

A microscopic image of cells, likely fibroblasts, with a green overlay. The cells are elongated and spindle-shaped, with visible nuclei and some cytoplasmic details. The green overlay is semi-transparent, allowing the underlying cell structure to be seen. The text 'Cell Technology' is centered in a white rounded rectangle.

Cell Technology

Molecular
Technologies

Summary of applications



Cell Technology

Application	Product	Page
Instruments		
Electroporation of eukaryotic cells (except for yeasts)	Multiporator®	214
Electroporation of bacteria, yeasts and other microorganisms	Multiporator® with bacteria module	214
	Electroporator	217
Electrofusion of mammal cells, plant cells and oocytes	Multiporator® with cell fusion module	214
Microinjection into suspension cells	TransferMan® NK 2, FemtoJet® and CellTram® Air	224
		230
		232
Manipulation of suspension cells, ICSI	TransferMan® NK 2, CellTram® Air / Oil	224 232
Transfer of ES cells	TransferMan® NK 2, CellTram® Air / vario	224 232
Semiautomatic microinjection into adherent cells	InjectMan® NI 2, FemtoJet®	222 230
Blastomer biopsy and similar techniques, e.g. for PGD	TransferMan® NK 2, TwinTip-Holder, CellTram® Air / Oil / vario	224
		224
		232
Microdissection	MicroDissector, TransferMan® NK 2, CellTram® vario	228
		224
		232
Consumables		
Electroporation	Electroporation cuvettes	217
Microinjection into suspension cells	Femtotip® II, VacuTip, Microloader	231
		235
		231
Manipulation of suspension cells, ICSI	VacuTip, TransferTip® (ICSI)	235
		235
Transfer of ES cells	VacuTip, TransferTip® (ES)	235
		236
Semiautomatic microinjection into adherent cells	Femtotip® II, Microloader, CELLocate	231
		231
		240
Blastomer biopsy and similar techniques, e.g. for PGD	CustomTips, VacuTip	236
		235
Microdissection	MicroChisel, Filtertip MDS, TransferTip® (MDS)	229
		229
		229

Summary of applications

Application	Product	Page
Reagents		
Electroporation of eukaryotic cells (except for yeasts)	Electroporation buffer, isoosmolar / hypoosmolar	216
Electrofusion	Electrofusion buffer, isoosmolar / hypoosmolar	216
Instructions for complete workplaces		
Products for nucleic acid purification		138
Products for PCR		187
<p>This table shows a selection of particular applications from the Cell Technology area and serves as an overview. The complete product portfolio of the Eppendorf Cell Technology System is found on the following pages.</p>		



Cell Technology

The multi-talent for transfection and cell fusion

Multiporator®

Applications

- Electroporation for the transient or stable transfection of eukaryotic cells
- Electroporation of bacteria, yeasts, and other micro-organisms
- Electrofusion of mammalian cells, plant cells and oocytes

Product features

- Compact unit – small and portable
- Robust housing with disinfectable surfaces
- Extremely simple operation and clearly arranged display
- Directly adjustable voltage and time constant
- Soft Pulse™ technology
- Microprocessor-controlled pulse discharge*
- Data documentation via printer or PC
- Optimised buffer system
- Outstanding safety levels provided by the built-in cuvette chamber
- CE, UL, and CAS approval
- 2 years warranty
- Connectors for external electrodes
- Upgradeable with optional functional modules

Electroporation of eukaryotic cells

The Multiporator in combination with the specially designed electroporation buffers is the optimum balanced system for the efficient and gentle electroporation of eukaryotic cells.

The Soft Pulse™ technology of the Multiporator applies extremely short electric pulses, thus enabling highest survival rates. Cell-damaging influences such as changes in pH values, aluminum release, and electrophoresis of the cell content are minimised. The relevant parameters of voltage and pulse duration are directly set and thanks to the patented electronic pulse discharge* will be maintained exactly – independent of the sample resistance. This ensures reliable and reproducible results.

The hypoosmolar buffer system increases the transfection efficiency, in particular for mammalian cells. It allows the electro-deformation of the cells and as a result a easier membrane penetration. The sodium-free buffer system is adapted to the inner cell environment and stabilises the Na⁺/K⁺ gradient across the cell membrane. In this way, even highly sophisticated transfection experiments are possible.

Applications include the transfection of animal and human cell lines, embryonic stem cells, primary cells, oocytes, and plant cells.

Two optional function modules extend the application range of the Multiporator to the transfection of bacteria and yeasts as well as cell fusion.

* US Patent 6008038



Updated protocols are available at www.eppendorf.com

Multiporator®

Cell fusion

The fusion module extends the Multiporator by the method of the highly-efficient electrical cell fusion. Cells are brought into contact with one another in an electrical alternating-current environment and are then fused with a direct-current pulse. This process is supported by the specific Electrofusion buffer system. Using only a few cells in the Micro fusion chamber the experimental parameters can be optimised. The ideal parameters determined in this way can be directly transferred to the cell fusion in the Helix fusion chamber.

