



## SENSELab Brush no. 5

### Manual

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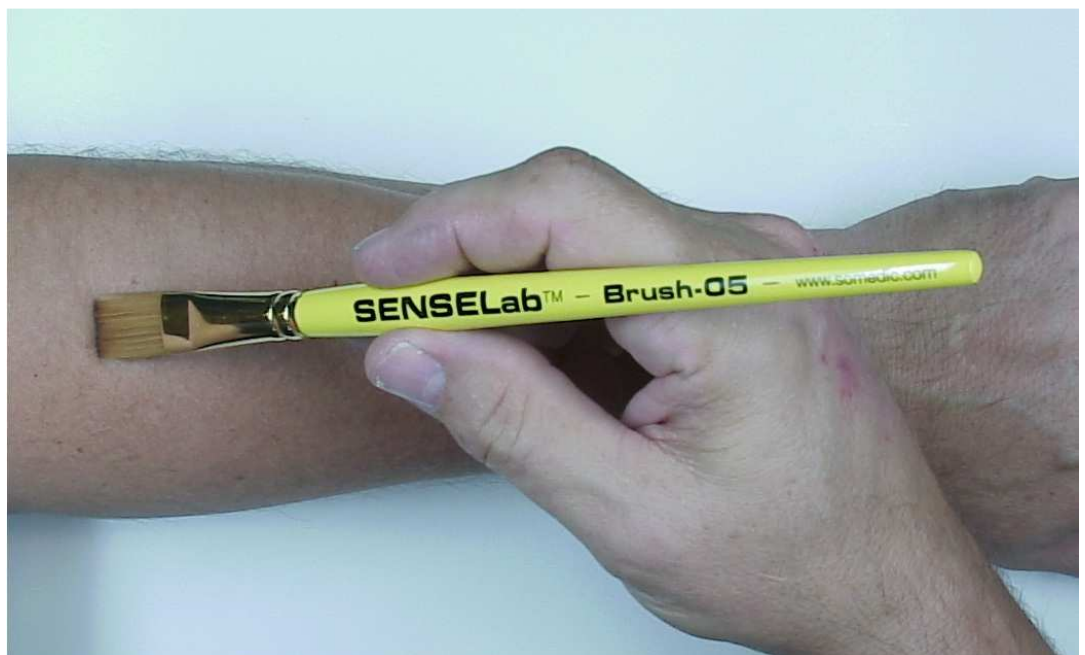
**Background:** A large range of different tools has been used for the investigation of the various percepts that can be the result of mechanical stimulation of the human skin. Among them you can find cotton wicks, von Frey hairs, sharp needle-point objects, weighted pins, brushes, etc. The current trend is to standardize these objects, so as to make investigations comparable among investigators and clinics. The SENSELab Brush no. 5 is an attempt to provide a brush with excellent characteristics for the investigation of Brush Stroke Allodynia, but also for general use where there is a need to investigate the percept to moving (light) touch to the human skin.

**General characteristics of SENSELab Brush no. 5:** This Brush is built with a lacquered wooden handle and a brass ferrule that holds the brush filaments, which are a mixture of synthetic and natural (sable hair) filaments, resulting in an exceptional smoothness and low friction, when applied to the skin. The filaments are shaped to a flat tip, having a width of 15 mm and a thickness of 5 mm, the free length of the brush filaments are 20 mm. The total length of the brush is 210 mm, from the tip of the handle to the tip of the Brush filaments. See Figure 1, below, for a photo of the Brush.



