

Baces3D Digitizing / BacesSCAN scanning System

Baces System

User Guide

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1. Overview

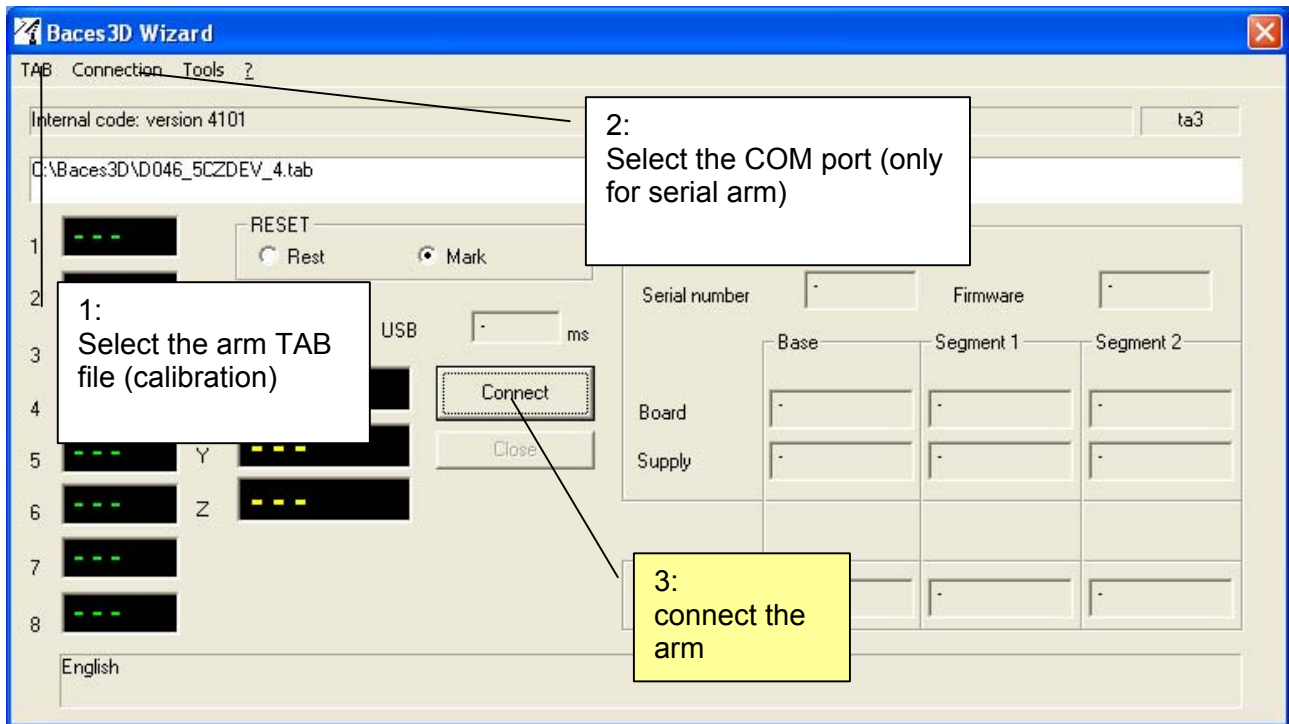
This manual provides you the information to use the Baces3D System . Read this guide to use correctly the Baces3D arm and BacesSCAN scanner.

2. Using the arm

Run BacesWIZARD utility software

The software is installed by default in C:\Program files\Baces3D directory. A BacesWIZARD shortcut is available on the desktop.

Run BacesWIZARD.



Start the arm connection with BacesWIZARD:

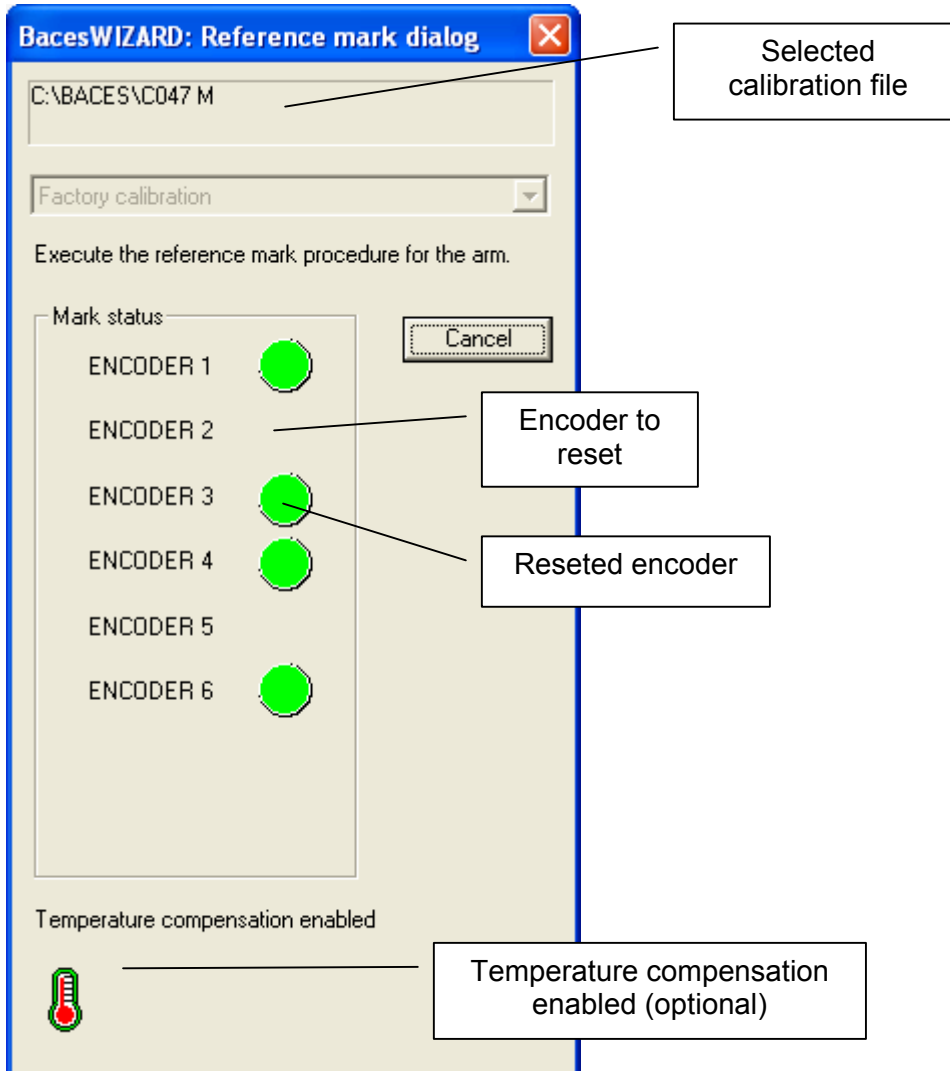
1. Click on the TAB menu to select the tab file of the arm in use (i.e. NNNN_M100_6P_CZDET_42.tab)
2. Click on Connection menu and select the COM port (**only for serial arm, not required for USB arm**).
3. Click the **Connect** button. The “Reference mark dialog” will appear.