Applications

- Generation of hybridoma cells for the production of monoclonal antibodies
- Fusion of immune and tumor cells for the vaccination of tumor diseases
- Cloning of mammals
- Fusion of plant protoplasts

Updated protocols are available at www.eppendorf.com



Device with insert for cell fusion and Helix fusion chamber



Helix fusion chamber
High-precision cuvette with two platinum wires wound in parallel and a 250 µl capacity

Micro fusion chamber for the optimisation of cell alignment and fusion parameters under microscopic control



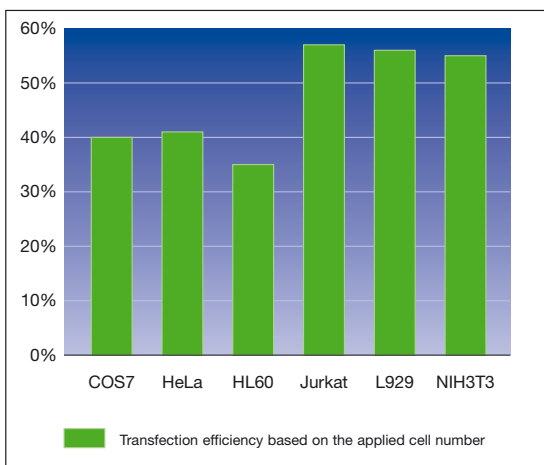
Electrofusion buffer system sterile, pyrogen- and endotoxin-free, mycoplasma-tested

Technical Specifications: Fusion module

Pulse voltage	5–300 V
Pulse width	0–300 µs, in increments of 5 µs
Pulse form	Square-wave pulse
Multiple pulsing	1–99, in time intervals of 1 s
Sinus voltage	1–10 V _p , symmetrically to 0 V
Frequency	2 MHz Sinus
Time range	0–95 s before and after pulses

Multiporator®

Transient transfection of various adherent and suspension cell lines. Cells were electroporated with the plasmid pEGFP using the Multiporator®.



Over 50% transient transfection is possible based on the number of cells used.

Updated protocols are available at www.eppendorf.com

Technical specifications: Eukaryotic module

Pulse voltage:	20–1,200 V
Pulse form:	Exponentially diminishing, electronically controlled
Time constant:	15–500 µs, in increments 5 µs
Multiple pulsing:	1–99, with 1 min. time interval
Interface:	RS232

Technical specifications: Bacteria and yeast module

Pulse voltage:	200–2,500 V
Pulse form:	Exponentially diminishing
Time constant:	5 ms (nominal)
Resistance:	600 Ohm
Capacitor:	10 µF
Special feature:	Electronic safety switch for eliminating short-circuits



Electroporation buffer system sterile, pyrogen- and endotoxin-free, mycoplasma-tested

Ordering information

Article	Order no.
Multiporator®, for eukaryotics	4308 000.015
Multiporator®, for eukaryotics, bacteria and yeasts	4308 000.023
Multiporator®, for eukaryotics, cell fusion, with one 1 Helix fusion chamber and 1 Micro fusion chamber	4308 000.031
Multiporator®, for eukaryotics, bacteria, yeast and cell fusion, with 1 Helix fusion chamber and 1 micro fusion chamber	4308 000.040
Insert for connecting external electrodes (electrofusion/electroporation)	4308 021.004
Electroporation buffer, – hypoosmolar (PH), sterile, 100 ml	4308 070.501
– isoosmolar (PI), sterile, 100 ml	4308 070.510
Electrofusion buffer, – hypoosmolar (FH), sterile, 100 ml	4308 070.528
– isoosmolar (FI), sterile, 100 ml	4308 070.536
Helix fusion chamber for cell fusion	4308 014.008
Micro fusion chamber, gap width 0,2 mm	4308 030.003
Stand for 10 Helix fusion chambers	4308 017.007



Cell Technology

Instruments

Consumables

Electroporator 2510

Product features

- User-friendly one-button control
- Programmable voltage, optimised, fixed pulse times
- Preadjusted voltages for the most frequent applications
- Requires minimum benchtop space
- Integrated cuvette holder
- Electronic safety circuit for arc prevention
- Data documentation via printer or PC

Description

The Electroporator 2510 enables the simple and rapid introduction of foreign DNA into bacteria, yeasts, and other microorganisms. The device has been specially optimised for targeted transformation experiments, thus ensuring the highest possible efficiency levels. Also user-friendliness and instrument safety have been particular points of focus in the design of the unit.

