



**JR AUTOMATION™**  
FSA Technologies



# Rhapsodie Net

**MWT**  
Electronic

*User Guide*

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Rhapsodie version : From V3.0.0.00



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Kept free voluntary

# 1 Servo-controlled electric press-fitting

A servo-controlled electric press-fitting unit (UE) consists of:

- an instrumented (for force measurement) motor-driven shaft (the "pin")
- a power amplifier (the "servo")
- an electronic control unit (MVAT) (the "MVAT card")

The electronic control unit controls the movement of the pin shaft whilst monitoring the force being exercised on the shaft. It is controlled by On/Off inputs or by a field network (Profibus, Ethernet, Profinet for example). It can communicate with the outside world through 2 serial links (1 RS485 and 1 RS232).

The "programming" of a press-fitting unit involves defining position and force settings.  
The interface with the press-fitting unit is carried out by the program **Rhapsodie.net**.

## 1.1 Geometric rule

**IMPORTANT: The following is a full description of FSA's design approach**

The positions of the end of the pin shaft are identified on an axis.

The zero point is defined during the calibration and learning cycle in pin pressing mode.

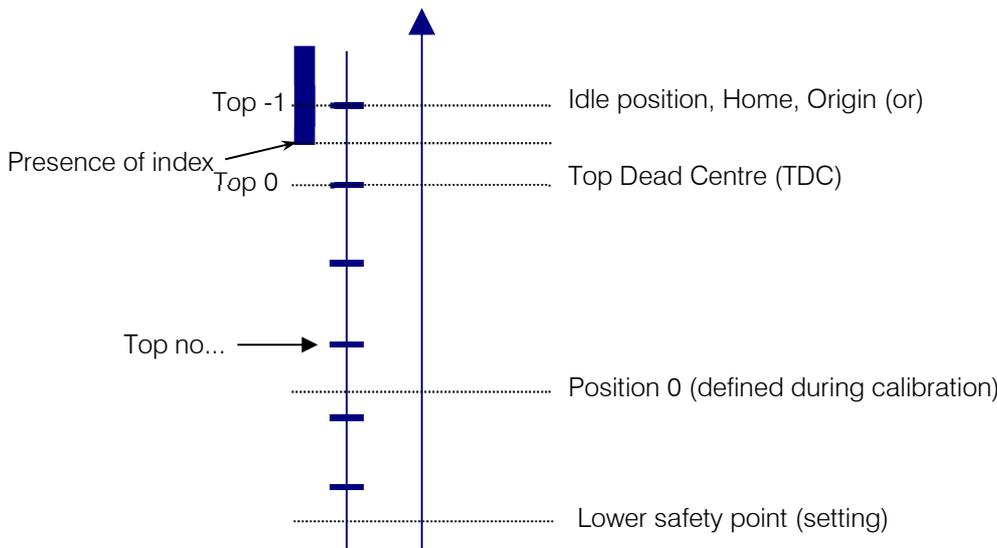
**Positions decrease** when the shaft exits and increase when it returns. It is essential to calibrate the press-fitting unit before using it otherwise it will not be possible to carry out a sequence.

*Note: this calibration operation is requested by the electronic control unit each time the electrical environment of the press-fitting unit is changed and must be repeated every time a change is made to the mechanical environment of the press-fitting unit.*

The electronic control unit knows the position of the pin shaft through the pulses delivered by the speed controller (the speed controller drives the motor through the synchro-resolver mounted on the shaft).

An inductive sensor (called the **Index**) active when the shaft is in home position, allows the absolute number of motor revolutions to be determined.

The **Top Dead Centre (TDC)** and the **lower safety point** delimit the working area of the press-fitting unit. Top dead centre equates to the position reached at the instant of the pulse on the first revolution after the loss of the index when the shaft exits. The lower safety point is a setting defined according to the mechanical environment of the pin



**Note:** In "manual raise" mode, the pin stops on the index while during normal operation, it stops in the idle position.

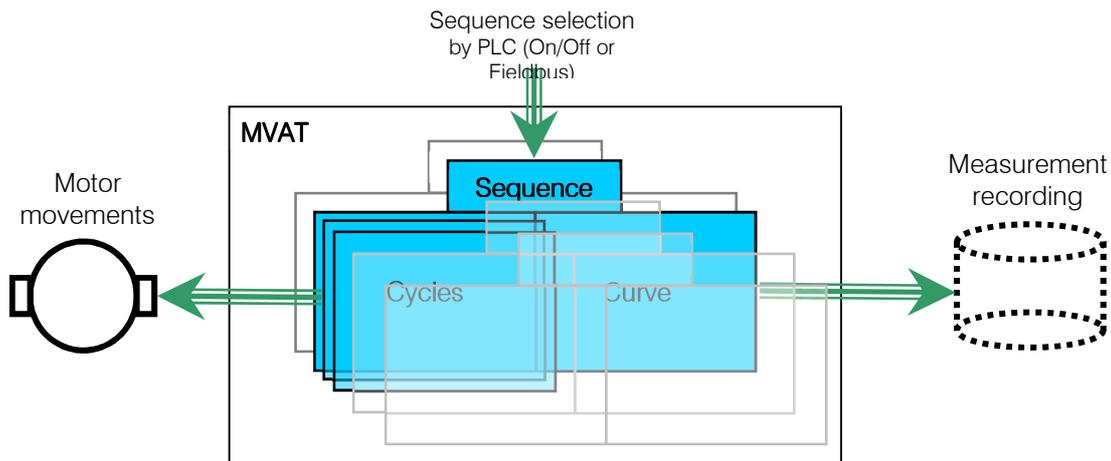
## 1.2 Sequence, Cycle, Curve: definitions

The programs (each, a series of pin shaft displacements) are called "**Sequences**". Each sequence is identified by a number (1 to 512) and **always starts with the shaft in idle position**.

The sequences are made up of "**Cycles**" which can be chained together one after the other and are identified by a number (1 to 384).

The change in the force during the sequence can be memorised in the "**Curves**" or in the "**Profils**". The curves or profils constitute storage programs which are identified by a number (1 to 16 for the curves or 17 to 100 for the profils) and allocated to a sequence.

ALL the settings describing sequences, cycles and curves are defined through the **Rhapsodie.net** GUI.



A sequence is therefore described very simply by the **number of the first cycle to be executed** and the **curve number** to be used to save the force values measured during the movements of the pin.

### Note:

- sequences, cycles and curves numbered "0" do not exist and are used to designate a non-existent element (for example, the association of the curve "0" with a sequence, means "No storage program associated with this sequence").
- The "Cycle start" input must be active throughout the execution of the sequence, otherwise the press-fitting units stops immediately and signals an emergency stop.

## 1.3 Cycles, chains

A cycle describes an elementary movement of the press rod. The main settings used to define a cycle are the **trip force** and the **trip position**.

The MVAT card stops the press rod either:

- when the trip position is reached
- when the trip force is applied.

The system then simultaneously saves the final force and the position reached. Various types of configurable quality checks enable the cycle to be declared OK or not OK. If the rod stops on the position, the force may go outside the tolerances. Likewise, if it is the force which causes the trip, the position may not comply with the programmed tolerances.

The following data is entered to describe the basic movement:

- the cycle type, chosen from the options "Press-fit", "Acquisition" or "Positioning"
- the direction of movement: "Pressing" or "Pulling"
- the **Engagement position**, which defines the change from the **Approach speed** to the **Working speed**.
- the **Slowing down position**, which defines the change from the **Working speed** to the **Trip speed**.
- the **Trip position**, and its tolerances
- the **Trip force**, and its tolerances
- the **maximum allowed current**
- the cycle to be chained if necessary

Press rod movements may be chained together.

Chains may be determined either:

- when programming the cycles themselves. This is known as **SOFT chaining**. The MVAT card will chain the cycles.
- from the outside (PLC), this is known as **Hard chaining**. At the end of the current cycle, the PLC selects the next sequence to execute. The MVAT card then chains the sequences.

## 1.4 Quality check

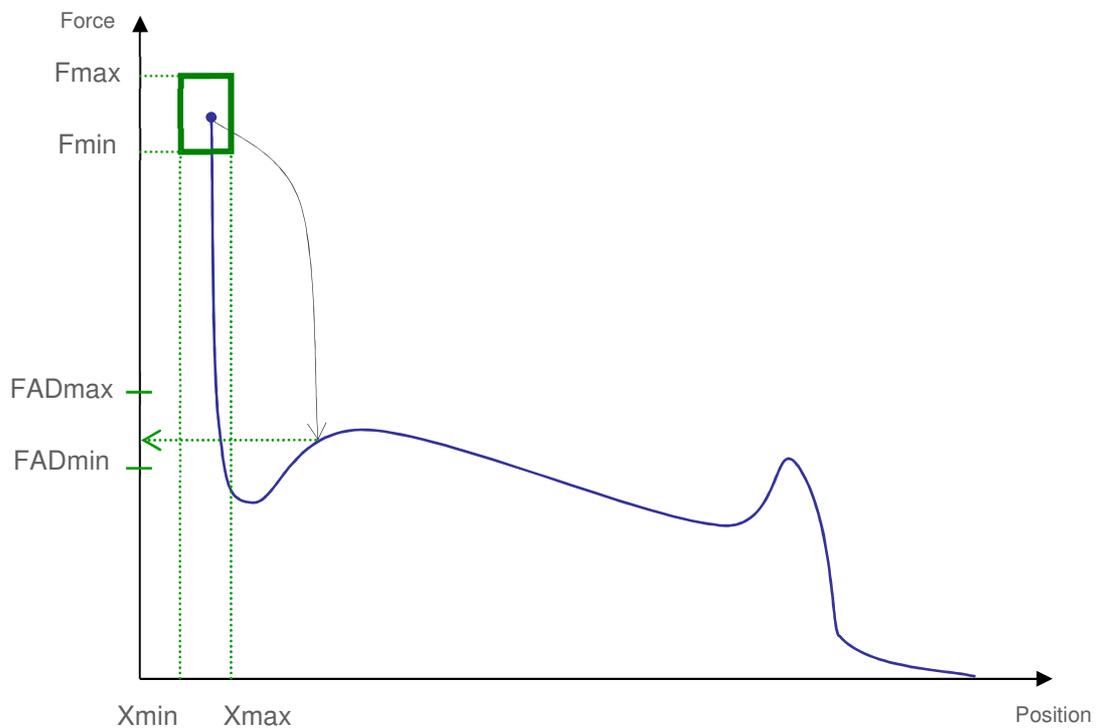
### 1.4.1 Cycle OK

For a cycle to be OK, the following conditions must be fulfilled:

- Final force is within tolerances
- Final position is within tolerances
- Calculation of the difference in position when compared with the preceding cycle or an "initial " cycle is within tolerances
- "Force Before Stop" (FBS) is within tolerances.

Note: any of these checks may be inhibited.

All of these checks may be represented (excluding differential check) as follows:





### 1.4.2 Curve check OK

For a curve program to be declared OK, all the checks it carries out must also be OK.

A curve program:

- Stores the force during displacement for 5 separate recording ranges.
- Positions 5 check windows in total over these recording ranges.

The 5 recording ranges may be positioned absolutely, or on a force threshold.

The 5 check windows, trapezoidal in shape, may be positioned absolutely or relative to the recording ranges.

9 check modes are possible using these windows:

- Inclusion (the curve must pass completely through the check window)
- Strict inclusion (the curve must pass completely through the check window and not exit from it)
- Increasing, decreasing (the curve increases/decreases in the check window)
- Peak, trough (the curve has a maximum/minimum greater than/less than the entry or exit point)
- Mean, Dynamic Mean (the mean or the dynamic mean of the curve must be within the check window)
- Working (the working calculation - surface of the curve - must be between a maximum and a minimum)

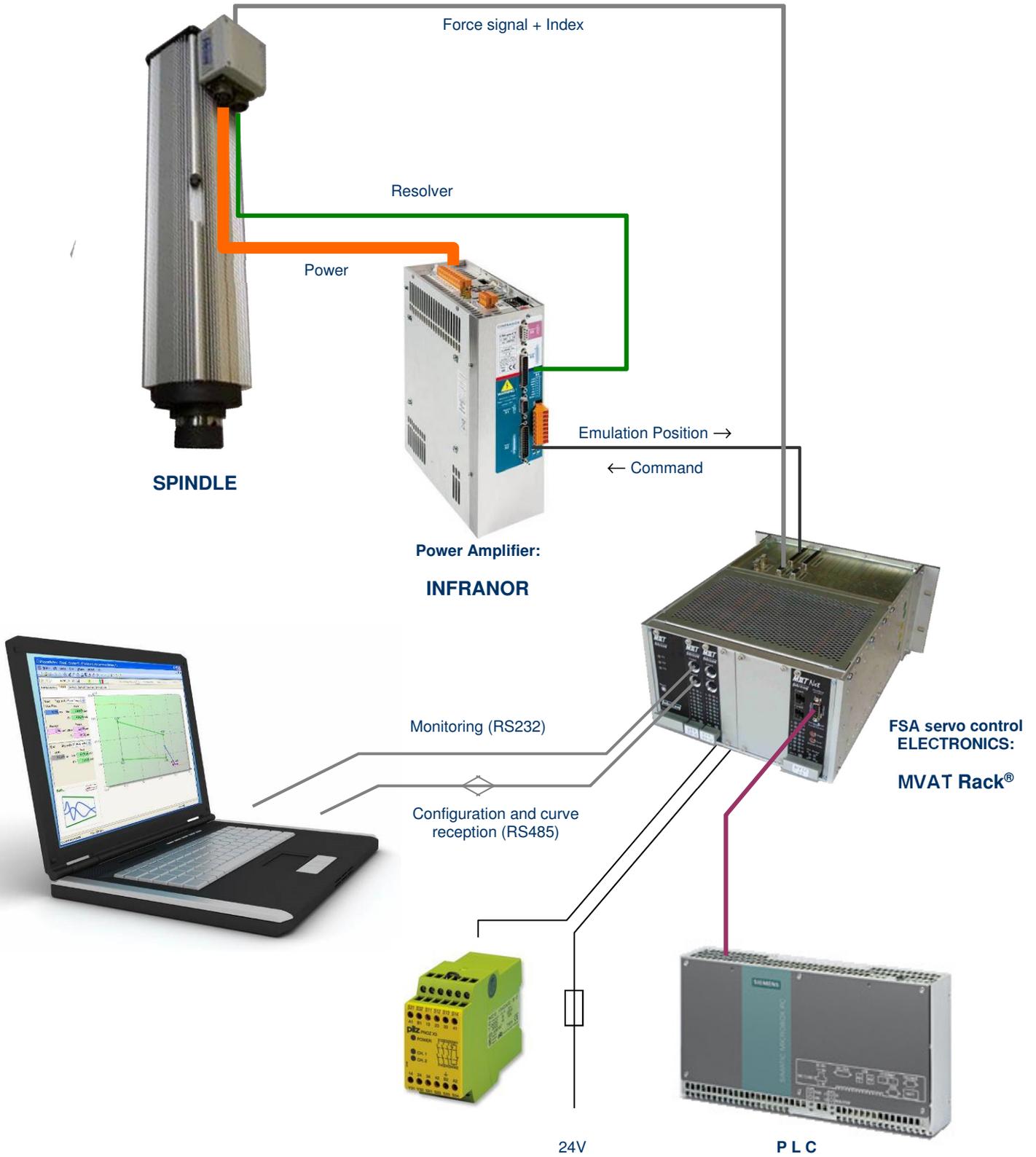
Each check window has its own check.

It is of course possible to inhibit the quality of this check.

### 1.4.3 Sequence OK.

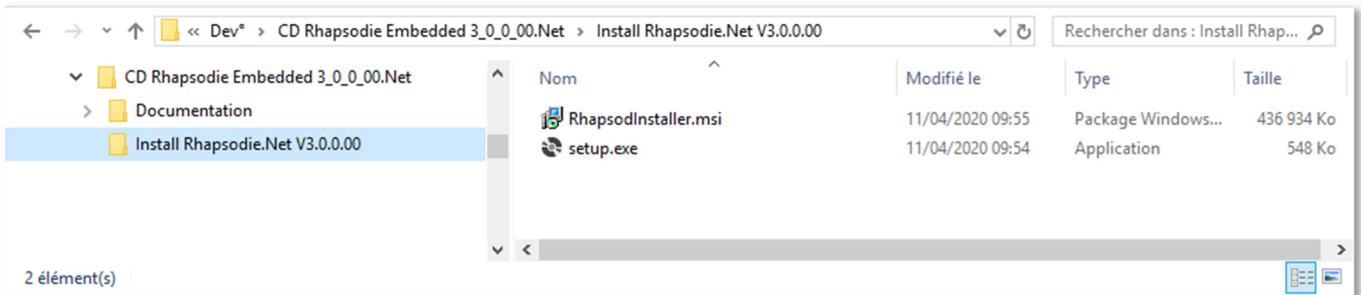
For a sequence to be OK, all the cycles executed and the curve must be declared OK by the MVAT.

## 2 Hardware

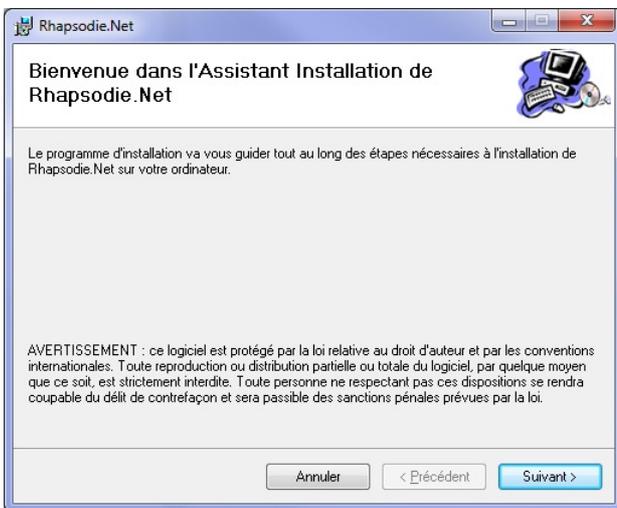


### 3 Installation

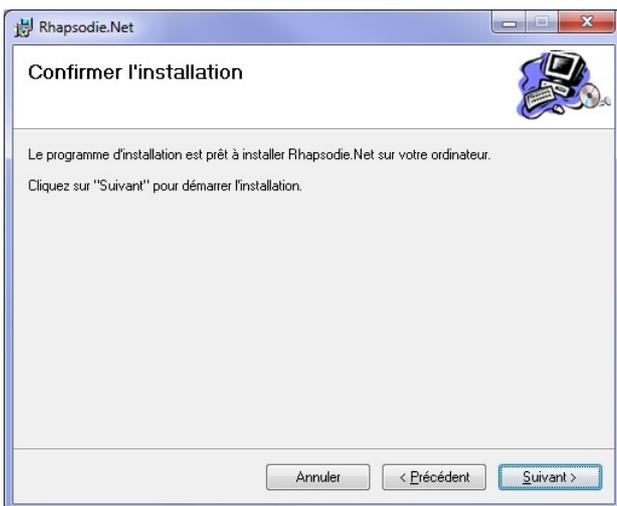
Insert the Installation medium (CD, USB flash drive, etc.) and double click on "Setup.exe"



The following screen appears, click "Next" then **leave "C:\Rhapsodie.Net"**, and click "Next" ("Suivant")



Click "Next", Rhapsodie.Net is now ready to start.



**During installation, 3 extra softwares are installed :**

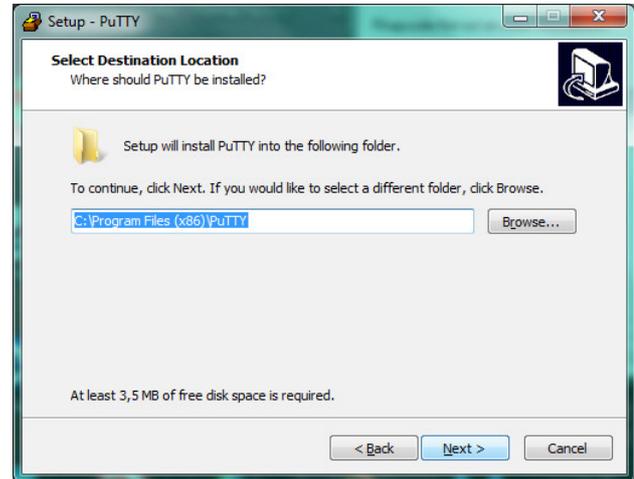
- **puTTY** : terminal which able to dialog the MVAT card through its Com1 port (RS232). It replaces the windows Hyperterminal, not enable anymore since Windows 7.
- **com0com** : Generation and redirection of Virtual com port to Ethernet software (used only when an UExp-MVAT panel is present on the station)
- **7zip** : Compressing software which allows the automatic curves archiving

**Steps : Installing puTTY**

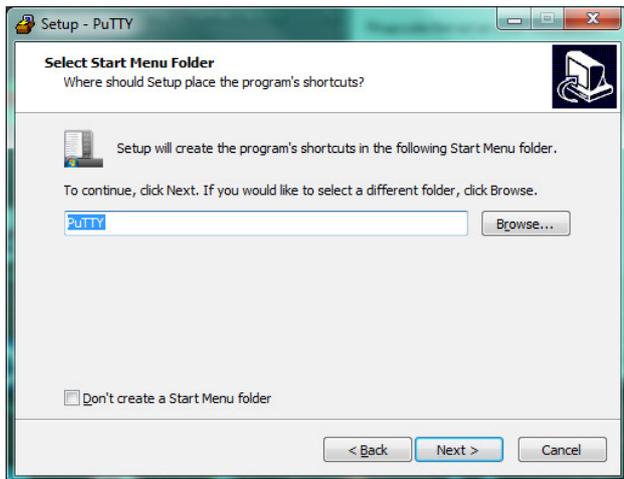
Choose « Next »



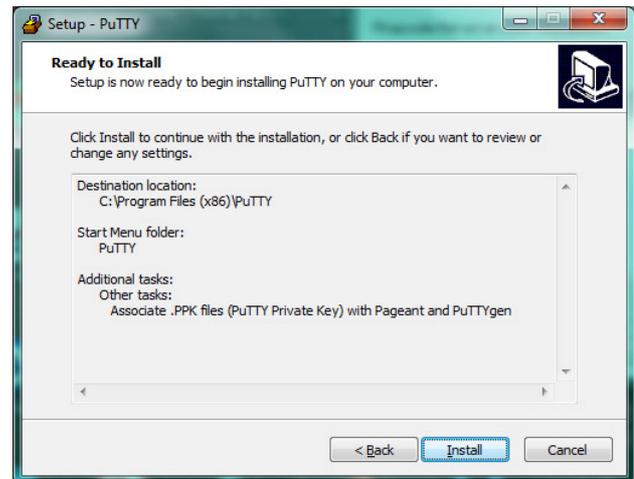
Leave the default directory



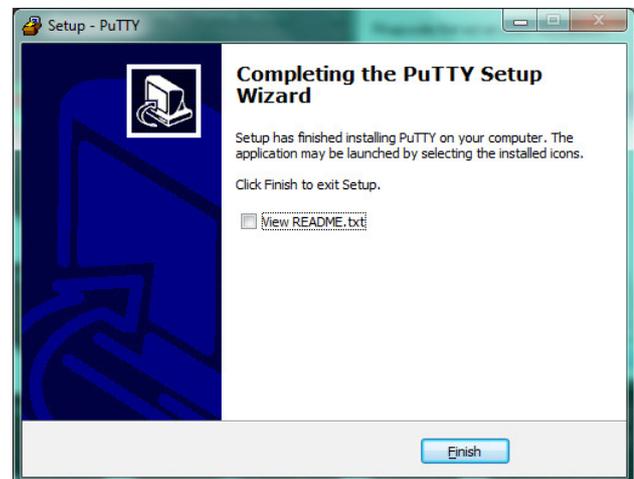
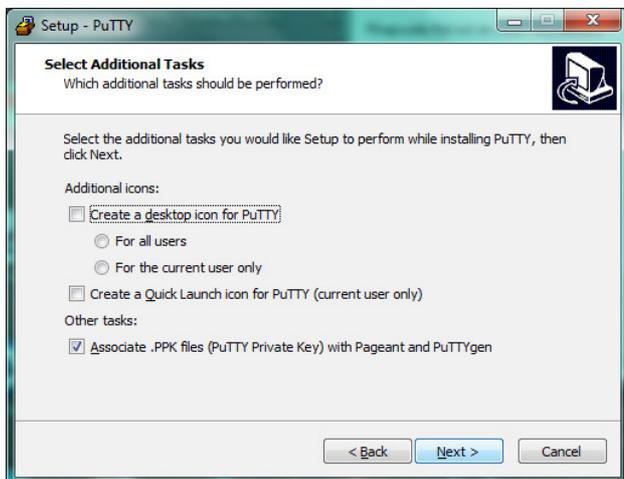
Choose « Next »



Click on « Install »

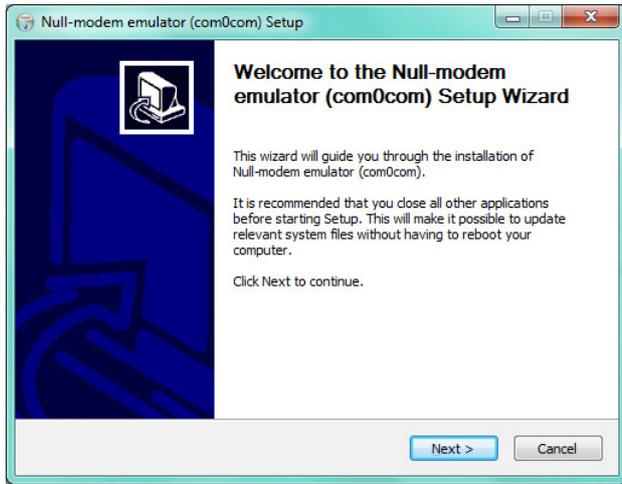


Leave just the last checkbox checked and choose « Next » Click on « Finish »

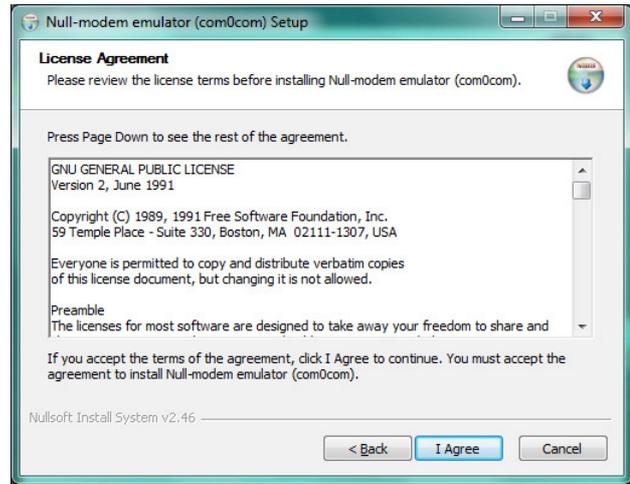


**Steps : Install com0com**

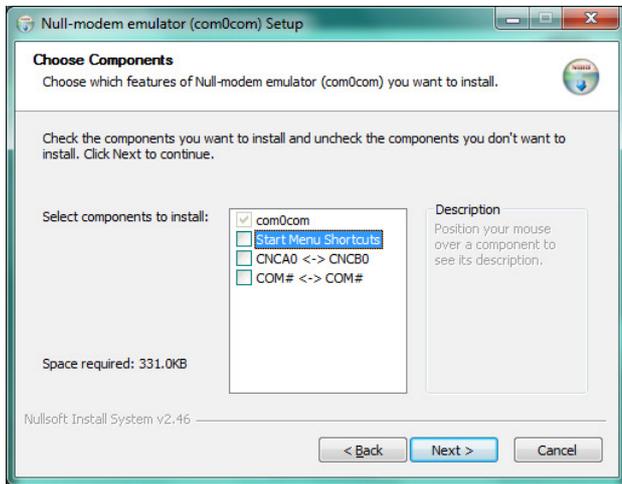
Choose « Next »



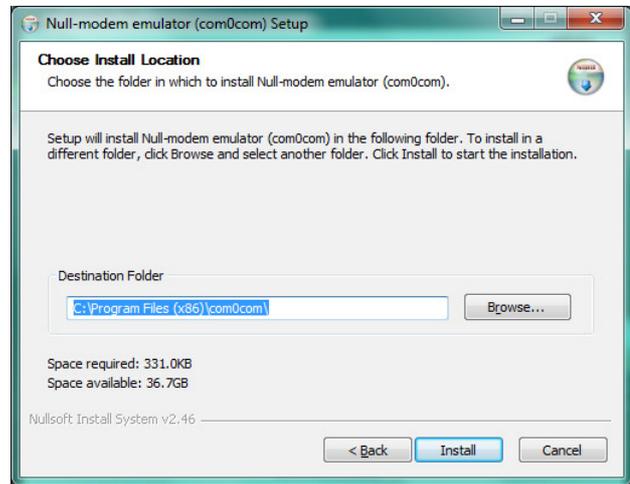
Clic « I Agree »



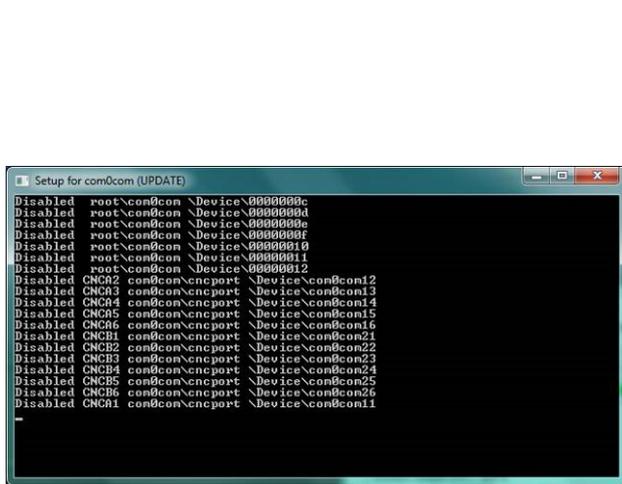
Uncheck all the checkbox and choose « Next »



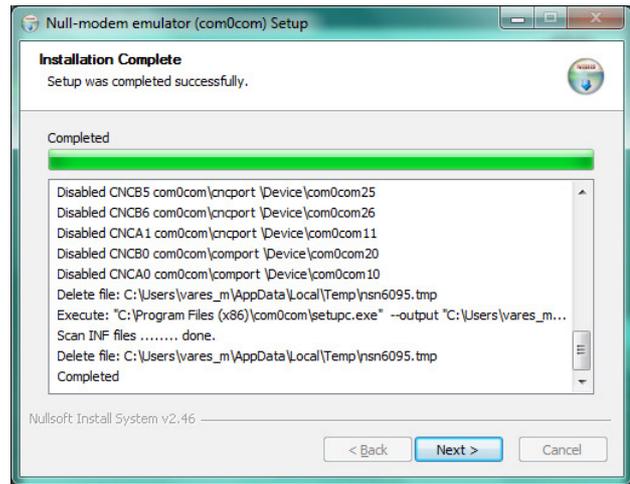
Clic on « Install »



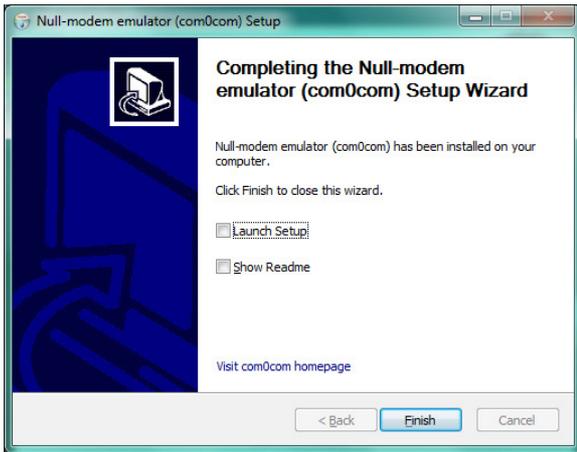
Screen during installation



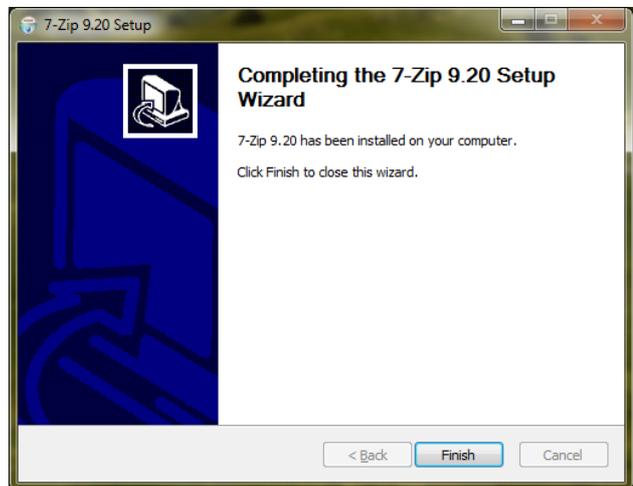
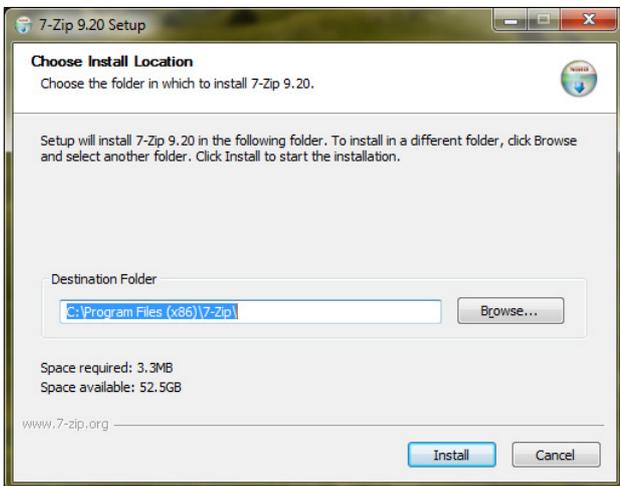
Clic on « Next »



Clic on « Finish »



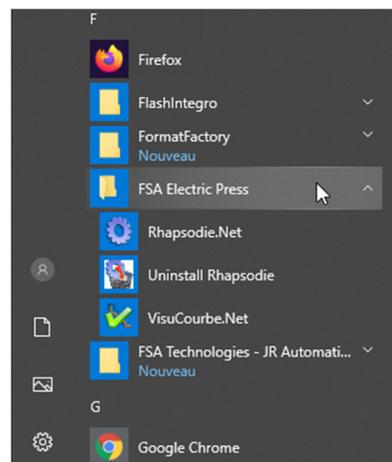
Etapes : Install 7Zip



Now, all the softwares are installed, and an icon is added to the desktop:

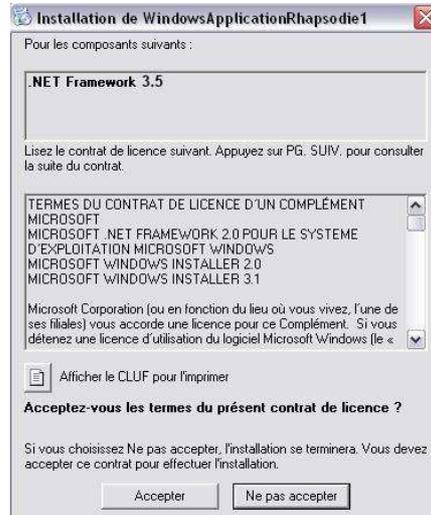


And the following shortcuts are added in "Start"/"All programs" menu :

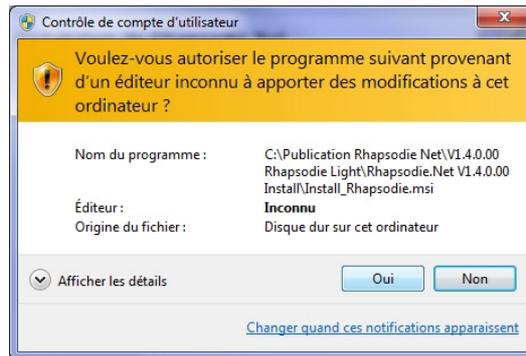


**Notes:**

If Microsoft Framework 3.5 (Microsoft Windows components library) is not present on the PC, it will be installed automatically: (accept)



If during installation a window mentions "Unknown Editor", accept:

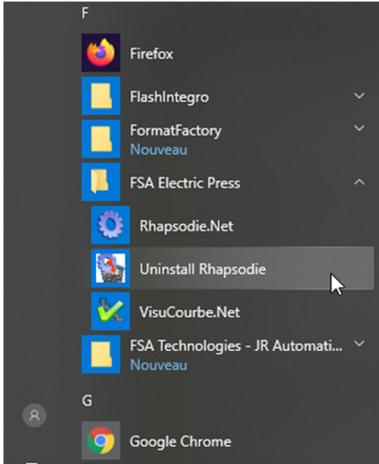


## 4 Updating software

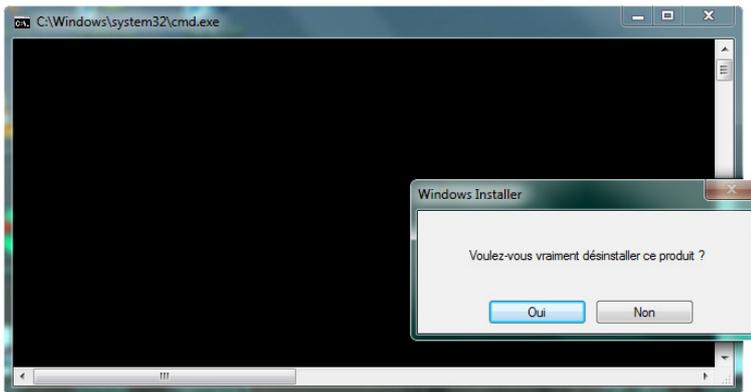
To update Rhapsodie.Net, you must first uninstall the installed version, then re-install the new version.

### 4.1 Uninstallation

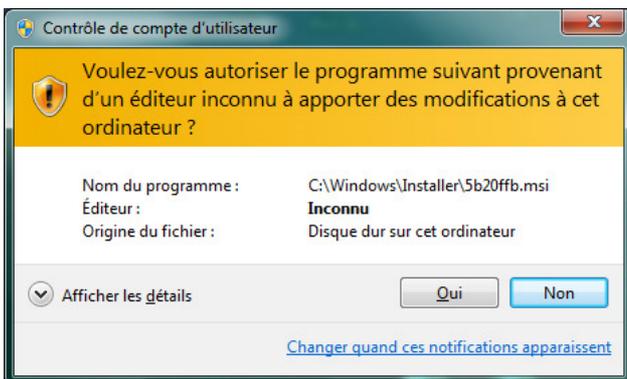
You just have to clic on the uninstall shortcut in « Start Menu/FSA Electric Press » :



then follow instructions : answer "YES"



If during the uninstallation, a window alerts about unknow Editor, please accept :



### 4.2 Re-installation

See Installation chapter.

## 5 1<sup>st</sup> Run

### 5.1 Software registration

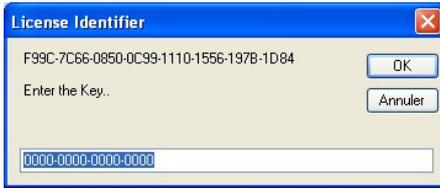
Run Rhapsodie.Net using the icon. When the software runs for the first time two information boxes are displayed as the licence has not been entered. Confirm each by clicking on OK.



The Splash Screen is displayed for 5 sec., followed by the main window:



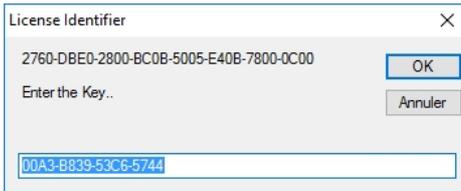
Then, to register Rhapsodie.net, select "Help"/"About"  
The following data entry box appears:



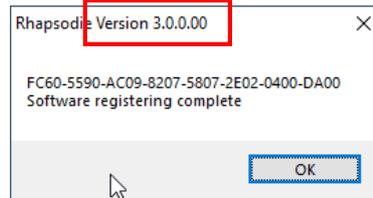
Read off the Identification number and call **Fabricom Presses after-sales service** (+33 475-85-27-27) who will give you the registration key.

Remark : the updating from a version older than V1.5.0.7 to a new version generate a new license ID.

After entering the key:



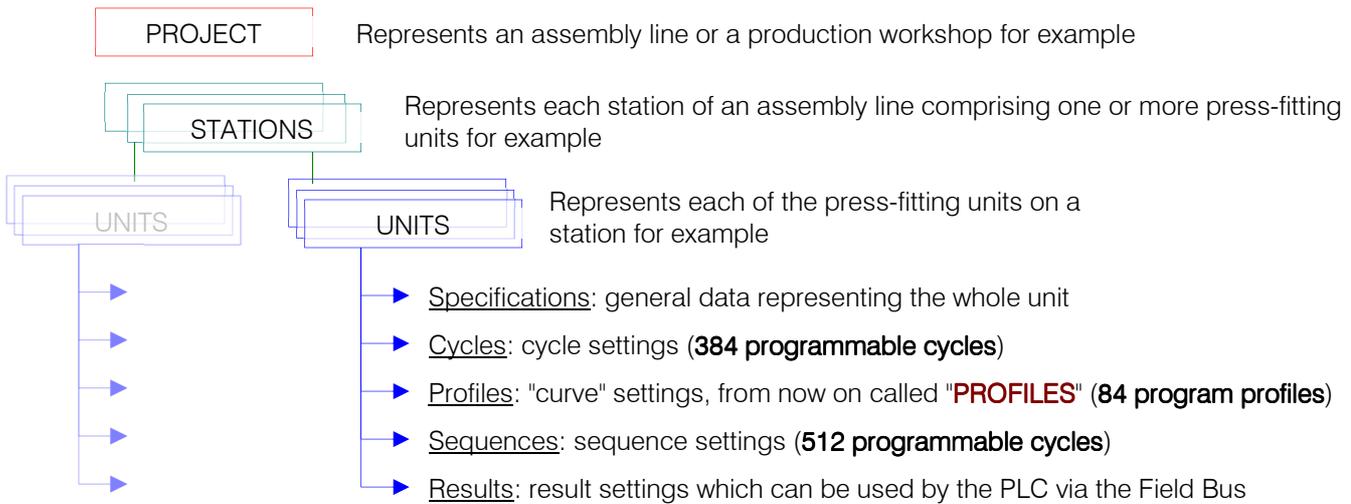
the following window appears showing the version installed.



You can now close Rhapsodie, then restart it.

## 5.2 Organisation of the software

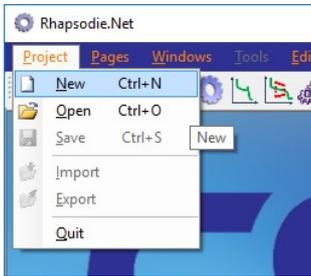
To provide a better idea of how Rhapsodie.net operates, the following diagram shows how it is organised:



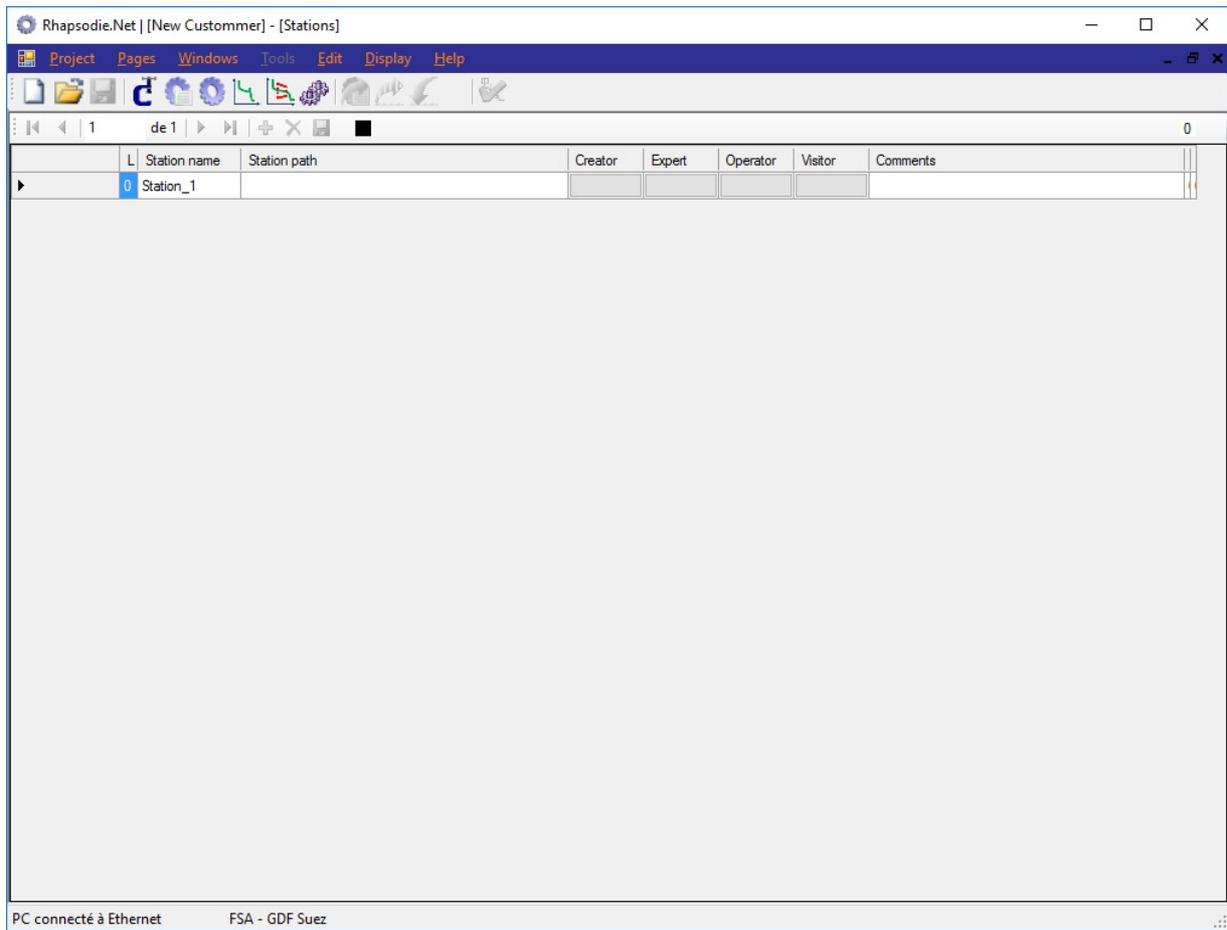
### 5.3 Creating a project with 1 station and 1 press-fitting unit

#### 5.3.1 Creating a Project, Station and File path

To be able to send programs to the MVAT card, you must create a project.

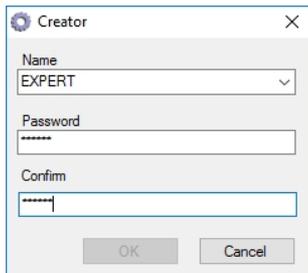
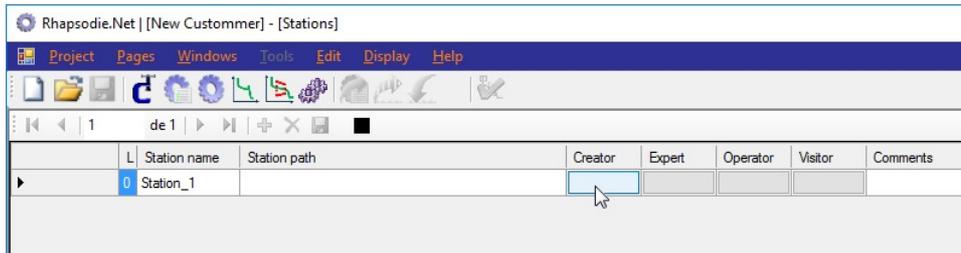


The "Stations" page opens:

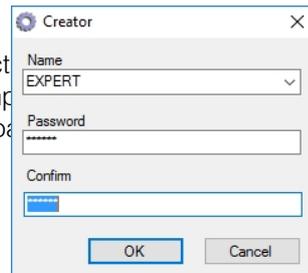


One station is created by default ("Station\_1"), but neither the directory where the file will be saved nor any passwords exist.

To change these, the **FIRST thing that must be done** is to create the "Creator" password:  
 Click the "Creator" button for station "Station\_1".

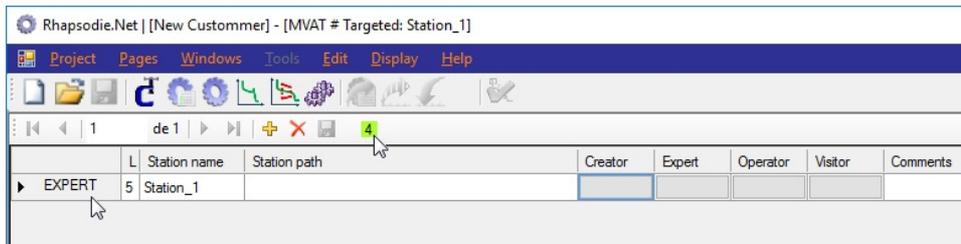


Select  
 example  
 and pa



Then to confirm, you  
 double click on the  
 password confirmed  
 and press OK.

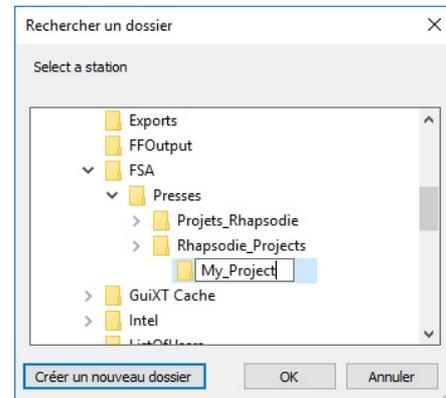
The red "4" goes green and the column in front of the station name shows the person logged in in:



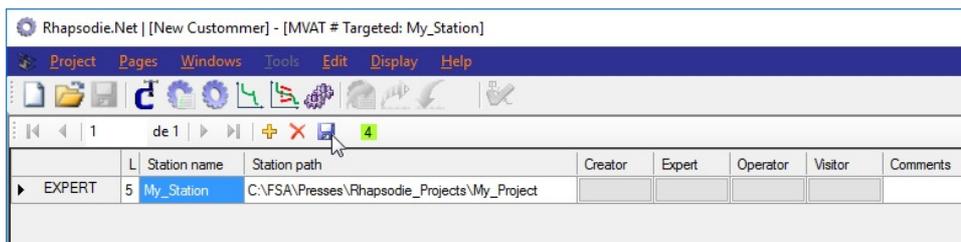
You change the name of the Station **NOW** (not later!):

Example:

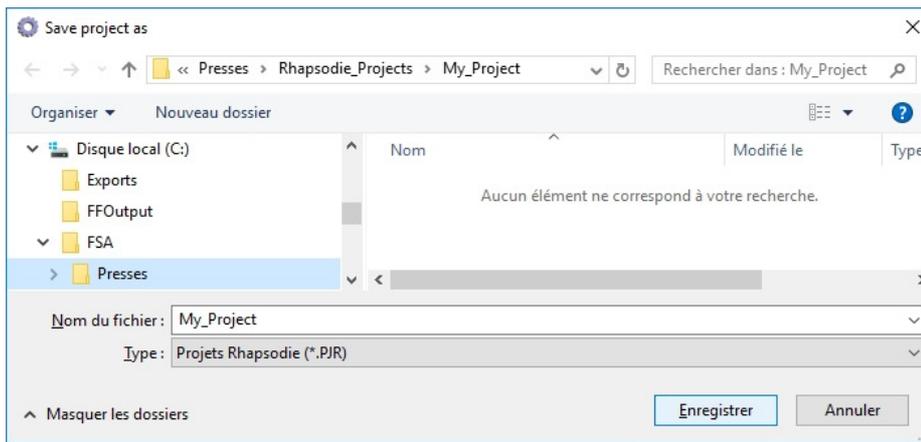
- "MY\_STATION"
  - then the directory where the file will be saved, for example  
 "C:\FSA\Presses\Projets\_Rhapsodie\My\_Project"
- (The directory C:\FSA\Presses\Projets\_Rhapsodie\ will already have been created, and the directory "My\_Project" is created during this step using the "Create a new folder" button)



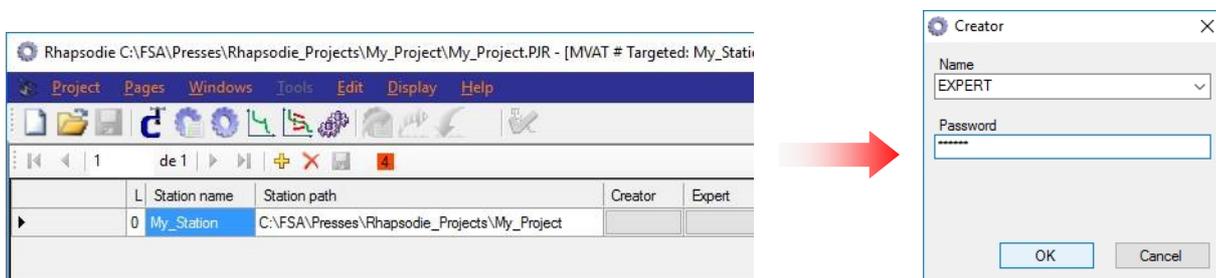
The diskette icon changes colour to indicate changes have been made. Click on it.



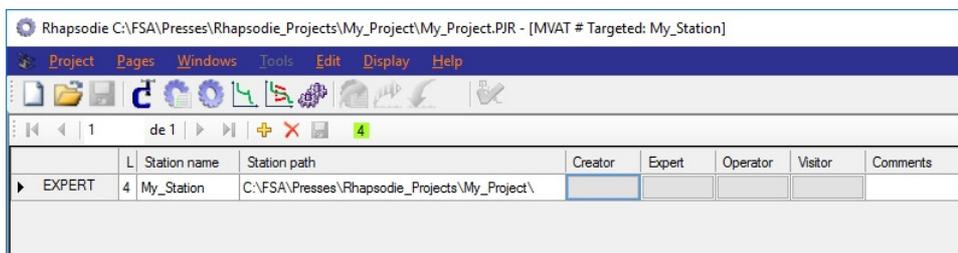
A "Save project as" window is displayed. We decide to give the PJR file the name "My\_Project":



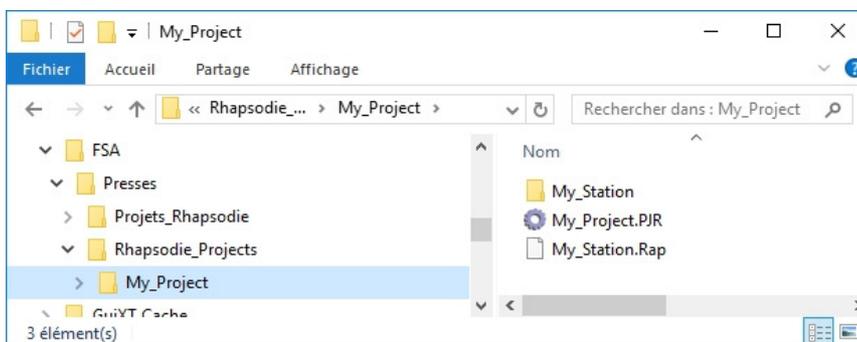
You are automatically logged out. You must then log back in and enter "EXPERT" "expert" then click OK:



You are then logged in as creator (the "4" is in green) under the name "EXPERT" as before.

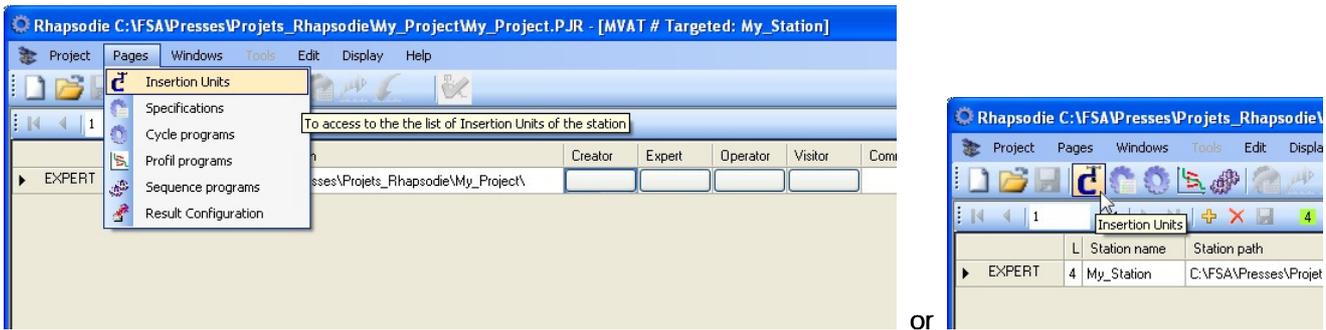


The project has been created, saved and includes a station called "My\_Station". The associated directory is structured as follows:

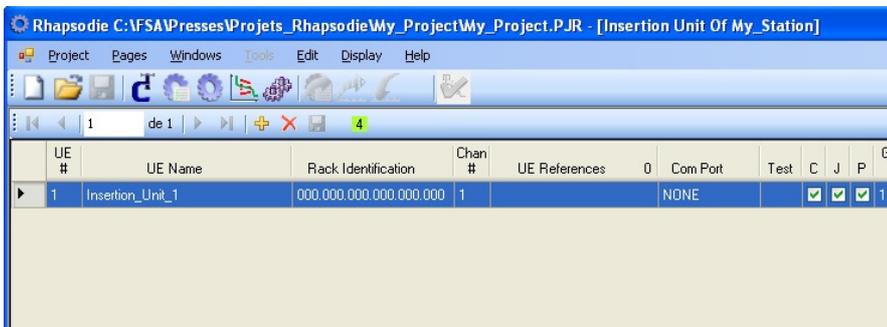


### 5.3.2 Creating a Press-fitting Unit

To create a unit, just open the "Insertion Unit" page which can be accessed from the setpoint menu:

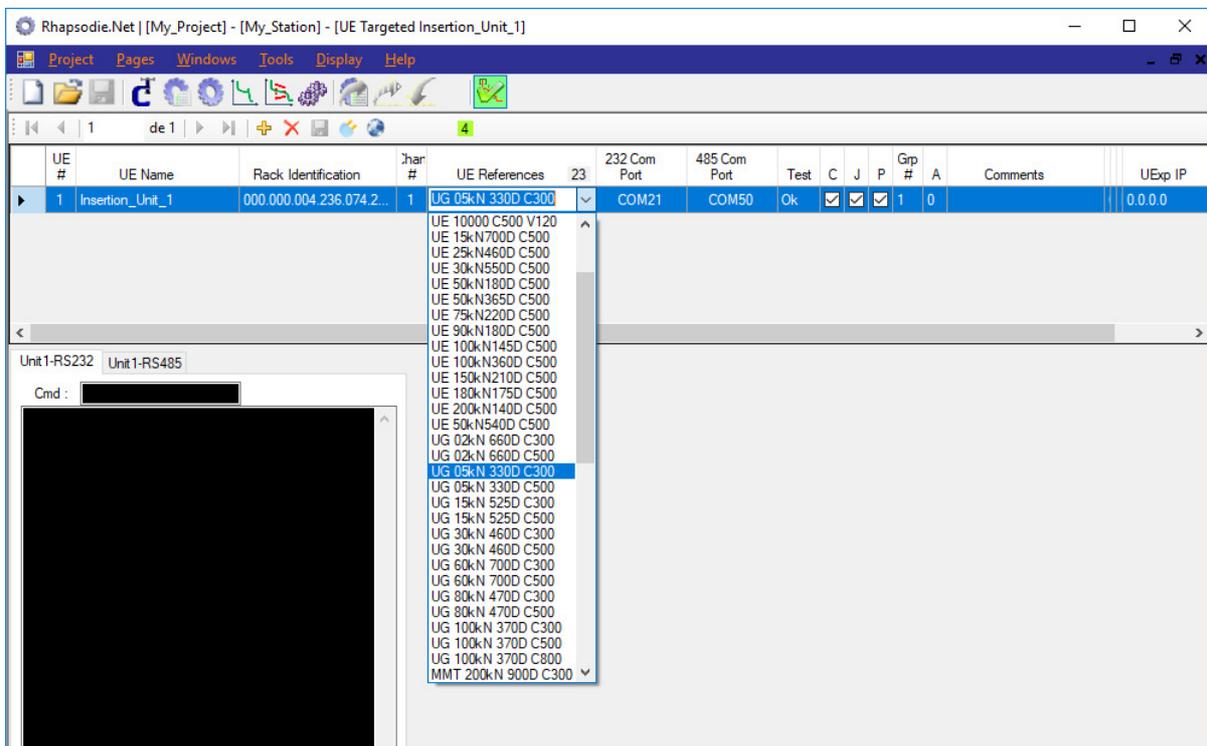


The Insertion Units page is displayed with one unit by default: Insertion\_Unit\_1.