IMPORTANT:

the “Rest” Reset option can be used only for diagnostic and functional tests and only if requested from the Technical Support.



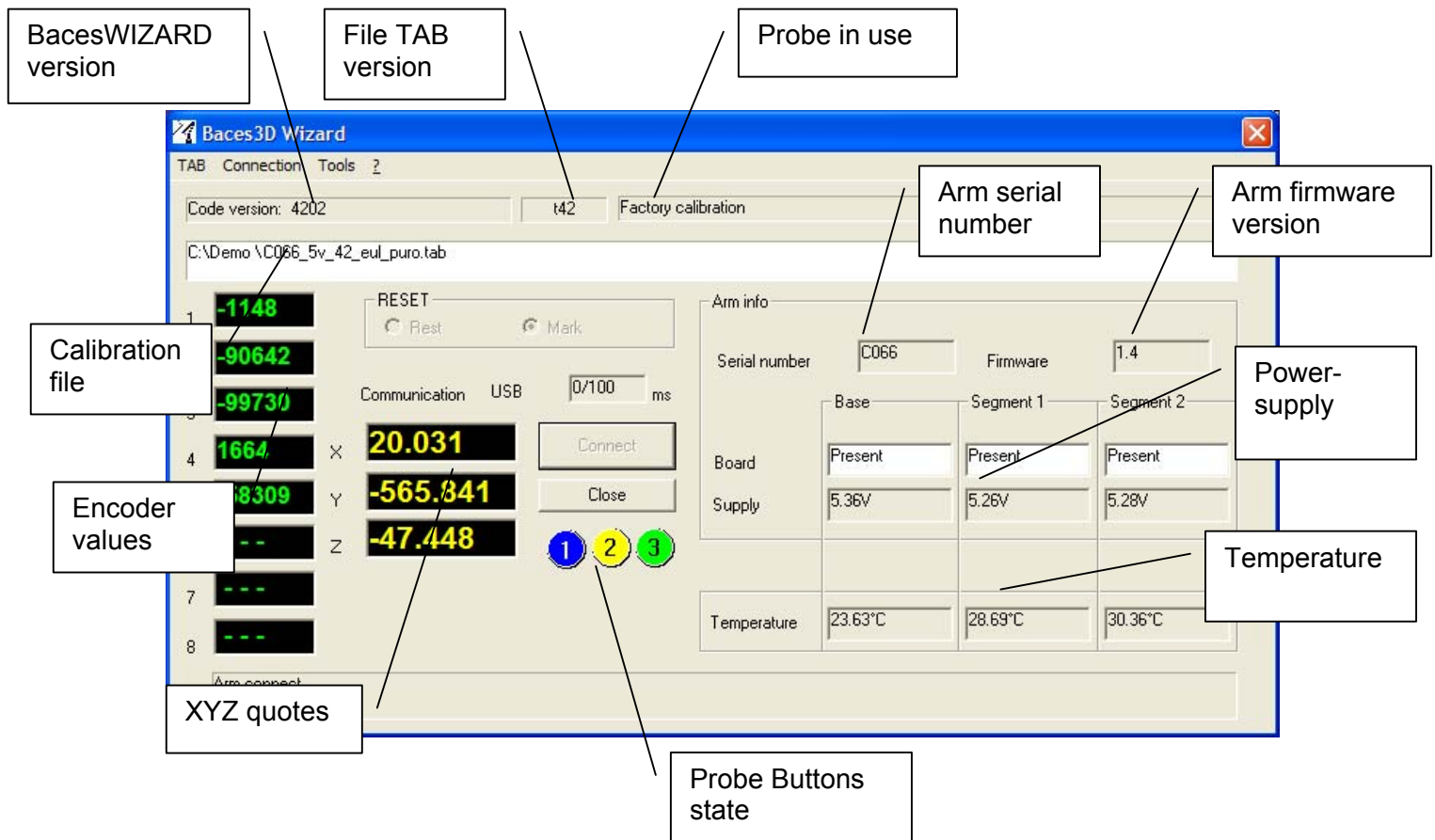
The calibration tab file included in the installation CD, contains the factory calibration parameters. The factory calibration probe is the standard 4mm sphere stylus on the standard 3 buttons probe.



Move the arm joints starting from the rest position.

Once reseted all the encoders of the arm, the dialog will automatically be closed. The green LED on the arm base will turn on (arm connected).

BacesWIZARD diagnostic window



Probes calibration

With the Probes Management procedure the user can add, delete or modify probes for Baces3D arm.



The original TAB file has only the factory calibration probe. Is necessary to create a new probe before to start measure.



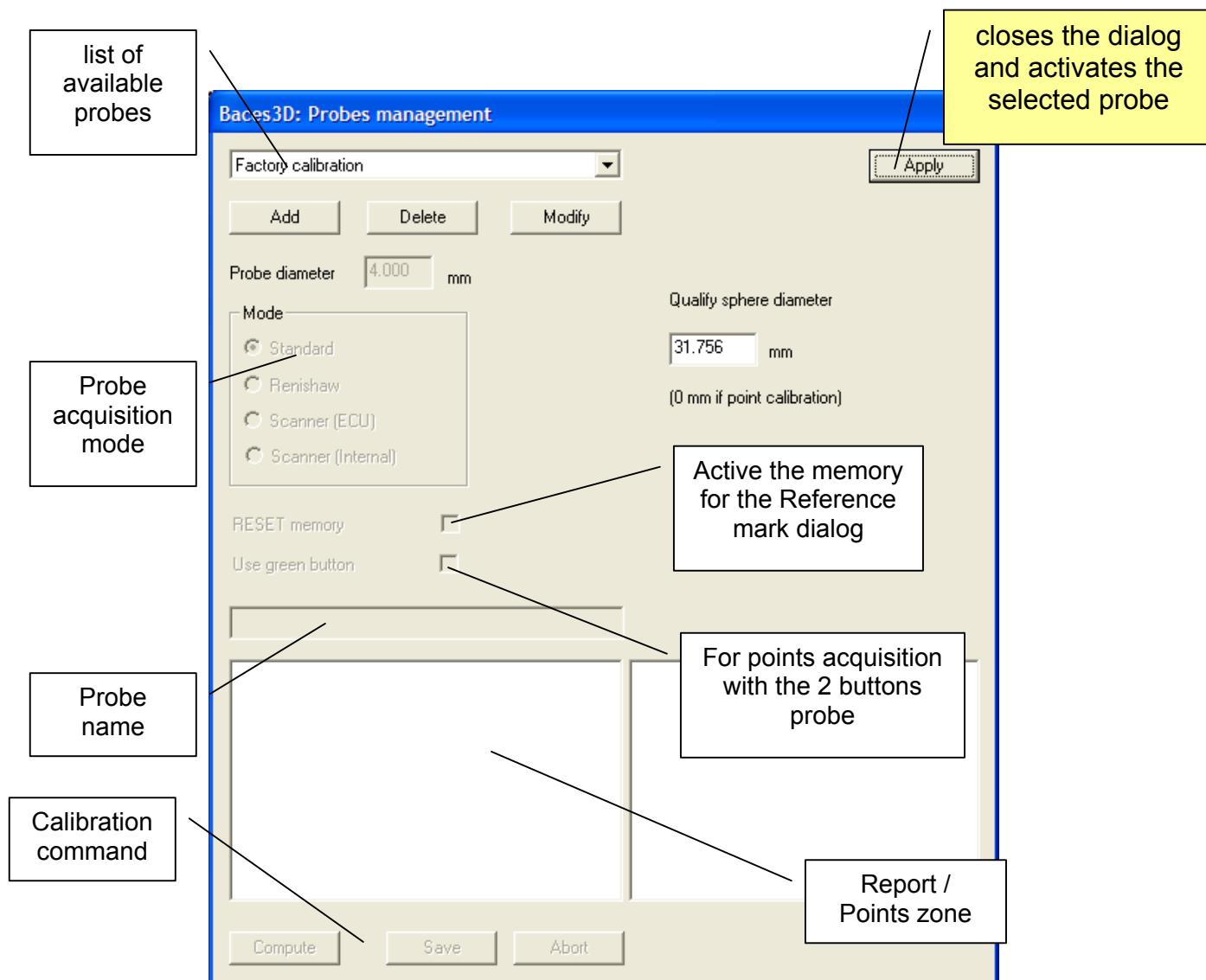
Is recommended to run a probe calibration routine each time the probe or the stylus is removed or replaced.



