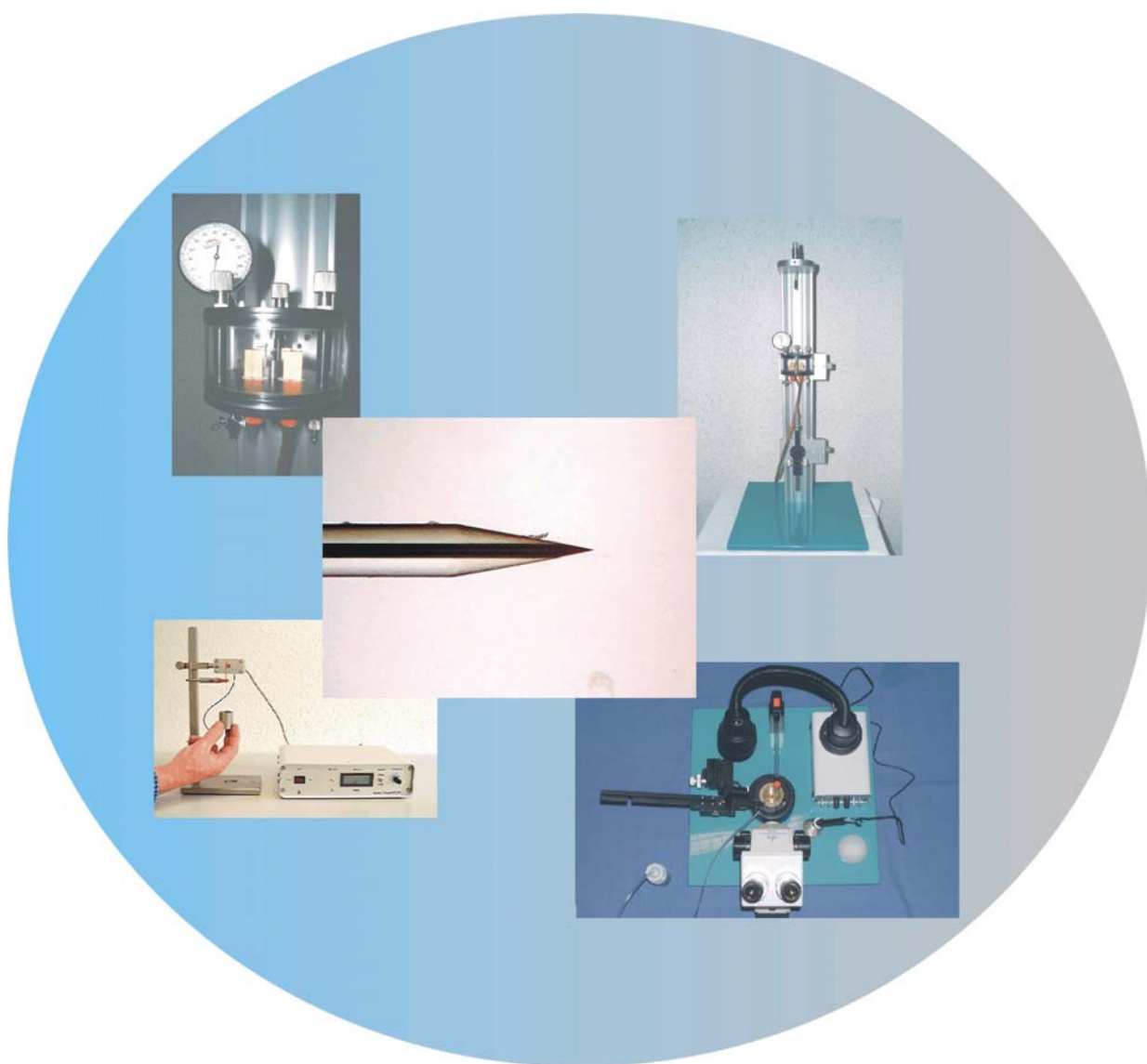




# Electrode Manufacture

## Tools

### Product Information



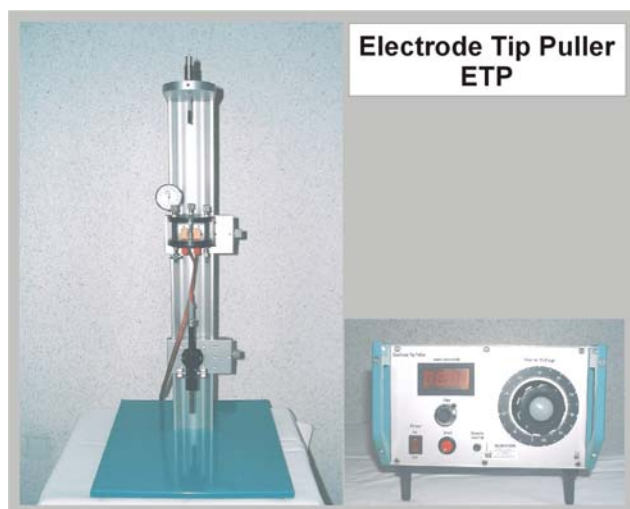
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# 1. Special tools for electrode manufacture

