Elastocon®

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Manual
Cell Ageing Oven EB 19, EB 20

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Contents

Technical documentation supplied on USB flash drive

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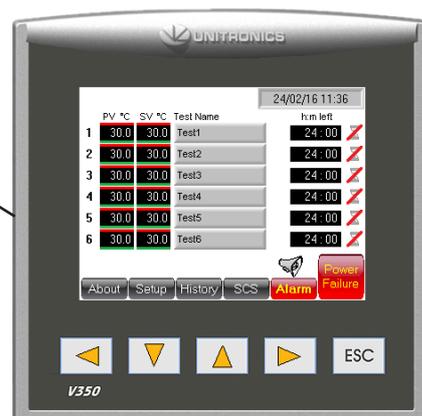
1. Setting up the Cell Ageing Oven

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.

2. Running the Cell Ageing Oven

2.1 Starting

Switch on the power (red switch).
Reset the power failure and alarm, see 2.2.4 and 2.2.6.
Set the temperature on the PLC, see 2.2.1.

2.2 Settings

Explanation

1. Date & time

2. Countdown time left

3. Countdown timer on or off
   (off in this example)

4. Test name

5. Power Failure

6. Alarm and History – tap this symbol and the alarm history will be visible on the PLC screen

7. SCS – multiple cells will be shown as slides shifting in a sequence with enlarged displays

8. Set up for
   • date & time
   • communication with software
   • calibration offset

9. Alarm Buzzer on or off

10. PV = Process value – the actual temperature in the cells

11. SV = Set value – the temperature set for this cell
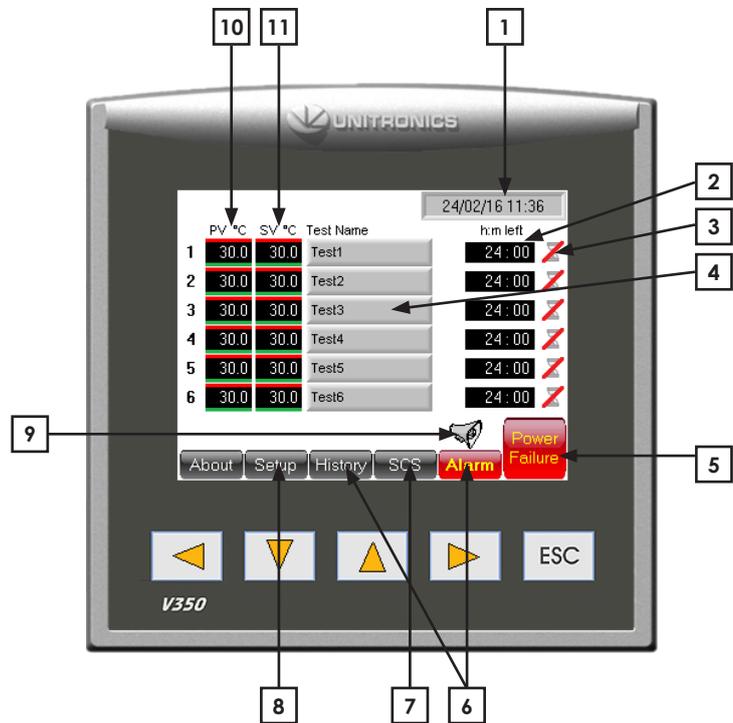
The oven has a touch controlled screen. A touch pen will be included

Note: Do not use sharp objects to touch the screen.
This can cause damage on the screen.

2.2.1 Temperature setting

Tap on the "SV" box (Set value) to set the test temperature **(Fig 2.2.1a)**.

A numeric keyboard will show. Type in the set temperature with the numeric keyboard and finish with a tap on the return button **(Fig 2.2.1b)**.

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

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

The "PV" box is an indicator and shows the present temperature in the oven.

2.2.2 Test name **(Fig 2.2.2)**

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.

2.2.3 Test time

In the "Time" box (h:m left) to the right of each cell a countdown time can be typed in **(Fig 2.2.3)**. Tap the box, type in the time and press Return. The time will now start countdown. This time can only be changed when the time symbol to the right is disabled. Press the symbol for at least 2 seconds and a red line is shown. The time can now be changed.