To calibrate the touch probe with sphere stylus, is possible to use:

- 1) the conical hole on the fixing plate
- 2) a precision sphere (optional)

Click on Tools->Probes management menu. The following dialog appears.



The **Apply** button closes the dialog and activates the selected probe.



Use Renishaw mode for RP1/LP2 probe.



For the Scanner mode, you can save the probe without pick the points. The scanner head/probe will be calibrated in the specific software in use with the scanner.



The 'Reset Memory' flag allows, after the first reset, the connection of the arm without the visualization of the mark reference dialog. The option is active up to the turning off of the arm.



The 'Use green button' flag is necessary when you use a 2 buttons probe to digitize points with arm (simulating the blue button).

Adding a touch probe

The button **Add** allows to create a new probe. To create a new touch probe, click the Add button, and then:

- Type the Probe diameter value.
- Select the Acquisition Mode value.
- Type the name of the probe
- Type the Qualify sphere diameter (0 mm if you want to calibrate the probe on the conical hole).

The screenshot shows the 'Baces3D: Probes management' dialog box. It contains the following elements and callouts:

- Factory calibration** dropdown menu with an **Apply** button.
- Add**, **Delete**, and **Modify** buttons.
- Probe diameter** input field with the value '4' and a unit of 'mm'. Callout 1: '1) Insert the Probe diameter value'.
- Mode** section with radio buttons: **Standard** (selected), **Renishaw**, **Scanner (ECU)**, and **Scanner (Internal)**. Callout 2: '2) Insert the Acquisition Mode value'.
- Qualify sphere diameter** input field with the value '31.756' and a unit of 'mm'. Callout 4: '4) Select the Qualify sphere diameter (0 mm if you want to calibrate the probe on the conical hole)'.
- RESET memory** checkbox.
- Use green button** checkbox.
- new probe name** text input field. Callout 3: '3) Insert the name of the probe'.
- Acquire at least 15 points** checkbox.
- Compute**, **Save**, and **Abort** buttons at the bottom.

Use the probe buttons or the foot-pedals to acquire the points:

pedal 1 (blue) – pick a point

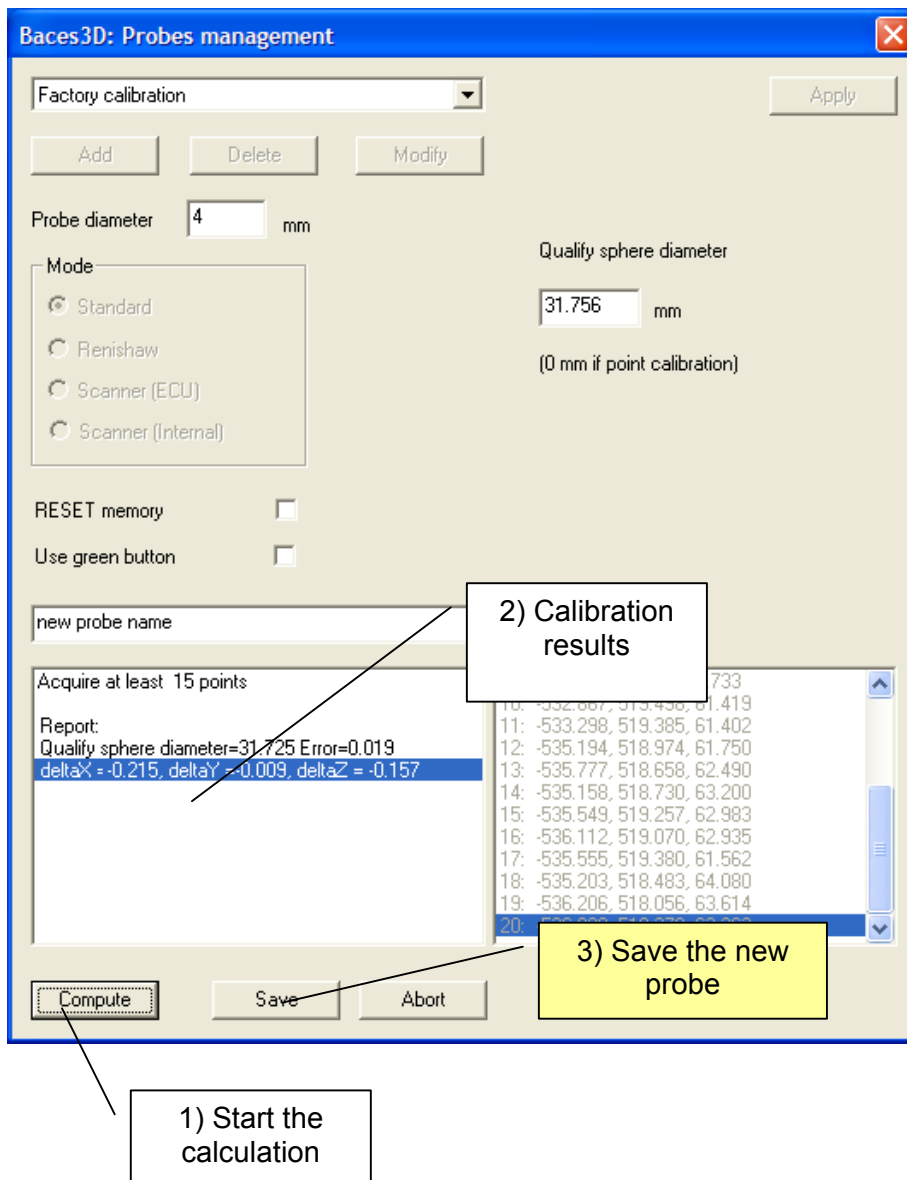
pedal 2 (yellow) - delete the last point



Pick the points with different orientation of the probe. If you use a calibration sphere, pick the points all around the sphere moving the probe along the sphere surface.

