Introduction to operation

The status of the system is visualized in real time and shows a synoptic of both the transfer chamber and the main components of the machine

⇨ **sheet C 70A**

A number of different access levels have been factory programmed in order to limit access to authorized functions. These levels are controlled by means of codes (user's name and password).

⇨ **sheet C 70C**

Each user has his own password allocated by the system administrator. To use the machine, he must perform the login procedure requiring this password.

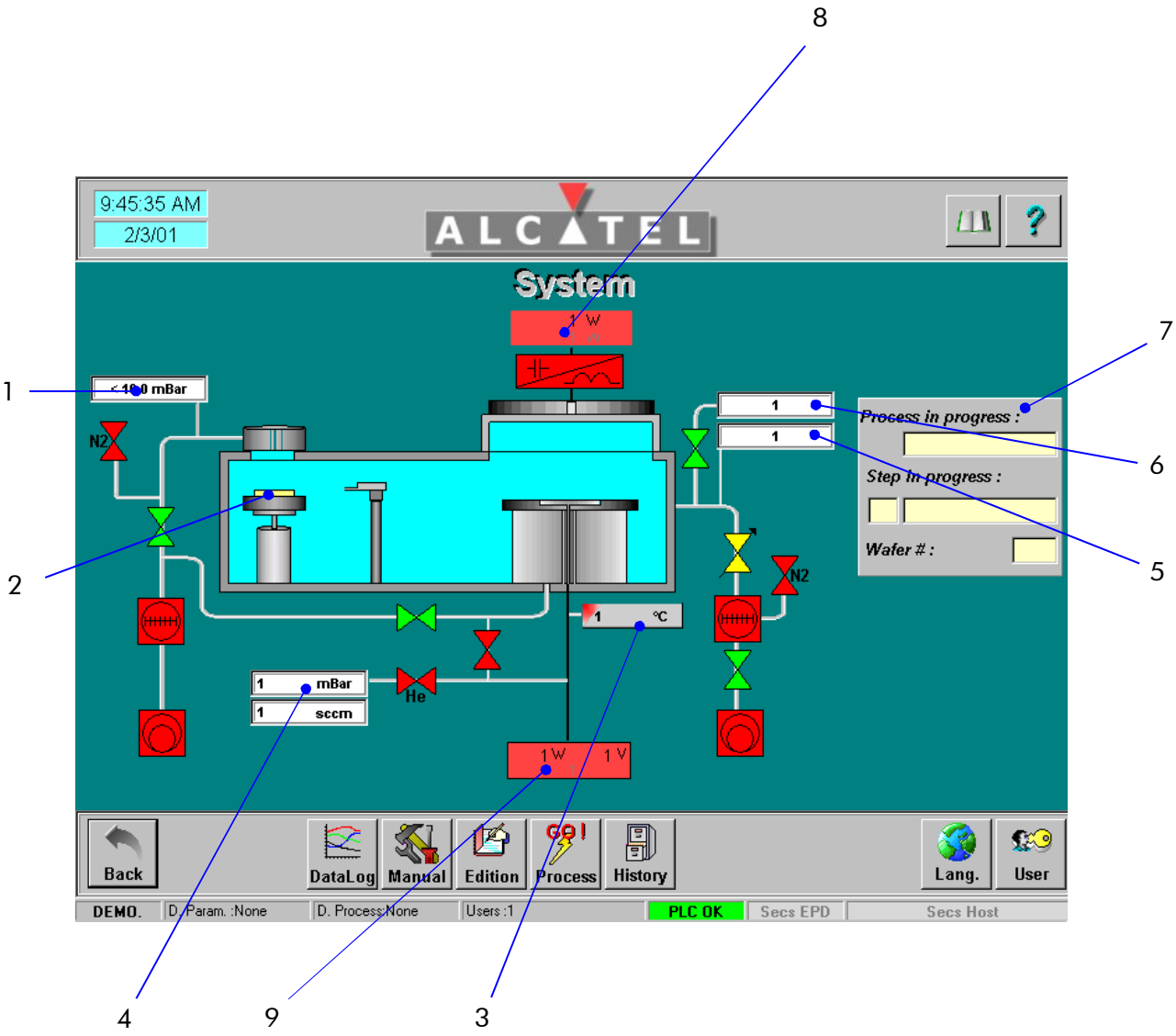
Note: The machine software only admits one user at a time.

⇨ **sheet C 70D**

You can choose the language for the user's interface.

⇨ **sheet C 70E**

System screen



In the working area, the main physical components of the system are represented diagrammatically and their interconnections are indicated by graphical symbols.

System screen

The main graphical symbols used are:


Turbomolecular pump


Rough pump

Electric motor


Throttle gate valve


Valve


Pressure gauge

As a general rule, each color has the following significance:

Green: valve **open** or component **activated**

Red: valve **closed** or component **deactivated**

Yellow: valve partially open

The main values of parameters of the system are also displayed on this screen:

1 - Rough pressure value.

2 - Wafer position in the transfer chamber.

3 - Substrate holder temperature.

4 - Helium pressure value under the wafer present on the substrate holder and corresponding helium flow.

5 - Process pressure value in the transfer chamber.

6 - High vacuum pressure value in the transfer chamber.

7 - Data related to the current process: name of the process, number of the step of the process and number of the wafers being processed

⇨ **sheet C 100**

8 - Incident power (big characters) and reflected power (little characters) values of the RF source generator.

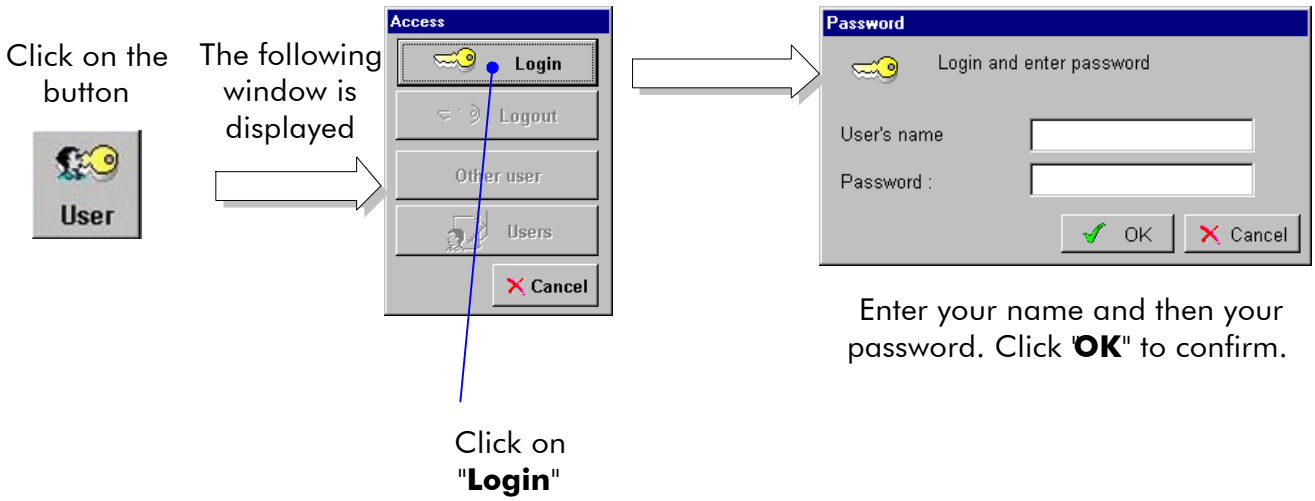
9 - Incident power (big characters) and reflected power (little characters) values of the substrate holder generator.

To display the identification name of a component, hold the mouse pointer a few seconds steady over its symbol.

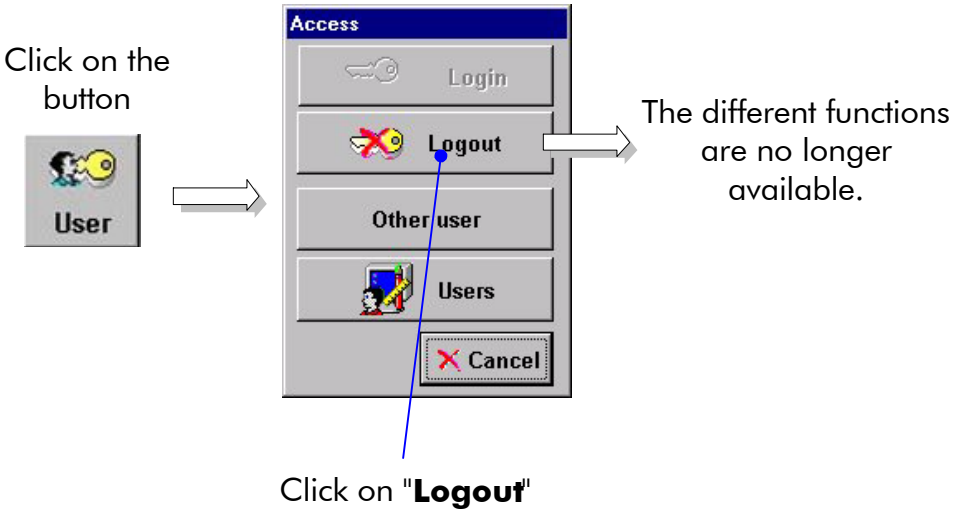
Log in

Each user has an individual password allocated by the system administrator. To access the different functions of the machine software, you must imperatively log in.

The current user's name appears in the status area at the bottom of the screen (if no user is logged in, the word "**none**" is displayed in the user's box of the lower status area). The machine software only allows one user to be logged in at any time.



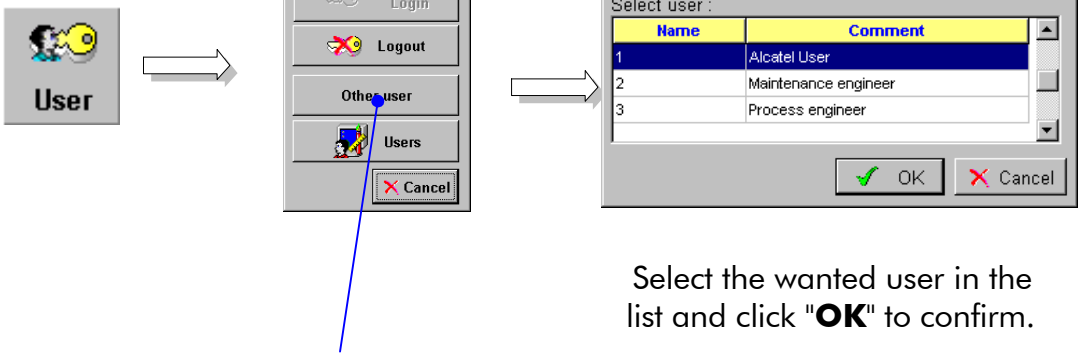
If another user is already logged in, click on the "**Logout**" button before doing anything else. Furthermore, you are advised always to execute the logout procedure before quitting the machine.



Log in

At any time, you may use the process parameters (tolerance presets, pressure presets, gas presets) as well as the step and process libraries of another user of the machine. Then, you must click on the "**Other user**" button and then select the wanted user in the list.

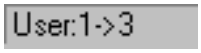
Click on the button



Select the wanted user in the list and click "**OK**" to confirm.

Click on "**Other user**" to use the same parameters as an other user of the machine .

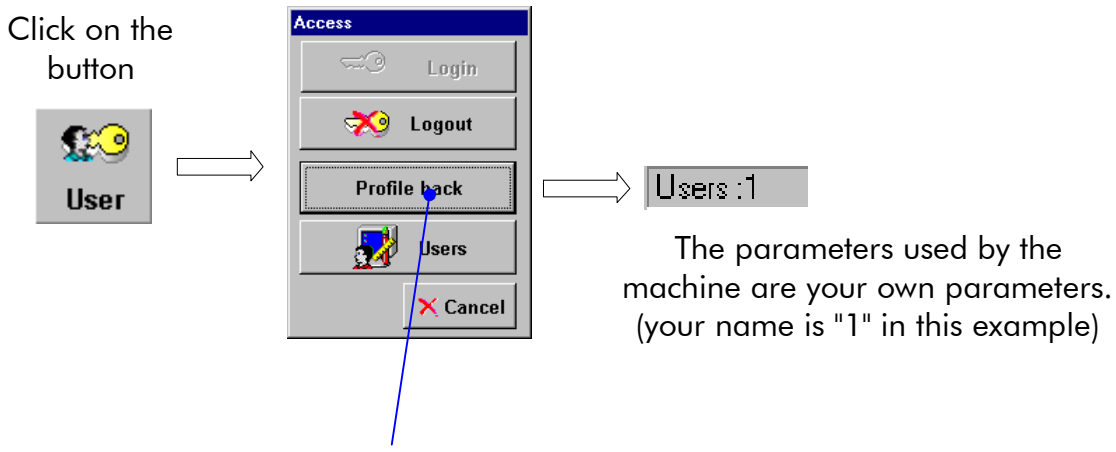
The user's box in the lower status area (at the bottom of the screen) indicates then that the parameters used by the machine are no longer your own parameters but those of the selected user.



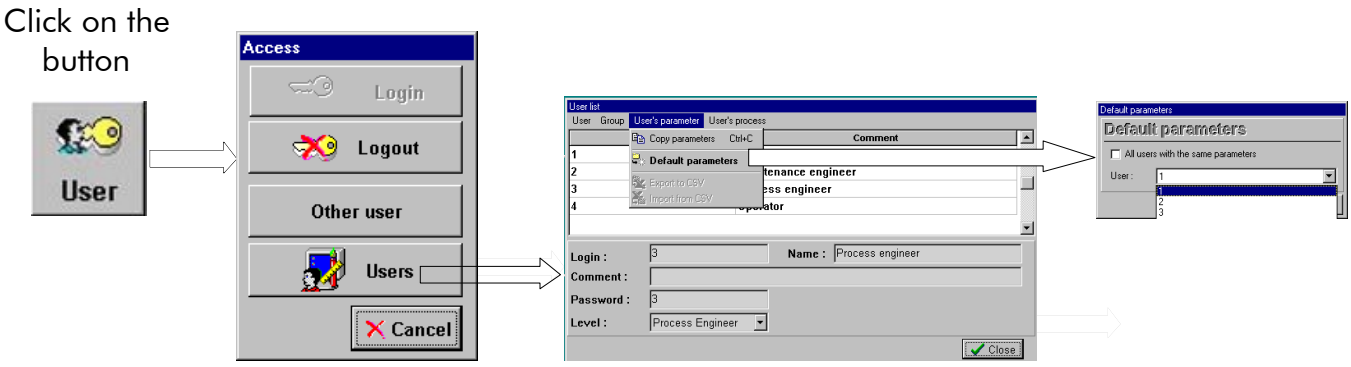
Example: your user name is "1" and you have chosen to use parameters of the user "**3**".

Log in

To use your own parameters again, you must click on the "**Profile back**" button.



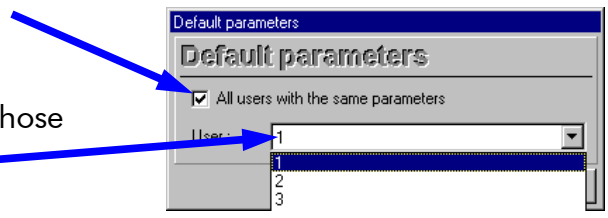
A user of the machine may use the same process parameters (tolerance, pressure and gas presets) as another user. Proceed as follows:



In the "**User's parameter**" pop-menu, select the "**Default parameters**" option. Then, select in the list the login name of the user you want to use the process parameters. Click OK.

All the users of the machine may use the same process parameters.
To do this, check this option

The process parameters are those of the user selected here



Description of the user's interface

In normal operation, you interact with the ALCATEL 601 machine via a color monitor and a keyboard.

⇨ **sheet C 60A**

In normal operation, you interact with the software:

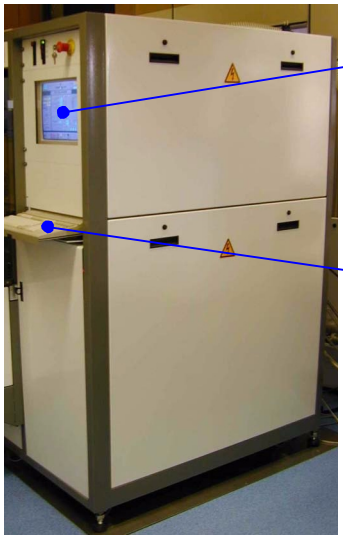
- by observing the data displayed on the screen (process data, alarm etc.)
- by moving the mouse cursor and pressing keys to enter a command.