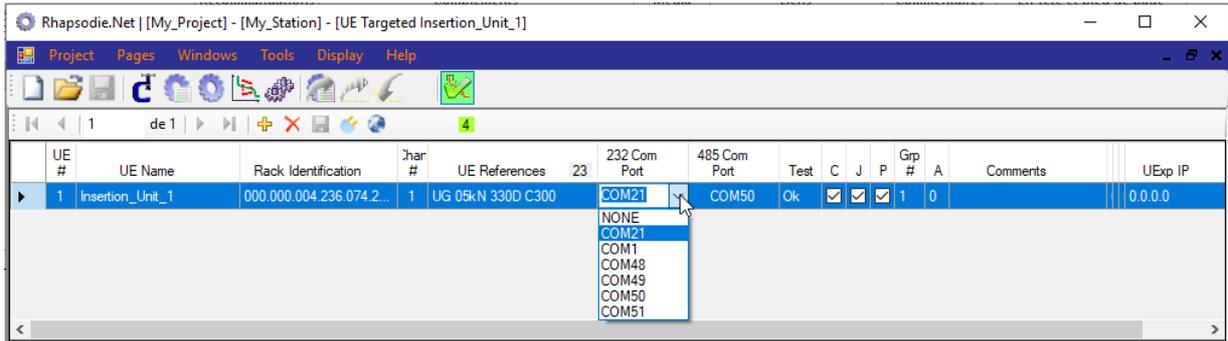


You must now change:

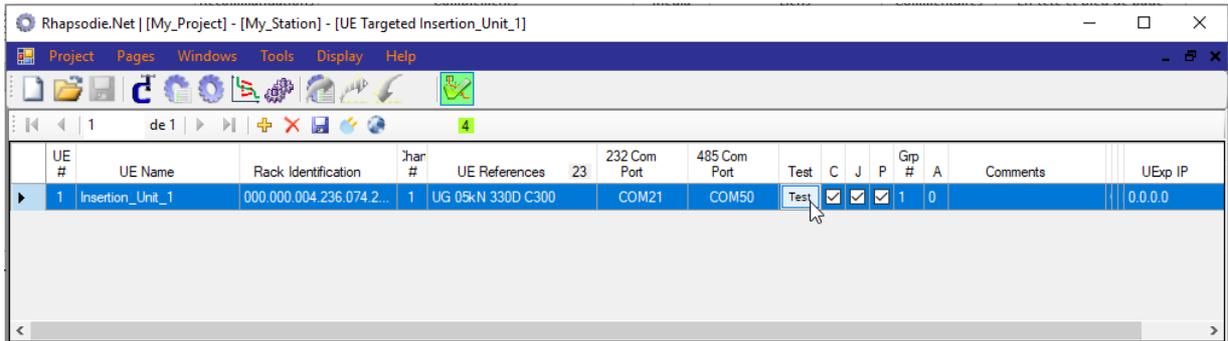
- the name: example "O-ring\_Press-Fit\_Unit"
- the Rack identification (see section "How to retrieve the MVAT rack identifier")
- Select the type of Pin in the "UE References" drop-down list,
- The boxes "C" (for running VisuCourbes with the project) and "P" for activating "Profiles" are already checked.



Then select the right COM ports, one for the real time terminal (RS232 COM port), and one for the safety communication (RS485 COM port)



And check the COM port selected is working properly by pressing the "Test" button which appears.



The response must be:



And not:



Or



You can save by clicking the diskette icon. Then, communication between Rhapsodie.Net and the MVAT card are set up. The RS232 terminal is displayed on the 1<sup>st</sup> tab of the following window, et the secure communication RS485, in the 2<sup>nd</sup> tab :

The VisuCourbes.Net software is also launched to display the curves:

The main window shows a table with columns: N° UE, Nom UE, Identification Châssis, N° Tr, Référence UE, N° Port Com 232, N° Port Com 485, Test, C, J, P, N° Grp, A, Commentaires, IP de l'UExp.

The terminal window for Unit1-RS485 displays the following text:

```

cmd:
Difference Cote : -0,109 mm OK
Contrôle Courbe NOK
-----
Envoi COM2 ok!
*****
Poste/Voie/Adr. :000.000.004.236.074.240.001
J/M/A , H/M/S :00/47/ hhhhhhhhhhhhh/7/////
Force Residuelle: 1656,3 daN TG
Difference Cote : -0,109 mm OK
Contrôle Courbe NOK
-----
Envoi COM2 ok!
*****
Poste/Voie/Adr. :000.000.004.236.074.240.001
J/M/A , H/M/S :00/47/ hhhhhhhhhhhhh/7/////
Force Residuelle: 1656,3 daN TG
Difference Cote : -0,109 mm OK
Contrôle Courbe NOK
-----
Envoi COM2 ok!
SORTIE MODE
SORTIE MODE
Variateur non-pret!
  
```

The VisuCourbe.Net window shows a graph of Force (daN) vs Position (mm). The y-axis ranges from 0 to 2000 daN, and the x-axis ranges from 19 to 32 mm. The graph shows a curve that starts at approximately 1750 daN at 21 mm and decreases to 0 daN at 28 mm. The graph is titled 'Fichier Mode Affichage Outils Options Langue ? Scrutation ON'.

Parameters for FCtrl 01 - Mode Ctrl: Inclusion:

- Début: Largeur Fxe/fin: Fmin: 738,3 daN
- Fin: Fin Courbe: Fmax: 1609,2 daN
- Courbe > Fmin ? : OK
- Début: 24.028 mm
- Courbe < Fmax ? : OK
- Fin: 22.030 mm

Parameters for FCtrl 02 - Mode Ctrl: Inclusion Défaut n°9: Fenêtre de Ctrl en dehors de la fenêtre d'enreg:

- Début: Largeur Fxe/fin: Fmin: Non Evalué
- Fin: Fin Courbe: Fmax: Non Evalué
- Courbe > Fmin ? : Non Evalué
- Début: Non Evalué
- Courbe < Fmax ? : Non Evalué
- Fin: Non Evalué

Curves Disponibles:

Nom/Name	Resol.
0000926351-1-cNOK-sNOK...	
0000926352-1-cNOK-sNOK...	
0000926353-1-cNOK-sNOK...	
0000926354-1-cNOK-sNOK...	

Informations:

```

Date : 13/03/2017 16:23:57
ID : 000.000.004.236.059.033.1
Force Nominale : 3000 daN
Résolution Presse : 512,14 Imp/mm
Résolution Courbe : 5,38 µm
Résultat N° : 926354-1
Séquence N° : 1
Courbe N° : 17
Nb de Cycles : 1
Contrôle Courbe : Actif
Qualité Ctrl Courbe : NOK
Qualité Séquence : NOK
Emplacement du Fichier :
C:\FSA\Presses\Projets_Rhapsodie
\Mon_Projet\Mon_Poste\UE-
Emmach-Joint\courbes
  
```

The terminal window for Unit1-RS232 displays the following text:

```

Debut Resultat
*****
Poste/Voie/Adr. :000.000.004.236.074.240.001
J/M/A , H/M/S :00/47/ hhhhhhhhhhhhh/7/////
Force Residuelle: 1656,3 daN TG
Difference Cote : -0,109 mm OK
Contrôle Courbe NOK
-----
Fin Resultat
Debut Resultat
*****
Poste/Voie/Adr. :000.000.004.236.074.240.001
J/M/A , H/M/S :00/47/ hhhhhhhhhhhhh/7/////
Force Residuelle: 1656,3 daN TG
  
```

Below the test results, there is a section for reception:

```

--> Reception :
Trame de type : C
Taille des donnees reçues : 11803 | Taille des
CRC16 reçu : 29442 | CRC16 calcule : 29442
CRC8 reçu : 82 | CRC8 calcule : 82
Numero De Trame Lu reçu : 1
Nombre De Trames Lu reçu : 1
----- OK
dernier bloc sécurisé !!
  
```

You are now ready to program specifications, Cycles, Profiles and Sequences.

## 5.4 Programming

The following description does not include the advanced features of Rhapsodie.Net. The less commonly used settings are brought together in the "Advanced" tabs.

For more information, refer to the Advanced Functions section.

To access each of the programming pages, you must select the Unit for which you want to create programs.

To do this, click on the corresponding row. The title of the application changes when a unit is selected:

Before:



After:

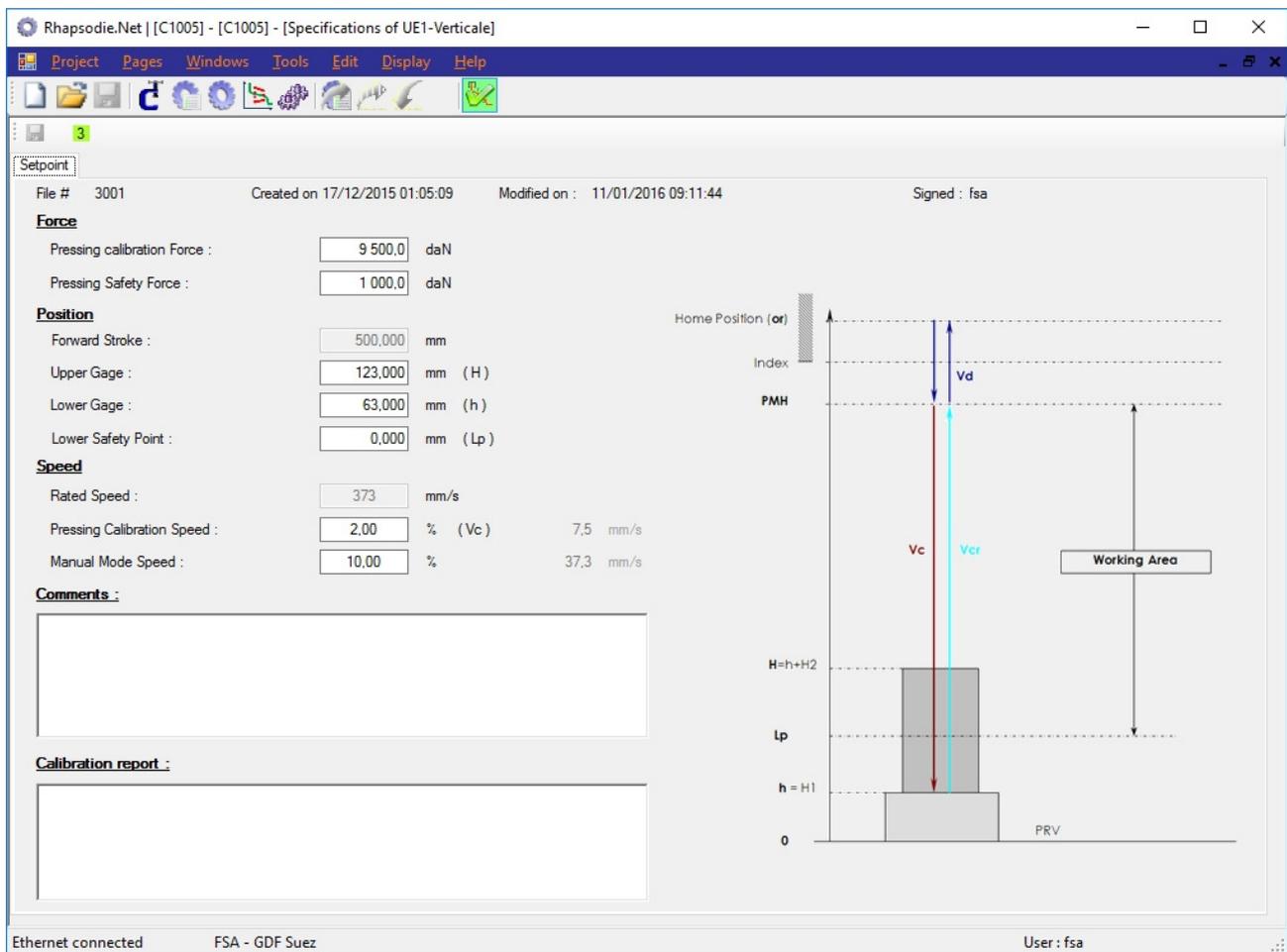


If this is not done, the following message appears if you try to open one of the programming pages:



### 5.4.1 Specifications

When you select the Pages/Specifications menu, or click the  button, the Specifications page appears, for the selected insertion unit:



**Rhapsodie.Net | [C1005] - [C1005] - [Specifications of UE1-Verticale]**

Project Pages Windows Tools Edit Display Help

File # 3001 Created on 17/12/2015 01:05:09 Modified on 11/01/2016 09:11:44 Signed : fsa

**Force**

Pressing calibration Force :	<input type="text" value="9 500,0"/>	daN
Pressing Safety Force :	<input type="text" value="1 000,0"/>	daN

**Position**

Forward Stroke :	<input type="text" value="500,000"/>	mm
Upper Gage :	<input type="text" value="123,000"/>	mm (H)
Lower Gage :	<input type="text" value="63,000"/>	mm (h)
Lower Safety Point :	<input type="text" value="0,000"/>	mm (Lp)

**Speed**

Rated Speed :	<input type="text" value="373"/>	mm/s
Pressing Calibration Speed :	<input type="text" value="2,00"/>	% (Vc) 7,5 mm/s
Manual Mode Speed :	<input type="text" value="10,00"/>	% 37,3 mm/s

**Comments :**

**Calibration report :**

**Diagram:**

The diagram shows a vertical axis with the following points from top to bottom: Home Position (or), Index, PMH, H=h+H2, Lp, h=H1, and 0. A PRV (Pressing Reference Volume) is shown as a shaded area between h=H1 and Lp. A Working Area is indicated by a vertical double-headed arrow between PMH and Lp. Two vertical arrows represent speeds: Vc (red) and Vcr (cyan), both pointing downwards from the Home Position level.

Ethernet connected FSA - GDF Suez User : fsa

#### 5.4.1.1 Description of fields

##### **Force**

**Pressing calibration force** This is the force to be applied during the pressing calibration cycles. No force may be programmed in a cycle which exceeds this force.

By **Default**, the value pre-entered is equal to **95%** of the maximum force of the pin (e.g. we have chosen a UG30kN, i.e. 3000 daN maximum force, so the default value will be 2850 daN).

The **minimum** force which can be programmed is **25%** of the maximum force (750 daN in our example)

The **maximum** programmable force is 100% - Offset default threshold = 5% by default, i.e. **95%**.

→ For more information on the calibration cycle, see the sections on Calibration.

**Safety force:** This is the maximum allowed force during the approach phase of a cycle. If this force is encountered during this phase, the MVAT card stops the shaft and outputs fault no. 8.

This is also the maximum value used for monitoring during movements in manual mode.

By **Default**, the value pre-entered is equal to **10%** of the maximum force of the pin.

The **minimum** force which can be programmed is **1%** of the maximum force.

The **maximum** force which can be programmed is **25 %** of the maximum force.

Note: during a manual descent, the safety force is equal to the Safety force setpoint

If this setpoint is not entered, the safety force is set to 10% of the nominal value for the pin

##### **Position**

**Forward Stroke** : This value is filled automatically by the choice of the Insertion Unit type made in the "Insertion Unit" page when you create the project.

Since the MVAT V10.08 version, this value is sent to the MVAT, which uses it to check that the travel made during the calibration is not over the allowed stroke.

**Upper Gage:** This is the AGGREGATED height of the upper gage and lower gage used during pressing calibration cycles.

By **Default**, the value pre-entered is equal to **60mm**.

**Lower Gage:** This is the height of the lower gage used during pressing calibration cycles.

By **Default**, the value pre-entered is equal to **0mm**.

There is thus a **minimum difference of 60 mm** between the two gauges. This minimum is recommended to ensure accuracy in positioning the shaft.

**Lower Safety Point:** value in mm of the position the pin must not overrun when exiting from the shaft. If this value is reached, the pin will stop and a fault number will be shown in the result block. This position must be between Bottom Dead Centre and Top Dead Centre ([see graph in appendix 1](#)).

PLEASE NOTE: This safety device is not enabled in MANUAL mode.

**Pressing calibration speed:** This is the speed at which the shaft will exit in the pressing calibration cycle looking for a force.

By **Default**, the value pre-entered is equal to **2%**.

The **minimum** speed which can be programmed is **1%** of the maximum speed.

The **maximum** speed which can be programmed is **10 %** of the maximum speed.

Note: if the speed is too low, the MVAT card may output fault no. 51. → Increase this speed

**Manual Mode speed** : This the speed used by the MVAT board during a movement in manual mode.

By **Default**, the value pre-entered is equal to **2%**.

The **maximum** speed that is strongly recommended is **10 %** of the maximum speed.

## 5.4.2 Cycles

When you select the Setpoint/Cycles menu, or click the  button, the Cycles page appears:

The screenshot shows the 'Cycles of UE-Emmanch-Joint' configuration window. Key fields include:
 

- Program #: 1001
- Created on: 25/04/2012 09:07:42
- Modified on: 27/04/2012 16:21
- Signed: EXPERT
- Chaining # if Ok: 2
- Nb of Loop: 0
- Chaining # if NOK: 0
- Holding time: 0.50 s
- Cycle Type: Press-Fitting
- Execution dir.: Pressing
- Forces: Max. Force (55.0 daN), Trip Force (50.0 daN), Min. Force (10.0 daN)
- Positions: Max. trip pos. (42,300 mm), Trip position (42,200 mm), Min. trip pos. (42,100 mm)
- Quality checking on: Peak Force
- Acceleration control: checked
- Store the Curve: checked
- Auto return: unchecked
- I/O validation needed for resume: unchecked
- Cycle resume if Nok: checked
- Acc./decel. dist.: 5,000 mm
- Cycle to be displayed on UExp: unchecked
- Disabling RS232 results: unchecked
- Disabling results on Fieldbus: unchecked
- Link cycle Qty to the Curve chk.: unchecked
- Reserv. (Field 35, bit C2): unchecked

 The speed profile graph on the right shows:
 

- Max. current: 100.0 %
- Approach speed: 100.00 % (333.3 mm/s)
- Working speed: 10.00 % (33.3 mm/s)
- Return speed: 70.00 % (233.3 mm/s)
- Working position: 57,000 mm
- Slowing down pos.: 44,000 mm
- Trip position: 42,200 mm
- Trip speed: 1.00 % (3.3 mm/s)

### 5.4.2.1 Description of fields

**Chaining # if Ok:** At the end of this cycle, if you want MVAT to chain to another "SOFT chaining" cycle, enter the Cycle number here (1 to 384).

The current cycle number is of course not allowed (a cycle cannot loop back on itself!).

Chaining may be contingent on a validation by the PLC (in this case check the "I/O validation needed for resume" box) Warning, if the current cycle does not execute successfully, chaining will ONLY be carried out if "Cycle resume if Nok" is checked.

Warning, this chaining is priority to a "HARD chaining", so be attentive that no HARD chaining is asked by the PLC.

By **Default**, the pre-entered value is **0** which means NO CHAINING.

**BE CAREFUL** : This value is automatically enforced to « 0 » (no chaining) when you check the « Auto Return » checkbox, **EXCEPT** if the chained cycle includes a loop. In this case, enforcement does not occur.

**Chaining # if NOK:** If the current cycle does not execute successfully but nevertheless you still want MVAT to chain to another "SOFT chaining" cycle, enter the Cycle number here (1 to 384).

The current cycle number is of course not allowed (a cycle cannot loop back on itself!).

Chaining may be contingent on a validation by the PLC (in this case check the "I/O validation needed for resume" box) Warning, this chaining is priority to a "HARD chaining", EVEN the cycle is GOOD, so be attentive that no HARD chaining is asked by the PLC.

By **Default**, the pre-entered value is **0** which means NO CHAINING

**Nb of Loop:** If you want to repeat a chain x times (e.g. running in a slide by executing Cycle 1 ⇒ Cycle 2 ⇒ 1 ⇒ 2 ⇒ 1 ... x times), enter x in this field for the 1<sup>st</sup> cycle of the loop.

You can loop more cycles. For example, you want to loop a chain 10 times 1⇒2⇒3⇒4⇒1⇒2... To do this enter 10 in Nb of Loop for Cycle 1 only.

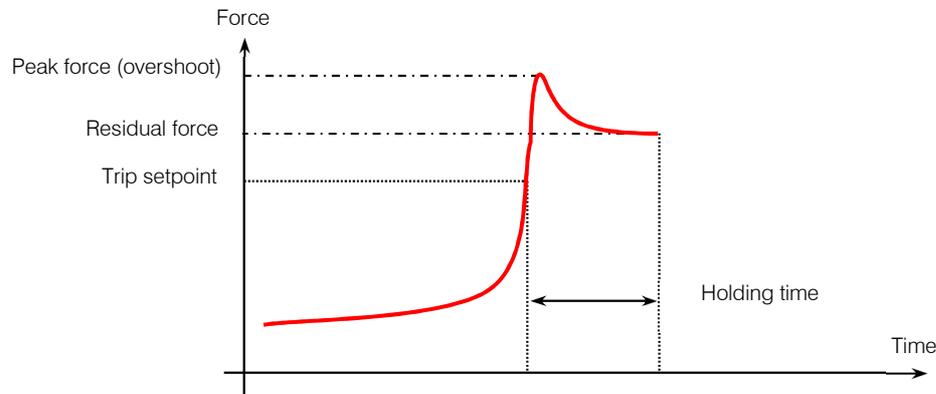
**BE CAREFUL** : The last cycle executed must be with Auto Return programmed, or be followed by a hard chaining.

By **Default**, the pre-entered value is **0** which means: NO LOOPING

The **maximum** number depends on the number of cycles in the loop, as **the MVAT can only chain 100 cycles** in the same sequence.

**Holding time:** At the end of a cycle, at the moment the pin comes to a stop depending on the speed and the mechanical stiffness of the assembly, there may be an "overshoot" of the force due to inertia.

Two forces are then used for checking the final force: the peak force and the residual force.



The holding time therefore allows the mechanics to "relax".

By **Default**, the pre-entered value is **0.00**. 0.5 secs is usually sufficient to relax the mechanics.

The **maximum** programmable value depends on the type of pin, the overall cycle time and the force applied relative to the nominal force of the press. In general, 1.5 secs is the maximum. Beyond this, the spindle applies the force continuously and the motor will overheat. Time must therefore be allowed for it to cool down.

**Cycle Type:** Allows you select the cycle time from: (the graphical design change depending the choice)

- **Press-Fitting:** Standard press-fitting cycle. The programmed positions are absolute.
- **Acquisition:** Same as Press-Fitting BUT the trip position is kept in memory to enable DIFFERENTIAL CHECKS to be carried out on position in the following cycles (whether or not within the same sequence) (see advanced functions)
- **Positioning:** Press-fitting cycle where ALL programmed positions are DISTANCES. Positioning is then relative to the preceding cycle.

Note: A sequence CAN NEVER start with a positioning cycle.

**Execution dir.:** Allows you select the working direction: (the graphical design change depending the choice)

- **Pressing:** The press shaft will exit and views a shaft pressing force as a "positive" force.
- **Pulling:** The press shaft will return and views a shaft pulling force as a "positive" force.

Note: A sequence CAN NEVER start with a pulling cycle.

Note: FABRICOM spindles work both in pressing and pulling mode without force limitation.

## Forces

**Trip force:** This is the Force setpoint which will stop the press if the trip position has not yet been reached.

**NEW :** If the checkbox «  **Force Increment** » is checked, the entered force here corresponds to a complementary force that the press will add to the last force reached (the one of the last cycle).

The **minimum** configurable force is **1%** of the nominal force for the press. Warning, to ensure accuracy in stopping under force and reading the force, this value must be less than **10%** of the nominal force of the press.

The **maximum** configurable force is the Pressing calibration force (see Specifications page).

**WARNING :** In traction mode, this is that value which is used as safety force during approach phase.

**Max. and Min. force:** These are the acceptance tolerances of the force at the end of execution (Peak force OR Residual force depending on the "Quality checking on" selection).

By **Default**, the pre-entered value is **0.0 daN** which means: NO CHECKING

**Quality checking on:** see above. Depending on the selection. in the results block (see section "Journal 232"), either the Peak force, or the Residual force will be monitored with regard to quality information (OK, TB, TL).

## Positions

**Trip position:** This is the Position setpoint which will stop the press if the trip force was not reached beforehand. There is no minimum or maximum value, this depends on the geometric identification learnt by the MVAT during calibration.

PLEASE NOTE: The value **0.000** MEANS "Position NOT programmed"

**Trip position Max. and Min.:** These are the acceptance tolerances for the position at the end of execution.

By **Default**, the pre-entered value is **0.000 mm** which means: NO CHECKING

**Max. current:** This is the maximum current that the MVAT will allow the servo to carry out its requests. If this value is too low relative to the work requested (application of force, acceleration, deceleration), the current limitation may cause undesirable behaviours:

- the shaft remains in support position until the max. cycle time has elapsed
- the shaft accelerates slowly
- the shaft brakes incorrectly in the deceleration phase.

By **Default**, the pre-entered value is **100.0 %**. This value may be reduced depending on the work requested, but be careful of the acceleration and deceleration phases which often necessarily consume more energy due to the cycle time, even for cycles where a very low force is applied.

**Speeds and position:** The cycle page diagram in Rhapsodie represents each of these parameters.

The default values are:

- **Approach speed: 100%** (fast approach: no time to lose! You must, however, take into account accelerations, the velocity of the FSA pins and the weight of the tool carried)
- **Working speed: 30%** (we are press-fitting, some energy is required!)
- **Trip speed: 5%** (if we want to stop cleanly and minimise overshoot, or ensure the trip position is accurate, we need to finish gently!)
- **Return speed** (ditto Approach speed)

Note: As most of the FSA pins are fast (from 330 mm/sec to 700 mm/sec), the speed entered as a percentage is translated into mm/sec for illustrative purposes.

The **Approach position** represents the position at which the Approach speed changes to the Working speed.

The **Slowing down position** represents the position at which the Working speed changes to the trip speed.

**Acceleration control and Acc./decel. dist.:** To save on mechanics, and taking account of the speed and sensitivity of FSA pins, it is recommended to introduce acceleration and deceleration ramps by enabling this function.

By **Default**, the pre-entered value is **5.000 mm**. This means that the MVAT will carry out the change of speed over 5 mm of movement.

Activity of this ramp:

<i>Change from:</i>	<i>to:</i>	<i>Ramp enabled?</i>
<b>Start speed*</b>	Approach speed	YES
Approach speed	Working speed	YES
Working speed	Trip speed	YES
Trip speed	Stop	NO
Stop	Return speed	YES
Return speed	Start speed*	YES

\*(see Advanced Functions - Specifications Page)

### Check boxes :

For MVAT version < V10.05

<input checked="" type="checkbox"/> Acceleration control	Acc./decel. dist. : <input type="text" value="5,000"/> mm
<input checked="" type="checkbox"/> Store the Curve	<input type="checkbox"/> Cycle to be displayed on UExp
<input type="checkbox"/> Sending Curve when waiting for I/O valid.	<input type="checkbox"/> Disabling RS232 results
<input type="checkbox"/> Auto return	<input type="checkbox"/> Disabling results on Fieldbus
<input type="checkbox"/> I/O validation needed for resume	<input type="checkbox"/> Link cycle Qty to the Curve chk. one
<input checked="" type="checkbox"/> Cycle resume if Nok	<input type="checkbox"/> Reserv. (Field 35, bit C2)

since MVAT version V10.08

<input checked="" type="checkbox"/> Acceleration control	Acc./decel. dist. : <input type="text" value="5,000"/> mm
<input checked="" type="checkbox"/> Store the Curve	<input type="checkbox"/> Cycle to be displayed on UExp
<input type="checkbox"/> Sending Curve when waiting for I/O valid.	<input type="checkbox"/> Disabling RS232 results
<input type="checkbox"/> Auto return	<input type="checkbox"/> Disabling results on Fieldbus
<input type="checkbox"/> I/O validation needed for resume	<input type="checkbox"/> Link cycle Qty to the Curve chk. one
<input checked="" type="checkbox"/> Cycle resume if Nok	<input type="checkbox"/> Reserv. (Field 35, bit C2)

**Store the Curve:** If during the movement described by the current cycle, you wish to store the force as a function of displacement, just check this box AND allocate a curve program (PROFILE) to the sequence which manages the execution of this cycle.

**Sending curve when waiting for I/O valid.:** if this box is checked, and if the box  **I/O validation needed for resume** is also checked, when the MVAT will have executed this cycle, and will await for synchronisation from the PLC, it will proceed during this waiting time to the curve sending to the PC. (then, the curve is sent in concurrent operation time)

**Auto Return:** if this cycle is the last in the sequence you can either:

- check this box and MVAT manages the return to the origin
- request SOFT chaining on special cycle 513
- use HARD chaining by the PLC which will request the same special cycle 513.

**ATTENTION :** When this box is checked, the field "Chaining # if OK" is forced to "0", EXCEPT if the chained cycle includes a loopback. Conversely, if you enter a value in the "Chaining # if OK" field, then this box is automatically unchecked.

**I/O validation needed for resume:** if this box is checked, the MVAT awaits synchronisation from the PLC to chain to the following cycle. Otherwise, chaining will be carried out directly.

**Cycle resume if Nok:** if this box is checked, the MVAT will continue with the chains even if the cycle just executed was not OK. The quality of this cycle is thus forced to OK in order to continue. However, in the result block, the actual quality will be displayed.

**Cycle to displayed on UExp :** if this box is checked, the MVAT will add to the result block a specific line "Displayed on UExp", used by the UExp press panel to display or not cycle automatically.

**Disabling RS232 results :** if this box is checked, the MVAT stops to display result blocks on RS232, to earn time.

**Disabling Results on Fieldbus :** if this box is checked, the MVAT stops to prepare results for Fieldbus interface, to earn time.

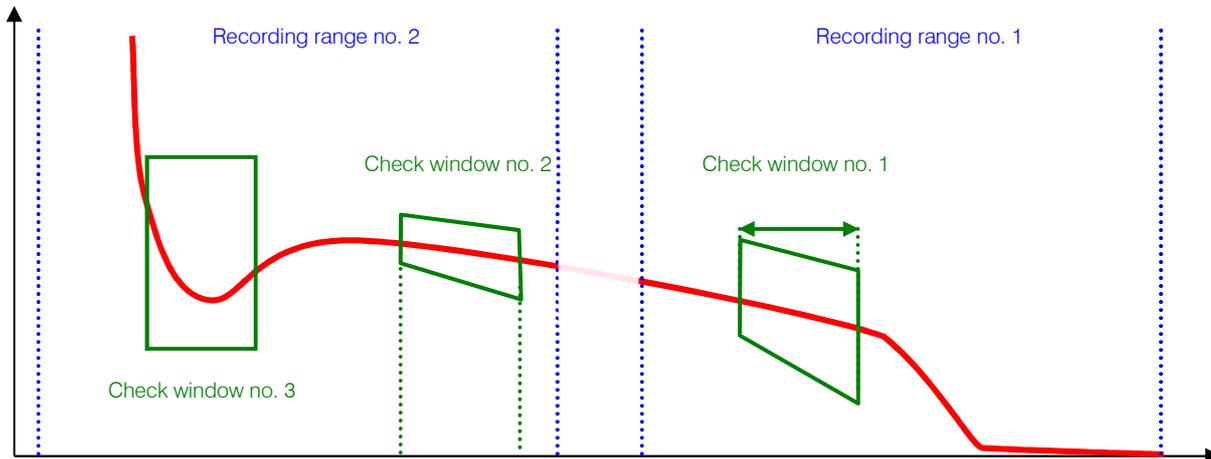
**Link Cycle Quality to Curve checking one :** if this box is checked, Cycle quality becomes dependant of the curve quality. If a BAD curve checking is finishing during this cycle, the quality of this cycle becomes BAD, even the cycle was OK.

**Reserv. :** Reservation. FSA after sales only

### 5.4.3 Profiles

When you select the Setpoint/Profiles menu, or click the  button, the Profiles page appears:

This menu allows you to carry out an advanced curve check. To configure this check, 5 force recording ranges are available. Once the recording ranges have been defined, up to 5 check windows in total may be configured split across the recording ranges.



#### Positioning modes of recording ranges:

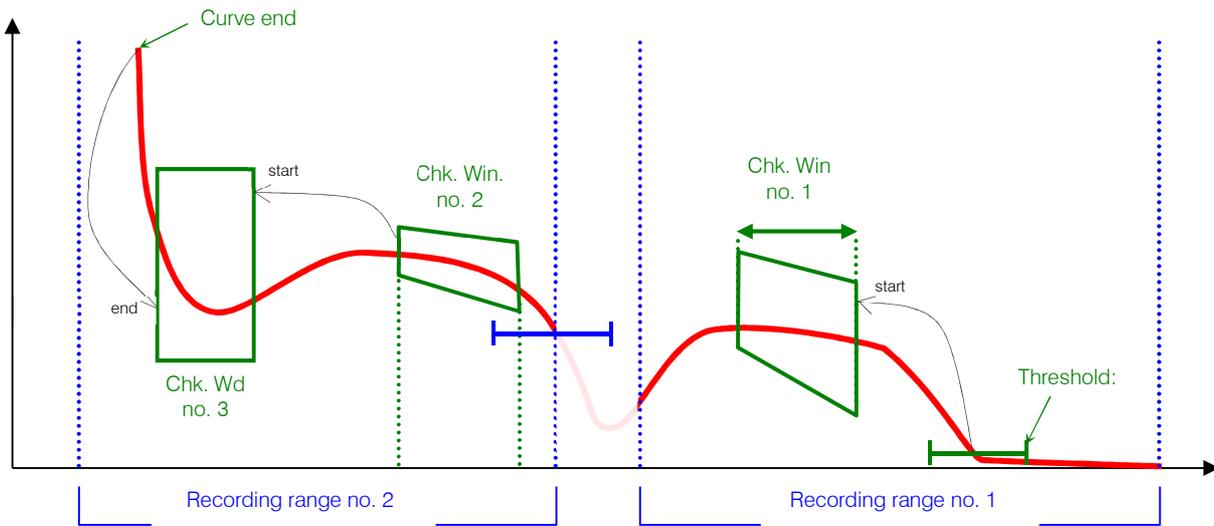
- Absolute Start, Absolute End
- Start on force threshold and End at a fixed width from the start
- Start on External signal and End at a fixed width from the start

#### Positioning modes of check windows:

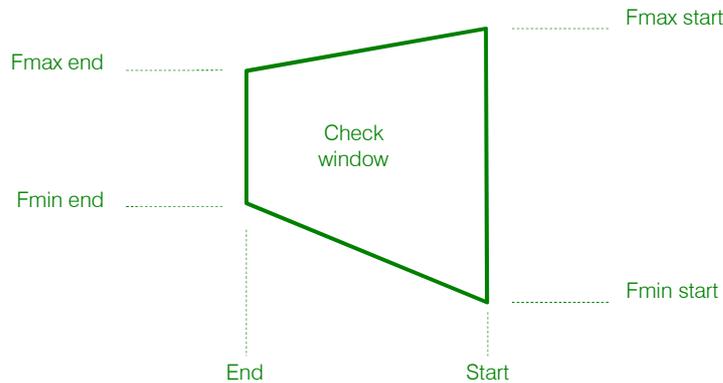
- Start of Window:
  - Absolute
  - Fixed width relative to the end
  - On force threshold exceeded in increasing direction
  - On force threshold exceeded in increasing direction
  - Relative to the end of the preceding window
- End of Window:
  - Absolute
  - Fixed width relative to the start
  - On force threshold exceeded in increasing direction
  - On force threshold exceeded in increasing direction
  - Relative to the start of the next window
  - Relative to the last point recorded in the window

Example:

- Recording range 1: Absolute Start, Absolute End
- Check window no. 1:
  - Start of force threshold
  - End defined by Fixed width
- Recording range 2: Start of force threshold - Fixed width
- Check window no. 2:
  - Absolute Start and End
- Check window no. 3:
  - Start relative to the end of window no.2
  - End relative to the end of the curve



4 force values can be configured for each check window giving a trapezoidal shape:



**Control modes:**

A control mode is selected for each check window:

*Inclusion mode:*

In this mode, all the points on the curve must be inside the window.  
The "Strict Inclusion" option invalidates the point on the end of the window.

*Increasing mode*

In this mode, in addition to an inclusion, a check is made that the start point of the window is less than that of the end.

*Decreasing mode*

In this mode, in addition to an inclusion, a check is made that the start point of the window is greater than that of the end.

*Peak mode*

In this mode, in addition to an inclusion, a check is made that the maximum of the curve corresponds to a peak (increasing before the peak, then decreasing afterwards).

*Trough mode*

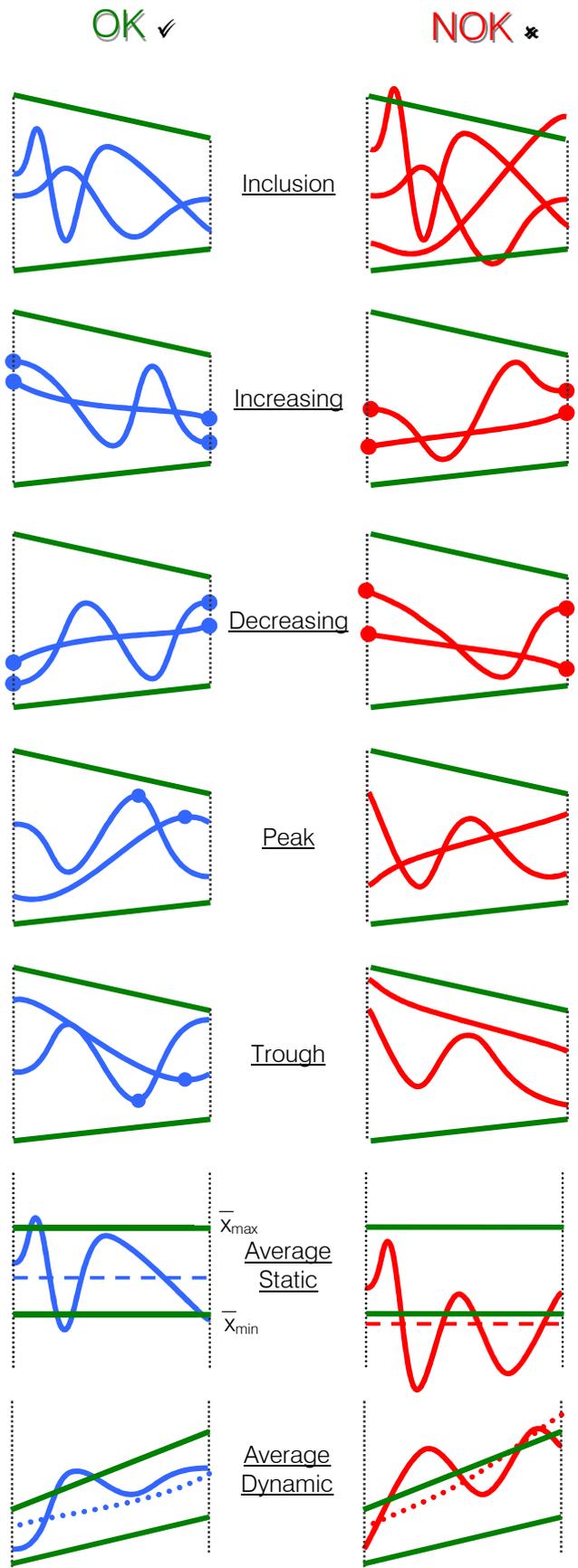
In this mode, in addition to an inclusion, a check is made that the minimum of the curve corresponds to a trough (decreasing before the trough, then increasing afterwards).

*Mean mode (static)*

In this mode, a check is just made that the mean of the curve between the start and the end of the window is between a max and a min.

*Dynamic mode*

In this mode, the dynamic mean is calculated and a check is made that the new curve is included in the check window.



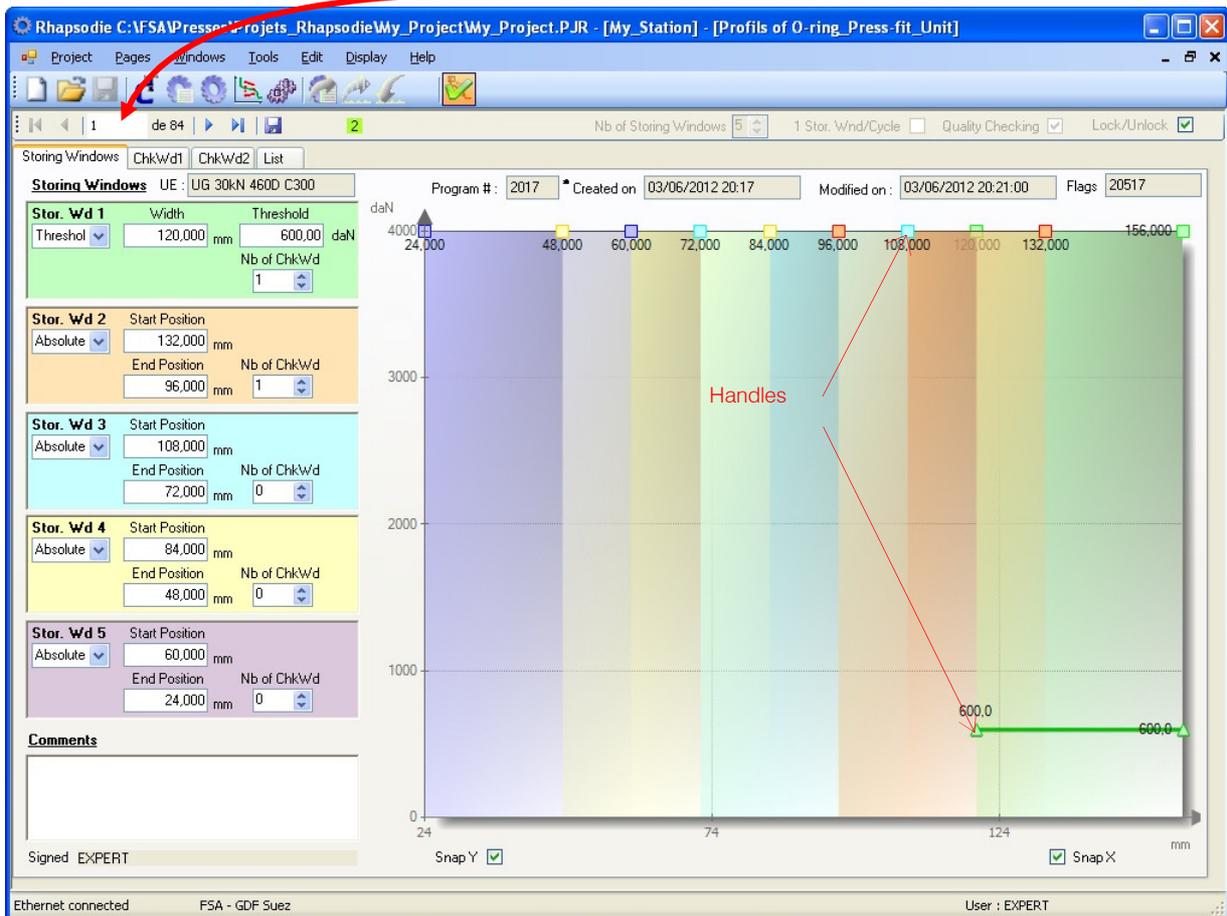
### 5.4.3.1 Configuring Storing Windows

**BE CAREFUL** : Profil program are numbered **from 17 to 100** (or 2017 to 2100, cause the adding of 2000 at the Profil program number allow to identify those are programmed, then sent to the MVAT)

However, until the Rhapsodie.Net version V2.2.0.03, the navigation bar was displaying "1" to "84", and only the "List" tab enabled to see the matching with the Profil program number.

From now on, this navigation bar displays from 17 to 100. You can enter directly the number of the profil program you want to access to, or use the navigation arrows ( )

The screens on this page also allow the user to carry out configuration by entering data as well as moving points using the mouse.



To the left, the boxes allow the user to enter the start and end positions of the recording ranges.

To remove or add a recording range, you must uncheck the "Lock/Unlock" box to increase or decrease the number of ranges.



The drop-down menu present in each "Stor. Wd X" area allows you to select the start mode for storing the force:



If **"Absolute"** if chosen, the Start and End positions must be entered.

If **"Threshold"** is chosen, a new "Threshold" box is displayed to enter the threshold force from which storage is to start. The Threshold force then appears on the graph.

If **"Trigger"** is selected, force storage will be tripped by an ON/OFF input to the MVAT card.

For both the last 2 modes, "Start position" and "End position" are replaced by "Width".

Repeatedly clicking a "Stor. Wd X" area alternately shows/hides the corresponding range on the graph.

The **"Quality Checking"** box ensures that the quality of the curve check is taken into account. If this box is not checked, the quality of the curve check will always be OK.

The graph is automatically updated when values are entered in the boxes. Similarly, if you move the "handles" available on each of the recording ranges, the corresponding value in the entry box is updated:

The 2 boxes **"Snap Y"** and **"Snap X"** provide a coarser displacement increment on the handles.

The "1 Stor. Wnd/Cycle" box causes a new storage range to be used at each new cycle executed (and where curve storage is required).

For each recording range, the "Nb of ChkWd" field defines the number of check windows which will belong to this recording range.

In total, a maximum of 5 check windows may be distributed across the Recording ranges.

To the side of the **"Storing windows"** tab, there are as many **"ChkWd"** tabs as requested check windows.

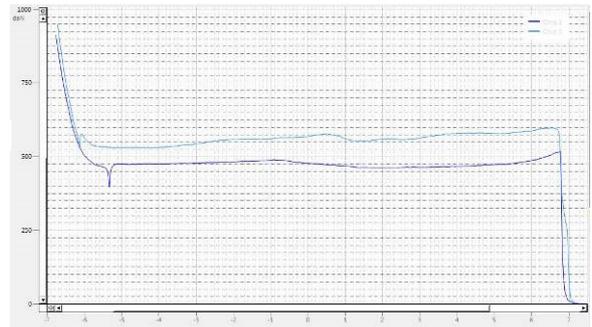
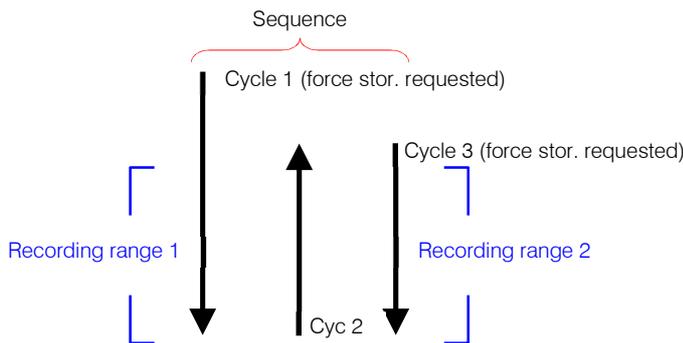
To configure the check windows, just click on the corresponding tab.

**Configuration essentials:** (to avoid execution errors)

- For a **pressing** cycle, the start position must be GREATER than the end position
- For a **pulling** cycle, the start position must be LESS than the end position

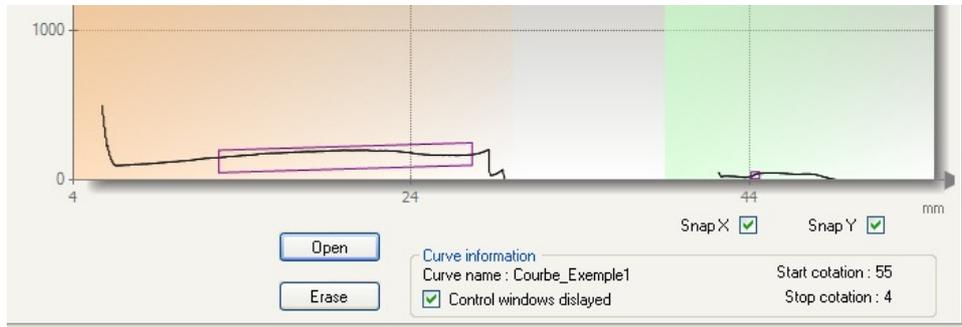
If 2 pressing cycles travel successively over the same area, it is possible to program 2 identical recording ranges:

e.g. Sequence of 3 cycles during which 2 identical split pins are fitted into a product at 2 different locations.



### 5.4.3.2 Using an envelope Curve to place Storing Windows and Checking windows

Since the version 1.5.0.00 of Rhapsodie, you can open a curve into profiles programming to help you to place the recording ranges and the checking Windows :



The start and the end of storing of the curve are displayed to help you to adjust the beginning and the end of the recording ranges.

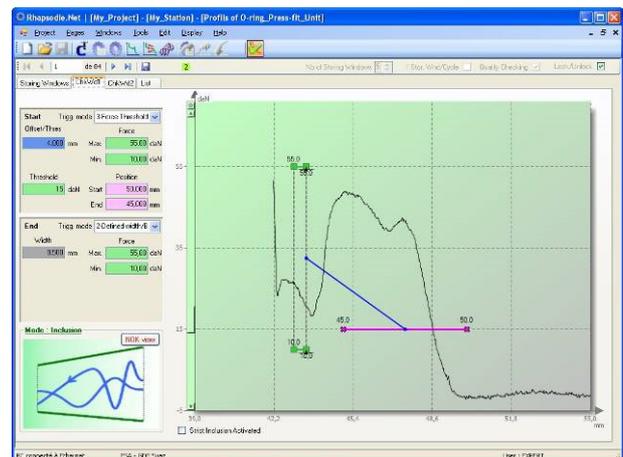
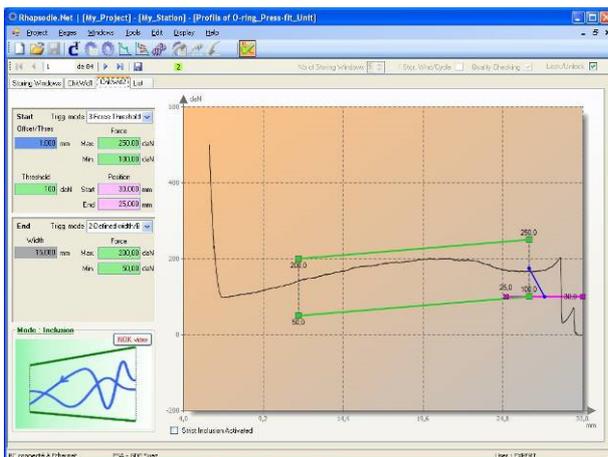
You can either open a standard curve, or an envelope curve generated by VisuCourbes.Net.

On the position axis, an auto-scale is done including the curve and your recording ranges.

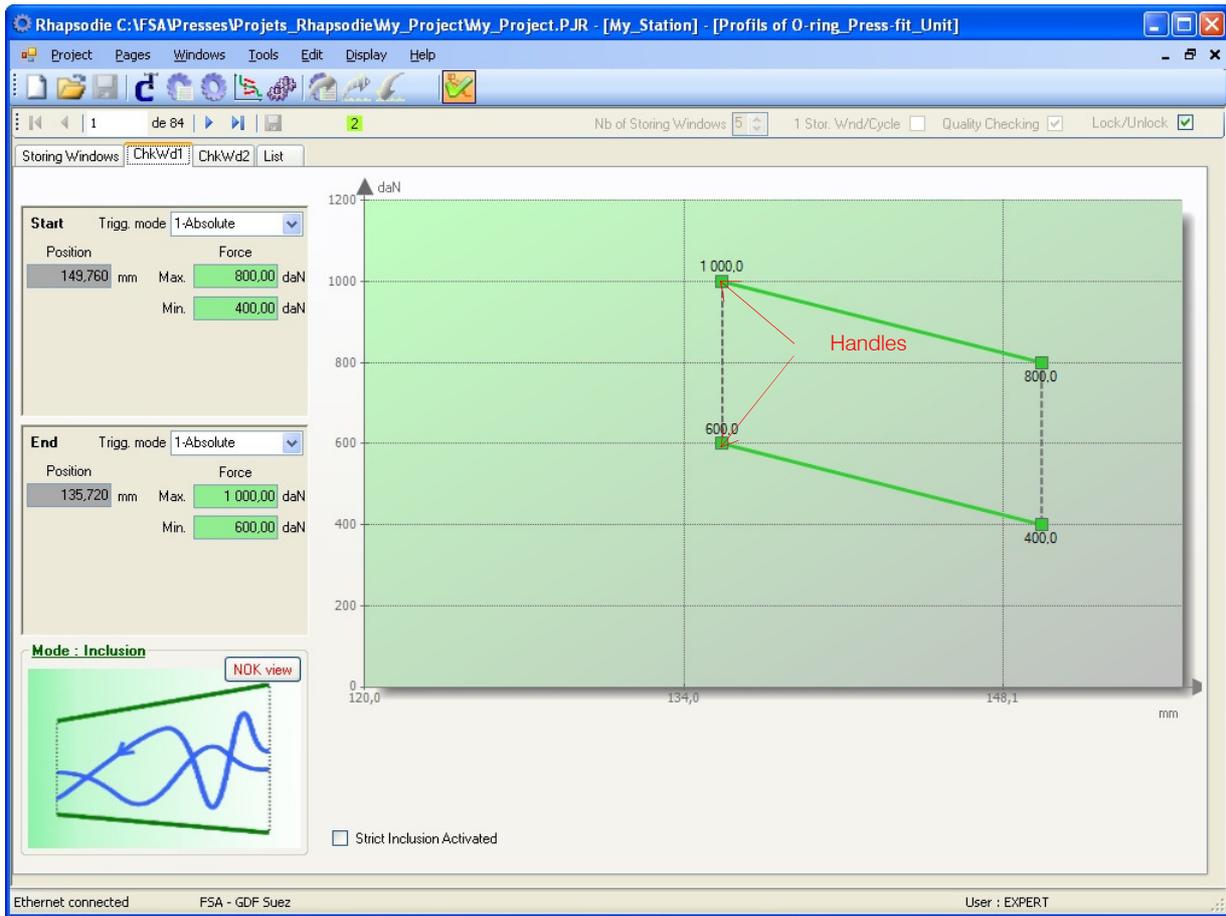
On the Force axis, the scaling is done on the nominal Force of the sensor of the press

Since the version 1.5.0.00 of Rhapsodie.Net, if you have opened a curve into the “Storing Windows” sheet, you will see in each Check Window the part of this curve :

In our example in 4.4.3.2, there is 2 Check Windows :



### 5.4.3.3 Configuring Checking Windows (ChkWd)



There are 4 areas in this screen:

- the **"Start"** area used to configure the start of the window with regard to both position and force
- the **"End"** area used to configure the end of the window with regard to both position and force
- the **"Mode"** area which defines the type of check to be carried out in this window.
- the graph area which gives a dynamic representation of the configuration and has the same background colour as the recording range to which it applies. The maximum and minimum positions of the graph relate to the start and end positions of the recording range.

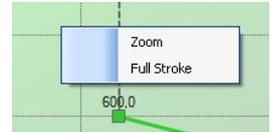
## Graph manipulation

The graph and the entry fields are fully interactive through the handles available on the graph (4 angles in the window and the bounds of the 2 force thresholds).

Modifications made to the entry fields are reproduced directly in the graph, and manipulating the graph updates the entry fields.

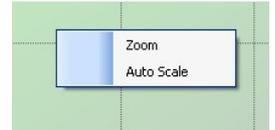
If you right-click inside the graph, a pop-up menu appears:

You can zoom in on the graph, or display it in full scale (the Y scale is not affected, but the X range takes in the full stroke of the pin).



On the next right-click, the pop-up menu becomes:

**"Auto Scale"** returns to the initial window (the Y axis starts from 0 daN and goes up to the nominal force for the pin, on the X-axis, the area related to the recording range is displayed)



In Zoom mode, scroll bars appear at the sides which allow you to move around the graph, and the symbols  allow you to zoom out (the various Zooms are saved)

**Trip modes** for the start and end of the window:

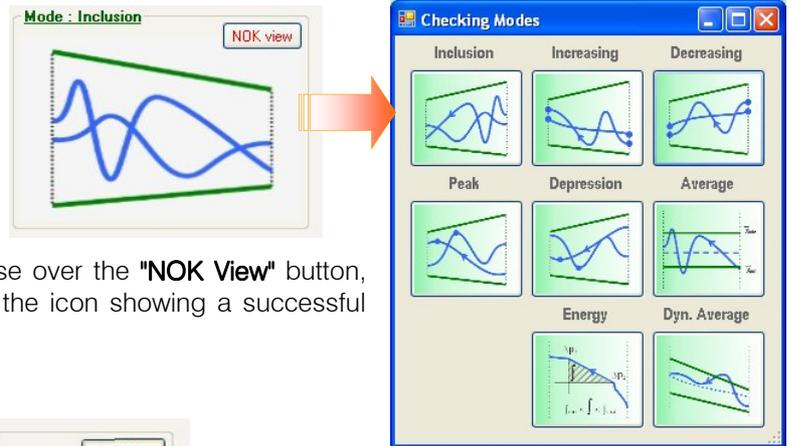
This allows the start and end of the window to be positioned.