Once finished collecting points, click on the **Compute** button to calculate the result of the calibration. If the value is compliant with the accuracy specs., save the new probe with **Save** button.

Click on **Apply** button when done.



The **Abort** button stop the calibration for the new probe and restores the previous.

Delete a probe

The button 'Delete' eliminate the selected probe. To delete a probe, click on Delete button and confirm.

Once deleted, the probe will no more be recoverable.

Modify a probe

If the probe is removed or replaced, you can re-calibrate the probe directly with the 'Modify' button, without creating a new one.

Use the same procedure as the section 'Add a probe'.

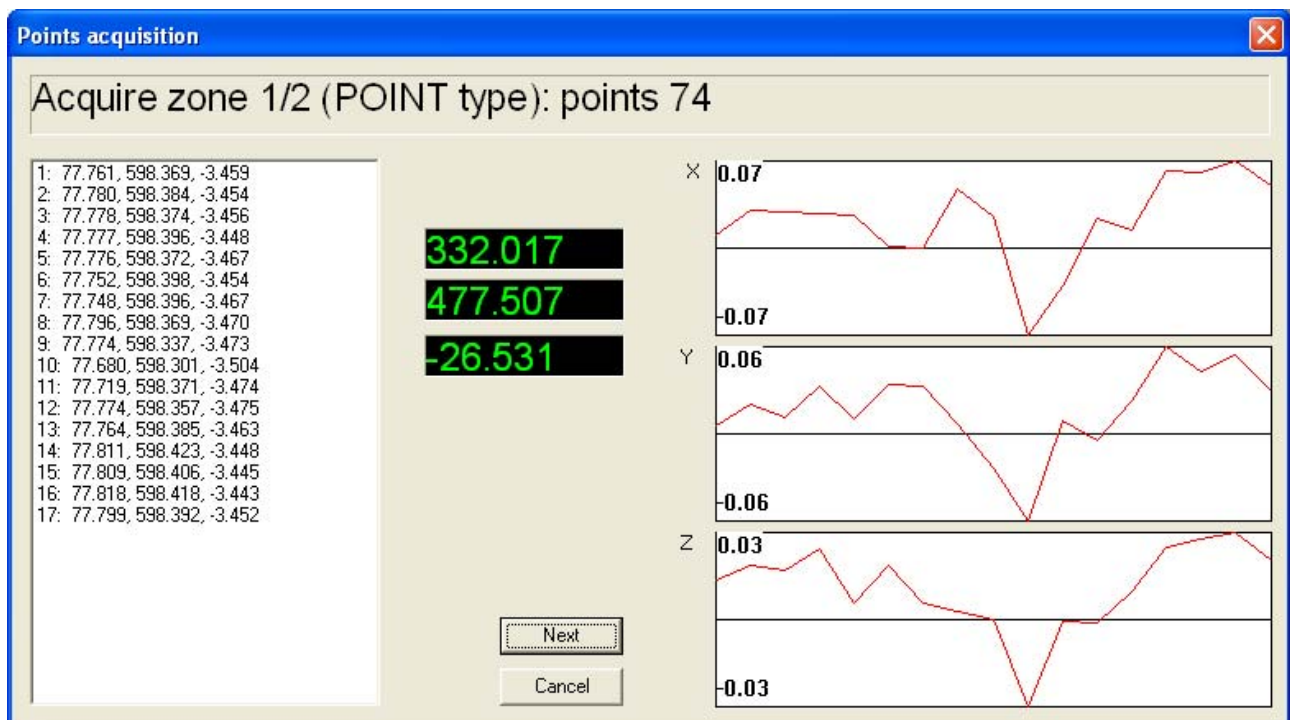
Baces3D arm testing

After the probe calibration, you can test the arm accuracy with the **Tools->Acquisition for calibration point** menu.

The acquisition is executed rotating the calibrated spherical stylus on a conical hole with different probe orientations.

Use the or the probe buttons or foot-pedal to acquire the points:

- pedal/button 1 (blue) - acquires point
- pedal/button 2 (yellow) - delete the last point



Analyze the graphical report to estimate the accuracy of the arm.



Close BacesWIZARD after the test / calibration operations. This will free the USB port for the use of the external software.

Troubleshooting

The arm cannot be connected

(red led off, green led off)

- Cause The measuring arm power supply unit was disconnected.
- Solution Connect the power supply unit and check the ON switch.

The arm cannot be connected

(red led on, green led flashing)

- Cause The USB cable is not connected / the USB drivers is not installed.
- Solution Check the serial cable connection and the corresponding COM port.

The arm cannot be connected

(red led on, green led on)

- Cause The measuring arm is already being used by another software program.
- Solution Deactivate the software and repeat the arm reset operation.

The quotes change significantly when the tip is rotated on a conical hole

(red led on, green led on)

- Cause An incorrect calibration file is being used.
- Solution Check the calibration file associated to the tip being used.

The quotes are out of specifications when the tip is rotated on a conical hole

(red led on, green led on)

- Cause The stylus isn't calibrated.
- Solution Perform the probe calibration.

If the stylus is already calibrated

The quotes are out of specifications when the tip is rotated on a conical hole

(red led on, green led on)