⇨ **sheet C 60B**

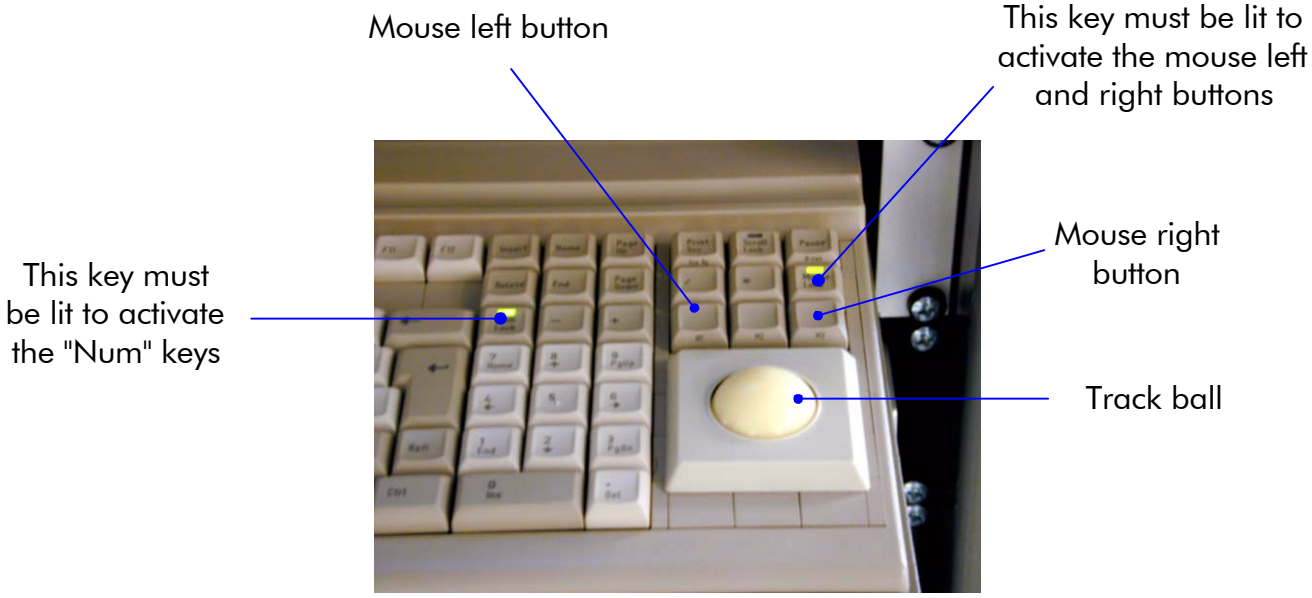
Description of the hardware

You interact with the ALCATEL 601 via:

- a 15 " color monitor with a resolution of 800x600 pixels/256 colors,
- a retractable keyboard.



To save space in the clean room, the keyboard is usually equipped with a trackball built into the keyboard instead of a mouse. The trackball is located next to the numerical keypad and two of the keys on the numerical keypad are used as mouse buttons.



Display on PC monitor

The display is divided into three areas:

Working area: This is the central area, which contains a diagram or information relating to the current operation. The screen name is displayed at the top of this area.

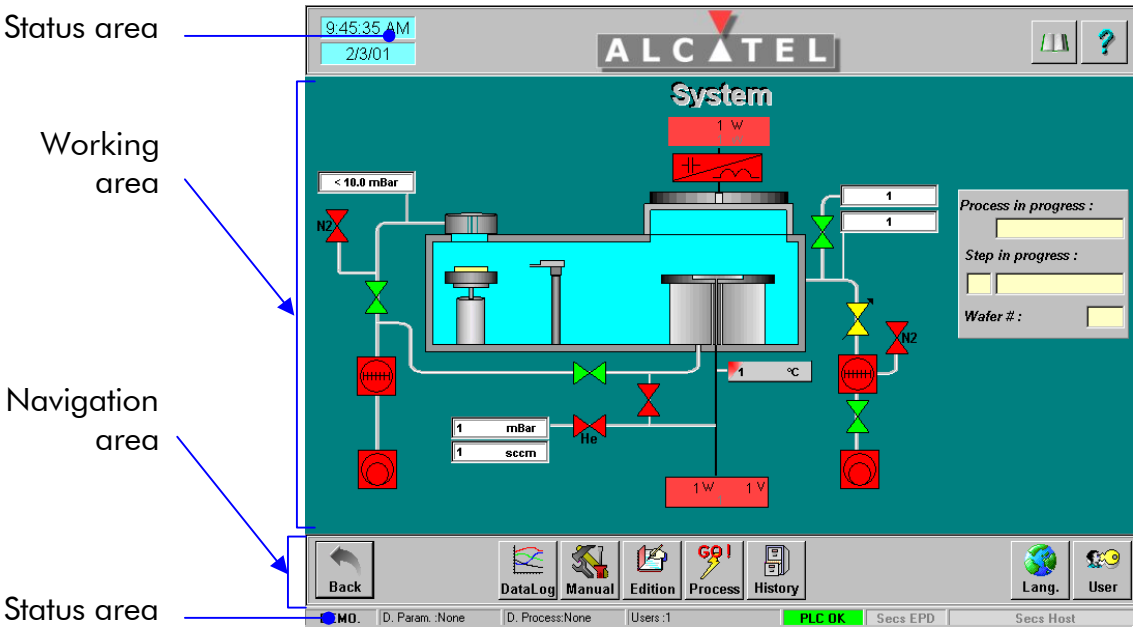
Status area: Upper and lower parts of the screen, containing boxes, which display the user identification, the PLC and EPD connection status and miscellaneous information (date and time).

⇨ **sheet C 60C**

Navigation area: Lower part of the screen containing items for:

- moving through the various software functions,
- specifying the user's name,
- specifying the selected language,
- editing alarm messages

⇨ **sheet C 60D**



Status area

Upper area

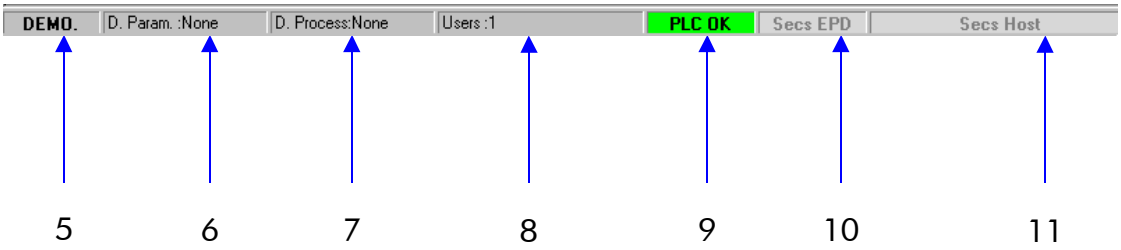
1 – current date *
2 - current time *
3 – button to display software information
4 - button to display the user's manual on the PC monitor

*: clicking the area (**1**) for the date and the area (**3**) for the time and then entering the desired values may change date and time. These modifications are possible only at the "**administrator"** access level.

⇨ **sheet C 70C**

Status area

Lower area



5 - machine operating mode:
- "**LOCAL**" : you control directly the machine using your own keyboard and PC monitor;
- "**REMOTE**" : you control the machine using a remote PC, via an Ethernet link;
- "**DEMO**" : this mode is a teaching mode to learn the different functions of the machine. There is no interaction with the machine components.

6 - default setting values are assigned to all preset user parameters (tolerances, pressures, gas) for the user whose name is indicated here.

7 - the process library is assigned to the user whose name is indicated here.

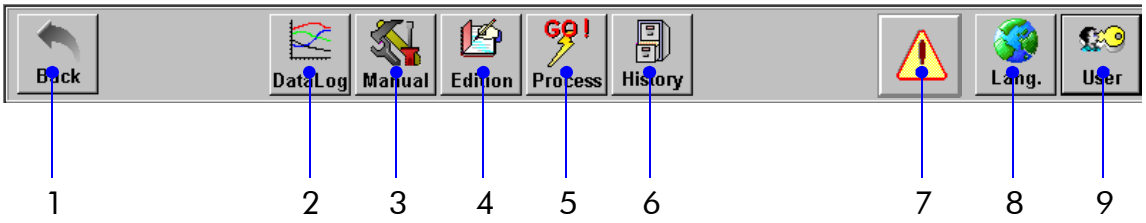
8 - name of the user who is logged in.

9 - status of PC/PLC link.

10 - status of PC/EPD link.

11 - reserved.

Navigation area



1 - back to previous screen

2 - data logging function ⇨ **sheet C 110**

3 - manual operations ⇨ **sheet C 120**

4 - process edition ⇨ **sheet C 90**

5 - process execution ⇨ **sheet C 100**

6 - archiving of alarm messages ⇨ **sheet C 130**

7 - access to alarm messages ⇨ **sheet C 130**

8 - choice of interface language ⇨ **sheet C 70E**

9 - user's identification ⇨ **sheet C 70D**

Two functions can be executed using the keyboard:

- print the screen : **Ctrl P**
- save the screen in a bitmap file (.bmp extension): **Ctrl F**.

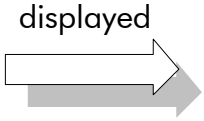
Process edition

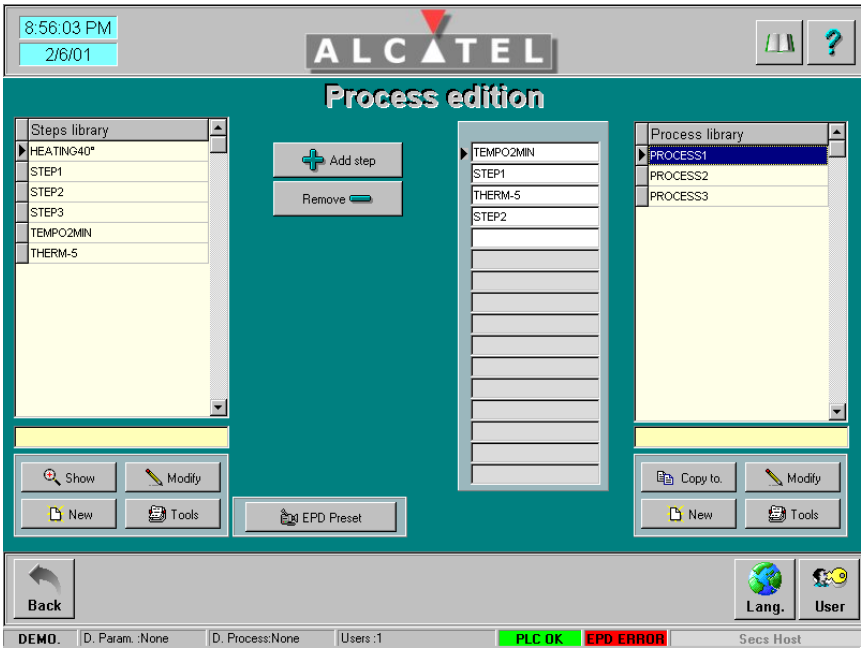
Minimum access level: process engineer

Access button: "**Edition**" icon in the navigation area

Click on the button

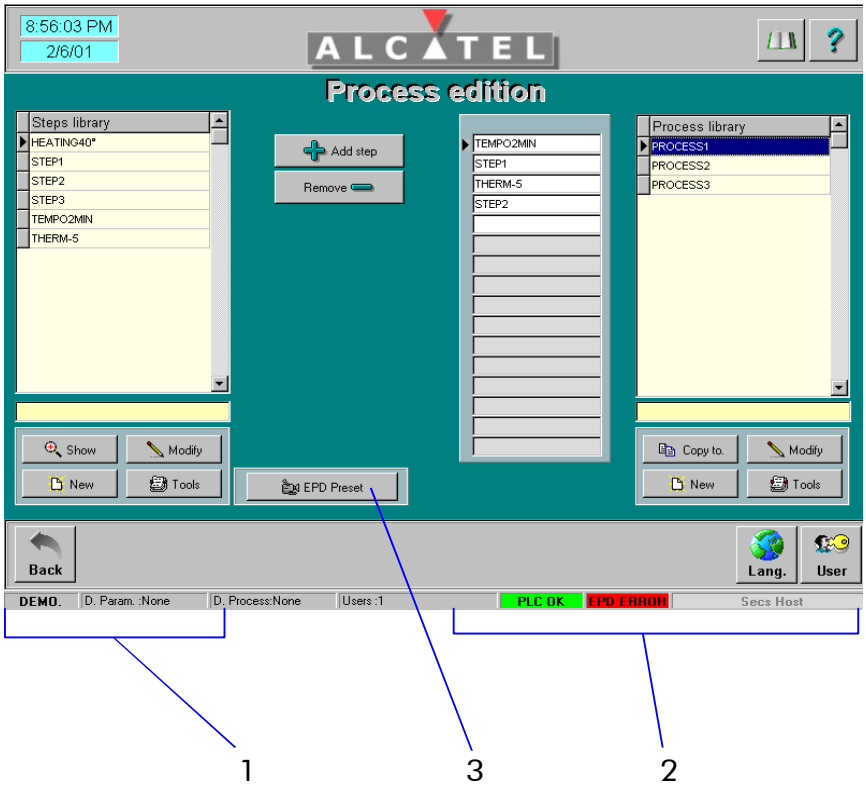
The following window is displayed





A recipe includes one or several different processes, each process including elementary steps. This screen allows creating and managing elementary steps as well as processes.

Process edition

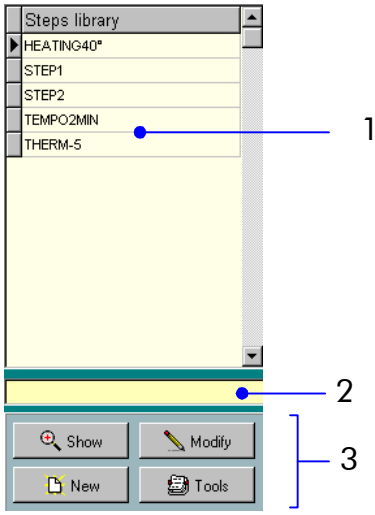


SCREEN AREA	FUNCTION
Area 1: steps library ⇨ **sheet C 90A**	This area is used to create and manage a library of elementary steps which you can include in your processes.
Area 2: process library ⇨ **sheet C 90I**	This area is used to create and manage a library of processes. Each process is built by using the steps created in the step library. In this way, you can create your own process library.
Area 3: EPD preset ⇨ **sheet C 90N**	This area is used to create and manage a library of EPD steps which you can include in your processes.

Note: The steps and process libraries which you have created may be used by all the users of the machine. You can also copy your process(es) to another user.

Steps library

Description of the "Steps library" area



1 - step selection area

2 - comment area for selected step

3 - buttons for creating, modifying, displaying and deleting steps

The “steps library” area contains several buttons that enable you to:

- display the parameters of an existing step ⇨ **sheet C 90B**
- modify an existing step ⇨ **sheet C 90G**
- create a new step ⇨ **sheet C 90C**
- delete a step ⇨ **sheet C 90H**

In order to display, modify or delete an existing step, you must select it previously by clicking in the list shown in the step selection area.

When you select a step, a black triangle is displayed to the left of the list in order to indicate the chosen step.

Displaying an existing step

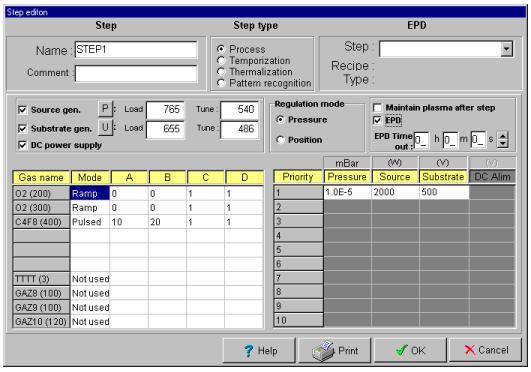
You can display the configuration parameters for an existing step. To do it:

- select the step to be displayed in the step selection area

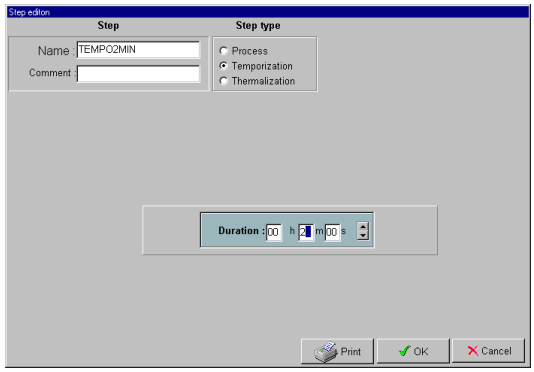
⇨ **sheet C 90A**

- click on the button 

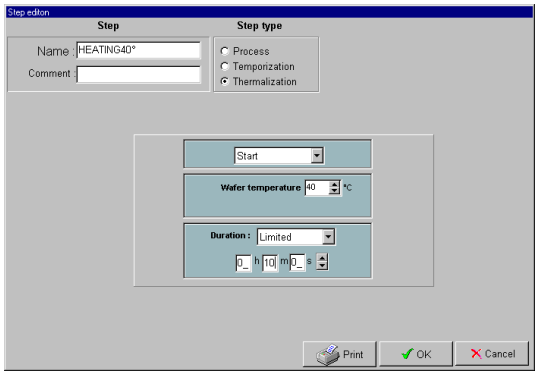
The following screen is displayed, depending on the type of the selected step :



"Etching process" step



"Temporization" step



"Thermalization" step

In this mode, it is not possible to modify the parameters. The regulation mode option (pressure or position regulation) can only be modified ("Etching process" step type).

