MANUAL
X-REFLOW 306 LF-ACH

Full Convection, Bench Top, Batch Oven, Nitrogen Ready,

with two connectors for external "K" thermocouples which are read and displayed by the optional X-306 Oven Commander capable of controlling the oven from a PC and incorporating Accelerated Cooling System.

This is a SPECIAL EDITION with the heating chamber 3½"high.

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I. INTRODUCTION

View of the X-Reflow306 LF-ACH Batch Reflow Oven

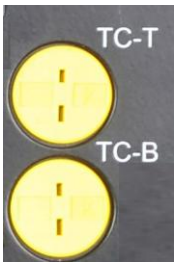
Congratulations on your purchase of our Superior Batch Reflow Oven Model X-Reflow306 LF-ACH.
You now own a uniquely designed full convection Reflow Batch Oven for use in low volume production, heat resistance testing of components and laboratory experiments where precise and accurate heating is required.

This oven was designed to achieve the highest degree of process control possible for demanding applications that call for uniform temperature distribution, temperature stability, accelerated cooling and repeatability.

The new, unique features of the X-Reflow306 Oven include:

1. An interface to a PC which allows downloading upgrades to the oven firmware. The upgrades are made following feedback and special requests from worldwide users.
   Newer firmware can be obtained free of charge from Bokar International and downloaded to each oven via X-KAR's X485-USB Converter.
   The same, build-in interface allows for monitoring (in real-time) the two "K" thermocouples measuring hot air (nitrogen) entering the heating chamber and controlling the heaters and monitoring two additional thermocouples which can measure the temperature of the heated object in the chamber or the temperature of the air in any place in the chamber.
   (To view these 4 temperatures in real time, store the time/temperature graphs, print them, recall them later for comparison and to have a record of what has happened during the program run, optional X306 Oven Monitor is required).

2. Two external "K" thermocouple inputs (placed on the back panel), to monitor temperature points selected by the user. These two thermocouple inputs are also used in the advanced "Power at Max mode" to set up a second level of control in order to precisely set pre-reflow and reflow temperatures.

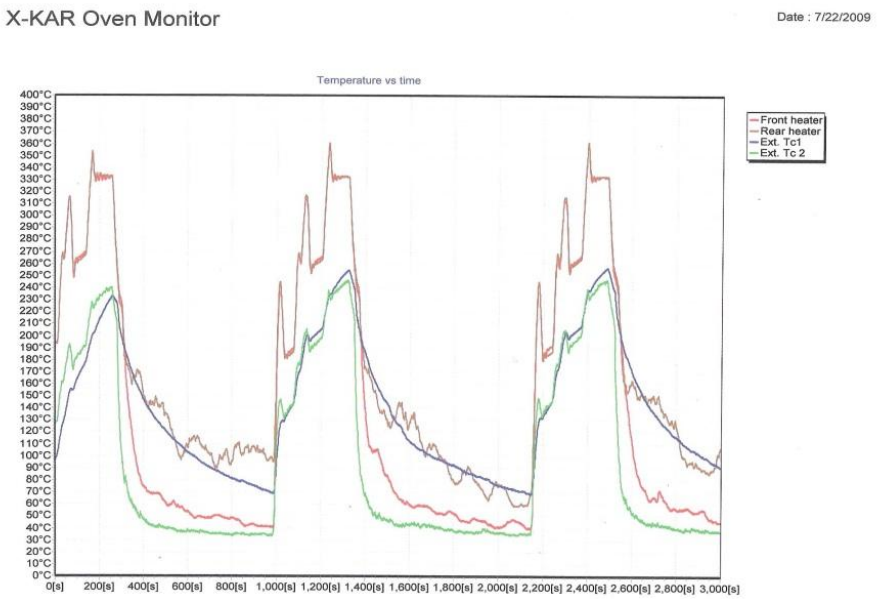


3. Build-in Fume Extraction Port. Batch Ovens are often placed in relatively small rooms with limited ventilation. Each reflow or curing process releases fumes which can be harmful to the operators and have an unpleasant smell. All of the other batch ovens on the market today do not provide facilities for fume extraction. The X-Reflow306 is the only oven which deals with this issue. It allows for the removal of fumes from the oven at the end of the soldering/heating cycle, prior to opening the batch oven lid. To remove fumes, a high vacuum fume extractor (possibly with a HEPA filter) is needed. Almost any commercially available high vacuum fume extractor will work, because our oven has a built-in heat exchanger to lower the temperature of the fumes to a level safe for any commercial filter.
   Besides the heat exchanger, the X-Reflow306 ovens have an additional socket outlet located on the back panel, which will supply power to the fume extractor and to turn it on or off when the oven program calls for it.

4. Build-in Accelerated Cooling System (Models with the prefix AC only)
   None of the known batch ovens on the market have an efficient cooling system. Some have extra fans that blow room-temperature air on top of a PCB after reflow.
   This is a very inefficient method. First, the board cannot be moved until the molten solder paste solidifies (to prevent displacement of components). Also, blowing room-temperature air in relatively small volume cools the heated object very slowly (at least 15 minutes to cool).
   In order to achieve increased reliability of soldering connections, the cooling rate is vital. The slower it is, the larger crystals formed in the solidified solder will become. A smaller crystal structure is stronger, making the connection more reliable over time.
   X-Reflow306's accelerated cooling works by injecting pressurized shop air (or ideally nitrogen) into the array of tubes placed in the top cover which impinges on the board (or another heated object) from the top. Air expansion expends heat, thus it will cool the PCB much more efficiently than any combination of forced air fans. Our accelerated cooling system will bring the temperature of the soldered PCB below 100 degrees Celsius in a few minutes. The cooling rate will depend on the cooling media (air or nitrogen), and to certain degree on the cooling media pressure. Rates of 1-4 degree/second can be achieved.
   In addition to the increased reliability of soldered connections, faster cooling allows the handling of hot PCB's with less expensive (lower temperature) and lighter hot gloves and helps prevent burns when gloves aren't used.

5. Numerous programming options were added to give the user ultimate control over the heating process. Standard batch ovens have only settings for zone time and temperature.
   a) Programmable purging time when working with Nitrogen to repeatedly push out the oxygen out of the heating chamber every time the oven is reloaded.

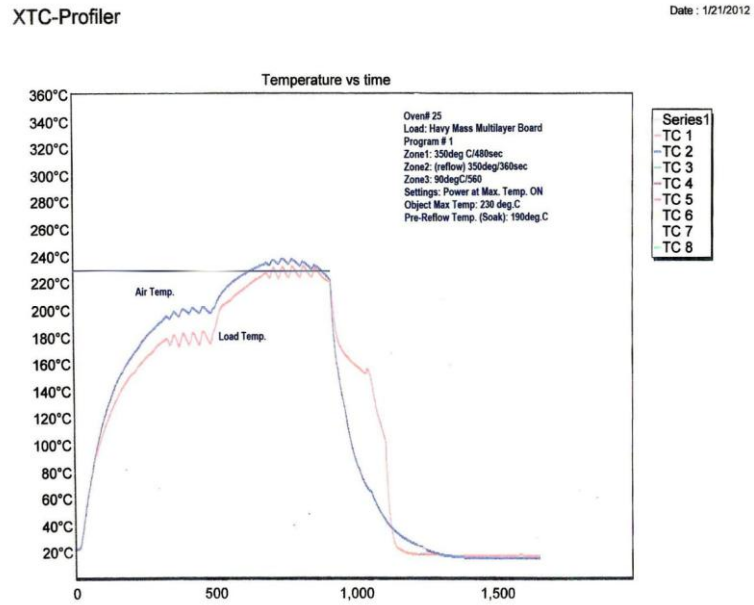
b) Sequencer mode allows for the choice of eight (8) programs from the memory and allows for running them one after another without opening and/or restarting the oven. This option is used to test behavior of boards or other heated objects when heated and cooled several times.



