

Anthropomorphous measuring arm

Baces3D

Series 4

User Manual

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1. Description of the Baces3D measuring arm

Baces3D is a manually operated measuring arm which allow the XYZ quota of the tip of the tracer point and its positioning to be measured.



Equipped with an articulated wrist and composed of light alloy parts, Baces3D may be positioned in areas which may be difficult to reach for conventional Cartesian measuring machines. It also allows for inspection of complex sample pieces. When combined with a Personal Computer and specific dedicated software, Baces 3D becomes a powerful three-dimensional digitization system.

By carefully reading the following instructions, the operator will be able to operate with the Baces3D arm.

2. Installing the measuring arm

The Baces3D is already assembled and calibrated. The operator is required to do the following:

- read the instruction manual
- installation
- the connection to a personal computer.

To remove the packaging, remove all the filler material found in the upper part of the container. Pull out the BACES 3D by lifting it, taking care not to strike other objects. Set the measuring arm on a level surface. During this procedure, we recommend leaving the wrist wrapped to the arm's base.

Remove all of the crate's contents (accessories).

Keep the packing material in for any eventual shipping.

Assembly

The assembly phases are the following:

- Attach the arm to the working surface using the four holes found in its base, or rather, use the plate which is supplied as an accessory.
- With the hanging version, attach the arm to the mechanical support structure and in the end, the counterweight.

Grounding connection

The grounding must be done by connecting a wire with a 2.5 mm² section from the arm's base to the grounding connection.

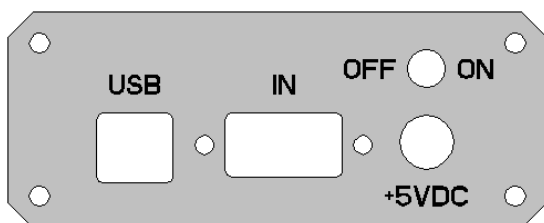
The connection is necessary to ensure the EC regulations regarding electromagnetic disturbance and operator safety.

Should difficulties arise or if you are unsure as to what kind of connection to use, consult a specialized electrician.

Electrical connection

Connection panel

The panel for the arm's electrical connection is located on the rear side of the base. It consists of the following connectors:



**COM
IN
+5V DC**

Connector for the PC USB port.
Connector for the pedal controls
Power supply connector

ON/OFF

On/off switch

IMPORTANT: install the USB drivers before use the arm.

Make sure that the switch is in the OFF position and complete the electrical connection:

- Connect the USB cable supplied with the arm to the USB port on the PC.
- Connect the power supply unit supplied jack into the 5V DC socket and make sure that the red LED turns on with the switch in the ON position.
- Connect the pedal control connector, if supplied, to the IN socket.

LEDS

Two LEDS on the base of the arm indicate the instrument's operating status.

Red LED: the instrument is on.

Green LED: blinking - mark reset not effected.
 on - communication activated.

3. Use of the arm of measure

To use the Baces3D measuring arm, refer to the device connection procedure included in the software program being used.

Verify the correct installation of the software library baces.dll and of the files of calibration (*.tab) furnished with the arm.

Attention

During the communication phase, the software uses the serial port with a specific communication protocol.

A connected and operating modem may interfere with the measuring arm communication protocol. Therefore, deactivate such a peripheral before starting the program to avoid incorrect device recognition.

Two operations must be carried out very carefully to ensure that the Baces3D measuring arm operates correctly:

- TAB calibration file selection.
- Reset procedure.

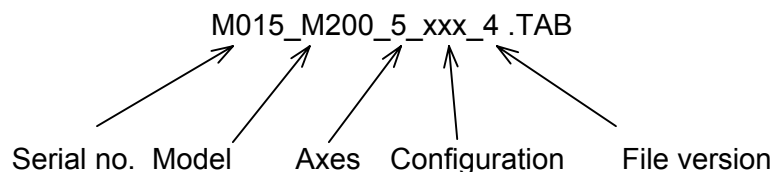
Once the communication has been initialised, the green LED will flash to indicate that data are being transmitted from the arm to the Personal Computer.

Calibration file

The Baces3D is supplied calibrated by the manufacturer with a precision stylus (length = 18mm diameter = 4mm) and compared with three-dimensional measuring instrumentation with greater precision to ensure that the measurements performed are correct.

Attention

Calibration data are reported in a calibration file with extension .TAB. That file name contains the arm's serial number and information of configuration.



CONFIGURATION

C	calibrated stylus
P	tapered tip
AR	hanging
Z	reset with reference mark
D	enables the reference mark reset dialogue (from bace.dll version 2.200)
E	Kinematics version series 3 (from baces.dll version 3.003)
Pxx	extension with length xx

FILE TAB VERSION

The version of the TAB file is tied to the specific version of the baces.dll. Use the same version for calibration file and dll.