Displaying an existing step

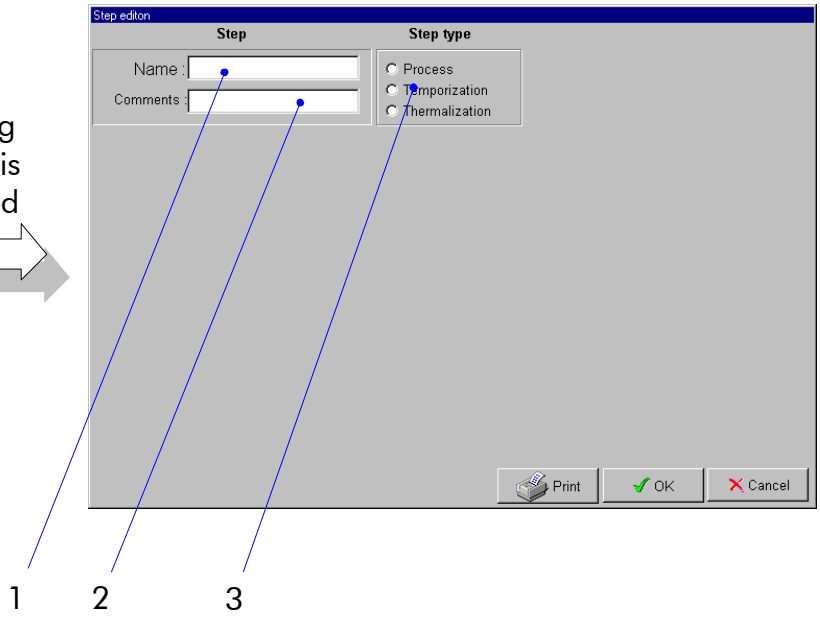
The signification of the different parameters shown in the “Edition step” screen is detailed in sheets **C90D (“Etching process” step), C90E (“Temporization” step) and C90F (“Thermalization” step)**.

Creating a new step

You can create a new step to create a new process or add it to an existing process. To do it:

Click on the button

The following window is displayed



1 Specify a name for the step to be created. This name will appear in the step library.

⇨ **sheet C 90A**

Do not use the following characters for the step and process names:
Ç ü é â ä à å ç ê ë è ï î ì Ä Å É æ Æ ô ö ò û ù ÿ Ö Ü ø £ Ø × ƒ á í ó ú ñ Ñ º ª ¿ ® ¬ ½ ¼ ¡ « » Á Â À © ¢ ¥ ã Ã ¤ ð Ð Ê Ë È ı Í Î Ï Ì ¯ Ó ß Ô Ò õ Õ µ þ Þ Ú Û Ù ý Ý ¯ ´ - ± ¾ ¶ § ÷ ¸ ° ¨ . 1 3 2

2 Enter a comment in order to recognize the step easily. This comment will appear in the comment area of the step library.

⇨ **sheet C 90A**

3 Choose the type of step to be created:

- etching process step ⇨ **sheet C 90D**
- temporization step ⇨ **sheet C 90E**
- thermalization step ⇨ **sheet C 90F**

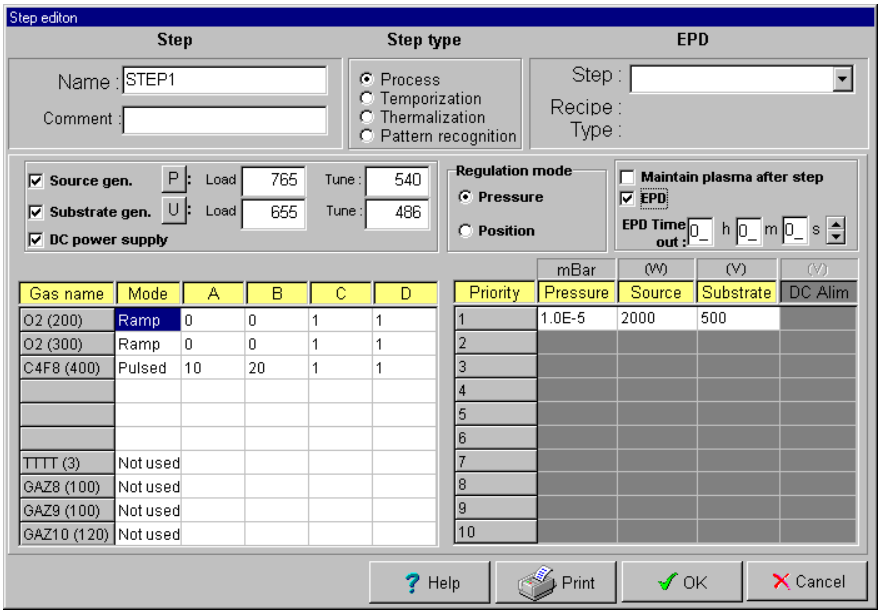
Creating a new step

The corresponding step edition dialog box is displayed on the screen, and you can parameterize the step.

Note: the “name” and “comments” fields are only accessible when a step is first created.

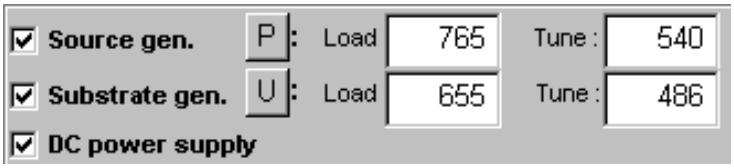
Creating an etching process step

If you have chosen an "**Etching process**" step type, the following dialog box ("**Step edition**") is displayed:



Note: For all parameters, ☒ :activation ☐ : deactivation

To create an "**Etching process**" step, you must configure the following parameters:



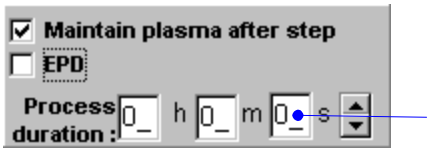
Activation/deactivation of the source generator
Preset value for load and tune capacities for plasma ignition.
- Load: 0 < VAL < 1000
- Tune: 0 < VAL < 1000
This entry is obligatory. The values are factory-set depending on the process type.

Activation/deactivation of the SH generator
Preset value for load and tune capacities of the SH generator matching box.
- Load: 0 < VAL < 1000
- Tune: 0 < VAL < 1000
This entry is obligatory. The values are factory-set depending on the process type.

Start/stop DC power supply in order to generate a magnetic field for the optimum coupling of the plasma RF voltage.

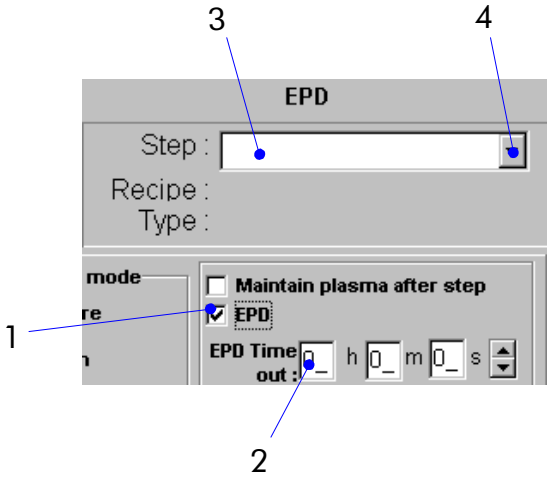
Creating an etching process step

Maintains the plasma once the step has been completed



If this box is checked: the plasma is held after execution of the step.
If the box is not checked: the plasma is stopped before moving on to the next step.
Setting the operating process period for the step: maximum value: 15 h 59 min 59 s

EPD detection

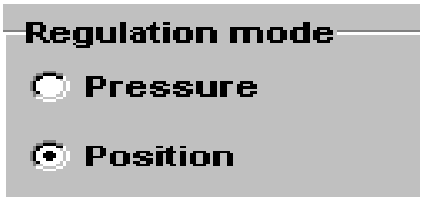


If the box (**1**) is checked: the end point detection (EPD) system is activated. A window (**3**) enables you to join an existing EPD step with the process step. Select the EPD step from those displayed in the drop-down list (**4**).

At the end of the time-out (**2**) you have defined, if the EPD system has not sent a validation signal, a machine fault appears.

Time-out adjustment: maximum value: 15 h 59 min 59 s

Choice of the regulation mode: by pressure or by position



- **pressure mode selected**: the throttle gate valve is slave controlled by the value of the pressure defined in the corresponding window. Typing the value directly on the digital block or scrolling values with the two arrows located on the right hand side of the block.

- **position mode selected**: the throttle gate valve is slave controlled by the value of the position without controlling the pressure.

Creating an etching process step

Gas presets

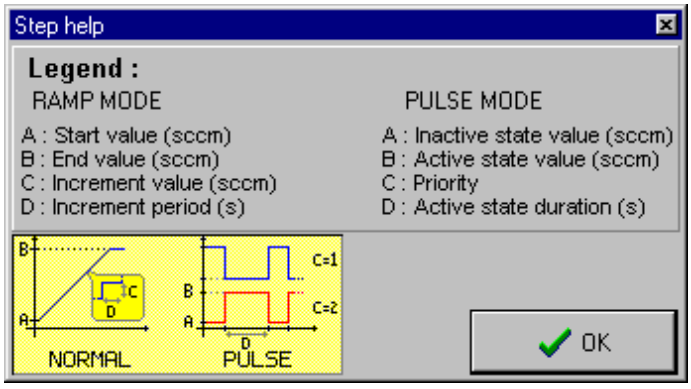
Gas name	Mode	A	B	C	D
O2 (200)	Ramp	0	0	1	1
O2 (300)	Ramp	0	0	1	1
C4F8 (400)	Pulsed	10	20	1	1
TTTT (3)	Not used				
GAZ8 (100)	Not used				
GAZ9 (100)	Not used				
GAZ10 (120)	Not used				

Priority	mBar Pressure	(W) Source	(V) Substrate	(V) DC Alim
1	1.0E-5	2000	500	
2				
3				
4				
5				
6				
7				
8				
9				
10				

The gas names and their maximum authorized flow (between parenthesis) are displayed in the "**Gas name**" column.

Three modes are available to parameterize the sequences of the various gases: Ramp mode, Pulsed mode and Unused. To select the mode, click in the white box corresponding to each gas in the column "**Mode**" and choose it in the list.

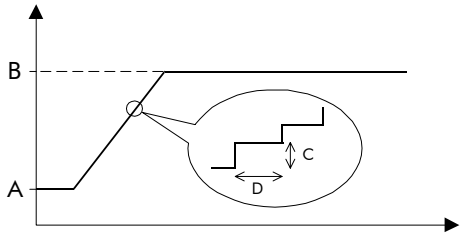
Help — You can gain access a helping for gas presets. This screen recalls the meaning of each parameter (A, B, C and D) used in the table.



Creating an etching process step

Ramp mode

A - start value (sccm)
B - end value (sccm)
C - increment value (sccm)
D - incremental period (second)

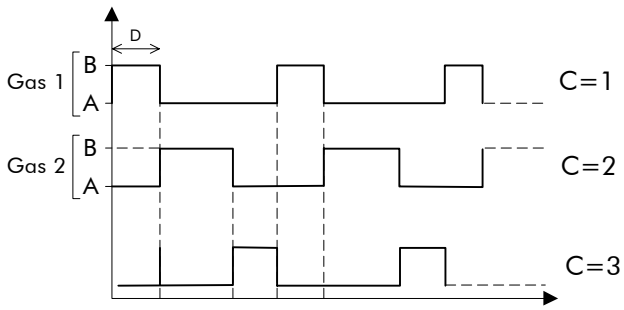


Ramp mode is recommended to obtain progressive increase or decrease of the gas flow.

Pulsed mode

A - inactive status value (sccm)
B - active status value (sccm)
C - order of priority
D - duration of active status (second)

Pulsed mode makes it possible to alternate between different gases during a process.



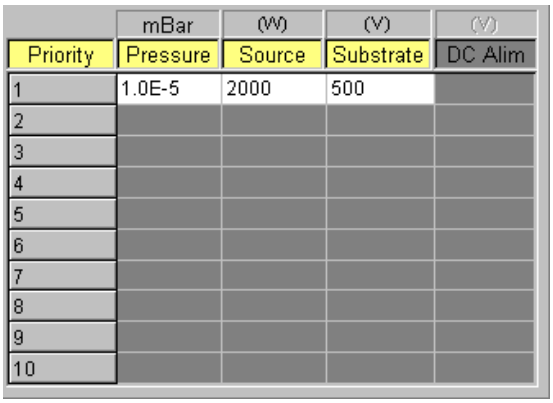
Not used

The corresponding gas is unused in the machine. No parameterization.

For each gas, enter the flow parameter values (A, B, C and D) either directly or using the arrows.

Creating an etching process step

In pulsed mode, each gas parameter (pressure, power of the source generator, power of the SH generator) can be defined for each single gas, according the priority order (C parameter) (table located on the right hand side of the screen).



	mBar	(W)	(V)	(V)
Priority	Pressure	Source	Substrate	DC Alim
1	1.0E-5	2000	500	
2				
3				
4				
5				
6				
7				
8				
9				
10				

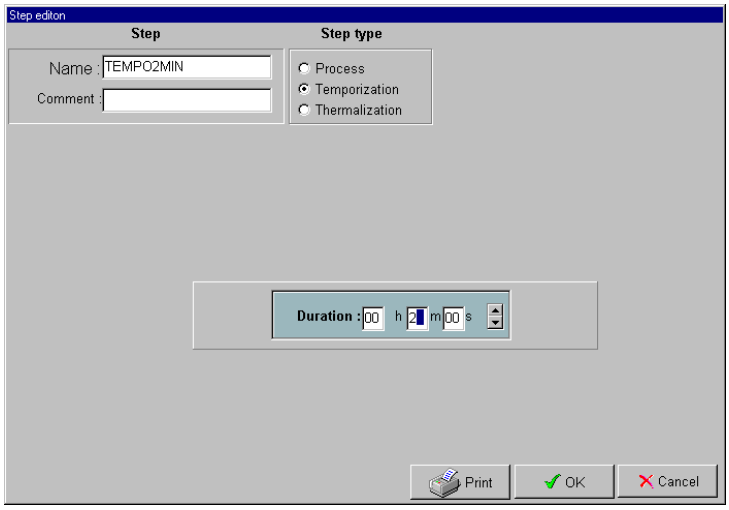
In Ramp mode, only the pressure parameter is available. The highest priority is obligatory assigned to this mode.

Warning: Don't forget to press the "ENTER" key on your keyboard to confirm each time you enter a new value.

Note: a shaded box doesn't enable you to enter a value.

Creating a "Temporization" step

If you have chosen a "**Temporization**" step type, the following dialog box ("**Step edition**") is displayed:



The different temporization parameters to be defined are displayed on the screen.

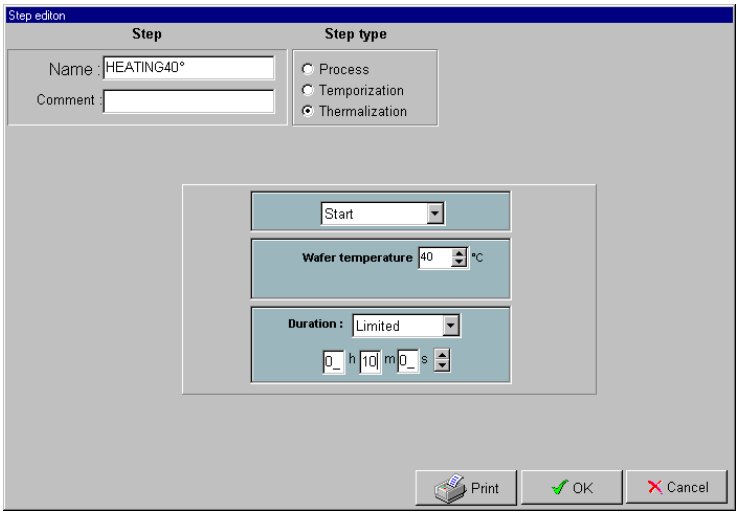
You can control the delay period either:

- by entering a value using the keyboard numerical keypad,
- or by scrolling through the values using the arrow situated to the right of the counter.

The maximum delay period is 15 h 59 min 59 s

Creating a "Thermalization" step

If you have chosen a "**Thermalization**" step type, the following dialog box ("**Step edition**") is displayed:



You can set the following parameters:

- **Stop**: stops a thermalization operation which has already been started.
- **Start**: starts a thermalization operation with the following parameters:

  - **Temperature** (only accessible in start mode): sets the thermalization temperature, depending on a chiller or a liquid nitrogen bottle is connected:
  . liquid nitrogen bottle : MIN.: -180 °C MAX.: + 60 °C
  . chiller : MIN.: - 30 °C MAX.: + 60 °C

  - **Duration**: limited or unlimited - in limited mode, the maximum value is 15 h 59 min 59 s

Limited mode: during a process, the thermalization step continues for the parameterized time and then stops before processing moves on to the following step.

Unlimited mode: during a process, the "**Thermalization step**" remains active during all the elementary steps. It is necessary to activate a "**Stop Thermalization**" step in order to stop the function. If no "**Stop Thermalization**" function is started, thermalization will not stop until four hours after a process stops (operational SH security).

Modifying an existing step

You can modify the configuration parameters for an existing step. To do it:

- select the step to be modified in the step selection area

⇨ **sheet C 90A**

- click on the button 

Clicking on this button displays the « **Step edition** » box in which you can modify the parameters of the step.

To modify a value:

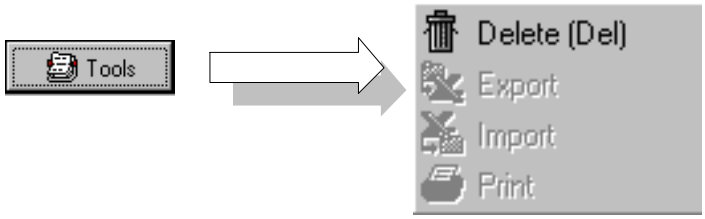
- click in the corresponding field
- enter directly the new value or select it using both arrows at the right of the field
- press the "**ENTER**" key of the keyboard to confirm.