Sequencer Runs

c) Cooling the heated object to a pre-defined temperature (works with the Accelerated Option or without it).

d) Advanced "Power at Max. temperature" option. When this option is selected, the temperature of the heated object is controlled by a thermocouple that is attached to the object. Most ovens simply measure and control the temperature of the circulating air. The Power at Max feature allows the user to set and maintain within few degrees Celsius the boards pre-reflow (soak) and reflow temperatures. It is handy when developing a new profile for a new board assembly. It takes away trying to guess the heat transfer ratio between the hot gas (air or nitrogen) and the heated object. After using this option only few times the operator will be able to set a perfect profile for the new board.



Power at Max. Temperature Option turned "ON" and controlling pre-reflow and reflow temperatures

SAFETY

The purpose of this "SAFETY" section is to inform the users of the heading guidelines used in this manual to indicate special Notes, Cautions, Warnings or Dangers. Also included are precautions, which must be observed when operating or servicing this product.

These "NOTES", "CAUTIONS", "WARNINGS" and "DANGERS" are inserted in this manual whenever deemed necessary. They appear in blocked off form with an outline and a shaded background to highlight the information as shown below.

**NOTE
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

****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 represent a potential for 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. A fume extraction system (such as those offered by the XTRACTOR Brand) is highly recommended to protect personnel from solder flux fumes.
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 reduced accordingly.
5. This oven must be properly grounded.
6. Please read this operation manual carefully prior to use.
7. The area around the viewing window becomes hot. Care should be taken when working around this area.
8. After finishing the cooling cycle, the inside of the oven is still hot, therefore care should be taken when removing and mounting the PCB.
9. Be sure to wear appropriate gloves to prevent burns when taking the PCB's out of the oven and placing a new one inside the oven.

   ****NOTE: To** ensure continued peak performance, use genuine X-KAR replacement parts.

II. PACKAGING

The packaging of the X-REFLOW306 LF oven has been carefully designed to ensure maximum protection during shipping. However, no packaging can guarantee 100% protection, and damage may occur through rough handing by the carrier. Please ensure that any claims for shipping damage are reported promptly to the carrier and to the Distributor from whom the product was purchased.

The content of the box is as follows:

1. X-REFLOW306 LF-AC Batch Oven with Nitrogen Connections and Fast Cooling
2. Two “K” thermocouples
3. X485-USB Converter
4. Exhaust connecting elbow
5. User Manual
6. Warranty Card

III. UNPACKING

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

****WARNING**
When unpacking, please be careful and read the manual prior to turning the System “ON”. Please check that 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. Numerical keypad
3. Power switch

Fig. 1. X-REFLOW 306 FRONT PANEL VIEW

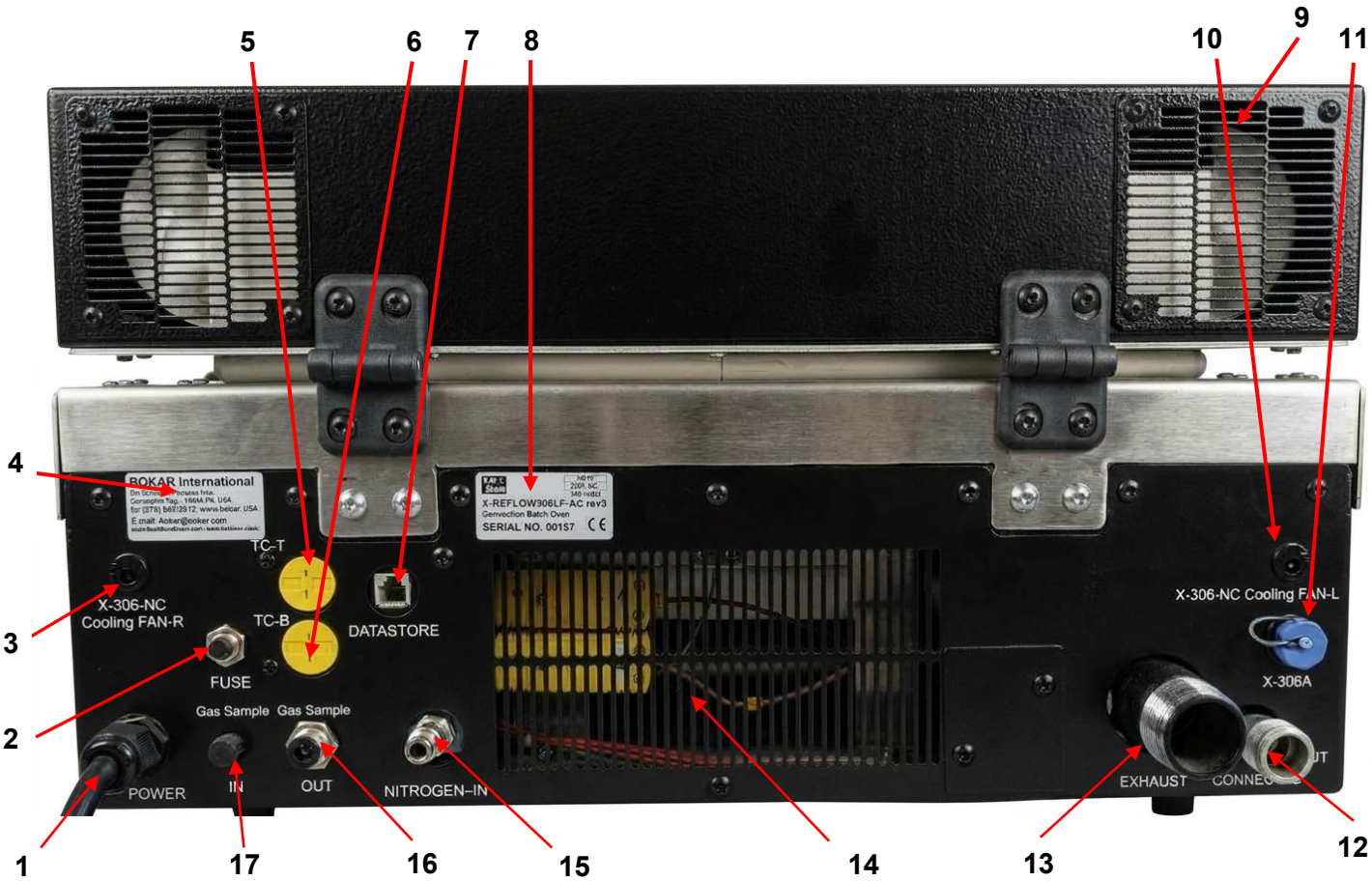


Fig.2 X-REFLOW306 LF-ACH REAR VIEW

1. Power cord
2. 30A Circuit Breaker
3. X-306-NC COOLING FAN-R Connector to supply cooling air (Models with the prefix NC only)
4. Bokar International Company Label
5. External 'K" Thermocouple Input TC-T (Top TC)
6. External "K" Thermocouple Input TC-B (Bottom TC)
7. DATASTORE Socket to connect to a PC for firmware upgrades and/or use of X306 Oven Monitor
8. Unit Label (Model, Serial # and working Voltage)
9. Louvers to provide airflow from front to back to cool the top cover
10. X-306-NC COOLING FAN-L Connector to supply cooling air (Models with the prefix NC only)
11. Socket to connect X-306A Fume Cleaning System
12. ½" airline pneumatic male nipple to connect cooling media line
13. Exhaust pipe (Models with the prefix AC only) or connect pipe from X-306A Fume Cleaning System
14. Louvers to provide ambient air for cooling the oven subsystems
15. N2 Inlet Port
16. Gas sample OUT
17. Gas sample IN

V. SET-UP AND INSTALLATION

ELECTRICAL REQUIREMENTS

The X-Reflow306 LF-AC unit requires 5 KW of power. A separate, dedicated AC supply line circuit may be required to adequately power the system. If your power outlet cannot provide suitable power, arrange for a qualified, licensed electrician to install one for you.