Start		End	
Mode	Values to enter	Mode	Values to enter
Absolute	Start position	Absolute	Enter the end position
Fixed width/end	Window width	Fixed width/start	Window width
Force threshold +	Offset, start position and end threshold, Tripping force	Force threshold +	Offset, start position and end threshold, Tripping force
Force threshold -	Offset, start position and end threshold, Tripping force	Force threshold -	Offset, start position and end threshold, Tripping force
End of prev. window	Offset		
Linear regression	Offset, start position and end of observation	Curve end	Offset

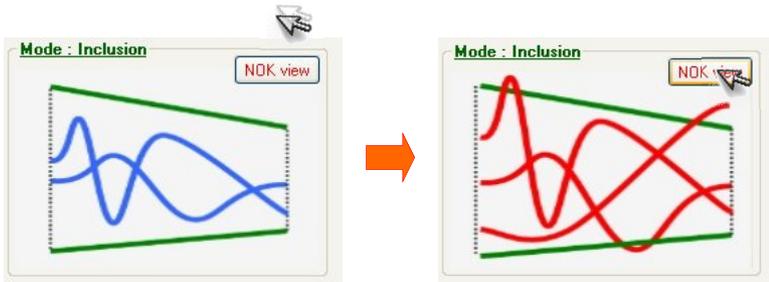
Some examples of the various programs are shown on the next page.

### Selection of the **Checking mode**

If you click on the **"Mode"** button, the following screen is displayed and enables you to select the type of check to be carried out in the window by a single click on the desired button.



Then, with the model selected, passing the mouse over the **"NOK View"** button, shows an example of a failed check in place of the icon showing a successful check.



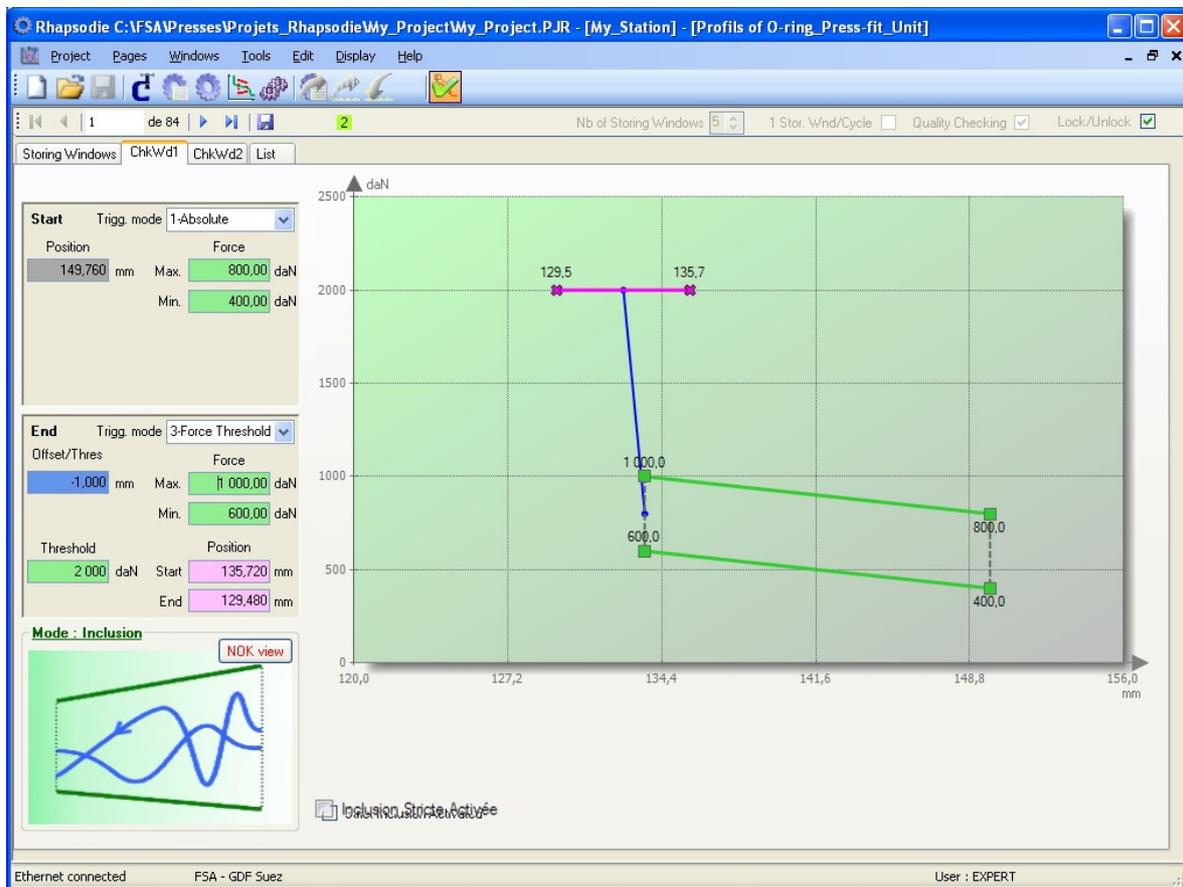
The **"Strict Inclusion Activated"** checkbox adds the Strict Inclusion criterion to the Inclusion check. In this mode, the curve may not exit from the window by the "End of window" edge, or check will be declared as Not OK.



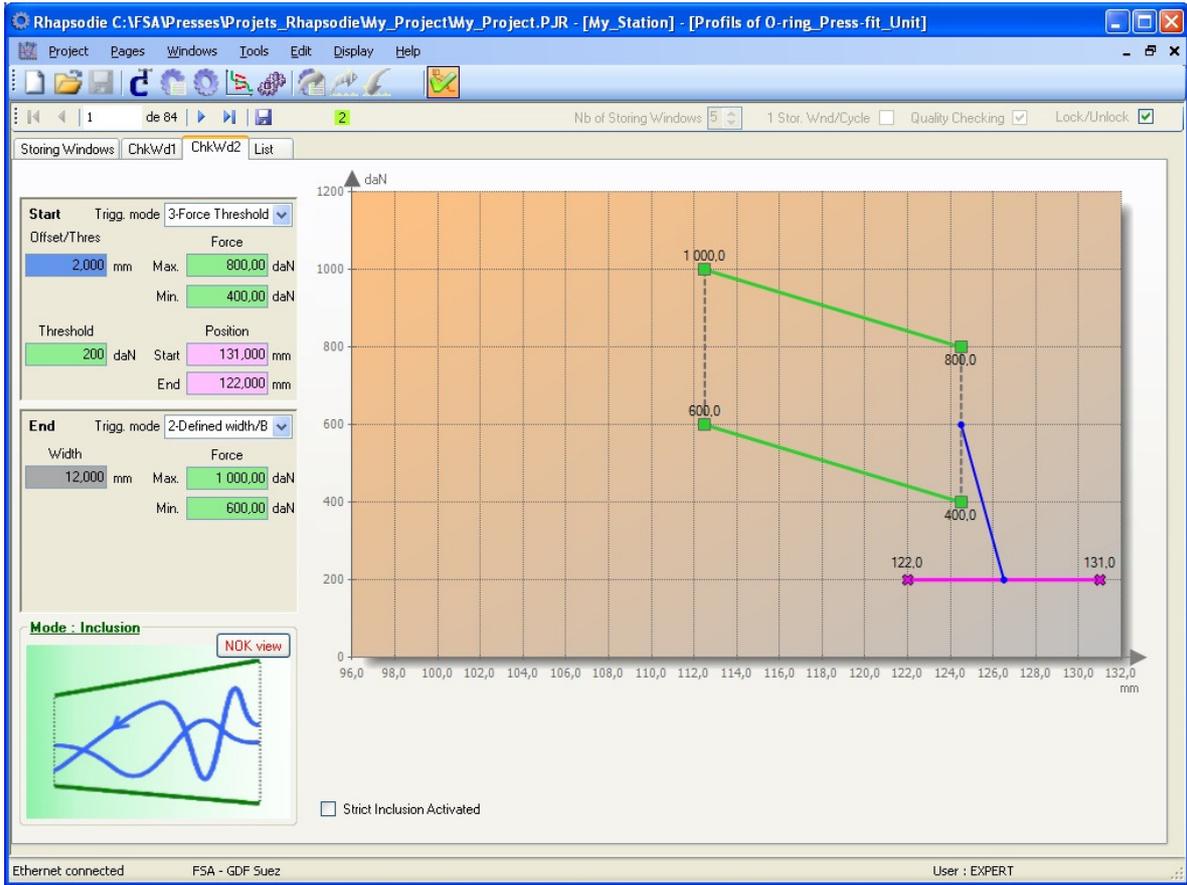
the

This mode makes it possible for example to check that a curve terminates within the window.

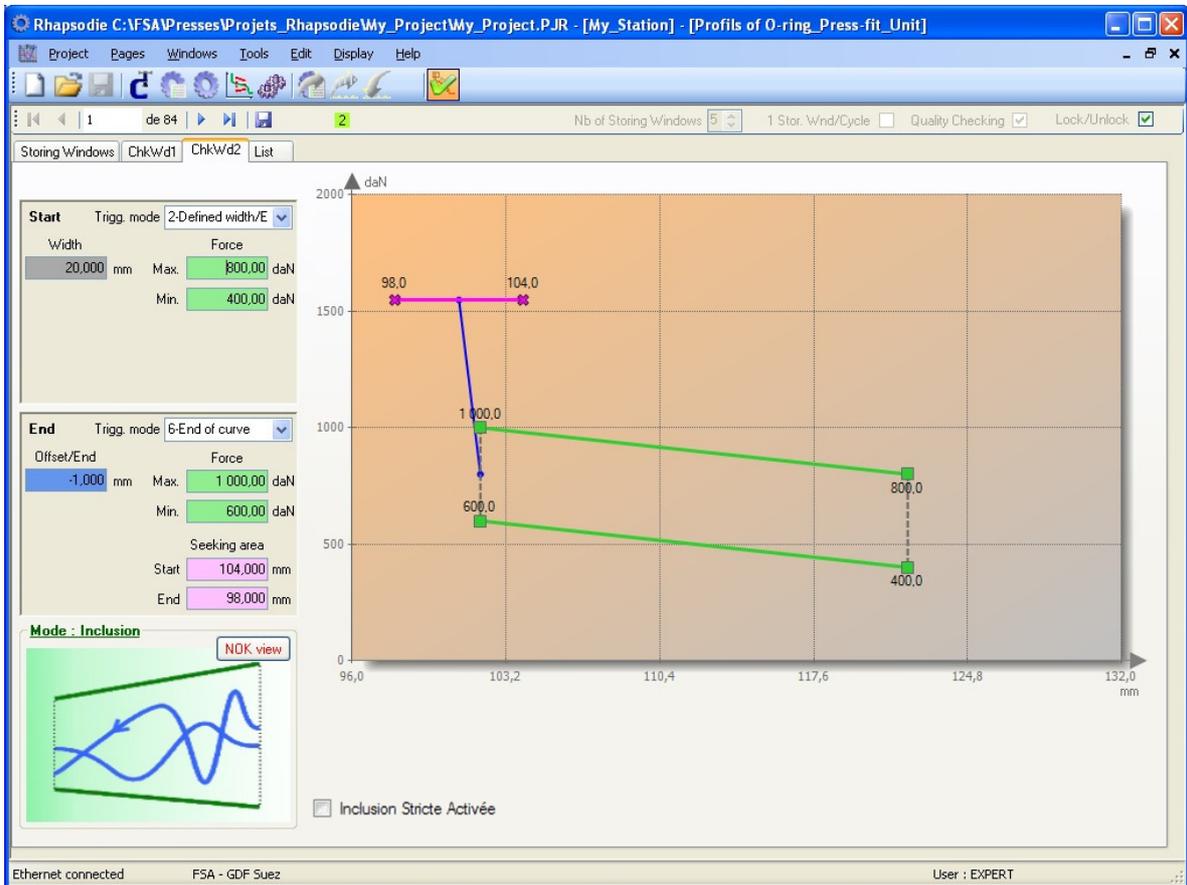
Programming examples: Absolute start and End on Force Threshold



Example no. 2: Start on force threshold and End at a fixed width from the start



Example no. 3: Start fixed width from the end and End placed relative to the end of the curve.



**Configuration essentials:** (to avoid execution errors)

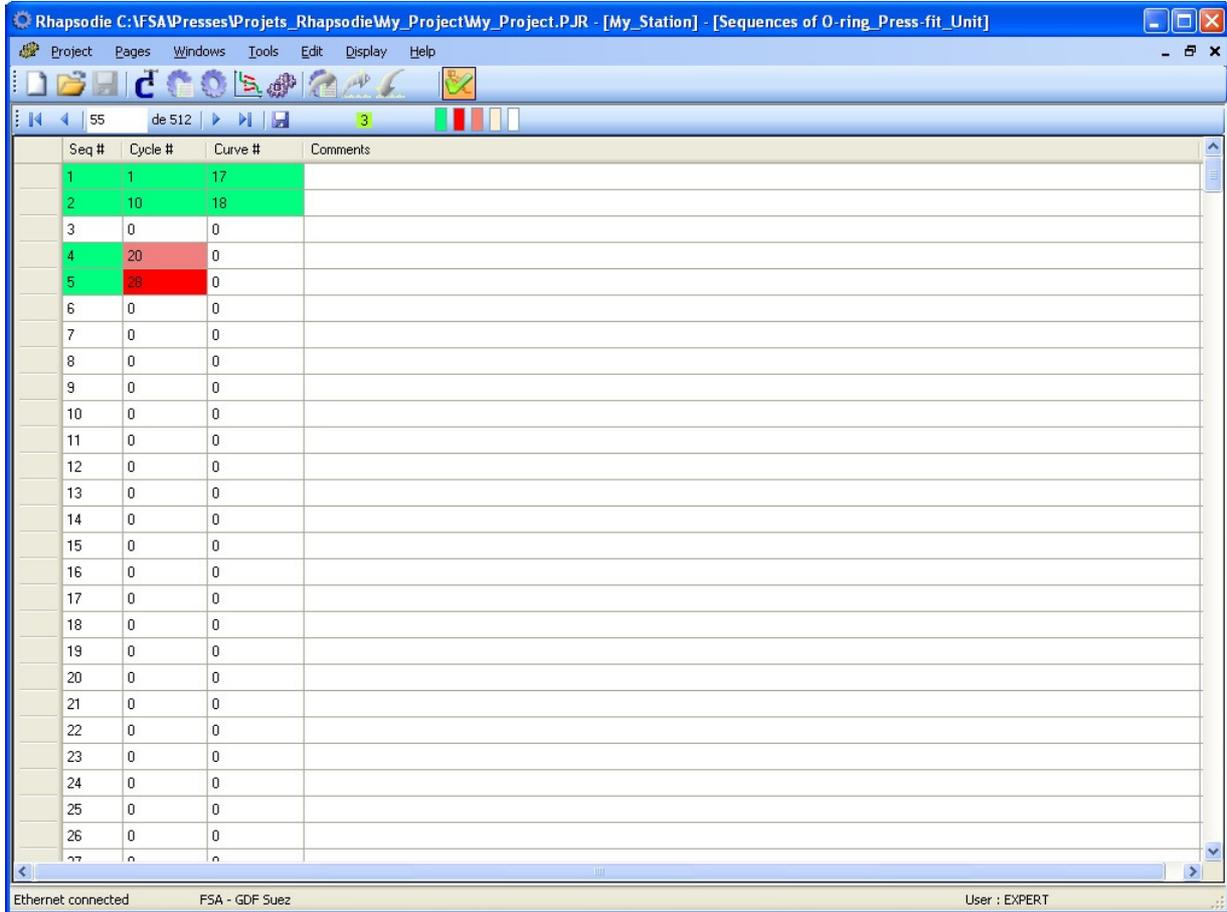
- For a **pressing** cycle, the start positions (start of window and threshold starts) must be GREATER than the end position (window end and threshold ends)
- For a **pulling** cycle, the start positions (start of window and threshold starts) must be LESS than the end positions (window end and threshold ends)
- The offset is signed: +5 mm means: the window starts 5 mm AFTER the trip, -5 mm means: the window starts 5 mm BEFORE the trip
- The width MUST BE POSITIVE (Fixed Width mode)
- Depending on the trip mode, the values of the active "Start" and "End" positions must be within the recording range (the graphical representation allows this to be checked simply).
- All Force values must be less than the press calibration force
- It is prohibited to select a "Fixed width/End" start trip mode and a "Fixed width/start" end trip mode

The List tab shows all advanced curve programs in the same way as in the other pages.

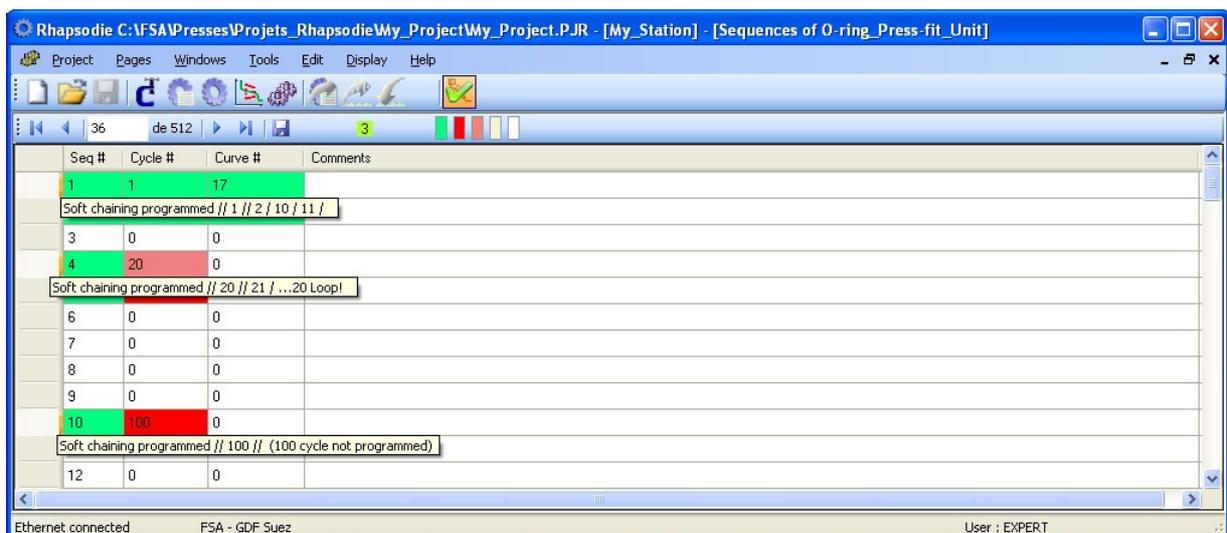
### 5.4.4 Page: "Sequences"

When you select the Setpoint/Profiles menu, or click the  button, the Profiles page appears:

This menu allows you to allocate the number of the 1<sup>st</sup> cycle executed to a sequence as well as the storage program number (PROFILE).



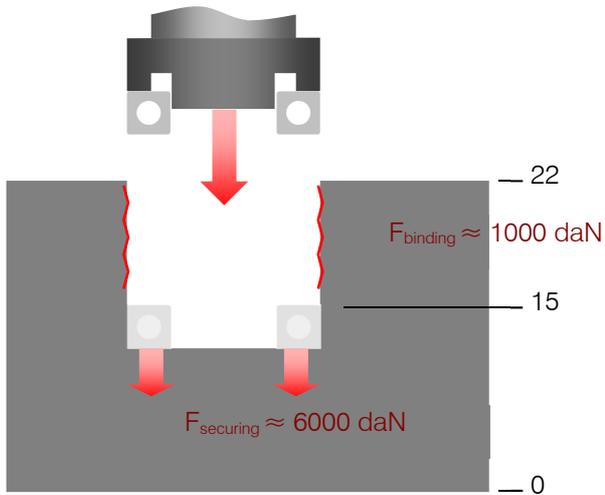
It is possible to view the cycle chain (soft only) by pointing to the row header of a sequence:



For the meaning of the colour code, see the section entitled "Use of List pages\Consistency"

## 5.5 Examples of conventional programs

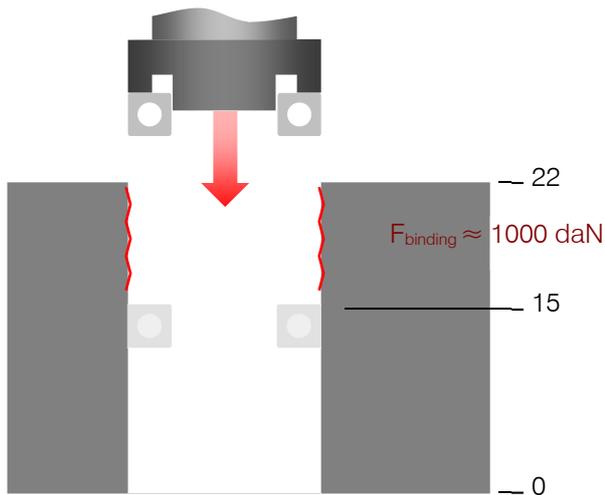
### 5.5.1 Press-fitting



Forces		Positions	
Max. Force :	<input type="text" value="6 100,0"/> daN	Max. trip pos. :	<input type="text" value="15,050"/> mm
<b>Trip Force :</b>	<input type="text" value="6 000,0"/> daN	<b>Trip position :</b>	<input type="text" value="14,000"/> mm
Min. Force :	<input type="text" value="5 900,0"/> daN	Min. trip pos. :	<input type="text" value="14,950"/> mm
Quality checking on	<input type="text" value="Peak Force"/>		

Programming of the related cycle

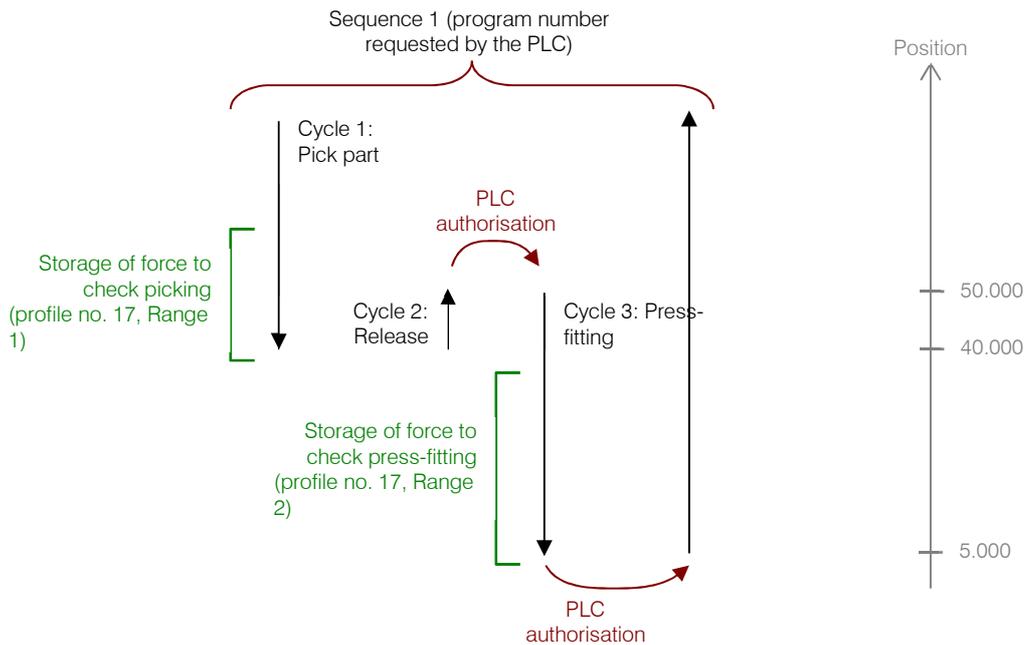
### 5.5.2 Interference fitting



Forces		Positions	
Max. Force :	<input type="text" value="1 500,0"/> daN	Max. trip pos. :	<input type="text" value="15,050"/> mm
<b>Trip Force :</b>	<input type="text" value="2 000,0"/> daN	<b>Trip position :</b>	<input type="text" value="15,000"/> mm
Min. Force :	<input type="text" value="600,0"/> daN	Min. trip pos. :	<input type="text" value="14,950"/> mm
Quality checking on	<input type="text" value="Peak Force"/>		

Programming of the related cycle

### 5.5.3 Sequence of 3 cycles with return by PLC and Curve check on Cycles 1 and 3



In this example, the press descends to position 40, picks a part of height 15 mm then goes back up with the part 10 mm, relative movement. The feeding cylinder can then return and the PLC gives the order to the press to continue the sequence. The press then descends to press-fit the part under force (the position reached is about 5 mm). We shall present all the Cycle, Profile and Sequence pages needed to carry out this process as well as the curve obtained (the comments give more information on certain choices)

#### Cycle 1 programming

Program # : 1 001 Created on : 03/06/2012 22:23:54 Modified on : 03/06/2012 22:23 Signed : EXPERT

Chaining # if Ok : 2 Nb of Loop : 0

Chaining # if NOK : 0

Holding time : 0,50 s

Cycle Type : Press-Fitting Execution dir. : Pressing

**Forces**

Max. Force : 55,0 daN

Trip Force : 50,0 daN

Min. Force : 10,0 daN

Quality checking on : Peak Force

**Positions**

Max. trip pos. : 42,300 mm

Trip position : 42,200 mm

Min. trip pos. : 42,100 mm

Acceleration control : Acc./decel. dist. : 5,000 mm

Store the Curve :

Auto return :

I/O validation needed for resume :

Cycle resume if NOK :

**Comments :**

Picking part Cycle. The feeding cylinder is out. The press will go out to pick-up the part with a position tripping.

The maximum force applied will avoid damaging the cylinder.

To check that the part picked is in the right position, we will use a curve checking, then we have to "Store the Curve" in this cycle.

Max. current : 100,0 %

Approach speed : 100,00 % 466,7 mm/s

Working speed : 10,00 % 46,7 mm/s

Return speed : 70,00 % 326,7 mm/s

Working position : 57,000 mm

Slowing down pos. : 44,000 mm

Trip position : 42,200 mm

Trip speed : 1,00 % 4,7 mm/s

PC connecté à Ethernet FSA - GDF Suez User : EXPERT

### Cycle 2 programming

Program # : 1 002      Created on : 03/06/2012 22:23:54      Modified on : 03/06/2012 22:23      Signed : EXPERT

Chaining # if Ok : 3      Nb of Loop : 0

Chaining # if NOK : 0

Holding time : 0.50 s

Cycle Type : Positioning      Execution dir. : Pulling

**Forces**       Force Increment      **Positions**

Max. Force : 0.0 daN      Max. trip pos. : 0.000 mm

**Trip Force** : 10.0 daN      **Trip Distance** : -10.000 mm

Min. Force : 0.0 daN      Min. trip pos. : 0.000 mm

Quality checking on : Peak Force

Acceleration control      Acc./decel. dist. : 5.000 mm

Store the Curve

Auto return

I/O validation needed for resume

Cycle resume if Nok

**Comments :**

Here, we go back for 10mm in relative mode to let the cylinder go back.  
A relative movement has to be signed. We go back => -10mm. The same for the Working and Slowing down distance : -5mm and -8mm.

At the end of this cycle, as we have to wait for the PLC to inform that the cylinder is back, we checked the "I/O validation needed for resume".

PC connecté à Ethernet      FSA - GDF Suez      User : EXPERT

### Cycle 3 programming

Program # : 1 003      Created on : 03/06/2012 22:23:54      Modified on : 03/06/2012 22:44      Signed : EXPERT

Chaining # if Ok : 513      Nb of Loop : 0

Chaining # if NOK : 0

Holding time : 0.50 s

Cycle Type : Press-Fitting      Execution dir. : Pressing

**Forces**       Force Increment      **Positions**

Max. Force : 550.0 daN      Max. trip pos. : 5.700 mm

**Trip Force** : 500.0 daN      **Trip position** : 4.000 mm

Min. Force : 450.0 daN      Min. trip pos. : 4.300 mm

Quality checking on : Peak Force

Acceleration control      Acc./decel. dist. : 5.000 mm

Store the Curve

Auto return

I/O validation needed for resume

Cycle resume if Nok

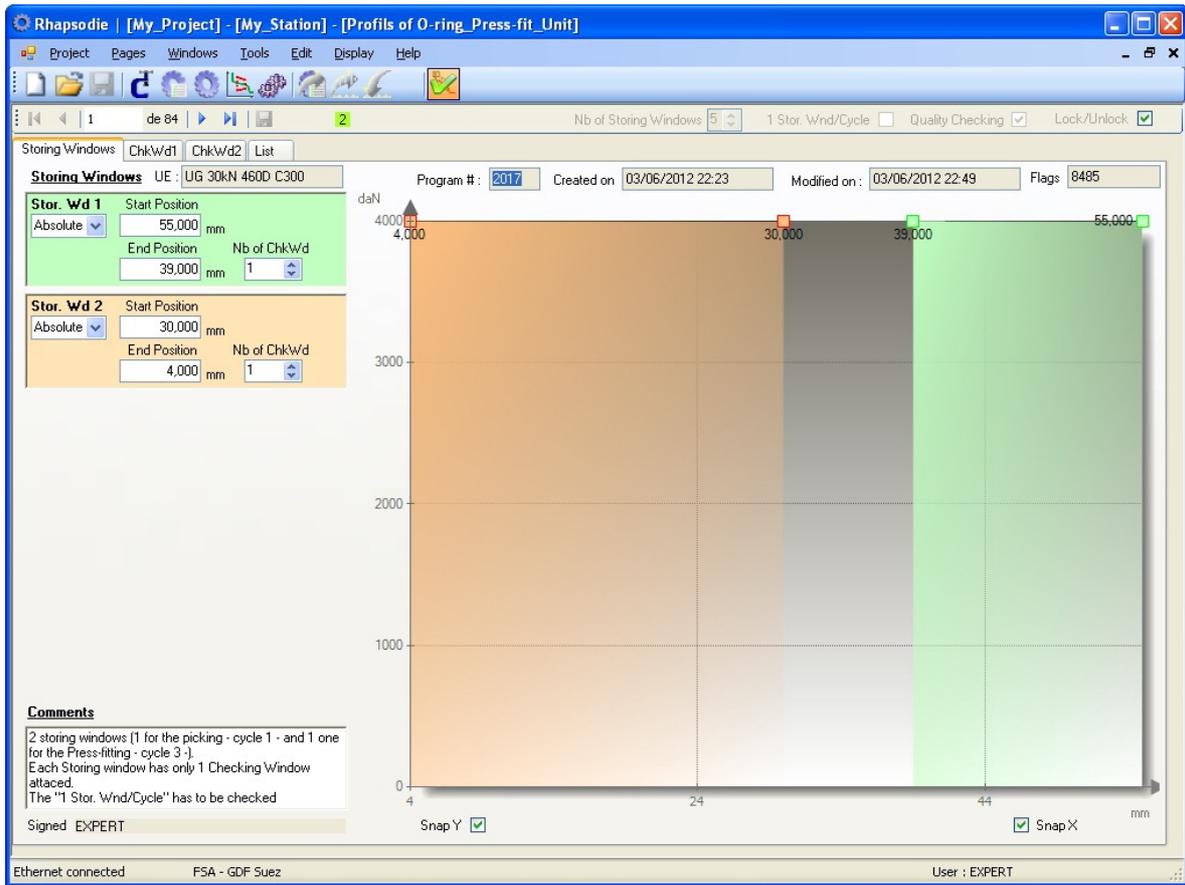
**Comments :**

Press-fit Cycle with tripping by the force.  
We applied 500daN and we try to reach the 4mm position which impossible to reach. Moreover, we check that the final position is into 5+/-0.3mm.  
If this cycle is OK, the PLC allow the press to go back with the 513 soft chaining.  
It should possible to the same, by using "Chaining # if OK : 0" and check the "Auto return" check.

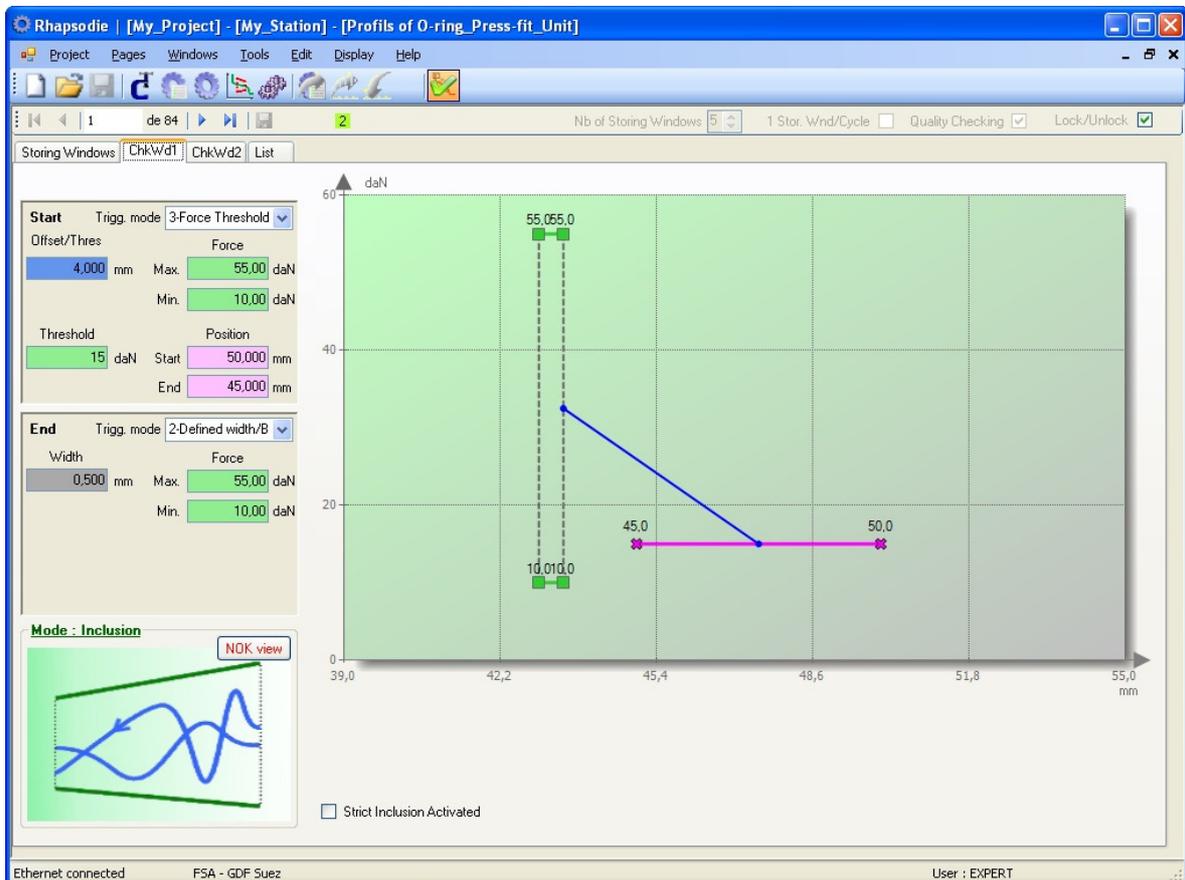
As we want to check the press-fitting, we store also the curve in this cycle.  
Then, we will programm a curve with 2 storing windows (1 for picking, 1 for press-fitting), and we will check the "1 ChkWd/Cycle".

PC connecté à Ethernet      FSA - GDF Suez      User : EXPERT

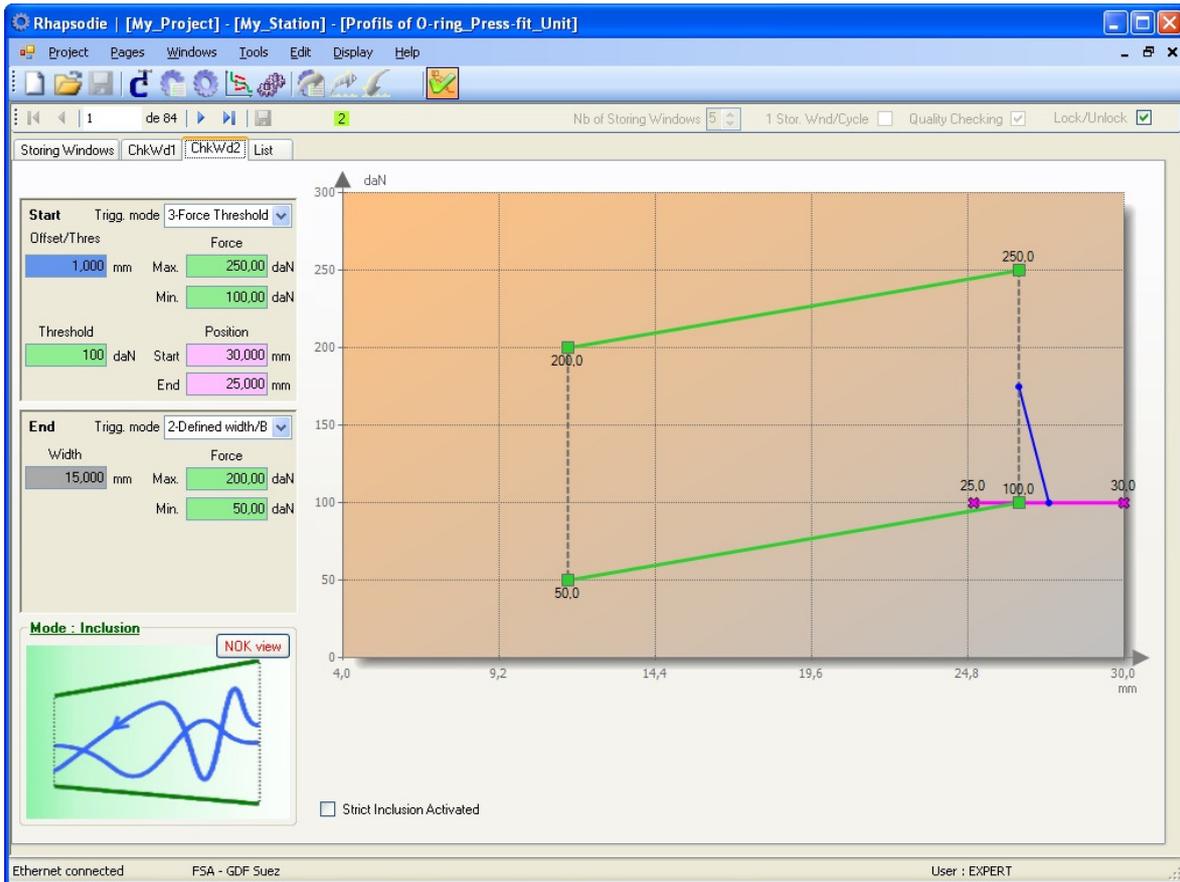
### Programming of the storage program: Profile:



Check window no. 1



Check window no. 2



### Programming of the sequence

The screenshot displays the Rhapsodie software interface for configuring a sequence. The main window shows a table of sequences. The table has columns for Seq #, Cycle #, Curve #, and Comments. The first sequence is highlighted in green. The status bar at the bottom indicates 'Ethernet connected', 'FSA - GDF Suez', and 'User : EXPERT'.

Seq #	Cycle #	Curve #	Comments
1	1	17	Imported on 03/06/2012 22:23:54 by EXPERT From file Mon_Projet_Mon_Poste_UE-Emmanch-Joint_Export_12-06-03 22 22 53 Created on 03/06/201...
2	0	0	Soft chaining programmed // 1 // 2 // 3 // 513 / Imported on 03/06/2012 22:23:54 by EXPERT From file Mon_Projet_Mon_Poste_UE-Emmanch-Joint_Export_12-06-03 22 22 53 Created on 03/06/201...
3	30	0	Imported on 03/06/2012 22:23:54 by EXPERT From file Mon_Projet_Mon_Poste_UE-Emmanch-Joint_Export_12-06-03 22 22 53 Created on 03/06/201...
4	0	0	
5	0	0	
6	0	0	
7	0	0	
8	0	0	



Associated result block:

```
*****
Station/Channel/Addr :000.000.001.237.160.136.001
D/M/Y , H/M/S :26/04/2012 14/58/38,11
Total seq. time: 19.10 s
Pin. Temp: 24.96 Deg.
Module temp.: 45.96 Deg.
Sequence number: 1
Active Curves Check OK
Sequence OK
Result Number: 203843
Cyc. no. before Greasing: 99863
Curve number: 17
Cycle number: 3
-----
```

```
Cycle number: 1
Form number: 1
Press-fitting pressing cycle OK
Cycle Time: 1.57 s
Previous position: 5.112 mm
Position reached: 42.217 mm OK
Peak force: 51.7 daN OK
Residual force: 50.5 daN
Position difference: 37.104 mm OK
-----
```

```
Cycle number: 2
Form number: 2
Pulling cycle positioning OK
Cycle Time: 0.92 s
Previous position: 42.217 mm
Position reached: 52.257 mm OK
Peak force: 3.7 daN OK
Residual force: 0.9 daN
Position difference: 10.040 mm OK
-----
```

```
Cycle number: 3
Form number: 3
Press-fitting pressing cycle NOT OK
Cycle Time: 2.85 s
Previous position: 52.257 mm
Position reached: 5.644 mm OK
Peak force: 504.2 daN OK
Residual force: 481.1 daN
Position difference: -46.612 mm OK
Curve check OK
-----
```

```
*****
Curve Check: Curve Profile N0: 17
-----
```

```
Start Increasing Threshold - End Fixed Width - Pressing Inclusion Mode
F 01; Fmax: 45.4 daN; Crv <= Max: OK; Fmin1: 25.3 daN; Crv >= Min: OK
```

```
Start Increasing Threshold - End Fixed Width - Pressing Inclusion Mode
F 02; Fmax: 200.8 daN; Crv <= Max: OK; Fmin1: 150.6 daN; Crv >= Min: OK
*****
```

```
Pitch number: 13
COM2 OK
Waiting for cycle start release
Presence Index
Idle position
Pitch number: 1
Awaiting Cycle Start
```

START of RESULT BLOCK – Overall sequence block  
This is the rack identification entered in Rhapsodie's Units page.

This is the program number (sequence) requested from the MVAT card by the PLC  
There is a curve check program associated with this sequence. Its quality is active and OK.  
The sequence is OK: all the executed cycles were OK and the curve check was also OK  
Incremented for each part produced. Cannot be reinitialised  
Count down to greasing configured on Specifications/Maintenance page  
No. of curve program associated with the sequence  
Number of cycles executed during the sequence

Start of 1st CYCLE BLOCK

First Cycle executed  
Cycle no. in Rhapsodie  
Cycle type: Press-fitting, direction: Pressing, quality OK  
Execution time of this cycle  
Position reached in the previous cycle  
Final position  
Final force (overshoot peak)  
Final force at the end of the holding time  
Difference between the final position and the previous position, or the initial position (see Rhapsodie/Cycles)

Start of 2nd CYCLE BLOCK

Second Cycle  
C  
Cycle type: Positioning (relative movement), Direction: Pulling, Quality OK

Start of 3rd CYCLE BLOCK

As the curve check has been completed in this cycle, the result is displayed

"WINDOW" RESULT BLOCK  
No. of curve control program. Type: PROFILE (no. > 16)

1st Window

2nd Window

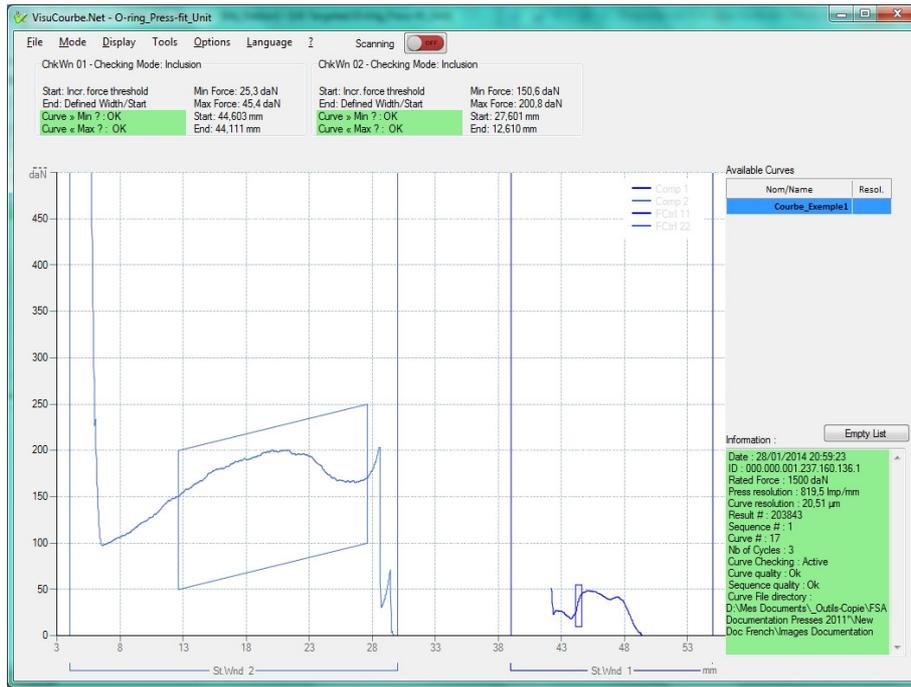
The curve was sent to the PC. Transmission OK

The pin shaft has returned to the origin position. The index (inductive sensor is present)  
The shaft has reached its origin, idle position, PULSE!

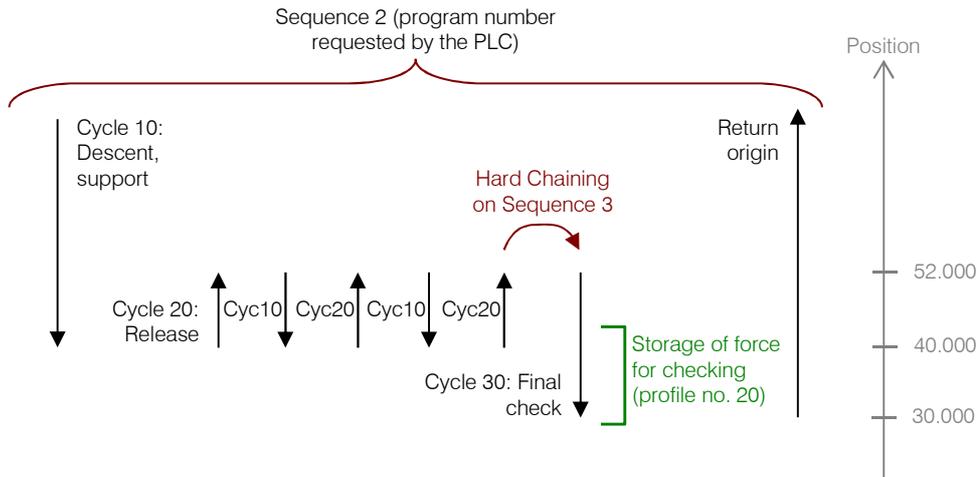
The card is ready again, awaiting Cycle Start.



Curve obtained:



### 5.5.4 Sequence with a "Looping" phase then a "Check" phase



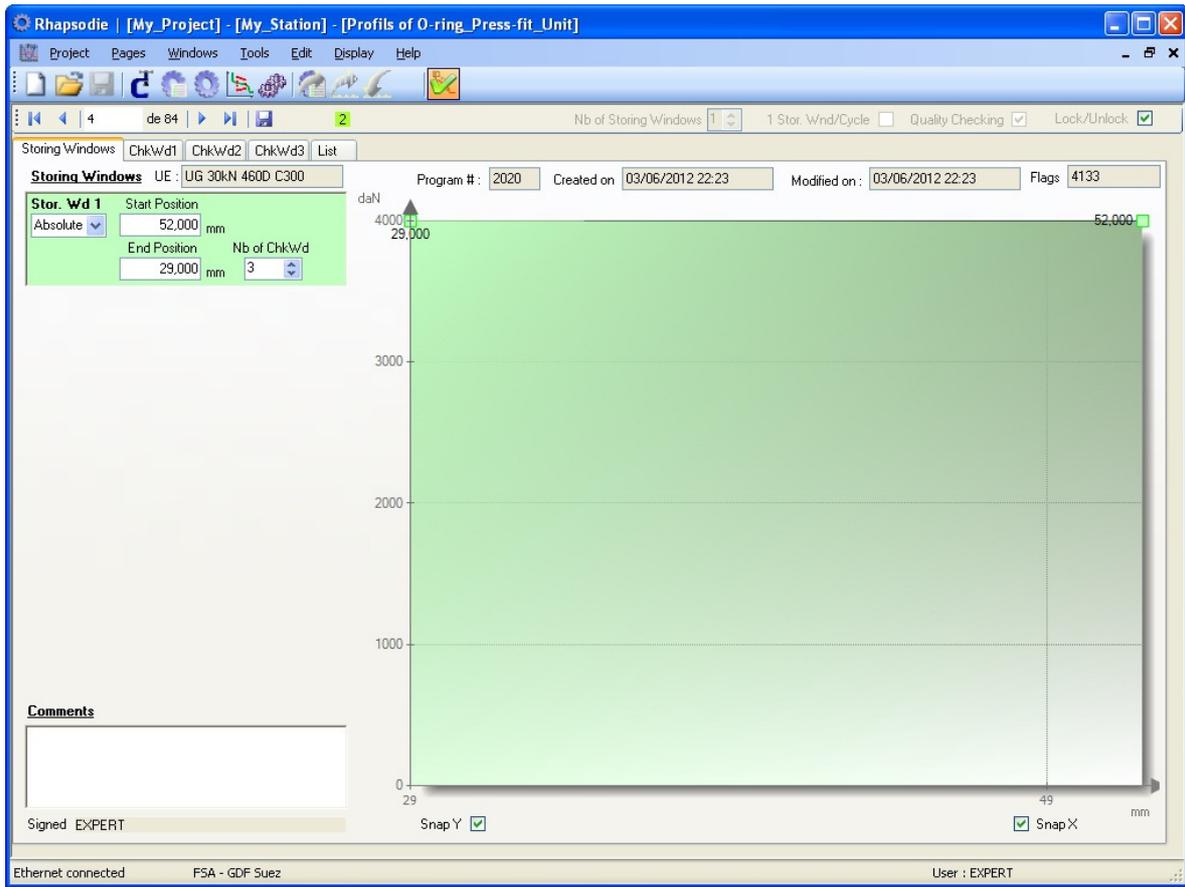
In this example, we descend to an elastic product to carry out 3 "gymnastics", then carry out a check cycle, then return to the origin automatically

#### Cycle 10 programming

### Cycle 20 programming

### Cycle 30 programming

Force storage programming: Profile no. 20



Programming of sequences 2 and 3

The screenshot shows the Rhapsodie software interface for programming sequences. The title bar indicates the project is '[My\_Project] - [My\_Station] - [Sequences of O-ring\_Press-fit\_Unit]'. The main workspace displays a table with the following data:

Seq #	Cycle #	Curve #	Comments
1	1	17	
2	10	20	As the PLC call in first the Sequence #2, the curve storing program is attached on this sequence, even the effective storing is made during the cycle 30
3	30	0	which is called in a hard chaining with the sequence #3.
4	0	0	
5	0	0	
6	0	0	
7	0	0	
8	0	0	
9	0	0	

The status bar at the bottom shows 'Ethernet connected', 'FSA - GDF Suez', and 'User: EXPERT'.

The screenshot shows the Rhapsodie software interface for programming sequences, similar to the previous one but with an additional note for sequence 2. The table data is as follows:

Seq #	Cycle #	Curve #	Comments
1	1	17	
2	10	20	As the PLC call in first the Sequence #2, the curve storing program is attached on this sequence, even the effective storing is made during the cycle 30
2	10	20	Soft chaining programmed // 10 // 20 // ...10 Loop!
3	30	0	which is called in a hard chaining with the sequence #3.
4	0	0	
5	0	0	
6	0	0	
7	0	0	
8	0	0	
9	0	0	

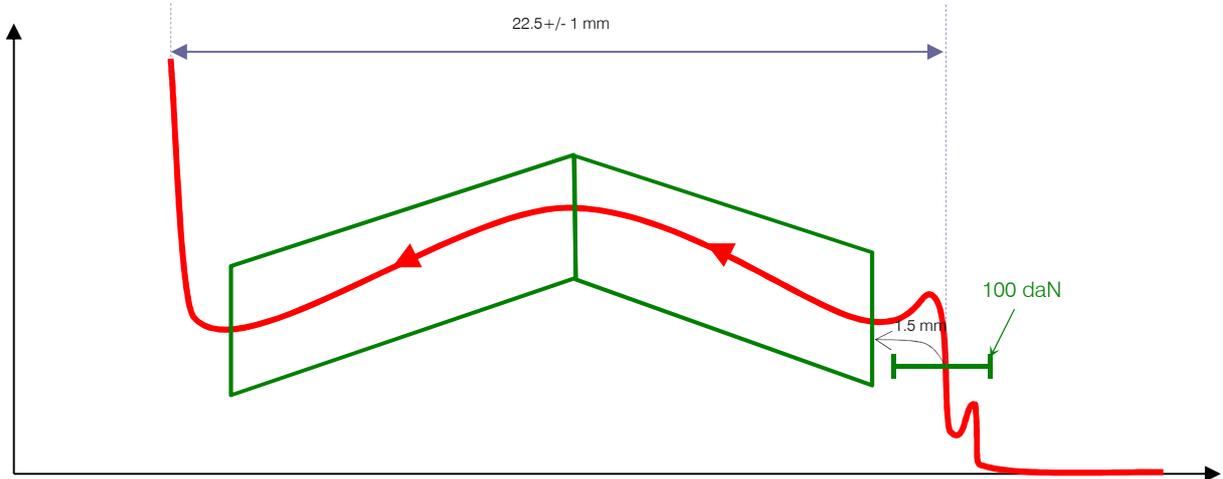
The status bar at the bottom shows 'Ethernet connected', 'FSA - GDF Suez', and 'User: EXPERT'.

### 5.5.5 Sequence with single press-fitting with a narrowly-targeted curve check

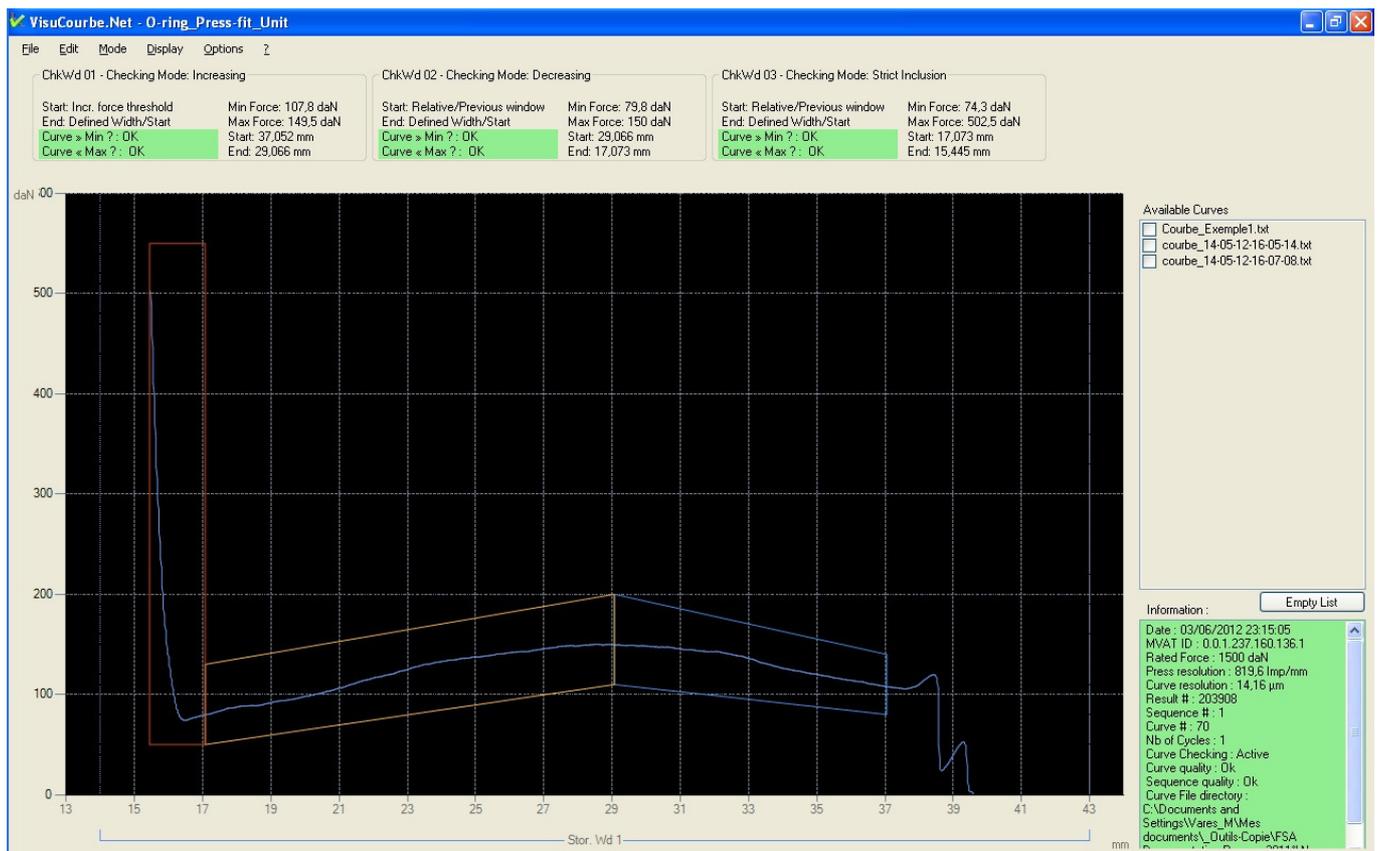
This example illustrates how to program a complete part check (threshold in cycle, profile during press-fitting, test of length press-fitted, etc.)

