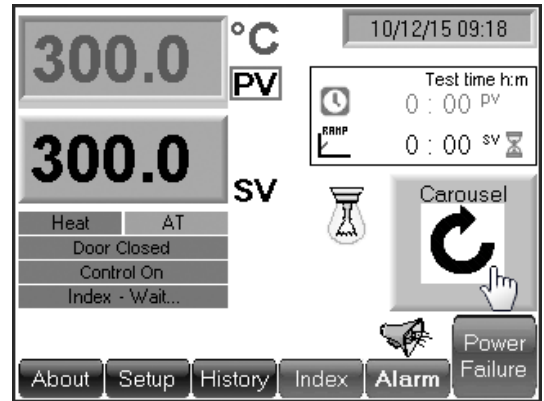4. To cancel any input changes, tap on the ESC key and return to the previous screen.
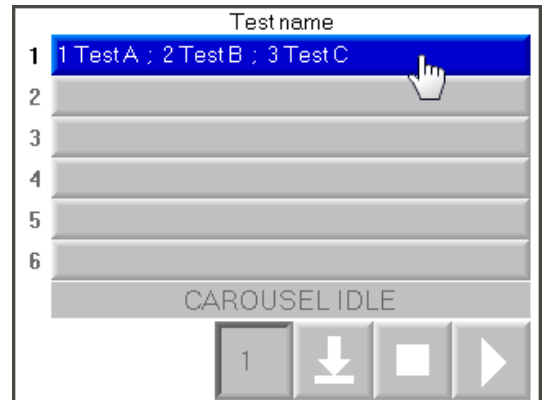

Fig 2.2.3a

Fig 2.2.3b

Fig 2.2.3c

Select a station and load samples

The carousel stations can be positioned to stop in a convenient position in front of the oven door. This makes it easier to load the samples on the test station rods.

Open the door and load the samples. Pull on the ring to open the clamp, insert the sample and gently let go of the ring. Do the same for both ends of the sample. The holders may have to be adjusted to fit for the sample size.

To adjust a test piece holder – loosen the screw on the top of the test piece holder and slide the holder into position. Lock with the screw again to fix the holder on to the square rod. (Fig 2.2.3d)

Note! The test piece holder must be mounted so that the test piece slides into the holder from above.

Position to another station rod (Fig 2.2.3e)

1. To position a station tap on the station number and type in the correct number.

2. Then tap on the step jog button to execute the movement of the carousel.

Activate the rotation of the carousel

When the samples are mounted and the oven temperature is set, it is time to start the rotation of the carousel.

To do so, make sure that the test time is fed in correctly.

See chapter 2.2.4 Test time – Set a test time.

The run button is not visible if the test time is set to 0:00.

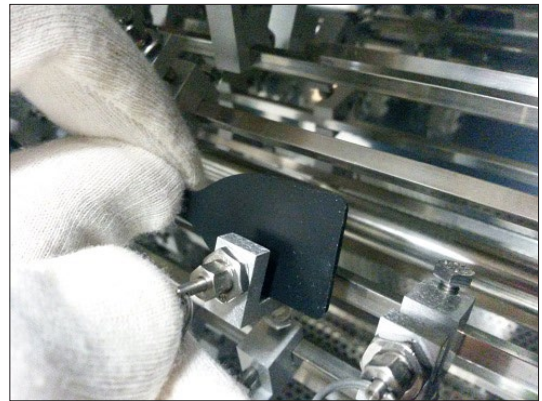Tap on the run button to start the rotation of the carousel. (Fig 2.2.3f)
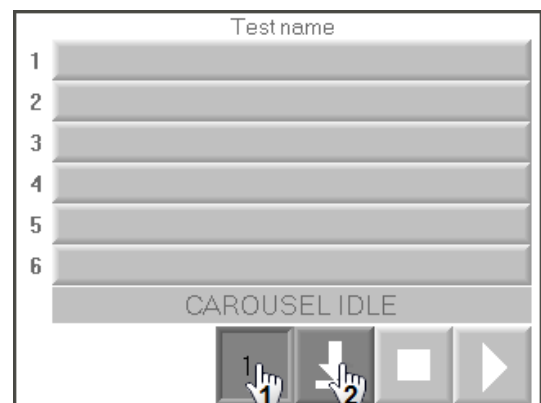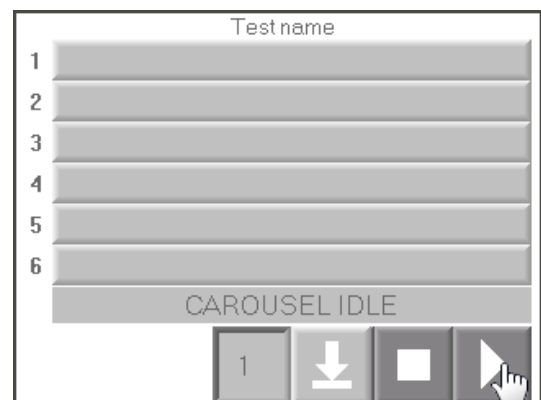

