OPERATING MANUAL

XSO-SuperOven

**Superior, Full Convection, Bench Top Batch Oven
features six viewing windows, very fast heating and cooling rates and
exceptional performance in maintaining N2 purity during the reflow cycle.**

The oven is nitrogen ready, with the ability to connect to a PC, and includes XMF-306
Cooling System Controller. It has a built in 8 channel profiler and two connectors for external
"K" thermocouples (readings of which are shown on the Oven display, stored and displayed
online on a PC by an optional X-306 Oven Monitor).
This batch oven has a sealed heating chamber that permits heating in N2 environment which
is as good as 3000ppm or better.

XSO Super Oven

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I. INTRODUCTION

Picture of the Scientific Convection Batch Oven

Congratulations on the purchase of a Superior Convection Batch Oven **XSO SuperOven.**
You now own a uniquely designed full convection Batch Oven for use in precisely controlled production processes, heat resistance testing of components, and for use in the laboratory experiments for other purposes where precise and accurate heating and underlined precisely controlled cooling media flow rate is required.

The unit offers several unique features, not found in any other ovens on the market today:

- Viewing windows on all 6 sides, 4 large windows in front and back, top and bottom plus two smaller windows on each side of the oven.
- Built-in on-board 8 channel data logger which monitors in real time 8 "K" thermocouples and record data on a PC connected via USB port to the oven.
- Built-in residual O_2 monitor to check the actual level of residual O_2 in the oven
- An operating mode in which the control of a heating/cooling process is implemented by reading the real-time temperature of the heated or cooled object via a thermocouple attached to that object and the TC-T input, controlling the heat to reach the pre-programmed temperatures.
- Advanced two zone, two media (N_2, shop air or both) programmable flow rate cooling system which enables cooling of heated objects (e.g. PCB's after reflow at the rates of 4 to 5 deck per second) which gives better reliability of soldered connections and safer handling of the heated objects.
- XMF-306 Programmable Cooling Module, which controls the amount of cooling media (Air or N_2) in order to provide the exact volume of L/min or SCFM's needed for cooling a particular load.
- True convection heating with added, separately controlled blue IR illuminators/heaters.
- Time settings in 9 time/temperature zones plus a time setting for purging the oven with nitrogen (N_2).
- Presetting of profiles for different heated objects with memory space for up to 250 profiles. The profiles may be pre-set with control of the air temperature in the chamber or by controlling heaters with the thermocouple attached to the heating object.
- Six inspection windows (one on each side of the oven) which allows the user to monitor the heating process during operation (inspection can be done using a microscope or camera system).
- Microprocessor-based control uses closed-loop monitoring to ensure absolute repeatability of the temperature profiles and has a memory to store 250 profiles.
- The large backlit display shows all process parameters and the specific temperatures and times or a graph of temperature versus time in real time.
- The Nitrogen inlet is standard and the oven can be used for heating in a Nitrogen environment with no additional hardware required.
- Each oven has a built-in heat exchanger on the fume extraction port to protect the filtration systems if used to extract the fumes.

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SAFETY
The purpose of this "SAFETY" section is to inform the users of the guidelines used to indicate special Notes, Cautions, Warnings or Dangers. Also included are the precautions which must be observed when operating or servicing this product.
These "NOTES", "CAUTIONS", "WARNINGS" and "DANGERS" are inserted in this manual wherever deemed necessary. They appear in blocked-off form with an outline and a shaded background to highlight the information as shown below.

NOTE
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

NOTE
- Used to indicate a statement of company recommendation or policy. The message may relate directly or indirectly to the safety of personnel or protection of property. NOTE is not

associated directly with a hazard or hazardous situation and is not used in place of "CAUTION", "WARNING" or "DANGER".

CAUTION
- Used to indicate a hazardous situation which may result in minor or moderate injury. May also be used to alert personnel to conditions, procedures and practices which, if not observed, could result in damage to or destruction of the product or other equipment.

WARNING
- Used to define additional information that, if not closely followed, may result in serious damage to equipment and serious personnel injury.

DANGER
- Defines additional information that, if not closely followed, may result in severe personnel injury or death. Danger is not used for property damage unless personal injury risk is present.

PRECAUTIONS

The following are general safety precautions which personnel must understand and follow when using or servicing this product. These precautions may or may not be included elsewhere in this manual.
1. Utilize all standard electrical safety precautions when using this or any other electrical equipment.
2. Always use this system in a well-ventilated area.
3. Exercise proper precautions when using chemicals (e.g., solder paste). Refer to the Material Safety Data Sheet (MSDS) supplied with each chemical and adhere to all safety precautions recommended by the manufacturer.
4. The fumes emitted during soldering are irritants and therefore should be removed. A pumped vent is located at the rear of the unit and should be ducted accordingly.
5. The area close to the hood becomes hot; care should be taken when working around this area.
6. The oven must be properly grounded.
7. Please read this operation manual carefully prior to use.
8. The areas around the viewing windows become hot, therefore, care should be taken when working around these areas.
9. After ending the cooling cycle, the inside of the oven is still hot, therefore, care should be taken when removing and placing the object(s) to be heated inside the oven.
10. Be sure to wear appropriate gloves to prevent burns when taking heated objects out of the oven and placing new ones inside the oven. The temperatures inside the oven may be as high as 380 degrees Celsius. Use ESD-safe heat-resistant gloves like Bokar P/N AHRG-11 or AHRG-16.
11. To ensure continued peak performance through the years, use genuine X-KAR replacement parts.

II. PACKAGING

The packaging of the XSO-SuperOven has been carefully designed to ensure maximum protection during transportation. However, no packaging can guarantee 100% protection. Damage may occur through rough handling by the carrier. Please ensure that any damage claim is reported promptly to the carrier and to the Distributor from whom the product was purchased.

The Oven is packaged in 2 crates:

The content of the crate 1 are as follows:
1. XSO SuperOven Main Body
2. The accessories box which includes:
   - User's manual for the XSO SuperOven
   - X485-USB Converter P/N 20-00092
   - XTC profiler CD, P/N 33100; XTC USB connecting cable P/N 32033
   - Ten "K" thermocouples, P/N 33101 (8 for the profiler and one each to be used as TCT and TCB)
   - XU-8 Board Holder and 2 board supports

- Two cooling flex lines connecting cooling media to both sides of the oven, P/N 33098
- One cooling flex line connecting XMF-306 with XSO SuperOven, P/N 32761
- 17mm wrench to remove the transport screws bolting the Main Oven Body to the bottom of the crate

The content of the second crate is as follows:
1. XSO SuperOven Electronics Control Unit
2. XMF-306 Cooling Media Controller.

Note: The unit comes without an AC plug because there are no unified standards for plugs and sockets used for high current 220V, 3 phase power lines,.

III. UNPACKING

Prior to using the system, please check if the system is complete. Should you notice that any items are missing, please notify us, giving the model number, voltage, date of purchase, place of purchase and what is missing. Missing items must be reported within 7 days of the date of purchase.

WARNING
When unpacking, please read the Manual carefully. Prior to turning the System "ON", please make sure the voltage of the System corresponds with the voltage of your available supply. Connection to incorrect voltage supply may cause damage to the System!

IV. GENERAL INFORMATION

1. Display
2. Current zone indicators
3. Numerical keypad
4. Cool Key
5. Start/Stop Key
6. TC-T and TCB status indicators
7. Main Power switch
8. Mode indicators (Base, N2 and Purging Modes)
9. EMO emergency push-button switch

Control panel view
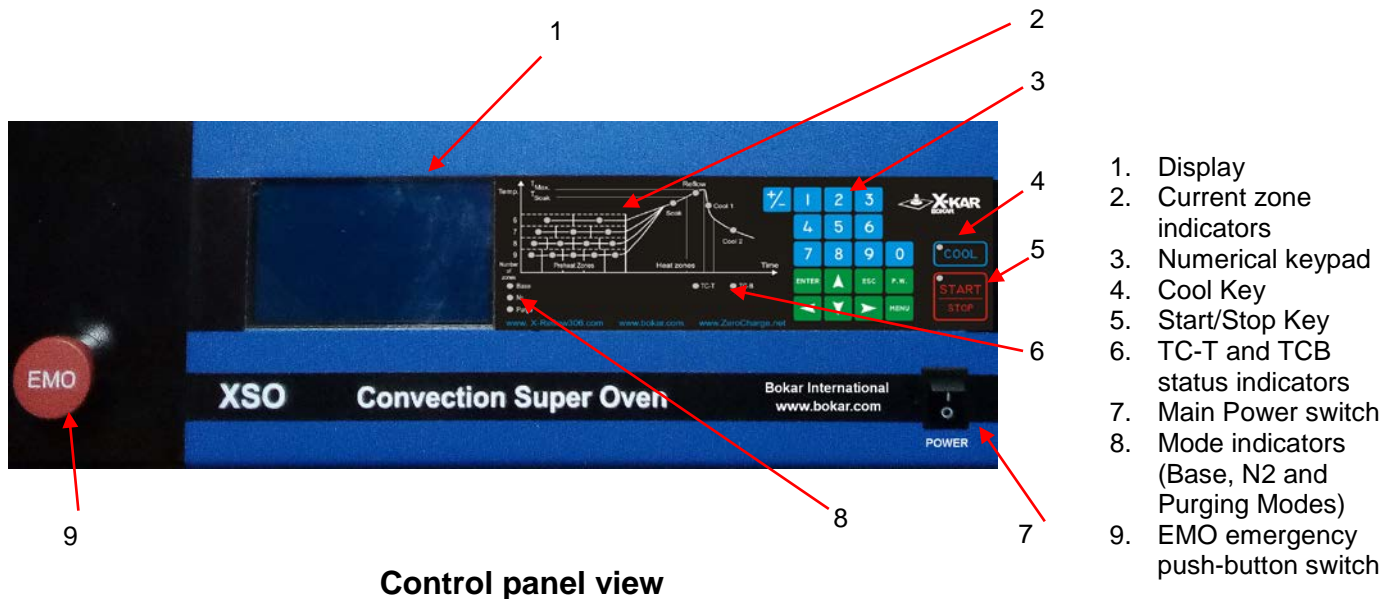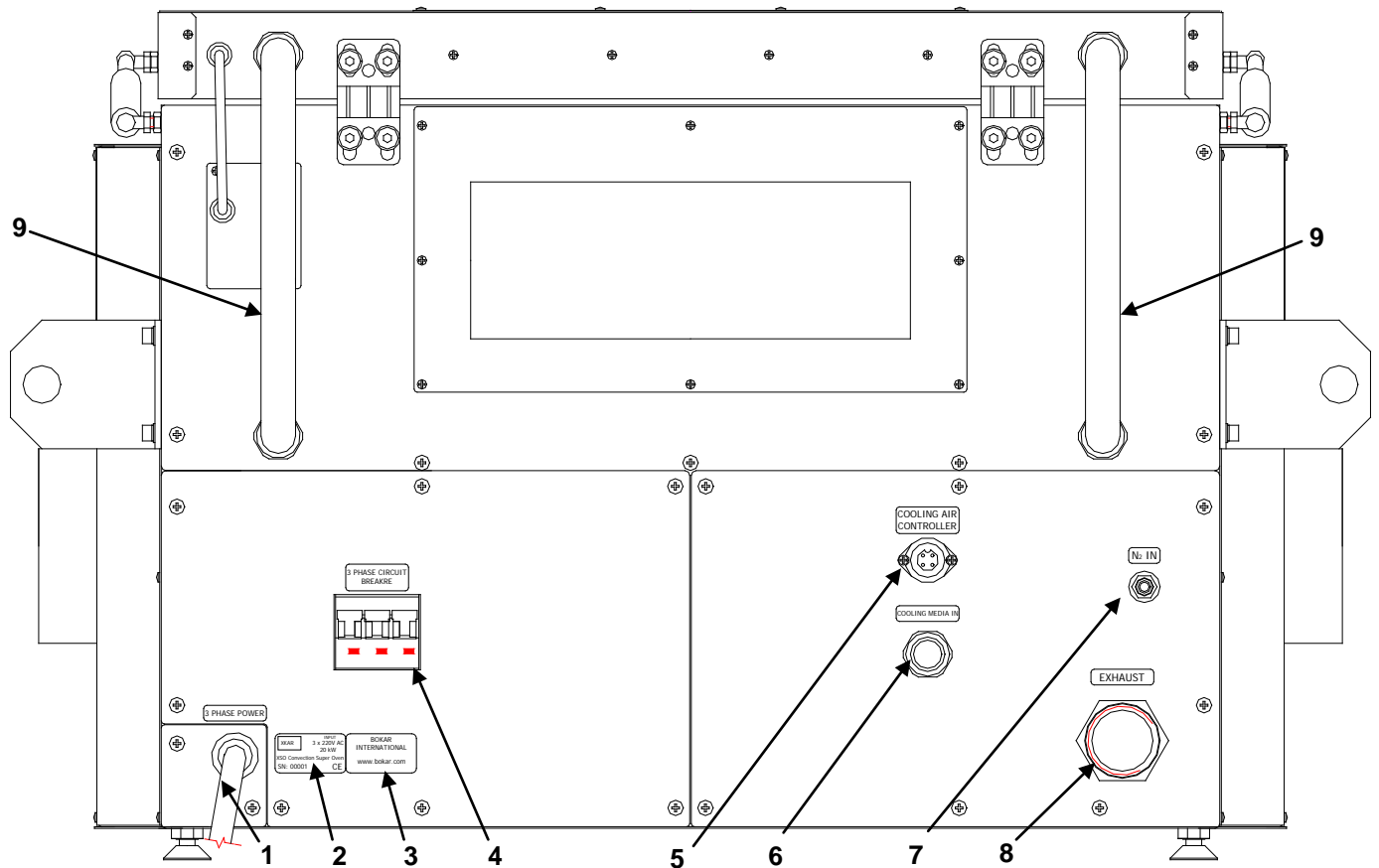
XSO Super Oven rear side view