The checks requested are as follows:

- On a force threshold of 100 daN, start a profile with checking of an increasing phase and a decreasing phase.
- Check the length of the part (22.5 mm +/- 1 mm) relative to the threshold of 100 daN



#### Resulting curve



Cycle programming

The screenshot shows the 'Cycles of O-ring\_Press-fit\_Unit' configuration window. It includes a menu bar (Project, Pages, Windows, Tools, Edit, Display, Help), a toolbar, and a main configuration area. The configuration area is divided into several sections:

- General:** Program # 1 070, Created on: 04/06/2012 09:55:14, Modified on: 04/06/2012 10:04, Signed: EXPERT.
- Chaining:** Chaining # of Ok: 0, Chaining # of NOK: 0, Holding time: 0,50 s.
- Execution:** Cycle Type: Press-Fitting, Execution dir.: Pressing.
- Forces:** Max. Force: 550,0 daN, Trip Force: 500,0 daN, Min. Force: 0,0 daN. Quality checking on: Peak Force.
- Positions:** Max. trip pos.: 16,000 mm, Trip position: 14,000 mm, Min. trip pos.: 14,500 mm.
- Advanced:** Acceleration control (checked), Store the Curve (checked), Auto return (checked), I/O validation needed for resume (unchecked), Cycle resume if Nok (checked). Acc./decel. dist.: 5,000 mm.
- Comments:** Simple Press-fit with tripping on force reached.

On the right side, there is a speed profile graph showing:
 

- Max. current: 100,0 %
- Approach speed: 100,00 % (466,7 mm/s)
- Working speed: 5,00 % (23,3 mm/s)
- Return speed: 100,00 % (466,7 mm/s)
- Working position: 40,000 mm
- Slowing down pos.: 16,000 mm
- Trip position: 14,000 mm
- Trip speed: 0,50 % (2,3 mm/s)

At the bottom, it shows 'PC connecté à Ethernet', 'FSA - GDF Suez', and 'User: EXPERT'.

Profile programming: Recording range

The screenshot shows the 'Profiles of O-ring\_Press-fit\_Unit' configuration window. It includes a menu bar (Project, Pages, Windows, Tools, Edit, Display, Help), a toolbar, and a main configuration area. The configuration area is divided into several sections:

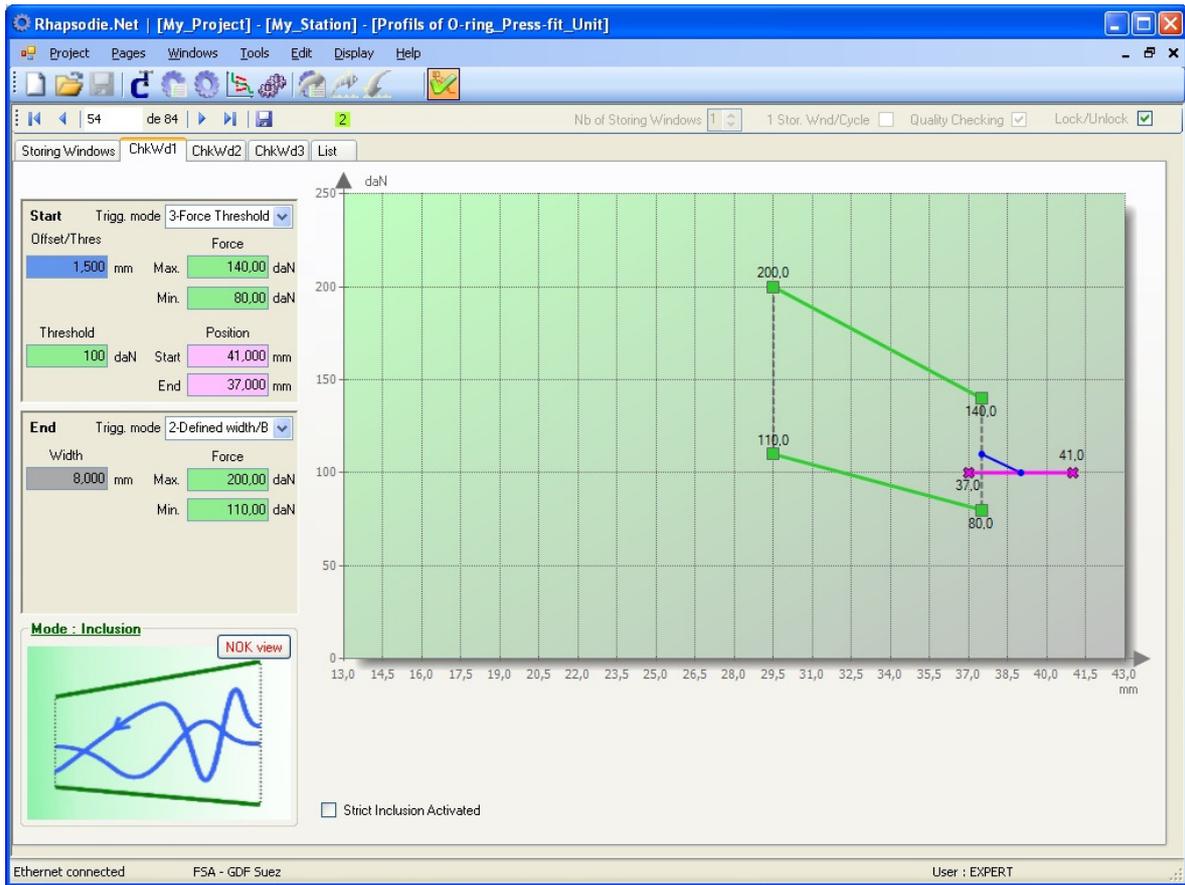
- General:** Program # 2070, Created on: 04/06/2012 10:08, Modified on: 04/06/2012 10:11:17, Flags: 4133.
- Storing Windows:** UE: UG 30kN 460D C300. A table shows:
 

Stor. Wd	Start Position	End Position	Nb of ChkWd
Stor. Wd 1	43,000 mm	13,000 mm	3
- Graph:** A force profile graph with force in daN on the y-axis (0 to 4000) and position in mm on the x-axis (13 to 43000). A green shaded area represents the recording range from 13,000 mm to 43,000 mm.
- Comments:** Only 1 storage Window on which 3 Checking Windows are attached.
- Advanced:** Signed: EXPERT, Snap Y (checked), Snap X (checked).

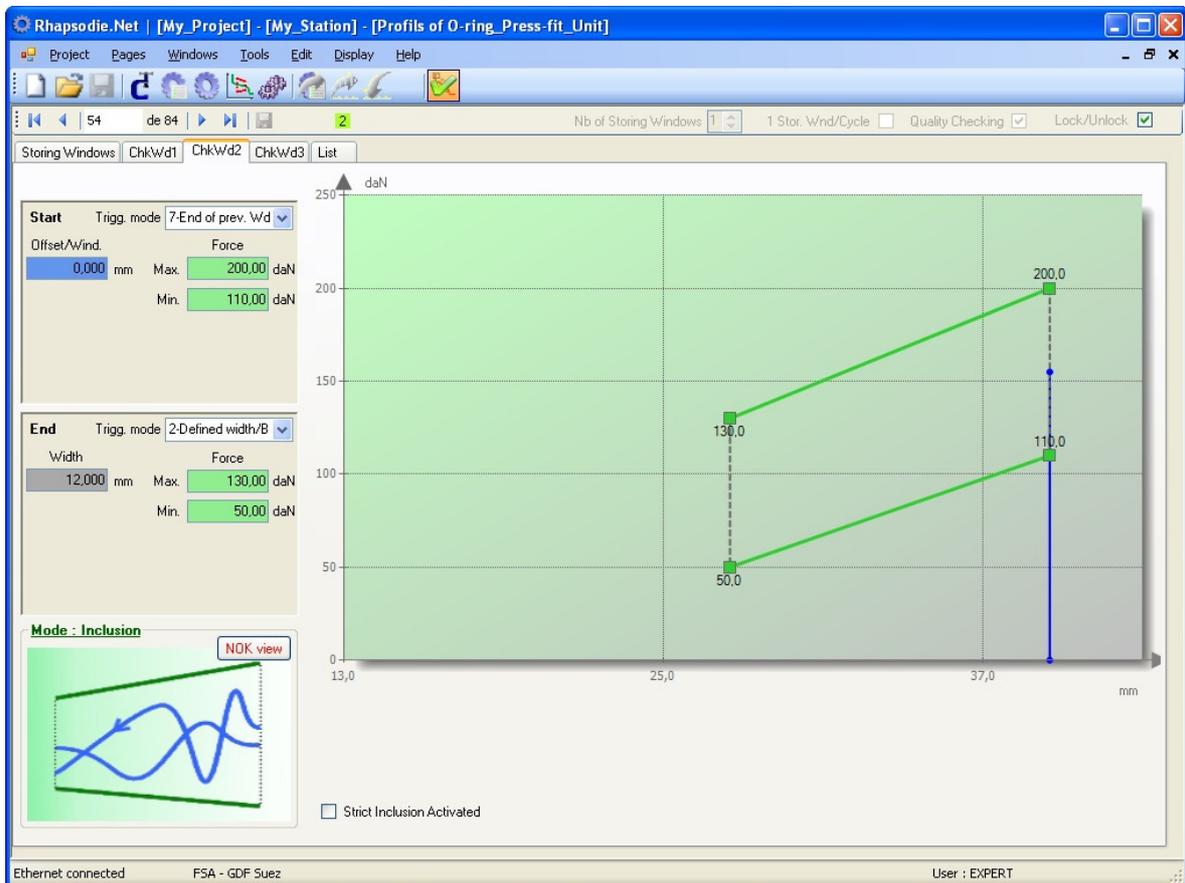
At the bottom, it shows 'Ethernet connected', 'FSA - GDF Suez', and 'User: EXPERT'.



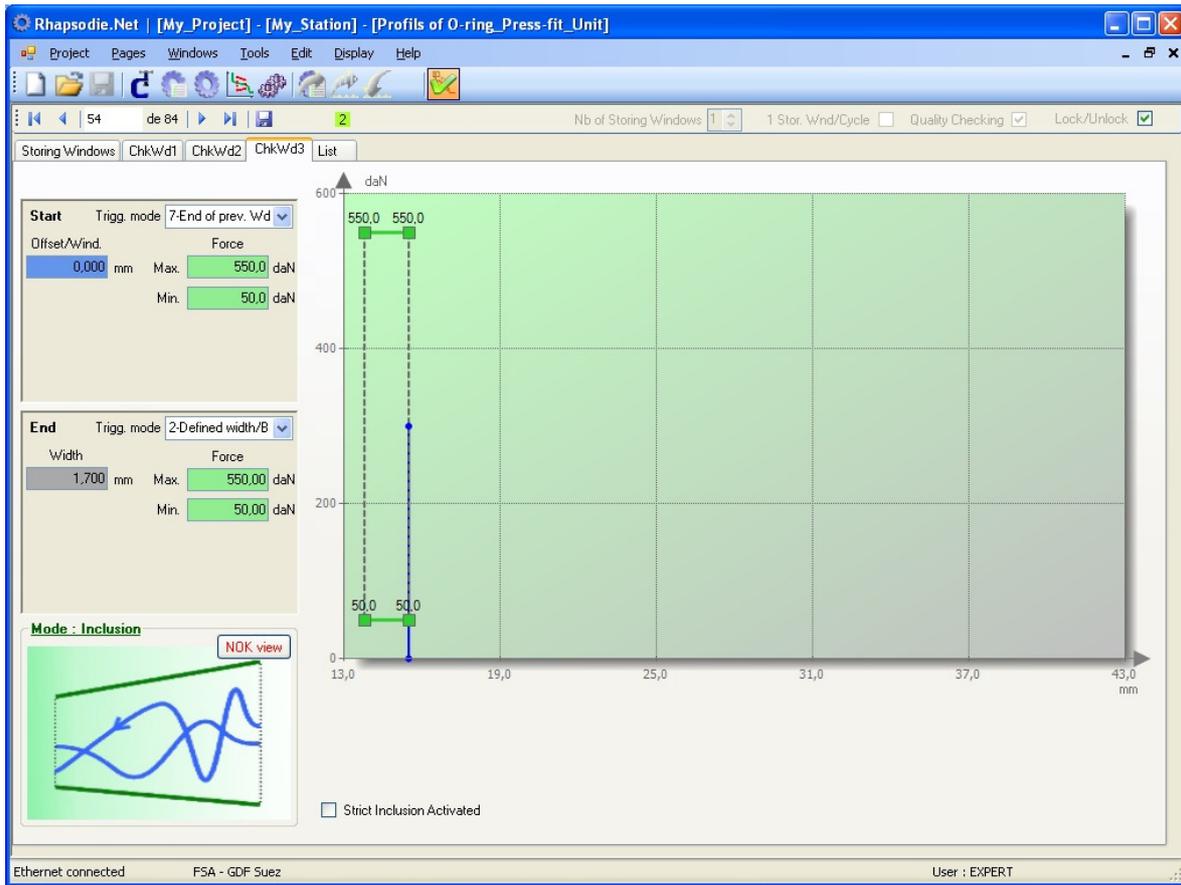
Check windows: ChkWd1



Check windows: ChkWd2



Check windows: ChkWd3

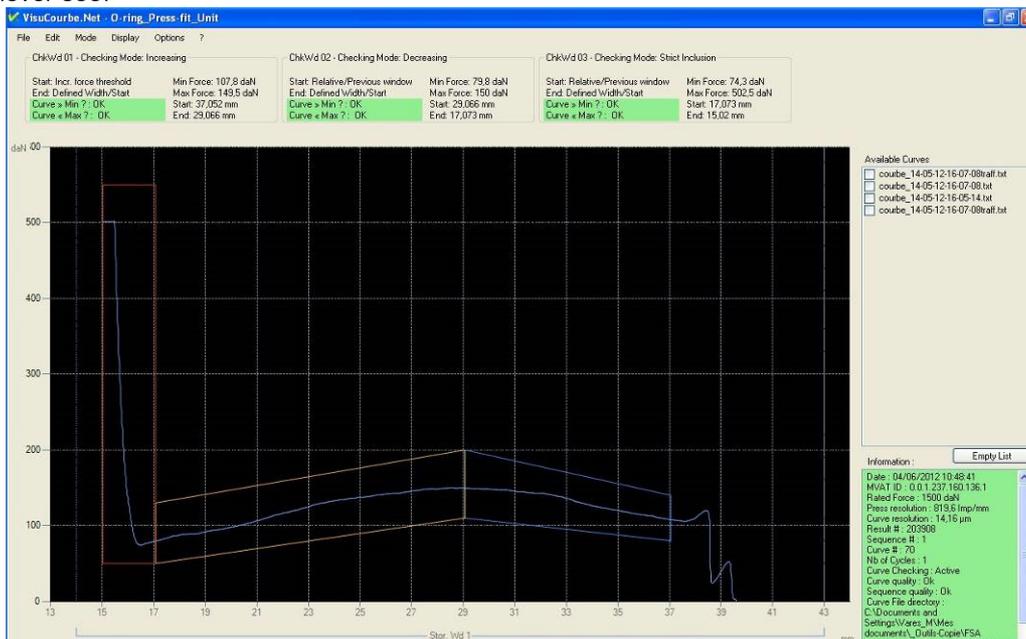


It can be seen that the 2 roles of windows 1 and 2 are as follows:

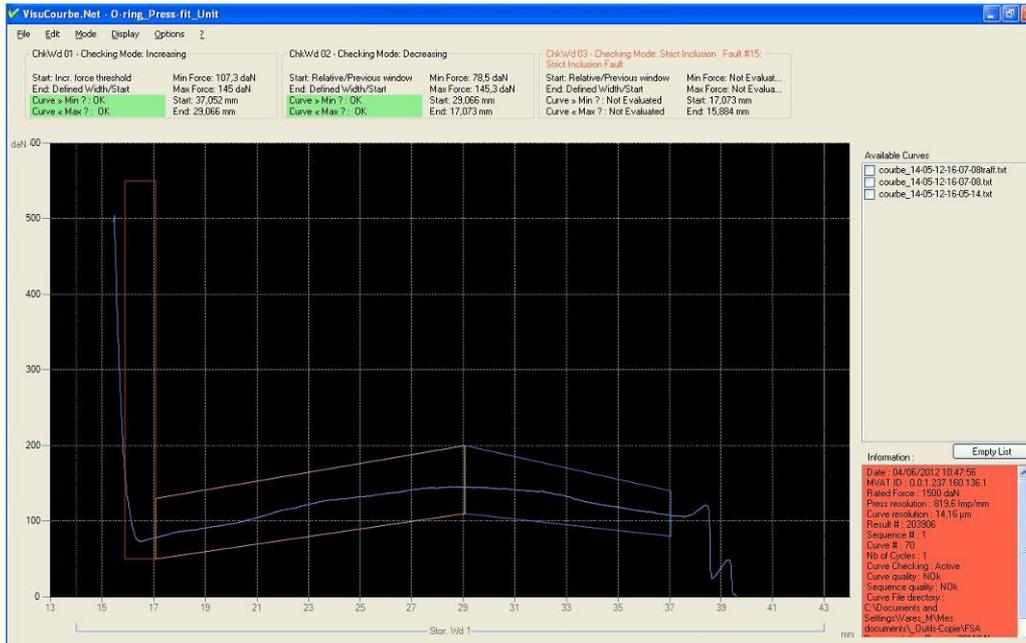
- check the increase and decrease
  - check that the length of the part is a minimum of 21.5 mm (Start Offset + width ChkWd1 + width ChkWd2 = 21.5)
- Window 3, configured in strict inclusion mode, ensures that the part does not exceed 22.5 mm (Start Offset + width ChkWd1 + width ChkWd2 + width ChkWd3 = 22.5)

**WARNING:** on the curve for the correct part, we note that the representation of the 3<sup>rd</sup> check window does not relate to the configuration: it should be 2 mm wide, while it is in fact only 1.628mm (17.073 – 15.445).

This is because the last check curve is always represented with its end brought back to the last point on the curve. We will therefore never see:



If the part is too long, the curve exits from check window no. 3, and a strict inclusion fault is obtained on the last window:



### 5.5.6 Page: "Results": (for Fieldbus interface only)

This menu allows the user to configure the construction of the table of press-fitting results obtained from the MVAT into the Fieldbus interface. These results may be retrieved by the PLC.

The screenshot shows the Rhapsodie software interface with the following components:

- Top Panel:** Title bar "Rhapsodie | [My\_Project] - [My\_Station] - [Results of Insertion\_Unit\_1]" and menu bar "Project Pages Windows Tools Display Help".
- Main Table:** A table with columns: Position, 1st, 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, 9th. Rows include Cycle #0 through Cycle #6.
- Exchange Table:** A table titled "Result choice for the exchange table (please enter hereinabove the value matching with you choice)". It contains data for 10 windows, including Max. force, Min. force, and Aver. F or NRJ values.
- Left Panel:** A list of designations and their values to enter, such as Cycle # (1), File # (2), Cycle time (3), etc.
- Bottom Panel:** Status bar showing "Ethernet connected", "JR Automation - FSA Technologies", and "User : EXPERT".

Designation	Value to enter	Profil or curve with 2 pts mode	Value to enter	Curve with 3 pts mode	Value to enter	Profil or Curve	Value to enter	Profil : ChkWnd pos.	Value to enter
Cycle #	1	Max. force	74	Max. force	138	Aver. F or NRJ	202	Début Fctrl.1	104
File #	2	Min. force	75	Min. force 1	139			Fin Fctrl.1	105
Cycle time	3			Min. force 2	140				
Previous position	4	Max. force	76	Max. force	141	Aver. F or NRJ	203	Début Fctrl.2	106
Final position	5	Min. force	77	Min. force 1	142			Fin Fctrl.2	107
Peak force	6			Min. force 2	143				
Residual force	7	Max. force	78	Max. force	144	Aver. F or NRJ	204	Début Fctrl.3	108
Pos. Diff. Calcul.	8	Min. force	79	Min. force 1	145			Fin Fctrl.3	109
Force before End	9			Min. force 2	146				
ChkWnd qty*	114	Max. force	80	Max. force	147	Aver. F or NRJ	205	Début Fctrl.4	110
Result #	115	Min. force	81	Min. force 1	148			Fin Fctrl.4	111
				Min. force 2	149				
		Max. force	82	Max. force	150	Aver. F or NRJ	206	Début Fctrl.5	112
		Min. force	83	Min. force 1	151			Fin Fctrl.5	113
				Min. force 2	152				
		Max. force	84	Max. force	153	Aver. F or NRJ	207		
		Min. force	85	Min. force 1	154				
				Min. force 2	155				
		Max. force	86	Max. force	156	Aver. F or NRJ	208		
		Min. force	87	Min. force 1	157				
				Min. force 2	158				
		Max. force	88	Max. force	159	Aver. F or NRJ	209		
		Min. force	89	Min. force 1	160				
				Min. force 2	161				
		Max. force	90	Max. force	162	Aver. F or NRJ	210		
		Min. force	91	Min. force 1	163				
				Min. force 2	164				
		Max. force	92	Max. force	165	Aver. F or NRJ	211		
		Min. force	93	Min. force 1	166				
				Min. force 2	167				

\* MVAT will send a decimal number from 0 to 31 to convert to binary. The 5 bits represent the qty of each window

The different choices of values that P.L.C. can pick-up are displayed on the bottom table of the page. MVAT can store 9 results of 7 consecutive cycles, and provide it for the P.L.C in an exchange table of 7x9 size. Depending of the sequence of cycles, and depending of the values you want to pick-up, you have to enter the good values in the upper table of the page.

Ex : 3 cycle Sequence :

- P.L.C. wants to pick-up for each cycle :
  - The final position (that P.L.C. will pick-up at the table position #5),
  - The finale force (that P.L.C. will pick-up at the table position #6),
  - And an extra result for 3<sup>rd</sup> cycle :
    - Max. and Min. forceOf the checking Window (picked-up in position 1 et 2),
    - And the position of this window (picked-up in position 3 et 4)

Then you have to fill the table as following : (only the green cells are of interest for our example exemple, when this is at these position that the P.L.C. will pick-up values)

	Position	1st	2nd	3rd	4th	5th	6th	7th	8th	9th
	Cycle #0	1	2	3	4	5	6	7	8	9
	Cycle #1	1	2	3	4	5	6	7	8	9
	Cycle #2	74	75	104	105	5	6	7	8	9
	Cycle #3	1	2	3	4	5	6	7	8	9
▶	Cycle #4	1	2	3	4	5	6	7	8	9
	Cycle #5	1	2	3	4	5	6	7	8	9
	Cycle #6	1	2	3	4	5	6	7	8	9

Then Rhapsodie.Net will send to the MVAT controller, the following Result configuration file :

```

&;4010
1;1.2.3.4.5.6
2;7.8.9.1.2.3
3;4.5.6.7.8.9
4;74.75.104.105.5.6
5;7.8.9.1.2.3
6;4.5.6.7.8.9
7;1.2.3.4.5.6
8;7.8.9.1.2.3
9;4.5.6.7.8.9
10;1.2.3.4.5.6
11;7.8.9.0.0.0
*
```

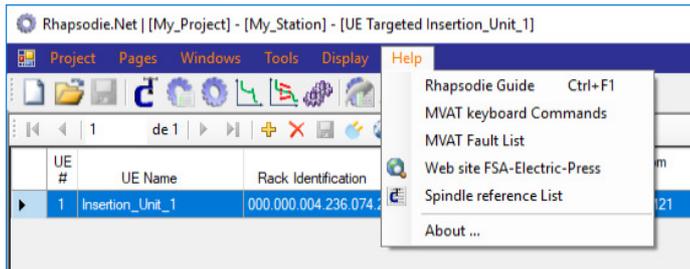
Remark : When you open a Rhapsodie project that has been created by a previous version of Rhapsodie.Net, the values will be displayed like that :

	Position	1st	2nd	3rd	4th	5th	6th	7th	8th	9th
▶	Cycle n-0	(1) - 1 Cycl...	(1) - 2 Prog...	(1) - 3 Cycl...	(1) - 4 Prev...	(1) - 5 Final...	(1) - 6 Pea...	(1) - 7 Resi...	(1) - 8 Diff. ...	(1) - 9 F.B.S. ...
	Cycle n-1	(1) - 1 Cycl...	(1) - 2 Prog...	(1) - 3 Cycl...	(1) - 4 Prev...	(1) - 5 Final...	(1) - 6 Pea...	(1) - 7 Resi...	(1) - 8 Diff. ...	(1) - 9 F.B.S. ...
	Cycle n-2	(1) - 1 Cycl...	(1) - 2 Prog...	(1) - 3 Cycl...	(1) - 4 Prev...	(1) - 5 Final...	(1) - 6 Pea...	(1) - 7 Resi...	(1) - 8 Diff. ...	(1) - 9 F.B.S. ...
	Cycle n-3	(1) - 1 Cycl...	(1) - 2 Prog...	(1) - 3 Cycl...	(1) - 4 Prev...	(1) - 5 Final...	(1) - 6 Pea...	(1) - 7 Resi...	(1) - 8 Diff. ...	(1) - 9 F.B.S. ...
	Cycle n-4	(1) - 1 Cycl...	(1) - 2 Prog...	(1) - 3 Cycl...	(1) - 4 Prev...	(1) - 5 Final...	(1) - 6 Pea...	(1) - 7 Resi...	(1) - 8 Diff. ...	(1) - 9 F.B.S. ...
	Cycle n-5	(1) - 1 Cycl...	(1) - 2 Prog...	(1) - 3 Cycl...	(1) - 4 Prev...	(1) - 5 Final...	(1) - 6 Pea...	(1) - 7 Resi...	(1) - 8 Diff. ...	(1) - 9 F.B.S. ...
	Cycle n-6	(1) - 1 Cycl...	(1) - 2 Prog...	(1) - 3 Cycl...	(1) - 4 Prev...	(1) - 5 Final...	(1) - 6 Pea...	(1) - 7 Resi...	(1) - 8 Diff. ...	(1) - 9 F.B.S. ...

To recover a correct filling, you can either :

- Enter the good 63 values in the table
- Ask for an Upload from the MVAT controller, then import it.

## 5.5.7 Help Menu



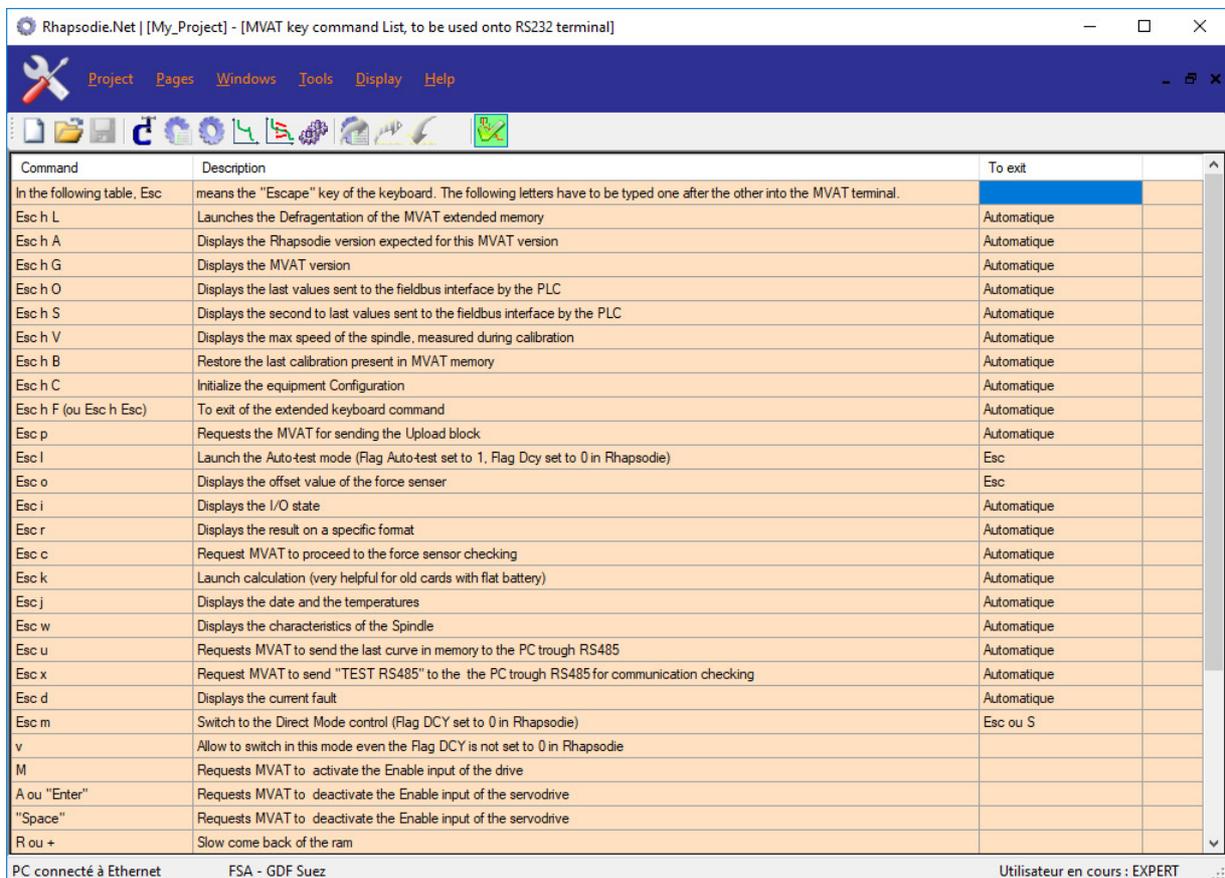
### 5.5.7.1 Rhapsodie Guide

This gives direct access to the User Guide in PDF format.

### 5.5.7.2 Liste de Commandes Clavier

Since the V1.7.0.00 Rhapsodie.Net version, a MVAT keyboard command list is available directly in Rhapsodie thanks to this menu.

This list presents the main keyboard commands than you can use in the MVAT terminal MVAT :



Command	Description	To exit
In the following table, Esc	means the "Escape" key of the keyboard. The following letters have to be typed one after the other into the MVAT terminal.	
Esc h L	Launches the Defragmentation of the MVAT extended memory	Automatique
Esc h A	Displays the Rhapsodie version expected for this MVAT version	Automatique
Esc h G	Displays the MVAT version	Automatique
Esc h O	Displays the last values sent to the fieldbus interface by the PLC	Automatique
Esc h S	Displays the second to last values sent to the fieldbus interface by the PLC	Automatique
Esc h V	Displays the max speed of the spindle, measured during calibration	Automatique
Esc h B	Restore the last calibration present in MVAT memory	Automatique
Esc h C	Initialize the equipment Configuration	Automatique
Esc h F (ou Esc h Esc)	To exit of the extended keyboard command	Automatique
Esc p	Requests the MVAT for sending the Upload block	Automatique
Esc l	Launch the Auto-test mode (Flag Auto-test set to 1, Flag Dcy set to 0 in Rhapsodie)	Esc
Esc o	Displays the offset value of the force sensor	Esc
Esc i	Displays the I/O state	Automatique
Esc r	Displays the result on a specific format	Automatique
Esc c	Request MVAT to proceed to the force sensor checking	Automatique
Esc k	Launch calculation (very helpful for old cards with flat battery)	Automatique
Esc j	Displays the date and the temperatures	Automatique
Esc w	Displays the characteristics of the Spindle	Automatique
Esc u	Requests MVAT to send the last curve in memory to the PC trough RS485	Automatique
Esc x	Request MVAT to send "TEST RS485" to the PC trough RS485 for communication checking	Automatique
Esc d	Displays the current fault	Automatique
Esc m	Switch to the Direct Mode control (Flag DCY set to 0 in Rhapsodie)	Esc ou S
v	Allow to switch in this mode even the Flag DCY is not set to 0 in Rhapsodie	
M	Requests MVAT to activate the Enable input of the drive	
A ou "Enter"	Requests MVAT to deactivate the Enable input of the servodrive	
"Space"	Requests MVAT to deactivate the Enable input of the servodrive	
R ou +	Slow come back of the ram	

PC connecté à Ethernet      FSA - GDF Suez      Utilisateur en cours : EXPERT

### 5.5.7.3 MVAT fault List

Since the V1.6.0.00 Rhapsodie.Net version, a MVAT fault list is available directly in Rhapsodie thanks to this menu.

Def.	Label	Description	How to solve
1	EMERGENCY STOP FAULT	Execution fault: cycle start release (E1) during sequence	
2	EXIT TIME FAULT	Programming or execution fault: Programmed "Cycle time" in cycle page exceeded	
3	SEQUENCE TYPE FAULT	Execution fault: start of the pulling calibration sequence was incorrect	
4	OFFSET FAULT	Execution fault: the force sensor offset is greater than the "Offset Fault Threshold" set point	Remedy: - Check the offset using the command "ESC o" - Increase the offset default threshold setting in the specification file (slightly) - Carry out calibration again
5	INDEX NOT PRESENT AT START FAULT	Execution fault: detector not present before spindle motor starts	Cause 1: the spindle is not in fall-back position Remedy : Put the spindle shaft back using manual mode Cause 2 : the index has not been seen by the MVAT Remedy : Check the wiring of the index
6	FORCE BEFORE INDEX RELEASE FAULT	Execution or programming fault: force encountered during detector presence. The force measured is greater than the "Safety force" or the "Maximum force" set point or, if calibrating, the "Pressing Calibration Force". It could also be an incorrect force measurement.	Remedy : - Clear the tip of the pin - Check the force using the command "ESC o"
7	FORCE BEFORE PULSE FAULT	Execution fault: force encountered before the PULSE has been received (between the detector and the PULSE). The force measured is greater than the "Safety force" or the "Maximum force" set point or, if calibrating, the "Pressing Calibration Force". It could also be an incorrect force measurement.	Remedy : - Clear the tip of the pin - Check the force using the command "ESC o"
8	FORCE BEFORE APPROACH FAULT	Execution fault: the MVAT measures a force before the "Approach position" set point. The force measured is greater than the "Safety force" set point or the "Trip force" set point or the "Maximum force" set point	Remedy : - Clear the tip of the pin - Check the approach position
9	STOP ON LOWER SAFETY IN CALIBRATION MODE ...	Execution fault : - Maximum displacement reached in calibration mode (displacement measurement overflow 10000mm depends on the number of pulses) - Phase wiring reversed (IN+ and IN-) in this case the fault appears on the first PULSE	Note: In the case where signals from the speed controller are used for displacement, if the direction of the motor is reversed in the Infranor program (Reverse movement), the IN+ and IN- wiring must also be reversed.
10	STOP ON LOWER SAFETY IN CYCLE FAULT	Execution fault: max. displacement reached in calibrating "Lower Safety Position" set point	
11	STOP ON MAX FORCE FAULT	Execution fault: no "Trip Force" programmed stop on max end stop force ("Safety Force" set point or "Maximum force" set point)	
12	STOP ON LOWER SAFETY ON INERTIA FAULT	Execution fault: during the "Holding time", the spindle reaches the "Lower Safety Position" set point	
13	LINE SELECTION FAULT	Programming fault: test whether the curve selection is between 0 and 16	
14	SETTINGS NOT CORRECT WITH THE CYCLE DEFINITION	Programming fault: this is in the case of a positioning sequence (the	

Ethernet connected      FSA - GDF Suez



#### 5.5.7.4 Site Web FSA-Electric-Press

If the PC is connected to internet, this link drives you directly to the FSA Electric press web site, which is fully dedicated to the Electric Press.

You will find on this web site all the softwares and documentation needed for the electrical press FSA.

### 5.5.7.5 UE references page"

This page displays all the press-fitting pins in the Fabricicom range.

It is essential to select the correct pin for each new UE created in the Press-fitting Units page, as a number of settings are pre-entered depending on the unit selected. The values used to pre-enter these fields come from this table.

UE Reference	Capacity kN	Nominal kN	Sensiv. mN/V	Pitch mm	Diameter mm	INb/Pitc	Idx Center	Stroke mm	Reduct	Speed rpm	Nom. Intensity	Max Intensity	Comments
UG 02kN 660D C300	2,00	2,00	0,8000	10,000	12,000	4 096	5,000	300,000	1,0000	4 000,00	3,6	7,2	FSA - UG05
UG 02kN 660D C500	2,00	2,00	0,8000	10,000	12,000	4 096	5,000	500,000	1,0000	4 000,00	3,6	7,2	FSA - UG05
UG 05kN 330D C300	5,00	7,50	1,0000	5,000	12,000	4 096	2,500	300,000	1,0000	4 000,00	3,6	7,2	FSA - UG05
UG 05kN 330D C500	5,00	7,50	1,0000	5,000	12,000	4 096	2,500	500,000	1,0000	4 000,00	3,6	7,2	FSA - UG05
UG 15kN 525D C300	15,00	20,00	1,1300	7,000	21,000	4 096	3,500	300,000	1,0000	4 500,00	20,0	45,0	FSA - UG15
UG 15kN 525D C500	15,00	20,00	1,1300	7,000	21,000	4 096	3,500	500,000	1,0000	4 500,00	20,0	45,0	FSA - UG15
UG 30kN 460D C300	30,00	40,00	1,1300	8,000	27,000	4 096	4,000	300,000	1,0000	3 500,00	20,0	45,0	FSA - UG30
UG 30kN 460D C500	30,00	40,00	1,3000	8,000	27,000	4 096	4,000	500,000	1,0000	3 500,00	20,0	45,0	FSA - UG30
UG 60kN 700D C300	60,00	100,00	2,0000	15,000	30,000	4 096	7,500	300,000	1,0000	2 800,00	35,0	70,0	FSA - UG60
UG 60kN 700D C500	60,00	100,00	2,0000	15,000	30,000	4 096	7,500	500,000	1,0000	2 800,00	35,0	70,0	FSA - UG60
UG 80kN 470D C300	80,00	100,00	2,0000	10,000	39,000	4 096	5,000	300,000	1,0000	2 800,00	35,0	70,0	FSA - UG60
UG 80kN 470D C500	80,00	100,00	2,0000	10,000	39,000	4 096	5,000	500,000	1,0000	2 800,00	35,0	70,0	FSA - UG60
UG 100kN 370D C300	100,00	100,00	2,0000	8,000	45,000	4 096	4,000	300,000	1,0000	2 800,00	35,0	70,0	FSA - UG60
UG 100kN 370D C500	100,00	100,00	2,0000	8,000	45,000	4 096	4,000	500,000	1,0000	2 800,00	35,0	70,0	FSA - UG60
UG 100kN 370D C800	100,00	100,00	2,0000	8,000	45,000	4 096	4,000	800,000	1,0000	2 800,00	35,0	70,0	FSA - UG60
MMT 200kN 900D C300	200,00	200,00	1,5000	40,000	100,000	4 096	20,000	300,000	1,0000	1 500,00	220,0	350,0	FSA - MMT
MMT 200kN 900D C600	200,00	200,00	1,5000	40,000	100,000	4 096	20,000	600,000	1,0000	1 500,00	220,0	350,0	FSA - MMT
MMT 200kN 900D C900	200,00	200,00	1,5000	40,000	100,000	4 096	20,000	900,000	1,0000	1 500,00	220,0	350,0	FSA - MMT
MMT 200kN 900D C12...	200,00	200,00	1,5000	40,000	100,000	4 096	20,000	1 200,0...	1,0000	1 500,00	220,0	350,0	FSA - MMT
MMT 300kN 790D C300	300,00	300,00	1,5000	35,000	100,000	4 096	17,500	300,000	1,0000	1 500,00	220,0	350,0	FSA - MMT
MMT 300kN 790D C600	300,00	300,00	1,5000	35,000	100,000	4 096	17,500	600,000	1,0000	1 500,00	220,0	350,0	FSA - MMT
MMT 300kN 790D C900	300,00	300,00	1,5000	35,000	100,000	4 096	17,500	900,000	1,0000	1 500,00	220,0	350,0	FSA - MMT
MMT 300kN 790D C13...	300,00	300,00	1,5000	35,000	100,000	4 096	17,500	1 200,0...	1,0000	1 500,00	220,0	350,0	FSA - MMT
MMT 400kN 560D C300	400,00	400,00	1,5000	25,000	100,000	4 096	12,500	300,000	1,0000	1 500,00	220,0	350,0	FSA - MMT
MMT 400kN 560D C600	400,00	400,00	1,5000	25,000	100,000	4 096	12,500	600,000	1,0000	1 500,00	220,0	350,0	FSA - MMT
MMT 400kN 560D C900	400,00	400,00	1,5000	25,000	100,000	4 096	12,500	900,000	1,0000	1 500,00	220,0	350,0	FSA - MMT

When you pass the mouse over the small columns on the right you see:

creation date	modification date	person who changed the reference.	Status (locked?)

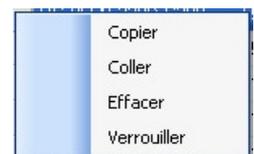
#### Creating a new UE:

The list of UEs is not fixed and it is possible to add UEs with characteristics which are specific to them. To do this, you can:

- Add a UE
- Delete a UE

#### Locking a UE:

After creating a new UE, it is possible to lock it to avoid the risk of deletion. To do this, select the UE then right-click it  
Then use the "Lock" command



**WARNING:** once locked, it will not be possible to delete this UE.

You will only be able to reinitialise the database by retrieving the original file from the Rhapsodie.net installation CD.

5.5.7.6 Page: "About..."

Allows the Software Licence to be registered and to find out which version is installed.

Before and after registering the software:



## 6 Advanced usage

### 6.1 Using Rhapsodie.Net: General principles

Do not open multiple screens, navigate with screens

#### 6.1.1 Project Storage folder

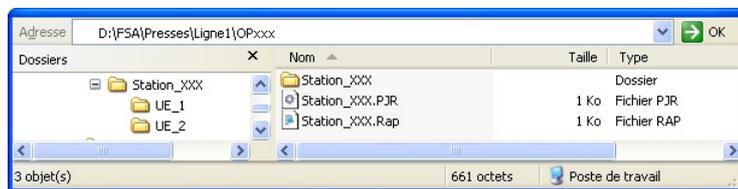
Rhapsodie projects are stored in the folder of your choice.

Let's take, for example, the folder: D:\FSA\Presses\

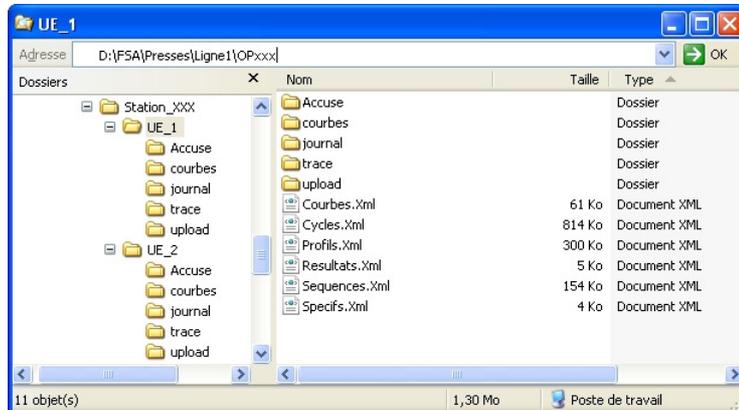
Within this folder, we will find the following structure:

```
D:\FSA\Presses\Line1\ OP110
                    OP120
                    OP130
                    OP140
                    Line2\ OP210
                        OP220
                        OP230
```

In each of the OPxxx folders, you will find:



- The "project" file: .PJR
- The "Stations" folders (1 per station created in the project)
- Under each Station folder, as many "UE" folders as press-fitting units created
- Under each UE folder:



You will find all the xml files containing the cycles, sequences, profiles, etc.

The folder :

- **"courbes"** contains all the curves stored during production when the PC was connected to the MVAT card, and the option "Send curve to PC" activated
- **"journal"** contains the log files (those size is limited to 20 Mb since the 2.1.0.15 version) that store all the result blocks produced by the MVAT (if PC is connected !)
- **"Upload"** contains the upload files produced after an "Upload" command in Rhapsodie (



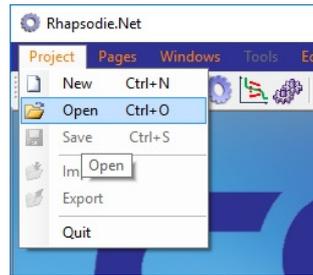
### 6.1.2 Opening a project to modify parameters

If you want to open a project that you know you will modify, use this method :

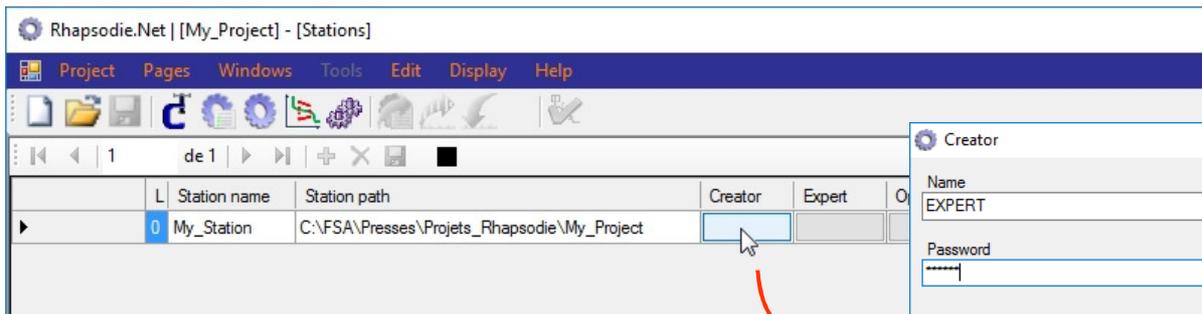
- Launch Rhapsodie with desktop shortcut :



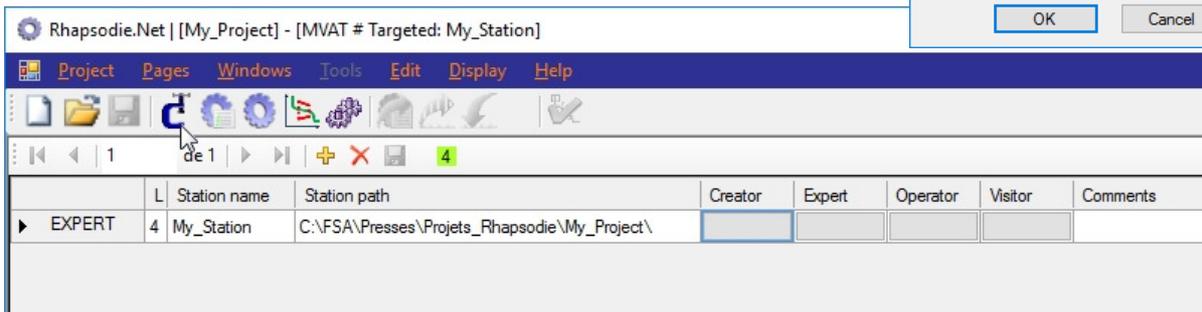
- Then open your project :



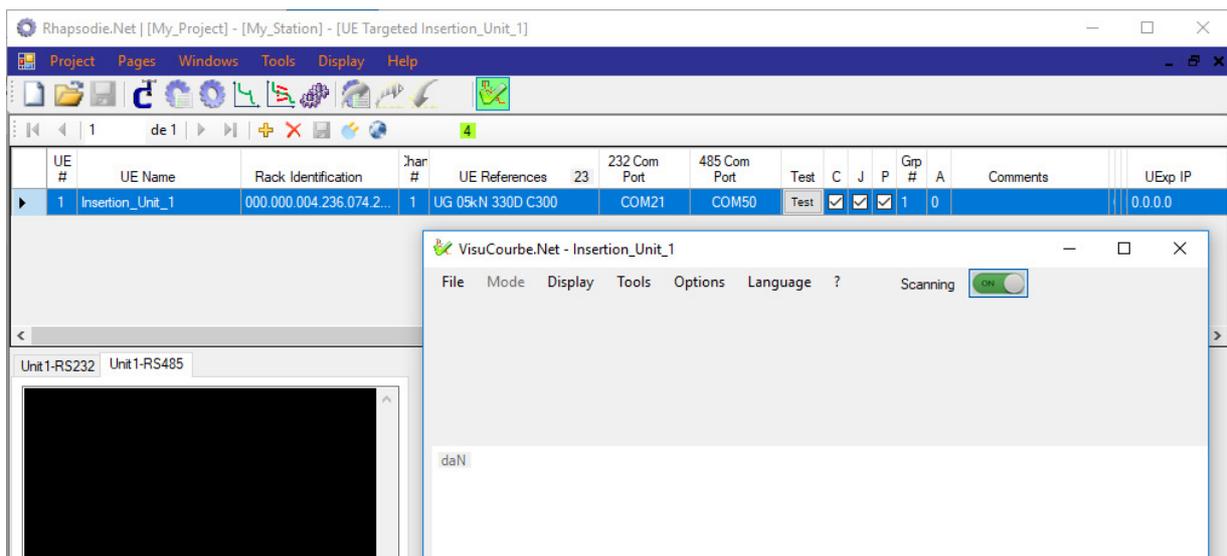
- When Project page is opened, log in :



- The "4" box becomes green, then you can open the "Insertion Unit" page :



- The "Insertion Unit" page launches the Communication interfaces, and VisuCourbes software :



- Now, you can open "Cycle" page, "Profil" page, "Sequence" page or "Specification" page and make modifications as you want.

### 6.1.3 Launch Rhapsodie and open a project directly

If you don't want to change the data for a project, but just open Rhapsodie to view the curves produced for example, just double-click the corresponding .PJR file.

When you do this, Rhapsodie starts up with the unit page for the first station in the project, and the COM\_MVAT communication interface starts along with VisuCourbes:



In this example, the "C" box is checked, so VisuCourbes has been started.

The  button is on a red background: the MVAT card related to the unit selected will not send curves at the end of the sequence.

If you want to view the curves being produced, just click this button (**Warning, NOT DURING PRODUCTION!**), the modification is sent to the MVAT card and on the next sequence, the MVAT card will send the curves.

The button then changes colour:  or  depending of the PC operating system.

If you want to be able to modify some parameters into cycles for example, you have to close all pages, including the "Insertion unit" one, answer "OK" to the "Close Com\_MVAT" question, then LOG with one the button of the "Station" page, and open pages again.

Now, the "number" which was on red backcolor, has became on Green backcolor.

### 6.1.4 Upload/Import/Export

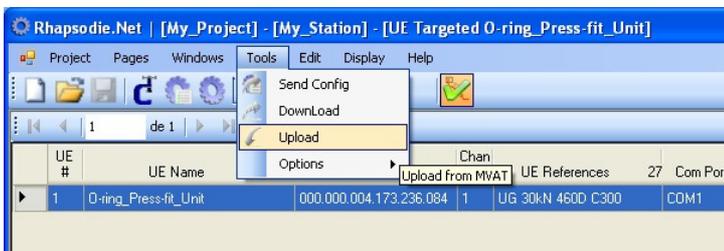
To use these functions, you must be logged on as "Creator"

These functions allow you to:

- Interrogate an MVAT card (UPLOAD) to retrieve the programs contained within it
- Replace the programs for the selected UE (IMPORT) by those retrieved from the MVAT card
- Export the programs for the UE selected in order to retrieve them onto another UE for example.

#### 6.1.4.1 Upload (Retrieval of programs from MVAT)

After selecting the UE concerned, just select the following menu option:



or click the button 

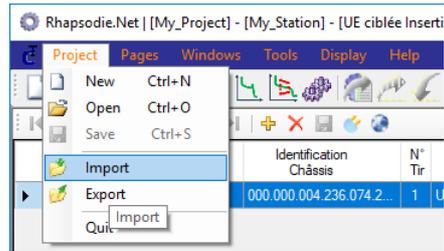
Then, the order is sent to the MVAT card. In reply, it will send all its programs.

When this send is finished, a message appears on the screen showing the name of the .txt file.

The programs will therefore be stored in the form of a txt file in the "Upload" directory for the unit concerned.

#### 6.1.4.2 Import

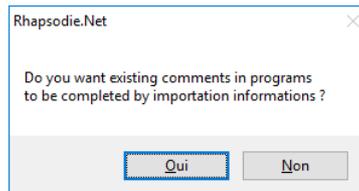
All that remains to be done is to import the txt file.



Before doing this, ensure all program pages are closed (Cycles, Sequences, Profiles, Specifications) to leave only the "Units" page.

You then select the unit involved, select the Project\Import menu and choose the desired txt file.

A message ask you if you want to add to the existing comments of the programs, an importation information :



At the end of the import, all the programs for the selected unit are replaced by those in the txt file.

#### 6.1.4.3 Export

This function allows all the programs for the selected UE to be exported to a text file.

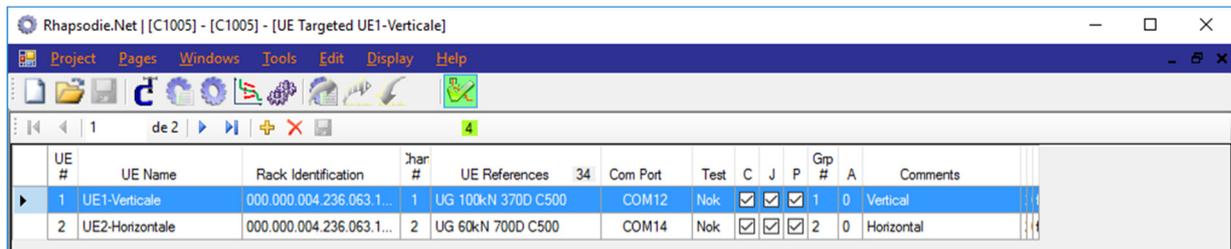
This .txt file may be re-imported in the same way as a txt file from an Upload.

#### 6.1.5 Sending programs

To use these functions, you must be logged on as "Creator" (see 6.1.2 Opening a project to modify parameters p.66)

Each time a program is modified (Cycles, sequences, Profiles, Specifications), in order for the MVAT card to take into account the changes, you have to:

- Save the page being modified in Rhapsodie by pressing on the button 
- Go back into the "Insertion Unit" page and select the good Insertion Unit :



- And send the new programs to the MVAT card by pressing on the button 

After each send has completed, a window shows the result of the download:

The correct result is: **"Download to MVAT terminated: OK"**

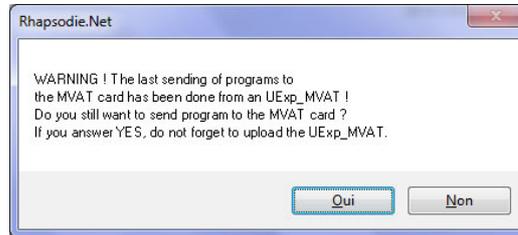
The following failure messages have the following meanings:

- **"Download to MVAT terminated: Timeout on transmission"**
  - ⇒ ComMVAT is not started
  - ⇒ The RS485 connection between the PC and Port COM2 of the MVAT is defective
  - ⇒ The MVAT card is not ready (in production?)
- **"Download to MVAT terminated: Too many NACKs"**
  - ⇒ The MVAT card has rejected the send (see the error number in the journal window of the ComMVAT module)

#### 6.1.5.1 Case of communicating through an UExp-MVAT panel

If the machine is equipped with an UExp-MVAT panel (operating panel at the station, see §\*5.10\*\*\*), before sending the programs to the MVAT, Rhapsodie.Net send to the MVAT controller an authorization request, to check that nobody modified the programs using the panel, in which case Rhapsody would most updated.

If you are in this case, a message box appears:



Then, the user has to decide between send notwithstanding (and then overwrite the modifications made from the panel), or cancel and update Rhapsodie programs with the "Upload from MVAT" button and the "Import" menu. (see §6.1.4 Upload/Import/Export p67).

## 6.1.6 Using the "List" pages

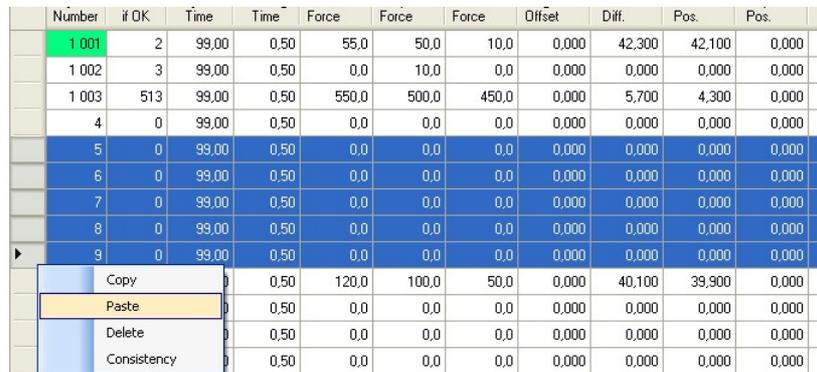
### 6.1.6.1 Copy/Pasting

The Cycles, Profiles and Sequence pages include a presentation of the data in the form of a table. This more compact but less readable presentation allows quick and efficient copy-pasting. For example, to duplicate cycle 1 (1001) 5 times to cycles 5 to 9, select row 1001 and right-click/copy



Cycle Number	Chain. if OK	Cycle Time	Holding Time	Max. Force	Trip Force	Min. Force	Gage Offset	Min. Diff.	Max. Pos.	Trip Pos.
1 001	2	99,00	0,50	55,0	50,0	10,0	0,000	42,300	42,100	0,000
			0,50	0,0	10,0	0,0	0,000	0,000	0,000	0,000
			0,50	550,0	500,0	450,0	0,000	5,700	4,300	0,000
			0,50	0,0	0,0	0,0	0,000	0,000	0,000	0,000
			0,50	0,0	0,0	0,0	0,000	0,000	0,000	0,000
6	0	99,00	0,50	0,0	0,0	0,0	0,000	0,000	0,000	0,000

Then select rows 5 to 9 and right-click/paste



Number	if OK	Time	Time	Force	Force	Force	Offset	Diff.	Pos.	Pos.
1 001	2	99,00	0,50	55,0	50,0	10,0	0,000	42,300	42,100	0,000
1 002	3	99,00	0,50	0,0	10,0	0,0	0,000	0,000	0,000	0,000
1 003	513	99,00	0,50	550,0	500,0	450,0	0,000	5,700	4,300	0,000
4	0	99,00	0,50	0,0	0,0	0,0	0,000	0,000	0,000	0,000
5	0	99,00	0,50	0,0	0,0	0,0	0,000	0,000	0,000	0,000
6	0	99,00	0,50	0,0	0,0	0,0	0,000	0,000	0,000	0,000
7	0	99,00	0,50	0,0	0,0	0,0	0,000	0,000	0,000	0,000
8	0	99,00	0,50	0,0	0,0	0,0	0,000	0,000	0,000	0,000
9	0	99,00	0,50	0,0	0,0	0,0	0,000	0,000	0,000	0,000
			0,50	120,0	100,0	50,0	0,000	40,100	39,900	0,000
			0,50	0,0	0,0	0,0	0,000	0,000	0,000	0,000
			0,50	0,0	0,0	0,0	0,000	0,000	0,000	0,000
			0,50	0,0	0,0	0,0	0,000	0,000	0,000	0,000

You can also select say a hundred or so cycles, copy and paste them into an Excel file, carry out bulk changes and paste them back into our list. (be careful however of certain values which are calculated by Rhapsodie from various checkboxes - the "Flag" columns in general)

### 6.1.6.2 Initialize (previously "Delete")

This feature initialize all the values, for the pages "Cycles", "Curves", "Profils" and "Sequences".