Updated protocols are available at www.eppendorf.com



Technical specifications

Pulse voltage:	200–2.500 V
Capacitor:	10 µF, 2.500 V pulse discharge
Charge time:	<8 s
Time constant:	5 ms nominal with a sample impedance of 3.3 kΩ
Interface:	RS232

Ordering information

Article	Order no.
Electroporator 2510 , for bacteria and yeast, 230 V/50 Hz	4307 000.658

Electroporation cuvettes

Product features

- Plastic cuvette with aluminum electrodes
- 3 sizes with 100, 400, and 800 µl filling capacity (1 mm, 2 mm, and 4 mm gap width)
- Individually wrapped and gamma-radiation sterilised
- Correct positioning in the cuvette holder guaranteed due to design
- Clear gap width identification by lateral cuvette label
- Frosted labeling area for clear experiments



Ordering information

Article	Order no.
Electroporation cuvettes , gap width 1 mm, 100 µl, sterile, 50 pcs.	4307 000.569
Electroporation cuvettes , gap width 2 mm, 400 µl, sterile, 50 pcs.	4307 000.593
Electroporation cuvettes , gap width 4 mm, 800 µl, sterile, 50 pcs.	4307 000.623
Cuvette stand for 16 electroporation cuvettes	4308 078.006

Evolution, Evolution, Evolution...

System solutions for cell and molecular biology

Our complete and fine-tuned program of micromanipulators, microinjectors, capillaries and accessories allows you to tailor-make the workstation to suit your applications.

The modular system ensures the ability of continuous upgrades; an intelligent concept of interfaces allows to combine existing Eppendorf devices with new components.



Instruments | Cell Technology



InjectMan® NI 2, TransferMan® NK 2 and PatchMan NP 2, the New Generation

With your creativity and our production knowledge we have stepped into the future of micromanipulation. Keeping the precision and reliability of the Eppendorf

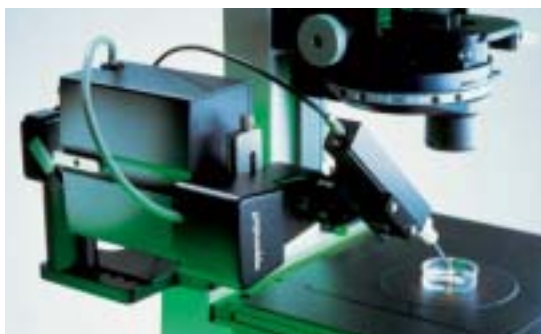
brand, along with the favoured joystick for coarse and fine modes, we have improved the standard features. The following improvements are self-explanatory:

Easy Mounting

- Small and compact units
- "Plug and Play setup"
- Flexible adaptations for all current applications

High Performance, easy Operation

- High speed for efficient penetration of rigid structures (V_{max} 7.500 $\mu\text{m}/\text{sec}$)
- Motors with high resolution for smooth step-free motions. Resolution per step: 0,04 μm
- Easy preset of speed or work area via control unit
- Menu controlled programming
- Storage of user profiles
- Communication with every labserver



Technical specifications	InjectMan® NI 2	TransferMan® NK 2	PatchMan NP 2
Main field of application	microinjection into adherent cells	suspension cells and microdissection	Patch-Clamping (e. g. Patch-Clamping)
Mode of movement	dynamical	proportional	dynamical
Mounting	X, Y, axial	X, Y, Z cartesical	X, Y, Z cartesical
Angle of inclination	10–80°		
Range of X-head		0–90°	0–90°
Range of speed	coarse/fine	coarse/fine	coarse/fine/extra fine
Display- /menu controlled	yes	yes	
Operation	10 buttons + positioning wheel	9 buttons + positioning wheel	7 buttons + positioning wheel
Connection to microinjector	yes		
Fixing of modules			yes
Storage of positions	yes: 2, 10 via menu	yes: 3	yes: 1



Workstations for cell technology

Semiautomatic microinjection into adherent cells

- 1 x InjectMan NI 2
- 1 x Adapter for any inverse microscope
- 1 x FemtoJet
- 5 x 20 Femtotips II
- 1 x 200 Microloader
- 1 x MiniSpin
- 1 x Pipette Research 0.5–10 µl
- 5 x 80 CELLocate



Individual system configuration on request.

Manipulation of suspension cells

ICSI:

- 2 x TransferMan NK 2
- 1 x Adaptor for any inverse microscope
- 1 x CellTram Air
- 1 x CellTram Oil
- 4 x 25 VacuTips
- 4 x 25 TransferTips (ICSI)

Transfer of ES-cells:

- 2 x TransferMan NK 2
- 1 x Adaptor for any inverse microscope
- 1 x CellTram Air
- 1 x CellTram vario
- 4 x 25 VacuTips
- 4 x 25 TransferTips (ES)

Blastomer biopsy and similar techniques, e. g. for PGD:

- 2 x TransferMan NK 2
- 1 x Adapter for any inverse microscope
- 1 x CellTram Air (e. g. for dispensing of acids)
- 1 x CellTram Oil (e. g. for holding of blastocytes)
- 1 x CellTram vario (e. g. for taking blastomers)
- 1 x TwinTip-Holder
- CustomTips (s. p. 236)



Individual system configuration on request.