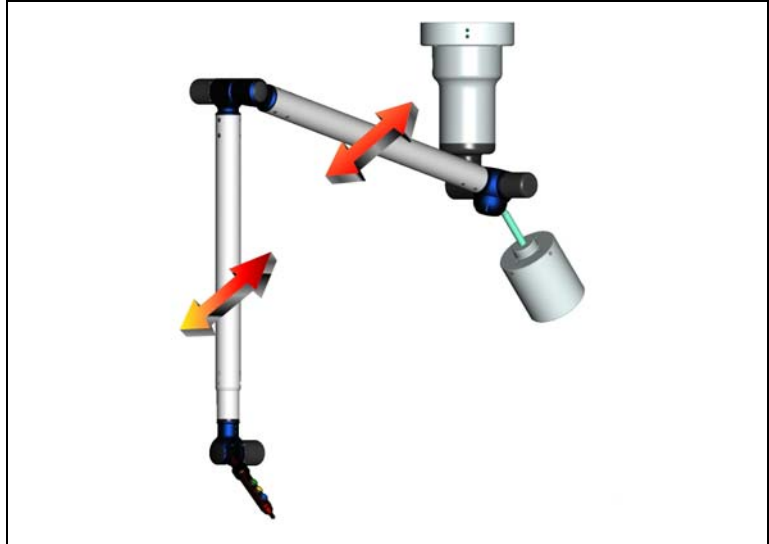
4. Reset procedure

To operate correctly, the Baces3D measuring arm's sensors must be reset. This operation must be carried out very carefully to avoid errors during the measuring phase.

The software being used will request the reset procedure each time it is required.

Reset with reference mark

In this procedure each arm joint is rotated until it reaches the reference mark position on each axis. The order with which the reset operation is carried out does not affect the results of the procedure.



For the standard arm, the reset procedure is carried out more efficiently by starting from the resting position. The base must be rotated around the LEDS, while the tracer point must be aligned with the second segment and rotated.

For the hanging model, the reset procedure is performed by vertically oscillating the first segment and then aligning the two segments. For the other joints the procedure is similar to the standard model.

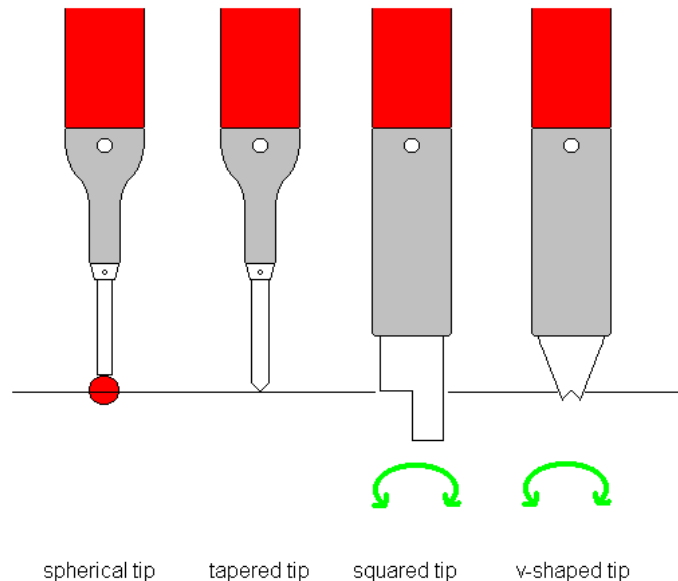
IMPORTANT NOTE

The mark reset procedure creates an absolute alignment of the x-y-z coordinate system in relation to the position of the base zero mark.

It does not depend on the stylus used.

5. Measuring styluses

The calibration stylus equipped on the Baces3D arm can be replaced with models suitable for the type of specific learning using a threaded attachment located on the end of the tracer point.



Styluses supplied by the manufacturer

A stylus supplied by the manufacturer is normally equipped with the relative TAB file. The specific calibration file is selected during the arm reset procedure.

Replacing the measuring stylus

Replacing the measuring stylus with a different model may generate measuring errors since the kinematic parameters contained in the TAB file do not correspond to the real tip. Therefore, the stylus being used must be associated very carefully to the relative calibration file.

Personalised styluses

Users can create special tips to meet their requirements, changing the length and the shape of the stylus tip as required.

The new tip must be precision machined. In particular, special attention must be focused on the thread support surface along with the relative perpendicularity of the tracer point.

Contact the dealer to obtain a drawing with dimensions that includes the specifications required to create the new stylus.

Use the BacesWizard software to generate the new calibration TAB file for the stylus, creating a file name that identifies the new tip. Select the file generated when the reset procedure is requested by the software being used.

Attention

Since the measuring tip is a critical component to ensure the precision of the measurements made with the Baces3D, the dealer cannot be held responsible for any errors or imprecision in the measurements due to improper use of the measuring tips.