### 6.1.6.3 Consistency

This presentation also has the advantage of clearly highlighting any problems of consistency between programs created and used.

It allows a colour to be allocated to each cycle no., profile or sequence in order to check they are used correctly:

#### COLOUR CODE

Cycle Page	Cycle programmed and allocated to a sequence	Green
	Cycle allocated to a sequence but NOT programmed	Red
	Cycle programmed but not allocated to a sequence	Beige
	Cycle NOT programmed and NOT allocated to a sequence	White
Profile page	Curve programmed and allocated to a sequence	Green
	Curve allocated to a sequence but NOT programmed	Red
	Curve programmed but not allocated to a sequence	Beige
	Curve NOT programmed and NOT allocated to a sequence	White
Sequence page	Sequence OK	Green
	Sequence with cycle or curve NOT programmed	Red
	Sequence which loops back on itself (e.g. sequence 1 is allocated to cycle 1 which is chained to cycle 2 which is itself chained to cycle 1)	Salmon pink
	Cycle, curve or sequence number in error	Beige
	Sequence not programmed	White

## 6.2 How to backup projects

Just save the project folder(s) (D:\FSA\Presses in our example)

## 6.3 How to retrieve a project on another PC

The simplest way is as follows:

- Copy the folder for the project in question (the one containing the station folder, the .PJR file and the .RAP files, for example D:\FSA\Presses\Line1\Opxxx)
- Paste it into the PC\Destination folder (for example C:\My Documents\Presses\Line1\Opxxx)

Before the version V1.5.0.03, it's still necessary to :

- Edit the .PJR file
- Change the following line:

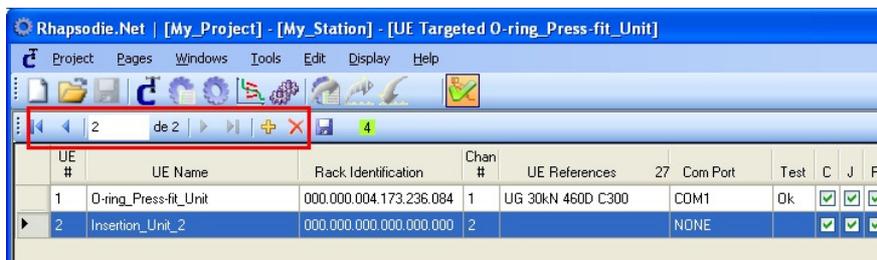
```
<StationPath>D:\FSA\Presses\Line1\Opxxx</StationPath>
```

- By updating the path to that for the new PC:

```
<StationPath>C:\My Documents\Presses\Line1\Opxxx</StationPath>
```

## 6.4 How to add/delete a Station to/from the project

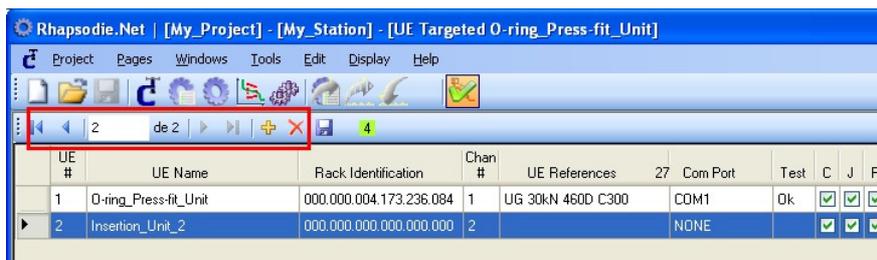
In the Station page, a browser window lets you scroll through the various stations for the project.



The  button allows you to add a station, the  button allows you to delete it. Afterwards, the procedure for saving the station with the passwords, path and name is the same as when it was created.

## 6.5 How to add/delete a Press-fitting unit to/from the Station

In the Press-fit Units page, a browser window lets you scroll through the various units for the station.



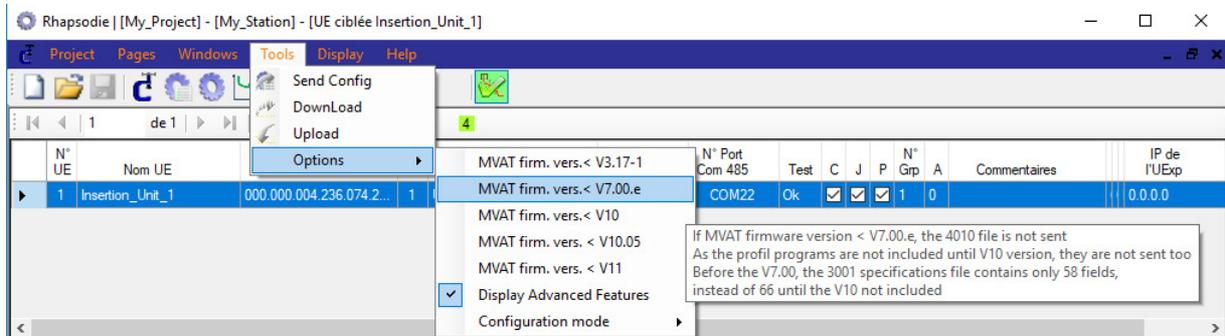
The  button allows you to add a unit, the  button allows you to delete it. Afterwards, the procedure for saving the unit with its name, identification, COM port, etc. is the same as when it was first created.

## 6.6 Results

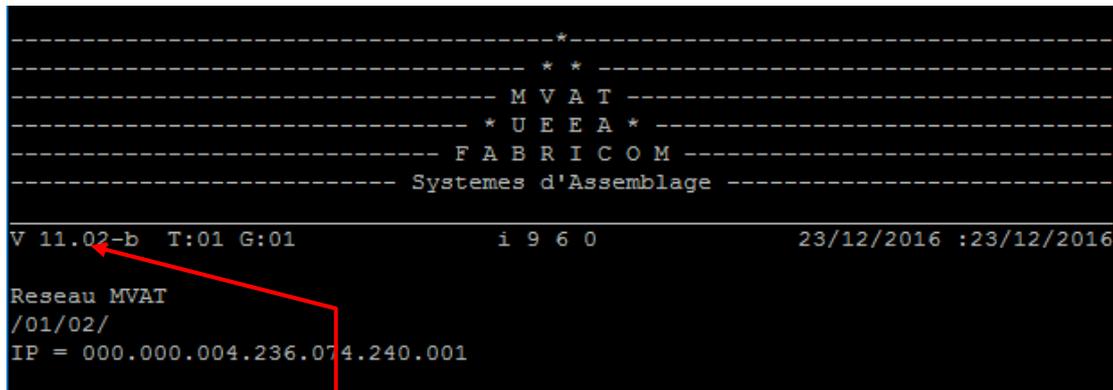
This chapter is under construction, as the Rhapsodie page is in modification.

## 6.7 Rhapsodie.Net Configuration to match with the MVAT version

Depending of the version of the MVAT card you want to communicate with, you need to configure Rhapsodie.Net to match with the MVAT version.

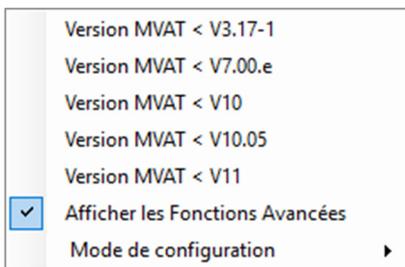


To know the MVAT version, after a reset of the MVAT rack, the following lines are displayed :

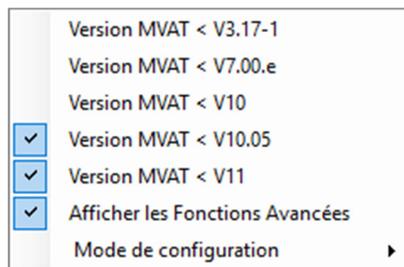


The version is displayed there :  
Depending of this version, you will have to configure correctly Rhapsodie.Net.  
Examples :

MVAT version is V11.02-c (2017)



MVAT version is V10.02 (2012)



MVAT version is V02.01 (2000)



After this configuration, you would have to close « Cycles » page, or « Specifications » page, then open it again, as some fields are hidden, or have their name changed, depending of what the MVAT is ready to understand.

## 6.8 How to get the MVAT rack Identification number

In order to know the MVAT rack Identification number, to fill the « Insertion Unit » page of Rhapsodie, you can see it on the MVAT terminal, after pushing the “reset” button of the rack :

```

-----*-----
-----* *-----
----- M V A T -----
----- * U E E A * -----
----- F A B R I C O M -----
----- Systemes d'Assemblage -----
-----
V 11.02-b T:01 G:01          i 9 6 0          23/12/2016 :23/12/2016

Reseau MVAT
/01/02/
IP = 000.000.004.236.074.240.001
  
```

The rack Identification number is displayed there : note just the 6th first 3 number series

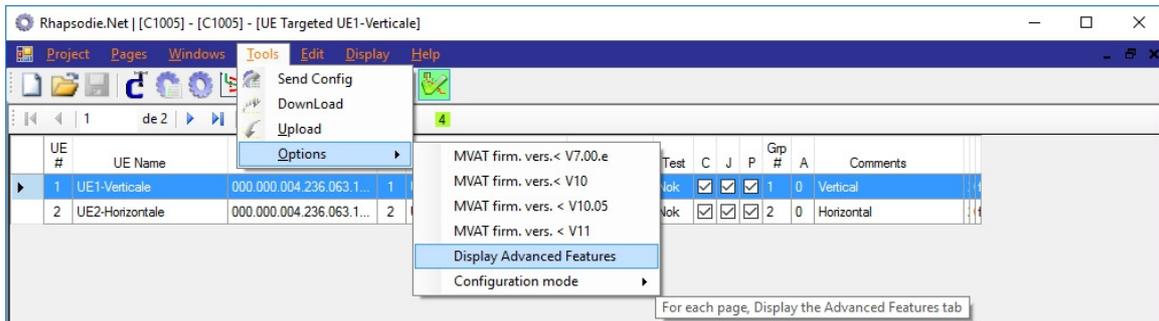
Otherwise, after each result, this number is displayed too :

```

*****
Poste/Voie/Adr. : 000.000.001.237.160.136.001
J/M/A , H/M/S : 26/04/2012 13/56/49,10
Temps total seq.:          21,95 s
Temper. Broche :          27,09 Deg.
Temper. Module :          41,84 Deg.
Numero sequence :          1
Controle Courbes Actif MAUVAIS
Sequence MAUVAISE
Resultat Numero :          203835
Nb Cyc av Graiss:          99871
Numero de courbe:          17
Nombre de cycle :          3
-----
Numero de cycle :          1
Numero de fiche :          1
Cycle Compression Emmanchement MAUVAIS
Temps du cycle :          1,45 s
Cote Precedente :          5,114 mm
Cote Atteinte :          46,026 mm TG
Force Crete :          55,2 daN TG
Force Residuelle:          46,6 daN
Difference Cote :          40,912 mm OK
-----
Numero de cycle :          2
Numero de fiche :          2
...
  
```

## 6.9 Advanced functions

Some new tabs become visible when the selection below is checked:

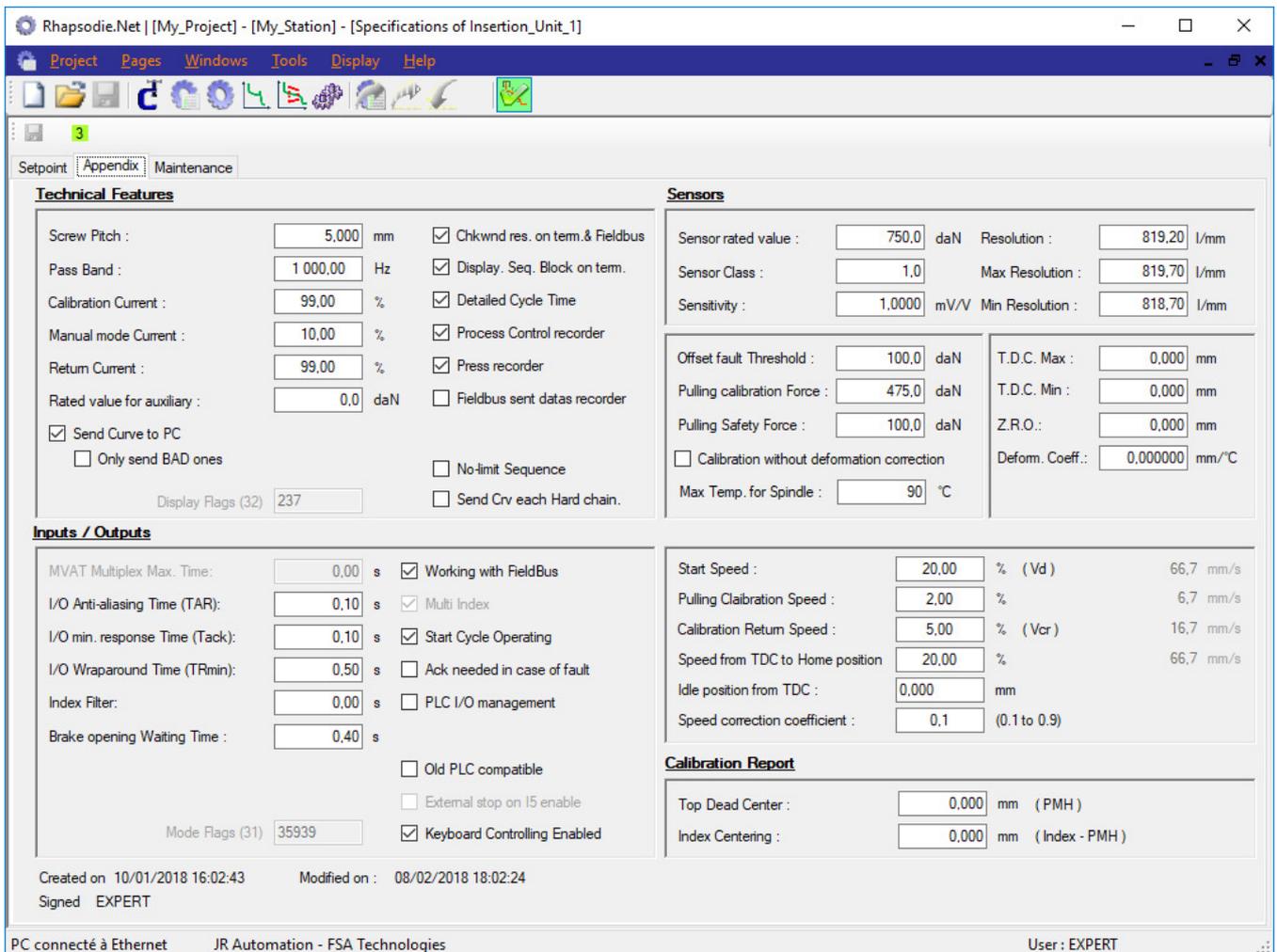


From then on, when the specifications or Cycles pages are opened, one or more additional tabs are displayed.

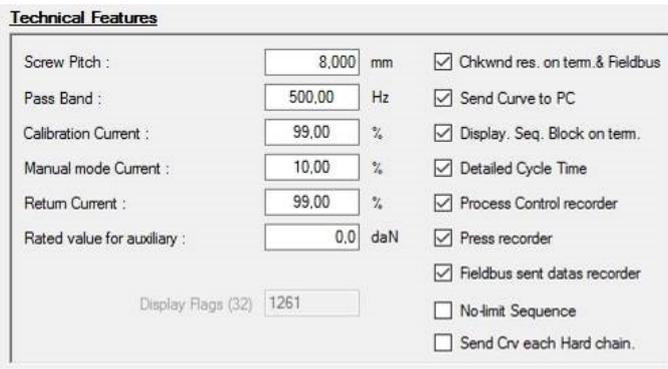
### 6.9.1 Specifications page

#### 6.9.1.1 "Appendix" tab

When Rhapsodie is configured for MVAT version <V11

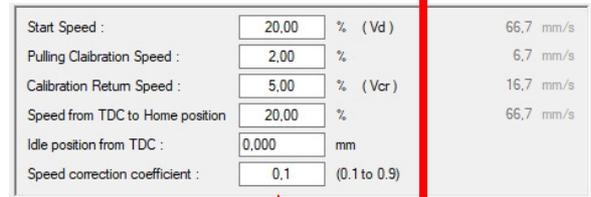


When Rhapsodie.Net is configured for MVAT version V11 or more :



These fields are available, and the feature change

A new field is available



### TECHNICAL FEATURES AREA:

**Screw pitch:** specifies the pitch of the roller screw in mm.

This field is only used by the MVAT card if the pin identification card is absent or defective.

To be entered only for pins which do not have an electronic identification or pins which do not appear in the "UE references" list

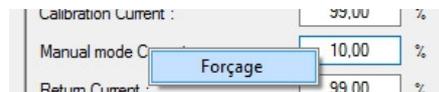
In this case, refer to the manufacturer's data (Equipment references section of the maintenance manual)

**Pass Band:** Value in Hertz of the pass band of the instrumentation amplifier, processed by the software. The default value is 1000 Hz.

**Calibration current:** specifies the maximum current that the speed controller can deliver during calibration in pressing or pulling mode. This value as a percentage is limited to 99%. Usual value is 99%.

**Manual mode current:** specifies the maximum current that the servo-drive can deliver during a manual ascent or descent. This value as a percentage is limited to 10% by Rhapsodie. If needed, it is possible to enforce to a upper value, by first "Double Click" on the "Manual Mode current" text, then right click on, the following contextual menu appears :

Just click on, and you will be allowed to enter more than 10%.



Just click on, and you will be allowed to enter more than 10%.

For safety reasons as regards the mechanical environment of the press-fitting pin, a maximum value of 10% is strongly recommended.

**Return current:** specifies the maximum current the speed controller can deliver during the return to the origin position. This value as a percentage is limited to 99%.

**Rated value for auxiliary:** specifies the maximum of the range of a control auxiliary which can be connected to the MVAT. For example, for a load cell delivering 10 mV under a full load of 100 kN, we will enter 10000 daN in this field.

### Checking boxes :

**Send curve to PC:** If this box is checked, at the end of each sequence, the MVAT sends over the RS485 link the 2048 or 4096 points stored according to the storage programme (curve).

**WARNING:** the MVAT can take up to 1 second to build the curve block and this time has a direct effect on the cycle time. Sending this block to the PC via the RS485 link can take up to 1.5 seconds. This does not affect the cycle time and allows the "VisuCourbes" tool to draw the force/displacement curves.

**WARNING:** If no PC is connected during production, this box must be unchecked to avoid wasting time (the card makes 3 attempts to send the curves)

On the other hand, the MVAT returns to "Ready" only when the curve is sent.

**Only send BAD ones :** If this box is checked, the MVAT sends on the RS485 ONLY the BAD curves. *This feature is available only for the MVAT bord those version is > V10.05*

**ChkWnd results displayed on terminal & Fieldbus:** **Available for MVAT V11 only.** If this box is checked, at the end of each sequence, the MVAT sends over the RS232 terminal the Checking Window result blocks, and provides it on the fieldbus interface exchange table.

**Cycle results displayed on terminal & Fieldbus:** **Up to the MVAT V11, this field is disabled, then becomes :**

**Display sequence Block on terminal** : If this check box is checked, at the end of each sequence, the MVAT sends over the RS232 terminal the Sequence result blocks. You can earn some cycle time by unchecking it.

**Detailed cycle time**: If this box is checked, the time of the last cycle carried out is displayed in the result block of the journal. If this box is not checked, the time displayed is the cumulative time from the start of the sequence.

**Process control recorder**: Monitoring mode for **Fabricom After-sales service**.

**Press recorder**: Monitoring mode for **Fabricom After-sales service**.

**Fieldbus sent data recorder**: If this box is checked, each time the PLC will send some datas to the MVAT (dynamical parametering), the values sent are displayed into the terminal. (very helpful to check what values are sent)

**No Limit sequence**: Usually, MVAT allows execution of sequences with a maximum of 100 cycles. For some process, if more cycles are needed in the same sequence (for the same product), you can use this specific mode. The sequence result block will be reduce to the last hard sequence executed. In this mode you can also ask the MVAT to send the curve at each hard chaining with the next checking box.

**Send curve at each Hard chaining**: This feature is use in "No Limit sequence Mode. Each time a Hard chaining is asled by the PLC, the MVAT send the last curve (except if this one has been already sent).

#### INPUT/OUTPUT AREA:

**MVAT Multiplex max time (TMUX)**: specifies the maximum time allowed for multiplexing the inputs in automatic mode.

**I/O Anti-aliasing time (TAR)**: specifies the anti-aliasing time for Inputs/Outputs

**I/O Wraparound time (TRMin)**: specifies the MVAT minimum loop time

**I/O min response time (Tack)**: specifies the minimum MVAT response time

**Index filter**: Allow the signal from the index (position detector) to be filtered by software to avoid the index being detected while the shaft is not on this position. This value must be between 0 and 0.08s.

**Brake opening Waiting Time**: Adjusts the time allowed to the brake to open before carrying out the Offset measurement at start-up. By default it is set to 400 ms.

#### Checking boxes :

**Working with Field Network**: when checked means you are using a network such as PROFIBUS DP or ETHERNET for the dialogue between MVAT and the PLC.

**Multi index**: Check the "Multi index" box to use the 4 "index offset" positions in the "Maintenance" tab.

**Start cycle operating**: validates the use of a "Cycle start" signal to launch either a press-fit sequence or a calibration, or a manual raise or lowering operation. Apart from FABRICOM AFTER-SALES SERVICE, this box must **always** be checked.

**Ack needed in case of fault**: when this box is checked in manual mode authorises continuation of execution with acknowledgement in case of fault. To continue execution with acknowledgement in case of fault, do not check.

**PLC I/O Management**: this box switches from automatic mode to manual mode. Checked means automatic mode, and unchecked manual mode.

**Idle position on S5 output**: when this box is checked, it activates the change of output S5 of the MVAT to level 1 when the spindle reaches its origin position. This field is greyed out and unchecked if the "Idle position from TDC" field is equal to 0.

**Old PLC Compatible**: this box allows disabling the fallen bit to 0 of « Cycle On» bit, between 2 cycles, SOFT chained without API authorization. Only the quality of the last cycle is known by the PLC.

**External stop on I5 enable**: this box allows an external ON/OFF signal connected to input I5 to cause a trip rather than a position or a force.

**Keyboard controlling enabled**: To directly control the press from the keyboard, this box must be checked. The control commands are sent exclusively by a UExp-MVAT connected to the MVAT card.

**SENSORS AREA:**

Sensors			
Sensor rated value :	<input type="text" value="4 000,0"/>	daN	Resolution :
Sensor Class :	<input type="text" value="1,0"/>		Max Resolution :
Sensitivity :	<input type="text" value="1,0000"/>	mV/V	Min Resolution :
			<input type="text" value="819,20"/>
			<input type="text" value="819,70"/>
			<input type="text" value="818,70"/>

**Sensor rated value:** rated value in daN of the Force sensor fitted to the press-fitting pin.

**Sensor Class:** OPTION. Authorises a limitation or overrun of the rated force (1 by default otherwise AS AN OPTION value between 0.8 and 1.2)

**Sensitivity:** number of millivolts delivered by the force sensor for every 1 volt of power supply voltage when stressed to its rated value. 1.000 mV/V is the default value.

**Resolution:** After the machine has been calibrated, the MVAT card calculates this value and displays it in the calibration result block in the journal under the title "Resolution depl."

(See Appendix, [Journal](#), calibration of bottom and top gages).

It must be updated by the user in Rhapsodie.net.

**Max. resolution:** Maximum value that the number of pulses/mm found during the calibration cycle must not exceed. If the number of pulses/mm is greater than the maximum resolution, the calibration is not confirmed and the new settings calculated are not taken into account by the MVAT which declares an incorrect calibration by output S6. A check must be made that the gages are of the correct thickness.

**Min. resolution:** Minimum value that the number of pulses/mm found during the calibration cycle must not exceed.

If the number of pulses/mm is less than the minimum resolution, the calibration is not confirmed and the new settings calculated are not taken into account by the MVAT which declares an incorrect calibration by output S6. A check must be made that the gages are of the correct thickness.

Entry of the last two settings is essential to the operation of the machine. A fault is enabled if they are not specified.

**FORCE AREA:**

Offset fault Threshold :	<input type="text" value="3 500,0"/>	daN
Pulling calibration Force :	<input type="text" value="9 500,0"/>	daN
Pulling Safety Force :	<input type="text" value="2 000,0"/>	daN
<input type="checkbox"/> Calibration without deformation correction		
Max Temp. for Spindle :	<input type="text" value="96"/>	°C

**Offset fault Threshold:** Value in daN of the maximum force offset tolerated at idle. If this value is exceeded, the card will refuse to start a cycle and a fault number is shown in the result block ([fault list](#)). A value equivalent to 10% of the rated value of the sensor is recommended.

**Pulling calibration force:** Value in daN of the force used during pulling calibration of the machine. This value must be greater than the largest pulling force programmed in the cycles and be between 0.25 and (1 times the rated - Offset fault threshold).

**Pulling Safety Force:**

- Value in daN of the maximum force authorised during the return travel of the pin. During this return travel, the force is continually checked and must not exceed this programmed value
- Value in daN of the maximum force authorised during the manual raise

**Calibration without deformation correction:** If this check box is checked, the MVAT will stop to use the learning of deformation during calibration to correct dynamically the position regarding this deformation. It is not recommended to check this box, to ensure accuracy in position.

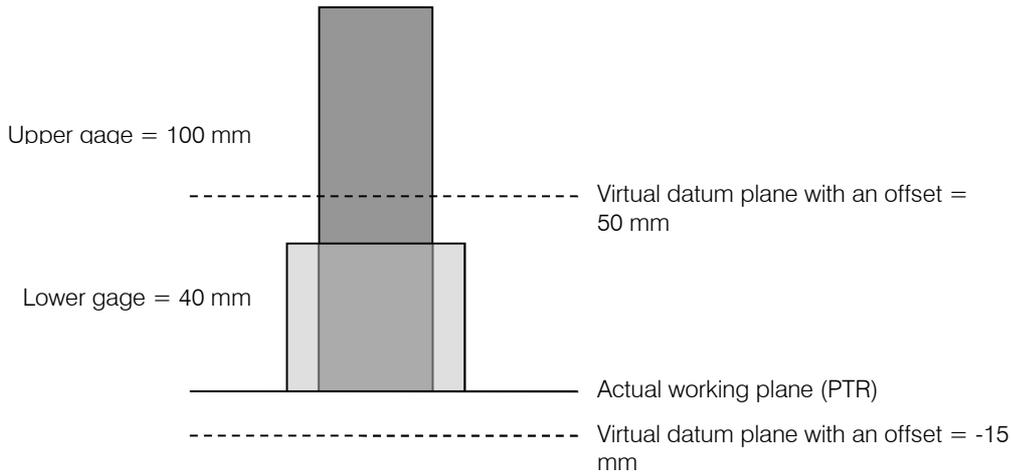
**Max. Temperature for Spindle** (since the MVAT version V10.07): Value in Celcius degree. If you want the MVAT stops and displays the fault #120 as soon as the temperature of the spindle goes over this value, enter a value **AND** check the "Activation of Spindle Temp." box in the "Maintenance tab" of "Specifications" page. If "0" is entered, this means "NO CHECKING". The advised temperature is around 90°C to preserve the spindle

## TDC AREA

T.D.C. Max :	<input type="text" value="0,000"/>	mm
T.D.C. Min :	<input type="text" value="0,000"/>	mm
Z.R.O.:	<input type="text" value="10,000"/>	mm
Deform. Coeff.:	<input type="text" value="0,000000"/>	mm/°C

**T.D.C. Max./ T.D.C. Min.:** When carrying out a calibration without gages, these fields protect the quality and consistency of the lower gage calibration.

**Z R O (Offset from Actual Working Plane):** This field offsets the **Actual working plane** (PTR), i.e. the "zero" obtained on calibration (bearing surface of the lower gage) in a positive or negative direction to obtain a **Virtual datum plane**(PRV).



**Coeff. Déform :** Provided that an external temperature sensor is connected to the spindle (to measure the temperature of the frame for example), this coefficient is used to correct the press aperture when the ambient temperature evolves. To help the user to evaluate practically the value of this coefficient, it's possible to make 2 calibrations at 2 different temperatures, and then, after the second calibration, the MVAT card calculates this coefficient and gives the result into the terminal result. (only if a preliminary value has been entered first to activate this correction)

## SPEEDS AREA:

Start Speed :	<input type="text" value="20,00"/>	% ( Vd )	66,7 mm/s
Pulling Calibration Speed :	<input type="text" value="2,00"/>	%	6,7 mm/s
Calibration Return Speed :	<input type="text" value="5,00"/>	% ( Vcr )	16,7 mm/s
Speed from TDC to Home position	<input type="text" value="20,00"/>	%	66,7 mm/s
Idle position from TDC :	<input type="text" value="0,000"/>	mm	
Speed correction coefficient :	<input type="text" value="0,1"/>	(0.1 to 0.9)	

**Starting Speed:** used at the start-up of the ram between the idle position and TDC.

(See [Position and speed diagram](#)).

This is a percentage value limited to 20% maximum.

**Pulling Calibration Speed:** this is used during pulling calibration of the machine between the lower shaft position (obtained using a standard cycle with returning to idle position) and the moment where the ram encounters the pulling calibration force. This is a percentage value limited to 20% maximum. The lower this speed (from 1 to 3%), the better is the pulling calibration.

**Calibration Return Speed:** this is used between the position where the ram stopped during pressing calibration or between the lower pulling calibration position and the TDC. This is a percentage value limited to 99 % maximum. To avoid shocks when returning after calibration, it is advised to program this speed > "Start Speed", or program a "Speed from TDC to home position" not equal to Zero (because in case of "Calibration return Speed" < "Start Speed", AND a "Speed from TDC to home position" = 0, a fast acceleration phenomenon occurs before the ram reach the TDC)

**Speed from TDC to Home position:** this speed is used for the return to idle position at the end of a sequence. If this value is 0, the "Start Speed" is used instead. This value as a percentage is limited to 20%.

**Idle position from TDC:** specifies the idle position relative to TDC. A value of 0 is strongly recommended (in this standard case, the idle position is PULSE-1). Otherwise, the value must be between the "Index centring" value and the screw pitch + 2mm (to avoid that the ram push on the internal stop)

**Speed correction coefficient :** If the PLC set the byte « OUT1.5 » to 1 before selecting the sequence to execute, all the speeds of the corresponding cycle (Travel Speed, Working Speed, Tripping Speed, and return Speed), will be affected by this coefficient. If the new calculated speed is less than 2%, the new speed will be enforced to 2%. The value of this coefficient has to be between 0.1 and 0.9, stepped by 0,1.

This new features allows to check a cycle in « Speed reduction » mode, without changing the speeds of the cycles in Rhapsodie.. If before the next selection, this byte is not set to 1, the cycles of the sequence will be executed with the speeds that are parametered into Rhapsodie.

#### CALIBRATION REPORT AREA

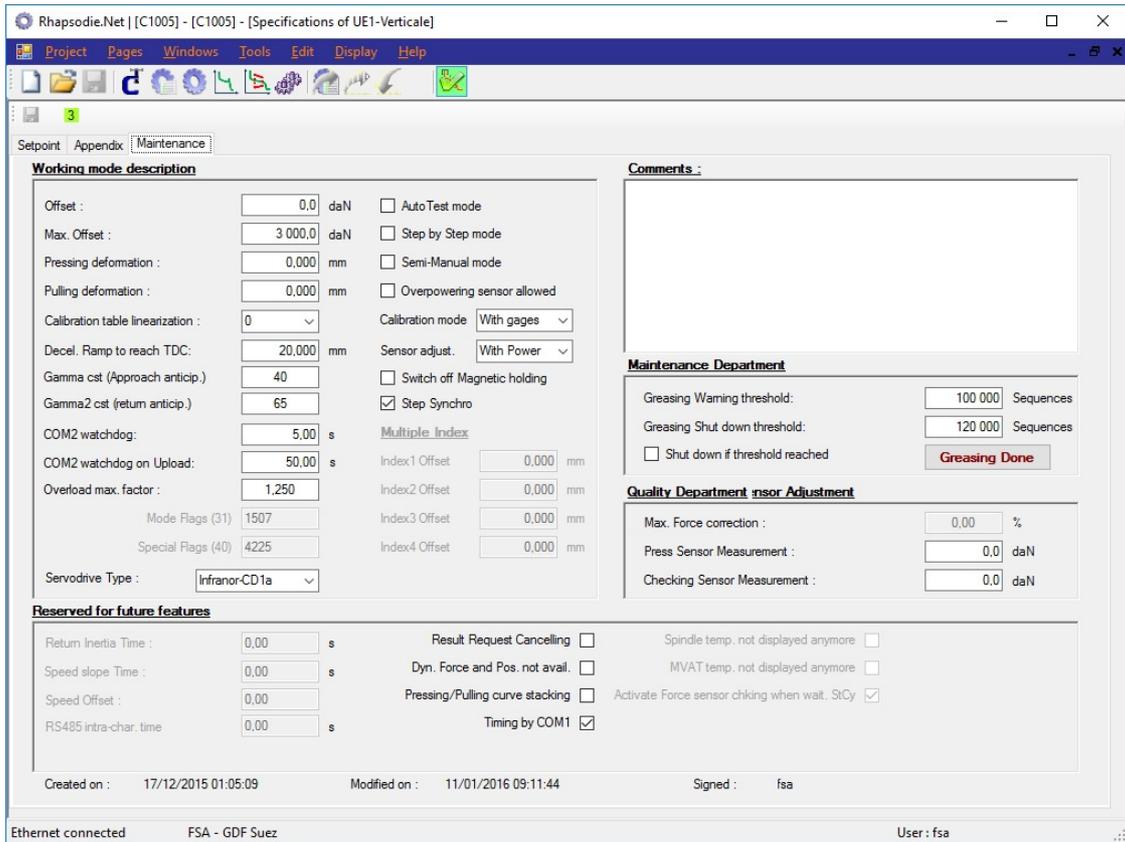
Calibration Report	
Top Dead Center :	<input type="text" value="0,000"/> mm (PMH)
Index Centering :	<input type="text" value="0,000"/> mm (Index - PMH)

**Top Dead Centre:** This position equates to the position of the 1<sup>st</sup> resolver or coder pulse encountered by the unit when the shaft exits. All position values are initialised when this PULSE is passed. The distance between Top Dead Centre and the position of the Virtual Datum Plane (machine table or reference 0) is called "**Press opening**" (see [Position and speed diagram](#) ). After the machine has been calibrated, the MVAT card calculates the press opening and displays it in the calibration result block in the journal. The value thus obtained must be entered by the user in Rhapsodie.net in the Top Dead Centre field.

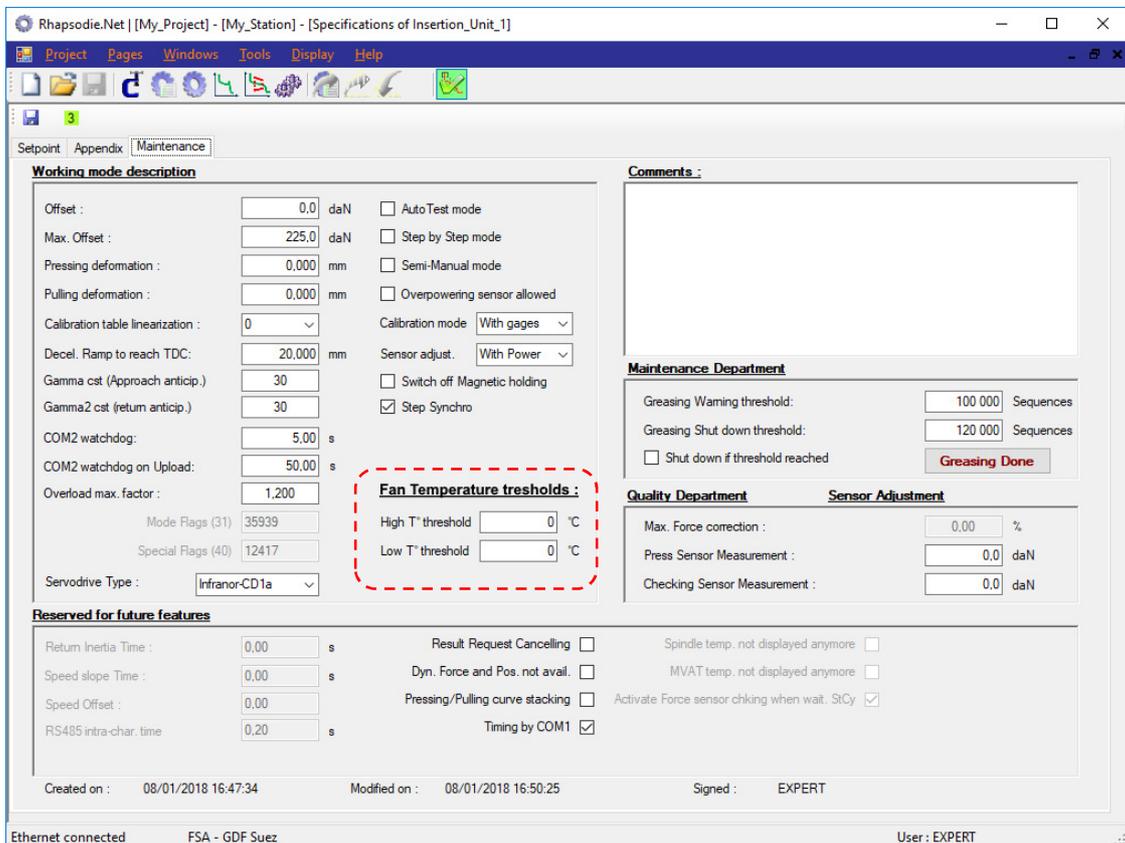
**Index centering:** After the machine has been calibrated, the MVAT card calculates this value and displays it in the calibration result block in the journal under the title "Index entering". It must be updated by the user in Rhapsodie.net. This value in mm gives the distance between the index (position detector) and the first pulse given by the coder when the shaft exits (see [Position and speed diagram](#) ). The index entering value must be very close to half the screw pitch.

### 6.9.1.2 "Maintenance" tab

When Rhapsodie is settled for MVAT version < V11



When Rhapsodie is settled for MVAT version ≥ V11



WORKING MODE DESCRIPTION AREA

**Offset:** This is the offset value given after calibration has finished.  
It can be entered in Rhapsodie.net, but the MVAT card keeps it in memory anyway.

**Max. offset:** This is the maximum value tolerated for the offset at the end of calibration.

**Pressing deformation:** This the max value in mm tolerated for the distortion of the frame with the pin in pressing mode.  
The value 0.00 disables this test.

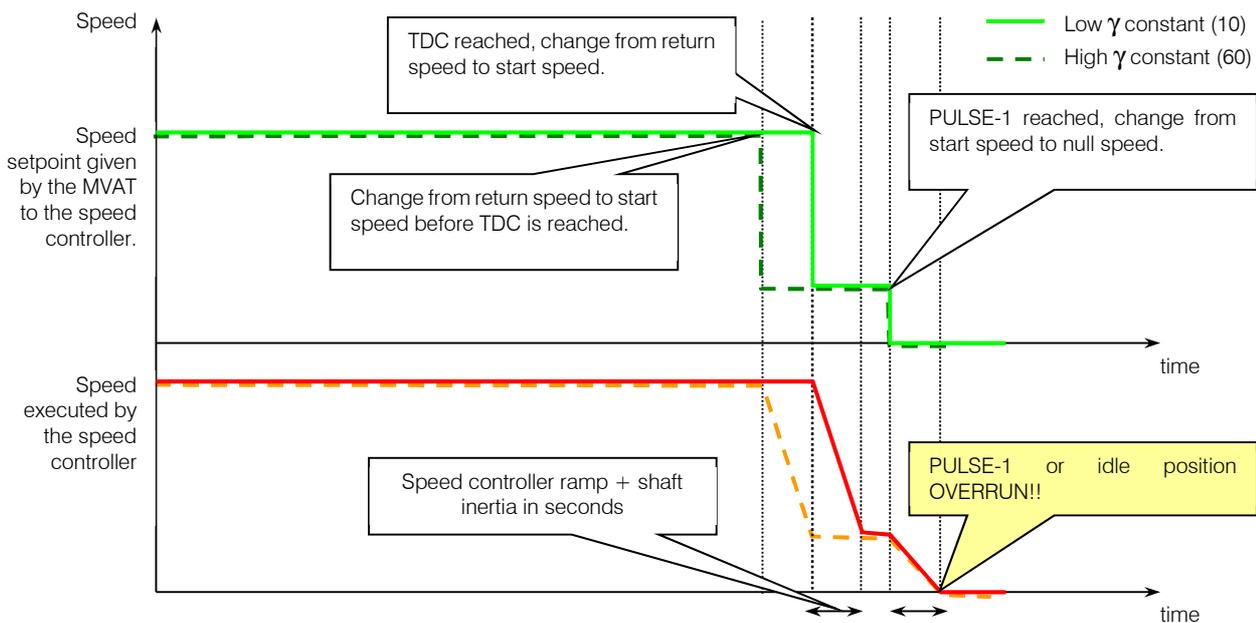
**Pulling deformation:** This the max value in mm tolerated for the distortion of the frame with the pin in pulling mode. The value 0.00 disables this test.

**Calibration table linearisation:** During calibration, the MVAT card saves the distortion table for the frame. This setting enables the first 8, 16 or 24 recordings to be linearised in order to filter any spurious values or mechanical sticking points.

**Decel ramp to reach TDC:** Determines the distance over which the UE decelerates to change from the return speed to the start speed.

**Gamma2 cst (Approach anticip.):** This value allows the MVAT to anticipate the travel of the shaft while slowing down during its outward movement. Indeed, depending on the acceleration/deceleration ramp of the speed controller, and the potential inertia of an embarked tool, the shaft may overrun the approach position during its outward movement.

**Gamma2 cst (return anticip.):** This value allows the MVAT to anticipate the slow down travel of the shaft during its return. Indeed, depending on the acceleration/deceleration ramp of the speed controller, and the potential inertia of an embarked tool, the shaft may overrun its idle position during its return.



Example illustrated: ramp = 0.05 secs

To avoid these overruns, **avoid as far as possible programming a ramp** in the operation of the speed controller.

**COM2 watchdog:** This the maximum time allowed for the MVAT to send curve files to the PC via the RS485 link. The value 3s is entered by default.

**COM2 watchdog on upload:** This is the maximum time allowed for the Upload (upload of the program from the MVAT via the RS485 link. The value 50s is entered by default.

**Overload max. factor:** this coefficient limits the over-classification of the press-fit unit. If the "Class" value of the "Appendix" tab is greater than this coefficient, the MVAT will generate a "Sensor rating fault".

CheckBoxes :

**Auto Test mode:** In this mode (reserved to **FSA After-Sales Service**), the press-fit unit executes sequence no.1 in a loop and sends a special result block at the end of each sequence.

This mode allows execution of the "Esc" "t" keyboard command to be checked. However, to validate execution of this command, the "Start cycle operating" field in the "Appendix" tab of the "Specifications" must not be checked and button Dcy must be set to 1.

**Step-by-step mode:** This mode, which can only be used when operating without a PLC allows execution of a sequence to be shut off by releasing the cycle start button  
When the cycle start is released, the sequence is interrupted until the cycle start is set back to 1. By combining this mode with semi-manual mode, the value of the force and movement during the execution of the sequence may be viewed dynamically.

**Semi-manual mode:** This mode, which can only be used when operating without a PLC, allows the value of the force and movement during the execution of the sequence to be viewed dynamically.

**Calibration:** this field must be set to "With gauges «as the other option is reserved for special cases.

**Sensor adjust:** this field enables the correction mode for the force to be selected. If "With power" is selected, the sensitivity correction is carried out by adjusting the power supply of the gauge bridge. If "Rated" is selected, the correction is made by adjusting the rated value. It is strongly recommended to always work in "With power" mode.

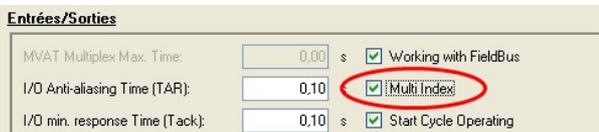
**Overpowering sensor allowed:** This box must *never* be checked when controlling FABRICOM pins.

**Step Synchro:** this field *must* be checked when working with a PLC.

**Switch off magnetic holding:** this field must be checked by default in order maintain the servo-control of the motor until the cycle start is released. Warning: after 15 secs, the servo-control will be automatically released as the automatic control system will have activated (by voltage loss) the electromagnetic brake.

MULTIPLE INDEX AREA (MVAT version < V11) or FAN TEMPERATURE THRESHOLD (MVAT version ≥ V11) :

In the "Appendix" tab, the "Multi Index" box must be checked to use the four "index offset" positions.



- Note:
- Multi Index can only be enabled if the "Field Bus" box is also checked.
  - If Rhapsodie is settled to work with MVAT version ≥ V11, this checkbox allows to display the "Fan Temperature Threshold" area in the maintenance page

Rhapsodie settled for a MVAT version ≥ V11 : Fan Temperature Threshold



If the High T° threshold is reached by the temperature sensor which is displayed in the MVAT terminal, (« Spindle Temp. »), the MVAT board set to 1 the « IN3.4 » byte, to allow the PLC to start the spindle fans.

If the Low T° threshold is reached, the MVAT board set to 0 the « IN3.4 » byte, to allow the PLC to stop the spindle fans.

If the temperature sensor is out of order, and some values are entered into these fields, the MVAT board enforce the « IN3.4 » byte to 1.

Index1 offset, Index2 offset, Index3 offset, Index4 offset:

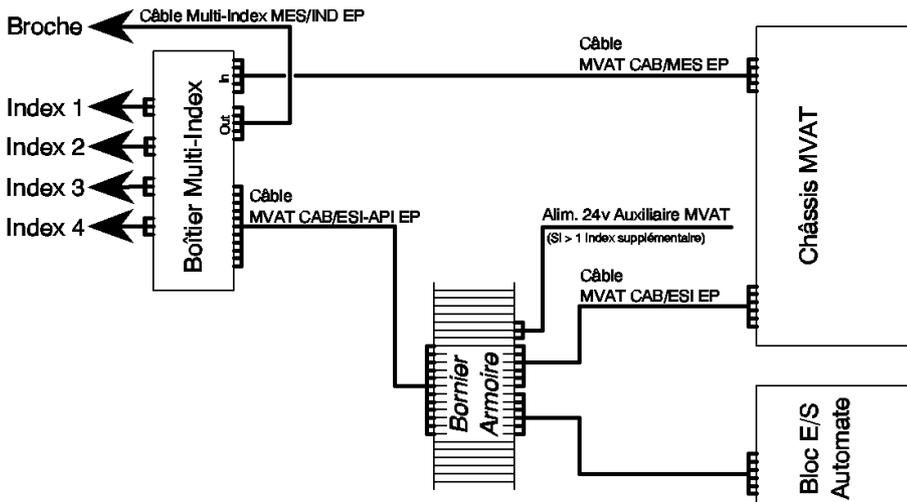
Press opening offset\* of a distance of N exact multiples of the screw pitch between this index and index0 (origin). Up to 4 indexes maximum may be configured.

Multiple Index	
Index1 Offset	<input type="text" value="0,000"/> mm
Index2 Offset	<input type="text" value="0,000"/> mm
Index3 Offset	<input type="text" value="0,000"/> mm
Index4 Offset	<input type="text" value="0,000"/> mm

The positions of the N offsets may be in any order. However, to make it easier to understand the movements, it is recommended to place them in either an increasing or decreasing order.

\*The opening of the press is available using the (E) command. The maximum offsets must be less than the press opening - 2 + P (screw pitch).

**Wiring the Multi-Index unit**



**Connecting the Multi-Index unit:**

See section 6.2 of the MVAT/Net manual

**Use of multiple indexes:**

In home position (Index0), the PLC changes from index0 to index-N (from 1 to 4) by coding the value N into word OUT1 (OUT1.7=C.2<sup>2</sup>, OUT1.6=C.2<sup>1</sup>, OUT1.5=C.2<sup>0</sup>) and by checking that FB\_XCHG\_INDEX=0 after having started the cycle to move the device to this index position, checked by the value declared in the Specifications tab.

At the end of the cycle (FB\_CYCLE\_ON=0), FB\_XCHG\_INDEX=1 if the positioning cycle is correct. To protect the change of index, the selection of Index-N must be controlled by a PLC output (PNP 24V) before releasing the cycle start (FB\_DCY=0), the re-read (echo) of this selection is carried out by an input of the MVAT rack.

If the selection echo or index-N is not correct, FB\_XCHG\_INDEX=0. If index-N is not correct when the pin starts, a standard fault FBV\_BRCH\_HAUT=0 is obtained.

Important:

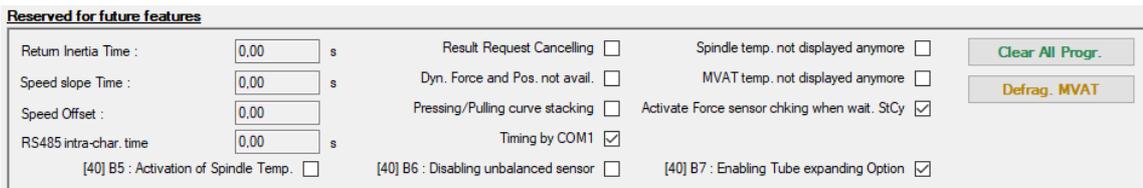
Changing from index-N to another requires going through a positioning cycle to Index0.

## RESERVED FOR FUTURE FEATURES AREA:

Without hidden features



After Double clicking, then right clicking on the “Reserved for futures features” title, to let the “SAV function” menu appear:



**Return Inertia Time :** For FSA After Sales only.

**Speed slope Time :** For FSA After Sales only..

**Speed Offset :** For FSA After Sales only..

**RS485 intra-char. time :** For FSA After Sales only..

**Activation of Spindle Temp.:** If this checkbox is checked, the value of max. temperature for spindle, entered into the “Appendix” tab, is used to stop with a temperature fault.

**Result request cancelling:** The results are no longer sent to the fieldbus interface.

**Dynamical Force and Position not available :** The values of the force and the position, displayed on the terminal and send to fieldbus interface ONLY in MANUAL MODE, are no longer available.

**Pressing/pulling curve stacking:** Check to enable the force and displacement of the UE in pulling and pressing mode to be recorded in the same curve window (Expansion).

**Timing by COM1:** This box must always be checked to synchronize the terminal and MVAT RS232

**Disabling unbalanced sensor checking :** If checked, the unbalance of the sensor is no longer checked.

**Spindle Temp. not displayed anymore :** If checked, the temperature of the spindle is no longer displayed into the sequence result block.

**MVAT Temp. not displayed anymore :** If checked, the temperature of the MVAT card is no longer displayed into the sequence result block.

**Activate Force Sensor Checking when waiting for Start Cycle :** If checked, the checking of the sensor is no longer made when the MVAT is waiting for start cycle.

**Enabling Tube expanding Option :** If checked, some calculation options are activated for the Tube expanding application.

**MAINTENANCE DEPARTMENT AREA**

Maintenance Department	
Greasing Warning Threshold:	<input type="text" value="100 000"/> Sequences
Greasing Shut down Threshold:	<input type="text" value="120 000"/> Sequences
<input type="checkbox"/> Shut down if threshold reached	<input type="button" value="Greasing Done"/>

**Greasing warning threshold:** When this threshold is reached, a "Greasing Alert" message is added in the sequence result block.

**Greasing Shut down Threshold:** When this threshold is reached, a "Greasing Shutdown" message is added in the sequence result block.

**Shut down if threshold reached:** if this box is checked, the press will shut down when the Greasing Shutdown Threshold is reached. It will not be possible to restart it until the "Greasing Done" button is pressed.

**QUALITY DEPARTMENT AREA:**

Without correction

Quality Department	Sensor Adjustment
Max. Force correction :	<input type="text" value="0,00"/> %
Press Sensor Measurement :	<input type="text" value="0,0"/> daN
Checking Sensor Measurement :	<input type="text" value="0,0"/> daN

With correction

Quality Department	Sensor Adjustment
Max. Force correction :	<input type="text" value="10,00"/> %
Press Sensor Measurement :	<input type="text" value="2 823,0"/> daN
Checking Sensor Measurement :	<input type="text" value="2 746,0"/> daN

Allows a linear correction to be made to the sensitivity to make the value given by the MVAT correspond to that given by the test equipment.

This correction is logically irrelevant as the MVAT corrects the force dynamically in accordance with the values measured when the shaft fitted with instruments was calibrated.

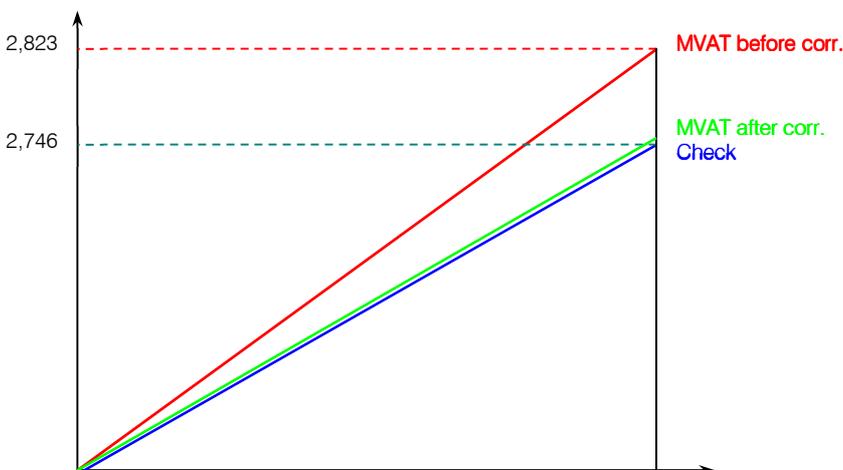
It may be necessary when an incorrect application of the force generates a **repetitive and linear** error at the test equipment. An offset between the two measurements may under no circumstances be cancelled by this correction.

**Max. force correction:** This is the maximum allowed correction as a percentage. It is limited to 10%.

**Press sensor measurement:** For the largest force applicable by the press-fit unit, we read off the force measured by the MVAT.

**Checking sensor measurement:** In the same test, the value input here is the value given by the test equipment.

**Note:** do not enter a non-zero value in the max. force correction field if the press sensor measurement and the checking sensor measurement fields are both 0.

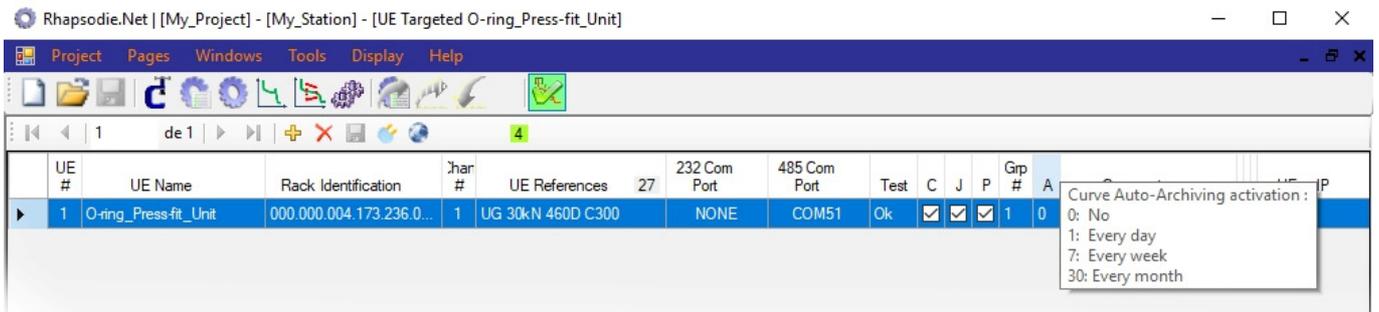


**Example:**

UG30kN  
 MVAT setpoint: 2,800 daN  
 Press sensor measurement: 2,823 daN  
 Checking sensor measurement: 2,746 daN

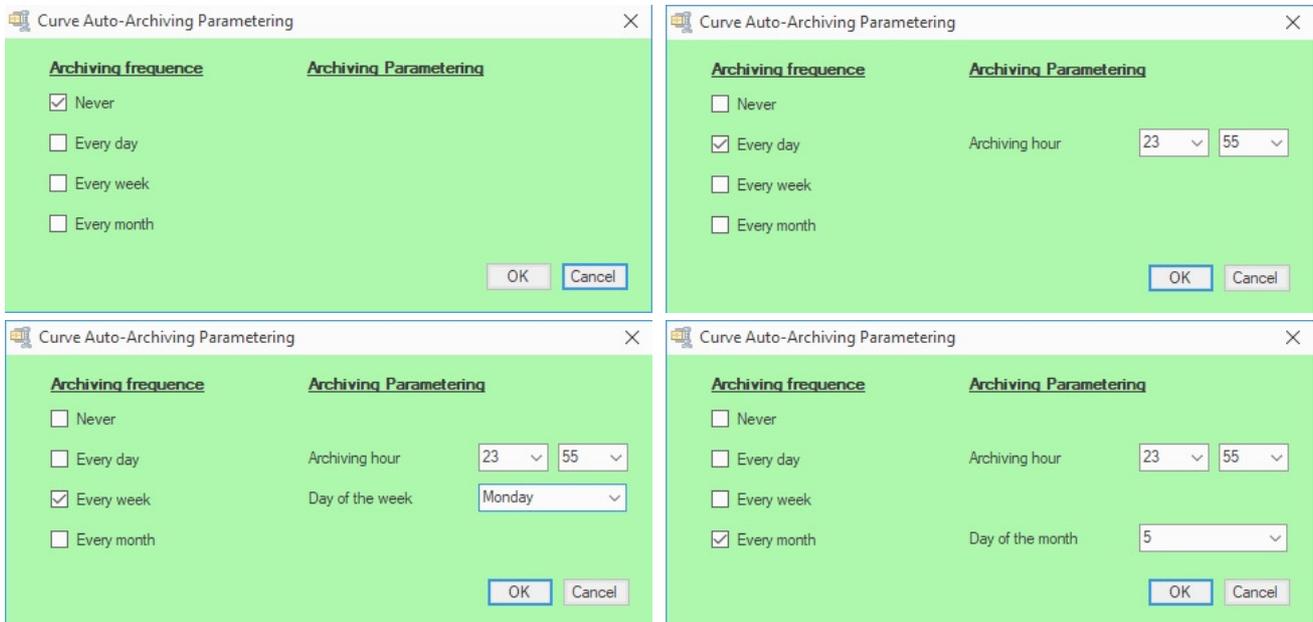
## 6.9.2 Insertion Unit Page – Curve Auto-Archiving feature

Since the Rhapsodie version 1.7, a new curve archiving feature has been implemented. To use it, just double-click on the value of the new « A » column of the “Insertion Units” page :

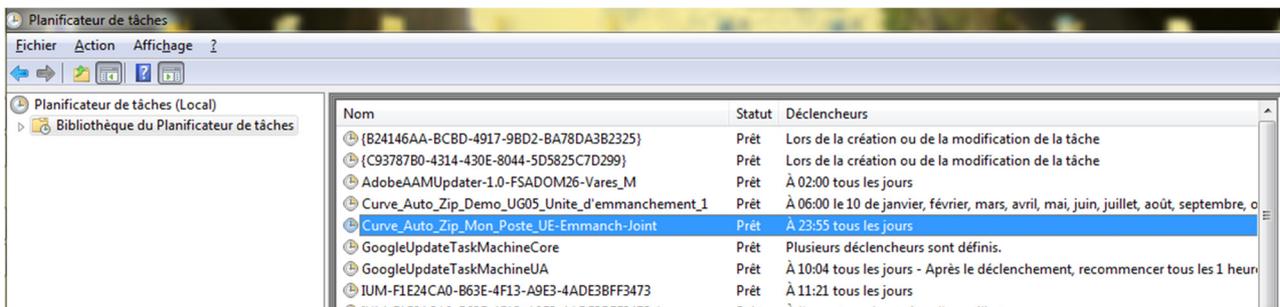


By double-click on the value of the new « A » column, a windows appears and allow the user to choose between :

- 0 : No (*no Auto-archiving settled – BE CAREFUL, Windows does not appreciate folders with hundreds thousands of files*)
- 1 : Archiving every day at a define hour of the day
- 7 : Archiving every week, at a define day of the week, at a define hour of the day
- 30 : Archiving every month, at a define day of the month, at a define hour of the day.