This function can also be used if the user don't want the countdown to start immediately. Press the symbol for at least 2 seconds until the red line is shown. Click the "Time" box, type in the time and press enter. When the countdown should start press the symbol (again >0 sec) until the red line disappears.

The countdown will now start. Time can also be changed by marking hours and use the arrows left and right.
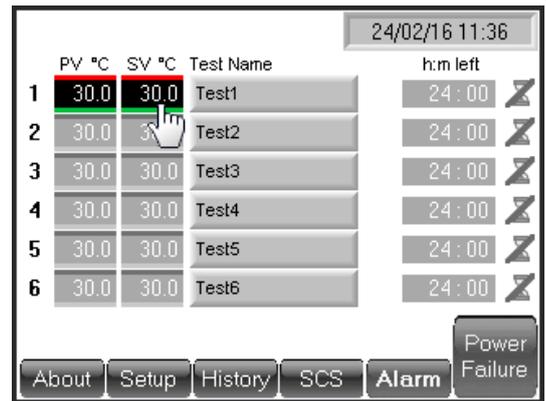
Fig 2.2.1a Temperature setting
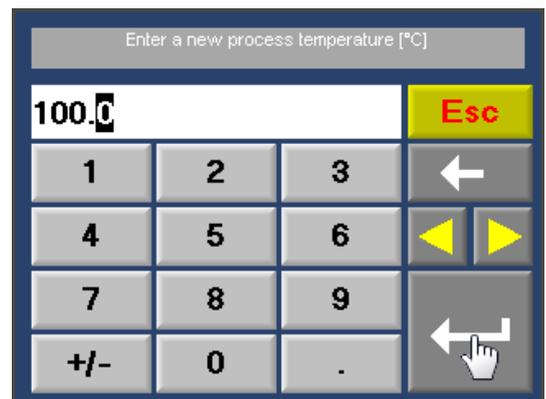
Fig 2.2.1b Temperature setting

Fig 2.2.2 Test name
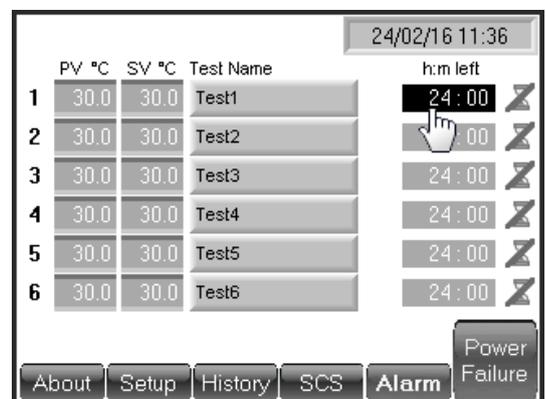
Fig 2.2.3 Test time

2.2.4 Power failure

Power failure during a test

If the test time is running 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 to reset the power failure **(Fig 2.2.4a)**.

A new screen will show **(Fig 2.2.4b)**.
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.