Deleting an existing step

You can remove an existing step from the steps library. To do it:

- select the step to be removed in the step selection area

⇨ **sheet C 90A**

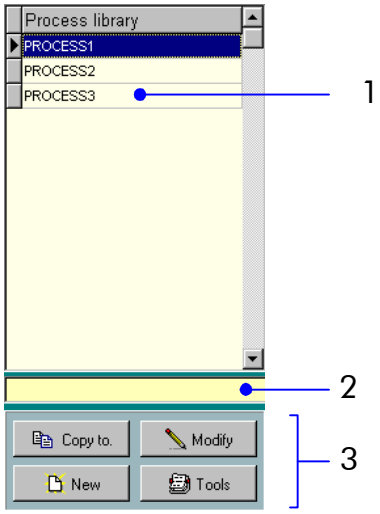
- click on the button 

- click on "**Delete**"

- a warning message is displayed to prevent any untimely destruction in the steps library, and therefore in the existing process.

Process library

Description of the "Process library" area



1 - process selection area

2 - comment area for selected process

3 - buttons for creating, modifying, deleting and copying a process

The process library allows you to:

- create a new process ⇨ **sheet C 90J**
- modify an existing process ⇨ **sheet C 90K**
- delete an existing process ⇨ **sheet C 90L**
- copy an existing process for an other user ⇨ **sheet C 90M**

In order to copy, modify or delete an existing process, you must select it previously by clicking in the list shown in the process selection area.

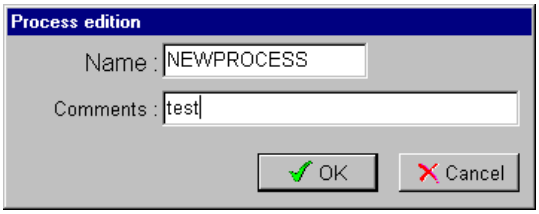
When you select a process, a black triangle is displayed to the left of the list in order to indicate the chosen process.

Creating a new process

To create a new process, you must proceed as follows:

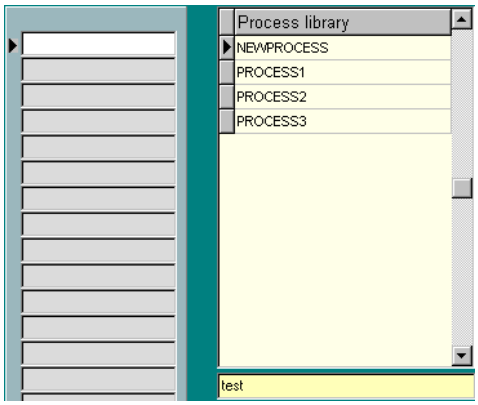
1 click on the "**New**" button in the process list area

2 enter the name of the new process in the text box, possibly together with a comment



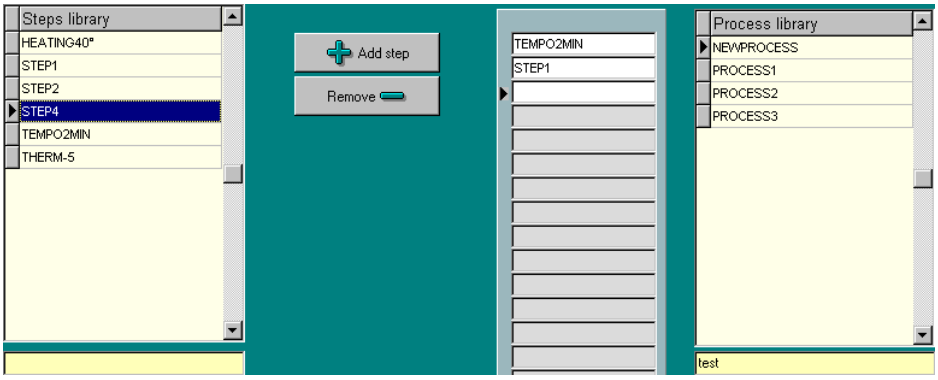
Do not use the following characters for the step and process names:
Ç ü é â ä à å ç ê ë è ï î ì Ä Å É æ Æ ô ö ò û ù ÿ Ö Ü ø £ Ø × ƒ á í ó ú ñ Ñ ª º ¿ ® ¬ ½ ¼ ¡ « » Á Â À © ¢ ¥ ã Ã ¤ ð Ð Ê Ë È ı Í Î Ï Ì ¯ Ó ß Ò õ Õ µ þ Þ Ú Û Ù ý Ý ¯ ´ - ± ¾ ¶ § ÷ ¸ ° ¨ . 1 3 2

The new name is entered in the process library



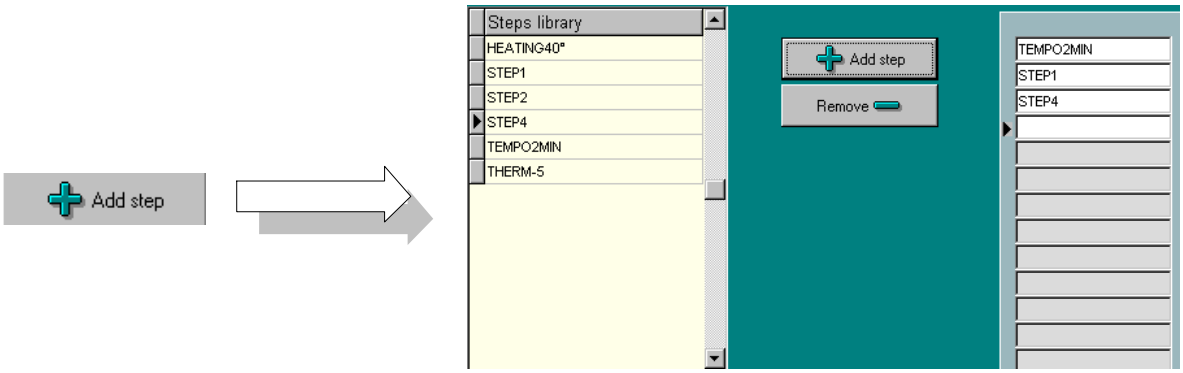
Creating a new process

3 In the steps library, select the step which you want to add to the process. A black triangle indicates the selected step.



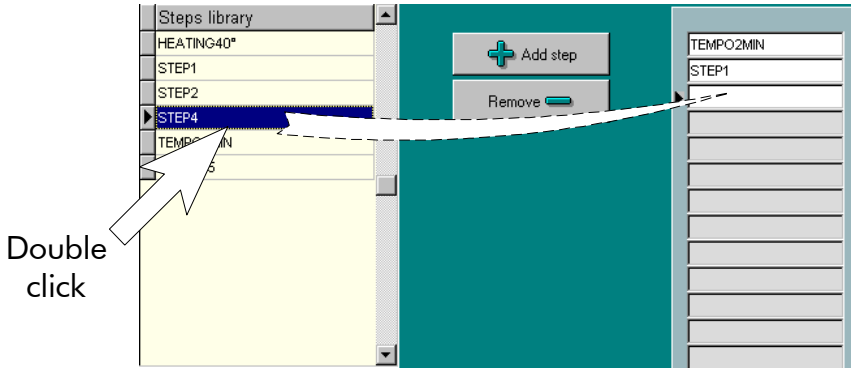
4 There are two ways of adding this step to the process:

- by clicking on the "**Add step**" button; the step is positioned above the cursor in the process edition area.



Creating a new process

- by performing a "move and drop" operation. To do it, you must double-click on the selected step and hold the left mouse button down while moving the cursor to the required insertion point in the process edition area.



Modifying an existing process

You can modify the parameters of an existing process.

To do it, you must previously select the process to be modified in the process edition area.

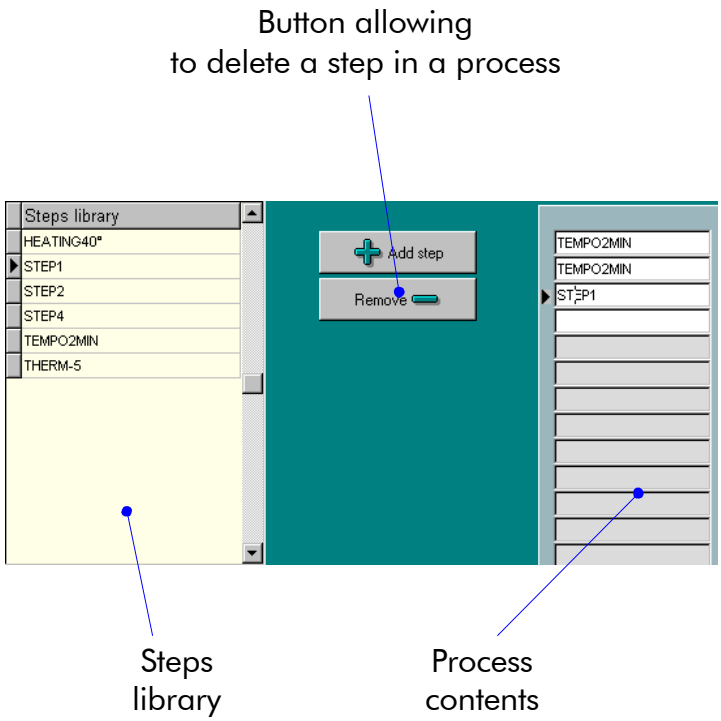
⇨ **sheet C 90I**

Then, you can:

- add a new step by using the "**Add step**" button or by means of a "move and drop" operation.

⇨ **sheet C 90J**

- remove a step from the process by selecting the required step in the “process contents” area and then using the "**Remove**" button.



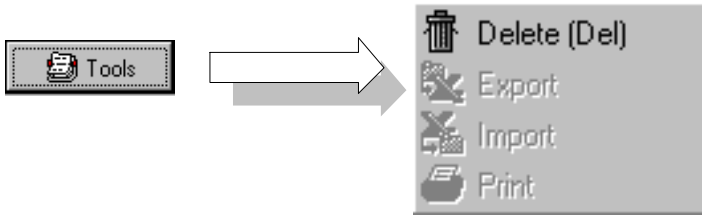
This button, below the process library, enables you only to modify the name and the comment of a process.

Deleting an existing process

You can remove an existing process from the process library. To do it:

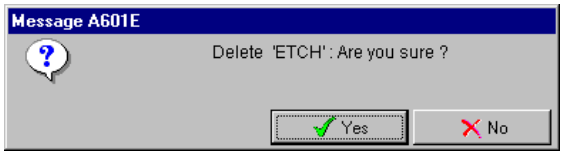
- select the process to be removed in the process selection area

⇨ **sheet C 90I**

- click on the button 

- click on "**Delete**"

- a warning message is displayed to prevent any untimely destruction in the process library.

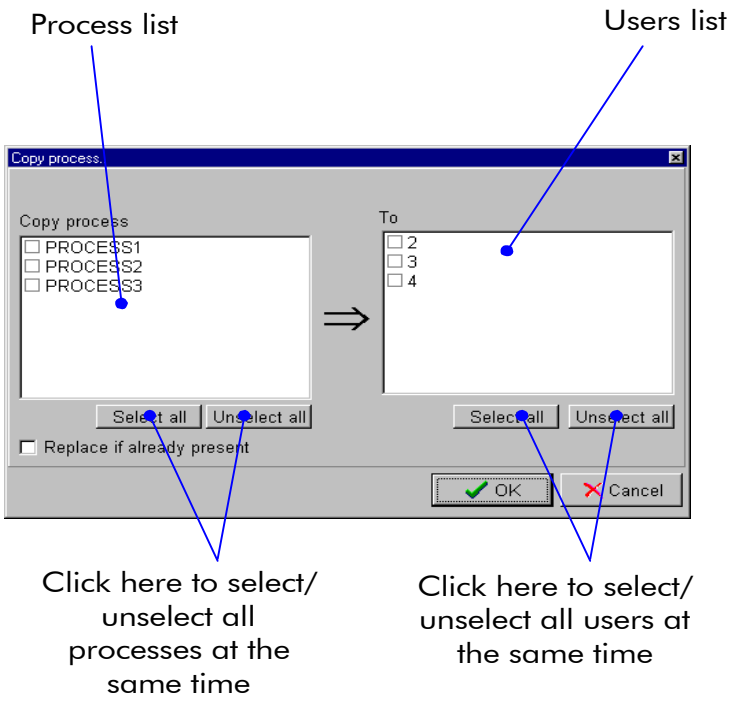


Copying a process for an other user

In order to avoid that a next user should enter all parameters for an existing process, it is possible to copy the process parameters configuration to this user.

1 click on the button "**Copy to**" in the process library area

2 a dialog box is opening. In the process list, check the process(es) to be copied.



3 in the user list, check the desired user addressee.

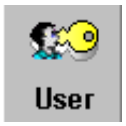
4 click "**OK**" to confirm.

Copying a process for an other user

Important:

- Clicking on the "**select all**" button in the process list allows copying all the existing processes at the same time.
- Clicking on the "**select all**" button in the user list allows copying the selected process for all the known users at the same time.

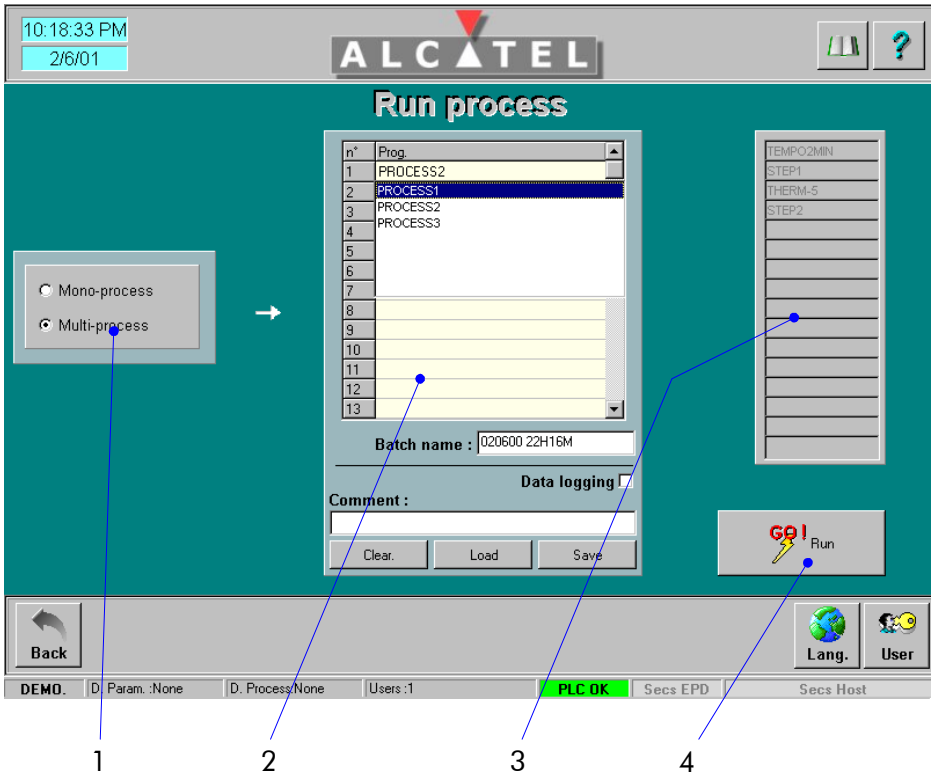
Process execution



Minimum access level: operator

Access button: "**GO**" icon located in the navigation area

Note: If a recipe is currently being executed, the access "**GO**" button is displayed as follows:



1 - Selection mono-process/multi-process operation mode

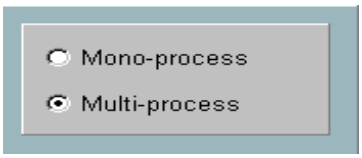
2 - Recipe dialog area to create or select a recipe.