Workstations for cell technology

Microinjection into suspension cells

- 2 x TransferMan NK 2
- 1 x Adapter for any inverse microscope
- 1 x FemtoJet
- 1 x CellTram Air
- 5 x 20 Femtotips II
- 4 x 25 VacuTips
- 1 x 200 Microloader
- 1 x Pipette Research 0.5–10 µl

Individual system configuration on request.



Microdissection

Workstation for microdissection of cell areas and single cells (for approx. 500 samples, incl. approx. 300 single cells):

- 1 x MicroDissector
- 2 x TransferMan NK 2
- 1 x Adapter for any inverse microscope
- 1 x CellTram vario
- 2 x 10 MicroChisel
- 2 x 96 Filtertips MDS
- 30 x 10 TransferTips (MDS)

Workstation for microdissection of cell areas (for approx. 500 samples):

- 1 x MicroDissector
- 2 x TransferMan NK 2
- 1 x Adapter for any inverse microscope
- 2 x 10 MicroChisel
- 5 x 96 Filtertips MDS

Individual system configuration on request.



InjectMan® NI 2

Application

- Semi-automatic microinjection into adherent cells
- Serial microinjection into fish larvae, insect embryos etc.

Product features

- Integrated coarse and fine manipulator with dynamic control via central joystick
- Work range: 20 mm per axis
- Automated axial injection movement
- Programmable Z axis limit at defined injection level in order to avoid capillary breakage
- Automated Home function for rapid capillary exchange
- Adjustable injection angle and injection speed for different injection processes
- Adjustable injection angle for complex injection processes
- **Axial mounting of Z-module**
- **Special Inject mode for applications in development biology**
- **Comfortable fine adjustment of work speed with positioning wheel**
- **Menu controlled programming via display**
- **Save and download user profiles**
- **External control for automatic processes**

Description

Menu-controlled, programmable micromanipulator, especially suitable for microinjection in adherent cells. The electronic connection of the InjectMan NI 2 and the FemtoJet guarantees a very rapid and safe microinjection into adherent cells. The "semi-automatic" microinjection allows a coordinated process of manipulation and injection. First the injection parameter has to be set at the FemtoJet. As a second step the injection level has to be fixed via push button at the InjectMan NI 2.

The exact axial injection movement ensures a minimum mortality rate. A high speed facilitates the penetration of rigid structures.



- **Workstation for microinjection into adherent cells:**
InjectMan NI 2 with Zeiss-microscope Axiovert 200 and microinjector FemtoJet



- Axial mounting of Z-module



InjectMan® NI 2

Semi-automatic microinjection into adherent cells

As a result of the electronic coupling of the InjectMan NI 2 with the FemtoJet (page 230) microinjector, microinjections into adherent cells are possible. This "semi-automatic microinjection" is enabled by the coordinated sequence of manipulation and injection.

First, the injection parameters are programmed on the FemtoJet. Subsequently, the injection level (Z-Limit) is established by pushing a button on the InjectMan NI 2.

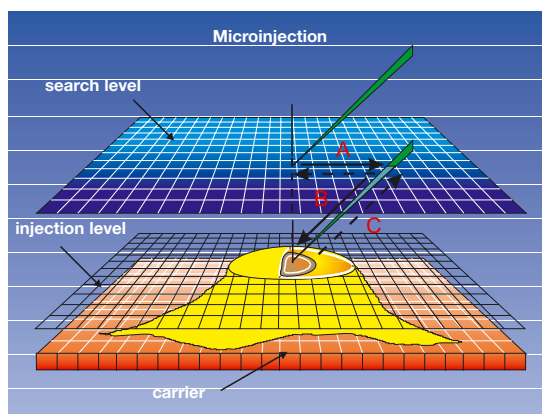
By activating the joystick key, the patented axial injection movement of the capillary (A, B) and the programmed pressure increase can be simultaneously triggered on the FemtoJet.

Following the preset injection time, the pressure decrease in the capillary is triggered simultaneously with the movement of the capillary back to its starting position (C).

The capillary tip thus serves as a "pointer" for the localization of the injection location in the cell.

At the same time, the exact axial injection movement secures the highest survival rate (Peloquin *et al.* 1997, *BioTechniques* 22, 496–499).

With the help of this technology it is possible to process more than 40 cells per minute simply, efficiently and reproducibly.



Technical specifications

Control:	Via central joystick; dynamic kinetics
Drive:	stepper motor
Resolution:	approx. 40 nm per micro step
Max. movement (each axes):	approx. 20 mm
Angle of inclination:	30–60° to object table
Max. speed of tool:	7,500 µm/s
Dimensions (W x D x H):	
Y/Z modul	12.0 x 10.0 x 6.8 cm
X modul	12.0 x 6.0 x 5.0 cm
control panel	27.0 x 20.5 x 16.0 cm
Weight:	
Module unit, complete	1.4 kg
control panel with power supply	2.7 kg

Ordering information

Article	Order no.
InjectMan® NI 2 manipulator for semi-automatic microinjection into adherent cells with FemtoJet. Dynamic control, menu controlled programming	5181 000.017
Connecting cable for InjectMan NI 2 and Transjector 5246 or Microinjector 5242	5181 150.060
Foot switch for InjectMan NI 2	5181 150.051
Microscope adapter see page 227	



TransferMan® NK 2

Applications

- Micromanipulation of suspension cells
- ICSI
- PGD
- Nuclear transfer
- ES cell transfer and DNA injection
- Microdissection in combination with MicroDissector

Description

We have leapt into the future of suspension cell micromanipulation. Our new TransferMan NK 2 combines simplicity and innovative in self-explanatory system capable of satisfying the most sophisticated users requirements.