2.2.5 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
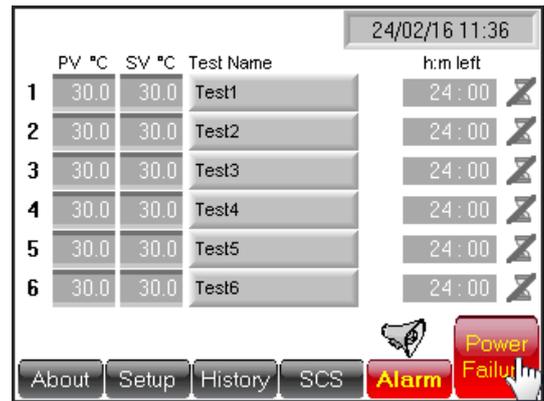
Fig 2.2.4a Power failure
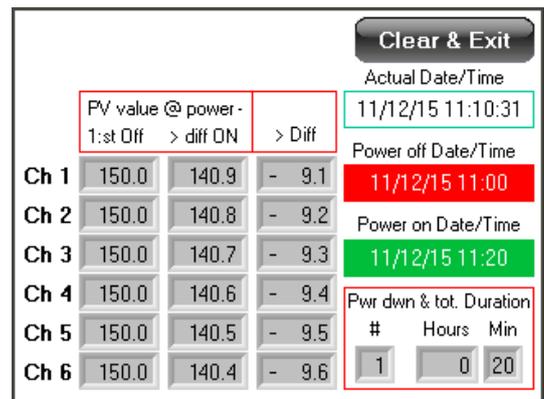
Fig 2.2.4b Power failure
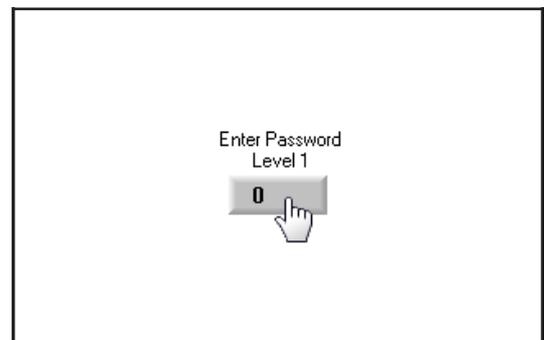
Fig 2.2.5 Password

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.

The oven main power must be switched off and on (restart) for the IP settings to refresh and initiate.

Temperature offset

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

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 below *Stdby*.

A 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 zero represents the temperature set value. 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 the screen.

Use the numeric keyboard to set a new time and date.
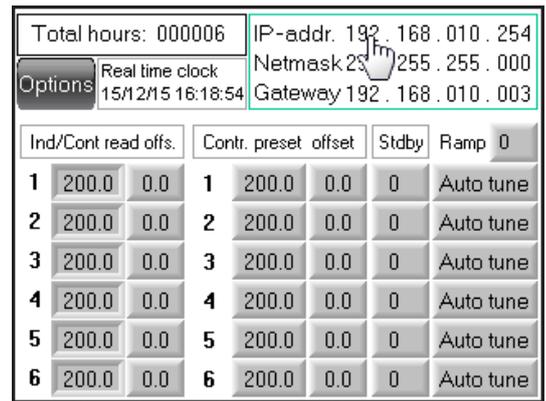
Fig 2.2.5 IP-address
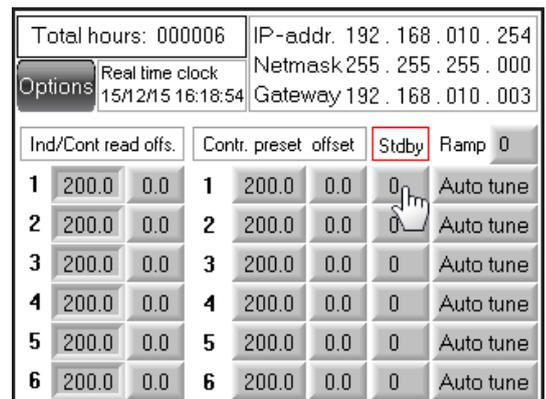
Fig 2.2.5 Standby temperature 1

Fig 2.2.5 Standby temperature 2
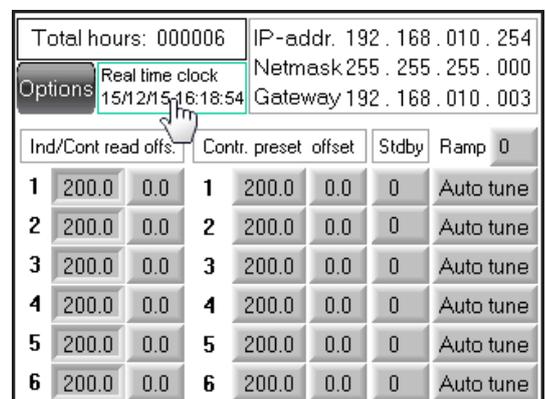
Fig 2.2.5 Real time clock

2.2.6 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
001–006 Cell 1–6	Oven cell is too warm.	The alarm will be reset when the alarm has been acknowledged and the cell has cooled down.
007–012 Cell 1–6	Temperature difference between set value and process value ±1 °C.	Wait until the temperature is within range to acknowledge the alarm.
013	Low pressure from airpump.	Check the airpump filter and function.
014	Shinko Communication Timeout.	Contact support.
015	Low battery.	Replace backup battery in OPLC (contact support).
016–021 Cell 1–6	Loop break controller #.	Broken temperatur sensor, call for service.
022–027 Cell 1–6	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).