What is on the back panel and the back of the top clam shell of the oven:

1. 3 Phase Power cord
2. Unit Label (Model, Serial # and working Voltage)
3. Bokar International Company Label
4. 32A, 3 Phase Circuit Breaker
5. Electrical connector to connect XMF-306 Controller
6. 3/4 " airline pneumatic male nipple to connect flex cooling media line from XMF-306 Cooling media controller
7. N2 Addition during heating cycle I/M size 1/4 male quick connector
8. Exhaust 1-1/2 " male pipe thread to connect the exhaust pipe
9. 3/4 "cooling flex lines

V. SET-UP AND INSTALLATION

ELECTRICAL REQUIREMENTS

The XSO Convection Super Oven unit requires 3 phase AC line as 127 (L-N) / 220 (L-L), 20 kW of power.
If your power outlet cannot provide suitable power, arrange for a qualified, licensed electrician to install one for you.

SET-UP

1. Unpack XSO Super Oven using "Unpacking instruction". Store the shipping crates in a convenient location. Reusing these crates will prevent damage if you ever need to ship or store the unit.
2. The system should be placed on a rigid and stable work surface. Its total weight is about 150Kg (330Lbs).
3. Confirm that the power switch on the front panel is on "OFF" position and the 3 phase circuit breaker on the rear panel is turned off (in the bottom position and green fields on the fuse)
4. Open the TOP Clam Shell, remove all accessories and documentation inside the oven and place the XU-8 Board Holder inside.
5. If you wish to use nitrogen for heating in N_2 environment and control low levels of O_2 during heating cycles attach the nitrogen source (1~2 kg/cm^2) to the nitrogen input port on the rear panel of the oven. Note: Higher N_2 pressure can be used (up to 6 bars) if your process requires it.
   If you plan to use the N_2 for cooling, secure a high volume source. A volume of 1000 to 2000 liters is recommended for fast cooling.
6. Unpack the XFM-306 Mass Flow Controller and place it behind the unit.
7. Connect the electrical cable which is attached to the XFM-306 unit to the mating connector on the back panel of the oven. Use ½" ID flex line supplied with the unit to connect the XFM-306 cooling media output to the ¾" cooling media input located on the back panel of the XSO SuperOven.
8. The XFM-306 controller allows for the use of N_2 for fast cooling to solidify the molten solder and cool the shop air. It has 2 cooling media inputs. Connect the N_2 to the fast cooling (Cool1) input and the shop air to cooling (Cool2) input.
9. For first-time installation: Install proper AC plug at the end of the power cord. The color coding of the wires is as follows: Brown, Grey, Black = Hot wires (L1, L2, L3), Blue = Neutral wire, Green/Yellow = Grounding wire

   The oven is now ready for use.

POWERING UP and LOGGING-IN

1. Connect the power cord to the appropriate AC power socket: 127 (L-N) / 220 (L-L)

CAUTION
To insure operator's safety, the AC supply receptacle must be checked for proper grounding before initial system operation.

2. Turn on (Lever to upper position) 3 Phase Circuit Breaker on the back panel.
3. Turn the power switch to the "ON" position.
4. A short sound will be heard and the display will show a welcome screen with the manufacturer's logo, the oven's name, a serial number and the oven firmware revision number (below-left).

Please check if the red LED marked "POWER" on the panel of the XMF-306 Flow Controller illuminates. If yes, the electrical cable from the XMF-306 was properly connected to the Oven.

5. After a few seconds, the display will show a "Log-In" screen where different level of users are listed After few seconds the display will show a "Log-In" screen where different level users are listed (above right).

Bokar International   650 Scranton Pocono Hwy, Covington Twp., PA 18444   USA

Depending on your privileges (Administrator, User, Guest or Factory Authorized Representative), choose an appropriate logging. Detailed information about privileges and accounts is presented in another chapter of this Manual.

6. If the operator is not the one of the authorized users he/she can log-in as a GUEST.

   Pressing "up" or "down" arrows on the numerical keypad moves the cursor to the desired

   user selection. When the appropriate position is selected, press **ENTER**

7. The screen (below-left) will ask for a Password.
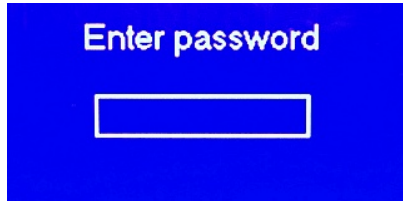
Enter Your four-digit Password and press **ENTER**. If you are going to be the administrator of the oven and turning on the oven for the first time, please enter preset Factory Code 1234 for the administrator and

press **ENTER**. The Code can later be changed to any four-digit combination. If you change it, please write it down and keep it in a safe place.

8. When the password is entered, the Process Window displays the most recently used profile (above–right). The Programming and Heating Process starts from this window. Process Window is the main window of the Oven Program. To return to the "Process Window" screen from any other viewing

   windows press **P.W.**. This window displays all information about settings of times and temperatures in the Oven in different zones. It displays also temperatures read by the external thermocouples connected to TC-T and TC-B sockets on the back panel and temperatures of the air circulating in the chamber from the thermocouples placed in the front and back of the heating chamber.

VI. OPERATION

The heating process (or Program Cycle) can be started from the "Process Window" and "Program window"

Pressing the **START STOP** key begins the Program Cycle. When the process started, Red LED illuminates in the corner of the Start/Stop key. The display shows the "Process Window" screen (Fig.4 below). Color LED's on the graph located next to the display indicate the phase of the cycle and in which zone the program executes the cycle.

Pressing the **START STOP** key at any time during the process advances the oven to the next task (not to the next zone) and eventually stops the cycle.

Pressing the **COOL** key opens the cooling air valve and starts the cooling immediately by the media connected to Cool2 input of the XMF-306. During the cooling cycle, the fan inside the oven circulates the air. The cold air jets will cool the object in the oven.

2. Object target temperature (displayed in each zone)

3. Temperature scale C or F displayed after a number

4. Actual temperature of air at the exit from <u>two rear heaters</u> and two <u>front heaters</u>

5 & 6. Temperatures of External "K" thermocouples connected to the TC-T (top) and TC-B (bottom) sockets on the side profiler panel

1. Actual temperature of the heated object

7. Programs list

8. Details of actual program

23. Program Number. (Asterisk next to a Number means that the program was modified).

9. Actual Cooling media flow

22. Lock/Unlock STATUS and who locked the Program

11. Sequencer Mode

12. Process can be started from here

21. N₂= Injection Mode of N₂ in each zone:
P= Proportional, T= Timed
C=Continuous injection
OFF= Nitrogen Valve Closed

20. Pre-Programmed Base Temperature
(If the base mode is not selected in the User Settings, the base temp. is not displayed).

18. Process Time (Sum of all pre-programmed zones)

19. Elapsed time from the beginning of the process beginning

16. Elapsed Zone Time (graphic bar)

15. Elapsed Zone Time [s]

14. Programmed Zone Time [s]

17. Process Status: Square=Process stopped
Triangle=Process is running
B inside=Base Mode ON   P inside=Purging in progress
(will appear when N₂ Mode is selected in the User Settings)

13.Display of the actual zone
- Heat 1
**   to**
- Heat 4
- Soak
- Reflow
- Cool 1
- Cool 2

Before the program starts, Process Window, <u>shown above, displays that the Oven is set to execute the program in which the Oven temperature is controlled by the thermocouple TC-T</u> connected to the heated object and plugged into to the TC-T input on the right side of the control panel of the Oven.

Before the program starts, Process Window, shown below, displays that the Oven is set to execute the program of which the Oven temperature is controlled by maintaining the pre-set temperature of the air or N2 in the Oven.

3a & 4a
Front and Rear Heater Overshot Temperatures (displayed in each zone)

3 & 4
Front and Rear Heater Temperatures (displayed in each zone)

On the right side of the Process Window there is a keypad. To set the required oven parameter, press [MENU].

The screen will change to the one below on the left.

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Settings	Protection	System	Connection
Base temperature			50.0
Offsets			
Overshoot			
Cooling to temp. of			Circulating Air
Ventilation			
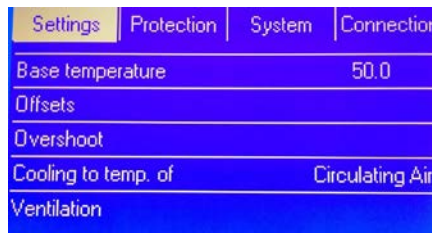
Press [ENTER]. The screen will change to the one shown above on the right. The first top row of the display shows the general oven settings.

Under the word Settings, there is a list of the first five oven parameters which can be pre-set.

Pressing the [▲] [▼] arrows allows an operator to scroll up and down the screen to choose the required parameter to change or view. Use [◄] [►] to move from the left side to the right side of the screen.