Fig 2.2.3d

Fig 2.2.3e

Fig 2.2.3f

When the run button is pressed a new screen will show up and specifically ask the user to choose and re-set the total test timer or not.

See chapter 2.2.4 Test time.

Choose *Reset timer and start* to reset the total test timer and start the carousel from the time 0:00.

Choose *Start without timer* reset to continue from the current test time.
(Fig 2.2.3g)

The carousel will start to rotate.

Note! As long as the carousel is running, the oven temperature cannot be changed. Turn the carousel rotation off to change the set temperature (SV).

Stop the rotation of the carousel

Note! Hit the emergency button in case of an emergency to stop the carousel.

To stop the carousel from rotating, tap and hold the stop button pressed for about 3 seconds.

The carousel rotation will also stop, if the oven door is opened. As long as the oven door is open a blinking pause symbol will replace the rotating arrow on the main screen.

The test time will still count even if the door is open.
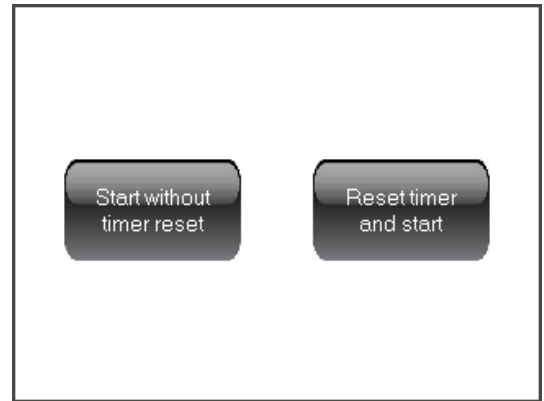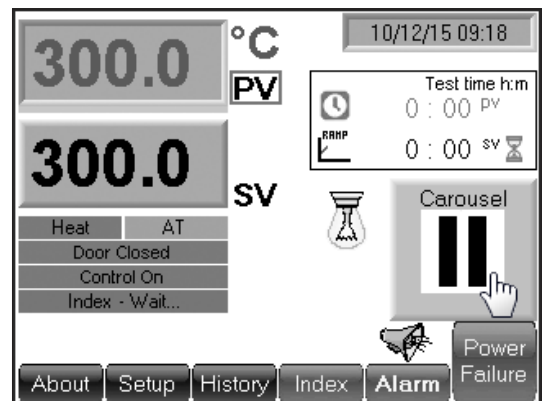(Fig 2.2.3h)

Fig 2.2.3g

Fig 2.2.3h

2.2.4 Test time

Set a test time

To run the carousel go to the main screen and fill in a test time. Tap on the figures for hour 0: or minutes :00 to the left hand of the hourglass. (Fig 2.2.4a)

Type in a value in hours and if necessary also enter the minutes input and type in a value in minutes. (Fig 2.2.4b)

Test time features

Test time is only active when the carousel is activated.