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.

If the alarm button starts to flash, go through the check list in chapter 2.2.6 Alarm to identify the alarm and address the problem for proper action.

Buzzer on   Buzzer off
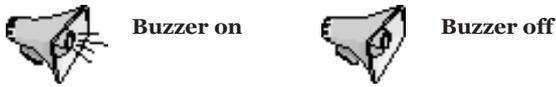
Acknowledge any alarm

To acknowledge any alarm, tap on the button Alarm.

Fig 2.2.6a. 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 2.2.6b. To acknowledge an alarm, press the magnifying glass to the right of the chosen alarm.

Fig 2.2.6c. 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.

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

Fig 2.2.6a

Fig 2.2.6b

Fig 2.2.6c

2.2.7 Set the air change rate

According to standards the air has to be changed during the test. ISO 188 Accelerated ageing, method A, requires an air change of 3 to 10 times an hour.

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

The cells in the oven have a volume of 2,4 l/cell.

This gives the following flow of air through the flow meters:

air change rate	
changes/h	l/min
3	0,12
5	0,2
7,5	0,3
10	0,4
12	0,5
15	0,6
17,5	0,7
20	0,8

For ageing of rubber materials it is suggested to set the flow-meters to 0,3 l/min.

For ageing of cable insulation materials it is suggested to set the flowmeters to 0,6 l/min.

Read the flow of the flowmeters at the center of the floats. The floats shall rotate slowly to show the correct reading.

Note: If the floats does not rotate properly check if the oven is placed horizontally.

2.3 Start the test

When the test temperature is reached, take up the test piece holders and place your samples on the pins, then return the sample holders in the cells. Be careful when placing the lid of the test piece holder, to achieve a good contact with the aluminium block of the oven.

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.
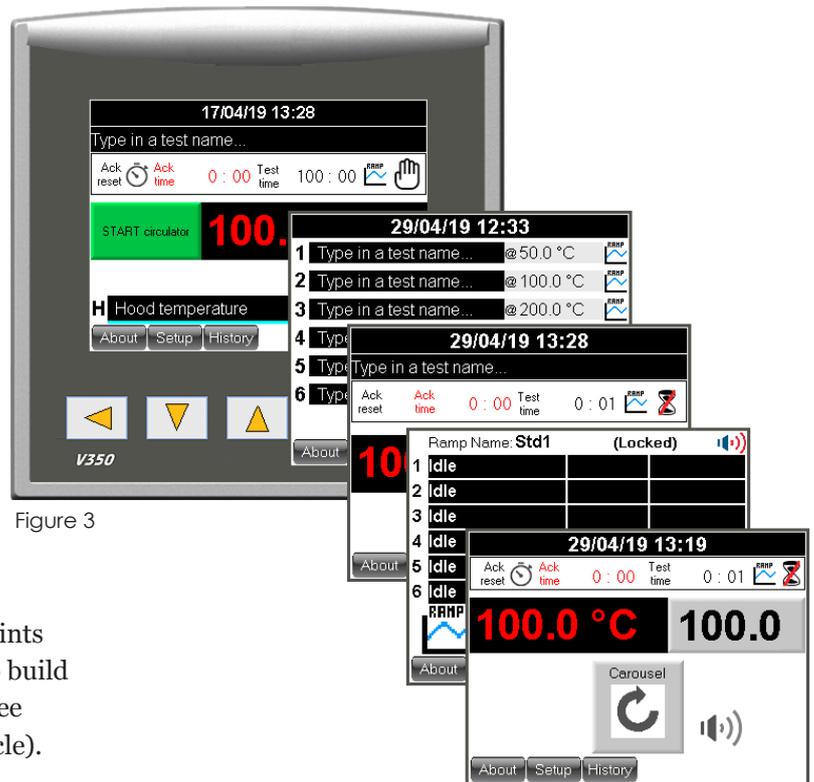
Figure 3