SET-UP

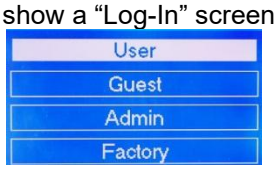
1. Remove the X-Reflow306 LF-AC from its shipping box. Store the shipping box in a convenient location. Reuse of the box will help to prevent damage when shipping or storing the system in future.
2. The system should be located on a rigid and stable work surface.
   ATR-1/360, the ESD safe cart which was designed to accommodate the Oven and accessories/options like A fume extraction system etc. It would make the oven mobile, independent and free work bench space in the laboratory.
3. Confirm that the power switch on the front panel is in the "OFF" position.
4. Open the TOP Clam Shell and check if there are accessories or documentation inside the heating chamber.
5. If you wish to use nitrogen, attach the nitrogen source (0.5~1 kg/cm^2) to the nitrogen input port on the rear panel of the oven.
   **Note: Higher N2 pressure can be used (up to 6 bars) if your process so requires.

POWERING UP and LOGGING-IN

1. Installation for the first time: Install a proper AC plug at the end of the power cord. The color coding of the wires is as follows: Brown=Hot wire, Blue=Neutral wire, Green/Yellow = Grounding Wire
2. Plug the power cord plug into an appropriate AC supply receptacle.(208V for 208V oven model and 220-230V for 230V oven model. The Oven's nominal voltage one can be found on the label on the back panel)

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

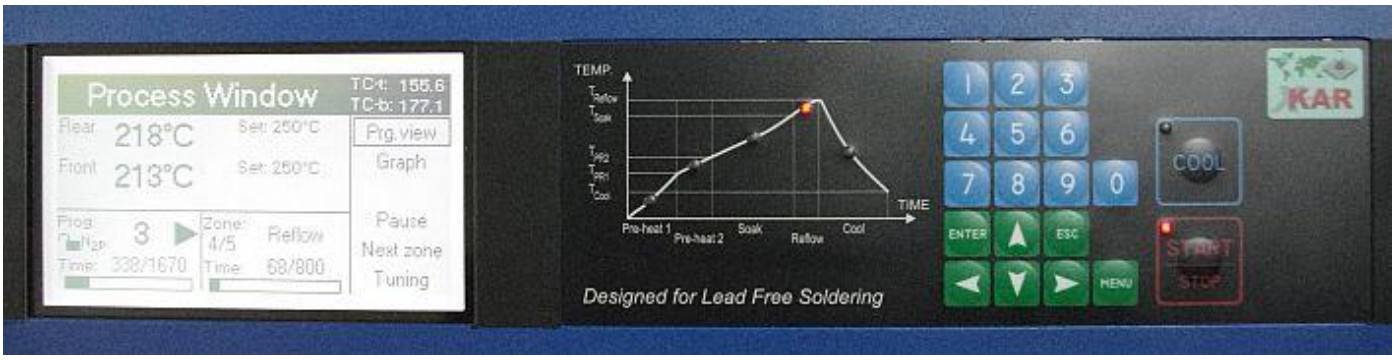
3. Turn the power switch to the "ON" position.
4. A short sound will be heard and the display will show a welcome screen with the manufacturer's logo, oven name, serial number and the revision number of the oven firmware
5. After a few seconds the display will show a "Log-In" screen where different level users are listed.



   Depending on privileges (Administrator, User, Guest or Factory Authorized Representative), choose an appropriate logging. Detailed information about privileges and accounts is presented later.
6. If the operator is not one of the authorized users he/she can log-in as a GUEST.
   Pressing "up" or "down" arrows on the numerical key-pad moves the cursor to the desired user selection. When the appropriate position is selected press ENTER
7. If any selection other than GUEST is made, the next screen will ask for a Password.
   Enter Your Password and press ENTER If you are going to be the administrator of the oven and are turning the oven on for the first time, please enter the universal code 1234 selected for the administrator in the factory and press ENTER
8. The Actual Process Window will show. The Programming and Heating/Soldering Process starts from this window. Process Window" is the main window of the Oven Program. Pressing P.W. when viewing any other window will always return the Operator to the "Process Window" screen. This window has all the information about the settings and temperatures in the oven as well as the reading of the external thermocouples connected to TC-T and TC-B sockets on the back panel.

VI. OPERATION

The Human Interface with the Oven is done by observing the oven display, and pressing ON/OFF power switch and the keys on the oven keypad.



The Soldering Process (or Program Cycle) can be started from the "Process Window".

Pressing the START/STOP key begins the Program Cycle. A Red LED illuminates in the corner of the Key. The display shows the "Process Window" screen (Fig.4), and color LEDs on the graph located next to the display indicate in which zone the Program Cycle is executed.

Pressing the START/STOP key at any time during the process stops the cycle. Pressing the COOL key opens the cooling air valve and starts the cooling cycle. During the cooling cycle the fan inside the oven circulates the air. If you have connected shop air to the cooling input on the back panel, the cold air jets will cool the object in the oven. To speed up the cooling, one can open the top clam shell (TOP) of the oven.