With its improved proportional kinetics and menu driven control the new TransferMan® NK 2 offers an excellent combination of automatic processes and intuitive operation, allowing the most complex micromanipulation techniques to be carried out rapidly, easily and precisely.

Product features

- Integrated coarse and fine manipulator with proportional control via central joystick
- Work range: 20 mm per axis
- Automated axial injection movement
- Programmable Z axis limit as defined injection level in order to avoid capillary breakage
- Automated Home function for rapid capillary exchange
- Adjustable injection speed
- Adjustable injection angle for complex injection processes
- **Comfortable fine adjustment of work speed with positioning wheel**
- **Storage of 3 independent work positions**
- **Menue controlled programming via display**
- **Save and download of user profiles**
- **External control for automatic processes**

Product features of TwinTip-Holder for TransferMan NK 2

- For special manipulation techniques e.g. blastomer biopsy
- For independent control of two capillaries on one TransferMan NK 2
- **Control via Piezostacks**



TransferMan® NK 2



● Workstation for ICSI or ES cell transfer:

2 TransferMan NK 2 with Olympus-microscope IX 70 and microinjectors CellTram Air and CellTram vario

Technical specifications

Control:	Via central joystick; proportional kinetics
Drive:	stepper motor
Resolution:	approx. 40 nm per micro step
Max. movement (each axes):	approx. 20 mm
Max. speed of tool:	7,500 µm/s
Dimensions (W x D x H):	
Y/Z module	12.0 x 10.0 x 6.8 cm
X module	12.0 x 6.0 x 5.0 cm
Control panel	27.0 x 20.5 x 16.0 cm
Weight:	
Module unit, complete	1.4 kg
Control panel with power supply	2.7 kg

Ordering information

Article	Order no.
TransferMan® NK 2 Proportional micromanipulator for suspension cells and microdissection, menue controlled programming.	5188 000.012
Spacer for the installation of Piezo stepper, laser and similar tools	
TwinTip-Holder for TransferMan® NK 2 twin capillary holder for special manipulation techniques e.g. biopsy	5188 200.011
Microscope adapter see page 227	



PatchMan NP 2

Applications

- Electrophysiology (e.g. Patch-Clamping)

Product Features

- Integrated coarse and fine manipulator with dynamic joystick control
- Large work range of 20 mm per axis
- **Three different speed ranges on the press of a button, easy adjustment by turning dial**
- Combination of X and Z axis for axial movement
- Rapid change of electrodes by storing the work position and automated home function

Description

The Eppendorf PatchMan NP 2 is the ideal micromanipulator for electrophysiology. The direct adapter attachment of the module unit to all commonly used inverted microscopes (optionally positioned at the left or right) and the separate control board prevent oscillation and vibration. The device is adapted to upright microscopes by means of the Eppendorf universal stand. The tool can be attached to the module unit at any angle and in any orientation.

The PatchMan NP 2 micromanipulator is designed for harmless placement of measurement electrodes on and in the cell. This is aided by the device's facility to approach the cell membrane extremely slowly and to execute a purely downward movement if required.



- **Example of configuration:** PatchMan NP 2 with Nikon Eclipse TE 300



PatchMan NP 2

Technical specifications

Control:	via central joystick; dynamic kinetics
Drive:	stepper motor
Resolution:	approx. 40 nm per micro step
Max. movement (each axis):	approx. 20 mm
Mounting angle of the pre-amplifier (X-head):	0–90° to object table
Max. speed of tool:	7,500 µm/s
Dimensions (W x D x H):	
Y/Z module	12.0 x 10.0 x 6.8 cm
X module	12.0 x 6.0 x 5.0 cm
Control panel	27.0 x 20.5 x 16.0 cm
Weight:	
Module unit, complete	1.4 kg
Control panel with power supply	2.7 kg

Ordering information

Article	Order no.
PatchMan NP 2 Micromanipulator for electrophysiology Headstage holder fits for HEKA: EPC 7, EPC 9 and AXON: CV-4, CV-5, CV-7A Axopatch 200 A, 200 B HS-2, HS-2A	5183 000.014
Microscope adapter see down	



Adapters for Micromanipulators

For all workstations, additional microscopes, adapters, video equipment and application-specific accessories may be required.

