macu4 │ Photo-based measurement guide

macu4™ Explorer System – Socket

NOTE: Please read this instruction carefully for the photo-based measurement of your arm. With our algorithm, we can extract all the required measurements from the requested 4 photos and generate a socket model. Read this document carefully before starting with the measurement. Contact macu4 AG if you have any questions about the instructions. You will find the contact details on the back.

1.   Materials needed

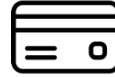For the photo-based measurement, you need the following:

|				
A smartphone or a standard camera to take pictures.	A person that assists you while taking the pictures.	A standard Printer and an A4 white sheet of paper (non-reflective) to print the template.	Any card in the same format as a credit card to validate the template (you only use the card size as a reference).	A skin-friendly pen (dark blue or black) to draw 2 points and a line on your arm.

2.   Preparations

Please make sure to use the *Template*. It serves as a reference environment for your photos.
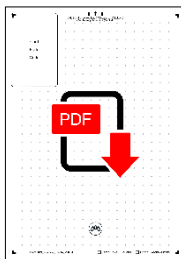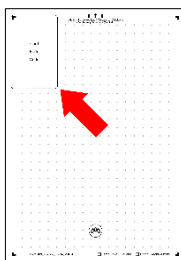

Step 1 – Download the *Template*
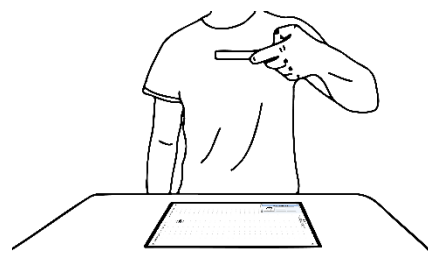Select the *Template* provided by macu4 (PDF format).
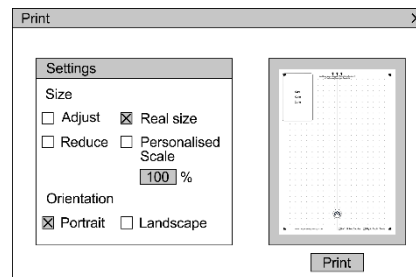
Step 2 - Print the *Template*
Print the *Template* with real-size printing settings (full-page) or with a scale of 100%. You can print either black-white or coloured.

Step 3 – Place the *Card*
Place the card on the *Card* field of the printed *Template*. If the card fits perfectly into the field, the *Template* was printed correctly.


Step 4 – Take *Picture 1*
Turn the card so that no personal data is visible*. Position the *Camera* centrally over the *Template* to take a picture of the *Template* with the *Card*.

*Ideally, you don't use an ID or Credit Card but a card with the exact format. For example, a commercial member card.
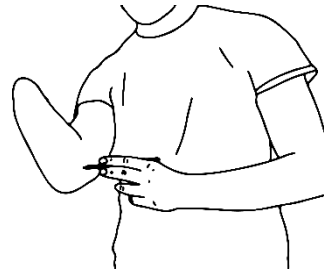
3. *Reference markers*

We need two *Reference Points* and a *Reference Line* on your arm. They serve us for the alignment of your pictures.
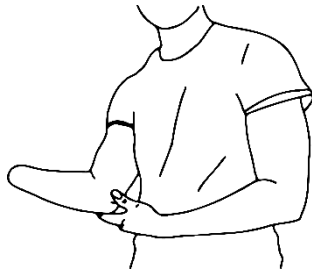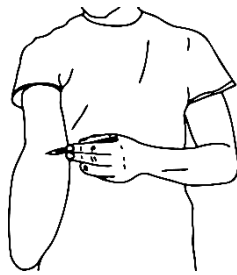

Step 5 – Find *Point 1*
Locate and feel with your fingers the small bony prominence next to the elbow, located on the inside of the arm. It is named *Epicondylus Medialis*.
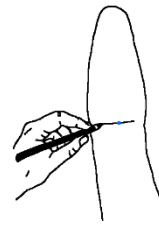

Step 6 - Mark *Point 1*
Mark the *Epicondylus Medialis* as *Point 1* on your arm using the *Pen*. If you are unsure whether you have marked *Point 1* correctly, watch the video (see email).

Step 7 – Mark *Point 2*
Now search for the point at your elbow flexion crease where a nurse would typically take a blood sample. Mark this spot as *Point 2*.

Step 8 – Draw the *Line*
Draw the line through *Point 2*. The line should be straight and about 5 cm long. Make sure *Point 2* remains visible. Increase its size if needed.

4. Instructions for Pictures

We capture your arm shape through pictures. We determine circumferences and length values based on your pictures. Since every arm is unique, please note the additional information.