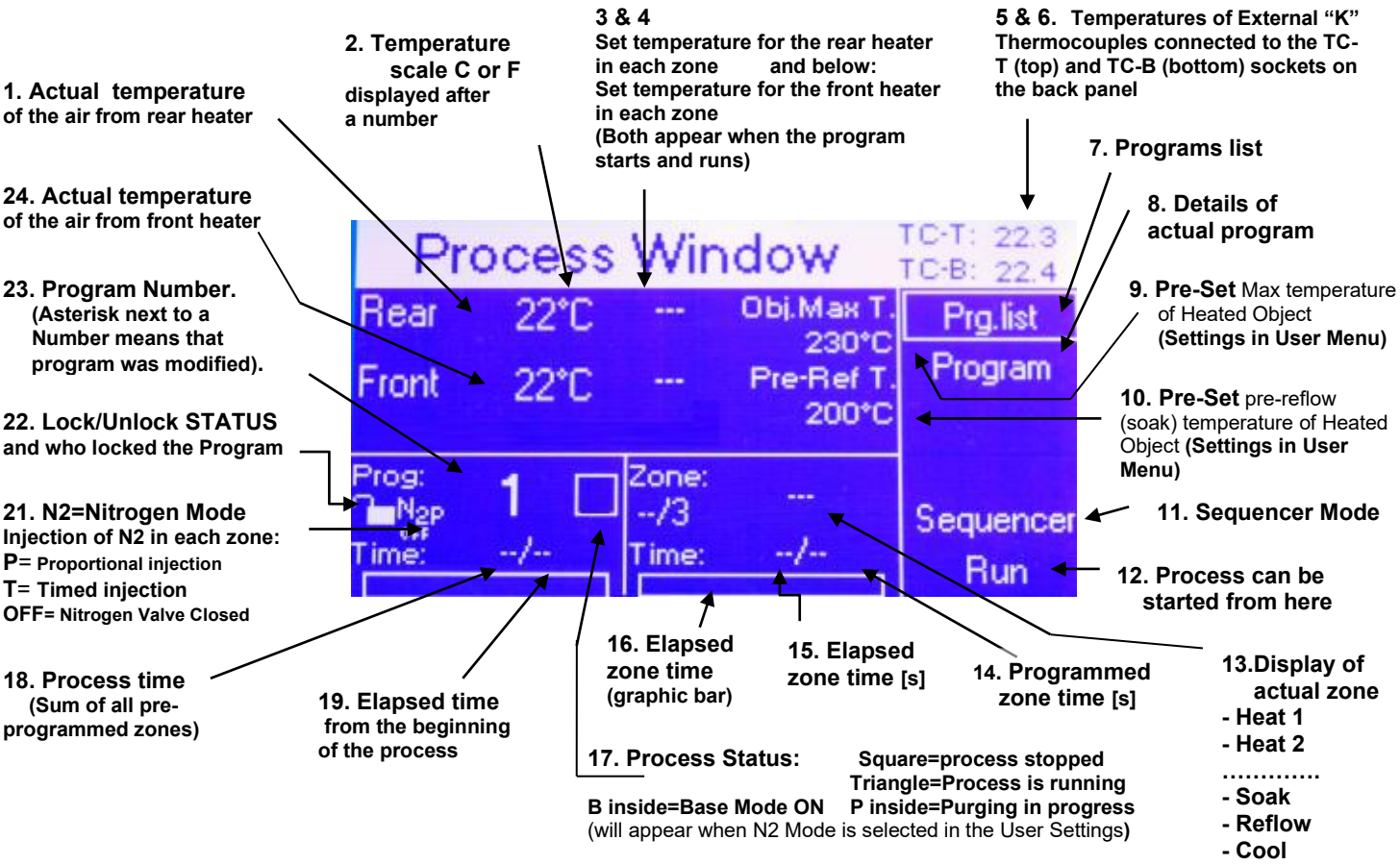


Fig. 3 Process Window before the program starts

On the right side of the Process Window there is a 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 to choose the required item.

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

Oven Settings:

Parameters of the oven can be set by the Administrator. To access the Oven Settings, one must log-In as the ADMIN or FACTORY.

1. After Log-in the "Process Window" screen appears.
2. Press MENU on the oven keypad. A window with a login menu appears.
3. Using the ▲ ▼ arrow keys, select Settings and press ENTER
4. This opens the window shown below.

Main Settings menu

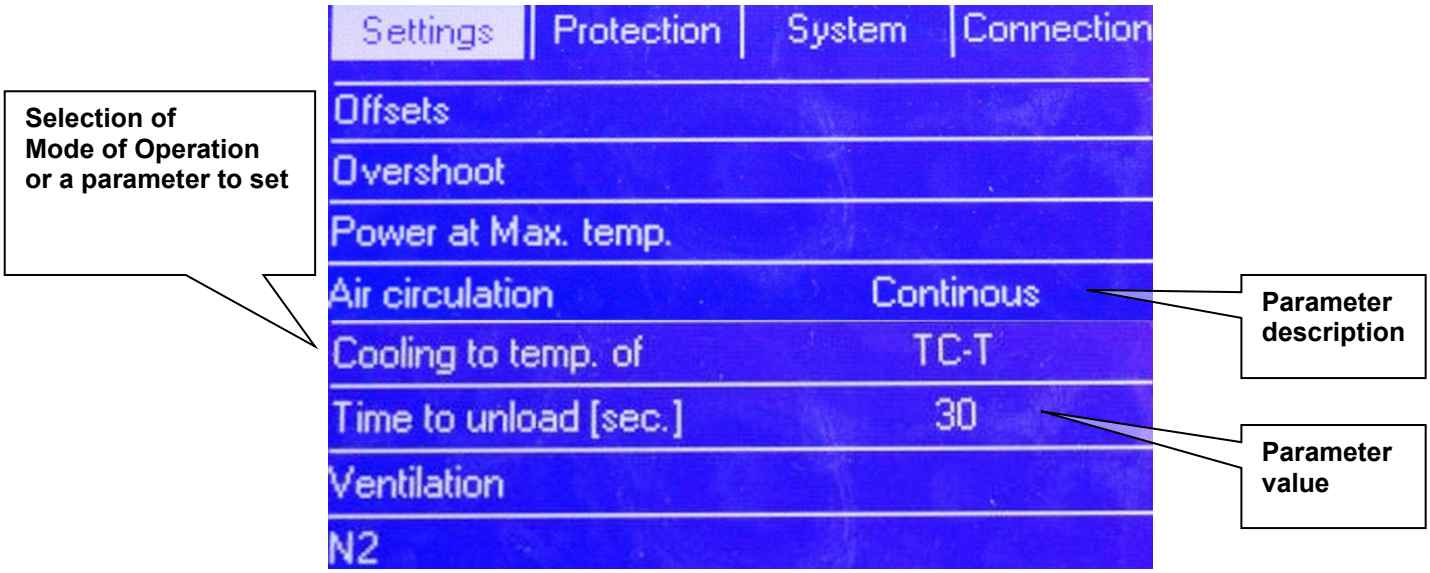


Fig. 4 User Settings Screen

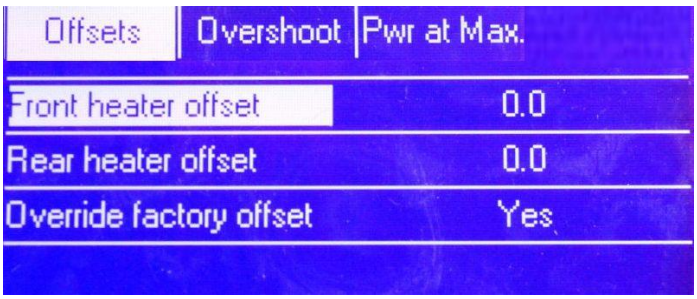
To move to the selected position on the screen press up/down and left/right arrows on the keypad.

1. Settings

Possible settings using the arrows and keypad:

1.1. Offsets

Using ▲ ▼ scroll to Offset. Press ENTER. The screen will change to:



1.1.1. Front heater offset – Press ►. The right part of the line will highlight and 0.0 value will blink. Using numerical keypad 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 0 ºC.

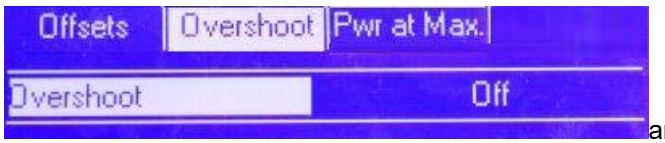
1.1.2. Rear heater offset – Press ▼ to scroll to Rear heater offset line. Press ►. The right part of the line will highlight and 0.0 value will blink. Using numerical keypad set your desired value. Press ENTER to confirm your setting. Possible settings for the offset for rear heater are: -20ºC to +90ºC.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

1.1.3. 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.

1.2. Overshoot

Using ▲▼ scroll to Overshoot line. Press ENTER. The right part of the line will highlight and "off" will blink. Pressing ▲▼ arrows you can turn the overshoot ON or OFF.

When you decide on your choice, press ENTER. The following screen opens.



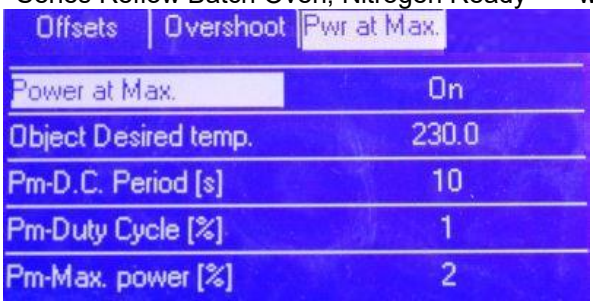
and Press ESC to return to the Settings menu.

Factory Overshoot is set up to 10 ºC during 10 sec time. If you choose not to override Factory Overshoot both heaters will be ON until the temperature is higher by 10ºC than the set temperature, after the thermocouples measuring air temperature of the air entering the heating chamber reach pre-set values and will keep this higher temperature for 10 seconds.

1.3. Power at Maximum Temperature

Note: This is a simplified option to get the heated object to pre-reflow temperature and reflow and not exceed these temperatures. Regardless of what temperatures are set in soak and reflow zones, the oven will heat the object to defined temperatures in Power at Max mode.
Please remember to connect the "K" thermocouple to the object and plug it into the TC-B socket located on the back panel of the oven.

Using ▲▼ scroll to Power at Max.. Press ENTER. This opens the next screen.



Press ►. The right part of the line will highlight and On or Off will blink.

By pressing ▲ ▼ arrows you can turn this option On or Off.