3 - Area describing the process selected in the area 2

4 - Button for executing the recipe

Process execution

This option allows selecting the machine operation mode:



The selection « **mono-process** » allows you to assign the same process program to all the wafers:

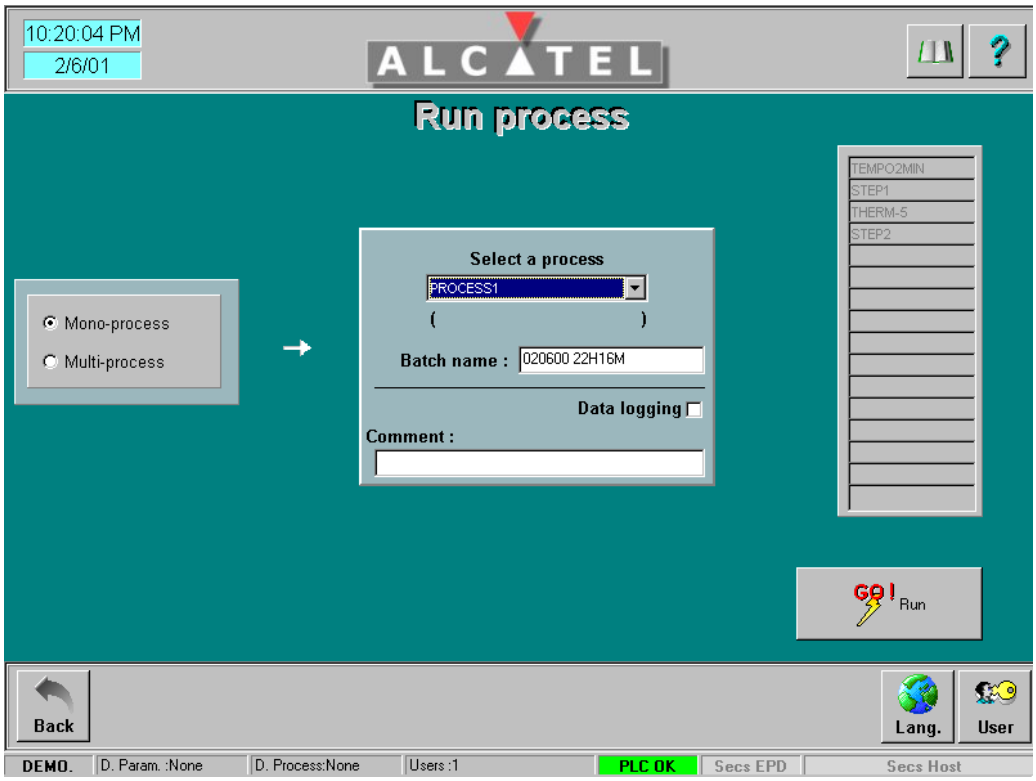
⇨ **sheet C 100A**

The selection « **multi-process** » allows you to assign a specific process program to each wafer:

⇨ **sheet C 100B**

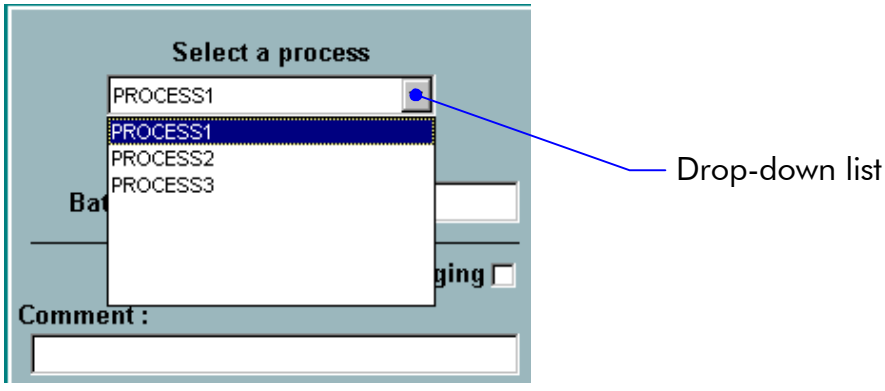
Mono-process execution

When the mono-process mode is selected, the recipe is composed of only one process, which is assigned to all the wafers.



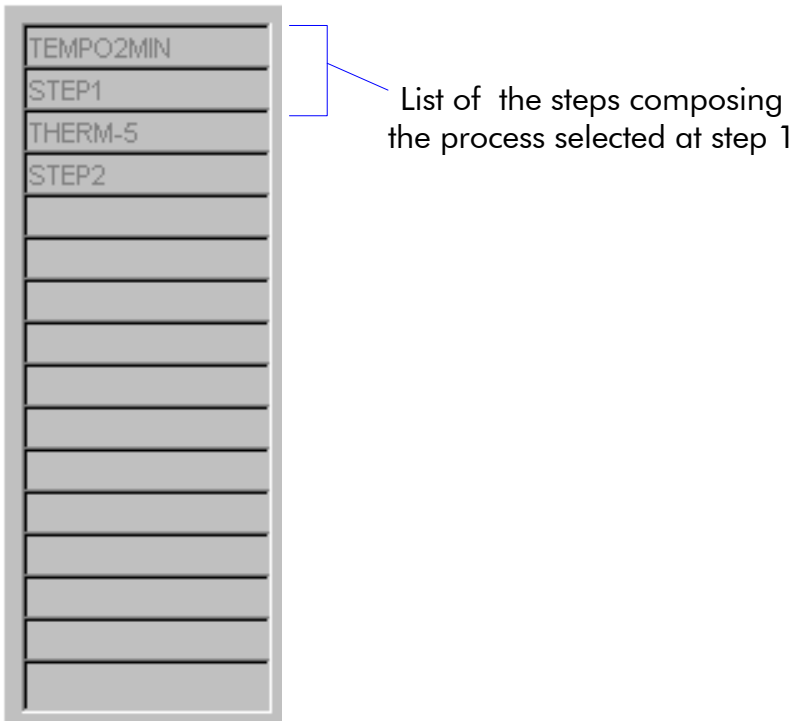
To execute the recipe, you must:

1 select the desired process in the drop-down list



Mono-process execution

2 check the composition of the process in the shaded area at the right of the screen



Important:

Checking the data logging box makes it possible to start data logging automatically. The data is saved in the file designated in the "Batch name" field. By default, this name corresponds to the current date and time. Data logging does not start until the first step.

Caution: The name must contain a minimum of eight characters without a comma or space.

Mono-process execution

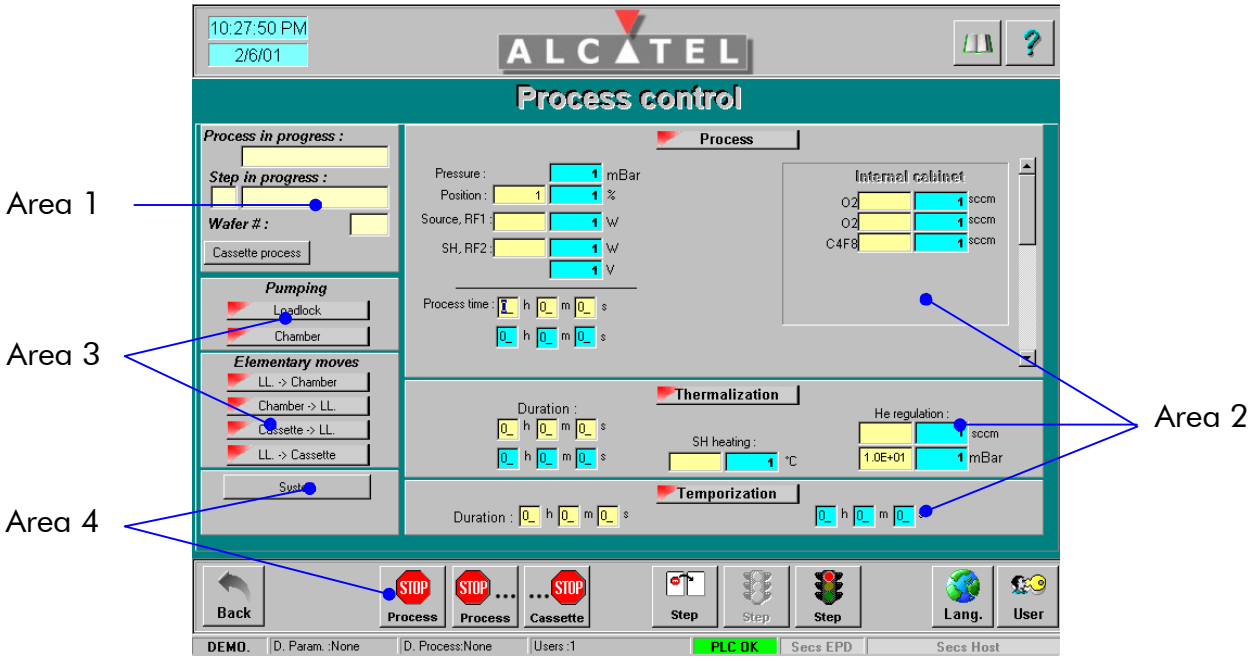
3 click on the  button

Note: the « GO run » button is available only if all conditions to execute the process are present.

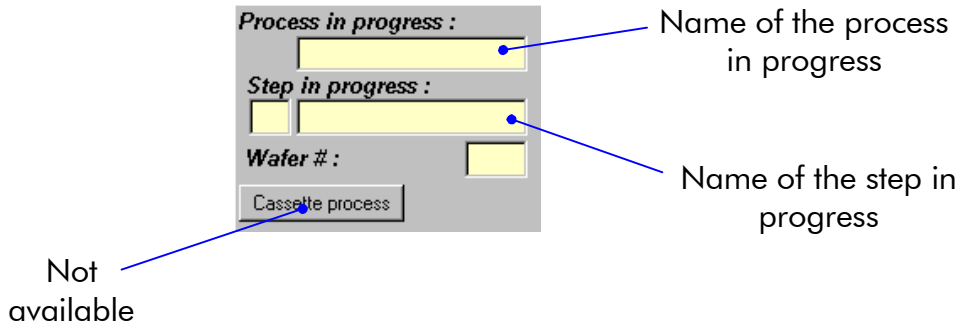
The process control window is then displayed. ⇨ **sheet C 100C**

Process control window

The process control window displays the main parameters of the three types of steps.



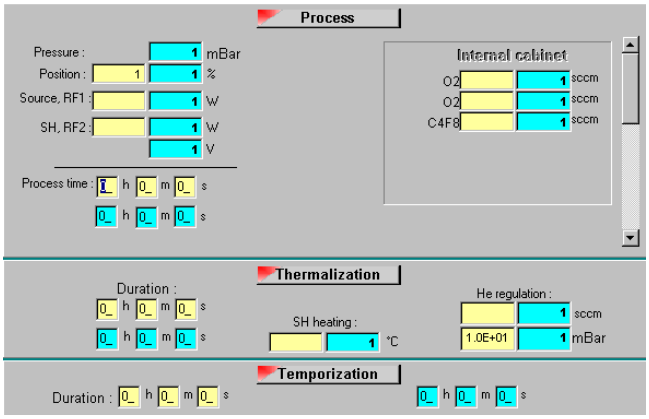
Area 1: Definition of the process in progress



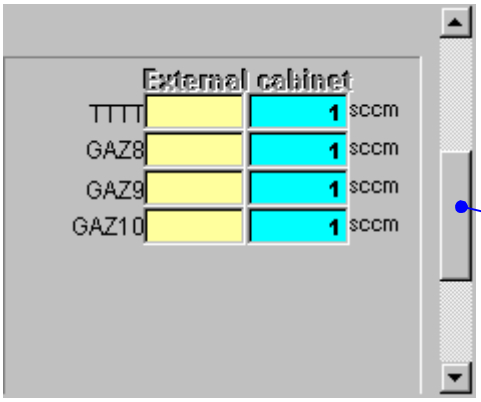
Process control window

Area 2: Description of the three types of steps

Each process consists of several elementary steps. Each step may be an etching process step, a thermalization operation or a temporization operation. The step in progress (etching, thermalization or temporization) is indicated by a green triangle. The other two are indicated by a red triangle. For each type of step, the process time is specified (preset value and real value).



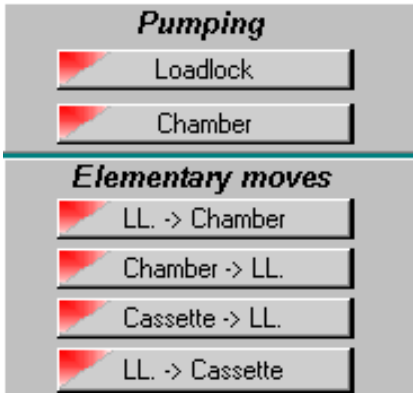
For each parameter, the grey values represent values that were set when the step was created. The blue values refer to the real-time values of the step.



To access the remote cabinet gas parameterization, use the scroll box to display the remote cabinet gas parameters.

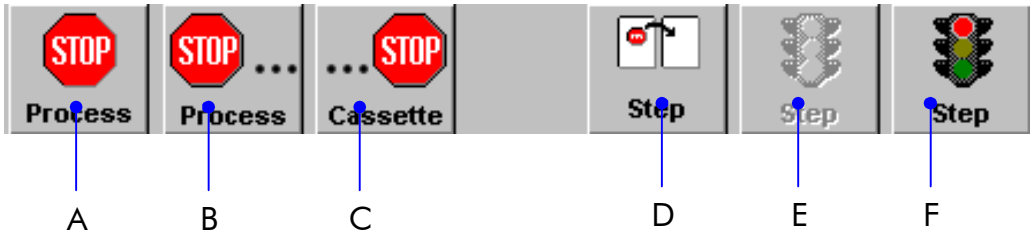
Process control window

Area 3: Pumping and elementary moves function status



The red triangle indicates that the corresponding function is off.
The yellow triangle indicates that the corresponding function is in progress.
The green triangle indicates that the corresponding function has been executed.

Area 4: Process control area



A Stops immediately the current recipe.

B The wafer process in progress is stopped.

C Not used.

D The current step is halted. The next step is executed.

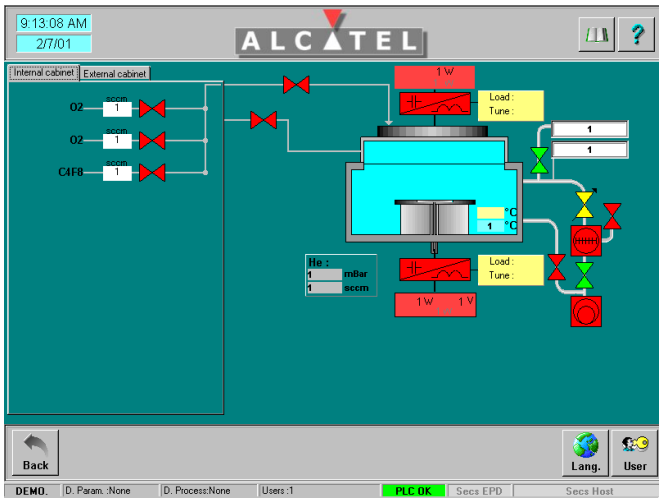
E Resume of the step after:
- a stop due to an alarm
- the current step has been held (control « F »).

F The current step is held. The parameterized duration is now disregarded.

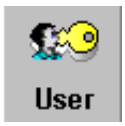
Process control window

System

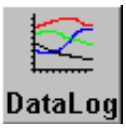
Allows you to show a diagram indicating the main parameter values of the process. This function does not authorize to modify these parameters.



Data logging

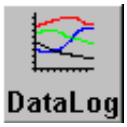


Minimum access level: process engineer

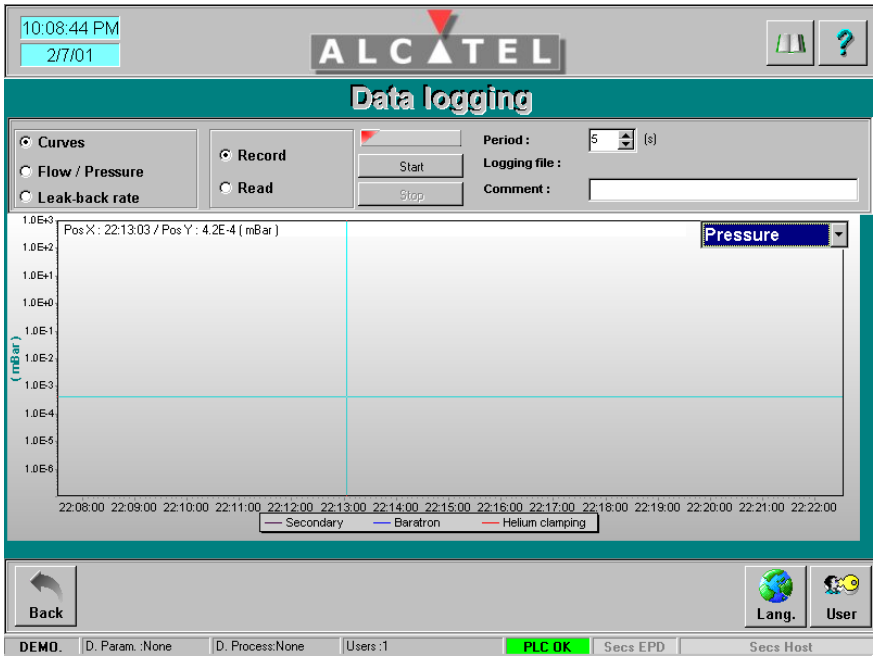


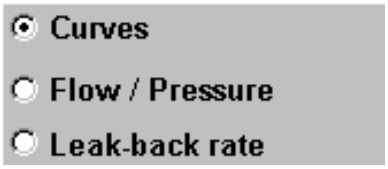
Access button: "**Data Log**" icon located in the navigation area

Click on the button



The following window is displayed



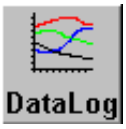


You can start three types of data logging:

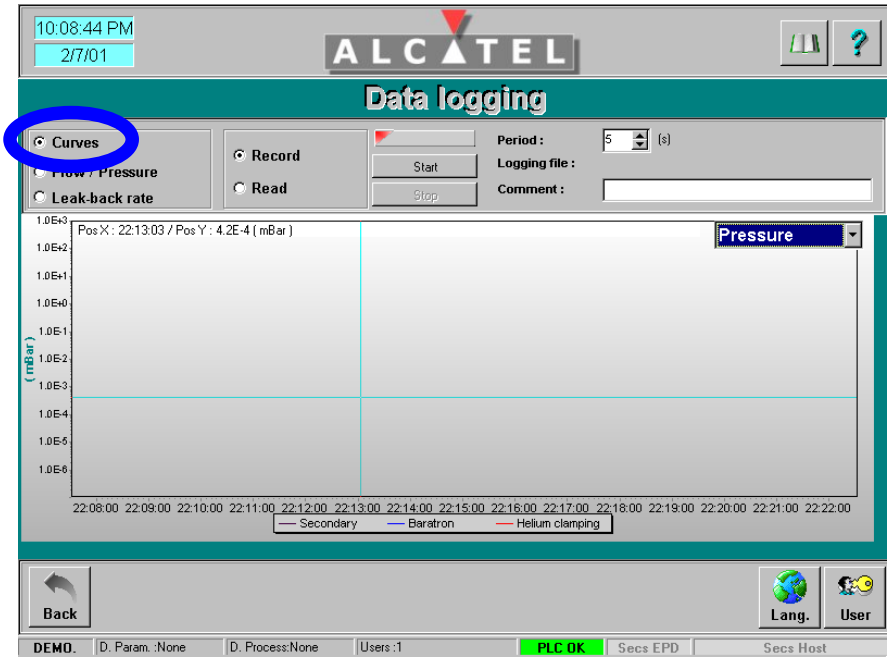
- curves ⇨ **sheet C 110A**
- flow / pressure ⇨ **sheet C 110B**
- leak-back rate ⇨ **sheet C 110C**

Curves data logging

Click on the button



The following window is displayed



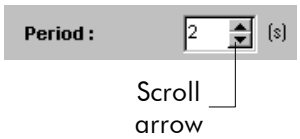
Record data logging curves

1 Select the "**Curves**" option.

2 Select the "**Record**" option.

3 Use the drop-down list located at the right of the data logging window to select the type of curves that you want to display in real time on the screen : pressures, gas, powers or temperature.