Ordering information

Article	Order no.
Adapters for micromanipulator InjectMan® NI 2, TransferMan® NK 2 and PatchMan NP 2	
Hund Wilovert 30	5181 234.000
Leica DMIL/HC	5181 201.004
Leica DMIRB/E/HC	5181 200.008
Leica DMIRE 2	5181 202.000
Nikon Diaphot/Diaphot TMD	5181 210.003
Nikon Eclipse TE 200/300/2000	5181 213.002
Nikon Eclipse TS 100	5181 212.006
Olympus CK-30/CK-40	5181 222.001
Olympus IMT-2	5181 221.005
Olympus IX 50/70/71	5181 220.009
Zeiss Axiovert 10/35	5181 233.003
Zeiss Axiovert 100/135	5181 230.004
Zeiss Axiovert 200	5181 235.006
Zeiss Axiovert 25	5181 232.007
Universal Stand	5181 250.005

Note: The Universal Stand is particularly suitable for manipulators mounted on upright microscopes and stereo microscopes.

MicroDissector PPMD (Piezo-Powered Microdissection)

Applications

- Microdissection of cell areas and smaller cell groups, extending to single cells from:
 - Living tissue
 - Histological sections
 - Plant material
 - Cell cultures

Product Features

- Flexible, modular system of PPMD cutting tool and electronically controlled pipette
- Quick and precise cutting of the material
- All common preparations can be processed without prior handling
- Layer thicknesses of from only a few μm to the macroscopic area pose no problem
- No material strain due to heat or UV radiation. Even the isolation of living cells for tissue engineering is possible

Functional principle of PPMD

With the help of a novel ultrasonic-Piezostepper, an extremely fine metal tip (MicroChisel) is set in motion at a high frequency and low amplitude. All common biological preparations, even cartilage and bone tissue, can thereby be quickly and precisely cut.

The isolation of cells, cell particles or cell groups is carried out according to individual specifications:

- For **larger cell quantities** we recommend **the integrated pipette** and our **Filtertips (MDS)**.
- For **smaller cell groups/single cells** we offer you **CellTram® vario** and our **TransferTips® (MDS)** glass capillaries with an inner diameter of 20 μm .

The isolated material can then be directly transferred into any micro test tube or into the cavity of a microtest plate. Naturally, all common downstream applications (e. g. RT PCR or quantitative mRNA expression analyses) can be carried out following the PPMD. As a result of **the very high vitality of the isolated cells** even further cultivation is possible.

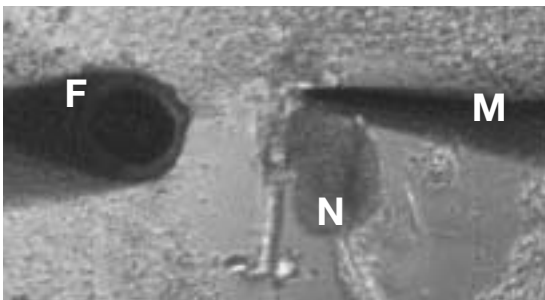


MicroDissector PPMD (Piezo-Powered Microdissection)

Applications for PPMD:

Isolation of living cells (e. g. tissue engineering)

With the help of the PPMD it is possible to isolate individual cells from tissue. The isolated cells can then be maintained in culture.



● **Isolation of cartilage cells (chondrocytes)**, which have differentiated themselves from embryonic stem cells of the mouse. The cartilage „nodule“ (N) is freed from the surrounding cells with the MicroChisel (M). Following the complete separation, the nodule is taken up with the help of the Filtertips MDS (F) and transferred into another Petri dish. Following further incubation, cells begin to grow out of the nodule.

This application has been provided to us by Dr. Rohwedel and Dr. Kruse (Institut für Medizinische Molekularbiologie der Universität zu Lübeck, Germany).

Updated list
www.eppendorf.com

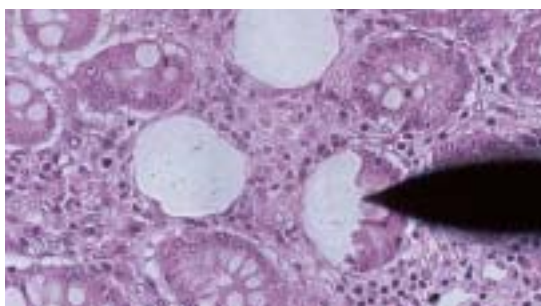
Technical specifications

Cutting frequency:	approx. 25–60 kHz, readable in 0.1 kHz steps
Cutting amplitude:	approx. 0–1.5 µm
Pipette volume:	adjustable to max. approx. 40 µl, readable in 1%-steps, usable volume of max. 30 µl with Filtertip MDS
Pipette control:	step-by-step or continuous
Power consumption:	60 W
Dimensions (W x D x H):	22 x 28 x 11 cm
Weight:	3.5 kg

Isolation of cell areas from histological preparations (e. g. cancer research)

Characterisation of molecular-genetic changes in cell populations is a decisive foundation for understanding the tumor formation. Analysis is conducted by isolating the interesting cell areas with the aid of PPMD and subsequent further experiments using RT-PCR, differential mRNA expression or other methods.