There are two test time counters visible on the main screen. (Fig 2.2.4c)

a) Test timer – next to the hourglass symbol.

This time is fed in by the user and is the time stated for the test.

Tap on the hour 0: or minutes :00 to set a test time. This time will count down.

When this timer has count down, a green frame and the hourglass will blink inside the boarder of the test timers, to indicate that the test time has ended.

The carousel will continue to rotate 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 2.2.8 Set up screen (user) – Standby temperature.

b) Total test timer – next to the clock symbol

This time is the total time for the test. It will count as long as the carousel is running. This timer can be reset when the carousel rotation is activated. This timer will count up.
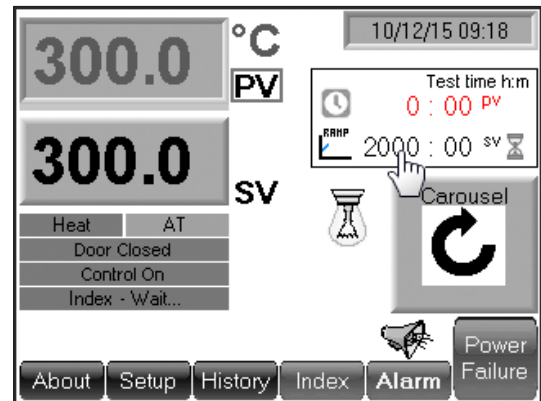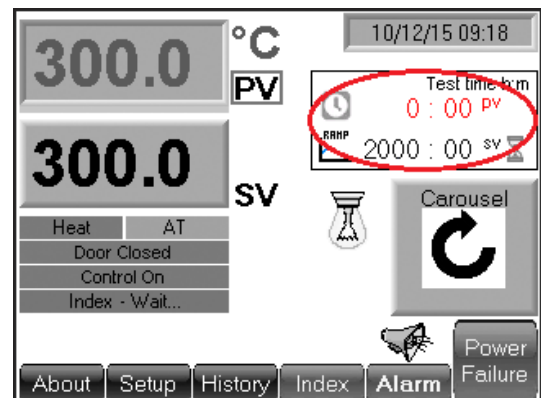

Fig 2.2.4a

Fig 2.2.4b

Fig 2.2.4c

2.2.5 Power failure

Power failure during a test

If the carousel is running when a power failure occurs, the carousel 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 carousel rotation and test timer count, the screen will lit up a power failure button.

Tap on the *Power Failure* button to see more information and reset the button. (Fig 2.2.5a)

A new screen will show. (Fig 2.2.5b)

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.

If more than one power failure occurs, the user can see the number of failures on the indicator "Pwr dwn".
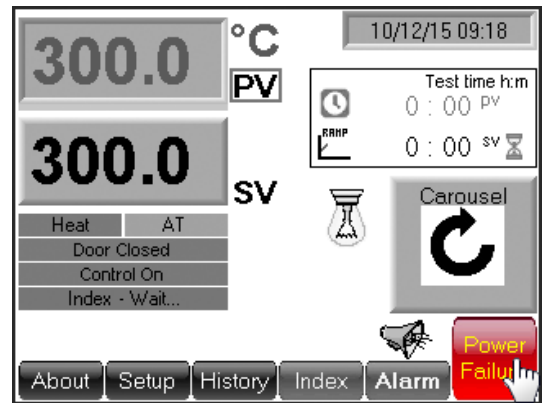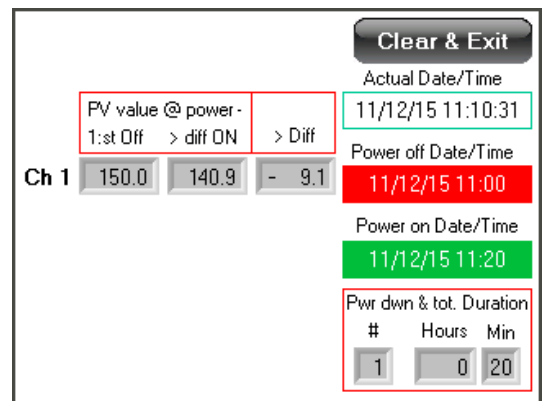
2.2.6 Emergency stop button

Press on the emergency button.