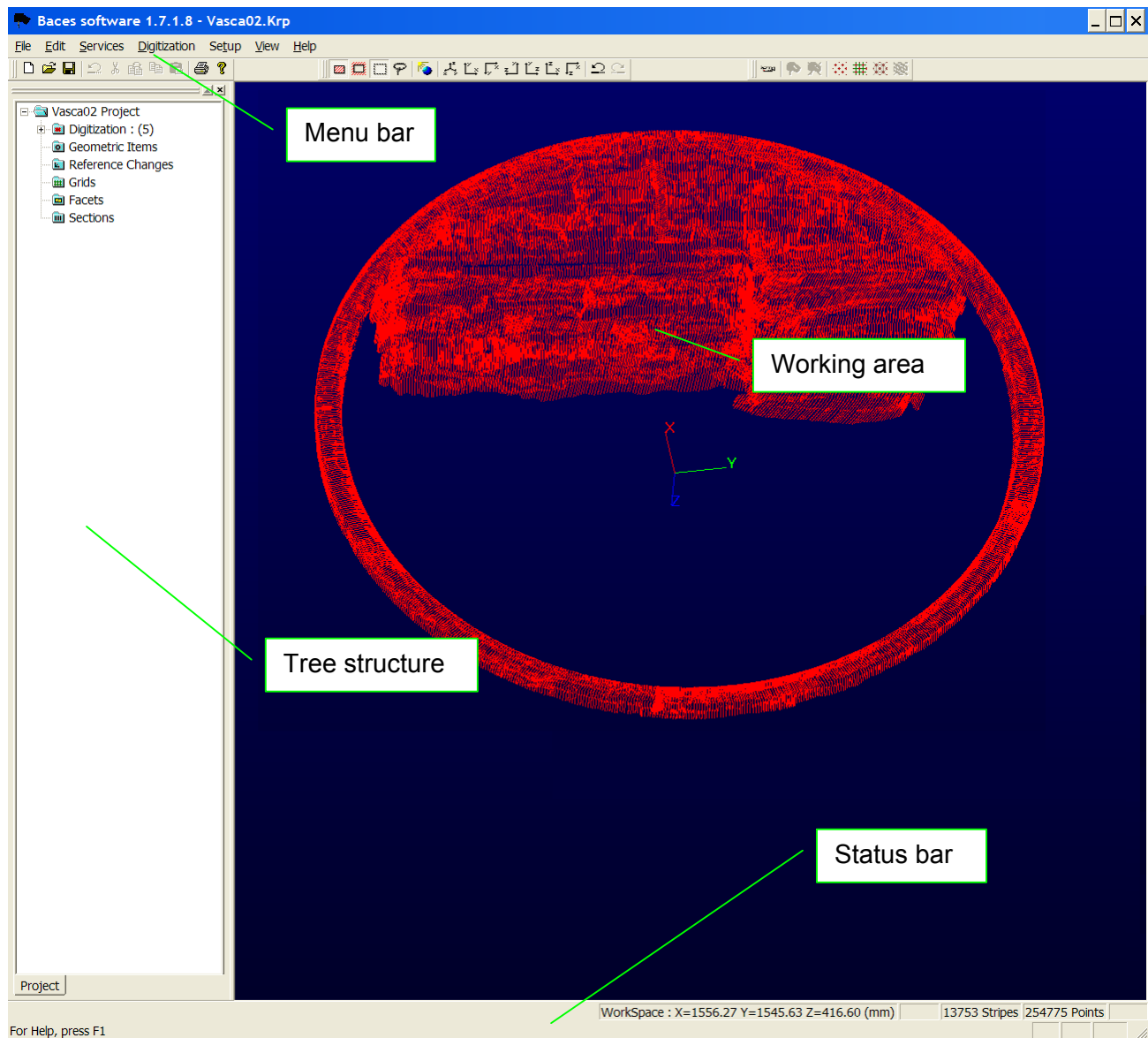
- Cause The arm is out of calibration.
- Solution Perform the arm test.

3. Using the scanner

Run BacesSoftware software

The software is installed by default in C:\Program files\FriulROBOT\BacesSoftware directory. Is created a program group in Start -> Programs -> Friulrobot -> BacesSoftware x.x.x.x. and a link to BacesSoftware on the user desktop.

Run BacesSoftware.



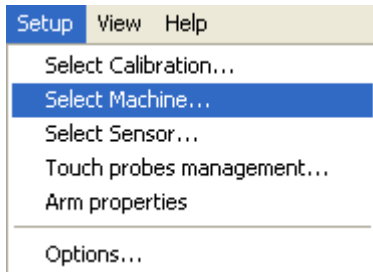
To start the scanning procedure, you have to set some parameters:

- Machine for scanner
- Calibration file for scanner
- Calibration file for arm

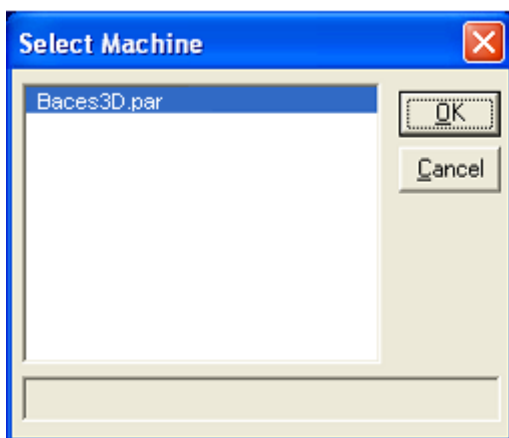
Setting the configuration

Selecting the machine

Click on *Parameters* > *select a machine* to display the machine selection box.



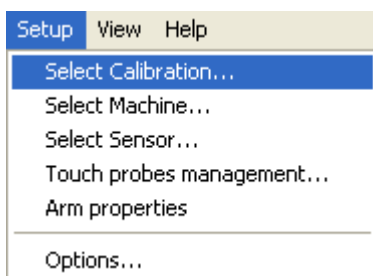
Click on the selected machine.



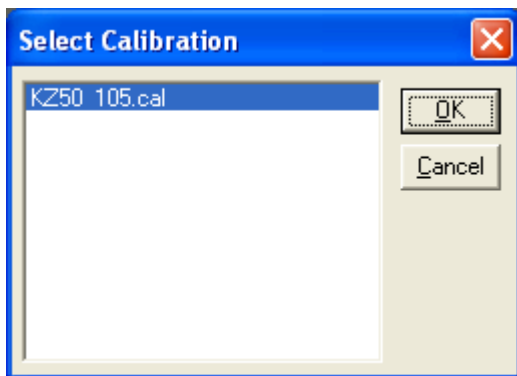
Click on OK to validate.

Selecting the scanner calibration

Click on *Parameters* > *select calibration* to display the calibration selection box.



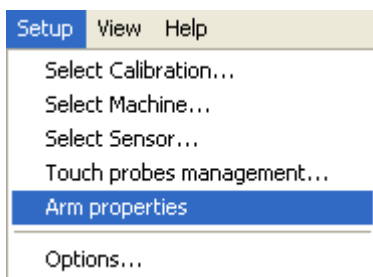
Click on the sensor calibration file name (extension .cal).



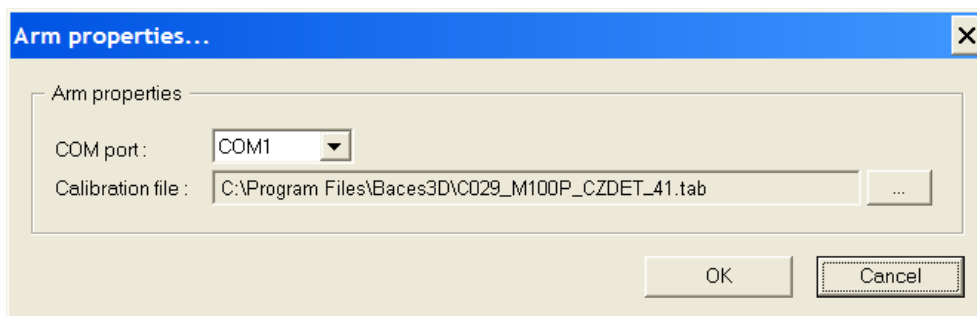
Click OK to validate.

Selecting the arm calibration

Click on *Parameters > Arm properties* to display the calibration selection box.



Select the COM port for the arm (if the arm is a USB model, this parameter isn't used).
Select the calibration file for the arm (extension .tab) with the ... button.



Click OK to validate.