When you decide on your choice, press ENTER. Power at Max will be highlighted.

Press ▼ arrow to go to Object Desired temp. Press ►. The right part of the line will highlight and previously set value will blink. Using numerical keypad set your desired value. Press ENTER to confirm your setting. Object Desired temp. will be highlighted.
Possible settings for the Object Desired temp. are: 50 to 300ºC.
The factory setting is 230 ºC.

Next parameter of Object Desired temp. to set, is Pm-D.C. Period, which defines how often the power will be added to the heaters after the object reaches desired temperature.

Press ▼ arrow to go to Pm-D.C. Period.

Press ►. The right part of the line will highlight and previously set value will blink. Using numerical keypad set your desired value. Press ENTER to confirm your setting.
Pm-D.C. Period will be highlighted.
Possible settings for the Pm-D.C. Period are: 0 to 600. The factory setting is 15 sec.

Next parameter of Object Desired temp. to set is Pm-Duty Cycle %. (Defines in what part of the set period the power will be added to the heaters).

Press ▼ arrow to go to Pm-Duty Cycle %. Press ►. The right part of the line will highlight and previously set value will blink. Using numerical keypad set your desired value. Press ENTER to confirm your setting. Pm-D.C. Period will be highlighted.
Possible settings for the Pm-Duty Cycle % are: 0 to 100. The factory setting is 3.

Next parameter of Object Desired temp. to set is Pm-Max. Power %. (Defines how much power will be added to the heaters during set by two previous parameter time).

Press ▼ arrow to go to Pm-Max. Power %. Press ►. The right part of the line will highlight and previously set value will blink. Using numerical keypad set your desired value. Press ENTER to confirm your setting. Pm-Max. Power %. will be highlighted.
Possible settings for the Pm-Max. Power %. are: 2 to 100. The factory setting is 2.

Next parameter to set is Obj. Pre-reflow temperature:

Press ►. The right part of the line will highlight and On or Off will blink.

By pressing ▲ ▼ arrows you can turn this option On or Off.

When you decide on your choice, press ENTER. Obj. Pre-reflow will be highlighted.

Press ▼ arrow to go to Pre-reflow Temp. Press ►. The right part of the line will highlight and previously set value will blink. Using numerical keypad set your desired value. Press ENTER to confirm your setting. Pre-reflow Temp. will be highlighted.
Possible settings for the Object Desired temp. are: 50 to 400ºC.
The factory setting is 200 ºC.

Next parameter of Pre-reflow Temp. to set is Pr-Duty Cycle Period, which defines how often the power will be added to the heaters after the object reaches pre-set, pre-reflow temperature.

Press ▼ arrow to go to Pr-Duty Cycle Period.

Press ►. The right part of the line will highlight and previously set value will blink. Using numerical keypad set your desired value. Press ENTER to confirm your setting.
Pr-Duty Cycle Period will be highlighted.
Possible settings for the Pm-D.C. Period are: 0 to 600. The factory setting is 15 sec.

Next parameter of Pre-reflow Temp. to set is Pre-reflow Duty Cycle %. (Defines the part of the set period in which the power will be added to the heaters).

Press ▼ arrow to go to Pre-reflow Duty Cycle %. Press ►. The right part of the line will highlight and previously set value will blink. Using numerical keypad set your desired value. Press ENTER to confirm your setting. Pre-reflow Duty Cycle %. will be highlighted.
Possible settings for the Pre-reflow Duty Cycle % are: 0 to 100. The factory setting is 3.

Next parameter of Pre-reflow Temp. to set is Pr-Max. power %. (Defines how much power will be added to the heaters during set by two previous parameter time period).

Press ▼ arrow to go to Pr-Max. power %. Press ►. The right part of the line will highlight and previously set value will blink. Using numerical keypad set your desired value. Press ENTER to confirm your setting. Pr-Max. power %. will be highlighted.

Possible settings for the Pr-Max. power % are: 2 to 100. The factory setting is 2.

Press ESC to return to the Settings menu.

1.4. Air Circulation

Press ▼ arrow to go to Air Circulation. Press ►. The right part of the line will highlight and previously set mode of air circulation will blink.

By pressing ▲ ▼ arrows you can turn this option to Continuous or Pulsed.

Press ENTER to confirm your setting. Air Circulation will be highlighted.

Continuous Mode of air circulation means that the air circulating blower is on all the time during oven operation. In Pulsed Mode of Operation blower is pulsing the air.

1.5. Cooling to temperature of

Press ▼ arrow 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 ▲ ▼ arrows you can turn this option to Circulating Air or TC-T.

Press ENTER to confirm your setting. Cooling to temp. will be highlighted.

Cooling of to temperature of circulating air means that the oven will cool for as long as pre-programmed and/or to the temperature measured by the thermocouple measuring temperature of the air in the heating chamber.
Cooling of to temperature of TC-T means that the oven will cool for as long as pre-programmed and/or to the temperature measured by the thermocouple attached to the load (PCB) processed in the heating chamber and connected to the TC-T input located on the rear panel of the oven. This mode allows you to cool the heated object exactly to desired temperature.
With cooling to the temperature of the circulating air (like all other batch ovens do) does not give any guarantee that, when the air is already cold, that the load is cooled as well.

1.6. Time to unload

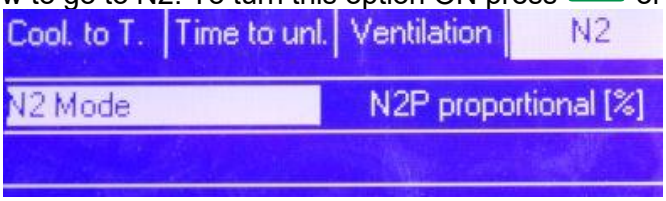
Press ▼ arrow to go to Time to unload**.** Press ►. The right part of the line will highlight and previously set value will blink. Using numerical keypad sets your desired value. Press ENTER to confirm your setting. Time to unload will be highlighted.

Possible settings for Time to unload are: 3 to 300 sec. The factory setting is 15 sec.

Press ESC to return to the Settings menu.

1.7. N2 :

Press ▼ arrow to go to N2. To turn this option ON press ► or ENTER. The new window will open.



Press ►. The right part of the line will highlight and the highlighted area will blink showing previously set N2 Mode. By pressing ▲ ▼ arrows you can set N2 mode of operation to:

off, N2C=Continuous fill, N2T=Periodic fill [sec] or N2P=Proportional [%].

Press ENTER to confirm your choice. N2 Mode will be highlighted.

Press ESC to return to the Settings menu.

1. **Protection** (Assignment of PASSWORDS)

1.10.1. **Admin** - Four digit Password to manage the Oven use. Highest Level of Authority. The factory setting is 1234

1.10.2. **Guest** – Possible settings: YES or NO. If YES, the user "Guest" can run the pre-set oven programs without a PASSWORD.

1.10.3. **User1**

1.10.3.1. Account Type: Possible settings: Privileged or Limited.

1.10.3.2. Four-digit Password for User1. The factory setting is 1111

1.10.4. **User2**

1.10.4.1. Account Type: Possible settings: Privileged or Limited.

1.10.4.2. Four-digit Password for User2. The factory setting is 2222.

1.10.5. **User3**

1.10.5.1. Account Type: Possible settings: Privileged or Limited.

1.10.5.2. Four-digit Password for User3. The factory setting is 3333.

1.10.6. **User4**

1.10.6.1. Account Type: Possible settings: Privileged or Limited.

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

1.10.7. **User5**

1.10.7.1. Account Type: Possible settings: Privileged or Limited.

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

1.10.8. **User6**

1.10.8.1. Account Type: Possible settings: Privileged or Limited.

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

2. **System**

2.10.1. **Temp. Scale** – Choice of Temperature Scale: The factory setting is ºC – Degree Celsius.