1. **Settings   (From this window, you can set the program on how you want the Oven to function. You can set the units in which your oven shall display the parameters and how it should execute the heating and cooling)**

   1.1. Base Temperature.

   This is the temperature which the oven will maintain inside the heating chamber at all times after the [START STOP] key is pressed. This option is unique and not commonly found on other ovens. It is very useful because, when the heating profile is started when the oven is cold, it takes a minute (or sometimes longer) to heat the mass of the oven body which slows down the heating of the object in the oven. The warm start from known starting temperature gives better repeatability of the same programs run at any time. The Base Mode is also very useful when using the oven as a one zone device for pre-heating or curing purposes. It offers a very quick setup of constant temperature heating.

Settings	Protection	System	Connection
Base temperature			50.0
Offsets			
Overshoot			
Cooling to temp. of			Circulating Air
Ventilation			

Settings	Protection	System	Connection
Base temperature			50.0 (Blinking)
Offsets			
Overshoot			
Cooling to temp. of			Circulating Air
Ventilation			
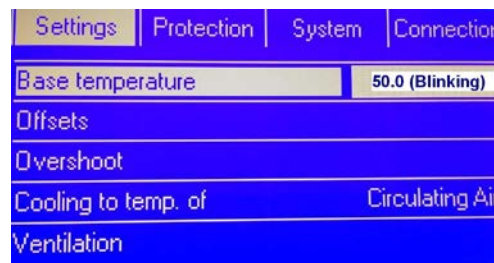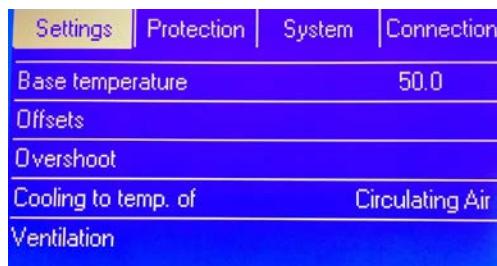
   To turn this option ON, press [►] and then [▲]. The right part of the line will highlight, and the number in the highlighted area will blink showing previously set Base Temperature. You can use the numerical keypad to set your desired base temperature value. Press [ENTER] to save your setting. Possible range when setting the Base Temperature is :+50ºC to +380ºC.

   From the display shown on the right above, scroll down by pressing [▼] to set one of the next 4 parameters.

   1.2. Offsets

   This feature is also unique. Theoretically, the hot air mixes in the heating chamber and reaches an average value. Both heaters are set up in the factory to deliver the same temperature of the airstream at the front and rear of the heating chamber. If the heated object mass is not evenly distributed (e.g. the board is heavily populated by the large components on the back and lightly populated at the front), the

oven heating gas will need to have higher temperature at the back to heat evenly the mass imbalanced object. This is because the mass of the hot air injected to the heating chamber from both front and back is the same. In case of not evenly distributed mass to be heated, the operator should measure the difference in the temperature rise and set the heater offset accordingly. Example: If the back heater should give the air hotter by 20ºC the operator should set the rear heater temperature offset to + 20.
Note: one may also enter negative offset values.

From the display as shown on the left above, scroll down by pressing ▼ to highlight Offsets. Then,

press ENTER or ➤ to set one or both heaters' offsets. The display will show as seen below on the left.

From the display as shown on the left above scroll down by pressing ▼ to highlight Offsets. Then

press ENTER or ➤ to set one or both heaters offsets. The display will be as seen below on the left side.

Base temp.	Offsets	Overshoot	Cool. to T.
Front left heater offset			0.0
Rear left heater offset			0.0
Front right heater offset			0.0
Rear right heater offset			0.0
Override factory offset			Yes

1.2.1.Front heater offset – Press ➤. The right part of the line will highlight and 0.0 value will blink.

Use the numerical keypad to set your desired value. Press ENTER to confirm your setting. Possible settings for the offset for front heater are: -20ºC to +90ºC. The factory setting is 0ºC.

1.2.2.Rear heater offset – Press ▼ to scroll to Rear heater offset line. Press ➤. The right part of the line will highlight and 0.0 value will blink. Use the numerical keypad to set your desired value. Press ENTER to confirm your setting. Possible settings for the offset for the rear heater are: -20ºC to +90ºC. The factory setting is 0 ºC.

1.2.3.Override Factory Offset – Factory offset is set-up to 0 ºC. For some customers (on demand) it is set to a different value. You should choose to override Factory Offset.

1.3. Overshoot

To speed-up the object temperature rise to the pre-set temperature in the zone and start the PID control of the temperature of the air in the heating chamber as close as possible to the moment when the heated object reaches the desired zone temperature, the operator can set target air temperature a bit higher than the desired zone temperature by the number of ºC which he/she can program. He/she can also pre-program how long this temperature overshoot should last.

Press ▼ to go the Overshoot line. Then, press ENTER. The right part of the line will highlight and "off" will blink. Pressing ▲ ▼ arrows turns the overshoot ON or OFF (picture below left).

| Base temp.	Offsets	Overshoot	Air circ.
Overshoot			Off

Base temp.	Offsets	Overshoot	Air circ.
Overshoot			
Overshoot time			30
Overshoot temp.			30.0

After selecting "ON", press ![ENTER]. The screen will be as shown above right.

Press ![▼] to go to Overshoot time. Press ![►] to go to overshoot time setting section.

Set the desired time and press ![ENTER] . Repeat the action to set the Overshoot temperature.
Recommended Overshoot is 10 to 30ºC in 10 to 30 seconds.

1.4 Cooling to temperature of
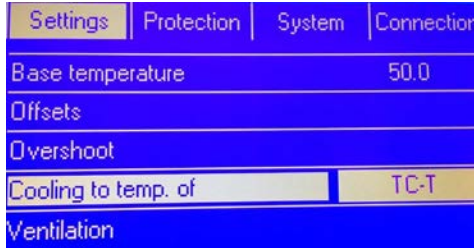
The operator can set how long the cooling shall last. It can be set to track the temperature of the circulating air and stop the cooling action when the circulating air drops to the pre-programed value. Working simultaneously is the setting of the maximum cooling time. The cooling action will stop when either: a) pre-set time elapses or
b) the temperature of the air in the oven drops below the pre-set value.

Press ![▼] to go to Cooling to temp. of. Press ![►]. The right part of the line will highlight and previously set mode of Cooling to temperature of will blink.

By pressing ![▲]![▼] you can set the oven to cool to the temperature of the circulating air or to the temperature measured by the TC-B or TC-T (thermocouple connected to the heated object and to the input on the back panel of the oven). Mode TC-B or TC-T will make the oven cooling work until the temperature measured by the selected thermocouple reaches pre-programmed value.

Press ![ENTER] to confirm your setting.
Note: Cooling to the temperature of the circulating air (as in all other batch ovens) does not give any guarantee that the load is cold as well.

1.5 Ventilation

From the screen Cooling to temperature of press ![▼] to go to Ventilation. Press ![ENTER] or ![►].
This opens the next screen.
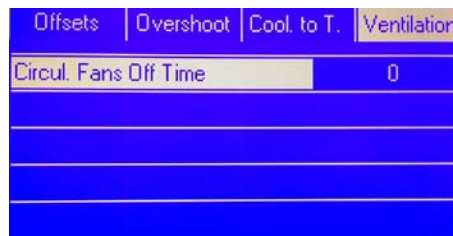
1.5.1   Circulating Fans Off time

The circulating fan may be disabled during cooling to avoid the entrance of hot air to the heating chamber in the heater section.   Possible settings for Circulating Fans OFF are 1 to 1200 sec. The factory setting is "0" (this means the fans are always ON and circulate the air in the heating chamber during cooling).

Press [▼] to go to Circul. Fan Off Time: Press [ENTER] or [►]. The right part of the line will

highlight and show blinking "0". By pressing [▲] [▼] you can turn the circulating fans OFF or choose the window where the numerical value of the "time off" can be entered. While in this

window, use the numerical keypad to set your desired value. Press [ENTER] to confirm your setting.

Press [ESC] to return to the Settings menu where Ventilation is higlighted.

1.6 N2 – Nitrogen Environment settings.
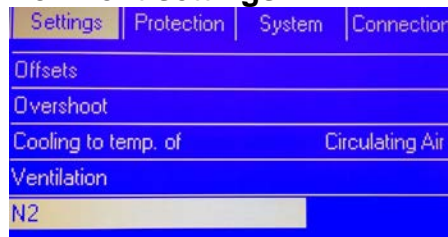
Press [▼] to go to N2. To turn this option ON press [►] or [ENTER]. The below left window will open.
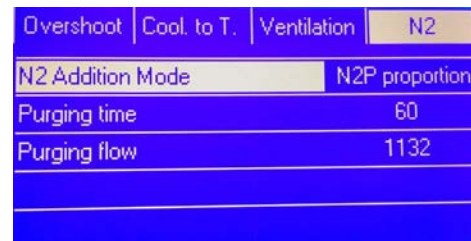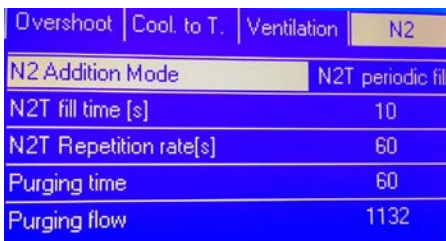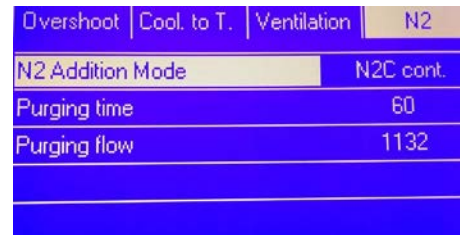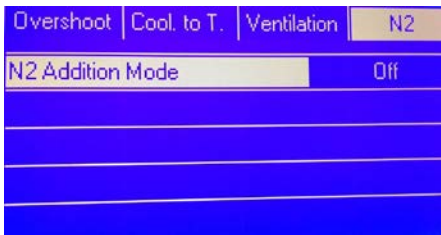
Press [►]. The right part of the line will highlight and the highlighted area will blink showing the

previously set N_2 Mode. By pressing [▲] [▼] you can set N_2 mode of operation to:
Off, N_2C=Continuous fill, N_2T=Periodic fill [sec] or N_2P=Proportional [%].

Press [ENTER] to confirm your choice. N_2 Mode will be highlighted.

Press [ESC] to return to the Settings menu.

1.7 Cooling Media Flow Control

These settings define how the XMF-306 Mass Media Flow Controller attached to the oven will function. The XMF-306 has two inputs (one for fast cooling with N_2 and the second one for the compressed air). Both Fast Cooling (Cool1) and Cooling (Cool2) can be programmed independently when creating the program.

In the settings the Operator can choose cooling flow units (l/min or SCFM's).

Note: Fast cooling solidifies the solder which is best done with N_2. The flow should be chosen depending on the mass and size of soldered components to avoid blowing them out of place. After solder solidifies, the air flow in Cool2 can have higher velocity.

When in Settings – N2 line, press ▼ to go to the Cooling Air (or N_2) flow Control.

The window shown below/left will open. Press ► or ENTER to go to the right side. Turn the mass flow controller ON using ▲ ▼ up/down arrows.