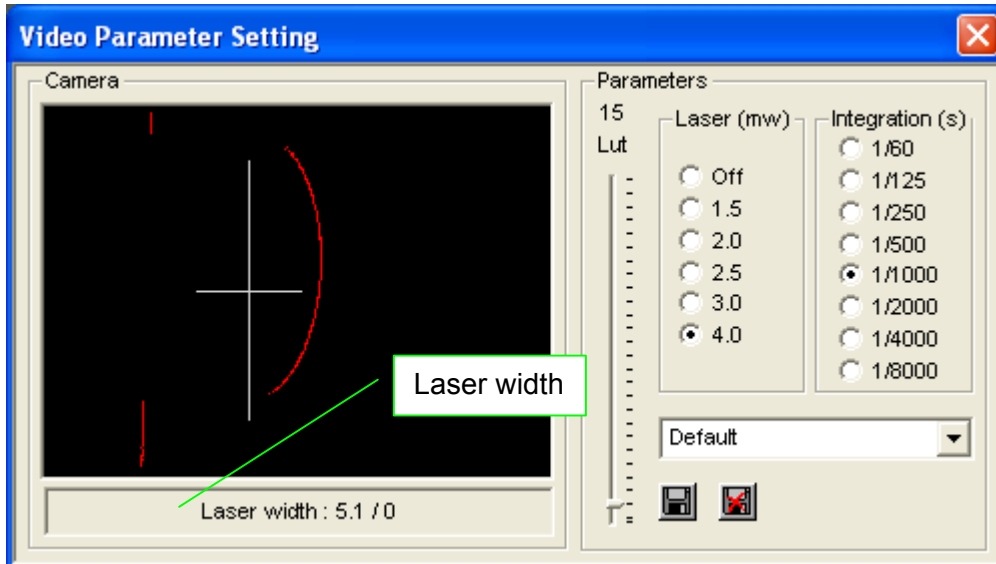
The tab calibration file for scanner must set the arm in trigger mode. Make sure that the file have a _SCANNER description, or a probe created in BacesWIZARD – Probe calibration with scanner mode.

If no calibration file is displayed, perform manual installation.

Setting the Video Parameters

The Video Parameters adapts the sensor to the measuring conditions.

Click on Services->Video parameters menu. The dialog box opens after a few seconds for the connection of the sensor to the E.C.U..



You have to verify the Laser width (Laser width / Multiple points) value adjusting the video parameters of the sensor.

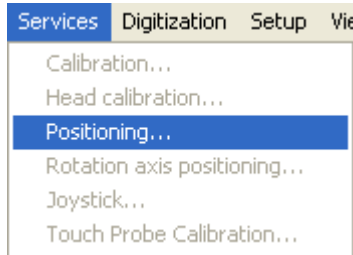


For standard setting, with the LUT value set to 10 and the Laser Power set to 4.0 mw , set the Integration value to obtain the default 7 / 0 value for Laser width.

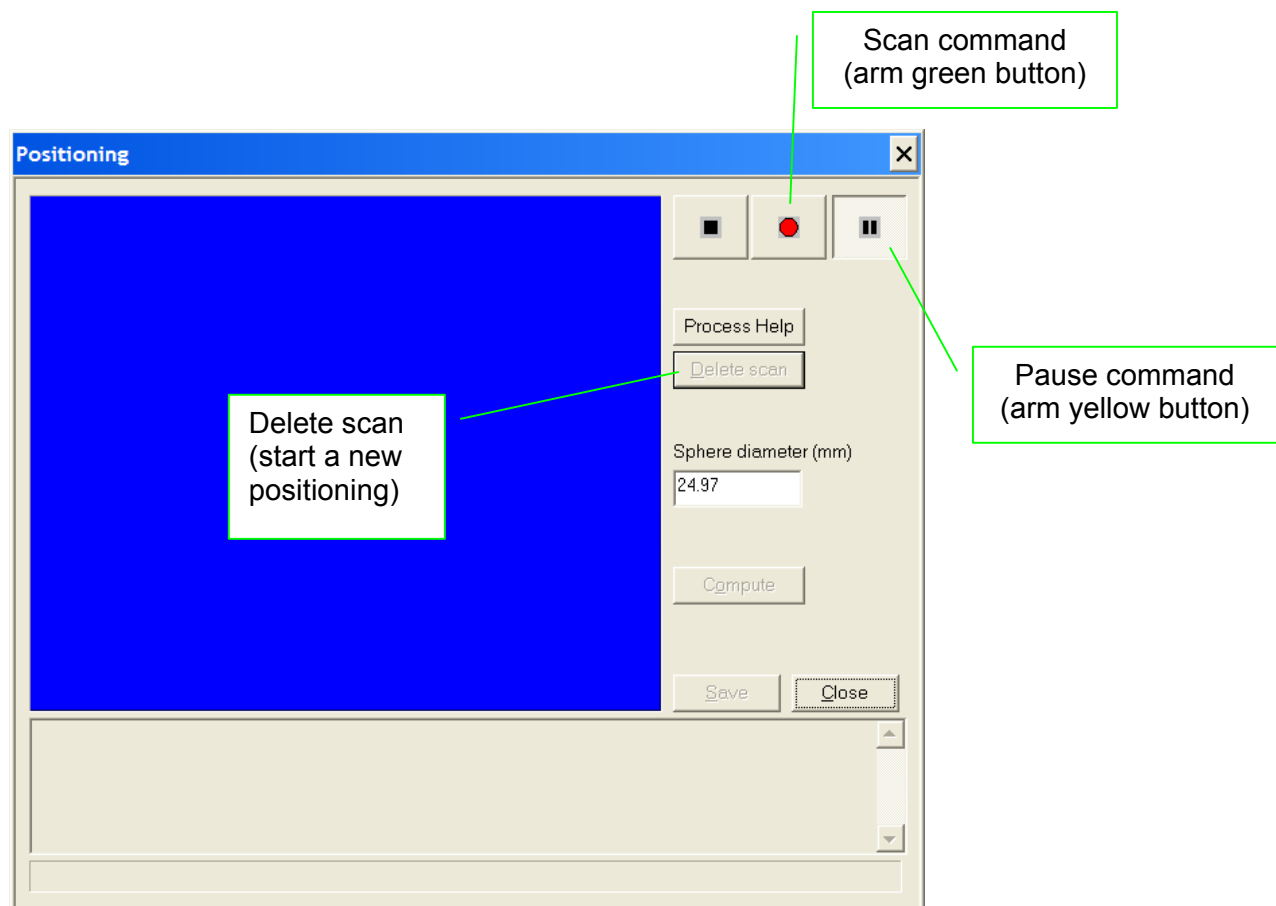
Positioning

This operation must be done every time the sensor is mechanically installed on the arm.

Fix the positioning sphere on your work-plane. Click on the Services-> Positioning menu.