Additional information 1
Depending on how much soft tissues you have, the arm shape could change when you position it on the table surface. In that case, the arm may look bigger than it is. If this is the case, while taking the *Pictures,* it is better to lift your arm slightly so that it does not touch the *Template*.
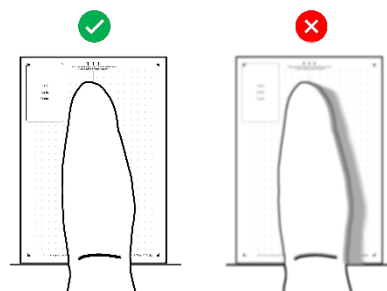
Additional information 2
If your arm is longer than the *Template*, place a second sheet of paper (A4 and white) at the end of the original *Template* and proceed as described below.
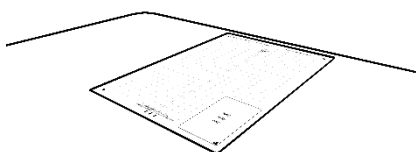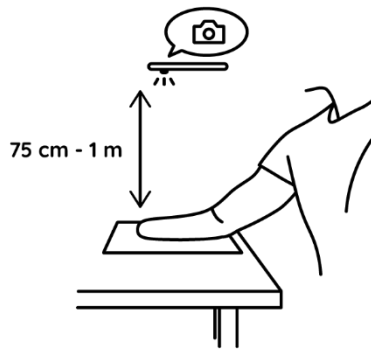

Step 9 – Place the *Template*
Place the *Template* flat on a table.

Step 10 – Assure optimal conditions
Make sure that there is enough light (ideally daylight). Avoid shadows visible on the picture of the Template.

Step 11 – Position the *Camera*
Centre the *Camera* over the *Template* in front of you. The *Camera* should be positioned at least 75 cm to one meter above the table.
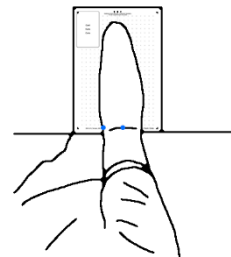
NOTE
Make sure that the picture shows at least the entire *Template*. It is no problem when the Picture shows as well part of the table.

5.   Take the Pictures
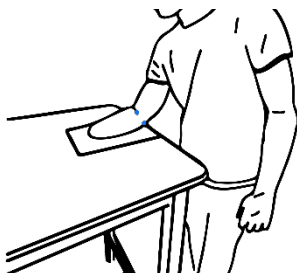
Step 12 – Position 1 for your arm
Place your arm stretched out above the *Template*. Your arm shall be aligned with the dashed line. Your elbow shall be located on the logo in the circle of the *Template*.
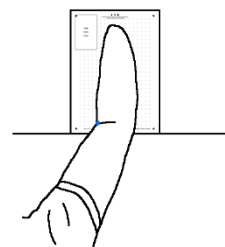

Step 13 – Take *Picture 2*
It is easiest when another person assists you in taking the *Picture*. Both *Points* and the *line* which you marked previously shall be visible in the photo.
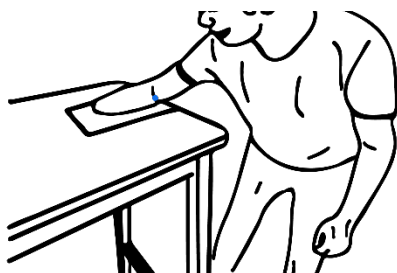
Step 14 – Position 2 for your arm
For the second *Picture*, rotate your arm 90 degrees. *Point 1*, which equals the *Epicondylus Medialis,* should be located on the logo in the circle of the *Template*.

NOTE:
At any time taking pictures, the arm should be stretched out.

Step 15 – Take *Picture 3*
It is easiest when another person assists you in taking *Picture 3*. The line should be only partially visible in the photo.

6.   Length of your second arm

We need the difference in length between your two arms to configure together with you not only the personalised socket but also one or more activity modules.

Option 1 – Photo-based approach _ Picture 4
To capture the arm length of your second arm, place both arms side by side on the *Template*. The photo should be taken at least 75 cm to one-meter distance from the *Template* and relatively vertically to the *Template*.
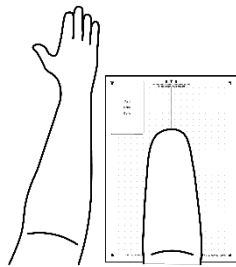

Step 16 – Take *Picture 4*
Place both arms stretched out above the *Template*. The elbow crease of both arms shall be visible. Take Picture 4 with the help of a person assisting you.

Option 2 – Manual approach
For the measurement of L_5, you should sit on a chair (alternatively on a table).

Extend your arm at a right angle to the seat surface. The palm should be fully and lightly pressed onto the seat/table surface.

Measure the arm length (L_5) from the *Epicondylus Medialis* of your second arm to the seat/table surface using a ruler or a flexible tailor's tape measure.
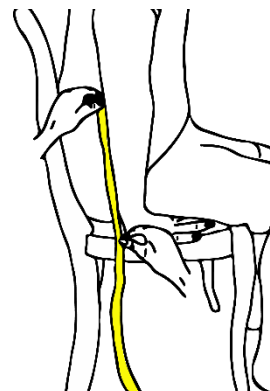
7.   Check the quality of your pictures

Do you have **4** pictures or **3** and the value of **L5**?
Are your pictures **blurry**? Is **lighting** sufficient?
Can you easily distinguish the **contours** of your arms in all the pictures? Is the **line** you drew **visible**?
Are the **four corners visible** in **all** the pictures?

8.   Send the Pictures

Send the pictures and the arm length value L_5 to macu4 via email (support@macu4.com). If you already have a macu4 account (online configurator), use your **User ID** and **Arm Measurement** as subject.
Contact: macu4 GmbH, Bücklestrasse 3, 78467 Konstanz, Germany