The emergency button is placed on the lower part of the front panel of the oven. (Fig 2.2.6)

When the emergency button is pressed the following will occur.

a) All power to the carousel motor will be cut off and remain cut off when the emergency button is released.

b) *Emergency* will show as a blinking text on the main screen.

Release and restore the emergency button.

To release the emergency button turn the red knob clockwise until it retracts to its normal position.

When the emergency button is released and the power is switched on, the index button will be visible on the screen.

See chapter 2.2.1 Index.

Fig 2.2.5a

Fig 2.2.5b

Fig 2.2.6

2.2.7 Oven door safety switch

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.

2.2.8 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.

Password

IP-address

Standby temperature

The operator can in this *Set up* also preset 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 bellow *Stdby*.

A 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. 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 room ambient temperature.

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 thescreen.

Use the numeric keyboard to set a new date.

Standby temperature

Real time clock
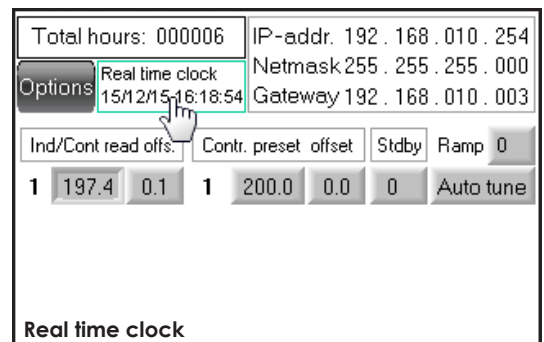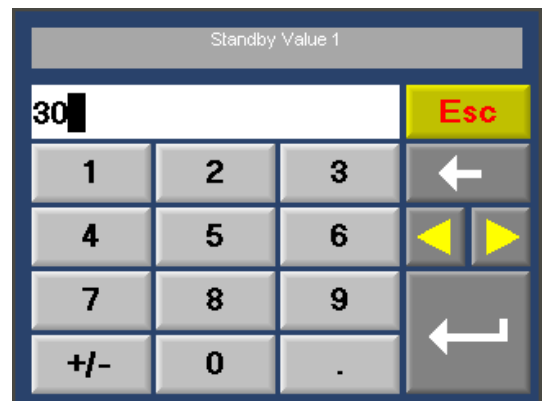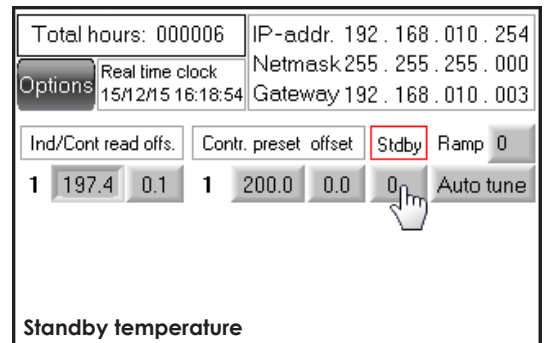
2.2.9 Alarm

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.

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

Alarm

If the alarm button starts to flash, go through the check list in chapter 2.2.7 Alarm 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.

2.2.10 Air change rate

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

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

IEC 811 Ageing of cable insulation, requires an air change rate 8 to 20 times an hour.

The air system of the oven is preset at delivery to 7 ± 3, alternatively 14 ± 3 air changes per hour.