ºC – Degree Celsius

ºF – Degree Fahrenheit

2.10.2. **Time and Date** - Please set. No Factory Settings.

The X-Reflow 306LF has built-in real time clock which is maintained by 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. The time and date is set from the Settings Menu.

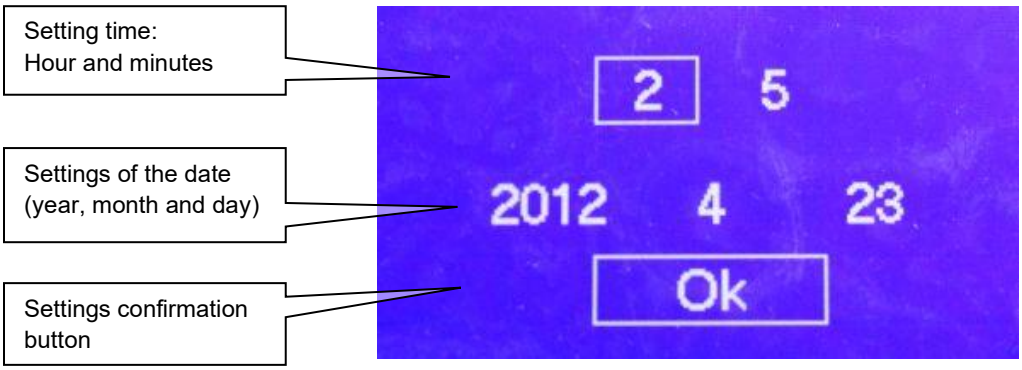


Fig.6 Time and Date Settings Window

How to set the time and date:

a) Access the time and date settings window (In settings menu)
b) The active frame shows the parameter which can be set. The first one is „hour".
c) Set the hour using numeric key-pad.
d) Confirm pressing the ENTER key.
e) Set the minutes and confirm pressing ENTER key.
f) Set the year and confirm pressing ENTER key.
g) Set the month and confirm pressing ENTER key.
h) Set the day of the month and confirm pressing ENTER key.
i) Active frame moves to „OK." If satisfied with the settings, confirm pressing ENTER key.

2.11. **Sound -** Available settings:
ON – sound is on
OFF – sound is off
2.12. **Contrast** – Display contrast setting.
Available values: 32 to 255

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

4. Restore
4.10. **Restore Settings** –This option allows for restoring all settings to factory set values.

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 PCBs.

PROFILE is a temperature curve in time of the PCB placed in the oven and heated by the temperature of Hot Air or cooled by Nitrogen. Each PROGRAM should have:

- A minimum of one PREHEAT Zone as recommended by the 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.
- SOAK or Heat Equalization Zone to evenly spread the heat across the board,
- 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
- COOLING Zone to cool the board and solder, preferably at the rate of one degree per second.

X-Reflow306 LF-AC has one example program entered at the factory which cannot be changed.
Operators can enter and save up to 249 Programs.
Only the Administrator and Privileged Users can create and Save the Programs.

The X-Reflow306 LF-AC PROGRAM Characteristics:

Each PROGRAM created and saved in X-Reflow306 LF-AC Memory has:

- Choice of 3 to 5 Temperature/Time Zones
- The ability to name the zones of the created programs
- A record of the date on which it was created
- The information who created the PROGRAM
- The information if it is Locked or Unlocked and who locked it.
  Note: The saved Program can be locked/unlocked only by the creator or the Administrator.
  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

Moving up and down the MENU

Fig. 7 Process window

Pressing the Arrow will move the surrounding rectangle one place down to “Program”.

Pressing button when hovering over “Program List” will open the window showing Program List (see below):

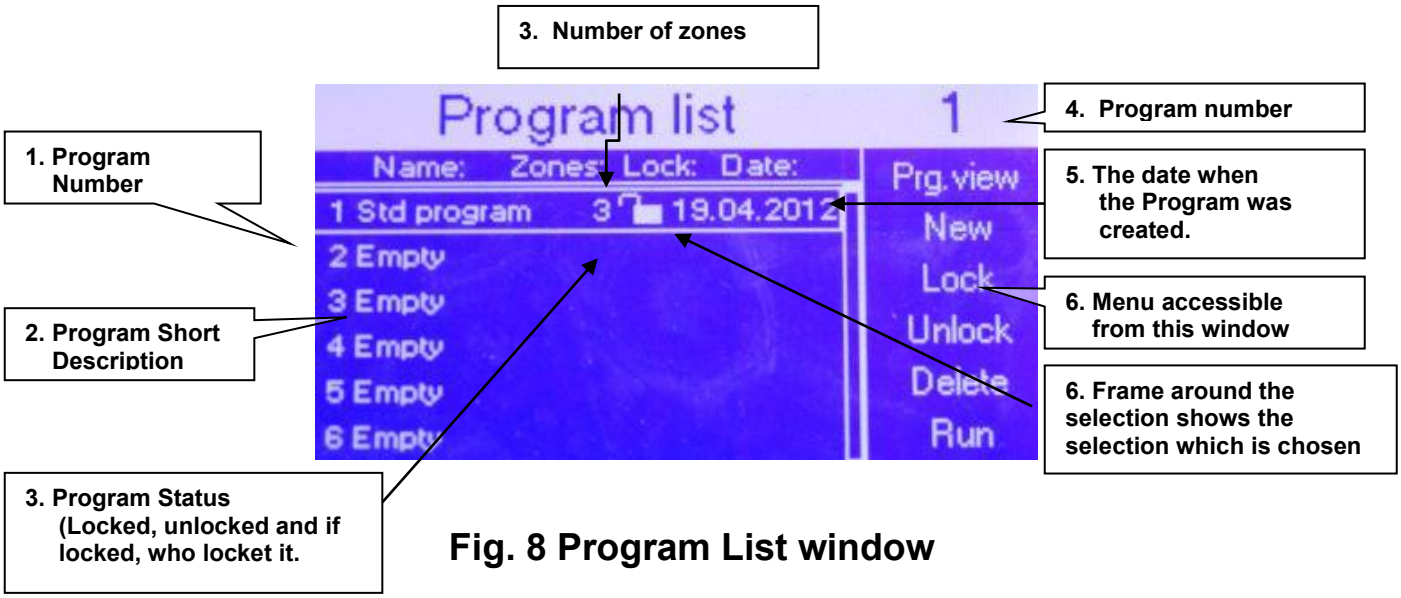


Fig. 8 Program List window

If Prg. view is selected and ENTER is pressed the PROGRAM window will show:

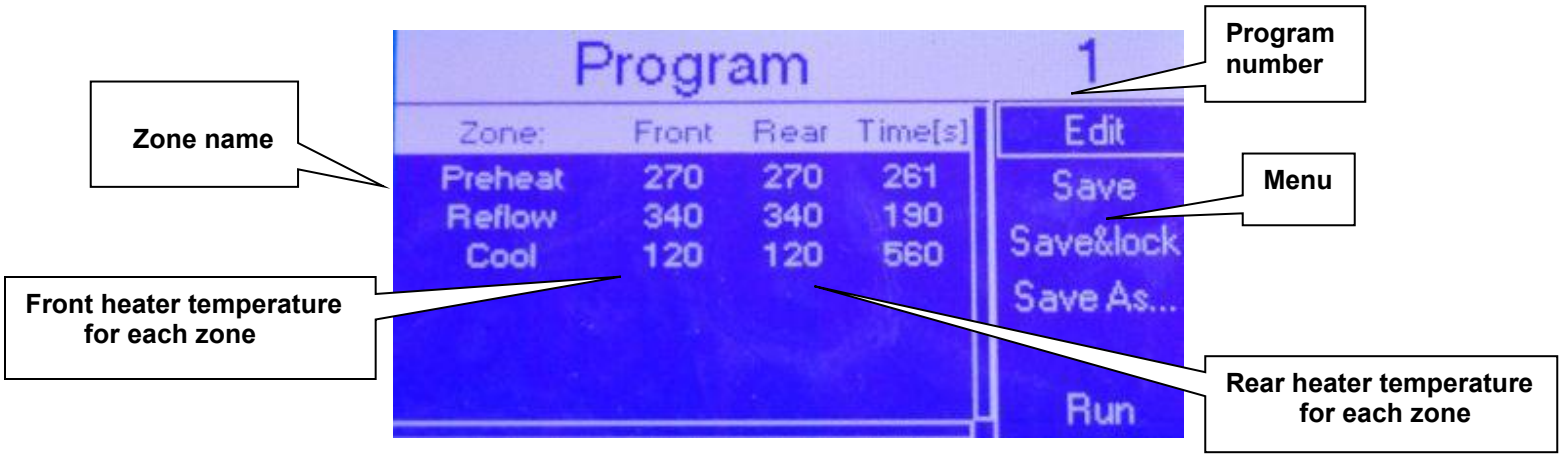


Fig. 9 Program window

<u>To change the program to a different one:</u>

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

<u>To edit Current Program or create a new one:</u>

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

a) Starting Program Cycle

- Power up the oven
- Select the program
- Press the START STOP key to start the oven.

b) Stopping the Program Cycle

- Press the START STOP key to stop 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.

c) Cooling Cycle

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

OR Press COOL key to start the cooling cycle at any time during program cycle.

NOTE
During 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.

d) Selecting the program

Screen “Program List” (FIG. 7).
To select a program to run:

a) Press ▲ ▼ arrow keys to select the desired program.

b) Press ENTER key to access this program.

When in the Program window, press START STOP to run the program.

e) Program Edit

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

VIII. Sequencer

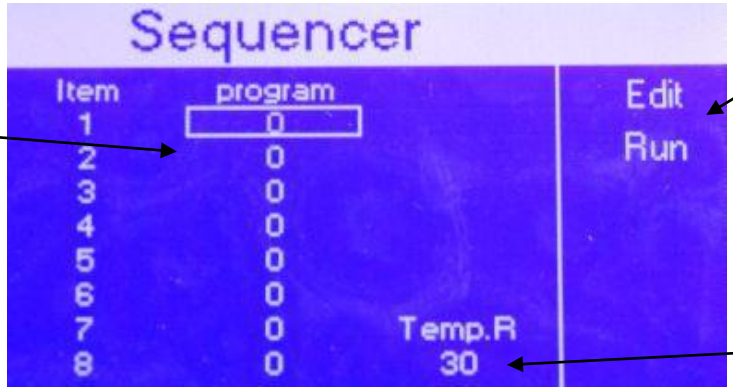
The Sequencer can be user by the following types of users:

PRIVILEGED USER
ADMIN
FACTORY

The Sequencer is an additional tool which allows user to run up to eight selected programs 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, when the temperature reaches the user’s pre-set value, the 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 effect. They are overwritten by the reading of the “K” TC1 temperature. The program will end when the TC-1 temperature reaches the pre-set temperature in the Sequencer temperature “R”. After the oven is cooled to this temperature, the running program stops and the next selected in the sequencer program starts.



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

Menu

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.

Fig. 10 Sequencer window

A. 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 program to run using the numerical keypad and press ENTER
4. Select the programs to run one after another.
   (If you want to run only four out of possible eight programs in the sequence, select 0 for item 5 to 8 on the program list (zero means that there is no program to run).
5. Pressing ▲ ▼ or ENTER to select the "Temp. R" field.
6. Set the 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 distinguish the views between "Process Window" in the "Sequencer" mode and a single program mode when the oven is running, the letter "S" is added to the word window in the "Process Window", e.g. "Process Window **S**" is displayed instead of "Process Window"

IX. LEVELS OF AUTHORITIES for OVEN OPERATORS

To protect stored profiles and oven settings, the X-REFLOW306 LF oven is programmed to give a selected choice of authorities to different users. The Operator can have either full access to oven settings (Administrator), limited access (USER), or no access (GUEST) at all. The Administrator has the highest level of authority. He or 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 or her and login by entering the PASSWORD assigned. Only GUEST does not require a PASSWORD (but GUEST can only RUN existing programs and cannot make any changes).

WHO CAN OPERATE THE OVEN:

- 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)

A. 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 in real time
- See the Program settings
- See the graphic display

User – Standard and Extended Set of Privileges for the 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 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
- See the Program settings
- See the graphic display

Factory – Account for Factory Personnel for Maintenance and Service purposes. Requires Special Factory Password known only to Factory Authorized Personnel.

B. List of Factory set PASSWORDS when the unit is shipped out to the Customer.
(The Administrator can change these PASSWORDS at any time)

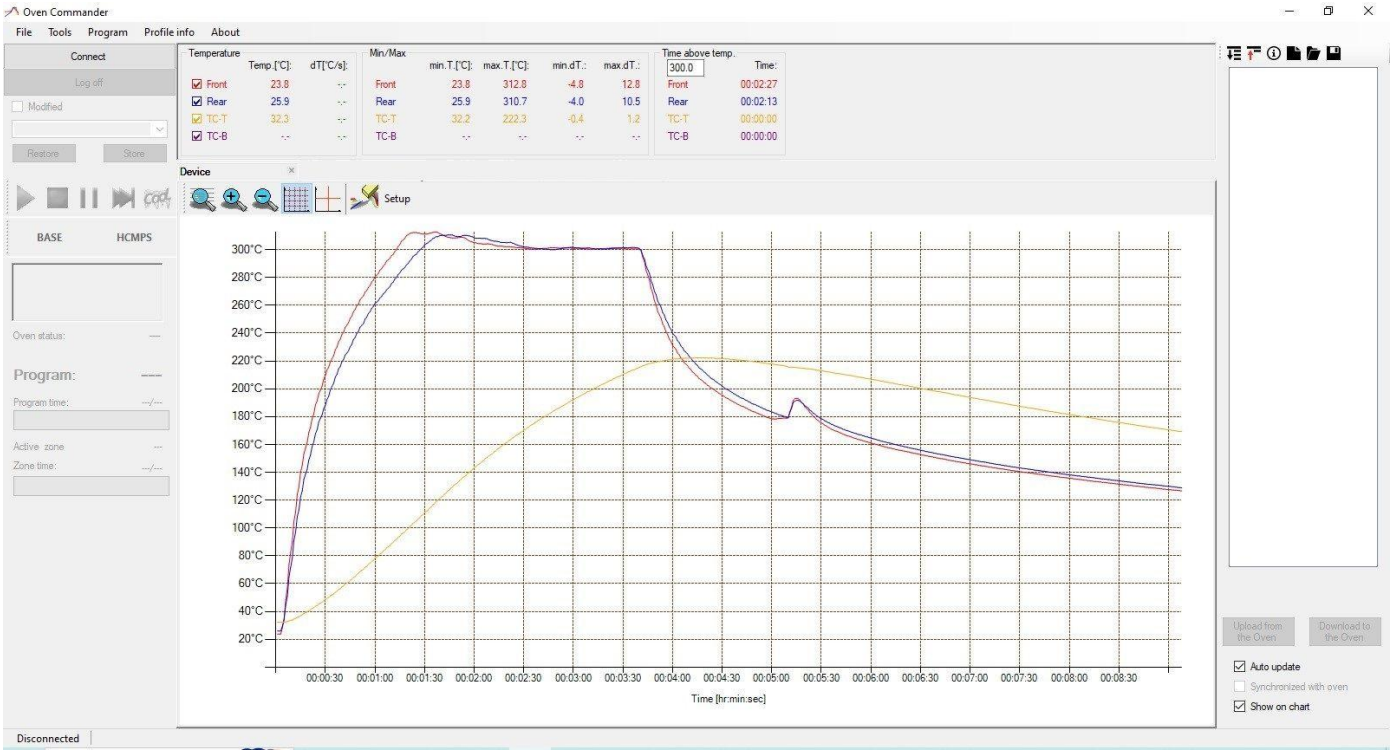
- Admin : 1234
- User1 : 1111
- User2 : 2222
- User3 : 3333
- User4 : 4444
- User5 : 5555
- User6 : 6666
- Guest : Does not require a PASSWORD
- Admin1 : XXXXX Emergency Password for the Administrator

NOTE: ***The*** *emergency PASSWORD should be used only when the regular PASSWORD is lost (forgotten). This PASSWORD 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 or she has to remember not to assign the same passwords for different Users.