1.8 Cooling Air (or N2) flow Units

Press ▼ to go to Cooling Air Flow Scale. Press ► or ENTER to go to the right side. The right part of the line will highlight and the previously set units will blink. Using ▲ ▼ (up/down arrows) set your desired units (L/min or SCFM).

1.9 Max.Temp.diff. heater to object

When controlling the heating rate in the oven with the thermocouple attached to the heated object, it is often desirable to set gas temperature as high as possible to quickly transfer the heat to the heated object. But the user may have temperature sensitive devices and may want to have control over how much differential to set between the heating air and the heated object. This setting allows pre-setting the limit for this max temperature difference.

Press ▼ to go to Max.Temp.diff. heater to object. Press ➤ or ENTER to go to the right side. The right part of the line will highlight and the previously set value will blink. Using ▲ ▼ (up/down arrows) adjust this value in increments of 0.1 ºC. You can also use the numerical keypad to set your desired value without going through .1deg. increments. Press ENTER to confirm your setting.

Press ENTER to confirm your setting. Top Heater temperature will be highlighted.

Press ESC to return to the Settings menu. Factory set value is 160 deg. C.

N2		Fl. scale	Obj.T.Ctrl.
Max.Temp. diff. heater to object			160.0
Object type			Light
Object PID tuning			

N2		Fl. scale	Obj.T.Ctrl.
Max.Temp. diff. heater to object			160.0
Object type			Heavy
Object PID tuning			
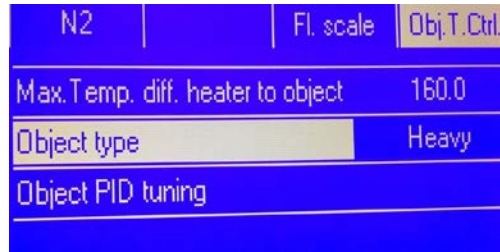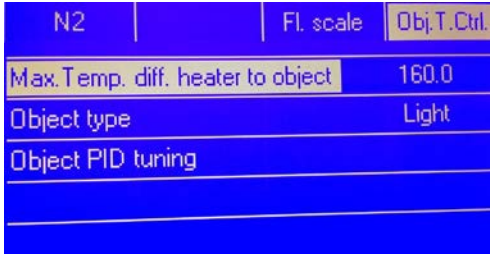
2   Protection (Assignment of passwords)

Settings	Protection	System	Connection
Administrator			
User1			
User2			
User3			
User4			

Admin – Four-digit Password to manage the Oven use. Highest Level of Authority.
                The factory setting is 1234
2.1.1 Guest – Possible settings: YES or NO. If YES, the user "Guest" can run the pre-set oven programs without a PASSWORD.

2.1.2   User1

2.1.2.1 Account Type: Possible settings: Privileged or Limited.
2.1.2.2 Four-digit Password for User1. The factory setting is 1111

2.1.3   User2

2.1.3.1 Account Type: Possible settings: Privileged or Limited.
2.1.3.2 Four-digit Password for User2. The factory setting is 2222.

2.1.4   User3

2.1.4.1 Account Type: Possible settings: Privileged or Limited.
2.1.4.2 Four-digit Password for User3. The factory setting is 3333.

2.1.5   User4

2.1.5.1 Account Type: Possible settings: Privileged or Limited.

2.1.5.2 Four-digit Password for User4. The factory setting is 4444.

2.1.6   User5

2.1.6.1 Account Type: Possible settings: Privileged or Limited.

2.1.6.2 Four-digit Password for User5. The factory setting is 5555.

2.1.7   User6

2.1.7.1 Account Type: Possible settings: Privileged or Limited.

2.1.7.2 Four-digit Password for User6. The factory setting is 6666.

3 System

System parameters which shall be set for all oven users.

3.1 Language (At this time we have a choice of English and German)

3.2 Temp. Scale – Choice of Temperature Scale: The factory setting is ⁰C
   ⁰C – Degree Celsius   ⁰F – Degree Fahrenheit

3.3 Time and Date – Please set these. Factory Settings are random.

The XSO Convection SuperOven has built-in real time clock which is maintained by an internal battery.
It is mainly used to remember the time and date when the programs were created. The correct time and date settings will provide accurate tracking of the order in which the programs were created.

Setting time:
Hour and minutes

Settings of the date
(year, month and day)

Settings confirmation
button

Time and Date Settings Window

a)   Access the time and date settings window (In settings menu)
b)   The active frame shows the parameters which can be set. The first one is "hour."
c)   Set the hour using the numeric key-pad.
d)   Confirm by pressing **ENTER**.
e)   Set the minutes and confirm by pressing **ENTER**.

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f)   Set the year and confirm by pressing ENTER .

g)   Set the month and confirm by pressing ENTER .

h)   Set the day of the month and confirm by pressing ENTER .

i)   Active frame moves to "OK." If satisfied with the settings, confirm pressing by ENTER .

3.4 Sound - Available settings:
ON – sound is on
OFF – sound is off
3.5 Contrast – Display contrast setting.
Available values: 32 to 255
3.6 Calibration (An option for the administrator to perform periodic calibration of temperature sensors)

4   Connection

4.1 Address – Oven address used when it is connected to a computer.
Available numbers 1 to 247. The factory setting is 247.

5   Restore

5.1 Restore Settings –This option allows an administrator to restore all settings to the
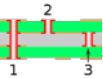
factory-set values. When the **Restore Settings** is highlighted - press ENTER .
5.2 Restore Analog Settings This option allows an administrator to restore analog settings to the factory-set values.
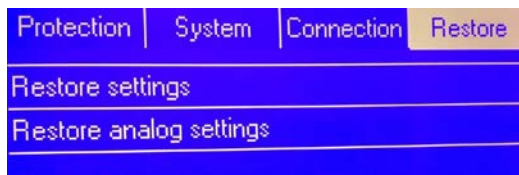
When the **Restore Settings** is highlighted - press ENTER .

VII. CREATION OF PROGRAMS

Each program has a set of time/temperature zones to fulfill all the requirements of temperature profile which is necessary for proper soldering of the SMT parts to the PCB's or any other heat treatment process.

The PROGRAM should have:
a)   As a minimum one PREHEAT Zone as recommended by solder paste manufacturer for the purpose of proper activation of the flux contained in the solder paste and to gradually change the temperature of the cold board to avoid stress across the entire board and especially on the

vias (connections between the pcb layers).
b)   SOAK or Heat Equalization Zone to evenly spread the heat across the board,
c)   REFLOW Zone to bring the temperature high enough above the melting point of the solder to melt and hold it in a liquid state for a sufficient time.
d)   COOLING Zone to cool the board and solder, preferably at the rate of one degree per second or better.

The XSO Convection Super Oven has one program example entered at the factory which cannot be changed. There is space to enter and save 250 Programs created by the User.
Only the Administrator and Privileged Users can create and save the Programs.

XSO Convection Super Oven PROGRAM Characteristics:

This XSO SuperOven can work in a conventional mode (the same way as other ovens work). This is the mode when the profile is created to control the heating gas temperature in each zone by guessing a difference between the real temperature on the board and the gas temperature. This method was used for years. An experienced oven operator could run the pilot test and seeing the results could estimate how much higher to set the temperature of the Air or N_2 in each zone to bring the board to a desired temperature in a given time.

XSO Convection SuperOven has a second mode (which can be selected when creating the programs). **This mode eliminates guessing of the temperature differential.** The thermocouple is attached to the board (or other heated object) and measures real board temperature. The oven will heat the air/N_2 in such a manner that the temperature set for the board in each zone is reached and maintained. **The greatest benefit is that the operator can set the time duration in each zone where the oven will maintain pre-set temperature.** There is no need to guess how long the oven will need to reach the pre-set, required temperature. The time to reach this temperature will depend on the board mass and size.

Each PROGRAM created and saved in XSO Convection SuperOven Memory gives the following choices:

- Number of zones (choice of 3 to 9 Temperature/Time Zones + purging zone)
- Choice of temperature control in the oven (Either by external TC connected to the heated object or by the thermocouples measuring the temperature of the air in the oven)
- A record of the date on which it was created
- The identity of the creator of the PROGRAM
- Whether it is Locked or Unlocked and who locked it.
  Note: The saved Program can be locked/unlocked only by the creator or the Administrator.
  An example:
  A program locked by User1 cannot be erased, unlocked or modified by User2 or User3 but can be modified and/or locked/unlocked by the Administrator or Factory Serviceman.

 - program unlocked

 - program locked by User1

 - program locked by User2

 - program locked by User3

 - program locked by the Administrator

 - program locked by the Manufacturer

To create a new program, go to the process window (below left).

Using ◀▶ and/or ▲▼ arrows go to the Prg. List. Press [ENTER]. A program list window similar to the one shown above right will open. Scroll using the ◀▶ and/or ▲▼ arrows to the first empty space for a program. The space will be shown in the white line outline. Than press ▶ and the section New will be outlined in the right part of the Program List window. Press [ENTER]. The window shown below left will appear.

Using keypad enter the desired number of zones which your profile requires. The max is 9 zones. (The purging with N_2 is an additional 10th zone). Press [ENTER]. The window shown above right will appear.

Select "No" if you want to enter the conventional program when the temperature of the air in oven is controlled,

or "Yes" if you want the oven to heat your object to desired and pre-programmed temperature in each zone and measured by an external thermocouple attached to the heated object. Press [ENTER]. If you have chosen to control the air temperature in the oven the display will show as below left. If you have chosen to control the object temperature in each zone as measured by attached to it thermocouple TC, the display will be like below right.

Press [ENTER] to edit the sample program and set your required values.

Depending on your choice of number of zones and the type of the temperature control one of the two windows shown below will appear.
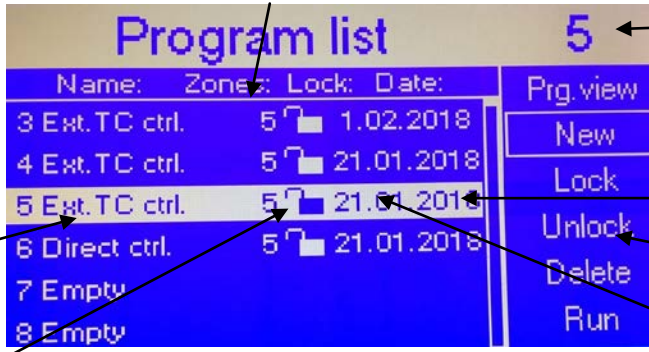
Using ◄ ► and/or ▲ ▼ arrows or the keypad, set the required values for your program.

When finished, press ESC. The screen will outline Edit on top of the right column. Press ▼. The rectangular outline will move over "Save". Press ENTER and then P.W. to go to the Process Window screen.

Now you can run your newly created program.

Information about the program:

Program List window

Moving around the Menu:

Use ◄ ► to move from the left side to the right side of the screen. Pressing the ▲ ▼ arrows allows an operator to scroll up and down the screen.

The selected item is framed by a rectangle. While in the MENU, pressing ENTER gets the Operator into the selected action (view of the Program List, Current Program Settings, the Sequencer Mode or the RUN position from which he/she can start the process by pressing either ENTER or the START STOP key.)

Note: To return to Process Window from any place just press P.W.

To change the program to a different one:

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Go back to the Program List. Select desired program and press ENTER .