4 Use the scroll arrows to define the data logging period for the curve. The scale of the graph is automatically adapted and updated in real time.



5 Click on the "**Start**" button to begin simultaneously the data logging of curves representative of the PLC analog inputs. These curves are classified in four types: pressures, gas, powers and temperature. For all types of curves, each curve is tagged by a specially colored line and referenced to the bottom of the graph.

6 The name of the data logging file is defined automatically. It consists of the current date and time. The curves are saved in **one** file with .crv extension.

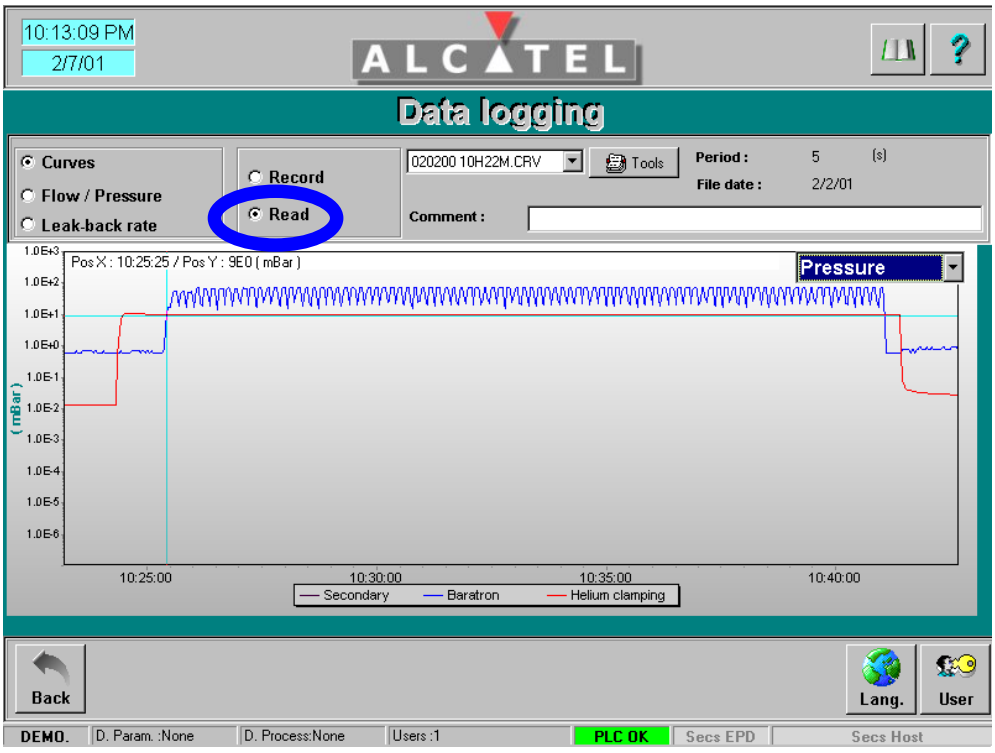
7 The triangle of the "**Start**" button becomes yellow during the data logging time.

Curves data logging

When the data logging is finished, the button becomes red.

- **You cannot modify the data logging period during recording.**
- **You can stop recording at any time.**

Read data logging curves



1 Select the "**Curves**" option.

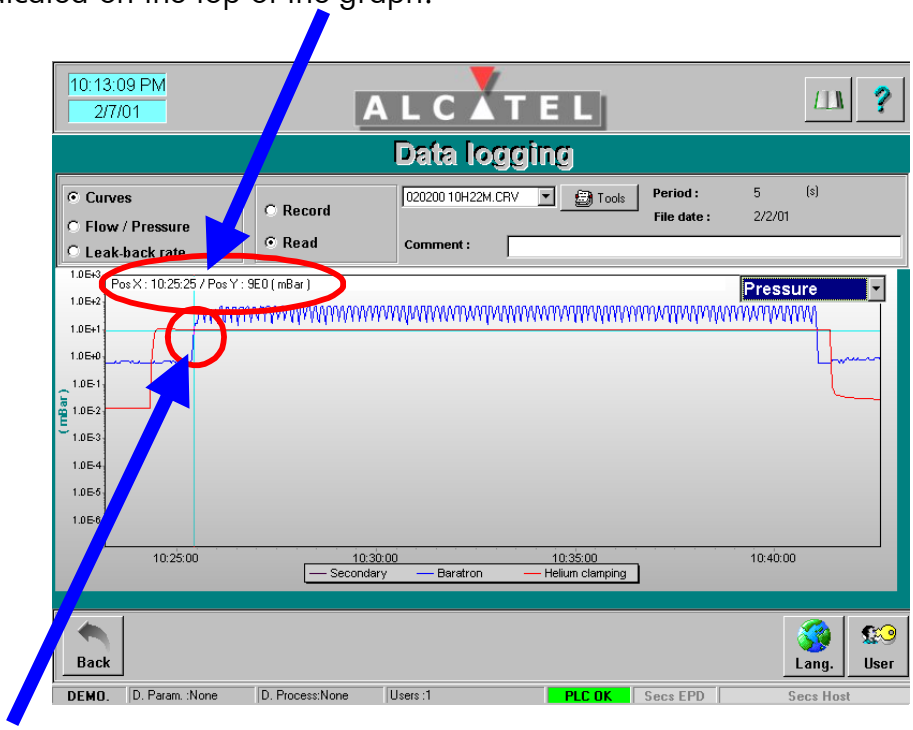
2 Select the "**Read**" option.

3 Use this drop-down list to select the file that you want to read.

Curves data logging

4 Use the drop-down list located at the right of the data logging window to select the type of curves that you want to display on the screen : pressures, gas, powers or temperature.

5 The curves are displayed. Each curve is tagged by a specially colored line and referenced to the bottom of the graph. A cross that you can move on the graph helps you to know the exact value of the coordinates of a point. The coordinates are indicated on the top of the graph:



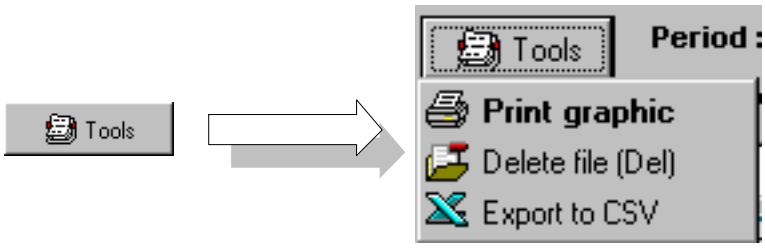
i.e. : the cross has been placed on the high vacuum pressure curve. The point designed by the cross indicates that the Baratron pressure was 9 E0 mbar at 10:25.

6 A graphic area can be enlarged or reduced by clicking the mouse button while moving the track ball at the same time. To enlarge an area, define the left-hand upper corner of the required area by clicking it and moving the track ball towards the right hand lower corner of the required area. To reduce an area, define the right hand lower corner of the required area by clicking it and moving the track ball so as to reach the left hand upper corner of the required area.

By clicking the right hand button of the mouse on a curve, it can be moved in any direction, except for the pressure curve, which can only be moved from the left-hand side to the right hand side.

Curves data logging

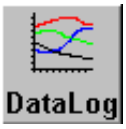
7 You can perform specific operations, using the "**Tools**" menu.



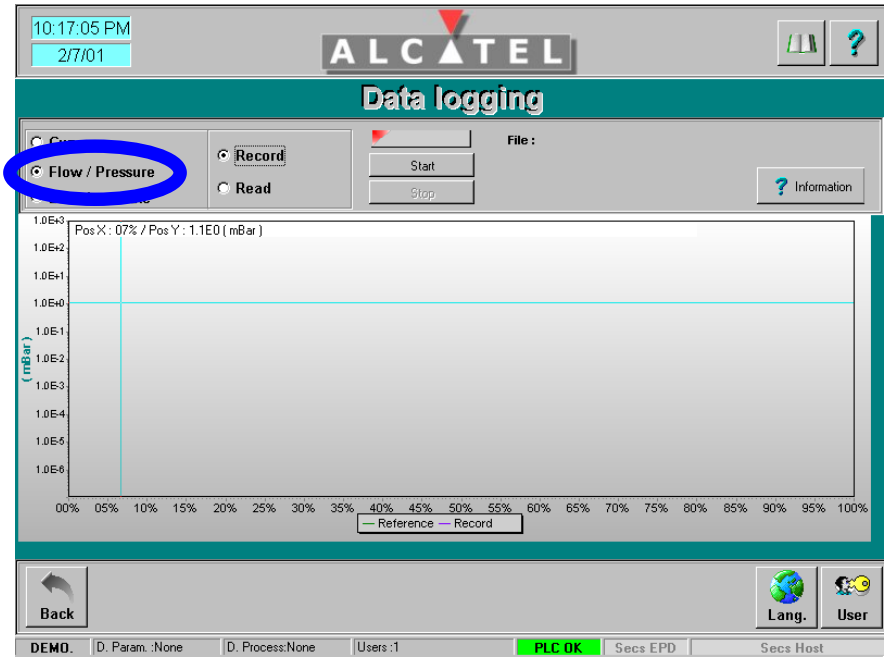
- You can print the curves in order to keep a written record of the tests performed. To do this, click on the "**Print graphic** " option.
- You can delete a recorded file. To do this, select previously the corresponding file in the drop-down list. Click then on the "**Delete file (Del)** " option. This will erase all the curves associated to this file.
- You can save the file with .csv extension (text file) so that it can be used by standard software, such as spreadsheets.... To do this, click on the "**Export to CSV** " option.

Flow / pressure curves

Click on the button



The following window is displayed

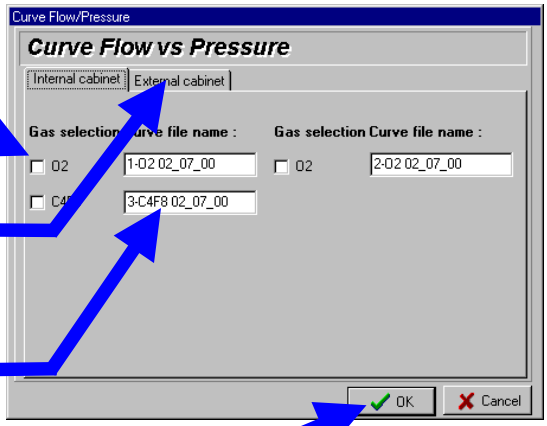


Record flow / pressure curves

1. Select the "**Flow / Pressure**" option.
2. Select the "**Record**" option.
3. Click on the "**Start**" button to begin the data logging of flow / pressure curves.

Flow / pressure curves

4 The following window is displayed:



5 Select the gas lines for which you want to record a flow / pressure curve.
You can select a gas line implemented either in the integrated gas cabinet (internal) or in the remote gas cabinet (external).

6 The name of the data logging file is defined automatically. It consists of the gas line number, the gas line name, the current date and time + a pointer.
The curves are saved in a file with .csv extension.

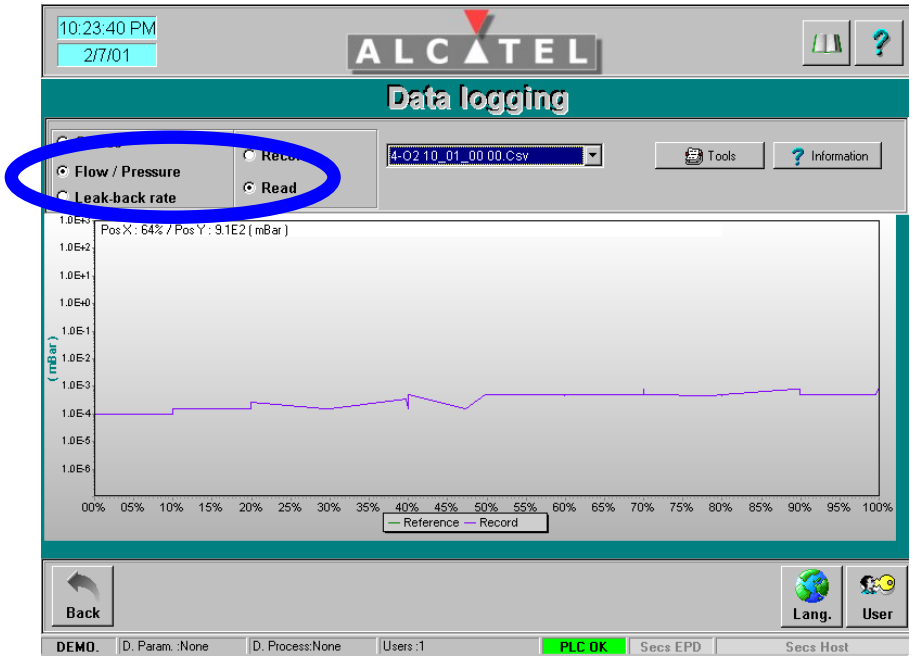
7 Click OK

8 The triangle of the "**Start**" button becomes yellow during the data logging time. When the data logging is finished, the button becomes red.

You can stop recording at any time by clicking on the "Stop" button.

Flow / pressure curves

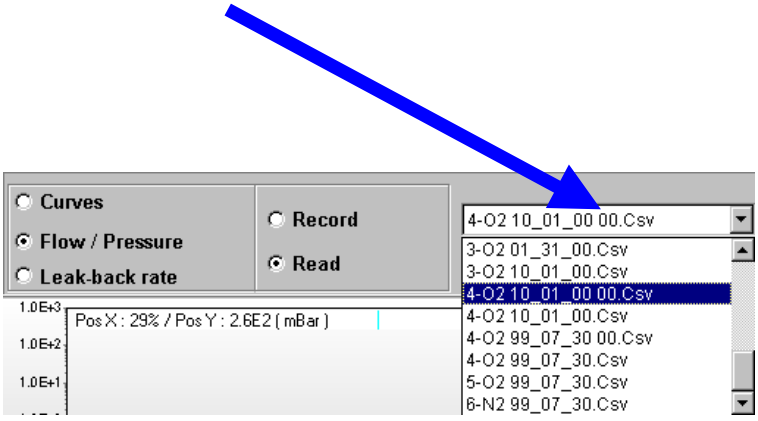
Read flow / pressure curves



1 Select the "**Flow / Pressure**" option.

2 Select the "**Read**" option.

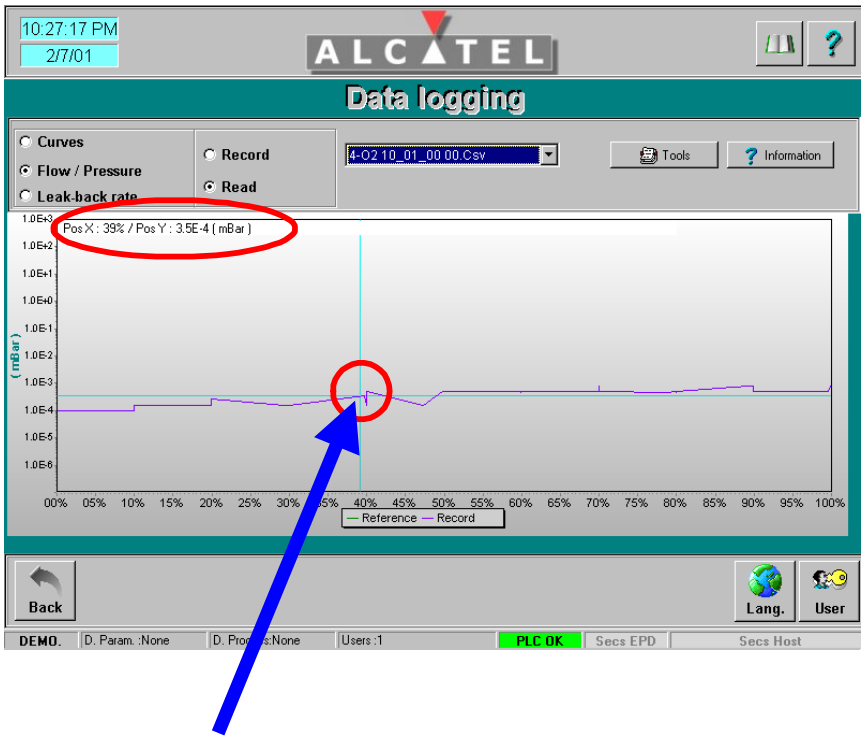
3 Use this drop-down list to select the file corresponding to the curve that you want to display.



Flow / pressure curves

4 The curves are displayed. The red curve is the measured curve. The black curve corresponds to the reference curve for the corresponding gas line. This one is a characteristic of the machine. It has been previously recorded in factory. It corresponds to a specific status of the machine, at a determined time. It allows you to compare all the flow / pressure curves that will be recorded later and therefore to determine a drift of the machine performances.