*Figure 1: SENSELab Brush no. 5.*

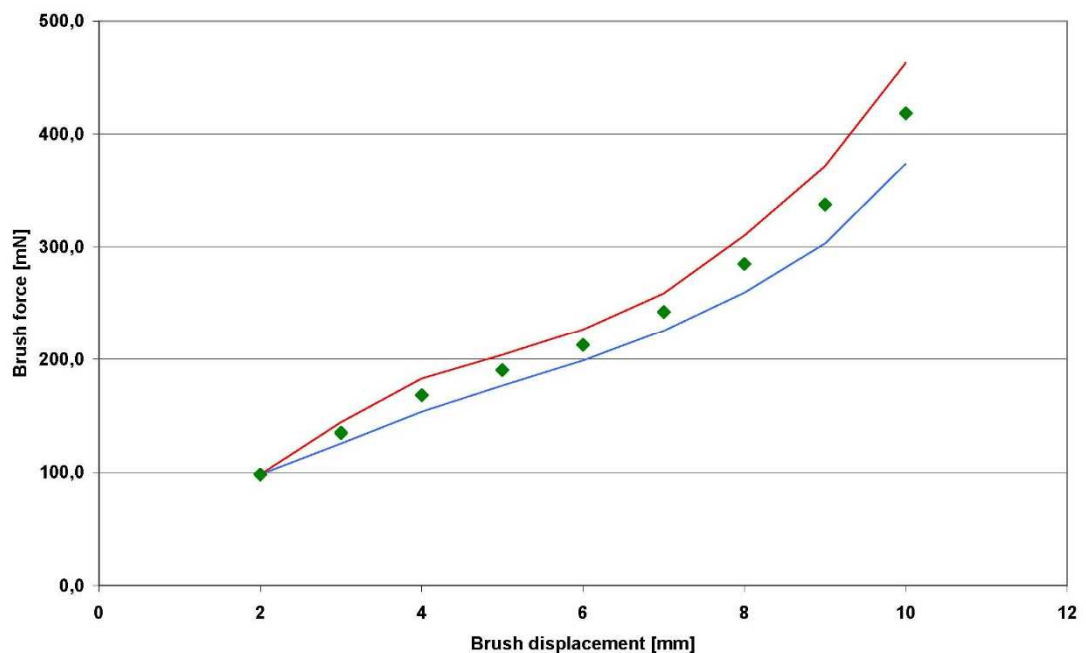
**Normal use of the Brush:** Figure 2 illustrates the normal use of the Brush. It is brought in contact with the skin and then moved a few millimetres more in the direction of the skin until the brush filaments slightly bends. Depending on the investigation protocol it may then be moved in different directions for different distances and at different speeds. A normal procedure would be to bring the Brush in contact with the skin and then during a 1 second long stroke move the brush for 40 mm, after which the Brush is lifted up again. This stroke may then be repeated at a specific time interval and for a specific number of times.



*Figure 2: Typical application of the SENSELab Brush no. 5.*

**Force, developed by the Brush:** We have designed an automated apparatus to measure the forces developed by the Brush as it is moved parallel to a silicone rubber sheet. This silicone sheet has been determined to have friction characteristics comparable to human skin.

The Brush is brought in contact with the silicone sheet and lowered against the sheet until a mean downward force of 100 mN is measured during a stroke. Then the Brush is further advanced in steps of 1 mm and the mean force during a stroke is determined for each step. Figure 3 illustrates the relationship between the Brush displacement against the skin and the mean force determined from measurements on two different batches of Brushes.



*Figure 3: Mean force (green diamonds) registered when moving the SENSELab Brush no. 5 against "skin" +/- 1 std. dev. given by red and blue lines.*

From Figure 3, it can be seen that with reasonable stability in the relationship between the skin and the Brush (5 mm +/- 2 mm) and including the variability between different Brushes, the force developed against the skin during a "normal" stroke should be in the range of 200 +/- 100 mN.

**How to take care of your Brush:** If the Brush has been severely contaminated, the best recommendation is to treat it as a disposable item and discard of it in a proper way. However in most cases, the Brush may be disinfected using alcohol-based solutions and cleaned by water-based and soap solutions. But, immersion in fluids as well as high environmental humidity may affect the stiffness of the filaments and it is advised that the Brush shall be allowed to dry for at least 12 hour before being used again. Although it may be tempting to use high temperatures to shorten the drying time, this is not recommended as it may create a permanent change in the shape of the filaments. Cleaning and drying in normal room temperature only, is advised.

To allow more measurements to be done, the best practice is then to have a number of Brushes and use each Brush only once during each day. Thus the Brush is sold in a pack containing 6 Brushes.