When you have made your choice, and you click on « OK », the windows is closed, the « A » value is updated in the column, and a Windows scheduled task is programmed or deleted depending of the choice. :



Then, each time this task is launched, the « courbe » folder corresponding at the insertion unit is emptied, and all the curves are compressed in a .zip file saved in the « Zips-Auto » folder. During this operation a Windows shell window is opened, then closed itself when finished)

## 6.9.3 Cycle Page

### 6.9.3.1 "Advanced" tab

Rhapsodie.Net | [My\_Project] - [My\_Station] - [Cycles of Insertion\_Unit\_1]

Project Pages Windows Tools Display Help

Sheet List **Advanced**

Max. Cycle time :  s

Flag Cycle : [20] 445 650  
[35] 8 705

**Position difference Calculation**

Position diff. calc with:

Calculation Offset :  mm

Max. diff. calc. :  mm

Min. diff. calc. :  mm

**Limited Force checking**

Start of checking :  mm

End of checking :  mm

Limited Force :  daN

Force tripping inhibition during checking

---

**Force Before Stop (F.B.S.)**

FBS distance :  mm

Max. FBS :  daN

Min. FBS :  daN

**Force Following Mode activated**

Force to follow :  daN

Delay Time :  ms

1st Multiplier :  }

2nd Multiplier :

---

**Specific Area Programation**

Pos. for "Out of area" during Traction :  mm

Pos. for "Specific Area" during Compr. :  mm

**Option for relative displacement**

Positioning cycle relative to the last acquisition cycle

Force Offset reset when cycle begins

**Slope Tripping mode Activation**

Force threshold to start Observ. :  daN

Offset/threshold OR Start Observ. pos. :  mm

Observation Window :  daN

Obs. Wnd Dividing Factor :   Obs. in decreas. way

Slope changing detection Rate :   Decreasing slope

Ethernet connected JR Automation - FSA Technologies User : EXPERT

**Max. Cycle time:** Maximum total time for the cycle from the start of the cycle until the pin returns to idle position or until the start of the next chained cycle (by default, this value is pre-entered to 99 sec., however, it's advised to adjust the value at the cycle time + 3sec., in order to limit the over-heating of the motor, when the spindle is not able to fulfil his cycle).

#### POSITION DIFFERENCE CALCULATION AREA

**Position diff. calculation with:** If "Initial" is selected, the position difference calculation along with the quality check (Min difference < Position difference < Max difference) will be carried out relative to the position obtained during the acquisition cycle. If "Previous pos." is selected, the position difference calculation along with the quality check will be carried out relative to the position obtained during the previous cycle.

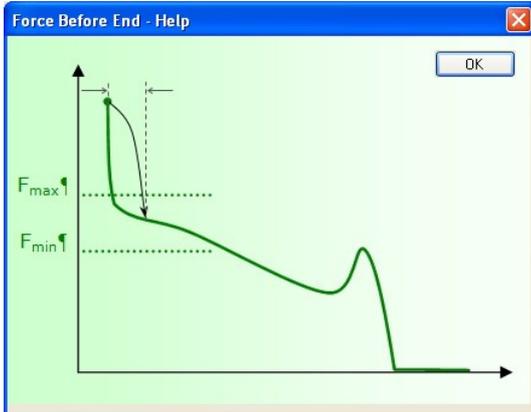
**Calculation offset:** Value in mm which will be deducted from the "Position difference" calculation  
 If a gauge (or a spacer) is used for the acquisition cycle which will then be removed for the press-fit cycle, the value of the calculation offset to be entered will be the position of the gauge (or the spacer).  
 If no gauge or spacer is removed between the acquisition cycle and the press-fit cycle, the value 0.00 must be entered.

**Max. diff. calc.:** Maximum value in mm that the position difference between the acquisition cycle (initial position) and the press-fit cycle (final position) must not exceed for the cycle to be declared OK. If no value is entered, this setting is not taken into account by the quality check. This value is not taken into account in an acquisition cycle.

**Min. diff. calc.:** Minimum value in mm that the position difference between the acquisition cycle (initial position) and the press-fit cycle (final position) must not exceed for the cycle to be declared OK. If no value is entered, this setting is not taken into account by the quality check. This value is not taken into account in an acquisition cycle.

## FORCE BEFORE STOP AREA

When the  button is clicked, the following help window opens:



This function provides a simple check of the pressing-fitting operation for a part which is press-fitted fully home. This check is carried out at the end of cycle or end of sequence. This function requires the use of a force storage program associated with the sequence.

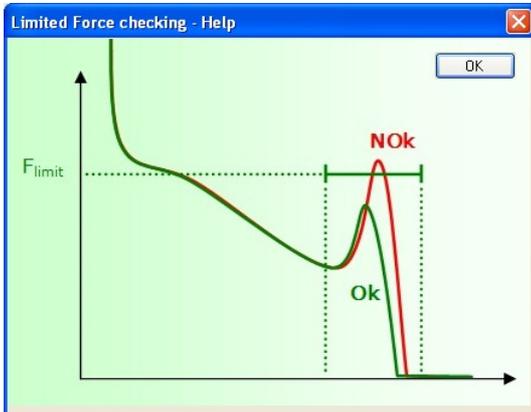
**Force Before Stop (FBS):** If this box is checked, the other fields become accessible and this function activates.

**FBS distance:** This is the distance between the position reached when pressed home as far as it will go (last point) and the measurement of the force to be checked.

**Max. FBS/Min. FBS:** These are the maximum and minimum allowed at the distance before stop. They are used to ensure correct binding for a part press-fitted fully home.

## LIMITED FORCE CHECKING AREA

When the  button is clicked, the following help window opens:



This function prevents the press-fitting of a non-compliant part (incorrect fitting, insufficient entry bevel, etc.). The sequence is stopped and the part can be recovered. This function does not require the use of a force storage program associated with the sequence.

**Start of checking:** This is the absolute start position for checking.

**End of checking:** This is the absolute end position for checking.

**Limited force:** If this force is reached between the monitoring start and end positions, the sequence is interrupted with fault no. 97.

**Force Tripping inhibition during checking :**

**FORCE FOLLOWING MODE ACTIVATED AREA**

**Force to follow:** If a force is entered, the press will stop its travel when this force is reached, then continue if the force reduces again. If the trip force or trip position are reached, the cycle terminates in the normal way. Otherwise, to stop the cycle, the stop on external signal may be used.

**Delay time :**

**1<sup>st</sup> Multiplier :**

**2<sup>nd</sup> Multiplier :**

**Force Following Mode activated**

Force to follow	1 000,0 daN	} 33816596
Delay Time	20 ms	
1st Multiplier	4	
2nd Multiplier	2	

**Slope Tripping mode Activation area**

**Slope Tripping mode Activation** ?

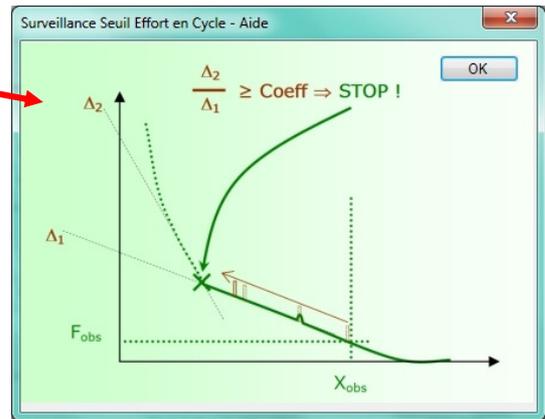
Force threshold to start Observ. : 0,0 daN

Offset/threshold OR Start Observ. pos: 0,000 mm

Observation Window : 0,0 daN

Obs. Wind Dividing Factor : divid. / 4  Obs. in decreas. way

Slope changing detection Rate : 0,0  Decreasing slope



**Force threshold to start** and **Offset/threshold:** If a force is entered, the press will look after this force, and as soon as this force is reached, the seeking of slope changing will start. If an offset is entered, the seeking will start after this offset.

If no force is entered (value 0,0 daN), the seeking will start at the "Start Observ. Pos." position.

**Observation window :** To calculate the slope independantly of the fast variations of the measurement, the average slope is calculated on a force interval than you can adjust with this parameter.

**Obs. Window Dividing Factor :**

**Slope changing detection Rate :** The slope of the curve is calculated permanently, and as soon as the ration of the new slope divided by the previous one is more than this value, the press will stop and finish its cycle.

**SPECIFIC AREA PROGRAMATION AREA**

**Specific Area Programation**

Pos. for "Out of area" during Traction : 0,000 mm

Pos. for "Specific Area" during Compression : 0,0 The physical S7 MVAT output is set to 1 when this position is reached during a traction cycle

---

**Specific Area Programation**

Pos. for "Out of area" during Traction : 0,000 mm

Pos. for "Specific Area" during Compr. : 0,000 mm The physical S6 MVAT output is set to 1 when this position is reached during a traction cycle

**Specific Area Programation :** To earn cycle time, and anticipate some other movements, you can use the 2 following fields. One field is reserved for pulling cycle, the other one for pressing cycle.

**Pos. for « Out of area » during traction :** If the cycle is a pulling cycle, used for example to let another device move (loading robot, ...); you can specify an absolute position. When the press will reach this position during the traction cycle, the **MVAT S7 physical output** will be set to 1. Then the PLC will be able to command the other device without risk of mechanical interference.

**Pos. for « Specific area » during compression :** If the cycle is a compression cycle, you can specify an absolute position. When the press will reach this position during the compression cycle, the **MVAT S6 physical output** will be set to 1. Then the PLC will be able to command another device during the press is moving (oiling of the insertion hole for example).

**OPTION FOR RELATIVE DISPLACEMENT**

**Positioning cycle relative to the last acquisition cycle :** If you check this box, this cycle (if it's a relative displacement one) will execute a relative displacement from the last Acquisition Cycle. If not, this cycle will execute a relative displacement from the Previous Cycle.



**Force Offset reset when cycle begins** : In **VERY RARE APPLICATIONS**, for which the press remains in cycle for a certain time, it may be that the force signal drifts during this time because of the temperature, and when the sequence continues, the insertion force can be distorted by this drift.

This box allows the MVAT to redo a "0" of the effort value at the start of the next cycle in the sequence.  
To use with PARSIMONIOUSLY!

6.9.3.1 "Page" tab - Force Check Cycle type

Cycle Type	Releas. Force cl	Execution dir.	Pressing
<b>Forces</b> <input type="checkbox"/> Force Increment		<b>Positions</b>	
Force releasing threshold :	55,0 daN	Max. trip pos. :	42,300 mm
<b>Trip Force :</b>	50,0 daN	<b>Trip position :</b>	42,200 mm
Min. Force :	10,0 daN	Min. trip pos. :	42,100 mm
Quality checking on	Peak Force		

When this type of cycle is chosen, certain fields have a different role relative to the other types (press-fitting, positioning). This type of cycle allows an auxiliary device to be controlled. The typical case is searching for a spline. The press descends, and if the pinion to be press-fitted is not opposite the splines, the force is stopped and an auxiliary device is controlled which turns the shaft or the pinion, and when the force drops (splines facing each other), the press restarts.

**Force releasing threshold:** This value must be much less than the Trip force. The stop order to the auxiliary device is given when the force passes below this value. If no value is entered, the MVAT outputs an error number.

**Trip force:** Value of the Force in daN which gives the order to stop the pin (null speed).

If when this force is reached, the position measured is not within the Max position/Min position window, the pin stops, and the auxiliary device is not triggered. The cycle is declared "NOT OK".

If when this force is reached, the position measured is within the Max position/Min position window, the pin stops, and the auxiliary device is triggered until the force passes below the "Force loss threshold", when the cycle is declared "OK".

If the position measured reaches the stop position before the force is reached, the pin stops and the auxiliary device is not triggered, but the cycle is declared "OK".

If the position measured reaches the stop position with a force greater than the "Force loss threshold", the pin stops and the auxiliary device is not triggered. The cycle is declared "NOT OK".

If no value is entered, the default value is the Maximum Force.

**Minimum force:** Field disabled in this mode.

**Trip position:** It is essential that when this position is reached, a force at least equal to the trip force has already been encountered or that no force was encountered, otherwise, the MVAT signals a fault. If no value is entered, the pin stops on the trip force (auxiliary triggered) or on the Lower safety position (default).

## 6.10 Calibration and learning cycle in pressing mode

### 6.10.1.1 Definition

This cycle teaches the MVAT controller the deformation of the frame in pressing mode under a configurable force that must be greater than or equal to the maximum force encountered in pressing mode. It also determines the value of the "Index Centring" setting and the travel resolution.

### 6.10.1.2 Description

This cycle must be executed with a mechanical stack which includes tools fixed to the tip of the pin and others fixed to the frame (so that their own deformation is also "learnt" by the MVAT). Use of workstation compliances (springs, etc.) which upset the learning process should be avoided.

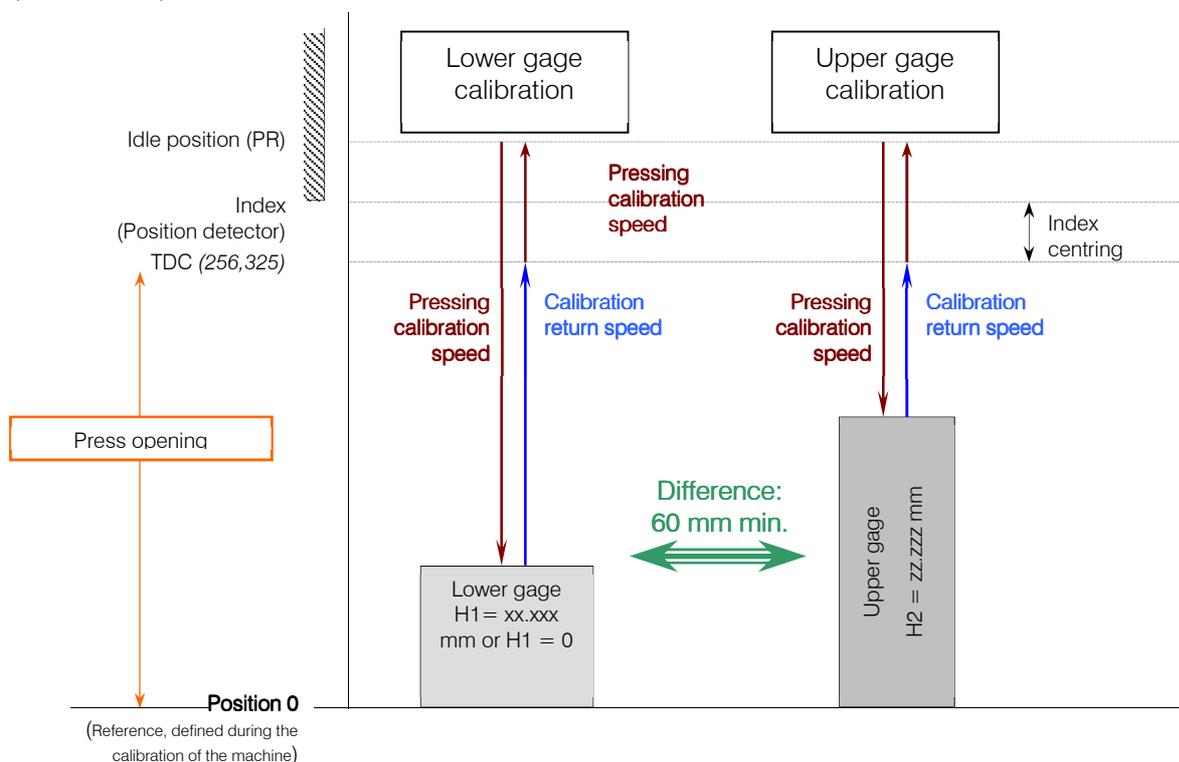
It consists of successively applying a calibration force on two gages whose height is known to the micron.

#### **WARNING:**

- the difference in height between the gages must be at least **60 mm** to ensure correct resolution (typical UE travel of 500 mm).
- the press-fit unit will refuse to carry out a sequence until an initial calibration has been carried out. Only manual movements are allowed.

The first gage, called the "lower gage" is placed in position and a "lower gage calibration cycle" is launched. The shaft of the pin exits at a configurable speed until the tip of the shaft or the end of the tool comes into contact with the lower gage. The pin then applies an increasing force, and when the calibration force is reached, the shaft raises back up to the idle position.

The second gage, called the "upper gage" is then placed in position and an "upper gage calibration cycle" is launched. The shaft of the pin exits at a configurable speed until the tip of the shaft or the end of the tool comes into contact with the upper gage. The pin then applies an increasing force, and when the calibration force is reached, the shaft raises back up to the idle position.



At the end of this last cycle, a "calibration result" block is displayed on the journal, giving the resolution, the index centring and the press opening.

The calibration curve (deformation in  $\mu\text{m}$  as function of the force) may be viewed using VisuCoube by opening the upload file for the unit. (see Visucourbes.Net manual).

## 6.11 Calibration and learning cycle in pulling mode

### 6.11.1.1 Definition

This cycle teaches the MVAT the deformation of the frame in pulling mode under a configurable force that must be greater than or equal to the maximum force encountered in pulling mode.

### 6.11.1.2 Description

This cycle must be executed with a mechanical stack which includes tools fixed to the tip of the pin and others fixed to the frame (so that their own deformation is also "learnt" by the MVAT).

It involves applying a pulling calibration force on a calibration tool.

#### **WARNING:**

Until the MVAT version V5.17, if a pressing cycle is followed by a pulling cycle, and the pulling calibration has not yet been carried out, the press-fitting unit will refuse to execute the pulling cycle.

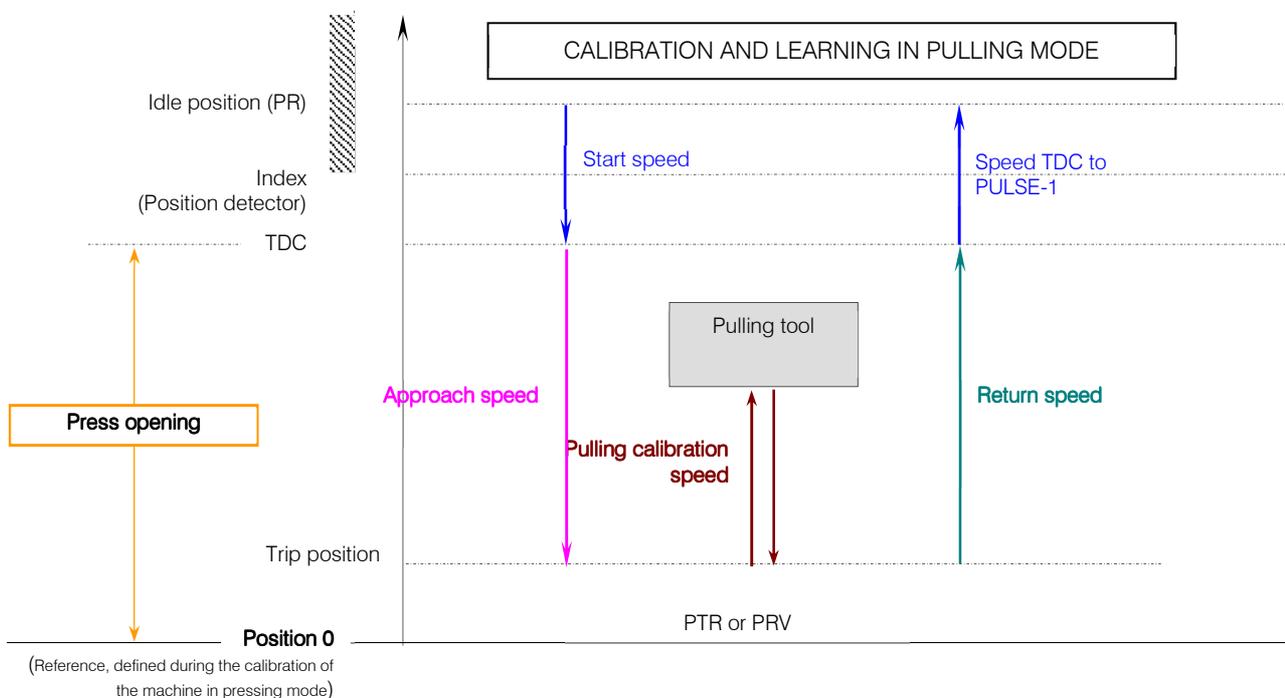
If the various programmed pulling cycles exercise a pulling force relevant to the process and accurate positioning is involved, it is essential to carry out pulling calibration each time the electrical or mechanical environment of the press-fitting unit is changed.

A "pulling calibration cycle" is run. The pin executes sequence no. 1, standard press-fit, in which the return to home position is not requested. The shaft therefore stops in an "exit" position. The pulling tool is fitted.

The cycle is continued. The pin shaft returns at a configurable speed until the pulling tool comes into contact. The pin then applies an increasing force, and when the calibration force is reached, the shaft comes back out to the previous bottom position.

The pulling tool is removed and the shaft returns to its home position.

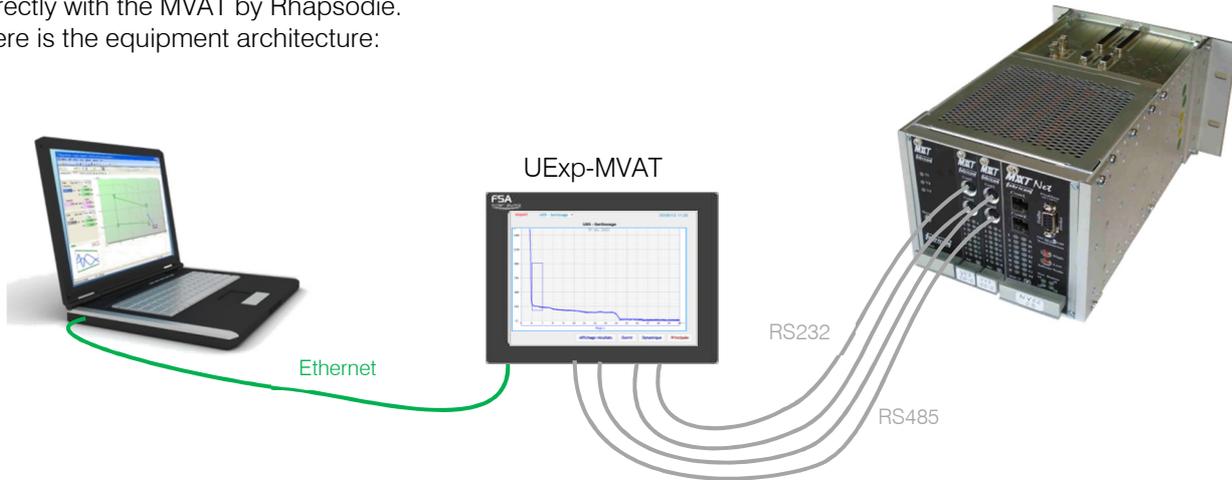
At the end of this last cycle, a "calibration result" block is displayed on the journal, giving the resolution, the index centring and the press opening.



## 6.12 Using a UEXP-MVAT and the communication tools

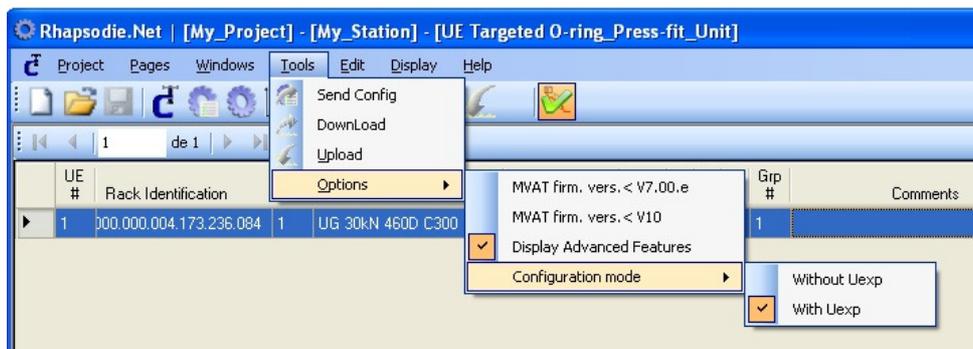
If you are using a UEXP-MVAT, which is connected directly to the MVAT card, no serial port is available to communicate directly with the MVAT by Rhapsodie.

Here is the equipment architecture:



A software (Com0com), which is installed by Rhapsodie, creates virtual ports on the PC. These virtual ports are redirected to Ethernet by another software, Com2tcp (included into com0com software).

You have to connect the PC to the Ethernet Port 1 of the UEXP-MVAT, and configure into Rhapsodie :



Then, two new columns appear: IP\_UEXP and Num Port UEXP



For "IP\_UEXP", you've have to enter the IPV4 of the UExp-MVAT used (ex : 172.16.2.50).

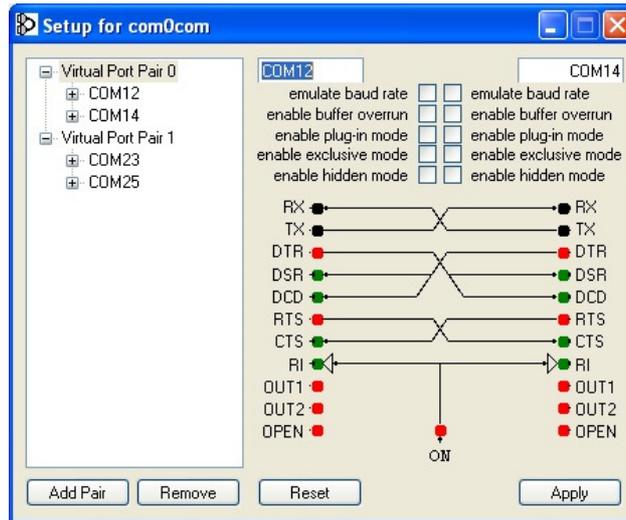
For the Num Port, if the unit is connected on the first "channel" of the UExp-MVAT (serial port 3 and 4 of the UExp), then type **2217**

If the unit is connected on the second "channel" of the UExp-MVAT (serial port 5 and 6 of the UExp), then type **2219**

To choose the COM Port, you have to click on the button:



Then the setup window of the com0com tool appears:



For each Unit into your project, you should have 2 pairs of Com Port. One is for the RS232, and one is for the RS485. In our example, when closing this window, the Com Port of the unit will be COM25 (the output port of the second pair).

Then, if you click on the "Launch Com Button",  the Com Port will be redirected to the MVAT by the PC and the UExp (DO NOT FORGET to DISCONNECT the COM PORT into the UExp Menu before), and a terminal, connected on the RS232 of the MVAT card will be launch.

## 7 Additional information

### 7.1 Number of sequences, cycles and curve acquisition programs

**512 resident sequences** are available in the MVAT card.

These 512 sequences can be selected by the PLC by multiplexing the MVAT inputs. They all relate to a "cycle(s)/curve" combination. These sequences are managed in the PLC according to chronograms DIAG\_ES1, DIAG\_ES3 and DIAG\_ES5

(See maintenance manual, "Chronograms")

In addition to these **512** sequences, **8** fixed selections are used to carry out the following actions:

- **513**: return to home position
- **514**: Upper gage pressing calibration
- **515**: Lower gage pressing calibration
- **516**: Pulling calibration
- **517**: Pulling calibration
- **518**: Manual shaft return (MVAT output S5 changes to 0 when the index is reached)
- **519**: Manual shaft exit
- **520**: Manual shaft return/exit

These sequences are selected in the same way by multiplexing the MVAT inputs. These sequences are managed in the PLC according to chronogram DIAG\_ES4.

Note:

- sequence 513 can be used where an automatic return is not programmed in the cycle and when the cycle has terminated. It can only be used through chaining.
- sequences 514 to 517 can only be executed when the shaft is in return position
- sequence 518 must not be executed if the index is already present otherwise the MVAT will output a fault. To avoid this, just test the presence of MVAT output S7 (shaft in home position) before starting this sequence.

**384 standard resident press-fitting cycles** are available in the MVAT.

Standard press-fitting cycle: "go to position x under controlled force N" or "push up to a force N and check position x" in 4 phases:

- **approach** at approach speed,
- **press-fit** at working speed,
- **slow down** to trip speed,
- **trip (or Stop)** then **return** to idle position or **chain**.

For standard cycles, a quality check is available at the end of the cycle for:

- the position reached,
- the peak force obtained,
- the residual force obtained,
- the difference in position between the position reached at the end of the cycle and that reached in the previous cycle or during a previous acquisition cycle.

**100 resident curve acquisition programmes** are available in the MVAT.

The first 16 of these curve acquisition programs allow 10 absolute position windows to be configured during which the force is stored by the MVAT.

The next 84 allow 5 recording ranges and 5 trapezoidal check windows to be placed absolutely or relatively.

The use of force/displacement curves allow a quality check to be carried out on the value of the force obtained x mm before the trip, and a more sophisticated check to be carried out on all the stored force values.

## 7.2 Operating modes

### 7.2.1 Mode with PLC

This mode is enabled through the field "PLC I/O Management" in the "Appendix" tab of the "Specifications" menu of RHAPSODIE. **Check** this box to enable this mode.

The "Step synchro" field must also be set to "YES".

This mode is governed by chronograms DIAG\_ES1, DIAG\_ES3 and DIAG\_ES5. In this mode it is possible to select one of the 512 configurable sequences through the PLC or execute one of the 8 fixed sequences.

The 32 manual sequences described in chronogram DIAG\_ES2 cannot be executed in this mode. On the other hand, the forced manual sequences described on the same chronogram can be executed.

### 7.2.2 Mode without PLC

This mode is enabled through the field "PLC I/O Management" in the "Appendix" tab of the "Specifications" menu of Rhapsodie.net. **Uncheck** this box to enable this mode.

In addition, MVAT input E7 must be set to 1, otherwise the forced manual sequences will be executed (see forced manual mode).

This mode is governed by chronogram DIAG\_ES2. In this mode, it is possible to select (by addressing without multiplexing inputs) one of the first 32 programmed sequences by coding the inputs as described below:

	E6	E5	E4	E3	E2	E7		E6	E5	E4	E3	E2	E7
Sequence N° 1	0	0	0	0	0	1	Sequence N° 17	1	0	0	0	0	1
Sequence N° 2	0	0	0	0	1	1	Sequence N° 18	1	0	0	0	1	1
Sequence N° 3	0	0	0	1	0	1	Sequence N° 19	1	0	0	1	0	1
Sequence N° 4	0	0	0	1	1	1	Sequence N° 20	1	0	0	1	1	1
Sequence N° 5	0	0	1	0	0	1	Sequence N° 21	1	0	1	0	0	1
Sequence N° 6	0	0	1	0	1	1	Sequence N° 22	1	0	1	0	1	1
Sequence N° 7	0	0	1	1	0	1	Sequence N° 23	1	0	1	1	0	1
Sequence N° 8	0	1	1	1	1	1	Sequence N° 24	1	1	1	1	1	1
Sequence N° 9	0	1	0	0	0	1	Sequence N° 25	1	1	0	0	0	1
Sequence N° 10	0	1	0	0	1	1	Sequence N° 26	1	1	0	0	1	1
Sequence N° 11	0	1	0	1	0	1	Sequence N° 27	1	1	0	1	0	1
Sequence N° 12	0	1	0	1	1	1	Sequence N° 28	1	1	0	1	1	1
Sequence N° 13	0	1	1	0	0	1	Sequence N° 29	1	1	1	0	0	1
Sequence N° 14	0	1	1	0	1	1	Sequence N° 30	1	1	1	0	1	1
Sequence N° 15	0	1	1	1	0	1	Sequence N° 31	1	1	1	1	0	1
Sequence N° 16	0	1	1	1	1	1	Sequence N° 32	1	1	1	1	1	1

This mode is often used for a station without a PLC, the selection of the sequence to be executed being made by coding wheels for example.

### 7.2.3 Forced manual mode

This mode is available whatever field "PLC I/O Management" is set to.

On the other hand, MVAT input E7 must be set to 0.

By setting the inputs as described below (see also chronogram DIAG\_ES2 on the bottom left), it is possible to execute pressing calibrations for the upper and lower gages, pulling calibration, and manual raising and lowering.

**WARNING:** This mode is not recommended for inexperienced users. When the station has a PLC, this must manage these movements through fixed selections.

	E2	E3	E4	E5	E6	E7
Lower gage pressing calibration	1	0	0	1	0	0
Upper gage pressing calibration	1	0	0	1	1	0
Pulling calibration	1	0	0	0	0	0
Pulling calibration	1	0	0	1	0	0
Manual return of shaft with force check	0	0	0	0	1	0
Manual exit of shaft with force check	0	0	0	1	1	0
Direct manual return of shaft with force check	0	0	1	0	0	0
Direct manual exit of shaft with force check	0	1	0	0	0	0
Direct manual return of shaft WITHOUT force check	0	0	1	1	0	0
Direct manual exit of shaft WITHOUT force check	0	1	0	1	0	0

### 7.3 Quality results

The quality result is given for each sequence and for each cycle in the sequence.

The quality result of the sequence is available on MVAT output S6 at the end of the sequence only.

The quality result of the cycle is available from the end of the cycle on MVAT output S6.

The quality result is built by logically "AND" of the following checks:

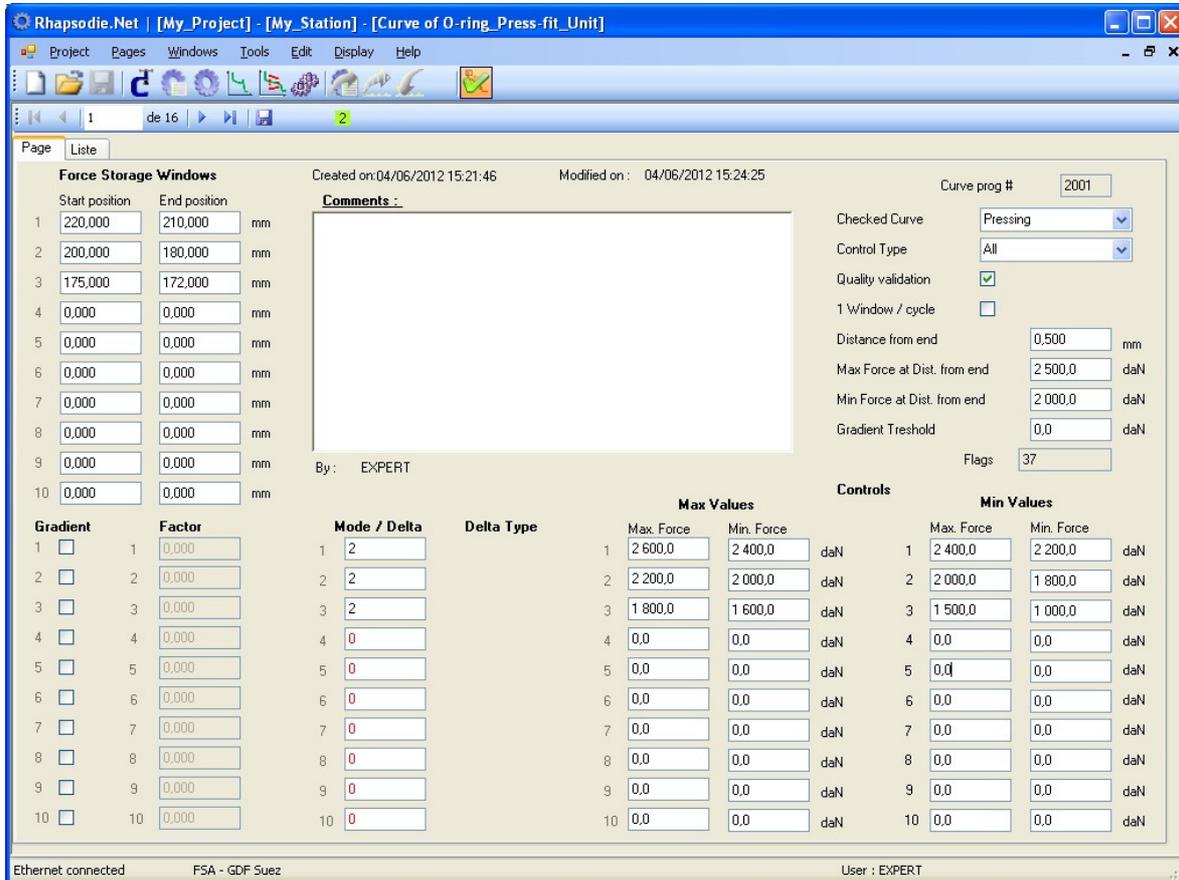
- min position < position reached < max position
- min force < peak force (or residual force) < max force
- Min difference < position reached - initial position (or previous position) < Max difference
- Min/ force at the position before trip < Force before trip < Max force at the position before trip
- Curve check OK

Of course, these checks may be failed separately either by not entering a value in fields where a value is expected or by not requesting a check.

("Quality Validation" field of the curve submenu).

## 7.4 Page: "Curves"

This page is used to define the basic curve checking settings unlike the "Profiles" page which is used to program advanced curve checking.



This menu allows up to **10** windows to be configured using absolute values which trace the force as function of the displacement, and defines the type of check to carry out for all windows in order to validate the final quality of the press-fitting operation.

There is a maximum of **16** basic curve check programs.

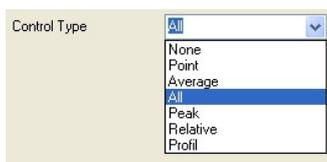
For these checks to be carried out, it is essential that "Store the curve" has been selected for the cycle affected by the checks (see [Curve Storage field](#)), and that this cycle is associated with a curve program.

### COMMENTS AREA:

Free format comment field (limited to 4096 characters)

### DEFINITION OF ENTRY FIELDS

**Control type:** allows the user to select **6 types** of check for all defined windows



Fields identical for all types of check:

**Checked curve:** This field allows the user to select which curves the check is to be carried out on, in pressing or pulling mode (checking both is disabled).



The MVAT currently stores 2048 pressing force values and 2048 pulling force values.

**Quality validation:** If this box is checked, the quality check carried out on each of the storage windows enters in the overall quality assessment of the press-fitting operation. For example, if a press-fitting operation reaches the desired end under the desired final force, but the check carried out on window no.3 proved to be not OK, the press-fitting cycle is declared not OK. If this box was not checked, the quality check of each window does not form part of the overall press-fit quality.

**1 Window/cycle:** If this box is checked, on each cycle or each sequence chained and if curve storage was requested in the cycle, the storage window taken into account will be the next window.

If this box is not checked, the window is no longer associated with the cycle and it is possible to have several windows in the same cycle.

The curve result is valid at the end of the sequence (the curve check is carried out once the pin returns to idle position)

- If the 1 Window/cycle box is checked, the curve result is valid over the last cycle which precedes the return if this is carried out using soft chaining.

- If the 1 Window/cycle box is not checked, the curve result is valid at the end of the cycle when all programmed windows have been executed.

In the other cases, the curve result is valid at the end of the sequence.

Since V10 MVAT version, if you want to use a Curve program with « Force From End », you have to use the fields in the Cycle.

The fields in Curve program are not used anymore.

**Distance from End:** during a press fit cycle, if you want to know the force measured at a given distance from the final position, just enter the value of this distance in this field. The force measured at the position equal to this distance will be given in the result block with the associated quality check. The default value 0 disables this feature.

Depending on the selection made in the cycle program, the "Force before end" will be available for each pressing cycle or only for the last in the sequence, and the quality validation of the sequence will include or not include all the "Force before end" checks. The result block is slightly different (see [Executing a sequence](#) )

**Max. Force at Dist from end:** If the force measured at the position before the end is greater than this value, the cycle is declared not OK.

If no value is entered, the quality check on this max. force is disabled.

**Min. Force at Dist from end:** If the force measured at the position before the end is less than this value, the cycle is declared not OK.

If no value is entered, the quality check on this min. force is disabled.

**Force storage windows:** These fields are used to define the start and end positions of each storage window. For each window where the start and end position values are non-zero, the MVAT will store the force values observed between the two positions. The force sampling step depends on the number of windows desired and the width of each sampling step.

On the screen shown as an example:

$$\text{Pas d'échant.} = \frac{(\text{cote déb.} - \text{cote fin})^{\text{fenêtre1}} + (\text{cote déb.} - \text{cote fin})^{\text{fenêtre2}} + \dots + (\text{cote déb.} - \text{cote fin})^{\text{fenêtre10}}}{2048}$$

**WARNING:** Where several cycles are chained (for example 1 calls 3 and 3 calls 10), the 2048 storage points will be distributed over all the check window for the cycles for which curve storage has been requested. Example:

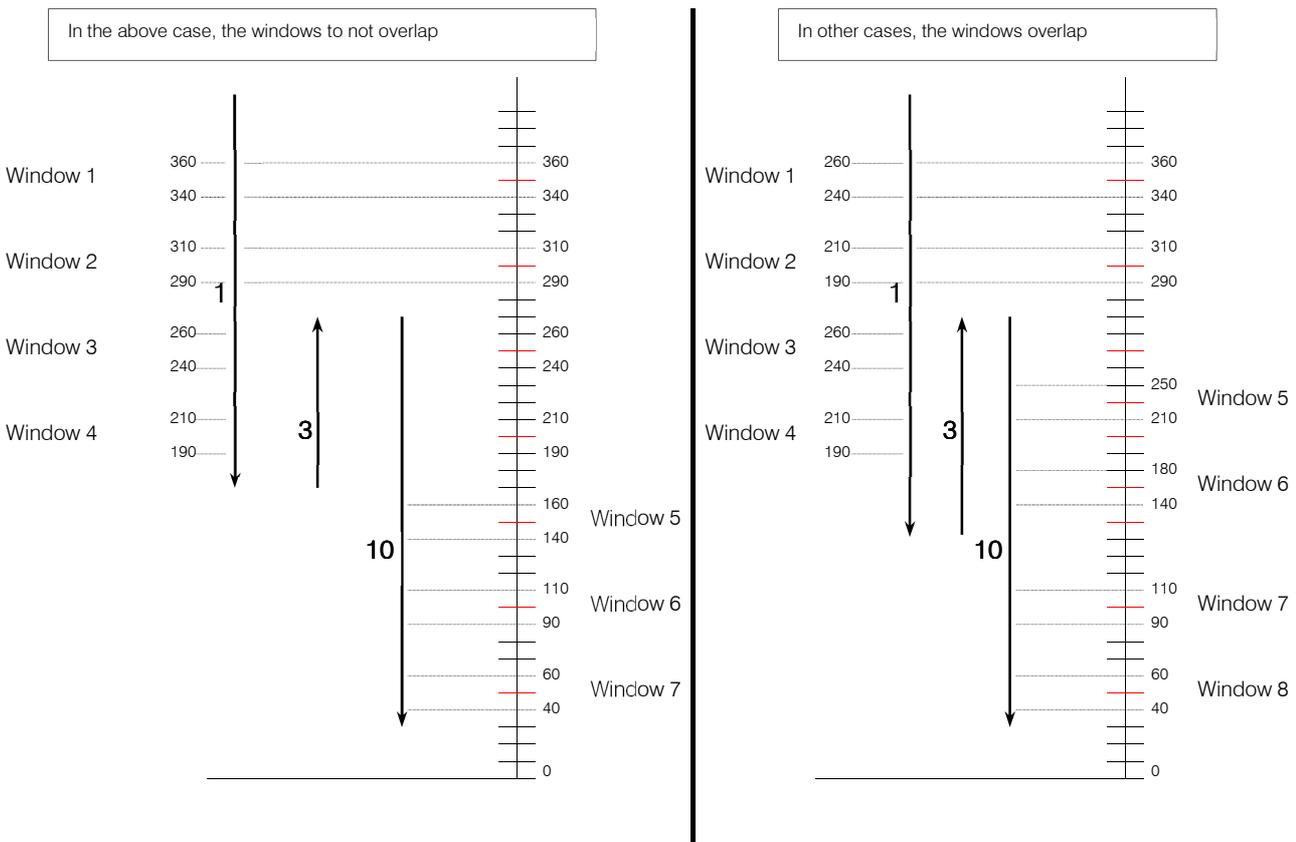
Sequence number	Cycle number	Curve number
6	1	3

Cycle 1	Storage YES	Cycle 3	Storage NO	Cycle 10	Storage NO
---------	-------------	---------	------------	----------	------------

Curve 3	Window 1: 360-340
	Window 2: 310-290
	Window 3: 260-240
	Window 4: 210-190
	Window 5: 160-140
	Window 6: 110-090
	Window 7: 060-040

$$\text{Pas} = \frac{(360 - 340) + (310 - 290) + (260 - 240) + (210 - 190) + (160 - 140) + (110 - 90) + (60 - 40)}{2048} = \frac{140}{2048} = 0,068 \text{ mm}$$

Illustration:



Fields which vary according by type of check:

**CONTROL TYPE: NONE:**

The screenshot shows the 'Force Storage Windows' configuration window. The 'Control Type' is set to 'None'. The 'Quality validation' checkbox is checked. The 'Checked Curve' is 'Pressing'. The 'Distance from end' is 0,500 mm. The 'Max Force at Dist. from end' is 2 500,0 daN. The 'Min Force at Dist. from end' is 2 000,0 daN. The 'Gradient Treshold' is 0,0 daN. The 'Flags' are set to 5. The 'Max Values' and 'Min Values' tables are visible at the bottom.

Force Storage Windows			Max Values		Min Values			
Start position	End position	mm	Max. Force	Min. Force	daN	Max. Force	Min. Force	daN
1	220,000	210,000	2 600,0	2 400,0	2 400,0	2 200,0	daN	
2	200,000	180,000	2 200,0	2 000,0	2 000,0	1 800,0	daN	
3	175,000	172,000	1 800,0	1 600,0	1 500,0	1 000,0	daN	
4	0,000	0,000	0,0	0,0	0,0	0,0	daN	
5	0,000	0,000	0,0	0,0	0,0	0,0	daN	
6	0,000	0,000	0,0	0,0	0,0	0,0	daN	
7	0,000	0,000	0,0	0,0	0,0	0,0	daN	
8	0,000	0,000	0,0	0,0	0,0	0,0	daN	
9	0,000	0,000	0,0	0,0	0,0	0,0	daN	
10	0,000	0,000	0,0	0,0	0,0	0,0	daN	

No check, the curve is merely drawn

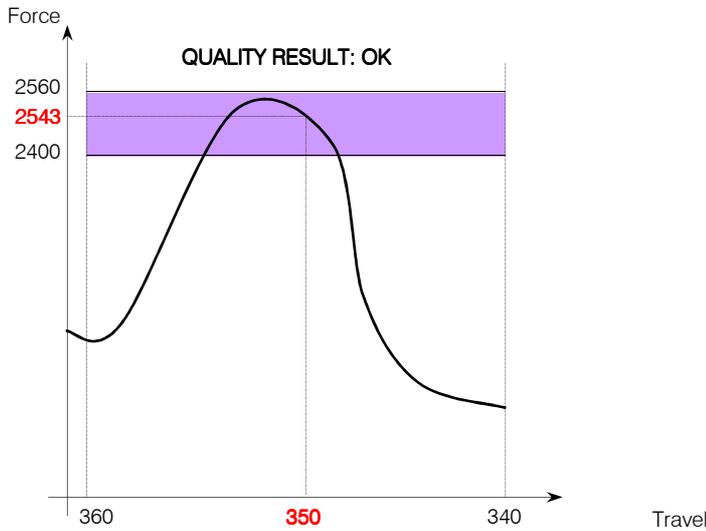
**Quality validation:** This field may not be accessed in this mode.

**CONTROL TYPE: POINT:**

The screenshot shows the 'Force Storage Windows' configuration window. The 'Control Type' is set to 'Point'. The 'Quality validation' checkbox is checked. The 'Checked Curve' is 'Pressing'. The 'Distance from end' is 0,500 mm. The 'Max Force at Dist. from end' is 2 500,0 daN. The 'Min Force at Dist. from end' is 2 000,0 daN. The 'Gradient Treshold' is 0,0 daN. The 'Flags' are set to 13. The 'Max Values' and 'Min Values' tables are visible at the bottom. A red circle highlights the 'Displacement' column in the 'Max Values' table.

Force Storage Windows			Max Values		Min Values			
Start position	End position	mm	Max. Force	Min. Force	daN	Max. Force	Min. Force	daN
1	220,000	210,000	2 600,0	2 400,0	2 400,0	2 200,0	daN	
2	200,000	180,000	2 200,0	2 000,0	2 000,0	1 800,0	daN	
3	175,000	172,000	1 800,0	1 600,0	1 500,0	1 000,0	daN	
4	0,000	0,000	0,0	0,0	0,0	0,0	daN	
5	0,000	0,000	0,0	0,0	0,0	0,0	daN	
6	0,000	0,000	0,0	0,0	0,0	0,0	daN	
7	0,000	0,000	0,0	0,0	0,0	0,0	daN	
8	0,000	0,000	0,0	0,0	0,0	0,0	daN	
9	0,000	0,000	0,0	0,0	0,0	0,0	daN	
10	0,000	0,000	0,0	0,0	0,0	0,0	daN	

A check is carried out here that for a position value contained in the window (field "Displacement"), the force is within a range whose max. and min. values are entered in the fields "Max. force" and "Min. force" of the column "Max values" (units: daN).



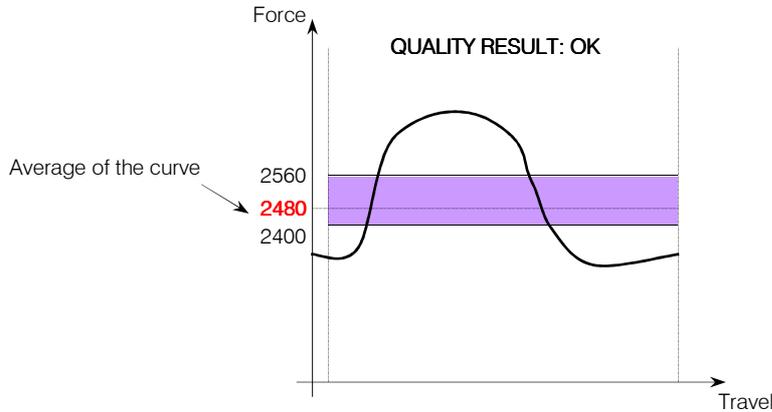
**CONTROL TYPE: AVERAGE:**

The screenshot shows the Rhapsodie.Net software interface. The main window displays a table of Force Storage Windows and a Controls section. The Force Storage Windows table has 10 rows, each with Start position, End position, and unit (mm). The Controls section includes fields for Checked Curve (Pressing), Control Type (Average), Quality validation (checked), and various force and distance parameters. A red circle highlights the Max Values table, which has columns for Max. Force and Min. Force in daN.

Force Storage Windows	Start position	End position	Unit
1	220,000	210,000	mm
2	200,000	180,000	mm
3	175,000	172,000	mm
4	0,000	0,000	mm
5	0,000	0,000	mm
6	0,000	0,000	mm
7	0,000	0,000	mm
8	0,000	0,000	mm
9	0,000	0,000	mm
10	0,000	0,000	mm

Max Values			Min Values	
Mode / Delta	Max. Force	Min. Force	Max. Force	Min. Force
1	2 600,0	2 400,0	2 400,0	2 200,0
2	2 200,0	2 000,0	2 000,0	1 800,0
3	1 800,0	1 600,0	1 500,0	1 000,0
4	0,0	0,0	0,0	0,0
5	0,0	0,0	0,0	0,0
6	0,0	0,0	0,0	0,0
7	0,0	0,0	0,0	0,0
8	0,0	0,0	0,0	0,0
9	0,0	0,0	0,0	0,0
10	0,0	0,0	0,0	0,0

A check is carried out here that the average force is within a range whose max. and min. values are entered in the fields "Max. force" and "Min. force" of the column "Max values" (units: daN).



**CONTROL TYPE: ALL:** (without gradient mode)

Force Storage Windows		Created on: 04/06/2012 15:21:46	Modified on: 04/06/2012 15:33:39	Curve prog #
Start position	End position	Comments :		2001
1 220,000	210,000 mm			Checked Curve: Pressing
2 200,000	180,000 mm			Control Type: ALL
3 175,000	172,000 mm			Quality validation: <input checked="" type="checkbox"/>
4 0,000	0,000 mm			1 Window / cycle: <input type="checkbox"/>
5 0,000	0,000 mm			Distance from end: 0,500 mm
6 0,000	0,000 mm			Max Force at Dist. from end: 2 500,0 daN
7 0,000	0,000 mm			Min Force at Dist. from end: 2 000,0 daN
8 0,000	0,000 mm			Gradient Treshold: 0,0 daN
9 0,000	0,000 mm			Flags: 37
10 0,000	0,000 mm			By: EXPERT

Gradient	Factor	Mode / Delta	Delta Type	Max Values		Min Values	
				Max. Force	Min. Force	Max. Force	Min. Force
<input type="checkbox"/>	1	0,000	1 2	2 600,0 daN	2 400,0 daN	1 2 400,0 daN	2 200,0 daN
<input type="checkbox"/>	2	0,000	2 2	2 200,0 daN	2 000,0 daN	2 2 000,0 daN	1 000,0 daN
<input type="checkbox"/>	3	0,000	3 2	1 800,0 daN	1 600,0 daN	3 1 500,0 daN	1 000,0 daN
<input type="checkbox"/>	4	0,000	4 0	0,0 daN	0,0 daN	4 0,0 daN	0,0 daN
<input type="checkbox"/>	5	0,000	5 0	0,0 daN	0,0 daN	5 0,0 daN	0,0 daN
<input type="checkbox"/>	6	0,000	6 0	0,0 daN	0,0 daN	6 0,0 daN	0,0 daN
<input type="checkbox"/>	7	0,000	7 0	0,0 daN	0,0 daN	7 0,0 daN	0,0 daN
<input type="checkbox"/>	8	0,000	8 0	0,0 daN	0,0 daN	8 0,0 daN	0,0 daN
<input type="checkbox"/>	9	0,000	9 0	0,0 daN	0,0 daN	9 0,0 daN	0,0 daN
<input type="checkbox"/>	10	0,000	10 0	0,0 daN	0,0 daN	10 0,0 daN	0,0 daN

A check is carried out here that the maximum of the curve for each window is within a range whose max. and min. values are entered in the fields "Max. force" and "Min. force" of the column "Max values" (units: daN).

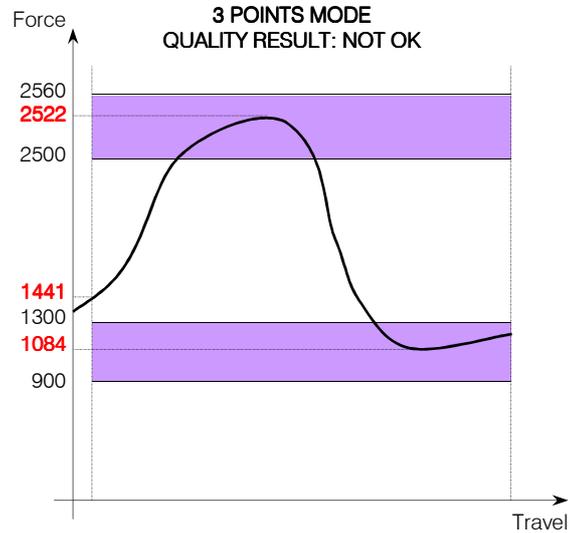
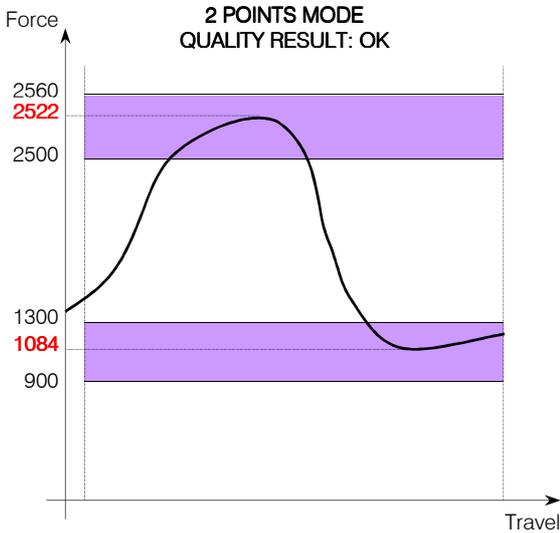
A check is also made that the minimum of the curve for each window is within a range whose max. and min. values are entered in the fields "Max. force" and "Min. force" of the column "Min values" (units: daN).

For this type of check, there are also 2 modes: "2 points" or "3 points".