If a massflow or a pumping unit has been replaced, you must record again a reference curve.



5 A cross that you can move on the graph helps you to know the exact value of the coordinates of a point. The coordinates are indicated on the top of the graph:

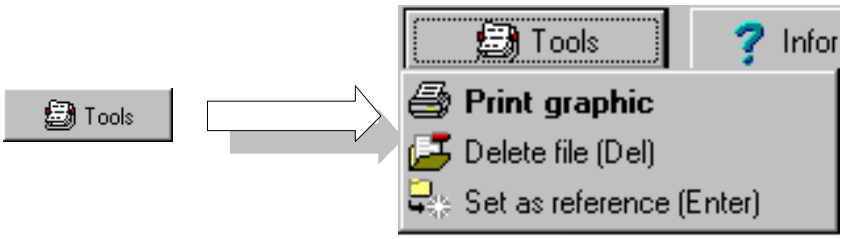
i.e. : the cross has been placed here. The point designed by the cross indicates that the pressure was 3.5E-4 mbar for a flow equal to 39 % of the maximum flow for the corresponding gas line.

Flow / pressure curves

6 A graphic area can be enlarged or reduced by clicking the mouse button while moving the track ball at the same time. To enlarge an area, define the left-hand upper corner of the required area by clicking it and moving the track ball towards the right hand lower corner of the required area. To reduce an area, define the right hand lower corner of the required area by clicking it and moving the track ball so as to reach the left hand upper corner of the required area.

By clicking the right hand button of the mouse on a curve, it can be moved from the left-hand side to the right hand side, and vice-versa.

7 You can perform specific operations, using the "**Tools**" menu.

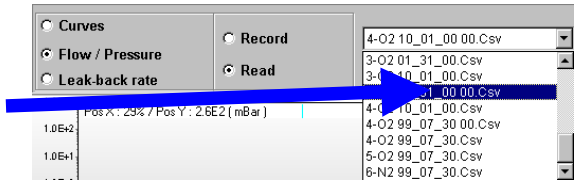


- You can print the curves in order to keep a written record of the tests performed. To do this, click on the "**Print graphic** " option.
- You can delete a recorded file. To do this, select previously the corresponding file in the drop-down list. Click then on the "**Delete file (Del)** " option. This will erase the curve associated to this file.

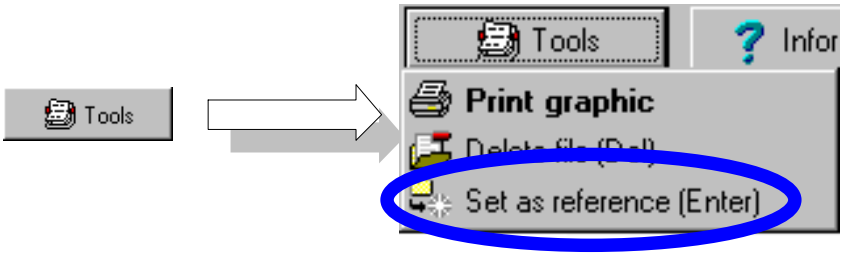
Flow / pressure curves

- You can change the reference curve. To do this, proceed as follows:

a) select in the drop down list the file corresponding to the curve that you want to put in reference

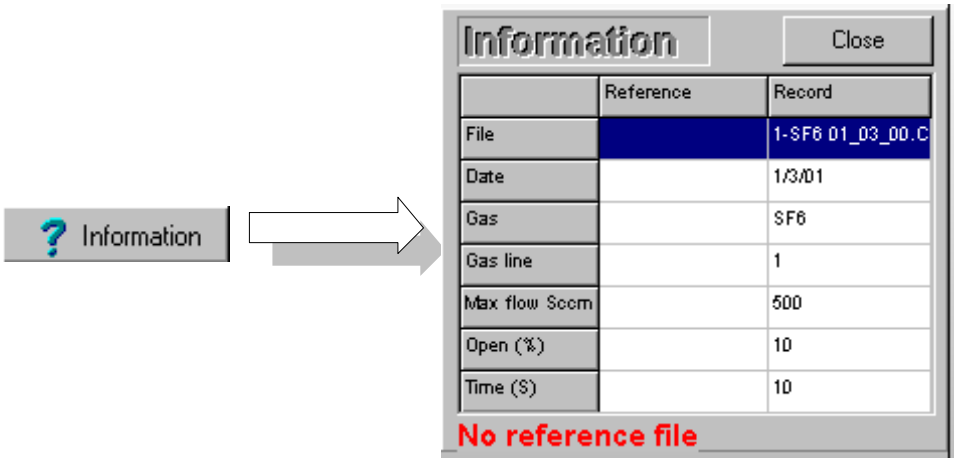


b) click on the "**Set as reference (Enter)** " option.



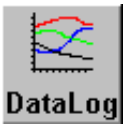
A confirmation message is displayed. If you click "Yes", the chosen curve becomes the new reference for the corresponding gas line.

8 To have more information about the displayed curves, click on the "**Information**" button at the right hand side of the screen. A table gives information relative to the displayed curves (measured and reference curves).

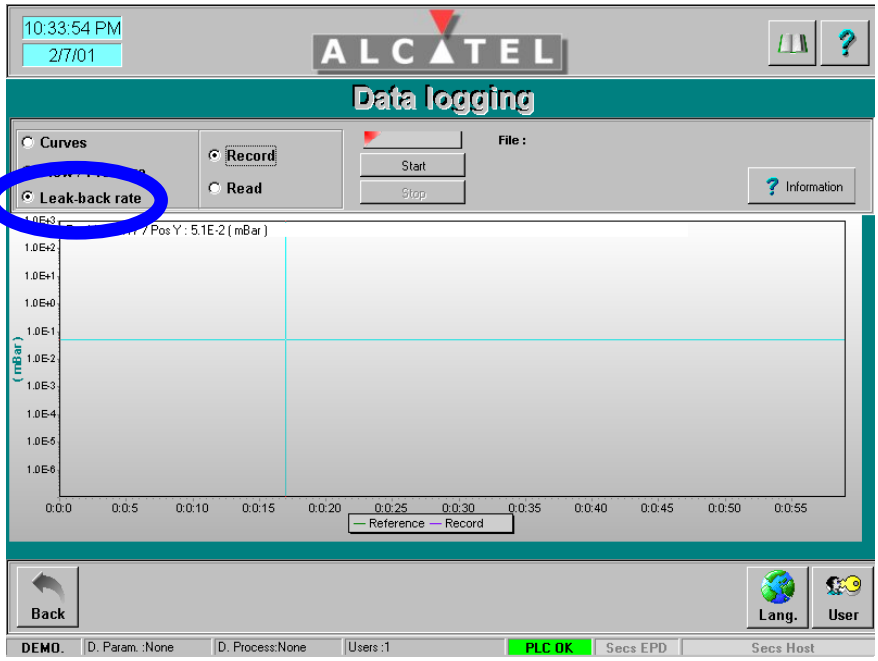


Leak-back rate curves

Click on the button



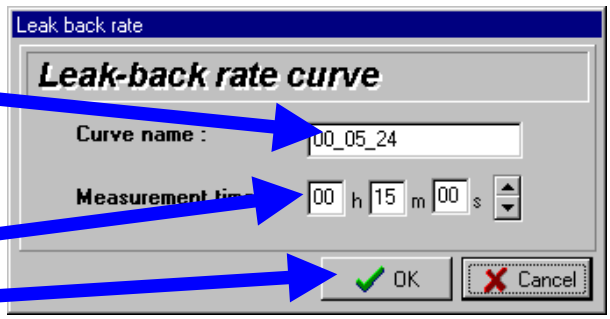
The following window is displayed



Record leak-back rate curves

1. Select the "**Leak-back rate**" option.
2. Select the "**Record**" option.
3. Click on the "**Start**" button to begin the data logging of leak-back rate curves.
4. The following window is displayed:

5. The name of the data logging file is defined automatically. It consists of the current date and time + a pointer.
6. Select the data logging duration.
7. Click OK

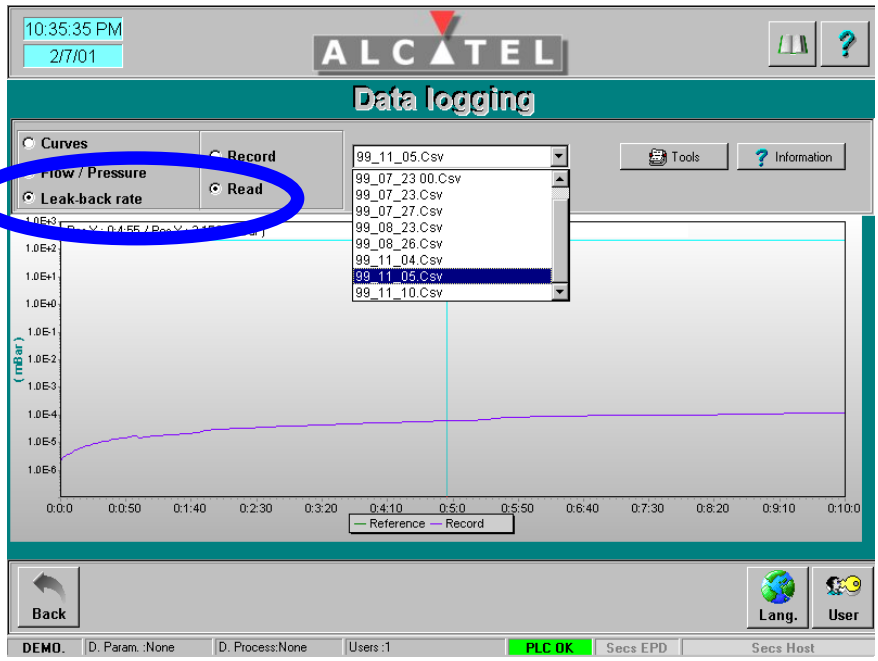


Leak-back rate curves

8 The triangle of the "**Start**" button becomes yellow during the data logging time. When the data logging is finished, the button becomes red.

You can stop recording at any time by clicking on the "Stop" button.

Read leak-back rate curves

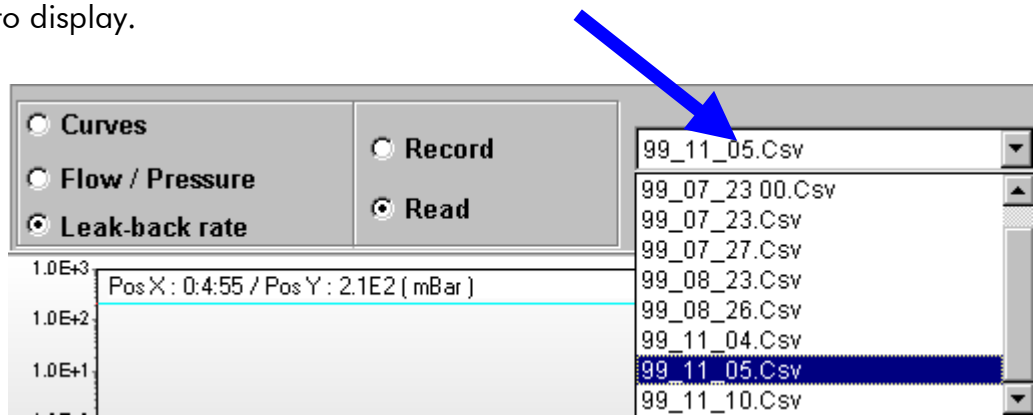


1 Select the "**Leak-back rate**" option.

2 Select the "**Read**" option.

Leak-back rate curves

3 Use this drop-down list to select the file corresponding to the curve that you want to display.



4 The curves are displayed. The red curve is the measured curve. The black curve corresponds to the leak-back rate reference curve. This one is a characteristic of the machine. It has been previously recorded in factory. It corresponds to a specific status of the machine, at a determined time. It allows you to compare all the leak-back rate curves that will be recorded later and therefore to determine a drift of the machine performances.

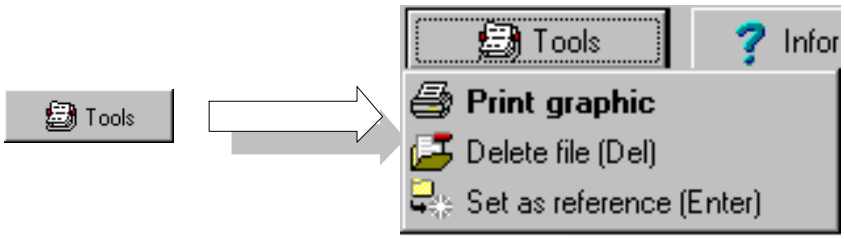
5 A cross that you can move on the graph helps you to know the exact value of the coordinates of a point. The coordinates are indicated on the top of the graph.

6 A graphic area can be enlarged or reduced by clicking the mouse button while moving the track ball at the same time. To enlarge an area, define the left-hand upper corner of the required area by clicking it and moving the track ball towards the right hand lower corner of the required area. To reduce an area, define the right hand lower corner of the required area by clicking it and moving the track ball so as to reach the left hand upper corner of the required area.

By clicking the right hand button of the mouse on a curve, it can be moved from the left-hand side to the right hand side, and vice-versa.

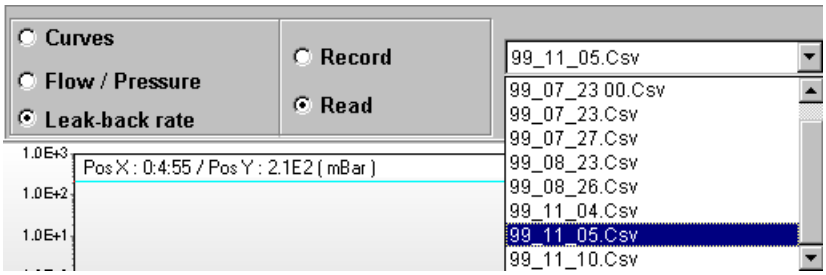
Leak-back rate curves

7 You can perform specific operations, using the "**Tools**" menu.

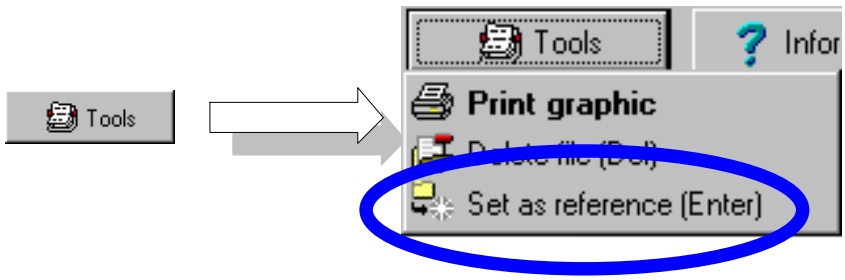


- You can print the curves in order to keep a written record of the tests performed. To do this, click on the "**Print graphic** " option.
- You can delete a recorded file. To do this, select previously the corresponding file in the drop-down list. Click then on the "**Delete file (Del)** " option. This will erase the curve associated to this file.
- You can change the reference curve. To do this, proceed as follows:

a) select in the drop down list the file corresponding to the curve that you want to put in reference



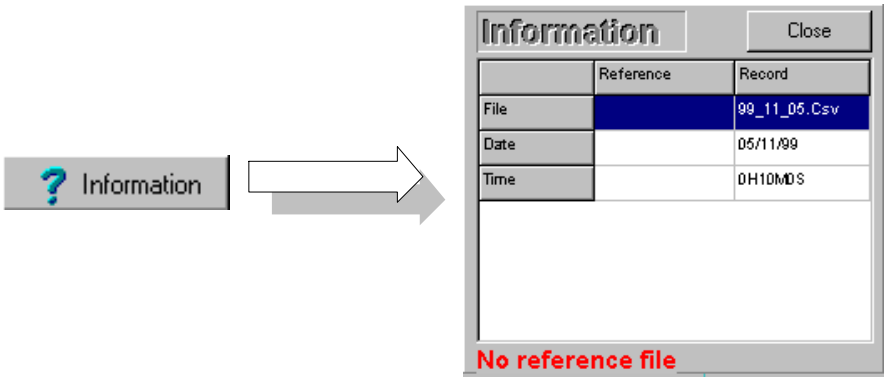
b) click on the "**Set as reference (Enter)** " option.



A confirmation message is displayed. If you click "Yes", the chosen curve becomes the new leak-back rate reference.