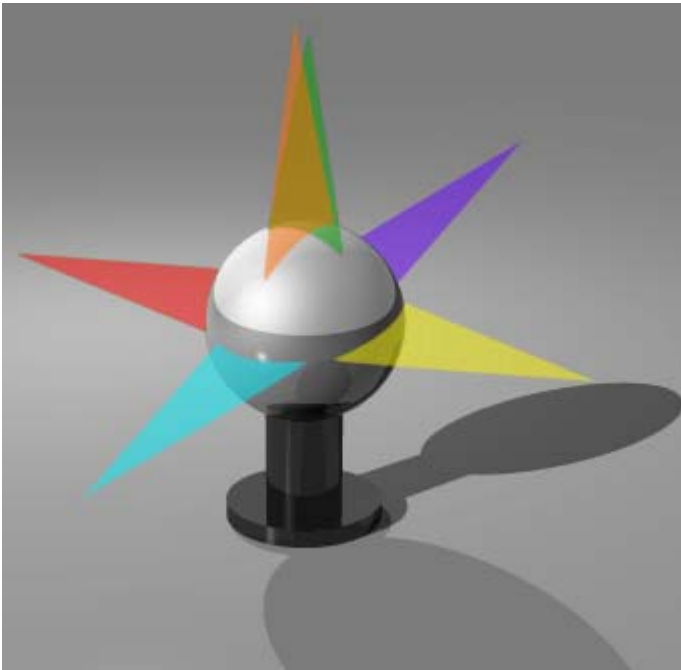


The positionig dialog will be displayed.



If the last sphere acquisition is present in the display window, click on the **Delete scan** button.

Scan the sphere with 6 different orientations:

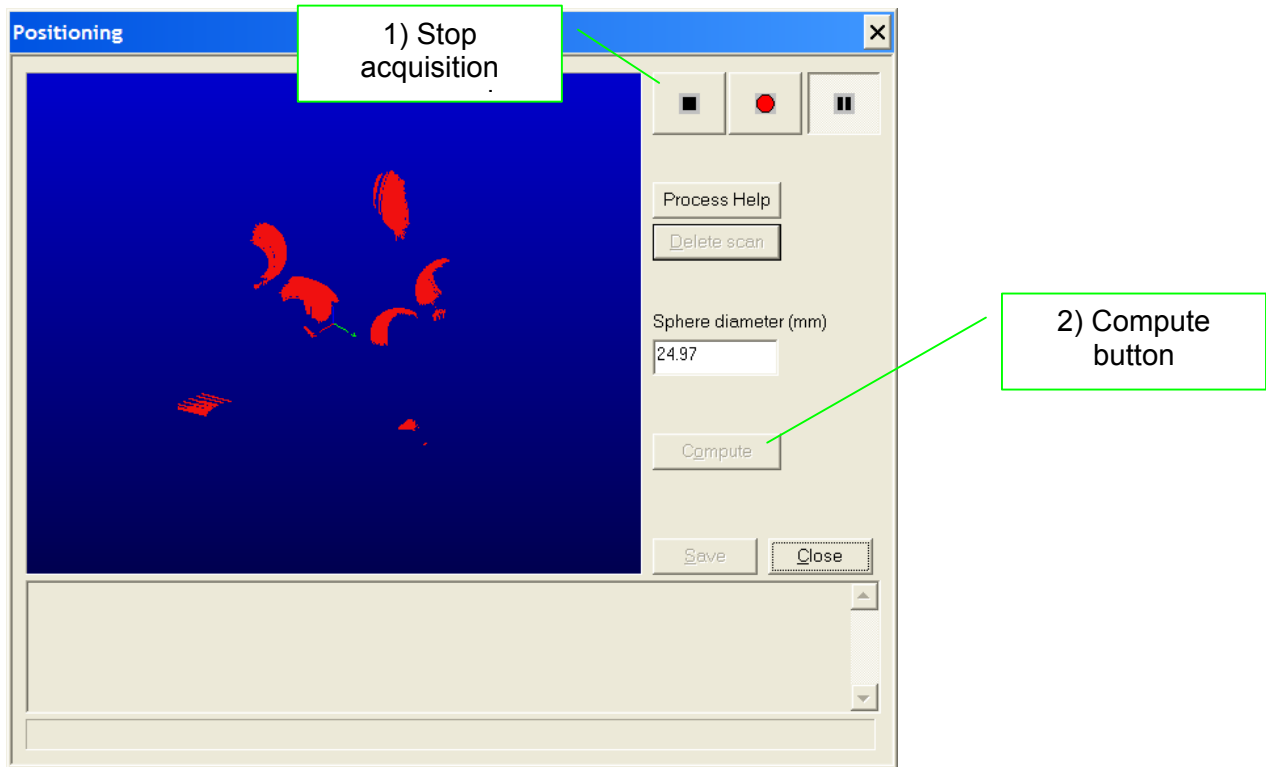


1. Above the standard sphere (green)
2. Facing the sphere (blue)
3. On the left-hand side of the sphere (red)
4. On the right-hand side of the sphere (yellow)
5. Behind the standard sphere (violet)
6. Above the standard sphere with the sensor rotated by 90° (orange)

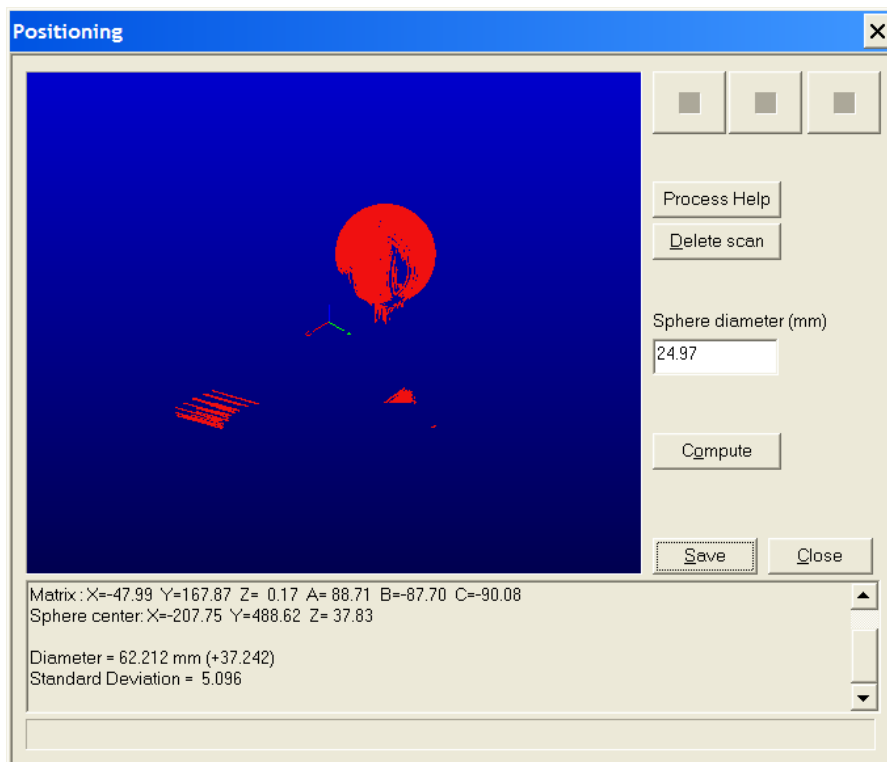
For each orientation, press the scan button of the arm (Green button) to start the acquisition. Scan with the laser until you obtain at least 20 scanned lines. Press the Pause button on the arm (Yellow button) to pause the acquisition.

Repeat the operation for each orientation.

After the scanning, select **Stop button** and verify the correct sphere diameter value (read it from positioning sphere certificate).