To edit the Current Program or create a new one:

Select "Edit" on the Menu and press ENTER . If you are authorized to do so, you will be able to edit this program's parameters.

Starting Program Cycle
- Power up the oven
- Select the program

- Press the [START STOP] key to start the oven.

CAUTION
The inside of the oven can be very hot. Start the cooling cycle before opening the oven and/or placing or removing the PCB.

Cooling Cycle
- When the reflow process is completed at the end of the REFLOW zone, the cooling cycle starts.

    OR   one can press [COOL] to start the cooling cycle at any time during program cycle.

NOTE
During the cooling cycle a fan inside the oven circulates the air. (Unless it is programmed to stop after a pre-defined number of seconds). To speed up the cooling, open the lid of the oven.

Selecting the program
To select a program to run:

a) Use the [▲] [▼] keys to select the desired program.

b) Press ENTER to access this program.

    When in the Process Window, press [START STOP] to run the program.

Program Edit

a) When in the window "Program" select Edit on the MENU and press ENTER . If you are authorized, you will be able to edit the program. If not, ask the oven Administrator for help.

VIII. SEQUENCER

The Sequencer can be used by the following types of users:
        PRIVILEGED USER
        ADMIN
        The Sequencer is an additional tool which allows up to eight selected programs to run one after another. The parameter which ends one set program and starts the next selected program is the temperature measured by the external thermocouple connected to the "K" TC 1 connector located on the back panel of the oven.

During the cooling cycle (zone) of the running program, the temperature reaches the value pre-set by the user, this program ends and the oven automatically starts the next program chosen in the sequencer. If the external thermocouple "K" TC1 is not connected, the temperature which ends one program and starts the next one is determined by the internal thermocouple measuring front heater temperature.

Note:

> During the Sequencer cycle the settings in the cool zones of the selected programs do not have any meanings. They are over-written by the reading of the "K" TC1 temperature. The program will end when the TC-1 temperature reaches the pre-set in the Sequencer temperature "R". After the oven is cooled to this temperature, the running program stops and the next program selected in the sequencer starts running.

Selected programs to run in the order pre-programmed in this window
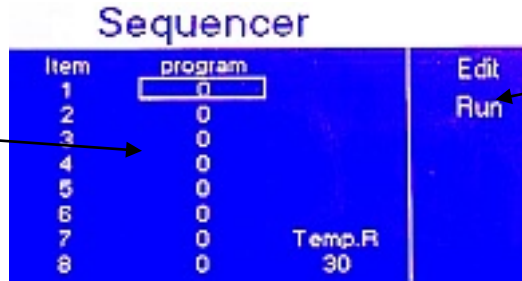
Menu

Sequencer window

Temperature which defines the end of one program (after cooled PCB reaches this temperature), and the start of the consecutive program on the sequencer list.

How to run the SEQUENCER

1. Access "Process Window".
2. From the menu on the right-hand side, select "Sequencer". The Sequencer window will be displayed.
3. Select the first desired program using the numerical key-pad and press **ENTER**.
4. Select the consecutive programs to be run one after another.
   (If you want to run only four out of possible eight programs in the sequence, select 0 for items 5 to 8 on the program list (zero means that there is no program to run).
5. Pressing **▲** **▼** or **ENTER** select "Temp. R" field.
6. Set cooling temperature which you want to reach in each cooling zone of each program run in the Sequencer.
7. Press **►** to get to the menu on the right-hand side.
8. Press **▼** to select "Run."
9. Press **ENTER** to start the first program to be run in the Sequencer Mode.

Note:
To differentiate view of the "Process Window" in the "Sequencer" mode from the view when a single program is run, in the "Process Window" the letter S is displayed after the word window.
"Process Window **S**" is displayed instead of "Process Window"

IX.   LEVELS OF AUTHORITIES for OVEN OPERATORS

The **XSO Convection Super Oven**, to protect stored profiles and oven settings, is programmed to give a selected choice of authorities to different users. In other words, the Operator can have either full access

to oven settings (Administrator), limited access (USER), or no access (GUEST). The Administrator has the highest level of authority. He/She manages the use of the Oven. This Security System protects against unauthorized or accidental changes in oven settings and/or loss of stored profiles. To use the oven, the Operator must select the Level of Authority assigned to him/her and log-in by entering the PASSWORD assigned to him/her. Only GUEST does not require a PASSWORD (but GUEST can only RUN existing programs and cannot change any settings or delete anything).

WHO CAN OPERATE THE SUPEROVEN :

- Guest   (No limits on the number of Guests)
- User   (There are three accounts available for authorized users)
- Admin   (There is one Administrator account)
- Factory (There is one account for Factory Personnel for Maintenance and Service purposes)

Level of Authorities for each Group of possible OPERATORS:

Admin – The Highest Level of Authorities. The account for the Oven Administrator.

The Administrator can:
- Assign passwords for the USERS
- Set the privileges for each USER
- Access and change all Oven settings
- Create New Programs and modify the Existing ones
- Lock and unlock all programs (except for the factory pre-programmed examples)
- Delete programs
- Run all programs
- Edit programs "on the go" in real time
- See the Program settings
- See the graphic display

User – Standard and Extended Set of Privileges for Oven Operator
(Requires Password to Log-in and operate the Oven)
- **Limited User** (with Limited Privileges) can:
  - Run existing programs
  - See the Program settings
  - See the graphic display

- **Privileged User** can:
  - Run existing programs
  - See the Program settings
  - See the graphic display
  - Create New Programs
  - Delete Programs
  - Edit the Programs "on the go" in real time
  - Lock and unlock the programs

Guest – This type of Operator does not need a PASSWORD to operate the oven

The GUEST can:
- Run existing programs

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- See the Program settings
- See the graphic display

Factory – Account for Factory Personnel for Maintenance and Service purposes. It requires a special factory password known only to the Factory Authorized Personnel.

List of Factory set PASSWORDS when the unit is shipped out to the Customer.

(The Administrator can change these PASSWORDS at any time)

- Admin :   1234   User1   :   1111   User2   :   2222

- User3 :   3333   User4   :   4444   User5   :   5555

- User6 :   6666   Guest   :   Does not require a password

- XXXXX Emergency Password for the Administrator

<u>NOTE:</u> The emergency PASSWORD should be used only when the regular PASSWORD is lost (or forgotten). This PASSWORD is for one use only and cannot be changed. Please call the Distributor or Factory to get this PASSWORD if you need it.
All other PASSWORDS can be set and/or changed in Oven Settings menu accessible only by the Oven Administrator.
He/She has to remember not to assign the same passwords for different Users.

X. Error Messages list

The oven is digitally controlled and has its own sub-program controlling the state of various subsystems.
In case of malfunction of one of them or abnormal behavior, the heating cycle will be stopped automatically and the display will show a error message.

The list of error messages is shown below.

Protection of the XSO SuperOven

List of Errors displayed by XSO Convection Super Oven

Software Protection
Note:
The first digit is the heater number : 1 = left front; 3 right front; 2 left rear, 4 = right rear;
The second digit of the code is the error number:
(Example: E11- pretends to the Left Front heater - means that the Left Front thermocouple have failed (open circuit);
E21- pretends to the Left Rear heater - means that the Left Rear thermocouple have failed (open circuit)).

#	Error code - description	Description	Type	Possible cause	When	an accurate description
1	E**11**-Left front thermocouple failed (open circuit) E**21**-Left rear thermocouple failed (open circuit) E**31**-Right front thermocouple failed (open circuit) E**41**-Right rear thermocouple failed (open circuit)	thermocouple has open circuit.	Software Protection	The thermocouple is not connected; the thermocouple is faulty; an error in the controller in the track of the A/D converter	Always	Thermocouple readings exceed 1500 °C.

2	E**12**-Left front thermocouple failed (short circuit) E**22**-Left rear thermocouple failed (short circuit) E**32**-Right front thermocouple failed (short circuit) E**42**-Right rear thermocouple failed (short circuit)	Short circuit in the thermocouple circuit.	Software Protection	Shorted thermocouple; error in the controller in the track of the A/D converter	When oven is heating	If in 15 seconds after delivery of power to the heater of more than 25% the thermocouple temperature is less than 50° C and the difference between reference temperature between the sensor on the PCB and a thermocouple is less than 1°C.
3	E**13**-Left front heater malfunction E**23**-Left rear heater malfunction E**33**-Right front heater malfunction E**43**-Right rear heater malfunction	No heating.	Software Protection	SSR defective (open); Faulty heater (open circuit); faulty controller	When oven is heating	If in 30 seconds after delivery of power to the heater of more than 25% the thermocouple temperature is less than 40° C and the difference between reference temperature between the sensor on the PCB and a thermocouple is less than 1°C.
4	E**14**-Left front heater malfunction (SSR is damaged) E**24**-Left rear heater malfunction (SSR is damaged) E**34**-Right front heater malfunction (SSR is damaged) E**44**-Right rear heater malfunction (SSR is damaged)	Thermal runaway in the chamber.	Software Protection	SSR defective (short circuit); faulty controller,	When the oven is turned on and is on standby or in the cooling mode	If after 10 seconds of switching to the standby mode or Cool the temperature will rise.
5	E**15**-Left front heater malfunction (overheat) E**25**-Left rear heater malfunction (overheat) E**35**-Right front heater malfunction (overheat) E**45**-Right rear heater malfunction (overheat)	An excessive increase in temperature in the chamber (>550 °C)	Software Protection	SSR defective (short circuit);	Always	

XI.   XSO-SuperOven TECHNICAL SPECIFICATIONS

Reflow area	20" x 16" x 6.5" (508 x 407 x 165 mm)
Temperature range	30°C to 380°C
Temperature Zones	Purging, to push oxygen out + up to nine zones pre-set by the operator for each program. The last 2 zones are two cooling zones.
Heaters	4 heater cartridges 4,88 kW (220V)
Max. PCB size	18 "x 14" (457 x 356 mm)
Supply Requirements	3 phase, 32 amps (Max. power consumption: 20.5 kW)
Advanced Cooling Module (Detachable to ease maintenance).	Cooling media: Nitrogen or Shop Air. Timing and object temperature to cool to is defined by the operator in the program. Cooling media enters through small holes in the array of tubes located above the heated object. Advanced cooling produces more reliable soldering connections and helps to handle heated objects at the end of a heating cycle. Opening and closing of the exhaust port is controlled by the programming.
Monitoring Glass Windows	There are 6 (six) viewing windows: - window in the center of top clam shell: 11.14"x11.14" (283×283 mm) - window in the center of the bottom of the heating chamber: 7.5"x7.5" (190x190 mm) - two identical rectangular windows (front and rear) 11"x3.94" (280x100 mm) - two identical small side windows: 2.36"x3.54" (60x90 mm)
Nitrogen Connection for re-filling during the heating cycle	I/M 1/4 in. pneumatic male plug connector. Nitrogen pressure:1/2-1bar (7-14.5 psi) Residual O2 in the heating chamber can be maintained at the levels 1000ppm or lower.
Size	L=33.7" x W=33.5" x H=21,7" {L=856mm x W=850mm x H=-550mm
Weight	Unpacked: 220 lbs. (~100 kg) Packaged for shipping: 330lbs. (~150kg)
Computer profile control	Allows pre-programming, storage and recall of up to 255 programs
Communication with PC	RS485 port (XKAR X485-USB converter required to connect to PC's USB port)
Advanced Features	• Heating and cooling rates between 2.0 C/sec to 3C/sec. • Equipped with X-KAR Residual O_2 Monitor when operating the oven in N_2 environment. • Display of the actual temperature/time numerically or as a graph and full indication of set functions and process parameters along with their values in the Process Window. • Choice to control the temperature in the oven getting feedback from the measurement of the air temperature (conventional way) or to control the air temperature to heat the object to a preset temperature by measuring this object's real temperature using the "K-type" thermocouple connected to this object. • Advanced, two stage cooling system allowing use of N_2 and the air to cool the heated object at the rate of few degrees per second. • RS-485 port for controlling the oven and for downloading firmware upgrades from a PC. • Built-in XTC-Profiler – a data logger collecting info from eight external thermocouples. • Heating control by the temperature of the "K" thermocouple attached to the heated object and to TC-T (a connector on the right side of the oven).