Leak-back rate curves

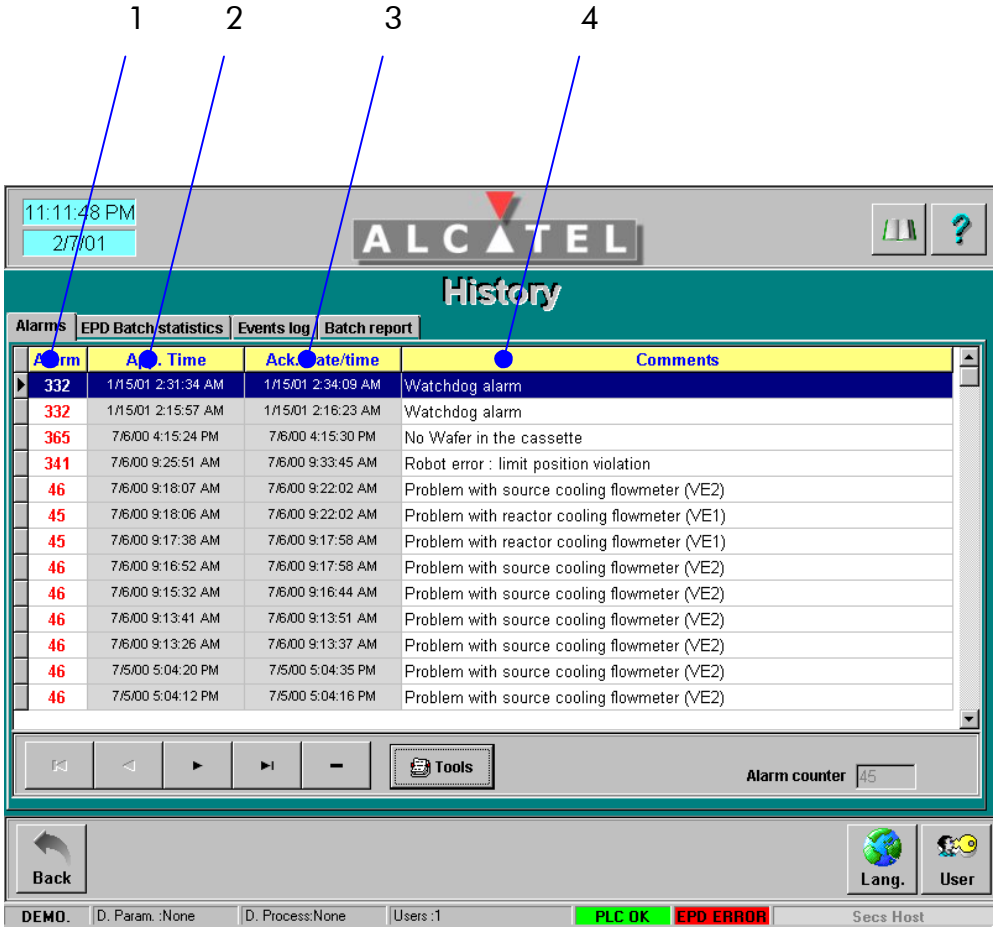
8 To have more information about the displayed curves, click on the "**Information**" button at the right hand side of the screen. A table gives information relative to the displayed curves (measured and reference curves).



Fault archiving

Access level: process engineer

Access button: « **History** » icon in the navigation bar

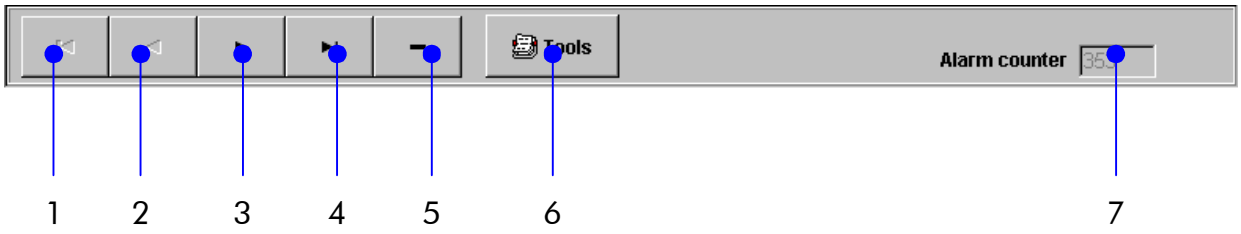


The faults archiving facility enables you to display the faults list, namely:

- the fault number (**1**)
- the date and time (**2**), at which the fault has occurred
- the date and time (**3**), at which the fault has been acknowledged
- a commentary (**4**) that allows to identify the fault

Fault archiving

A navigation bar is provided to permit flexible list operation.



1 Access to the first fault in the list

2 Access to the previous fault in the list

3 Access to the next fault in the list

4 Access to the last fault in the list

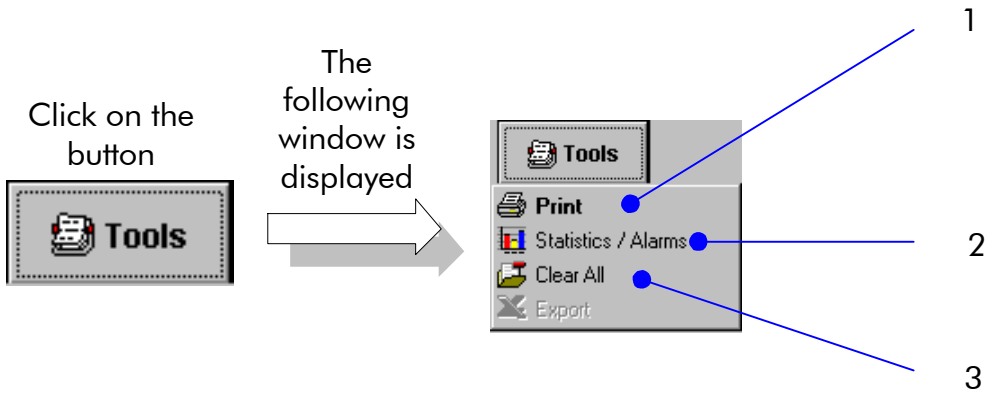
5 Delete the current fault

6 Access to a "tools" menu

7 Indicates the number of faults which have occurred

Double-clicking an alarm line allows displaying the corresponding trouble shooting sheet.

"Tools" menu



1 Allows to print the faults list

2 Access to the statistics function

3 Allows to delete all the faults of the list

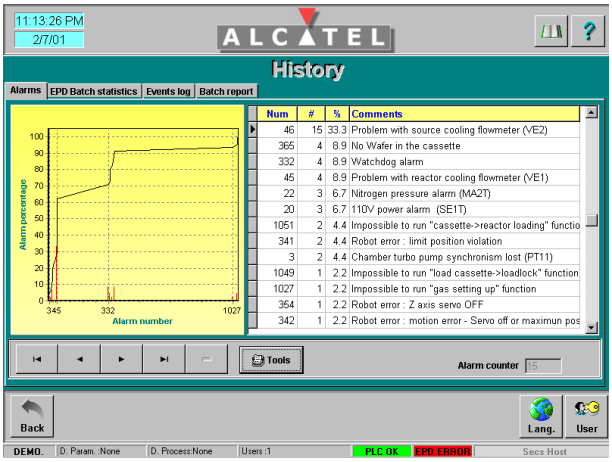
Fault archiving

Statistics function

For each existing fault type, this function displays the percentage of faults that occurred during machine operation, using vertical bars. Then underlining the most frequent faults, the « **Alarm history** » function may be used easier.
An additional curve displays the sum of faults (%).
To access this function, click on "**Statistics/Alarms**" in the "**Tools**" menu.

Click on the button

The following window is displayed



To come back to the faults list, click again on "**Statistics/Alarms**" in the "**Tools**" menu.

Fault archiving

Other functions

Three other thumb-indexed functions are available:

- **EPD batches statistics**: displays the result of the statistics built up by the EPD system and concerning the EPD step processing. ⇨ **sheet C 130B**

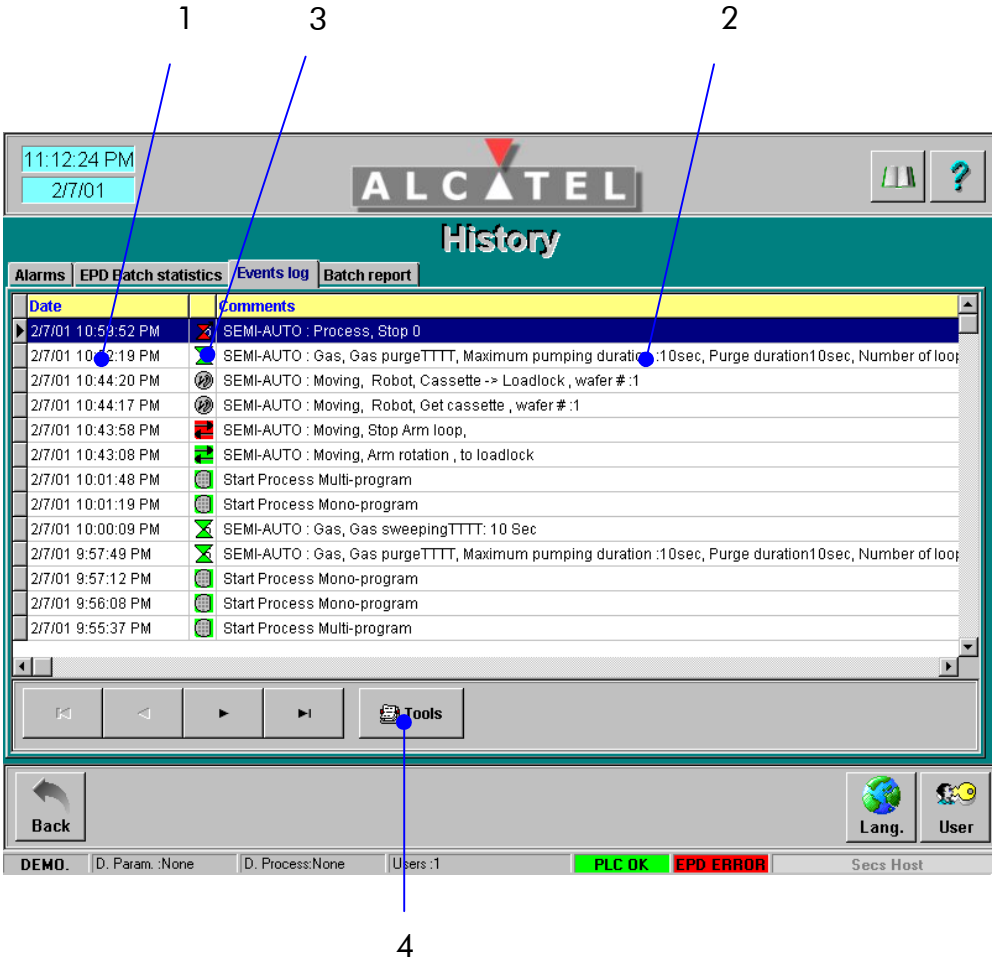
- **Events log**: list which indicates events that occurred during machine operation: user's login, user's actions, software events.

⇨ **sheet C 130A**

- **Batches report**: displays various information about the processed wafers such as processing times, batches reports and faults that occurred during machine operation.

⇨ **sheet C 130C**

Machine events



1 Date and time, at which the machine event has occurred.

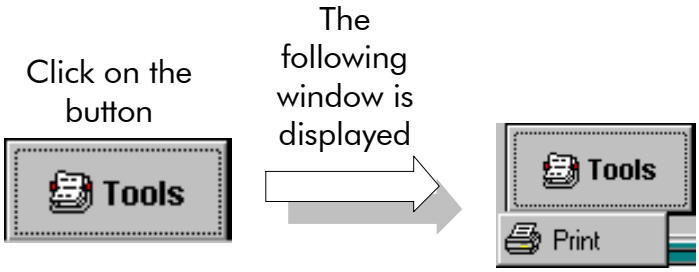
2 The machine events are displayed using pictograms. A green pictogram indicates that the corresponding function is activated. A red pictogram indicates that the corresponding function is deactivated.

3 A commentary that allows you to identify the machine event.

4 Access to the "**Tools**" menu.

Machine events

"Tools" menu



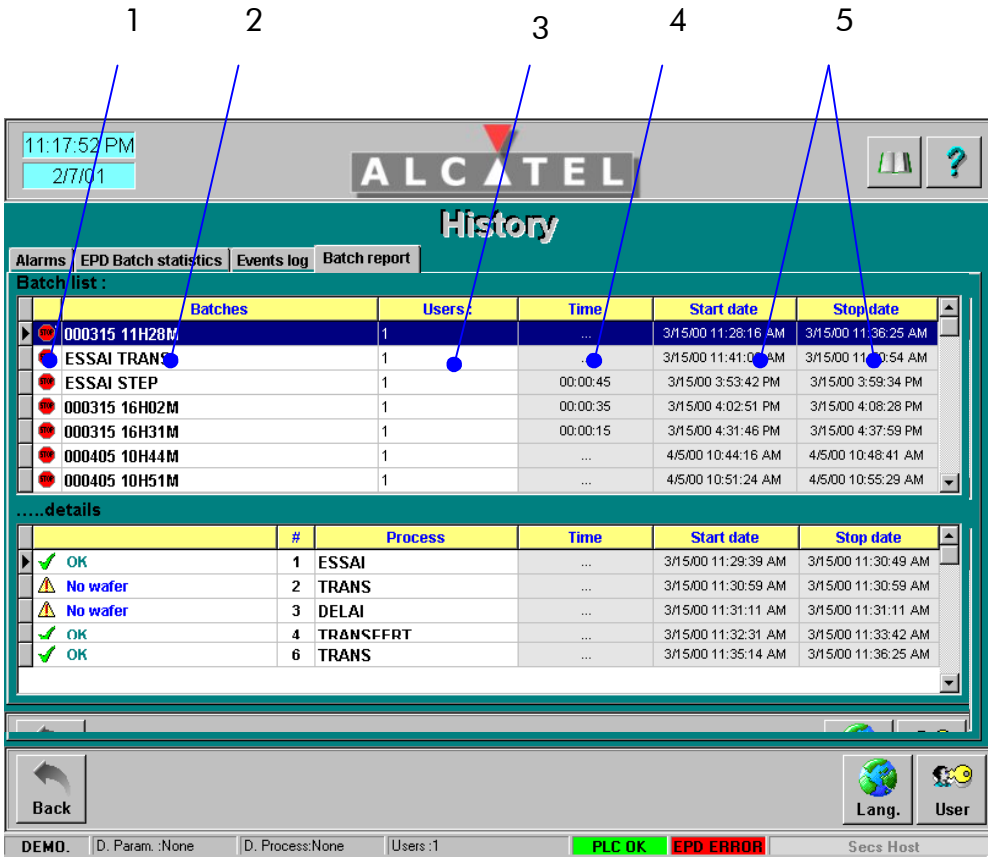
Prints the list of the machine events.

You can sort the machine events:

- by date and time
- by commentary
- by type (displayed using a pictogram).

To do this, double click inside the yellow strip at the beginning of the column to be sorted.

Batch report



This function displays information about the processed wafers such as processing times, batches reports and faults that occurred during machine operation.

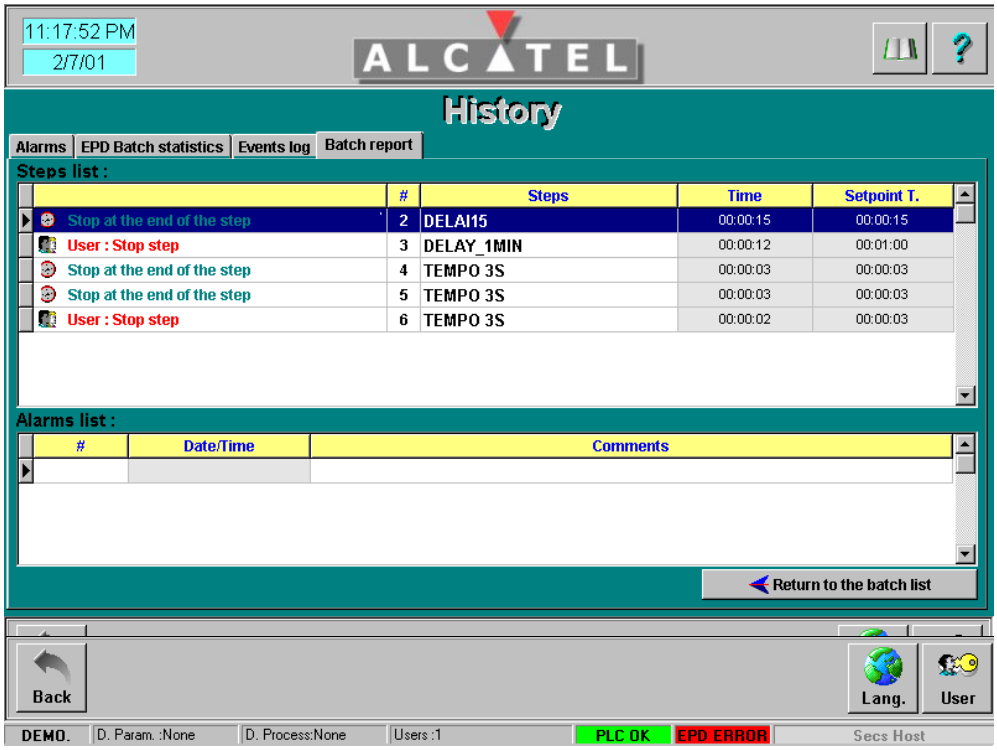
The upper area of the screen gives the list of processed batches with the following indications :

1 a pictogram indicating the result of the batch processing (√ = OK ; stop = the process has been interrupted by the user or after a fault).
2 the name of the batch
3 the user's name
4 the total batch processing time
5 the date and time for the beginning and the end of the batch processing.

Batch report

The lower area of the screen gives details about the batch selected in the upper area. The various processes executed for the whole cassette are detailed. For each process, a pictogram indicates if the process has been finished correctly or not (√ = OK ; "⚠" = a fault has occurred during the corresponding process)

To have more details after a fault has occurred, double-click on the corresponding line. A new screen appears giving more details about the selected process.



The upper area of the screen shows detailed information relating every step of the selected process.

A pictogram gives the result of every step :

- the watch indicates that the process has been finished properly
- the camera indicates that the process has been stopped by the EPD system
- the little man indicates that the process has been stopped by the user.

The lower area of the screen gives details about faults that occurred during the execution of the step selected in the upper area.