## 1.1 Electrode Tip Puller

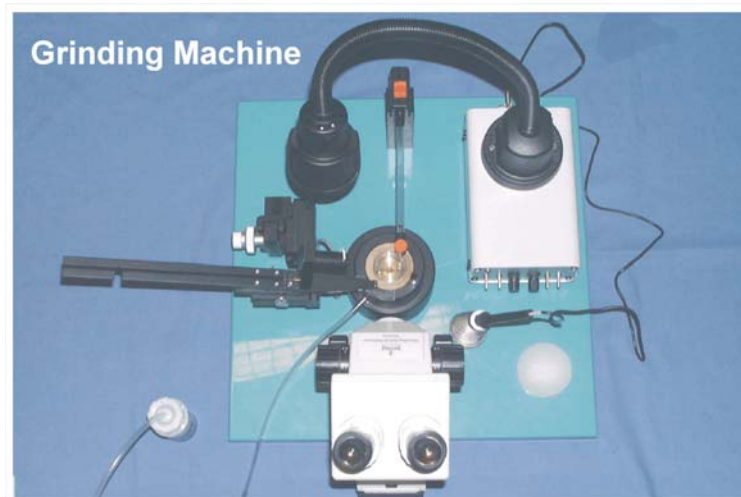


High-temperature tip puller with helium-filled chamber for the pulling of quartz fibers with platinum/tungsten core (quartz-platinum/tungsten 90/10 fiber); about 500 mm height, adjustable pulling force. A matching power supply (110V/60Hz) to heat up the filament is provided as well. The tip puller **ECKL-1.2** enables you to pull a standard tip in various sizes. The helium-filled chamber with precise guidance of the electrode fiber is set-up very easily.

The operation of this equipment requires helium gas. Bottled helium is inexpensive and can be purchased e.g. from companies that sell bottled gas for welding. One re-fill of helium is between Euro 20,-- and Euro 50,-- depending on the volume of the cylinder. There is little consumption of helium.

| item | article-number | description          | unit    |
|------|----------------|----------------------|---------|
| 01   | ECKL-1.2       | Electrode Tip Puller | 1 piece |

## 1.2 Grinding Machine



Precision diamond grinding disk manufactured using high quality engineering, balanced and without vertical error. The electrode will be fixed on a precise 1-dimensional translation sledge with micro-motor for holding and rotating the electrode during grinding; the translation sledge is adjustable such way, that a tip angle of 15 degrees can be achieved.

A special device will moisten the diamond grinding disk while grinding the electrode tip. The complete equipment is mounted on a base plate. A special microscope for observing the microelectrode tip during the grind process is included.

| item | article-number | description                | unit    |
|------|----------------|----------------------------|---------|
| 02   | DIECKL-ST      | Electrode Grinding Machine | 1 piece |

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### 1.3 Electrode Tray



Special made electrode tray that is urgently required for a save storing the electrodes and electrode fibers during the manufacturing proces

| item | article-number | description    | unit    |
|------|----------------|----------------|---------|
| 03   | ElecTray       | Electrode Tray | 1 piece |

### 1.4 Inspection Stereo Microscope



Complete inspection stereo microscope system for (Microscope including a special designed lightweight and precision microscope table) for an easy check of the microelectrodes and microelectrode fibers during the manufacture. The microscope is required for the test of the microelectrode tip shape and metal core over the whole fiber distance. Moving distance about 20cm of the electrodes. The special designed microscope table allows to move the table over the whole length of the electrode. So it is possible to have a look at the electrode over he complete length!

| item | article-number | description                  | unit    |
|------|----------------|------------------------------|---------|
| 04   | ET-Microscope  | Inspection microscope system | 1 piece |

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## 1.5 Electrode Impedance Meter



The impedance value of a metal microelectrode for neurophysiological research is a very important parameter to characterize the recording performance of the microelectrode.

The Metal Electrode Impedance Tester Model EIT-201 is a precision instrument for measuring metal electrode impedance at a frequency of 1kHz. It is designed as a bench-top model.

The model EIT-201 will measure electrode impedance in the two ranges 100k $\Omega$ ...1M $\Omega$  and 1M $\Omega$ ...10M $\Omega$  and displays the impedance value on an easy to read high quality digital liquid-crystal-display (LCD). A toggle switch is provided to select one of the two impedance test ranges.