Fig 1

Fig 2

Fig 3

3. Programming of cycling temperatures

Programming of cycling temperatures/ramp is an additional option. *If this addition is included in the oven the ramp button will be visible on the main screen. Observe that cooling of the oven will be natural cooling due to ambient temperature (very slow and non-controlled).*

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 20 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 on each leg.

Ramp button

Press the ramp button to enter the ramp function.

This button can be found on the main screen and is placed in about the same location for different instrument layouts.
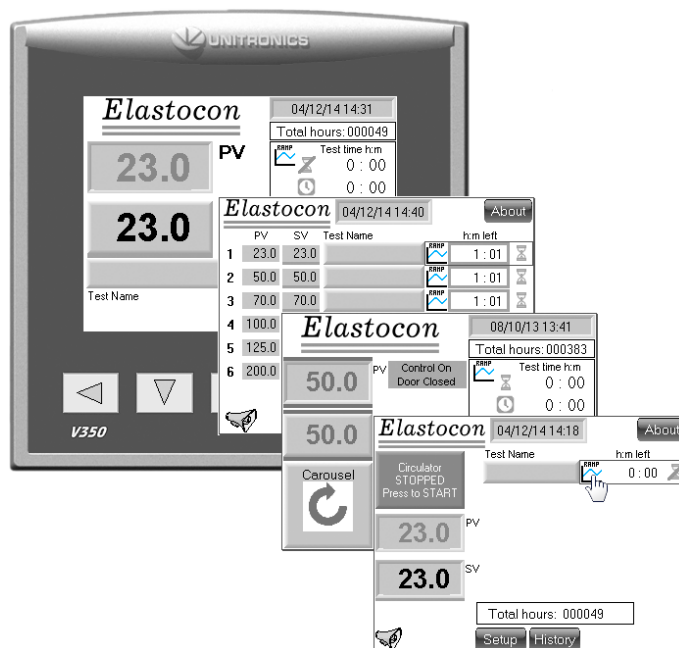
Legs

The oven can have more than one individually controlled temperature cell or chamber. 20 legs are 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. This option is only visible for one ramp screen (first ramp screen), if the instrument has more than one temperature cell or chamber.

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**.

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**.
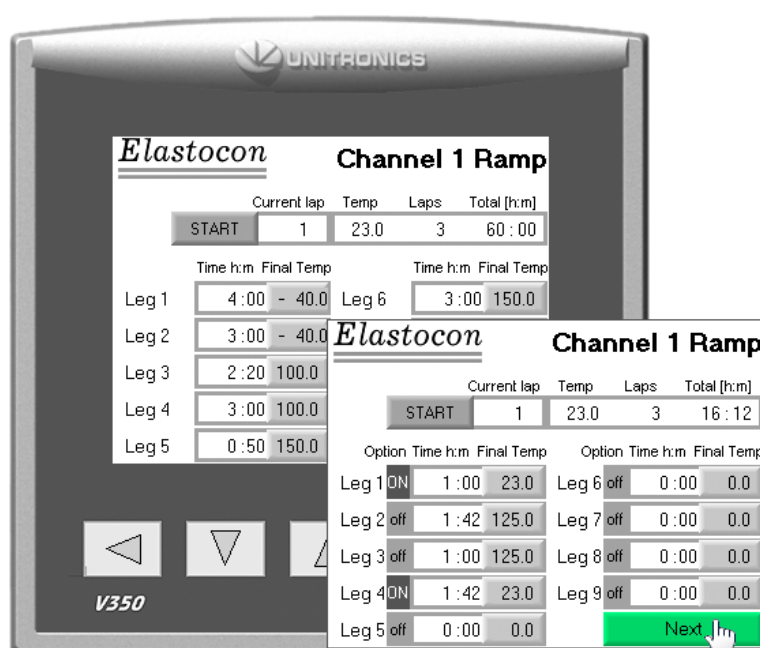
On the other hand, if the temperature set value for the leg is lower or higher compared with the following leg, the temperature will increase/decrease towards the temperature set point typed in the **following leg** control. The temperature increase/decrease -speed will be calculated to last over the 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 another 11 legs available for the same temperature cell/chamber.