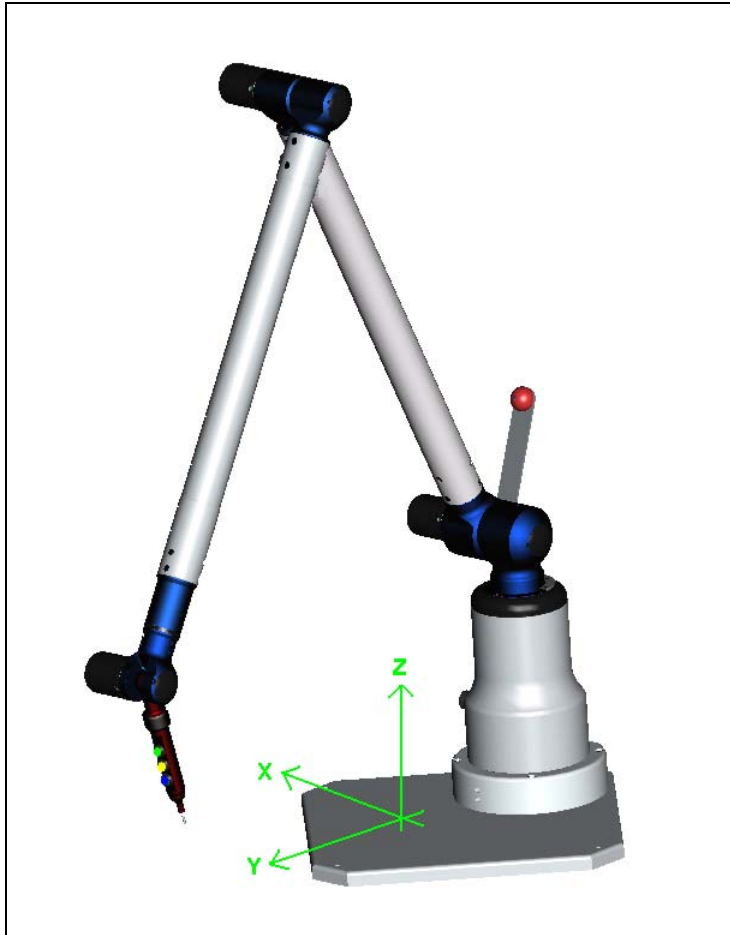
6. Operator controls

The operator can memorise the points using the BLUE pedal /button.

The YELLOW pedal / button and GREEN button can be used to manage additional functions, such as menu selection or confirmation. This functionality is dependent from the software in use.

7. Reference system

During the reset procedure, the measuring arm assigns a right-hand orthonormal coordinate system with zero positioned in the centre of the support base. The tracer point dimension measurements will refer to this zero point.



Reference x-y-z coordinate system alignment

Depending on the software used, the system may have to learn a series of points that can be used to align the x-y-z coordinate system of the arm to that of the piece in order to use the same piece/arm reference system.

After this procedure, the reference system and therefore the dimension measurement will refer to the acquired zero-piece instead of the arm base.

8. System description

The following components, which are supplied together with the arm, are required to operate the Baces3D:

COMPONENTS	
	Description
Plate of support	Plate of fixing for the use of the arm on a generic plan of support
Power supply unit	Power supply unit 110/220V 50/60Hz -> 5V DC
USB cable	USB cable for PC connection
Calibration diskette	Diskette/CD containing arm calibration files, drivers and software
Calibrated stylus	Stylus with spherical tip (d = 4 mm)
Manual	Operating and installation manual
Declaration	Declaration of conformity

According to the model, the arm can be equipped with the probe with buttons and/or couple of foot pedals.

9. Safety information

Electromagnetic compatibility

The Baces3D arm has been built in conformity to electromagnetic compatibility standards. Based on the tests carried out it must be used exclusively in compliance with manufacturer's specifications. Any tampering or improper use will cancel the user's right to use it.

To comply with the imposed limits the user must abide by the following rules:

Use the equipment connected to a PC supplied with the European electromagnetic compatibility certificate of conformity.

For the connection with the PC RS232 serial port use the cable supplied or shielded cables corresponding to the characteristics set forth by regulations.

Do not use cables with a length of more than 3 metres for the serial connection.

Connect the Baces3D directly to the computer without installing any other equipment.

Tighten the serial cable attachment screws on both the Baces3D side and on the computer side.

Use only the power supply unit supplied with the kit. If the power supply unit must be replaced, contact the dealer.

IMPORTANT NOTE: Replacing the power supply unit with an inappropriate version, even if it has the same operating voltage, may generate imprecise measurements that are often quite small and thus very difficult to detect. Therefore, contact the dealer if the power supply unit must be replaced.

Identifying possible sources of damage

Damage caused by dropping the arm

Dropping the arm, i.e. an impact with the measurement surface or with other objects, not only will damage the structure and the instrument transducers but might also generate a mechanical calibration defect. In this case, the arm must be recalibrated by FriulROBOT S.r.l..

To avoid this problem, the operator should always hold the Baces3D while it returns to the resting position.

Electric risk

No electric risks are involved in using the BACES 3D measuring arm because of its low-voltage power supply and because of the double insulation of the supplied power transformer.

Possible damage to the user

Because it has moving parts, the BACES 3D measuring arm must be managed with a certain degree of attention. While it is being used, it might cause slight injuries if it is held close to the joints in certain positions. Since it is a manually controlled instrument, the magnitude of such injuries is directly proportional to the care with which all the required operating movements are carried out.

10. 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 off)

- 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.

Last update: 16/03/2007

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