The EIT-201 has its own sine wave oscillator integrated which generates a very stable 1kHz sine wave test signal. The electrode impedance is measured with a constant current of 5nA. The EIT-201 measuring circuit is largely unaffected by microelectrode offset or tip junction potentials.

A special designed stainless steel laboratory stand is provided with the system.

| item | article-number | description   | unit    |
|------|----------------|---|---------|
| 05   | EIT-201        | Digital Electrode Impedance Meter<br>incl. stainless steel laboratory stand | 1 piece |

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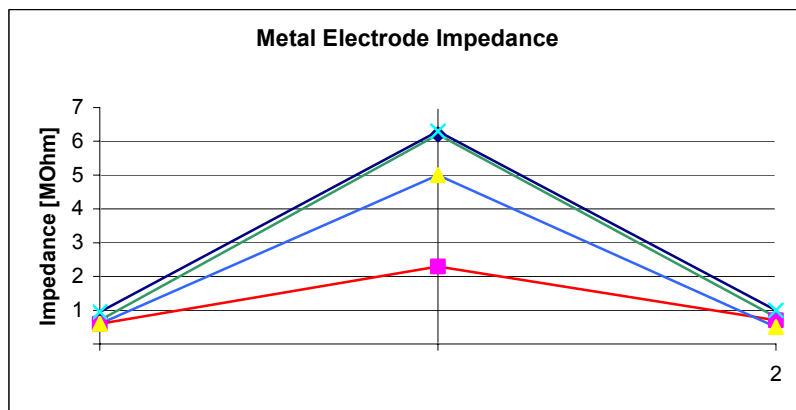
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## 1.6 Electrode Tip Cleaner

The **M**icro**e**lectrode **T**ip **C**leaner (MTC) is an instrument that allows to clean the tips of our quartz-platinum/tungsten metal microelectrodes after a longer stock period.

Metal microelectrode impedance tends to increase if some time has passed since the electrode was manufactured or was not in use for some time. The impedance increase is caused by metal oxidation.

The microelectrode tip cleaner uses a special developed electrochemical technique to clean the electrode tip. The cleaning process removes the oxidation layer from the electrode tip and reduces the electrode impedance to the recommended value.



**Figure 1:** Impedance of 4 single electrodes after manufacture (x=0), after some time (x=1) and after cleaning the tips with the MTC (x=2)



**Figure 2:** MTC

As one can see in figure 1, the electrode impedance of 4 tested metal microelectrodes increased from a value below  $1\text{M}\Omega$  (x=0) to up to  $6\text{M}\Omega$  (x=1) (impedance measured at  $f=1\text{kHz}$ ). After cleaning the electrodes with the MTC all tested quartz-platinum/tungsten microelectrodes had approximately the same impedance value as short after the electrodes were manufactured (x=2).

The MTC is delivered completely ready for use including a connection cable and a 9V battery.

| item | article-number | description                | unit    |
|------|----------------|----------------------------|---------|
| 06   | MTC            | Microelectrode tip cleaner | 1 piece |

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## 1.7 Additional small tools for electrode manufacture

| item | article-number    | description  | unit         |
|------|-------------------|--|--------------|
| 07   | E-ParallelTong    | Parallel pair of pliers with special head for pressing the silver hulls  | 1 piece      |
| 08   | E-FlatTong        | Flat pair of pliers without grooves for stripping the quartz-glass-isolation of the microelectrode fiber   | 1 piece      |
| 09   | E-Solder          | Special solder for connecting the silver core of the microelectrode to the silver wire<br>diameter=0,5mm   | 250g roll    |
| 10   | E-Lacquer         | Special lacquer for fixing the silver wire and the monofil cord  | 12 ml bottle |
| 11   | E-Pipette         | Borosilicate glass pipettes for guiding the electrode fibers during the grinding process,<br>length=130mm,<br>OD= 0,5mm, glass<br>thickness=0,05mm | 100 pieces   |
| 12   | E-Tweezers        | One pair of tweezers   | 1 piece      |
| 13   | E-ThirdHand       | Holding tool incl. a magnifying glass  | 1 piece      |
| 14   | E-SolderStation   | Soldering station with one miniature soldering needle (6W) and one standard soldering iron (25W).<br>Adjustable temperature range 200°C to 450°C   | 1 piece      |
| 15   | E-InstallTube     | Small metal tube for threading the fiber into the completely assembled electrode carrier unit, length=80mm   | 1 piece      |
| 16   | E-CleanRod        | Metal rod for cleaning the installed tube, length=200mm  | 1 piece      |
| 17   | E-Wax             |  | 1 piece      |
| 18   | E-Grinding Liquid |  | 0,5 Liter    |