As far as type and thickness are concerned, there are no limitations imposed by the PPMD method.



● Isolation of cell areas from a human specimen of colon mucosa. (Harsch *et al.*, 2001, *Americ. J. Pathol.*, Vol. 158, No.6). Picture from Prof. Dr. A. Niendorf (Medeea Forschungs GmbH, Hamburg).

Ordering information

Article	Order no.
MicroDissector mechanical MicroDissector with ultrasonic piezo stepper and electronic-controlled aspirating pipette, complete with accessories and pedal controls	5190 000.011
MicroChisel , 10 pcs., sterile metal needle for microdissection	5190 204.008
Filtertips (MDS) , 96 pcs., sterile pipette tips with filter	5190 043.004
TransferTips® (MDS) , 10 pcs., sterile glass capillaries for aspirating cells	5190 042.008
TransferMan® NK 2	5188 000.012
TwinTip-Holder for TransferMan NK 2	5188 200.011
CellTram® vario manual microinjector for cell transfer	5176 000.033



FemtoJet®

Application

- Microinjection into adherent and suspension cells

Product features

- Reproducible microinjection guaranteed by programmable injection parameters
- Independent pressure supply with built-in compressor
- Suitable for microinjection into adherent and suspension cells
- Injection volumes ranging from femtoliters to nanoliters
- Can be combined with all common micromanipulation systems
- Easy to operate
- Menu-controlled extra functions (e.g. for bubble pressure test; Schnorf *et al.* 1994, *Exp. Cell Res.* 210)
- Inject and Clean function triggered via mouse (supplied) or directly on device
- Inject function may be triggered via foot control (optional)
- Large display
- Space-saving dimensions

Description

FemtoJet is the ideal microinjector for injecting aqueous solutions into adherent and suspension cells. It boasts perfect technology, a wide spectrum of functions, simple handling and with its integrated compressor, has an independent pressure supply. In addition, its wide pressure range and finely tunable pressure parameters mean that it sets new standards for successful microinjection. FemtoJet can be combined with Micromanipulator 5171, InjectMan and InjectMan NI 2 to perform semi-automatic microinjection into adherent cells (see below). The FemtoJet is also suited to suspension cell injection when coupled with the TransferMan NK 2. In addition, it is also the ideal partner for non-Eppendorf microinjection systems.

Ordering information

Article	Order no.
FemtoJet® , programmable microinjector with integrated pressure supply	5247 000.013
Foot control for triggering inject function	5247 623.002
Universal capillary holder for Femtotips, Femtotips II or grip heads	5176 191.002
2 positioning aids for universal capillary holder	5171 130.001
Grip heads for universal capillary holders:	
2 x grip head 0 for microcapillaries; outer diameter 1.0–1.1 mm	5176 210.003
2 x grip head 1 for microcapillaries; outer diameter 1.2–1.3 mm	5176 212.006
2 x grip head 2 for microcapillaries; outer diameter 1.4–1.5 mm	5176 214.009
2 x grip head 3 for microcapillaries; outer diameter 0.7–0.9 mm	5176 207.002
Note:	
Grip head 0 is contained in delivery package of FemtoJet	
Spare parts:	
O-ring set (seals, tool)	5176 196.000
Service kit (O-ring set plus different adapters)	5176 195.004
Injection tube, 2 m	5246 164.004

Technical specifications

Injection time t_i	0.0–99.9 sec; can be set in increments of 0.1 sec
Injection pressure p_i	0–6,000 hPa; can be set in increments of 1 hPa
Compensation pressure p_c	0–6,000 hPa; can be set in increments of 1 hPa
Rinsing pressure	Max. 7,000 hPa
Dimensions (W x H x D)	22 x 28 x 17 cm
Weight	6.2 kg



Liquid handling system for microinjection

Applications

- Microinjection into adherent and suspension cells

Product features

- Sterile
- Every tip is individually tested
- Defined opening
- Screw thread for simple mounting

Description

Eppendorf microinjection capillaries and Microloaders enable rapid, precise microinjection with the utmost reproducibility.

Stringent quality control procedures ensure the best possible quality. The combination of InjectMan® NI 2, FemtoJet® and Femtotips® ensures exact results with high-throughput experiments.



Femtotip®

- Microinjection capillary for reproducible injection of adherent cells
- Defined opening with 0.5 µm inner diameter and 1.0 µm outer diameter (± 0.2 µm)
- Thread for rapid mounting
- Precise length accuracy
- 100% individual testing of every Femtotip using a flow parameter



Femtotip® II

- Microinjection capillary for reproducible injection of adherent cells and suspension cells
- Defined opening with 0.5 µm inner diameter and 0.7 µm outer diameter (± 0.1 µm)
- Screw-thread for rapid mounting
- Precise length accuracy
- 100 % individual testing of every Femtotip II using a flow parameter



Microloader

- Pipette tip for filling the microinjection capillaries
- Rack package can be sterilised
- Ideal for recovering surplus solution from the capillary

Information on capillary selection on page 238

Ordering information

Article	Order no.
Femtotip® , sterile injection capillary, 0.5 µm inner and 1.0 µm outer diameter, set of 20	5242 952.008
Femtotip® II , sterile injection capillary, 0.5 µm inner and 0.7 µm outer diameter, set of 20	5242 957.000
Microloader , set of 200	5242 956.003

Please enquire about our attractive staggered prices.