XII. Residual O$_2$ Monitor

The oven is equipped with on board Residual O$_2$ monitor which can be used for continuous or (to save the O$_2$ sensor life), momentary checking of oxygen content in the N$_2$ environment in the oven.

Description and Operation

Residual O2 Monitor is equipped with the oxygen sensor which offers excellent linearity The gas (air/N2 mixture from the oven) is pulled by the long life pump through the built-inside heat exchanger to lower sampled gas temperature below 50°C which is required by the design of the sensor. The sampled gas enters then the sensor passing first through the flowmeter with the valve. The sample gas flow should be set at 2 l/min.

To protect the sensor and extend the sensor's life, the monitor has 2 switches. The STANDBY switch turns "ON" the pump which circulates the sample gas from the heating chamber in a closed loop making the Monitor ready for the measurement of the residual O2 at any desired time.

Only when the PUSH to TEST pushbutton is pressed the sampled gas is switched to circulate through the sensor and to display residual O2 value on the LCD display.

The display can be set to read either in % or in PPM's. When the measurement is finished, it is recommended to press the PUSH to TEST pushbutton again and close the flow of the sample gas through the sensor.

The measurement can be repeated periodically during the reflow cycle.

The monitor is essential to determine the purging time needed to reach the desired level of residual O2 during the heating cycle.

Since the oven is not perfectly sealed, there is the second N2 entry to the heating chamber (The purging is done through the Cooling/Purging controller) where N2 shell be connected through the pressure regulator set at 1 to 2 bars. This is N2 addition connector on the back panel of the oven.

In the heating program the operator can select how he/she wants to add N2 during heating cycle: continuously, proportionally to the time of the zone or set up the fixed amount of time during the zone in which the N2 will be added to the heating chamber.

This N2 addition will depend on the operator settings and also on the pre-set N2 pressure delivered to the N2 Addition port on the back panel of the oven.

Residual O$_2$ Monitor front panel.
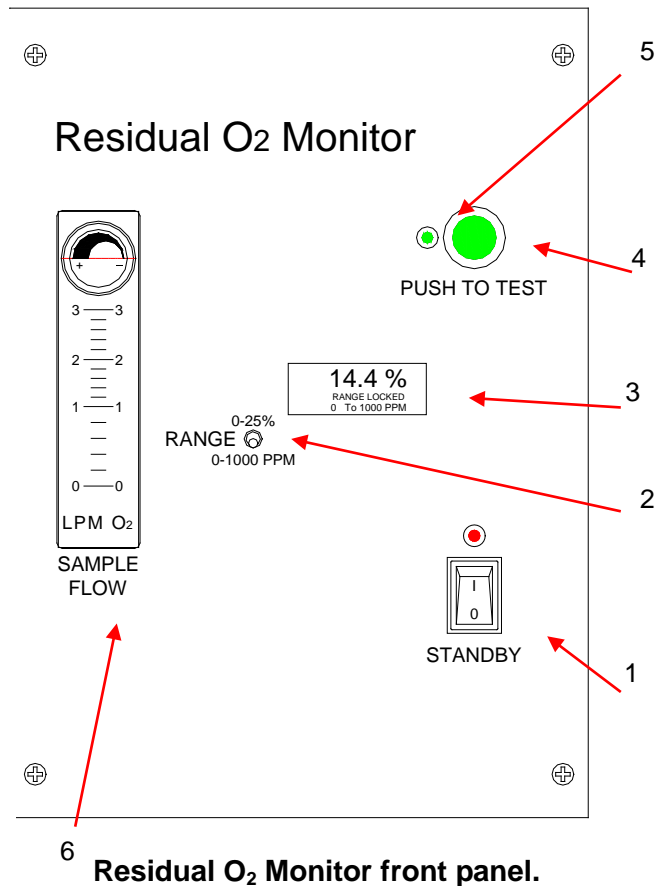
1. Standby switch

2. Range switch

3. Measurement display

4. Push to Test pushbutton

5. Led indicator showing that the monitor

is measuring residual O2

6. Airflow meter 0-3 L/min

XIII.   XTC Profiler

XTC Profiler is an eight channels K-TC data logger which connects to a PC and allows monitoring of eight "K" thermocouples. This unit is very useful to determine heating object temperature uniformity in real time when running heating/cooling process.

Introduction

The XTC-Profiler allows for:
- On line measurement, display and storage on the PC of the eight monitored thermocouple's temperatures
- Printing the stored time / temperature graphs
- Exporting to Excel stored information of the time / temperature graphs

The system Includes:
- Eight "K" Thermocouples 1m long
- USB cable
- CD with XTC Profiler Software

System Description:

Keyboard:

Power   - Turns the profiler ON and OFF
ESC   - Exits the selected function
Arrows: - Left to Right –scroll through
                  the functions
Enter   - Confirm the selected function
Menu   - Entry to the unit Menu   – not applicable
ACQUIRE   – Not applicable
LOW MEM.   – Not applicable
CHARGE   – Not applicable
LOW BAT.   – Not applicable

TC1, TC2, TC3, TC4, TC5, TC6, TC7, TC8 - Sockets to connect up to 8 Thermocouples
On the right side of the XSO Convection SuperOven

Display of temperatures measured by the thermocouples:

Press and hold POWER button. The display shows temperature of the first thermocouple.
Pressing the right and left Arrows scrolls, in sequence, through the readings of all thermocouples from TC1 to TC8.

## XTC-Profiler – Application Software

a) Installation instructions

1. Copy file from a CD on a Hard Disc of Your PC (or the file sent to you by e-mail, unpack zip file: XTC-Profiler v2.0.2.2.zip on a Hard Disc of Your PC)

   All unpacked files must be together in the same folder.

The files are listed below:
DocumentFormat.OpenXml.dll
FTD2XX_NET.dll
Profiler.exe

2. Run the file: **Profiler.exe**
   and start Oven Monitor program from start menu on your PC
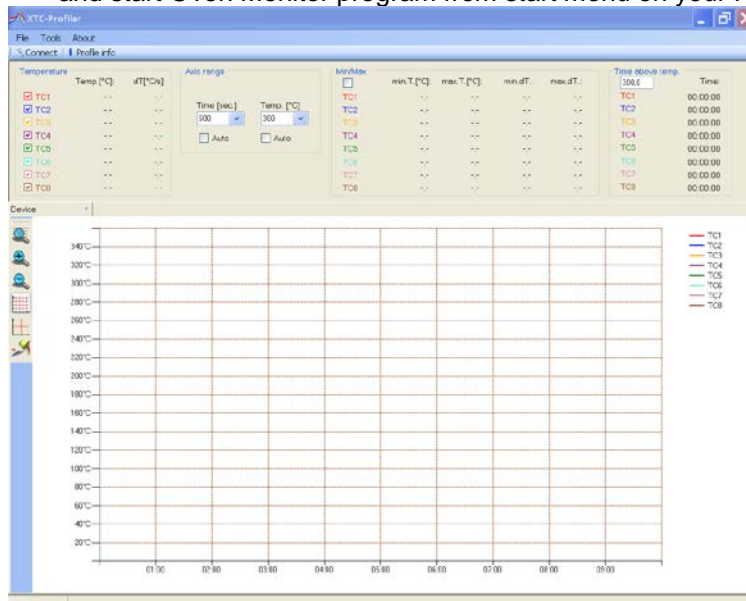
3. Connect the XTC-Profiler to a PC via a USB cable (make sure to use the original cable with a magnetic core around the cable)
4. Press ESC (Power) and hold. The XTC-Profiler will power-up and show the reading of Ch 1

5. Press *Connect* (Top/Left corner on the Menu for X-306 Oven Monitor.
   This will connect the oven with your pc.

Connect
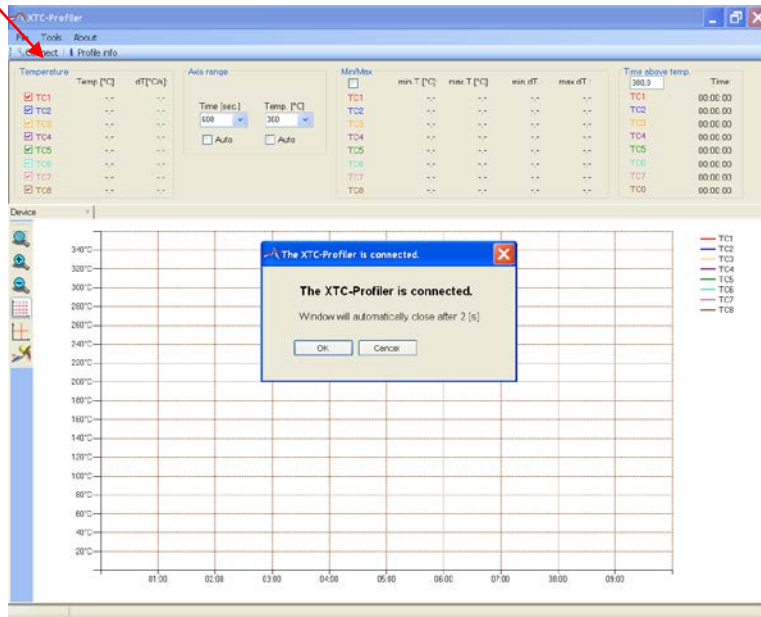
Note:
If your computer will not connect to the oven via X485-USB Converter*,*
   *unzip the file "X485-USB converter_driver.zip" and run file "CDM20600.exe".*