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.
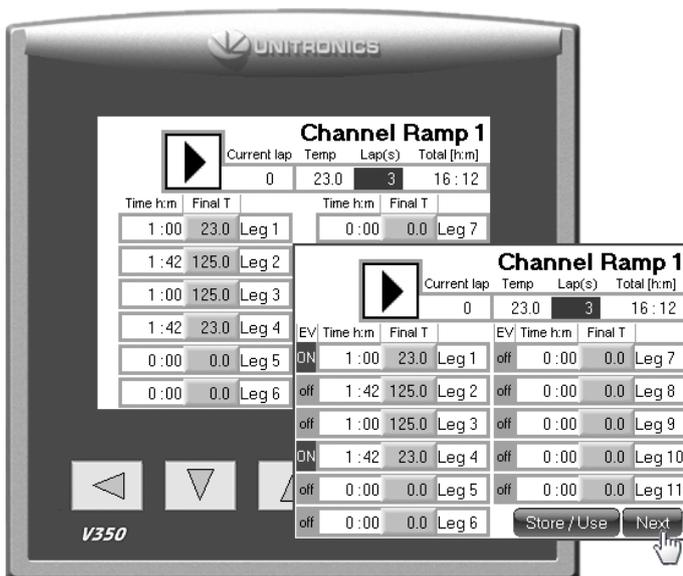
Button [ON/off] (optional)

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).
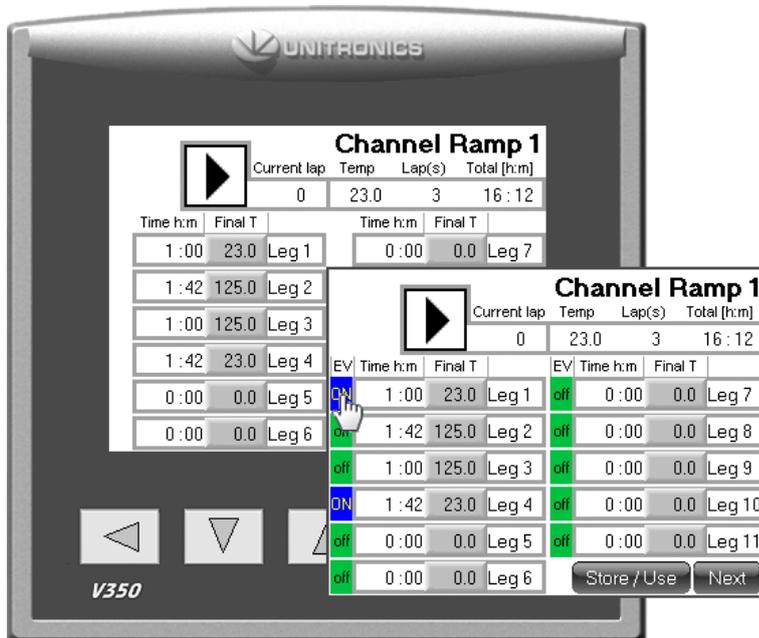
Ramp view header

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.

Play

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.