Enter 2 or 3 in the "Mode/delta" field

In 2-points mode, the maximum and minimum of the curve are taken into account.

In 3-points mode, the maximum of the curve and the 2 minimums are taken into account (that BEFORE the maximum and that AFTER).



**CONTROL TYPE: PEAK:**

**Force Storage Windows**

	Start position	End position	
1	220,000	210,000	mm
2	200,000	180,000	mm
3	175,000	172,000	mm
4	0,000	0,000	mm
5	0,000	0,000	mm
6	0,000	0,000	mm
7	0,000	0,000	mm
8	0,000	0,000	mm
9	0,000	0,000	mm
10	0,000	0,000	mm

By: EXPERT

**Controls**

	Max Values		daN	Min Values		daN
	Max. Force	Min. Force		Max. Force	Min. Force	
1	2 600,0	2 400,0	daN	2 400,0	2 200,0	daN
2	2 200,0	2 000,0	daN	2 000,0	1 800,0	daN
3	1 800,0	1 600,0	daN	1 500,0	1 000,0	daN
4	0,0	0,0	daN	0,0	0,0	daN
5	0,0	0,0	daN	0,0	0,0	daN
6	0,0	0,0	daN	0,0	0,0	daN
7	0,0	0,0	daN	0,0	0,0	daN
8	0,0	0,0	daN	0,0	0,0	daN
9	0,0	0,0	daN	0,0	0,0	daN
10	0,0	0,0	daN	0,0	0,0	daN

Control Type: Peak

Quality validation:

Distance from end: 0,500 mm

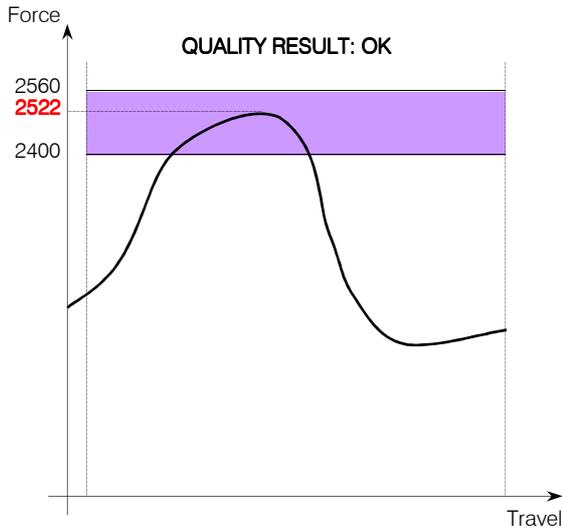
Max Force at Dist. from end: 2 500,0 daN

Min Force at Dist. from end: 2 000,0 daN

Gradient Treshold: 0,0 daN

Flags: 69

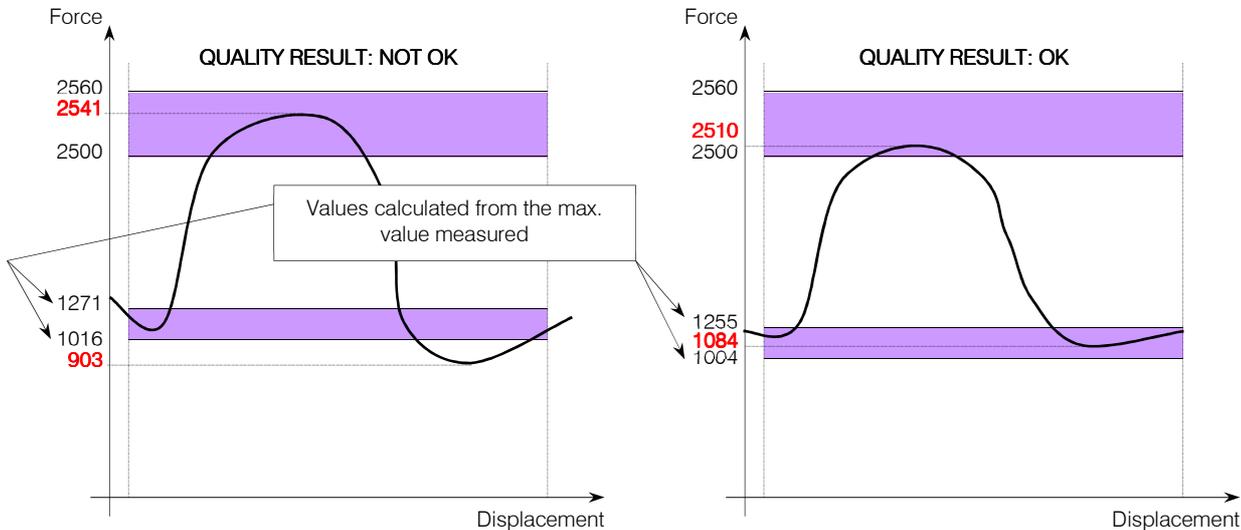
The only check carried out here is that the maximum of the curve for each window is within a range whose max. and min. values are entered in the fields "Max. force" and "Min. force" of the column "Max values" (units: daN).



**CONTROL TYPE: RELATIVE:** (without gradient mode)

A check is carried out here that the maximum of the curve for each window is within a range whose max. and min. values are entered in the fields "Max. force" and "Min. force" of the column "Max values" (units: daN).

A check is also made that the minimum of the curve for each window is within a range whose max. and min. values are calculated from the maximum value of the curve. 2 values as a percentage are entered in the "Max force" and "Min force" fields of the "Min values" column (unit: %).



For this type of check, there are 2 modes in addition: "2 points" or "3 points".

In 2 points mode, in the same way as the example above we take the maximum of the curve to check the maximum value and the minimum of the curve to check the minimum value.

In 3 points mode, we take the maximum of the curve to check the maximum value and 2 minimums of the curve to check the minimum value.

We check that the minimum of the curve situated BEFORE its maximum and the minimum situated AFTER its maximum are between the maximum force and minimum force calculated.

Control type: with Activation of GRADIENT mode

**Gradient:** checks changes in the slope of the curve.

See: [Appendix 8 – GRADIENT FUNCTION](#)

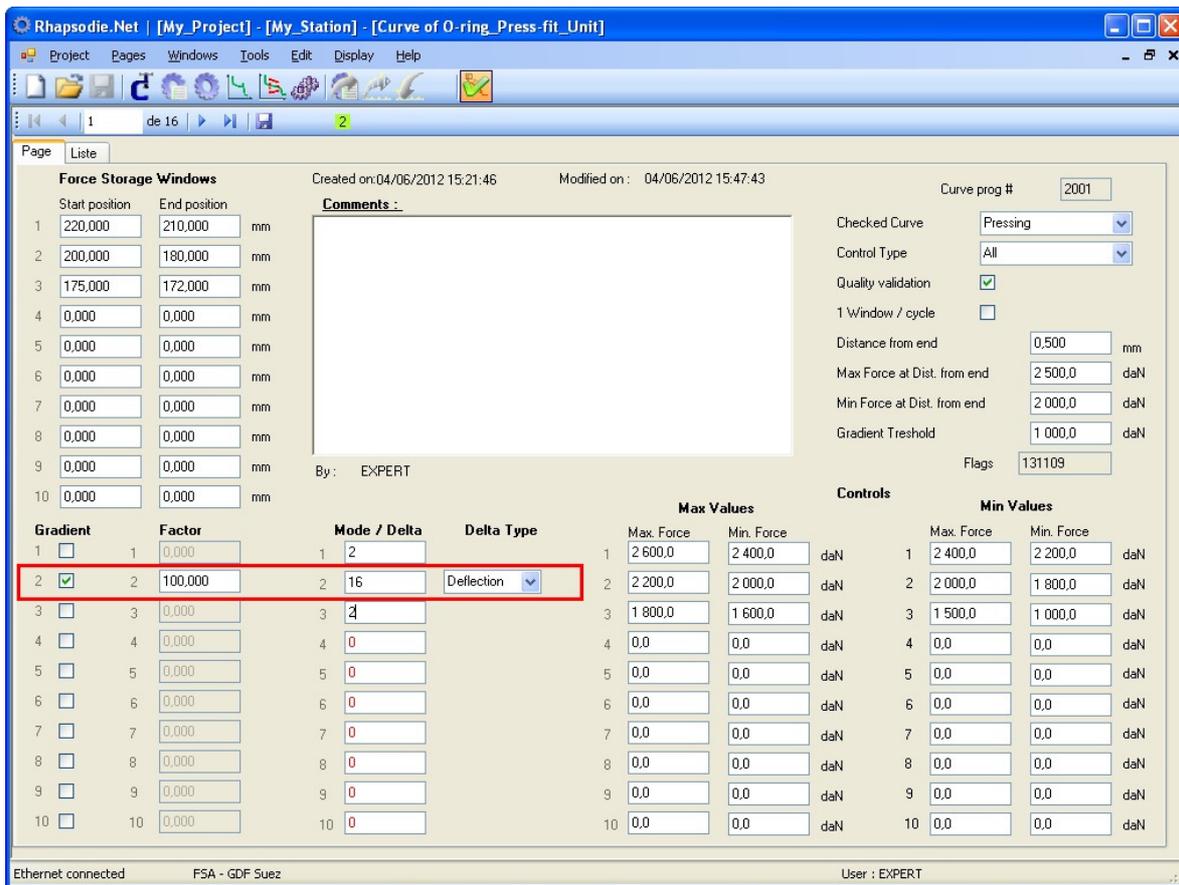
When the gradient function is enabled, a delta type field is available.



Allows the orientation of the curve on input to the window to be specified either as **Inflection**, **Deflection** or **Model** (not enabled, reserved for profile application).

**CONTROL TYPE: ALL:** (With gradient mode)

- Check "**Gradient**" to check changes in the slope(s) of the window(s) to be monitored.
- Enter the "**Gradient threshold**" value (with the help of Fabricom's Solution3d.xls tool)
- Enter the "**Factor**" and "**Delta**" values for each window where the gradient check box is checked, the field for the corresponding "factor" value having become active.

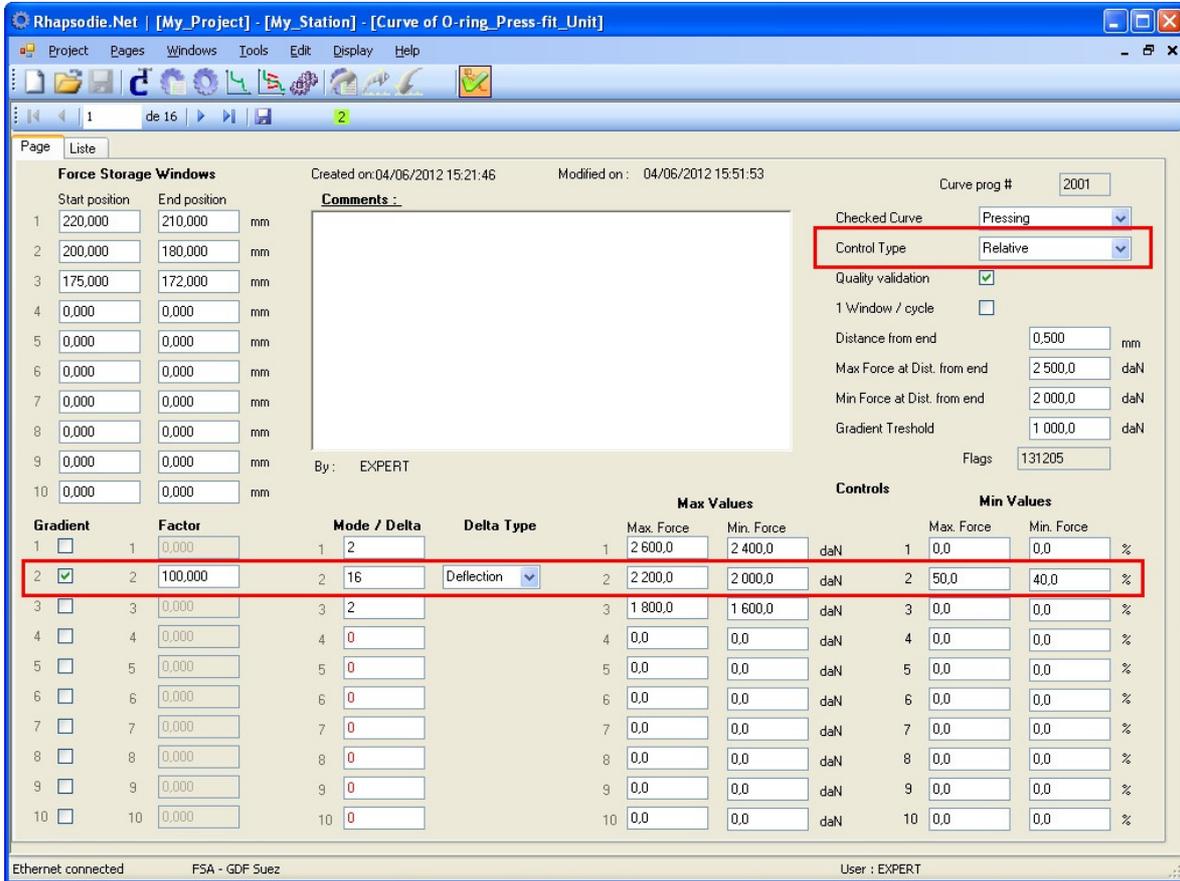


- In a window with gradient checking, as the entry of the "mode" is hidden by the "Delta", the force control settings are forced to "2 points" mode automatically. If one or more of the max or min values are not wanted, just set them to zero.

- It is essential to use the Fabricom Solution3d.xls assistance tool which uses the curves from VisuCourbe and enables suitable settings to be defined from actual readings.

**CONTROL TYPE: RELATIVE:** (With gradient mode)

- Check "Gradient" to check changes in the slope(s) of the window(s) to be monitored.
- Enter the "Gradient threshold" value (with the help of Fabricicom's Solution3d.xls tool)
- Enter the "Factor" and "Delta" values for each window where the gradient check is checked, the field for the corresponding "factor" value having become active.



- In a window with gradient checking, as the entry of the "mode" is hidden by the "Delta", the force control settings are forced to "2 points" mode automatically. If one or more of the max or min values are not wanted, just set them to zero.

- It is essential to use the Fabricicom Solution3d.xls assistance tool which uses the curves from VisuCourbe and enables suitable settings to be defined from actual readings.

**CONTROL TYPE: PROFILE:**

**Profile:** modelling the curve and checking it by envelope. (Reserved for a future application)

## 7.5 Access level

Rhapsodie.net has 4 access levels: Creator, expert, operator and visitor  
 Each restricts each function and each page in a different way



For each page, the figure indicates the minimum level necessary to modify the page  
 The possible box colours are as follows:

**4** if you do not have sufficient rights or

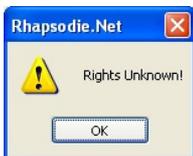
**2** if you have sufficient rights.

The tables below show the minimum level you must have to be able to modify pages and access functions

Page	Level	No.
Stations	Creator	4
Press-fitting units	Creator	4
Specifications	Expert	3
Cycles	Operator	2
Line Chart	Operator	2
Sequences	Expert	3
Results	Creator	4
Press-fit unit references	Creator	4

Functions	Level	No.
Send config	Expert	3
Global send	Expert	3
Partial send	Operator	2
Upload	Expert	3
Import	Creator	4
Export	Creator	4
Backup compilation	Operator	2

### Access control



If you try to modify a station which is already open but for which you do not have rights, you will not be able to save any changes made

## 7.6 TRACEABILITY OF SETTINGS

Each page has its own traceability.

*All actions are traced and recorded by the software under the name of the person who opened the session.*

Station, UE, sequence, result and UE reference pages:

**Modification date:** Date of last modification carried out on the UE in question.

**Creation date:** Date of last modification carried out on the UE in question.

**Signature:** Name of the person who carried out the last modifications.

Specification, cycle, curve pages:

**Modification:** Date of last modifications carried out for the current page.

**Creation:** Date the current page was created.

**Signed:** Name of the person who carried out the last modification.

## 8 Execution Journal

The journal is a window in the communication software. Everything which appears in this window is stored in a file in the "journal" directory itself situated in the directory for the press-fitting unit.

Each time Rhapsodie.net is started, a new file is created with a name made up as follows: "journal\_Dddmmyyyhhmmss" (journal\_D+date+time).

**This directory must be regularly cleared so as not to saturate the disk on the PC.**

### 8.1 Execution of a calibration on the lower gage

```
*****
Calibration in progress
Station/Channel/Addr: 000.000.001.237.173.008.001
D/M/Y , H/M/S      : 28/03/2000 08/03/00,61
Total seq. time   :      20.74   s
Spindle temp.    :      22.73   Deg.
Frame temp.      :      22.77   Deg.
Module temp.     :      37.05   Deg.
Sequence number  :      10039
Sequence NOT OK
Lower gage pressing calibration
Force Nominale   :      3000,0   daN
Force Limite     :      3300,0   daN
Force Utile      :      3150,0   daN
Calibration Force :      2811.1   daN
-----
Resolution depl. :      1212.050 I/mm
Press Opening    :      275.033 mm
Index centring   :      5.267 mm
Initial Offset   :      9.14 %
Final Offset     :      -0.04 %
Calibration Force :      2811.1 daN
*****
```

Annotations:

- Station/Channel/Addr: 000.000.001.237.173.008.001: Combination of the chassis identification and the channel number
- Only if external temperature sensor connected. (points to Spindle temp., Frame temp., Module temp.)
- 1 = i/o not coded  
39 = decimal of binary number given by inputs E0 to E7 (points to Sequence number)
- Not OK as calibration not terminated (points to Sequence NOT OK)
- Force obtained during calibration (points to Calibration Force)

### 8.2 Execution of a calibration on the upper gage

```
*****
Calibration terminated
Station/Channel/Addr: 000.000.001.237.173.008.001
D/M/Y , H/M/S      : 28/03/2000 08/05/2003,22
Total seq. time   :      20.74   s
Spindle temp.    :      23.03   Deg.
Frame temp.      :      22.99   Deg.
Module temp.     :      37.05   Deg.
Sequence number  :      10103
Sequence OK.
Upper gage pressing calibration
Force Nominale   :      3000,0   daN
Force Limite     :      3300,0   daN
Force Utile      :      3150,0   daN
Calibration Force :      2805.9   daN
-----
Resolution depl. :      512.050 I/mm
Press Opening    :      275.033 mm
Index centring   :      5.267 mm
Initial Offset   :      9.14 %
Final Offset     :      -0.04 %
Calibration Force :      2811.1 daN
*****
```

Annotations:

- Calibration took place correctly and the new resolution, opening and centring values of the pulses have been saved by the MVAT (points to Sequence OK.)

This "Calibration results" block only gives the correct values for the resolution, press opening and index centring at the end of upper gage calibration after lower gage calibration has been carried out. The 3 values "Resolution depl.", "Press Opening" and "Index centring" must be copied into Rhapsodie.net in the respective fields "Number of pulses/mm", "Top Dead Centre" and "Index Centring" of the setpoint tab of the specifications page.

### 8.3 Execution of a sequence

Example 1: Sequence made up of a single cycle, without chaining, without curve checking, no force before end - Execution correct and quality OK

```

*****
Station/Channel/Addr: 000.000.001.237.173.008.001
D/M/Y , H/M/S      : 29/03/2000 20/01/1949,79
Total seq. time   :      7.26 s
Pin. temp.       : 23.03 Deg.
Frame temp.      : 22.99 Deg.
Module temp.     : 37.05 Deg.
Sequence number  :      1
Sequence OK
Serial Number    : S12-XSRT223788-Q
Result number   :      318
Nb Seq bef. Greas :    10335
Curve number    :      2
Cycle number    :      1
-----
Cycle number     :      1
Sheet number    :      1
Press-fitting pressing cycle OK
Cycle Time      :      6.41 s
Previous position :    12.461 mm
Position reached :    12.442 mm
Peak Force     :    2561.3 daN
Residual Force  :    2542.1 daN
Position difference:    -0.019 mm
-----
  
```

The date is that sent by the PC

Quality result on the entire sequence

If the PLC sent a serial number to MVAT, this one is displayed in this bloc

Sequence countdown before greasing alert

Order number of cycle within sequence

No. of cycle executed

Quality result: TH = too high  
TL = too low  
OK = good

Example 2: Sequence made up of a single cycle, without chaining, with curve checking, and force before end - Execution incorrect

```

*****
Station/Channel/Addr: 000.000.001.237.173.008.001
D/M/Y , H/M/S      : 29/03/2000 20/01/1949,79
Fault number:      6
Total seq. time   :      7.26 s
Pin. temp.:       23.03 Deg.
Frame temp.:      22.99 Deg.
Module temp.:     37.05 Deg.
Sequence number:  1
Curve check enabled NOT OK
Sequence NOT OK
Serial Number    : S12-XSRT223788-Q
Result number:   318
Nb Seq bef. Greas :    10335
Curve number    :      2
Cycle number    :      1
Av. force Peak  :    567.0 daN
-----
Cycle number     :      1
Sheet number    :      1
Acquisition pressing cycle NOT OK
Cycle Time      :      6.41 s
Previous position :    12.461 mm
Position reached :    15.442 mm
Peak Force     :    2561.3 daN
  
```

A fault number was output. Refer to appendix 5 to find the title of the error

Quality validation by curve checking was requested

No. of curve acquisition program

Force read at the position before end (see "Curve" page) on condition that storage of the curve was requested in the cycle



Residual Force : 2542.1 daN OK  
 Position difference: -3.019 mm TH  
 Contrôle Courbe NOK  
 Affichage UEXP

The MVAT board fulfilled the curve checking during this cycle. The quality result of this is displayed

In the cycle page, the « Cycle to be displayed on UExp » has been checked.

Example 3: Sequence made up of 3 chained cycles, without curve checking, and with force before end of each cycle - Execution correct

\*\*\*\*\*  
 Station/Channel/Addr: 000.000.001.237.173.008.001  
 D/M/Y , H/M/S : 29/03/2000 20/01/1949,79  
 Total seq. time : 7.26 s  
 Pin. temp.: 23.03 Deg.  
 Frame temp.: 22.99 Deg.  
 Module temp.: 37.05 Deg.  
 Sequence number: 1  
 Sequence OK.  
 Serial Number : S12-XSRT223788-Q  
 Result number: 321  
 Nb Seq bef. Greas : 10335  
 Curve number : 2  
 Cycle number : 3

Number of chained cycles

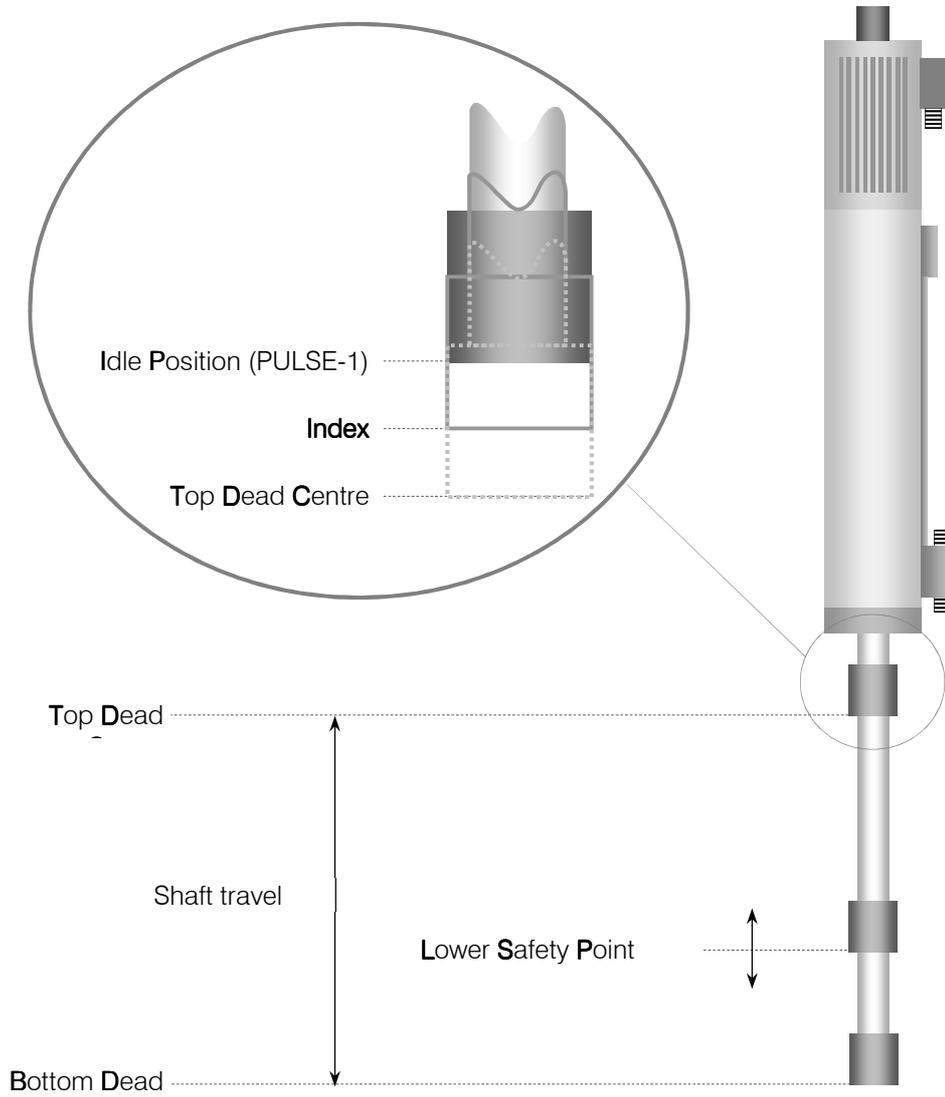
-----  
 Cycle number : 1  
 Sheet number : 1  
 Press-fitting pressing cycle OK  
 Cycle Time: 6.41 s  
 Previous position : 12.461 mm  
 Position reached: 15.442 mm OK  
 Peak Force : 2561.3 daN  
 Residual Force : 2542.1 daN OK  
 Position difference: -3.019 mm OK  
 Av. force Peak : 567.0 daN OK

The force before end is no longer global to the sequence but given for each pressing cycle

-----  
 Cycle number : 2  
 Sheet number : 134  
 Press-fitting pulling cycle OK  
 Cycle Time: 6.41 s  
 Previous position : 15.442 mm  
 Position reached: 120.012 mm OK  
 Peak Force : 1.3 daN  
 Residual Force : 0.2 daN OK  
 Position difference: -104.570 mm OK

-----  
 Cycle number : 3  
 Sheet number : 22  
 Press-fitting pressing cycle OK  
 Cycle Time: 6.41 s  
 Previous position : 120.012 mm  
 Position reached: 15.398 mm OK  
 Peak Force : 2540.3 daN  
 Residual Force : 2521.5 daN OK  
 Position difference: 104.614 mm OK  
 Av. force Peak : 581.0 daN OK

## 9 Appendix



### 9.1 Glossary

**Idle Position** Default position of the shaft at the start of each cycle. This position is only active after an initial cycle each time the equipment is switched on. This position may be configured between the Index (position given by the MVAT after calibration under the title "Index centring") and the position of PULSE-1. See "Specifications" However, it is recommended to operate with the field "Idle position from TDC" set to 0.

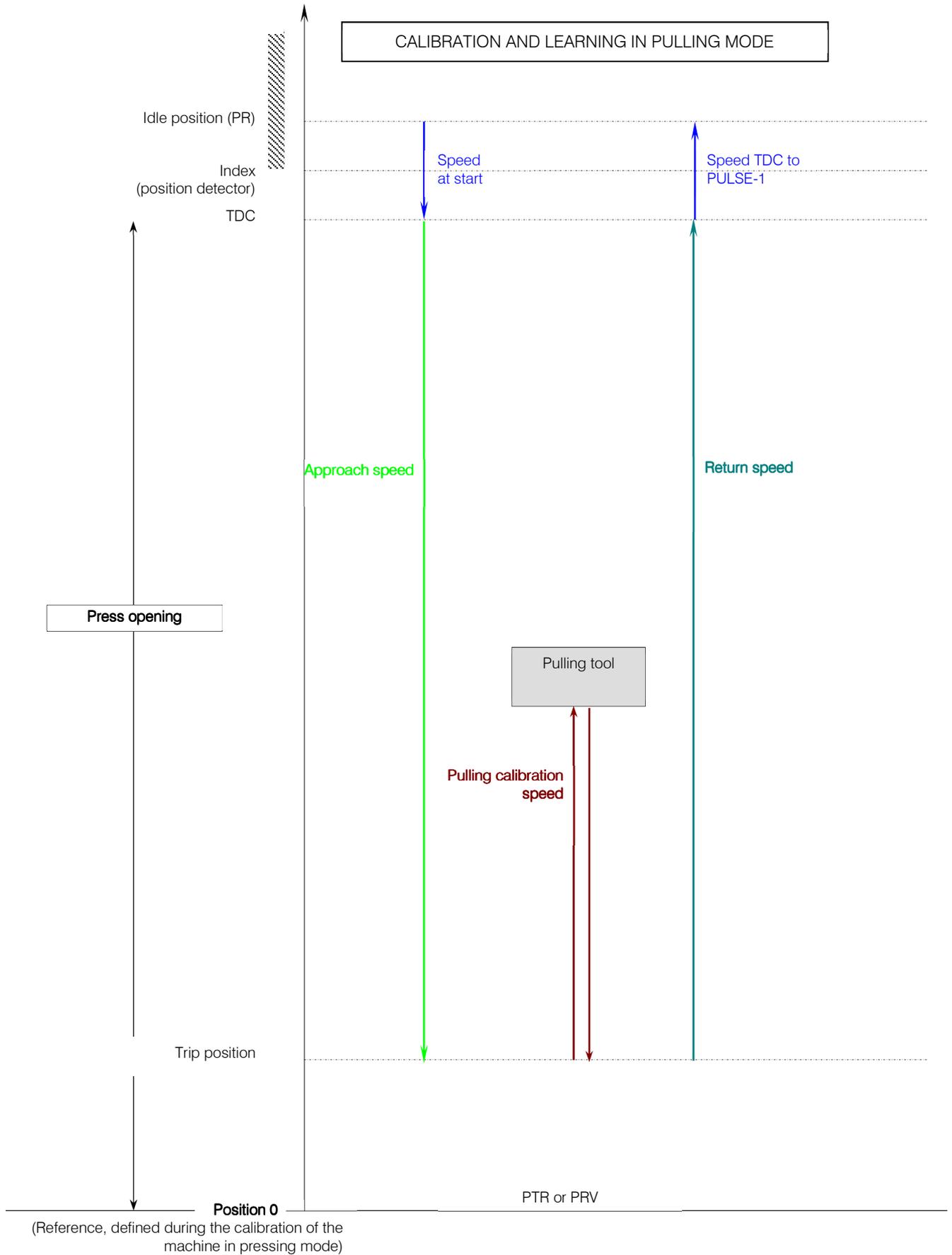
**Index:** The position of PULSE 0 and PULSE-1 must be either side of the position of the Index and at an equal distance for safe operation (i.e. "Index centring" equal to half of the screw pitch). This is the return position of the shaft until the pin has been initialised (by an initial cycle after power on).

**Top Dead Centre:** This is the effective starting point of displacement measurements.

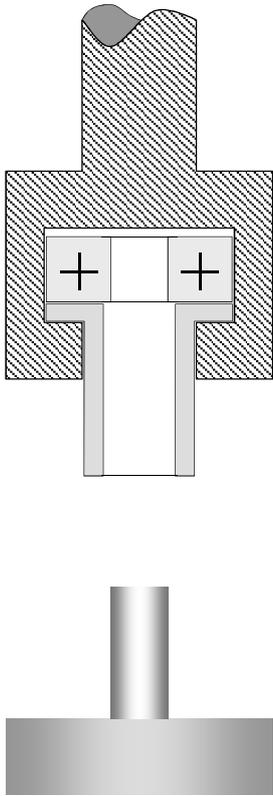
**Bottom Dead Centre:** This is the maximum physical position the shaft can reach when it is fully extended.

**Lower Safety Point:** This is a limitation on this position obtained by programming in order to avoid damaging the pin

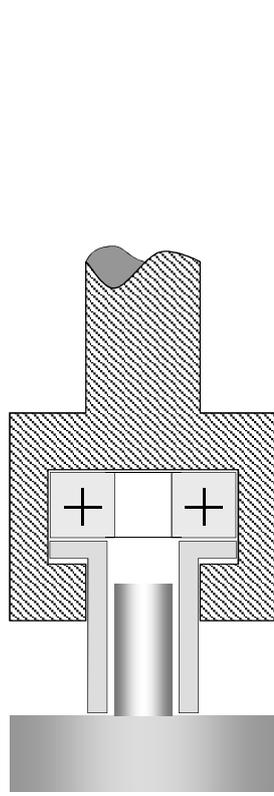
## 9.2 Position and speed diagram



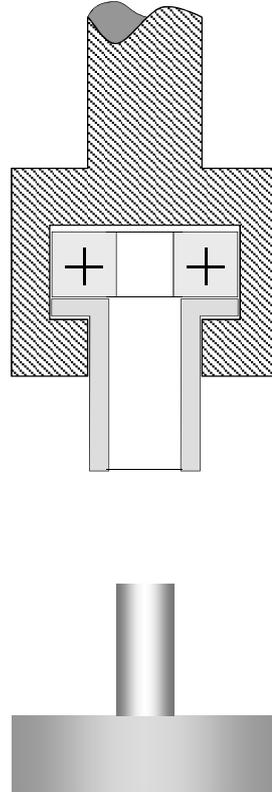
### 9.3 Acquisition and Press-fitting: example:



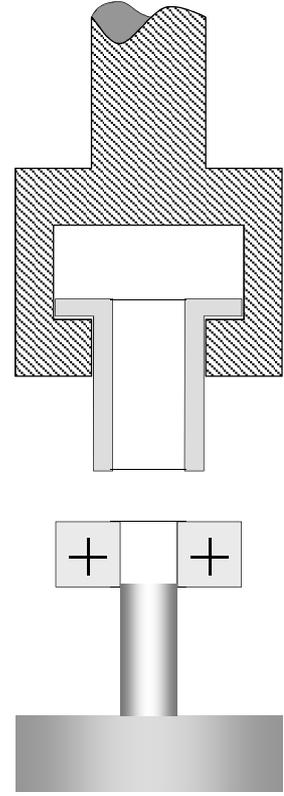
1: Acquisition cycle with end part in the stack



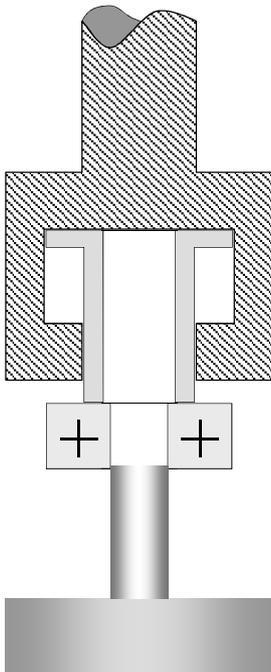
2: The initial position is probed



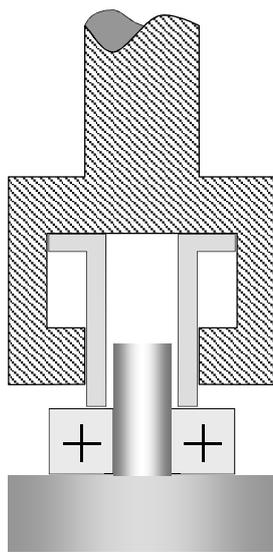
3: Return to idle position



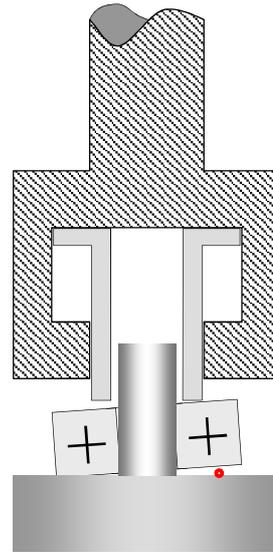
4: part ready to be press-fitted



5: Start of press-fitting



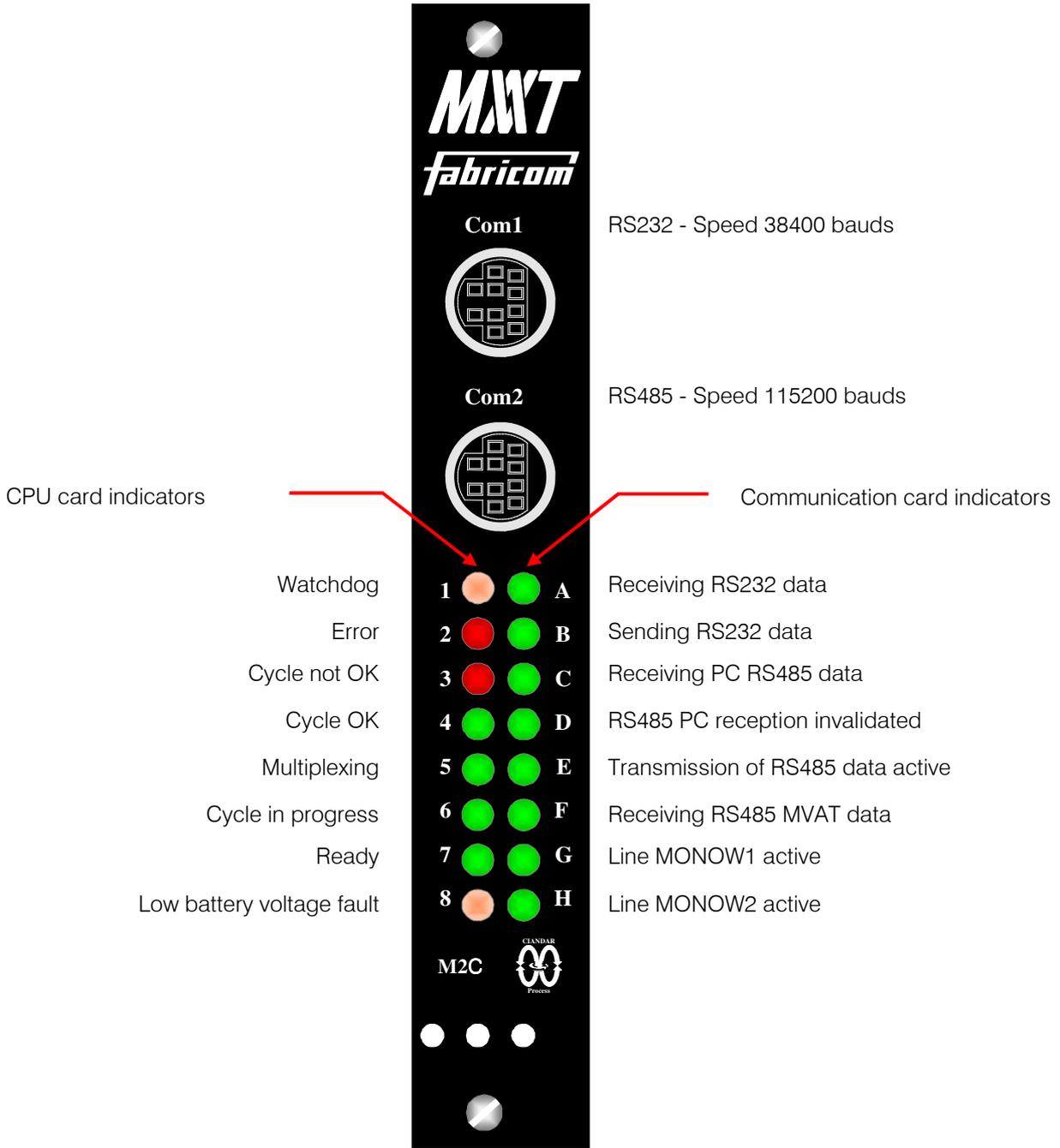
6: Press fitting finished Max Diff. < final position - initial position < Min. Diff.



6a: Press fitting finished Final position > initial position

## 9.4 Meaning of indicators on front panel

### 9.4.1 MVAT card



### 9.4.2 MVAT NET card:

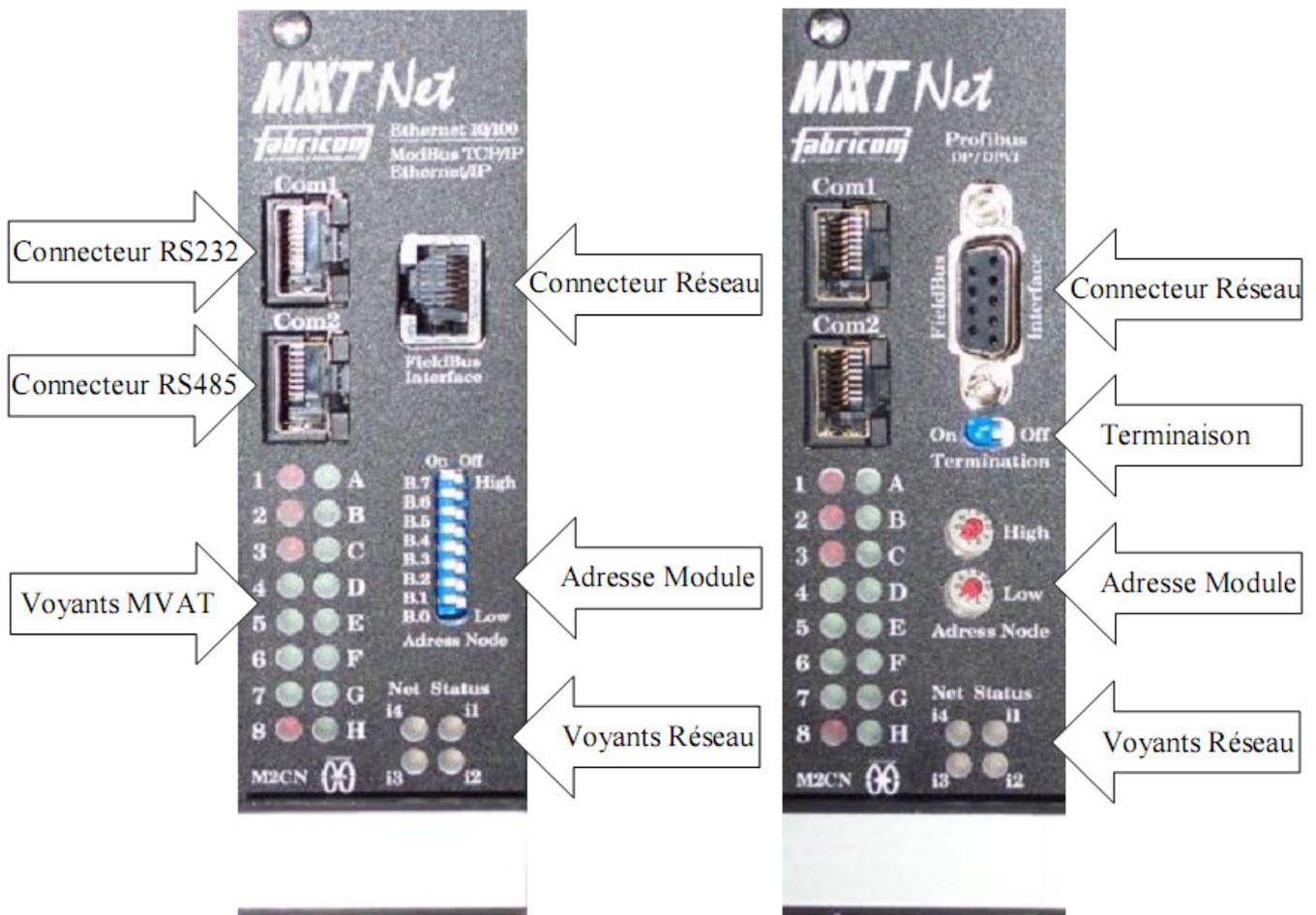
All the designated MVAT *Net* couplers have the same hardware architecture.

An MVAT communication part which comprises:

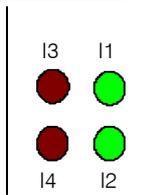
- 1 connector to the MVAT network owner Multip allowing dialogue between cards.
- 1 RS232 connector for testing and maintenance
- 1 RS485 connector for sending protected data to the PC, Supervisor, etc.
- 16 operation and communication indicator lights

A Field bus comprising:

- 1 connector to a specific network such as CANopen(SubD9M), Profibus(SubD9F), Ethernet TCP(RJ45), etc.
- 1 module address selector (Switches or Commutators), speed selector (CANopen), etc.
- 1 termination switch for line impedance (which may also exist on the socket e.g. Profibus).
- 4 Field bus operation and fault indicator lights.



### NETWORK INDICATOR



### Ethernet Modbus/TCP/ Ethernet IP

Number	Colour	Status	Comment
1	Green	On	Module has a connection established
		Off	No connection detected
2	Green	On	The module is working normally
		Off	The module is not switched on
		1 Hz	The module is not configured correctly
	Red	On	Major internal error detected
		1 Hz	Minor recoverable error detected
	Green/ Red	1 Hz	Power on self-test in progress
3	Green	On	At least one IP Ethernet address detected
		Off	No power or No Ethernet address detected
		1 Hz	No Ethernet connection established
	Red	On	Duplicate IP address detected
		1 Hz	The connection time has been exceeded
	Green/ Red	1 Hz	Power on self-test in progress
4	Green	Flash	Each packet has been received or sent
		Once	

### Profibus DP/DPV1

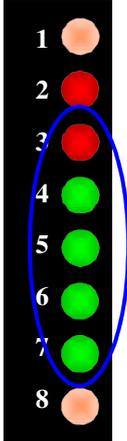
Number	Colour	Status	Comment
1	Green	On	DPV1 request executed normally
		Off	No power or no request executed
2	Green	On	Bus detected, exchange possible
		Off	Bus switched off, no power supply to module
		1 Hz	Delete mode
3	Red*	On	Bus switched off (*inverse of LED 2)
		Off	Bus switched off, no power supply to module
4	Red	Off	No diagnostic or no power supply
		1 Hz	Error in configuration data
		2 Hz	Error in parameter data
		4 Hz	Error in initialising Profibus ASIC

For more information refer to the "MVAT Net User Manual"

***Fault codes on MVAT indicator lights***

These codes are indicated by green indicator lights (and unencrypted via the RS232 link) and are identical for all networks. See the example in the screen below for error code 0x05 which appears on power up as the MVAT part initialises quicker than the network part.

Faults higher than 0x06 are global and the Hyper Terminal is needed to specify the group and the type affected by the error message.



	No.	Error
●●●●●●●●	<b>0x00</b>	The Network module is not ready to be initialised
●●●●●●●●	<b>0x01</b>	Start of initialisation
●●●●●●●●	<b>0x02</b>	Initialisation of Network module
●●●●●●●●	<b>0x03</b>	Initialisation of Network
●●●●●●●●	<b>0x04</b>	End of initialisation
●●●●●●●●	<b>0x05</b>	Line switched off
●●●●●●●●	<b>0x06</b>	Mac ID
		.....
●●●●●●●●	<b>0x0C</b>	Multip FieldBus In/Out Failed (send, line failure, attempt, etc.)
●●●●●●●●	<b>0x0D</b>	Parameter/Result request confusion
●●●●●●●●	<b>0x0E</b>	Parameter file error (4 types) 1 – Dynamic Set Points Stack Overload! 2 – File type error 3 – File number error 4 – Set Point number error
●●●●●●●●	<b>0x0F</b>	FB_DCY or FB_CYCL_ON must not be enabled
●●●●●●●●	<b>0xff</b>	No error detected

## 9.5 Analysis of malfunctions when first switched on

The application runs for the first time or after hardware replacement

<i>Symptom of malfunction</i>	<i>Message on RS232 Hyper terminal</i>	<i>Cause and solution</i>
Shaft exits or returns at maximum speed		Motor phases reversed relative to those of the synchro-resolver
Pressing calibration: the shaft does not rise back up after application force		Force sensor wired wrong way round: check by command " <b>Esc O</b> "(see keyboard commands) Or current limited by RHAPSODIE.NET (calibration current) or by the speed controller settings.
Pressing calibration: shaft exits then stops	<b>"Force before pulse fault"</b>	Mechanical problem (sticking point, obstacle, etc.)
Pressing calibration: shaft exits then stops after a short distance		Check whether the brake has been disabled or whether the INFRANOR speed controller is not malfunctioning
	<b>"Displacement change fault"</b>	Resolver or coder pulses absent or PULSE absent Or travel time between the index release and the 1 <sup>st</sup> PULSE is greater than 1 sec: increase the pressing calibration speed
	<b>"Index change fault"</b>	The index remains present all the time
Cannot start a cycle or carry out calibration	<b>"Index NOK"</b>	The shaft has not returned sufficiently or the index is absent.
	<b>"Offset fault"</b>	Sensor absent or wiring fault. Check using command " <b>Esc C</b> "
	<b>"Unbalancing fault"</b>	Force sensor wiring fault
	<b>"Force before index release fault"</b>	The max. force entered, protecting between PULSE-1 and the approach position, is too weak
During a cycle, the shaft stops when applying force		Current limitation in the cycle (see RHAPSODIE.NET) Current limitation in speed controller (see BPCW 2.6) If speed controller fault I <sup>2</sup> t = > holding time too long for the trip force requested

## 9.6 List of execution faults

The fault number given in the sequence result block on the 3<sup>rd</sup> row is the number in the 1<sup>st</sup> column of the table

<i>Fault no.</i>	<i>Message on RS232 Hyper terminal</i>	<i>Cause and solution</i>
1	<b>EMERGENCY STOP FAULT</b>	Execution fault: cycle start release (E1) during sequence
2	<b>EXIT TIME FAULT</b>	Programming or execution fault: Programmed "Cycle time" in cycle page exceeded
3	<b>SEQUENCE TYPE FAULT</b>	Execution fault: start of the pulling calibration sequence was incorrect
4	<b>OFFSET FAULT</b>	Execution fault: the force sensor offset is greater than the "Offset Fault Threshold" set point Remedy: <ul style="list-style-type: none"> <li>- Check the offset using the command "<b>ESC o</b>"</li> <li>- Increase the offset default threshold setting in the specification file (slightly)</li> <li>- Carry out calibration again</li> </ul>
5	<b>INDEX NOT PRESENT AT START FAULT</b>	Execution fault: detector not present before pin motor starts Cause: <span style="float: right;">Remedy:</span> <ul style="list-style-type: none"> <li>- the pin is not in fall-back position - Put the pin shaft back using manual mode</li> <li>- the index has not been seen by the MVAT - Check the wiring of the index</li> </ul>
6	<b>FORCE BEFORE INDEX RELEASE FAULT</b>	Execution or programming fault: force encountered during detector presence. The force measured is greater than the "Safety force" or the "Maximum force" set point or, if calibrating, the "Pressing Calibration Force". It could also be an incorrect force measurement. Remedy: <ul style="list-style-type: none"> <li>- Clear the tip of the pin</li> <li>- Check the force using the command "<b>ESC o</b>"</li> </ul>
7	<b>FORCE BEFORE PULSE FAULT</b>	Execution fault: force encountered before the PULSE has been received (between the detector and the PULSE). The force measured is greater than the "Safety force" or the "Maximum force" set point or, if calibrating, the "Pressing Calibration Force". It could also be an incorrect force measurement. Remedy: <ul style="list-style-type: none"> <li>- Clear the tip of the pin</li> <li>- Check the force using the command "<b>ESC o</b>"</li> </ul>
8	<b>FORCE BEFORE APPROACH FAULT</b>	Execution fault: the MVAT measures a force before the "Approach position" set point. The force measured is greater than the "Safety force" set point or the "Trip force" set point or the "Maximum force" set point Remedy: <ul style="list-style-type: none"> <li>- Clear the tip of the pin</li> <li>- Check the approach position</li> </ul>
9	<b>STOP ON LOWER SAFETY IN CALIBRATION MODE FAULT</b>	Execution fault: <ul style="list-style-type: none"> <li>- Maximum displacement reached in calibration mode (displacement measurement overflow 10000mm depends on the number of pulses)</li> <li>- Phase wiring reversed (IN+ and IN-) in this case the fault appears on the first PULSE</li> </ul> <b>Note:</b> In the case where signals from the speed controller are used for displacement, if the direction of the motor is reversed in the Infranor program (Reverse movement), the IN+ and IN- wiring must also be reversed.
10	<b>STOP ON LOWER SAFETY IN CYCLE FAULT</b>	Execution fault: max. displacement reached in calibrating "Lower Safety Position" set point

11	<b>STOP ON MAX FORCE FAULT</b>	Execution fault: no "Trip Force" programmed stop on max end stop force ("Safety Force" set point or "Maximum force" set point)
12	<b>STOP ON LOWER SAFETY ON INERTIA FAULT</b>	Execution fault: during the "Holding time", the pin reaches the "Lower Safety Position" set point
13	<b>LINE SELECTION FAULT</b>	Programming fault: test whether the curve selection is between 0 and 16
14	<b>SETTINGS NOT CORRECT WITH THE CYCLE DEFINITION</b>	Programming fault: this is in the case of a positioning sequence (the sign of the value must relate to the cycle type)
15	<b>PIN POSITIONING ERROR</b>	Execution fault: detector not present on the cycle start
16	<b>INDEXER BEFORE PULSE ON RETURN FAULT</b>	Execution fault: during the return phase, the MVAT see the presence of the "index presence" inductive detector Cause: interference of the indexer by the motor or the environment. Remedy: - Check the wiring, in particular the grounds, proximity of the measuring cable to the motors or power cable - Increase the index filtering time (Index filter field in the specification page).
17	<b>RECOVERY OF PULSE BEFORE INDEXER ON RETURN FAULT</b>	Execution fault: the MVAT sees PULSE-1 or the "Idle position from TDC" set point before seeing the presence of the detector. Cause: - Problem of coder coupling on UE with belt drive, check the coupling bellows - Index Centring incorrectly centred between the two resolver or coder pulses. Check the centring of the TOPs in the calibration result. (command "e" in the HyperTerminal)
18	<b>STOP ON INDEXER MANUAL CONTROL</b>	indicates that the MVAT stopped on the detector
19	<b>STOP ON SAFETY FORCE MANUAL CONTROL</b>	Indicates that the MVAT stopped on the Safety Force or 10% of the true rated force
20	<b>CALIBRATION NOT DONE FAULT</b>	Execution fault: the MVAT card has not recorded a pressing calibration
21	<b>RATED FORCE PROGRAMMING FAULT</b>	Programming fault: "Sensor Rating" set point incorrect
22	<b>CALIBRATION FORCE PROGRAMMING FAULT</b>	Programming fault: "Pressing Calibration Force" set point incorrect
23	<b>SPEED PROGRAMMING FAULT</b>	Programming fault: the speeds on the specification screen page or the cycle screen page
24	<b>CYCLE DEFINITION PROGRAMMING FAULT</b>	Programming fault: the mode relating to the type of cycle is not defined or inconsistent
25	<b>FORCE BEFORE PULLING APPROACH FAULT</b>	Execution fault: the MVAT measures a force during the pulling approach phase. The force measured is greater than the "Trip force" set point or the "Maximum force" set point
26	<b>TRIP POSITION &gt; APPROACH POSITION PROGRAMMING FAULT</b>	Programming fault: the pressing "Trip Position" set point is greater than the pressing "Approach Position" set point
27	<b>CALIBRATION FORCE &lt; PRESSING FORCE PROGRAMMING FAULT</b>	Programming fault: the pressing "Trip Force" set point is greater than the "Pressing Calibration Force" set point
28	<b>SELECTION PROGRAMMING FAULT</b>	Programming fault: the selection of the cycle is incorrect
29	<b>NUMBER OF PULSES INCORRECT FAULT</b>	Execution or programming fault: the resolution (number of pulses/mm) found during pressing calibration is greater or less than the "Max. Resolution" and "Min. Resolution" set points
30	<b>APPROACH POSITION &lt; WORKPIECE MAX HT POSITION PROGRAMMING FAULT</b>	Programming fault: the "Approach position" set point is less than the "Max. Position" (max. work piece position)
31	<b>CALIBRATION REQUEST PROGRAMMING FAULT</b>	Programming fault: the "Pressing Calibration Force" is greater than the value of the pressing calibration force for the last recorded calibration (correct calibration)
32	<b>TRIP &lt; APPROACH ENTERED PROGRAMMING FAULT</b>	Programming fault: the pulling "Trip Position" set point is less than the pulling "Approach Position" set point

33	<b>APPROACH DISPLACEMENT &lt; TABLE OPENING PROGRAMMING FAULT</b>	Programming fault: the pressing "Approach position" set point is less than the "Top Dead Centre" (the opening of the U <sup>F</sup> ) found during calibration
34	<b>OPERATING MODE PROGRAMMING FAULT</b>	Programming or execution fault: the selected operating mode is incorrect
35	<b>SLOWING DOWN POSITION &lt; TRIP POSITION PROGRAMMING FAULT</b>	Programming fault: the pressing "Slowing down Position" set point is less than the pressing "Trip Position" set point
36	<b>MAX CHAINING &gt; 100 CYCLES PROGRAMMING FAULT</b>	Execution fault: the number of chained cycles is greater than 100
37	<b>APPROACH &gt; WORKPIECE MIN POSITION ENTERED PROGRAMMING FAULT</b>	Programming fault: the pulling "Approach position" set point is greater than the "Min. Position" (min. work piece position)
38	<b>SPEED OFFSET FAULT</b>	not active
39	<b>MEASUREMENT OVERFLOW FAULT</b>	Execution or programming fault: the allowed offset + the measurement exceeds the true rated force (useful force) Example: offset = - 200 daN; true rated force = 3000 daN, measurement without offset correction = 2900 daN, true measurement = 2900 - (-200) = 3100 daN = exceeds the true rated force. This test is carried out when the value is stored. During execution, the saturation of the measurement is checked.
40	<b>SETPOINT OVERFLOW FAULT</b>	Execution or programming fault: the offset + requested force set point exceeds the true rated force (useful force)
41	<b>STOP ON RETURN FORCE FAULT</b>	Execution or programming fault: the MVAT measures a force during the return phase which is greater than the "Safety Return Force" set point Remedy: - Check the force using the command "ESC o" (warning, offset display does not work just after a RESET) - Increase the safety return force parameter in the specification tab
42	<b>EXTERNAL CHAINING PROGRAMMING FAULT</b>	not active
43	<b>PULLING TRIP POSITION &gt; DISPLACEMENT CARRIED OUT PROGRAMMING FAULT</b>	Programming fault: the pulling "Trip Position" is greater than the current pin displacement
44	<b>SEMI-MANUAL MODE =&gt;E3 OR E4 FAULT</b>	Keyboard command execution fault: if in SEMI-MANUAL MODE, inputs E3 or E4 must be active
45	<b>PULLING APPROACH POSITION &gt; DISPLACEMENT CARRIED OUT PROGRAMMING FAULT</b>	Programming fault: the pulling "Approach Position" is greater than the current pin displacement
46	<b>CHAINING SELECTION NUMBER PROGRAMMING FAULT</b>	Programming fault: the number of chained cycles is greater than 384
47	<b>INPUTS (E3+E4) AT THE SAME TIME FAULT</b>	Keyboard command execution fault: on the start of the cycle, inputs E3 or E4 are simultaneously active
48	<b>CHAINING CONTINUATION AS CYCLE NOT OK FAULT</b>	Execution or programming fault: chaining is requested on a bad cycle although the "Cycle resume if Nook" flag is not enabled (box checked)
49	<b>SELECTION 0 ON CHAINING BY PLC FAULT</b>	Execution or program fault: automatic chaining but no cycle no.
50	<b>PULLING CALIBRATION FAULT</b>	Execution fault: pulling calibration not saved or initialised
51	<b>DISPLACEMENT CHANGE FAULT</b>	Execution or programming fault: safety time relating to the release of the detector and change in displacement measurement elapsed. Safety time = 2 secs. Cause: not enough pulses during a covering time delay. Remedy: - check the coupling in the case of a belt-driven press-fitting unit - check the encoder wiring in the case of a belt-driven press-fitting unit - check the programming of the number of pulses (Infranor speed controller) in the case of a direct drive press-fitting unit
52	<b>NO AUTOMATIC RETURN FAULT</b>	Execution or programming fault: where the "Auto Return" flag is not enabled (the box is not checked) and the cycle requested is not 513 in non-automatic return mode, cycle 513 must be called to carry out the return

53	<b>AWAITING AUTHORISATION TO CONTINUE CYCLE FAULT</b>	not active
54	<b>INDEXER CHANGE FAULT</b>	Execution or programing fault: safety time relating to the start of the pin motor and release of the detector elapsed. Safety time = 2 sec. Cause: the index does not disappear after the pin starts, it is therefore impossible to raise it back up in manual mode. Remedy: check the wiring to the index
55	<b>SENSOR UNBALANCE FAULT</b>	Execution fault: before starting the pin, the MVAT card carries out a test on the force sensor and the measuring chain. This test involves unbalancing the sensor by a known amount (50% of the true rated value) and checking this value
56	<b>INDEXER FAULT DURING PULLING</b>	Execution fault: the MVAT sees the presence of the detector during the pulling phase
57	<b>STORAGE BUT NO TRACE SEQUENCE FAULT</b>	Programing fault: tracing has been requested by setting the flag "Store the Curve" to YES, but there is no curve number associated
58	<b>NO PROGRAM CYCLE START FAULT</b>	Execution or programing fault: indicates no program cycle start indicated
59	<b>CALIBRATION FORCE TOO SMALL FAULT</b>	Programing fault: indicates that the "Pressing Calibration Force" set point is less than 25% of the true nominal force (useful force)
60	<b>SPLINE HOLDING TIME FAULT</b>	Execution or programing fault: "Holding time" expired but no splines found
61	<b>NEW CALCULATED TRIP POSITION &lt; LOWER SAFETY POINT FAULT</b>	Programing fault: the "Trip Position" set point calculated relative to the current displacement (positioning sequence) is less than the "Lower Safety Position" set point
62	<b>TABLE OPENING CALIBRATION FAULT</b>	Execution or programing fault: the pressing elasticity measurement is greater than the "Pressing elasticity" set point
63	<b>FILE ERROR FAULT</b>	Programing fault: indicates that there are one or more incorrect values in the cycle file selected
64	<b>MAX DISPLACEMENT REACHED ON PULLING</b>	Execution fault: where there is no programmed pulling trip position indicates that the MVAT reached position 0 which is the starting PULSE
65	<b>RATED CALCULATION FAULT</b>	Programming fault: the useful calculation force is not valid. The "Rated Calculation Error" message runs round in a loop. RATED CALCULATION ERROR: 01 sensitivity entry error 02 load limit overrun error (warning, the new rated value calculated with the "Overload max. factor" must be greater than the true rated value calculated with the sensitivity. In this case an Overload max. factor > 1 must be entered, for example, 1.2) 03 class entry error 04 sensor power supply overrun error (15 volts) 05 sensor power overrun allowed (15 volts) 06 requested force correction > positive authorised percentage error 07 requested force correction > negative authorised percentage error (if in the Quality Department menu a value is entered in the Max. force correction field and nothing in the other fields, you will have this fault which scrolls on the screen with the nearest output flashing
66	<b>APPROACH &gt; OPENING FAULT</b>	Programing fault: the "Approach position" set point is greater than the "Top Dead Centre" (the opening of the Ue) found during calibration
67	<b>MEASUREMENT SATURATION</b>	Execution or programing fault: indicates that the force measured exceeds the true rated force (useful force)
68	<b>FORCE BEFORE END YES BUT NO TRACING</b>	Programing fault: indicates that the "Force before stop result" is enabled (box checked) although the "Store the Curve" flag is disabled (box not checked)
69	<b>TABLE OPENING OFFSET FAULT</b>	Programing fault: indicates that the "Offset from Actual Working Plane (PRV)" is positive and greater than the Top Dead Centre (the opening of the UE) found during calibration
70	<b>DISPLACEMENT POSITION CALCULATION OVERFLOW FAULT</b>	Programing fault: indicates that there is a positive position set point greater than the opening of the UE for the sequence requested (cycle+curve). Example: opening 249.418mm; programmed position 250mm
71	<b>PULLING CURVE FAULT (POSITION FAULT IN THE CURVE CHECK; NO. OF PULLING WINDOWS NOT EQUAL TO NO. OF PRESSING WINDOWS)</b>	Execution or programing fault: expansion case: indicates that the number of pulling windows which have been executed is not equal to the number of pressing windows executed in order to carry out the curve check in pulling mode. The number of windows executed in pulling mode must equal the number in pressing mode.