b) MAIN WINDOW

Menu

Choice of the thermocouple readings
which should be displayed

Axis range
modification

Display area
controls

Display Area to observe Profile in real time
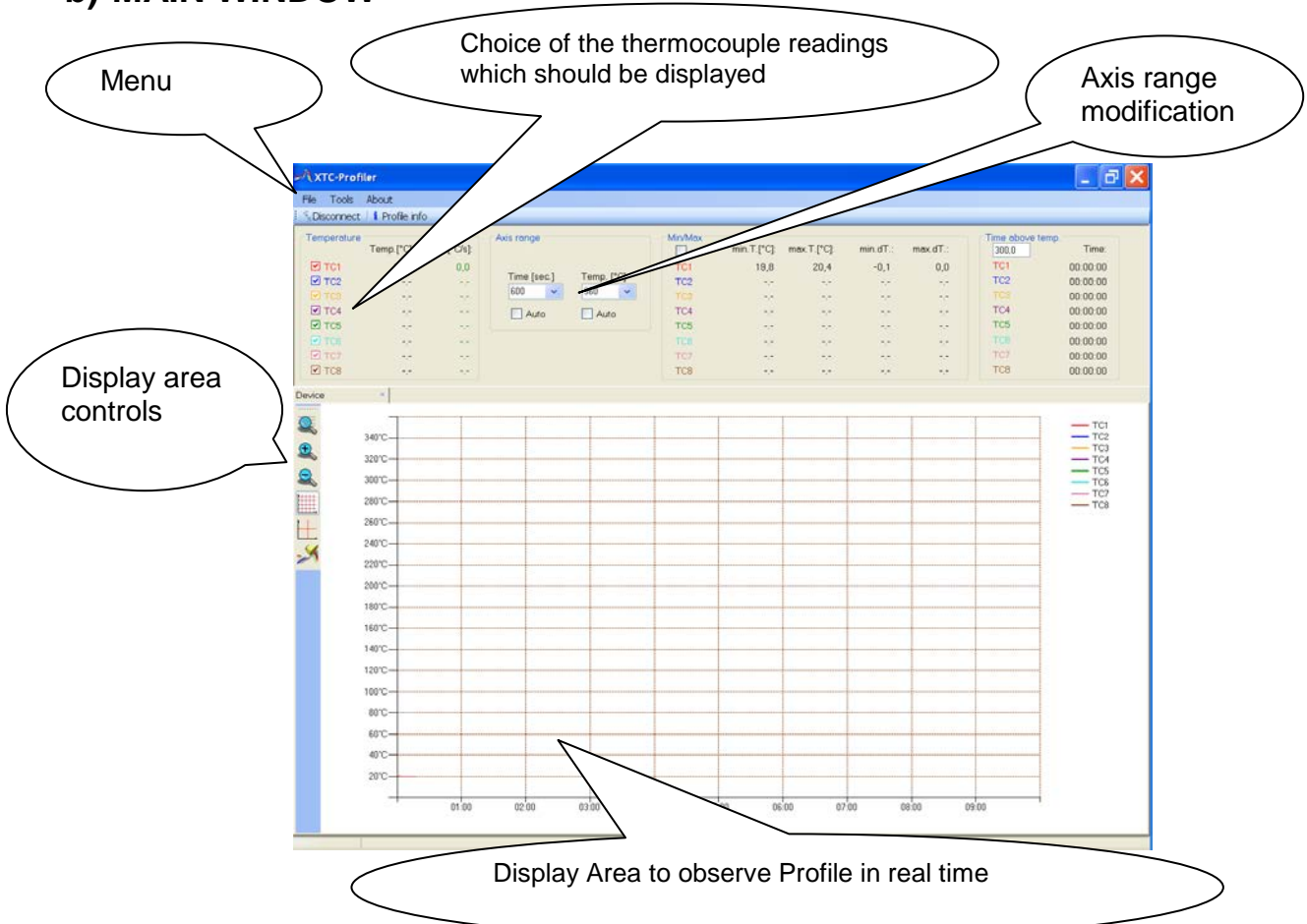
c)   Saving profiles

When you already have a profile on the screen and you want to save it, select "File" from the Menu and then "Save "
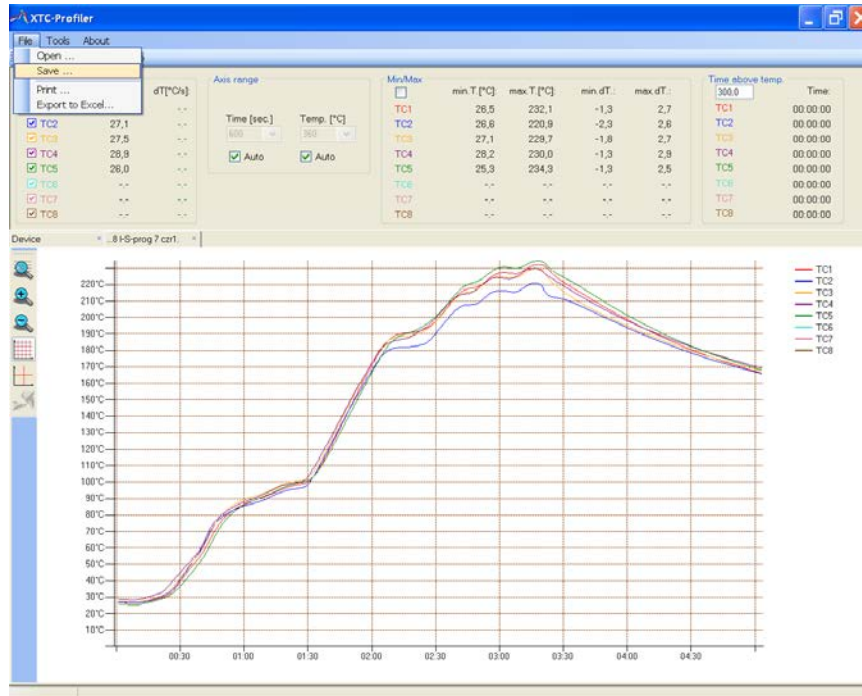
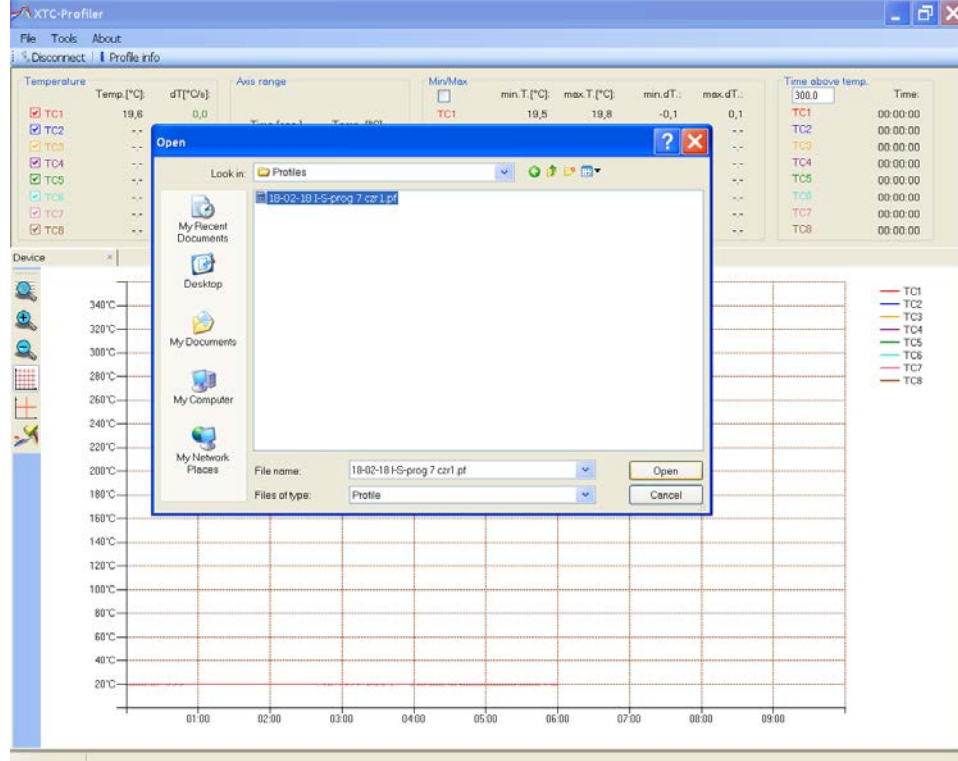Select where you want to save it on your computer, enter the file name and save by clicking the Save button
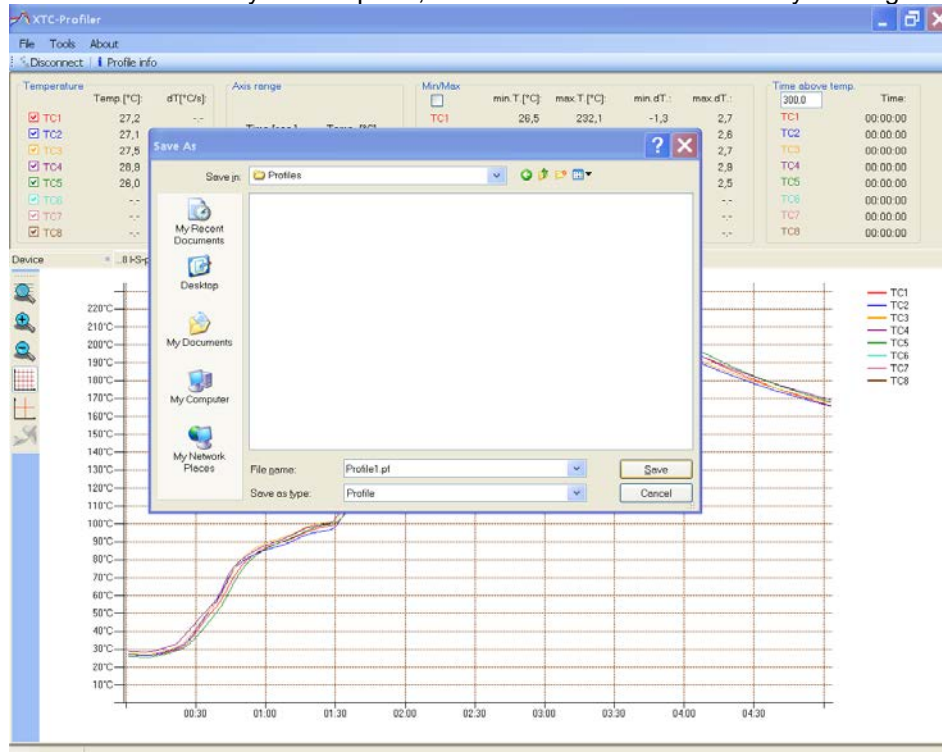
d) Reading saved profiles