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. 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).
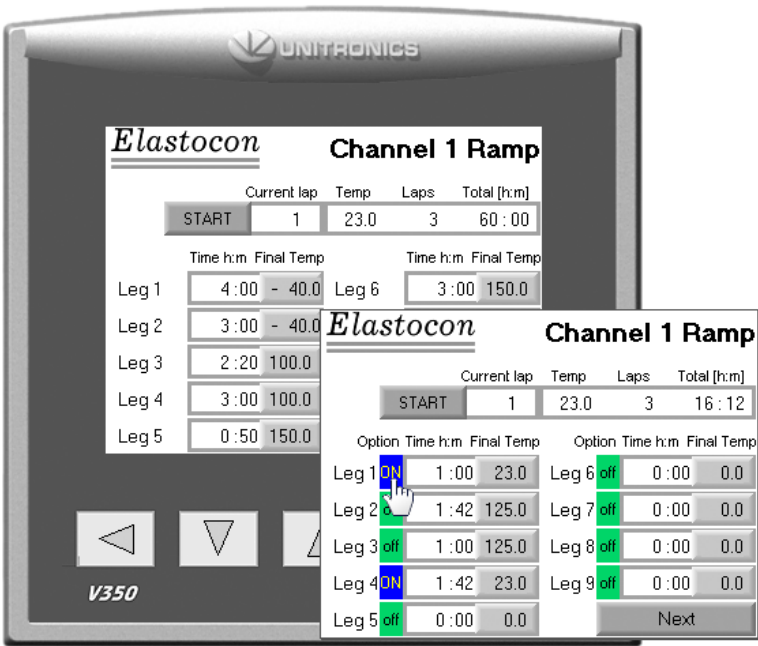
Ramp view header

The header is located on the first screen as the ramp button is pressed. The header consists of one *START* button, *Current lap*, *Temp*, *Laps* and *Total [h:m]*.

The **START** button will execute the full temperature cycle(s). To start the temperature cycle, press the button *START*. To stop the ongoing cycle, press and hold the *START* button pressed until the process is stopped (about 3 seconds).

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 **Laps** is a control where the operator can set up a number of repetitions for the cycle.

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.

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.
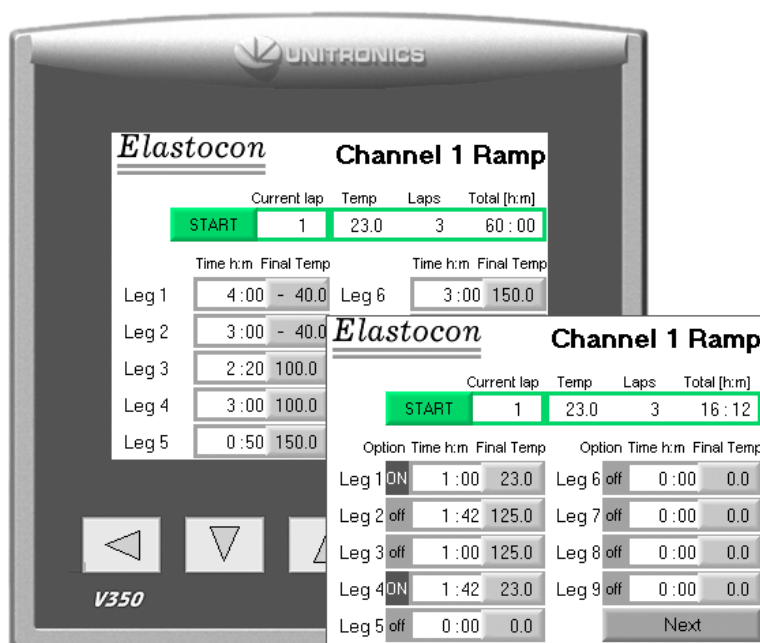
Quick guide to initiate a ramp (temperature cycle) and run it.