X. X-Reflow306 LF-ACH TECHNICAL SPECIFICATIONS

Reflow area	12”x12”x3.5” (305x305x90 mm)
Temperature range	40°C to 360°C
Number of Zones	Purging, to push oxygen out + variable, three to five zones, set by the operator for each program. Last zone is a cooling zone. So, the oven can have 3 zones or 5 zones.
Heaters	2 Heaters (Front and Rear) 3.45kW (230V) and 3.45KW (208V) **(Please specify voltage to receive correct heaters)**
Max. PCB size	12”x12” (306x306 mm)
Supply Requirements	30 amps, 230V 50/60 Hz (Max power consumption: 6.9 kW)
Advanced Cooling Module (Removable to ease maintenance, or to gain extra ½” of chamber height if it is needed occasionally)	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 under the heated object. Advanced cooling produces more reliable soldering connections and helps to handle heated objects after heating cycle. Opening and closure of the exhaust port is controlled by the programming. (This option is not included in the X-Reflow306 LF Models)
Monitoring Window Size	7.8”x7.8” (200×200 mm)
Nitrogen Connection	Standard Connector. Nitrogen pressure:1/2-1bar (7-14.5 psi)
Size	L=28”xW=21”xH=15,4” (L=711mm x W=530mm x H=390mm)
Weight (unpacked)	145lbs. (~68 kg)
Computer profile control	Allows pre-programming, storage and recall of up to 255 programs
Communication with PC	RS485 port (X485-USB converter is included with the oven to connect to PC’s USB port)
Advanced Features	• 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. • Independent off set for the 2 heaters, (useful when processing unevenly loaded boards). • RS-485 port for downloading firmware upgrades from a PC and monitoring air and two additional “K” Thermocouples during reflow process. (X-KAR R485-USB Converter is needed for connection to a PC and X306 Oven Monitor Software for monitoring and displaying on a PC real temperature during the heating cycle. **X-KAR XTC-Profiler (Eight TC inputs) is also recommended** for multi-point monitoring. • Ready to solder in Nitrogen environment and to connect Residual O2 Monitor. • Means to monitor the process in progress (besides the on-board LCD display) • Power at Max Mode, which allows for pre-setting a pre-reflow temperature of the heated object and a maximum temperature of this object by means of control of the heating by the “K” thermocouple attached to the heated object and the TC-B socket at the back of the unit.

The X-Reflow306 LF-ACH was developed to perform heat treatment of an aluminum part which had a height of 3.2 inches. A higher heating chamber was needed to accommodate the part. Due to significant increase in the heating chamber volume and the weight of the heated object exceeding the design limits for all ovens meant for reflowing the PCBs, the time from a cold start to reach 220 deg. C. had to increase. The graph of the temperature rise is shown below. The heated object inside was an AL structure 1500 diameter and 3.2 inches in height.



XI. OPTIONAL ACCESSORIES and EQUIPMENT

a) ATR-1/306

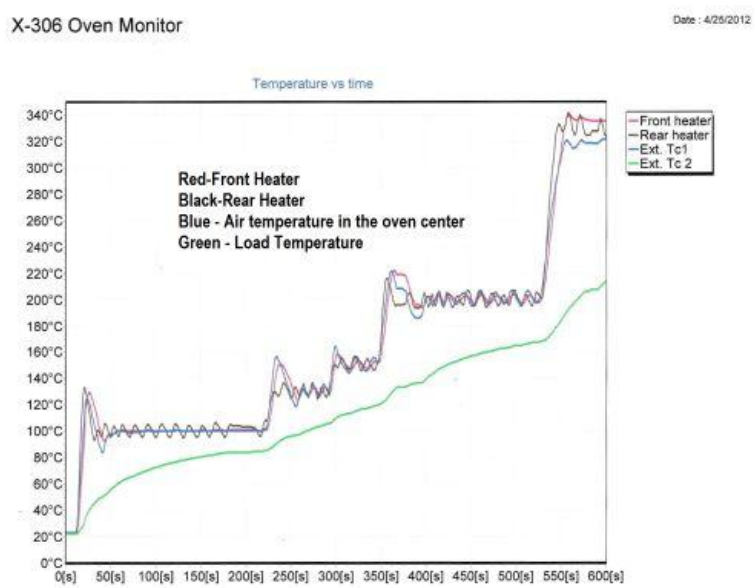
ATR-1/306 was designed especially to make the use of the batch oven easy and very practical.
It is fully antistatic to add security and comfort.

The oven fits on top of the cart and can be moved around the workplace. The cart has a brake on one of the front wheels to secure the cart in place.
There is enough space on the side of the oven to place additional TC meter, tools, hot gloves or the note pad.

The middle shelf is positioned at such height so that the X-306 Fume extract can fit on the bottom shelf of the cart. (**Note that this fume extract shall be supplied from the back panel of the oven**).

The middle shelf is reserved for various accessories one may need when using the oven [polyamide (Kapton TM) tape, knife or scissors, test boards, players (if used to pick-up hot items from the oven) etc. The cart makes it easy to store the oven out of your way when not in use.

b) X-306 Oven Monitor, Highly Recommended.



Process Monitoring Software that displays the graphs of temperature versus time on a PC.

It reads the front and rear thermocouples of the oven and two additional thermocouples connected by the oven operator. One can see, record, save and print the profile of the soldered PCB. One or two external "K" thermocouples can be connected to the board, or one to the board and another placed inside the oven above the board to see the actual board and air temperatures during the program cycle.

c) X-306A Fumes Cleaning System with HEPA Filtration

A cost-effective unit capable of filtering fumes from the X-Reflow306 Batch Oven.
Shop air or N2 used for cooling pushes the fumes through the X-306A Fumes Cleaning System which cools down the hot fumes and filters them so that they can be released as clean air into the atmosphere.

XII. How to upgrade the firmware in X-Reflow306 LF-ACH in the future:

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

1. Copy the file firmware XXX.zip and unpack this to one folder (All files must be in the same folder)
2. Connect the X-Reflow 306 (Data Store Connector) to a PC(USB) via the X485-USB converter.
   NOTE: X485-USB Converter required an installed driver for proper operation.
   When the converter is connected to the PC for the first time, the X485-USB driver will be installed automatically.
3. Press and hold the enter button on the Oven
4. Turn Power switch to the ON position.
5. Release the “Enter” button. The oven display “Bootloader mode”
6. Run the program Flasher.exe on the PC (double click on the flasher icon)
7. Flashers should find the serial port where the oven is connected.
8. Flasher will ask, “Do you want to start to update device?”,
9. Select “Yes” to confirm and press “enter”.
10. After the upgrade is finished, you should see the message “Write successful. Would you like to run application?”
11. Press “ENTER”
12. The oven will start. The display in the oven should show X-KAR logo, name, serial number and firmware version number.
13. The Flasher window will close automatically.

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Other related Bokar Products pages:
Please find below the web pages describing Bokar International products.
We also have listed the pages of partner Companies which products are sold by our Distribution network.

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.ESDgloves.info** **www.ZeroCharge.net** **www.No-Stat.com** **www.ESDchair.com** **www.ESDlabcoats.com** **www.ESDcarts.net** **www.ESDbrushes.com**
Other: www.SMT-ESD.com www.SuperiorScrewdrivers.com www.Super-Iron.com

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