72	<b>WINDOW FAULT (POSITION FAULT IN THE CURVE CHECK)</b>	Marker with the same address twice A window has been defined which could not be drawn (window outside the cycle) or the marker has been stored which should not have been
73	<b>NO. EXEC WINDOW FAULT</b>	The number of windows executed differs from the number of windows programmed
74	<b>PULLING CURVE RELOAD FAULT</b>	Programing fault: the sequence is trying to reload a curve on a pulling cycle in which storage has been requested
75	<b>ACCELERATION OVERFLOW FAULT</b>	Programing fault: the acceleration setpoint is too large
76	<b>SPEED AND ACCELERATION INCONSISTENCY</b>	Programing fault: The requested speed and acceleration distance are inconsistent
77	<b>POSITIONING CYCLE FAULT</b>	Programing fault: the first cycle in the sequence is a positioning cycle.
78	<b>INDEX SELECTION EXECUTION FAULT</b>	Execution fault: the index has been moved (case of multiple indexes)
79	<b>INDEX SETPOINT EXECUTION FAULT</b>	Execution fault: the index has been moved (case of multiple indexes)
80	<b>PLC STOP FAULT</b>	Execution fault: The PLC is no longer responding
81	<b>CURVE RELOAD AUTHORISATION FAULT</b>	Programing fault: Curve reloading is not authorised during a sequence
82	<b>OPENING FAULT</b>	Execution fault: The Top Dead Centre calculated at the end of calibration is outside tolerances (TDC Max and TDC Min in the "Setpoints" tab of the "Specifications" page
83	<b>MAX NO. OF PROFILE WINDOWS FAULT</b>	Programing fault: In profile mode, a maximum of 5 recording ranges is allowed.
84	<b>WINDOW MARKER FAULT</b>	Execution fault: An internal error has occurred in calculating the position of the check window.
85	<b>FORCE BEFORE STOP IN PROFILE MODE FAULT</b>	Programing fault: in advanced curve mode (Profile), the "Force before Stop Result" on the Cycle page may not be requested.
86	<b>WIN/CYCLE CONSISTENCY FAULT</b>	Programing fault: on a complete sequence, if one of the cycles has its "Force Before Stop per Cycle" box checked, it must be the same for all cycles in the sequence and the "Per cycle" box on the Curve page must also be checked for the curve associated with this sequence. In this mode, curve reload is possible with Hard chaining (but only for standard curves - curve prog. from 1 to 16) Similarly, on a complete sequence, if one of the cycles has its "Force Before Stop per Cycle" box unchecked, it must be the same for all cycles in the sequence and the "Per cycle" box on the Curve page must also be unchecked for the curve associated with this sequence.
87	<b>TRIP BY EXTERNAL INPUT</b>	Indicates that the trip has been carried out by an external input, ON/OFF input E5
88	<b>NO. OF RECORDINGS EXECUTED NOT EQUAL TO NO. OF RECORDINGS PROGRAMMED FAULT</b>	Fault linked to a curve reload => curve reload not possible. In PROFIL Mode, to reload a curve, a test must be made that all programmed recordings have been executed
89	<b>CALIBRATION FILE ERROR FAULT</b>	Programing fault: indicates that there are one or more incorrect values in the calibration file selected
90	<b>RESOLUTION MESSAGE ENTERED</b>	Calibration result message without gage
91	<b>HARDWARE RESOLUTION MESSAGE</b>	Calibration result message without gage
92	<b>SPEED DIRECTION FAULT</b>	The direction of the speed setpoint is not equal to the direction of the force measured
93	<b>CALIBRATION FUSE VALUE FAULT</b>	Calibration fuse value fault in the flash memory
94	<b>STOP MESSAGE ON THE POSITION IN CONTROL MODE</b>	In control mode, indicates that the stop is carried out on the position
95	<b>POSITION DISPLACEMENT NOT VALID IN CONTROL MODE FAULT</b>	This fault occurs in control mode:

		<ul style="list-style-type: none"> <li>- If an absolute or relative ascent is requested after power on, then the shaft is not at its origin</li> <li>- If an absolute or relative descent is requested after power on, then the shaft is not at its origin</li> <li>- If a change is made to this mode without having started by descending</li> </ul>
96	<b>NO POSITION IN CONTROL MODE FAULT</b>	<p>This fault occurs in control mode:</p> <ul style="list-style-type: none"> <li>- If an absolute or relative ascent or descent is requested when no position has been entered</li> </ul>
97	<b>MAX THRESHOLD TRIP FAULT</b>	A trip has occurred on the max threshold set point. The sequence is interrupted
98	<b>SPEED DECIMAL PLACES FAULT</b>	The MVAT has received a speed set point with 3 decimal places while the maximum is 2 decimal places
99	<b>FORCE BEFORE END BUT NO DISTANCE BEFORE END SETPOINT FAULT</b>	A force before end is requested although no distance before end set point has been programmed
100	<b>FORCE BEFORE END BUT NO CALCULATION FAULT</b>	<p>Programing fault: the force before end is requested but the force before end has not been able to be calculated as:</p> <ul style="list-style-type: none"> <li>- we are in window/sequence mode ("Per Cycle" field in profile program not checked) while the recording windows have not all been run through</li> <li>- a force before end is requested while the curve check took place in the previous cycle</li> <li>- we are in window/sequence mode, and it is only possible to have the force before end at the same time as the curve calculation. i.e. once all windows have been executed.</li> </ul>
101	<b>HARD CYCLE START NOT ACTIVE IN CONTROL MODE FAULT</b>	In control mode, the Hard cycle start (On/Off input E1) must be raised.
102	<b>CONTROL MODE NOT AUTHORISED FAULT</b>	Programing fault. The "Keyboard controlling enabled" box in the Appendix Specifications page is not checked.
103	<b>ABSOLUTE DESCENT POSITION IN CONTROL MODE FAULT</b>	<p>In control mode, programing fault associated with the absolute descent command:</p> <ul style="list-style-type: none"> <li>- positive set point: Descent set point &gt; table opening (TDC)</li> <li>- negative set point: Descent set point &lt; Lower safety position</li> </ul>
104	<b>ABSOLUTE ASCENT POSITION IN CONTROL MODE FAULT</b>	<p>In control mode, programing fault associated with the absolute ascent command:</p> <ul style="list-style-type: none"> <li>- positive set point: Ascent set point &gt; table opening (TDC)</li> <li>- negative set point: Ascent set point &lt; current position</li> </ul>
105	<b>RELATIVE ASCENT POSITION IN CONTROL MODE FAULT</b>	<p>In control mode, programing fault associated with the relative ascent command:</p> <ul style="list-style-type: none"> <li>- positive set point: Ascent set point &gt; current position</li> <li>- negative set point: Relative ascent set point must not be negative</li> </ul>
106	<b>RELATIVE DESCENT POSITION IN CONTROL MODE FAULT</b>	<p>In control mode, programing fault associated with the relative descent command:</p> <ul style="list-style-type: none"> <li>- positive set point: <ul style="list-style-type: none"> <li>New descent position &gt; safety set point</li> <li>Relative descent set point too big =&gt; overflow</li> </ul> </li> <li>- negative set point: Relative descent set point must not be negative</li> </ul>
107	<b>SPEED CONTROLLER NOT READY IN CONTROL MODE FAULT</b>	Execution fault. The speed controller is not ready
108	<b>SEQUENCE FINISHED</b>	In control mode only, the « MESSAGE » numbers are used by the UExp-MVAT panel to translate the message
109	<b>SPEED CONTROL FAULT IN FORCE FOLLOWING MODE</b>	In force following mode, a speed control fault occured. Check the parameters of this mode.

110	<b>CURRENT CONTROL FAULT IN FORCE FOLLOWING MODE</b>	In force following mode, a current control fault occurred. Check the parameters of this mode : <ul style="list-style-type: none"> <li>- Either the current reference value is &gt; than 50% max current when the press is tripping under force</li> <li>- Or the current reference value calculated to compensate the force loosing is &gt; than 50% of max. current.</li> </ul>
111	<b>FORCE POSITIONNING CYCLE FAULT</b>	In Force incremental mode, an overflow calculation occurred for the new force reference
112	<b>TEMPERATURE CORRECTION FAULT</b>	Could occur when temperature correction is activated, and if the external temperature sensor is missing during calibration or cycle.
113	<b>FORCE FOLLOWING MODE &amp; SLOPE TRIPPING MODE TOGETHER</b>	The 2 incompatible working mode have been selected at the same time.
114	<b>SLOPE TRIPPING MODE PARAMETERING FAULT</b>	In Slope tripping mode, a parametering fault is present : <ul style="list-style-type: none"> <li>- Either the loop is too big</li> <li>- Or the tripping coefficient is too big</li> </ul>
115	<b>MISSING CALIBRATION FAULT</b>	When you update from version MVAT V10.05 to V10.06, a calibration sequence is needed
116	<b>TEMPERATURE CORRECTION ACTIVATED WITHOUT TEMPERATURE SENSOR (CIT)</b>	Occurs when temperature correction is activated (a value in the field "Deform. Correct." has been entered) and there is no temperature circuit, OR the card has been updated from 10.05 version to 10.06 version, and the parameters haven't been send again to the MVAT card. Remark : when the MVAT card is updated from 10.05 version to 10.06 version, a full downloading is needed from Rhapsodie.Net.
117	<b>TEMPERATURE CORRECTION FAULT</b>	Occurs when temperature correction is activated (a value in the field "Deform. Correct." has been entered) and the frame deformation calculated with the actual temperature is too high.
118	<b>INCREMENTAL FORCE MODE FAULT</b>	When the Incremental Force mode is used : <ul style="list-style-type: none"> <li>- the type of cycle has to be "Insertion" (logically, Rhapsodie doesn't allow to do otherwise)</li> <li>- the incremental Force mode has been used on the 1st cycle of the sequence.</li> </ul>
119	<b>LUBRICATION STOP FAULT</b>	The "Greasing Shut down threshold" (Specifications page, Maintenance tab) is reached, and the "Shut down if threshold reached" checkbox has been checked, then the MVAT stops, and doesn't want to continue. Please proceed to the lubrication of the spindle, then validate by "Greasing Done" button in Rhapsodie, or on the MVAT panel.
120	<b>N.U.</b>	
121	<b>N.U.</b>	
122	<b>N.U.</b>	
123	<b>N.U.</b>	
124	<b>N.U.</b>	

## 9.7 Fault list related to the Profil curve checking

The fault number given in the Result block at the 3<sup>rd</sup> line, is the in the 1<sup>st</sup> column of the following table :

Ex :

\*\*\*\*\*

Controle Courbe:Profil Courbe N0: 57

Numero de défaut courbe : 04

-----  
Debut Largeur Fixe - Fin Fin Cycle - Mode Inclusion Compression

F 01; Fmax : 0,7 daN; Crb <= Max : OK; Fmin1: 0,1 daN; Crb >= Min : TP

Debut Seuil Croissant - Fin Seuil Croissant - Mode Inclusion Traction

F 02; Fmax : 0,0 daN; Crb <= Max : TG; Fmin1: 0,0 daN; Crb >= Min : TP

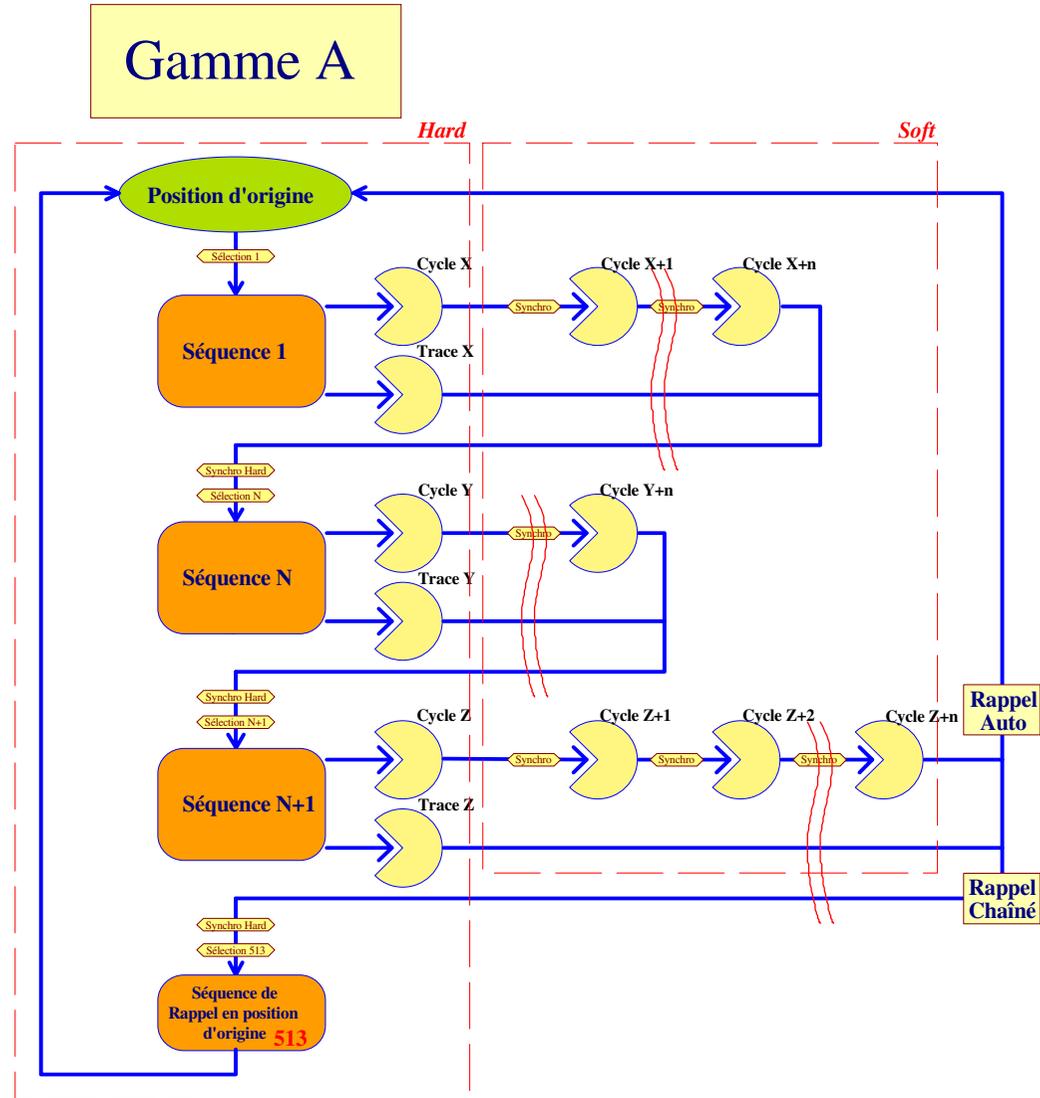
\*\*\*\*\*

N° de défaut	Message sur Hyper terminal RS232	Cause et solution
01	01-WINDOW START PARAMETER. ERROR	Le début de la fenêtre de contrôle a été trouvé après la fin de la fenêtre dans le sens de l'avance de l'axe.
02	02-START. WND THRES+ NOT REACHED	Le seuil de début de fenêtre dans le sens croissant n'a pas été rencontré dans la zone de scrutation programmée.
03	03-START. WND THRES- NOT REACHED	Le seuil de début de fenêtre dans le sens décroissant n'a pas été rencontré dans la zone de scrutation programmée.
04	04-ENDING WND THRES+ NOT REACHED	Le seuil de fin de fenêtre dans le sens croissant n'a pas été rencontré dans la zone de scrutation programmée.
05	05-ENDING WND THRES- NOT REACHED	Le seuil de fin de fenêtre dans le sens décroissant n'a pas été rencontré dans la zone de scrutation programmée.
06	06-CHKWND START OUT OF STOR.WND	Le début de la fenêtre de contrôle a été trouvé avant le début de la plage d'enregistrement, dans le sens de l'avance de l'axe
07	07-INTERNAL CALCULATION ERROR	La fin de la plage d'enregistrement n'a pas été trouvée.
08	08-CHKWND START AFTER/OUT OF STOR.WND	Le début de la fenêtre de contrôle a été trouvé après la fin de la plage d'enregistrement, dans le sens de l'avance de l'axe
09	09-CHKWND OUT OF STORING WND	Le début et la fin de la fenêtre de contrôle ont été trouvé en dehors de la plage d'enregistrement
10	10-PREVIOUS WND NOT-EXISTING	La fenêtre de contrôle précédente, nécessaire pour placer cette fenêtre de contrôle, n'a pas été placée. Vérifier qu'il ne s'agit pas de la 1 <sup>ère</sup> fenêtre de contrôle.
11	11-NEXT WND NOT-EXISTING	La fenêtre de contrôle suivante, nécessaire pour placer cette fenêtre de contrôle, n'a pas été placée. Vérifier qu'il ne s'agit pas de la dernière fenêtre de contrôle.
12	12-CHKWND START OUT OF STOR.WND	Le début de la fenêtre de contrôle a été trouvé avant le début de la plage d'enregistrement, dans les cotes négatives. (vérifier en négatif, -2 est avant -5)
13	13-CHKWND OUT OF STOR.WN	Si la fenêtre de contrôle n'est pas incluse dans la plage d'enregistrement, ce défaut apparait.
14	14-RESERVED	
15	15-STRICT INCLUSION FAULT	L'inclusion stricte de la courbe d'effort dans la fenêtre de contrôle n'a pas été respectée. La courbe est ressortie de la fenêtre de contrôle après la fin de la fenêtre dans le sens d'avance de l'axe.
16	16-START INFLEXION THRESH. NOT REACH.	Le seuil d'inflexion pour le début de la fenêtre de contrôle n'a pas été rencontré dans la zone de scrutation programmée.
17	17-END INFLEXION THRESH. NOT REACH.	Le seuil d'inflexion pour la fin de la fenêtre de contrôle n'a pas été rencontré dans la zone de scrutation programmée.

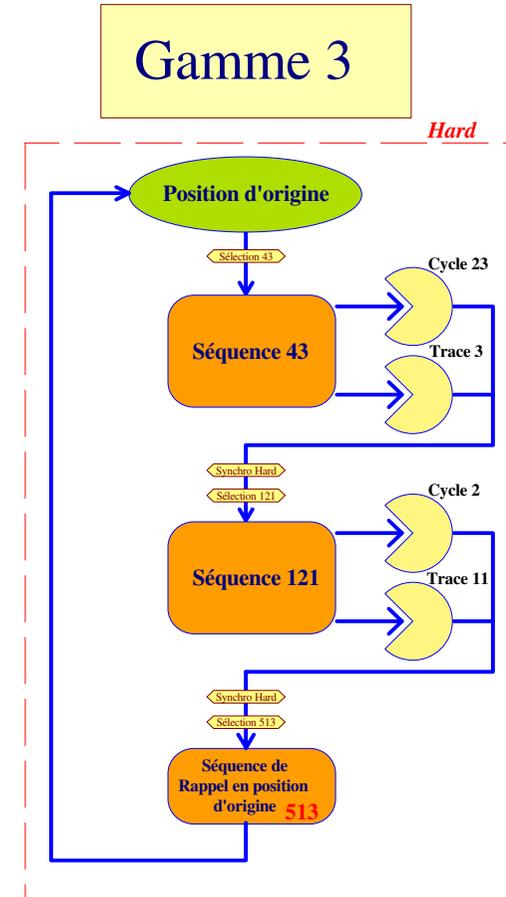
18	<b>18-INEXISTING FAULT</b>	
19	<b>19-LINEAR REGRESS. THRESHOLD FAULT</b>	Le point de départ calculé en regression linéaire est en dehors de la plage d'enregistrement
20	<b>20-LINEAR REGRESS. DIRECT. FAULT</b>	Le calcul du point de départ par regression linéaire n'est pas possible car la force de fin de scrutation est inférieure à la force de début de scrutation
21	<b>21-PREVIOUS WINDOW NOT POSITIONED</b>	Cette fenêtre doit démarrer par rapport à la fenêtre précédente mais la fenêtre précédente n'a pas pu être positionnée.
22	<b>22-TOLERANCES OF WINDOW ARE EITHER + AND -</b>	
23	<b>N.U.</b>	
24	<b>N.U.</b>	
25	<b>N.U.</b>	
26	<b>N.U.</b>	
27	<b>N.U.</b>	
28	<b>N.U.</b>	
29	<b>N.U.</b>	
30	<b>N.U.</b>	
31	<b>N.U.</b>	
32	<b>N.U.</b>	

## 9.8 Appendix 7 - Principle diagrams

### 9.8.1 Principe

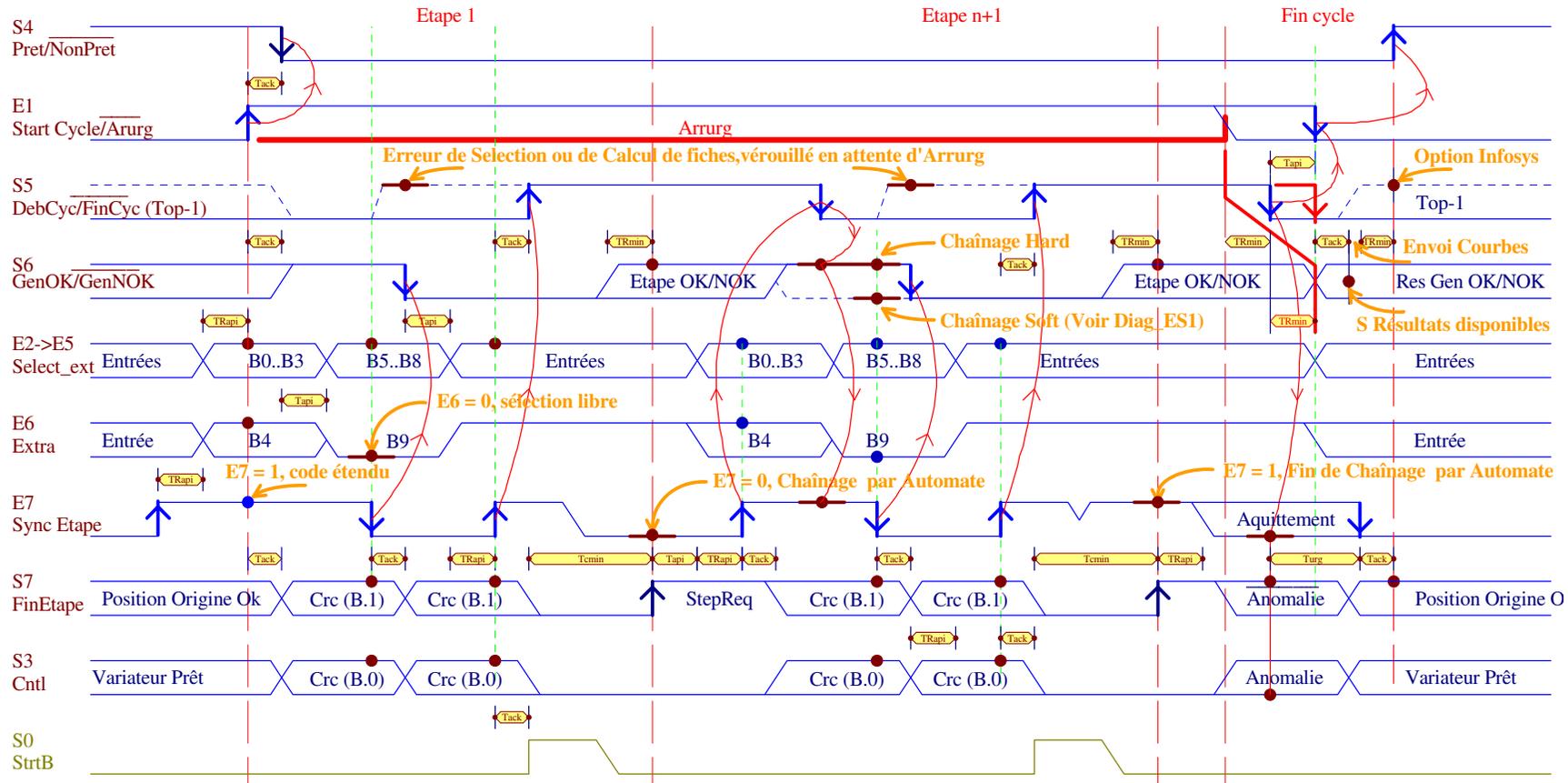


### Exemple



## 9.8.2 ON/OFF I/O with PLC diagram

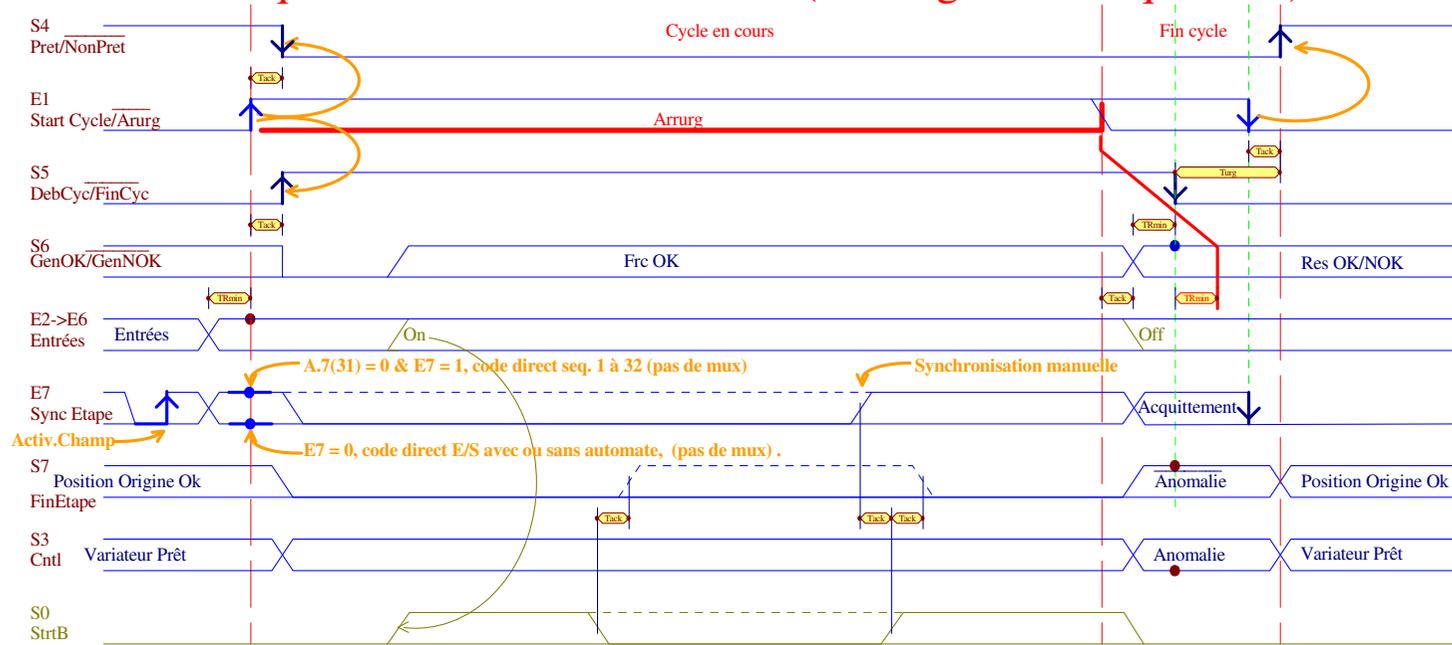
### Press-fitting



9.8.3 ON/OFF I/O without PLC diagram

**Diagramme E/S MVAT Presse sans Automate (Info Générales @31(A.7 = 0))**

**Séquence manuelle forcée (montée/descente)**  
**Séquence d'étalonnage forcée (compression: cale b./h.)**  
**Séquences manuelles de 1 à 32 (chaînage soft uniquement)**



**Séquences manuelles forcées**

E7	E6	E5	E4	E3	E2	Code Roues Codeuses	Description
@E1 0	1	1	x	x	1	(26d)	Etalonnage Compression Cale Haute
@E1 0	0	1	x	x	1	(10d)	Etalonnage Compression Cale Basse
@E1 0	1	0	x	x	1	(18d)	Etalonnage Traction
@E1 0	0	0	x	x	1	(02d)	Etalonnage Traction
@E1 0	1	0	x	x	0	(17d)	Montée Manuelle avec CdF
@E1 0	1	1	x	x	0	(25d)	Descente Manuelle avec CdF
@E1 0	0	0	1	0	0	(05d)	Montée Manuelle directe, avec CdF *
@E1 0	0	0	0	1	0	(03d)	Descente Manuelle directe, avec CdF *

\* Si E5=1, Mont/Desc sans CdF (pour sortie de défaut de mesure de force)

**Légende**  
E2 = Etalonnage/Manuelle  
E3 = Descente  
E4 = Montée  
E5 = Compression(Desc)/Traction(Mont)  
E6 = Caleh./Caleb.  
CdF = Contrôle de Force

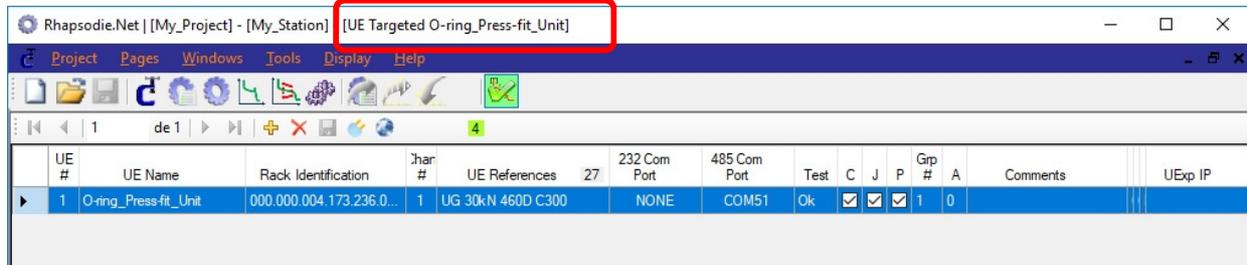
**Séquences manuelles de 1 à 32**

E7	E6	E5	E4	E3	E2	Code Roues Codeuses	Description
@E1 1	0	0	0	0	0		Séquence N°1
@E1 1	0	0	0	0	1		Séquence N°2
@E1 1	1	1	1	1	0		Séquence N°31
@E1 1	1	1	1	1	1		Séquence N°32

## 9.9 Appendix 8 - Communication report

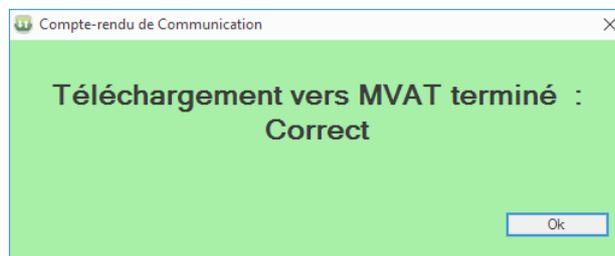
### Compte rendu de communication RS485 (dans le journal)

La "boîte d'information" fait référence à un port de communication associé à une Unité d'Emmanchement qui est précisée dans le titre de la fenêtre Page « Unité d'emmanchement » :



La "boîte d'information" lors d'un envoi de configuration ou de paramètres retourne l'un des 4 états:

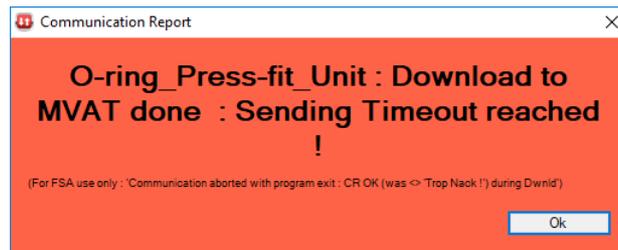
- **Terminé Correct !**



ou après le type d'envoi effectué, par exemple: "Téléchargement vers MVAT", "Envoi configuration", "Récupération des Programmes".

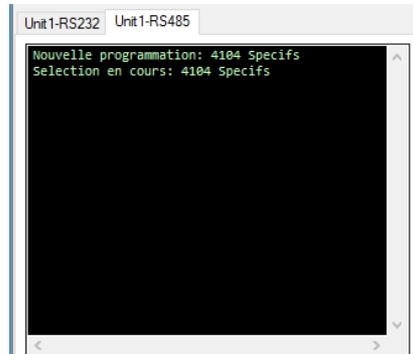
- **Nack !**
- **Time Out en Emission !**
- **Pas de compte-rendu de communication**

(dans cet exemple, le port n'est pas précisé car la tentative de communication a été effectuée avant la définition du port)



In the RS485 communication report (in the COM\_MVAT journal), you may see, if there has been a communication fault, a row of the type:

"File error: 4xxx"



The meanings of the error codes are given below.

**List of File Download communication errors**

- 4100** : Group without rack (configuration undefined)
- 4101** : Communication error on write
- 4102** : Communication error on command
- 4103** : Target of the group not controlled
- 4104** : Unknown IP
- 4105** : Unknown or improper group
- 4106** : File contents in error or incorrect
- 4107** : Multip network not available for sending packets
- 4108** : Multip network not available for storing packets
- 4109** : Multip network not available for sending commands
- 4110** : Multip network not available for executing commands
- 4111** : Batch error (batch processing)
- 4112** : Group not designated as destination of the configuration file
- 4113** : Non-compliant groups found on network scan at power on
- 4114** : Group no. not equal to rack no.
- 4115** : Configuration Error
- 4200** : CHR Timeout
- 4201** : CKS error
- 4202** : Too many characters
- 4203** : Unknown file type

**Change at 26/07/2006 from version MVAT V05.17-7**

Usage restrictions have been made:

- Group no.0 (test group) no longer exists, else error 4113 or 4114
- The configuration must be sent on communication from the 1<sup>st</sup> unit of the 1<sup>st</sup> MVAT rack location, else error 4112
- The racks declared in the configuration file must exist in the MultiP SCAN, else error 4113
- The group number must be equal to the rack number else error 4114

**Note:**

There is no error when less racks are configured than those scanned by MultiP. UEs may be disabled without having to withdraw MVAT cards

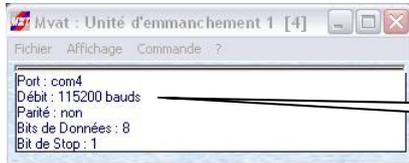
Racks do not have to be in increasing order, but this is safer and more "readable" to the user.

If one of the racks declared in the configuration file does not exist on the MultiP network or if the group no. is not the same as the rack number, the new configuration sent is completely disregarded (the previous configuration is not changed).

## 9.10 Appendix 9 – MVAT Com

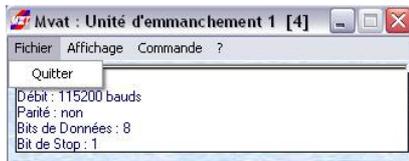
Since the Rhapsodie version V2.1.0.15, this communication interface is not used anymore. It's replaced by the tab « RS485 » of the « Insertion Units » page.

This is the management of the communication port between the card and Rhapsodie.net



Communication port settings

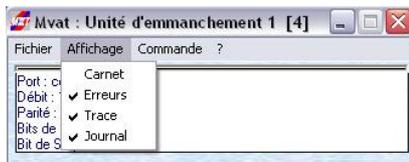
### FILE:



**Exit:** closes the communication port

**WARNING** it will not be possible to send to the MVAT card or to receive curves

### DISPLAY:



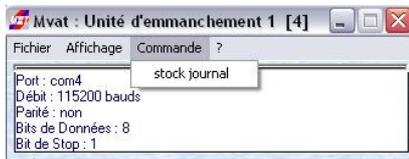
**Book:** ...

**Errors:** Displays a summary of communication faults between Rhapsodie and MVAT

**Trace:** ...

**Journal:** Displays the press-fitting result blocks

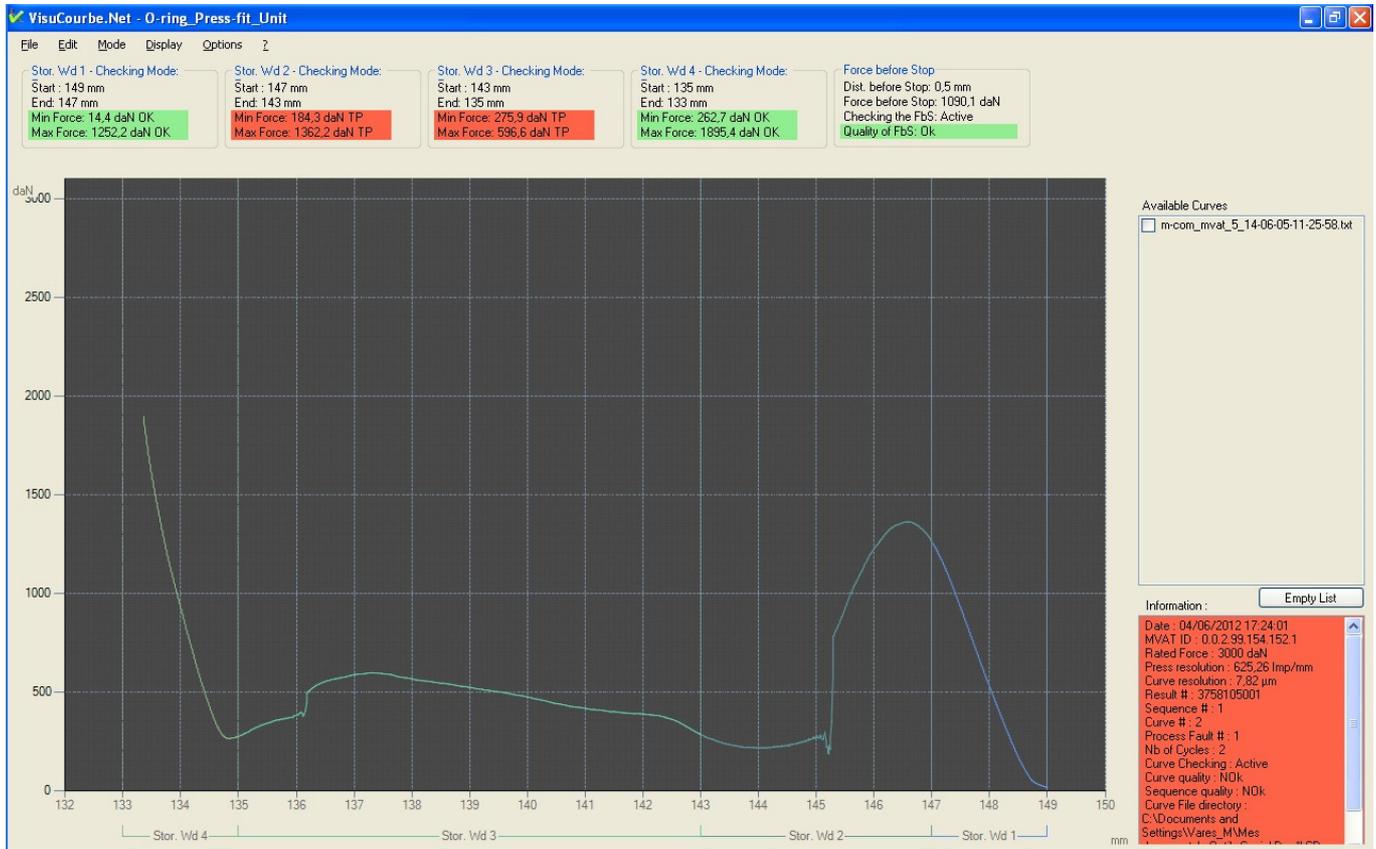
### COMMAND:



**Journal stock:** ...

## 9.11 Appendix 10 – GRADIENT FUNCTION

### *Force gradient - Slope checking*



The curve for force  $F$  which we observe varies according to a displacement ( $x$ -axis) from right to left (direction the shaft exits from the press towards the zero point of the axes).

The value of the Force  $F$  depends on a point  $x$  where it is applied. For a small variation  $dx$  in  $x$  we obtain a variation  $dF$ , defined by:

$$dF = F(x + dx) - F(x)$$

The mean variation  $\frac{dF}{dx} = \frac{F(x + dx) - F(x)}{dx}$  is the Force gradient denoted in Physics by  $\frac{\Delta F}{\Delta p}$

When  $dx$  is very small, this quotient approaches the derivative as the curve representing a derivable function at one point allows a tangent at this point for which the slope is equal to the derivative of the function. The study of the variation of this slope by a gradient curve reveals the behaviours of the function.

$\Delta F$  denoted Delta F represents the variation in the Force

$\Delta p$  denoted Delta P represents the variation in the Displacement

The analysable displacement is always stored using 2048 points. The curve may be made up of 10 windows each having their own Gain and Delta P.

Delta P represents a number of these points between 1 and 64.

Delta F can take any sort of force value from 0 to that rated for the pin. As it is often only a very small value, as only a small variation, we can amplify it using a factor known as the Gain which can vary between 1 and 500.

Once amplified,  $\frac{\Delta F}{\Delta p}$  will be compared with an arbitrary threshold value (free dimension in daN which enables the Gradient curve to be drawn and by making it significant, "visible").

The expression in pure slope terms is quite difficult (see end of section).

When  $\frac{\Delta F}{\Delta p} \times \text{gain} - \text{seuil} > 0$  the detection of an abnormal force variation will be activated.

The S3d tool (MS Excel 2003) allows all these elements to be varied and to immediately draw the response. The objective is to show a good compromise between these elements in order to control the sensitivity with which an abnormal change in slope is detected. The settings thus determined will then be programmed into Rhapsodie's Curve menu.

The windows enable different compromises to be made on the force curve depending on the nature of the forces to be checked. Example:

For a difference in force ( $\Delta F$ ) of 400 daN to invalidate the cycle, the following is required:

A Threshold of 1000, if  $\Delta p = 20$  and Gain = 50.

Which is equivalent to:

Threshold = 20  $\Delta p = 20$  and Gain = 1 (graphically less visible in terms of gradient).

This is almost equivalent to:

Threshold = 1000,  $\Delta p = 16$  and Gain = 40 (also completely visible but much more sensitive).

According to the following example, for the purists, 1 point on VisuCourbe is equal to 0.0078125 mm, i.e.

$\Delta p = 0.0078125 * 16 = 0.125$  mm,

The Threshold expressed in terms of slope set point represents:

$\text{Seuil} \times \frac{\Delta p}{\text{gain}} = 1280$  daN/mm,

$\Delta F = 370.24$  daN gives an effective slope of 2962 daN/mm quite sufficient for causing a fault ( $\Delta F$  min necessary = 160 daN).

Manipulating these terms is a delicate operation, a version of S3d will allow a secondary slope scale (in actual points, the value of the point may vary from 0.976 $\mu$  to 0.244mm).

**Warning:** It is not recommended to look for a  $\Delta F$  under 20% of the sensor rated value. However, the observation of the fluidity of the curve may allow this value to be lowered.

**Fabricom's Solution3d.xls (S3d) assistance tool**

**Warning concerning S3D:**

S3D is a modelling tool for assisting with configuring the gradient check.

S3D on Excel®\* is provided "as is" without any express or implicit guarantee of any sort whatsoever covering any direct or indirect loss associated with the ability or inability to use it. FSA provides no servicing, maintenance or modifications to S3d.xls

The user must always check the results obtained and carry out actual production runs in order to validate the settings applied which depend on the behaviour of the assembled products. They must randomly cycle products (components) causing the phenomenon sought by the gradient check.

The user is free to create their own modelling tool to use the MVAT curves from VisuCourbe according to information provided by FSA.

The disclosure of this information may in no way act as a licence and does not assume the protections and rights attached to the use of the information from this software.

However, the reproduction, reference, use of all or part of this computer software in agreement with the provisions of the intellectual property code are still subject to prior written authorisation from FABRICOM Systèmes d'Assemblage S.A.

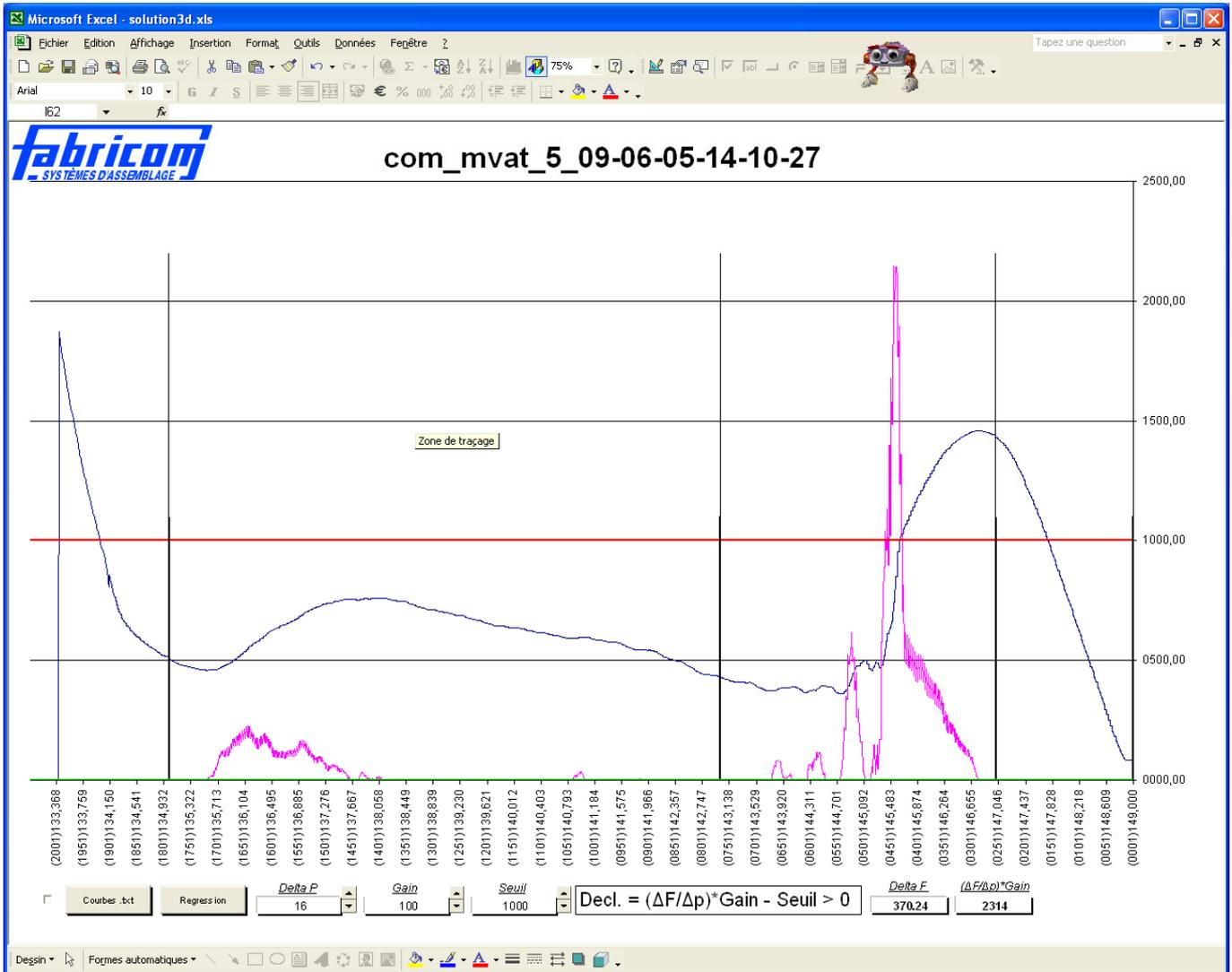
\*Excel® property of Microsoft Corp, software not supplied by FSA.

Solution3d.xls uses the curves produced by VisuCourbe (See VisuCourbe manual). The windows are not active but are marked and may be isolated.

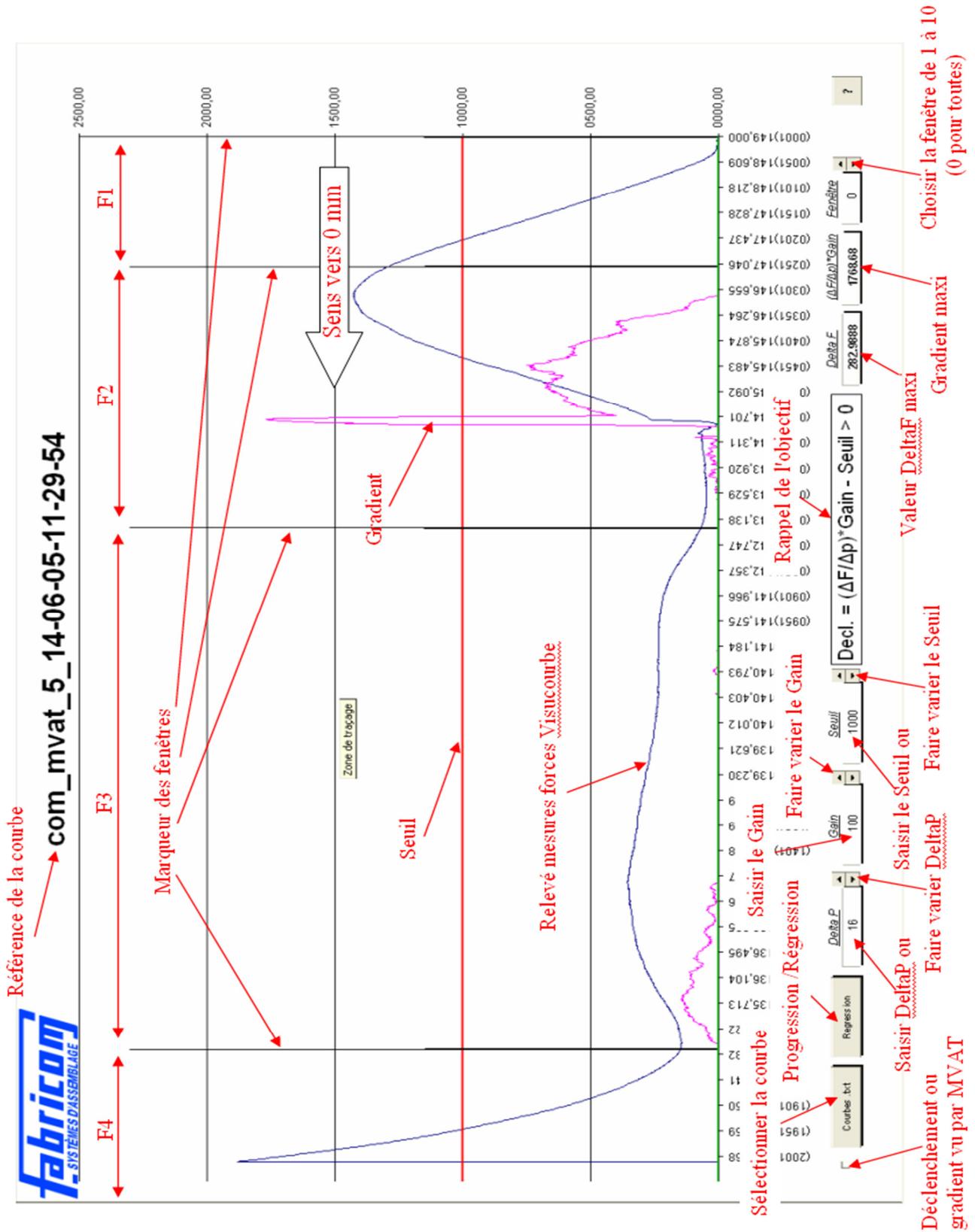
**Example:** curve of an actual event with break.



This curve file opened under S3d allows its force gradient to be observed.



Use of the S3d tool



For more information, refer to the examples given in the installation CD-ROM:  
... \Excel 97 tools \S3d

## 9.12 Appendix 11 - Rhapsodie.net Version

RHAPSODIE.NET V1.0  
Initial Version.

RHAPSODIE.NET V1.2

RHAPSODIE.NET V1.3  
Integration of advanced curve checking

RHAPSODIE.NET V1.4  
Change to a "light" version which is in phase with MVAT V10 (management of signatures, defrag, and UExp-MVAT terminal), and integration from version 1.4.1.00 of VisuCourbes "Multicourbes" with recalibration and calculation of Average and Envelope.

RHAPSODIE.NET V1.5  
Include the Use of UExp-MVAT, and allows opening curves into Profiles programming.

RHAPSODIE.NET V1.6  
Include small corrections + New features in Cycle page (Force increment, slope tripping, temperature compensation)  
MVAT fault list available into "Help" menu.

RHAPSODIE.NET V1.7  
Adding the Auto-archiving of the curve feature.  
Adding the "Specific areas" in the cycle

RHAPSODIE.NET V2.1  
The communication interface Com\_MVAT disappears, cause it is now integrated into Rhapsodie.net, as well as a Terminal tab.

RHAPSODIE.NET V2.2  
Adding automatic sending using BdR  
Adding Fan managing  
Adding "Speed reduct. Coeff" (V2.2.0.03)  
Adding "Send only BAD cures" feature (V2.2.0.04)

RHAPSODIE.NET V3.0  
Programmed under Visual Studio 2019  
Result page modified.