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. 9 legs are available in the first ramp window. Another 11 legs can be initiated in the next ramp window. Press the button *Next* to enter the next ramp window.

   Option buttons (visible on instruments with this option) To activate the option output, click and set the option "ON" for each leg that is supposed to activate the option 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 **START**.

6. The ramp symbol will start to blink on the main screen, when the main screen is restored automatically after 2 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 hours. 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 = 1h 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 = 1h and 42 minutes. Option is ON to run an optional event.

Repeat this cycle 3 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. 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 separate description for the setup screen. The control parameter is named *Stdby*.

4. Temperature and air flow calibration

The temperature sensor for the indicator can be removed for calibration in a block calibrator.

The air flow was calibrated with an air flow probe attached on every second station rod and in three different positions on each of these stations. Air probe positions on each rod are numbered as 1 on the left side of the oven, 2 in the middle and 3 on the right side of the oven.

The oven is at the delivery adjusted and calibrated according to the attached calibration certificates.

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.
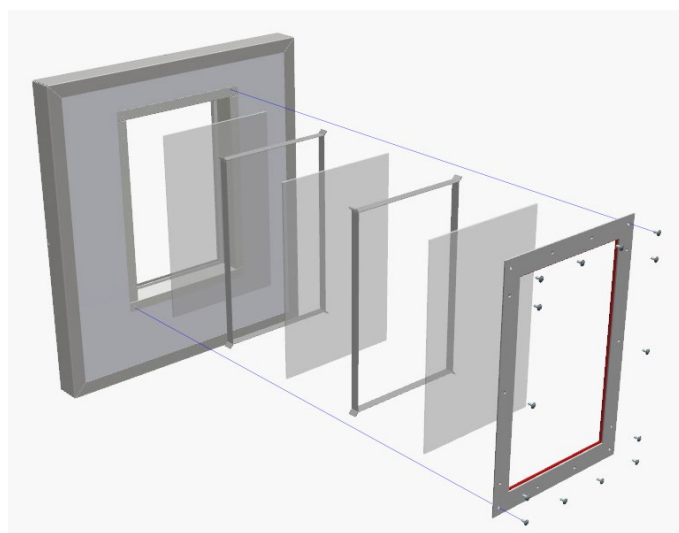
6. Trouble shooting

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 2.2.9 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 thefollowing working environment:

- Standard laboratory temperature of either 23 °C ±2° or 27 °C ±2°.

- Humidity not more than 90 % RH – non condensing.

- For long term logging instruments secure the power to the computer with a double converting UPS, for reducing electrical disturbances and power failure (ask Elastocon for recommendations or quotation).

- 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:	1 ± 0,5
Air changes, changes/hour:	7 or 14[*1]
Useful volume, l:	50
Dimensions, inner, w × h × d, mm:	450 × 450 × 250
Dimensions, external, w × h × d, mm:	875 × 845 × 620
Dimension, window, 4 glass, mm:	200 × 300
Illumination of the inner chamber:	24 V, 10 W halogen
Sample rod positions:	6
Sample rods:	12
No. of specimen:	36
Weight, kg:	106
Voltage, V/phase/freq:	220 to 240/1/50–60
Power, W:	2 200
Standards:	ISO 188 method B2

[*1] *preset by manufacturer*

Common specifications:

- The oven perform well inside the apparatus requirements in ISO 188 method B2 and other equivalent standards.

- Special design with controlled air exchange rate and 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 7 or 14 changes per hour.

- High and laminar air speed as specified in ISO 188 method B2.

- Cooling channels in the casing for low surface temperature.

- Controlled cooling fan for the electronics cabinet.

- Run-time meter (PLC).

- Count up and down time (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.

ED 04, computer, pc.

ED 06, UPS 1000 VA double converter.

Network cables.