Pause   Stop

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.
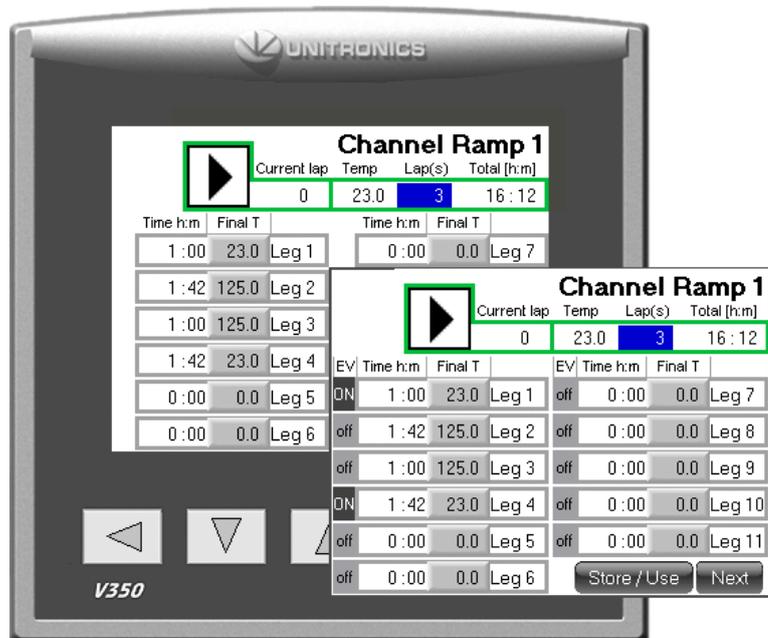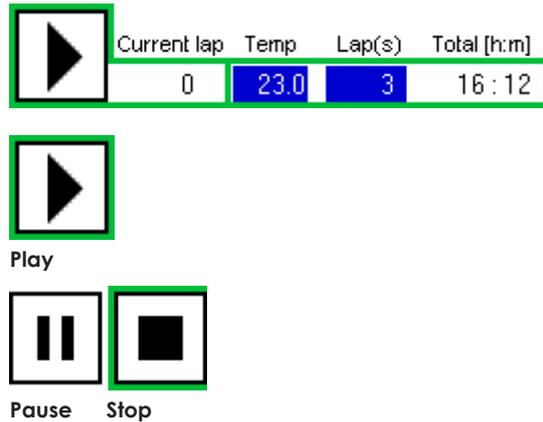
3.2 How to Store/Use a programmed ramp

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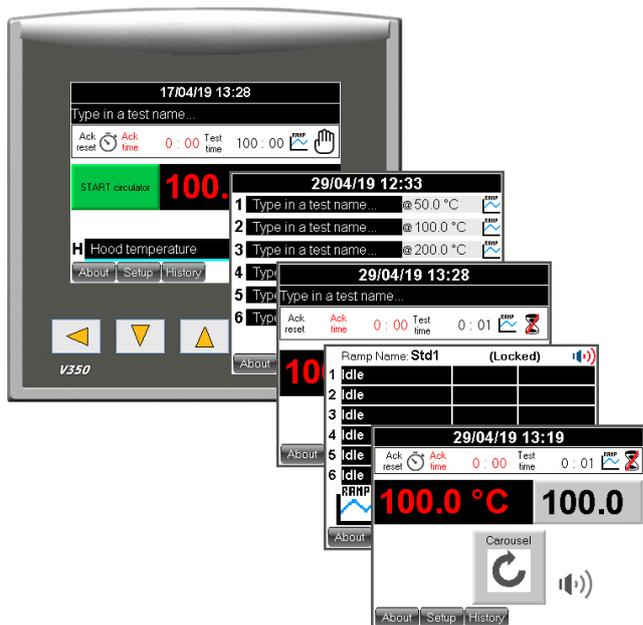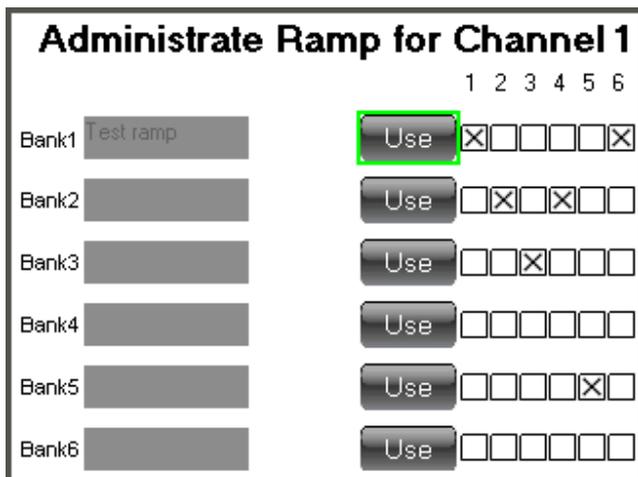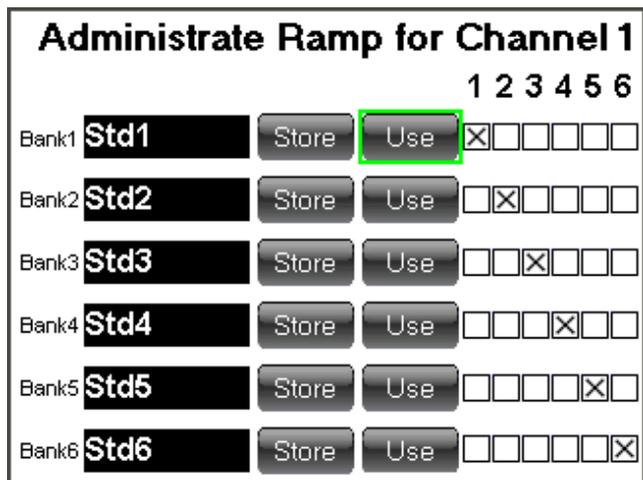
Quick guide to initiate a ramp (temperature cycle) and run it.