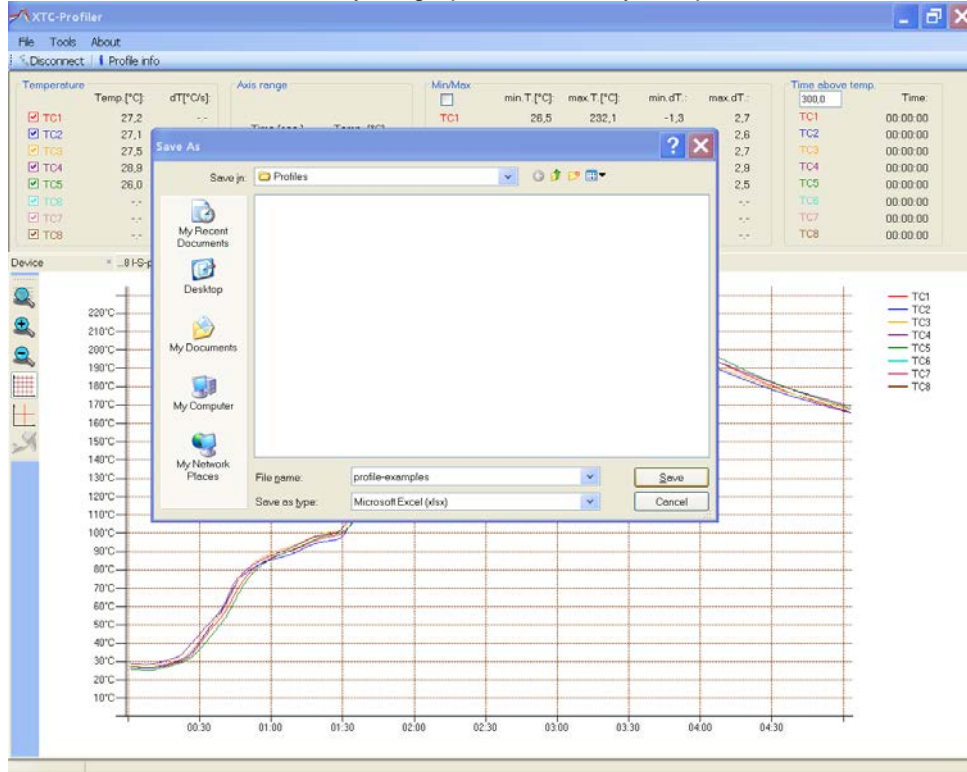Open the file: chose from the Menu "File" and then "Open
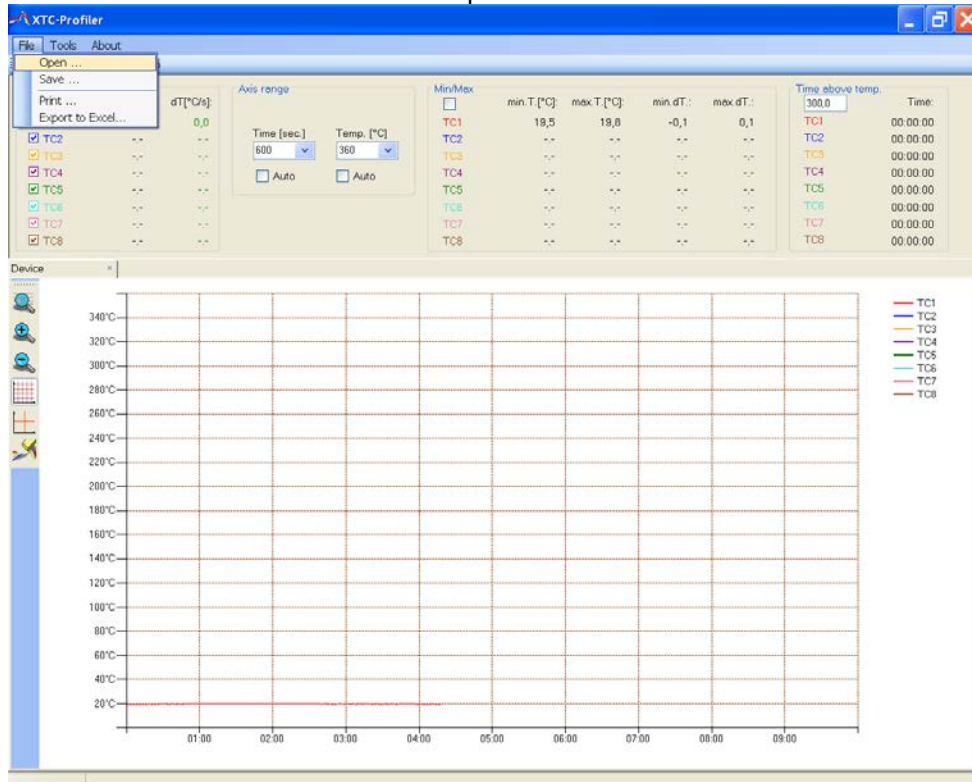
Chose "profile-example1.pf" or other file and open it:

e) Export the graph to the Excel file

If you want export the graph to the excel file, chose from the menu: "File" and then "Export to Excel". Enter the file name and chose the place to save the excel file.
Click "Save" button and the excel version of your graph is saved to your specified location.
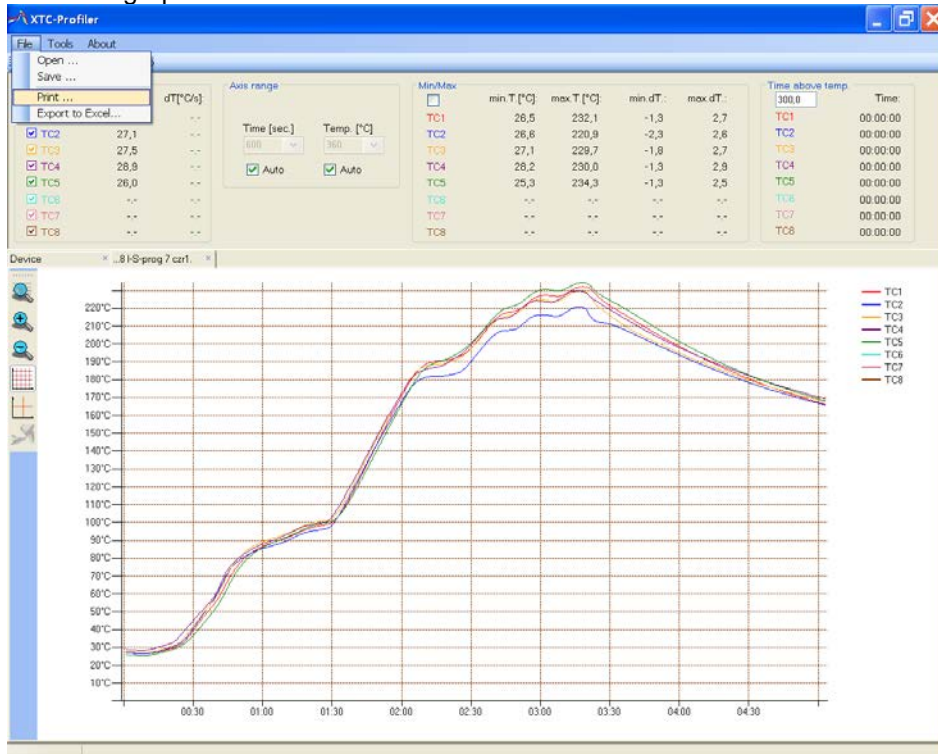

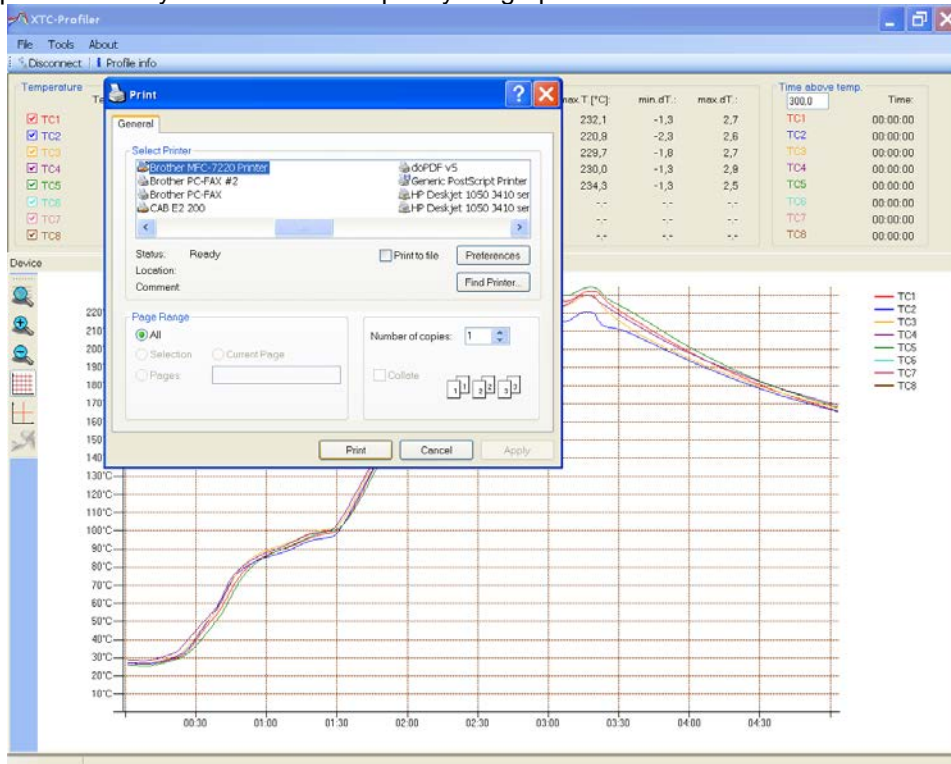When you open the excel file it will look as shown below:

f) Printing the graphs:

If you want to print on the graph: select "Print" from the Menu.

And select the printer which you want to use to print your graph. Click "Print"

XIV. How to upgrade the firmware in XSO-SuperOven in the future:

Receive the latest firmware version from Bokar International by e-mail.

1. Copy file firmware XXX.zip and unpack this to one folder (All files must be in the same folder)

2. Connect XSO SuperOven (RS-485 Connector) with PC (USB) via X485-USB converter.
   NOTE: X485-USB Converter needs installed driver for proper operation.
   If the converter is first connected to the PC, You should install the X485-USB driver.
3. Press and hold the enter button on the Oven
4. Turn Power switch to ON position.
5. Release "Enter" button. The oven display should show text "Bootloader mode"
6. Run program Flasher.exe on the PC (double click on the flasher icon)
7. Flasher should find the serial port where the oven is connected.
8. Flasher will ask "Do you want to start up update device?"
9. Select "Yes" to confirm and press "enter".
10. After upgrade is finished, you should get the message "Write successful. Would you like to run application?"
11. Press "ENTER"
12. Application will start. The display in the oven should show X-KAR logo, name, serial number and firmware version number.
13. Flasher window will automatically close.

XV. XSO Convection Super Oven Spare Parts list:

Item no	Description	P/N
1	Thermocouple Ass'y (for the heater chamber)	**33099**
2	Heater Cartridge Ass'y left (2 pcs in the unit)	**33102**
3	Heater Cartridge Ass'y right (2 pcs in the unit)	**33103**
4	Circulating Fan Ass'y left (2 pcs in the unit)	**33117**
5	Circulating Fan Ass'y right (2 pcs in the unit)	**33118**
6	TC "K" Thermocouple 1m long	**33104**
7	ASR-25DA Solid state relay	**30170**
8	Cooling fan DC24V	**31722**
9	Cooling fan DC12V	**33044**
10	XC-64 Controller Board	**33105**
11	Power supply 24V DC	**33106**
12	Power supply 12V DC	**33107**
13	Display Assembly	**32376**
14	Keyboard	**32737**
15	EMO button	**32983**
16	Power switch	**31205**
17	3 phase circuit breaker	**33108**
18	N2 valve 24V DC	**32640**
19	Exhaust valve 24V DC	**33084**
20	Airflow meter 0-3 L/min	**33085**
21	O_2 Sensor	**33109**

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Other Bokar Products pages:

SMT: www.Assembly-SMT.com   www.FineRework.com   www.X-Reflow306.com,

www.X-1003.com   www.SMTrepair.com   www.SMTFocus.com

www.SMTdispenser.com   www.BestBatchOven.com   www.SMT-tool.com

ESD: **www.ESDapparel.com   www.ESDmeters.com   www.ESDpackaging.net**

www.ZeroCharge.net   www.No-Stat.com   www.ESDchair.com

www.ESDlabcoats.com   www.ESDcarts.net   www.ESDbrushes.com

Other: www.SuperiorScrewdrivers.com   www.Super-Iron.com

Latest Additions: www.ProportionAir.com

www.FumeXtraction.com and www.ULT.de (We represent ULT in the USA, Canada and Mexico)