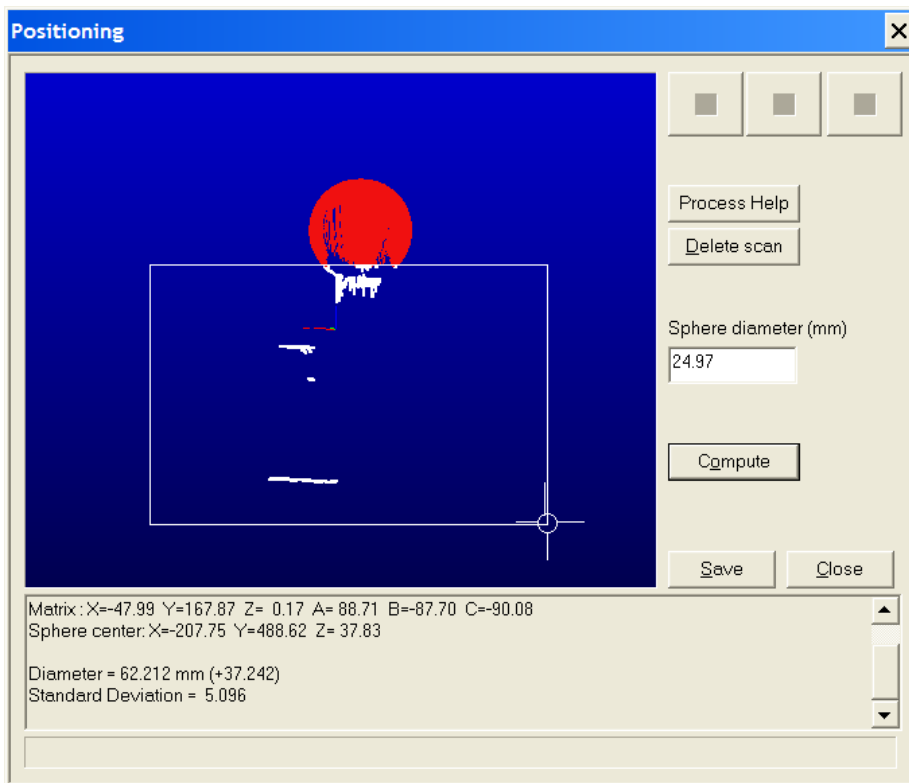


Click the Compute button to start the positionig sphere calculation.

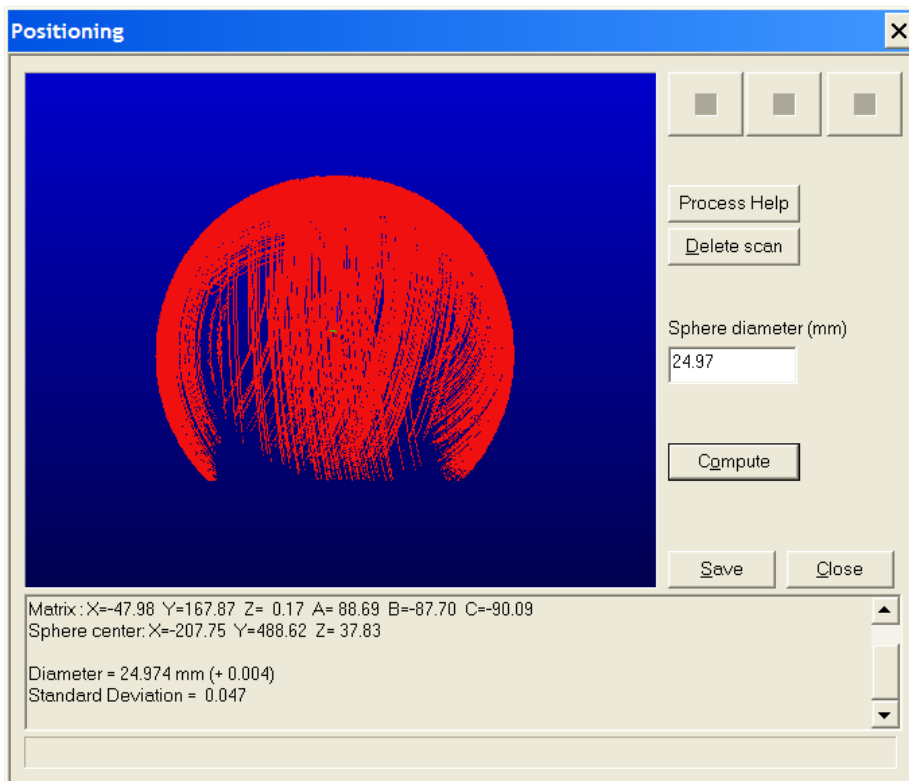


Use the right button of the mouse to rotate the view.

With the shift key pressed, select with the left mouse button the points out of the sphere.



Press Canc key to delete the points.
Press Compute button to re-calculate the positioning.



A value of standard deviation between 0.050 and 0.030 microns is acceptable.

BacesSCAN scanner testing

The positioning procedure can be used like sensor testing.

The statistics given by Positionning windows (sphere diameter and standard deviation) represented a report on the accuracy of the system.

Troubleshooting

The sensor cannot be connected

- Cause Nothing is displayed in the “calibration selection” dialog box.
- Solution The sensor calibration file is not installed. Copy manually the file (provided on CD) in the directory C:\Documents and Settings\AllUsers\ApplicationData\Friulrobot\HardwareZLS\Calibration.

- Cause The message "Cannot connect to 216.189.82.254 on port 23" is displayed each time you try to use the sensor in BacesSoftware.
- Solution This message means that bacesSoftware cannot communicate with the E.C.U. Check your network configuration. If it still does not work, try to change the network cable that connects the E.C.U. to the computer (100 Mbits/s straight cable).

- Cause The message "Error! BacesSoftware requires a version of the E.C.U. software (at least XXXX) more recent than yours (YYYY)" comes into view at the end of each E.C.U. software update.
- Solution This message means that the version of your E.C.U. update is not compatible with your version of BacesSoftware. Re-install BacesSoftware.

- Cause The image is jerky in the video window, the scan is not regular. The system sometimes gets blocked.
- Solution This problem comes from simultaneous use of other resident programs. While using BacesSoftware, we recommend to de-activate all active programs: mail, antivirus, firewalls, and for portable computers: energy savers, protections against drops, etc.

The arm cannot be connected

- Cause Impossible to position: the message "The scan does not have enough laser lines" or the message "Cannot find initial solution. Do you want to continue?" comes into view.
- Solution The first message means that the algorithm did not find enough different circular and orientation laser lines to obtain a first approximation. The second message means that it did not find the initial conditions. Regardless of the displayed message, make sure you have selected the appropriate sensor calibration file, and that the arm calibration file is loaded. Also check that the sphere diameter you entered is correct. Finally, carefully clean the scan (support deletion).

- Cause During scanning on arm, the message "The arm did not receive trigger" is displayed in the digitization window.
- Solutions First check that you have properly connected the trigger output of the E.C.U. to the trigger input of the arm, using the cable provided by FriulROBOT. Verify if the arm calibration file enable the trigger mode (SCANNER). If, despite these checks, you still cannot scan correctly, contact FriulROBOT to check your trigger cable.