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 adjusted and calibrated according to the attached calibration certificate at the delivery.

Calibration should be done annually.

5. Service and maintenance

The cell 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.

On the inside, most dirt is accumulated on the inside of the upper lid, by volatiles from the samples condensing. The lid can be cleaned with a suitable solvent such as ethanol or white spirit.

The most sensitive parts of the oven are the air filter and the air pump, which should be checked at least once a year.

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 2.2.6 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 the oven or removed from the oven.

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

	EB 19	EB 20
Temperature range, °C:	+ 40 to + 200	+ 40 to + 200
HT-version, °C:	+ 40 to + 300	+ 40 to + 300
Temp. control, +40 to +100 °C, °C:	± 0,5	± 0,5
+101 to +200 °C, °C:	± 1,0	± 1,0
+201 to +300 °C, °C:	± 1,5	± 1,5
Temp. variation in time, °C:	± 0,25	± 0,25
Temp.variation in space, %:	± 0,5	± 0,5
Temperature sensors:	Pt 100, 1/3 DIN	Pt 100, 1/3 DIN
No. of temperatures:	4	6
No. of cells:	4	6
Air speed, m/s:	<0,001	<0,001
Air changes, changes/hour:	3 to 20	3 to 20
Useful volume, l:	4 × 2,4	6 × 2,4
Dimensions, inner, dia × h, mm:	100 × 300	100 × 300
Dimensions, external, w × h × d, mm:	760 × 500 × 510	960 × 500 × 510
Weight, kg:	55	74
Voltage, V/phase/freq:	220–240/1/50 (110–120/1/60)	220–240/1/50 (110–120/1/60)
Power, W:	900	1300
Standards:	ISO 188 method A IEC 60811-1-2 IEC 60216-4-3	ISO 188 method A IEC 60811-1-2 IEC 60216-4-3

Common specifications:

- The ovens perform well inside the apparatus requirements in ISO 188, IEC 60811-1-2 and other equivalent standards.

- The ovens are controlled from a PLC (with a colour touch screen).

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

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

- The inner cells are made of aluminium.

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

- Temperature indicator with sensor in each cell (PLC).

- Fixed over temperature fuse.

- Flowmeters with needle valves, for setting the air exchange rate.

- 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.

- Alarm for low air pressure (PLC).

- Built in air pump.

- Cooling channels in the casing for low surface temperature.

- Temperature controlled cooling fan for the electronics cabinet.

- Indication of power failure (PLC).

- Run-time meter (PLC).

- Countdown timer (PLC).

- Microfilter for the air which removes 99,99 % of all particles over 0,1 μm.

- Also available as high temperature versions, to 300 °C.

Optional accessories

EB-P Ramp function for temperature setting in the PLC.

EC 11 Monitoring software.

ED 04 Computer, PC.

Network cable.

Support

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