CellTram® Air / Oil / vario

Common product features

- Maintenance-free piston/cylinder system
- Large, ergonomic dials
- Stable, non-slip base plate
- Universal capillary holder for mounting onto all common micromanipulators

Description

The manual microinjectors CellTram Air, CellTram Oil and CellTram vario for pressure control, manual microinjection and liquid dispensing were designed with special emphasis on optimal ergonomics, operational comfort and high precision. They can be used with all common micromanipulation systems.

Application: CellTram® Air

- Gentle holding of suspension cells (e.g. oocytes)
- Manual microinjection and dispensing of aqueous solutions

Product features of CellTram® Air

- Optimised resolution for holding suspension cells
- Work point can be set easily via pressure-compensation valve
- Very easy to use, oil filling not necessary



Application: CellTram® Oil

- Uptake and dispensing of small cells (e.g. sperm)
- Manual microinjection under high pressure (e.g. in plants)

Product features of CellTram® Oil

- QuickValve system for simple, rapid filling
- Biological compatibility guaranteed by embryo-tested oil (Sigma M-8410)
- Max. pressure: 20,000 hPa



Application: CellTram® vario

- Transfer of suspension cells (e.g. ES cells)
- Transfer of organelles (e.g. nuclear transfer)
- Extraction of cells (e.g. Microdissection, polar body biopsy, blastomere biopsy)

Product features of CellTram® vario

- Variable transmission ratio (1:1 and 1:10) for utmost demands of resolution and sensitivity
- QuickValve system for simple, rapid filling
- Biological compatibility guaranteed by embryo-tested oil (Sigma M-8410)



CellTram® Air / Oil / vario and QuickValve™ system

QuickValve™ system:

Filling CellTram vario and CellTram Oil is now unbelievably quick and easy, thanks to the new QuickValve system. A special valve screw enables the oil to be filled directly into the piston chamber. The optimised piston/cylinder system minimises friction in the piston chamber, thereby guaranteeing the utmost reliability and ultra-fine sensitivity.



Technical specifications

	CellTram® Air	CellTram® Oil	CellTram® vario
Generation of pressure	Piston/cylinder system; air-filled, maintenance-free	Piston/cylinder system; oil-filled, maintenance-free	Piston/cylinder system; with gears, oil-filled, maintenance-free
Volume change per revolution	88 µl	9.8 µl	9.6 µl / 960 nl (coarse / fine)
Total volume that can be set	2,640 µl	980 µl	960 µl
Minimum volume that can be set	<200 nl	<20 nl	<20 nl / <2 nl (coarse / fine)
Maximum pressure	2,900 hPa	20,000 hPa	20,000 hPa

Ordering information

Article	Order no.
CellTram Air , pneumatic manual microinjector	5176 000.017
CellTram Oil , hydraulic manual microinjector	5176 000.025
CellTram vario , hydraulic manual microinjector, with gears	5176 000.033
Accessories:	
Grip heads for universal capillary holder:	
2 grip head 0 for microcapillaries; outer diameter 1.0–1.1 mm	5176 210.003
2 grip head 1 for microcapillaries; outer diameter 1.2–1.3 mm	5176 212.006
2 grip head 2 for microcapillaries; outer diameter 1.4–1.5 mm	5176 214.009
2 grip head 3 for microcapillaries; outer diameter 0.7–0.9 mm	5176 207.002
Note: Grip head 0 is contained in the delivery package of CellTram Oil.	
Universal capillary holder for Femtotips, Femtotips II or grip heads	5176 191.002
2 positioning aids for universal capillar holder	5171 130.001
Spare parts:	
O-ring set (seals, tool)	5176 196.000
Service kit (O-ring set plus different adapters)	5176 195.004
Pressure tube, 1 m	5176 114.004



The specialists for cell technology

Eppendorf microcapillaries

Modern cellular and molecular biology poses the strictest requirements for the usage of sensitive samples such as living cells, nucleic acids or other cell components. With this ambition of quality in mind, Eppendorf offers a large selection of microcapillaries for the most varied applications.

- VacuTips capillaries and TransferTips, for intracytoplasmatic sperm injection (ICSI) (see below)
- TransferTip, (ES) for embryonic stem cells (page 236)
- TransferTips, (MDS) for microdissection (page 229)
- Femtotips for microinjection of the smallest volumes (page 231)

For special requirements not covered by this range, we will manufacture CustomTips (page 236 ff) according to your specifications.

Eppendorf microcapillaries offer the user reproducible quality through narrowly defined specifications and intensive quality control, as well as the greatest security through effective sterilization methods.

Expensive and complicated devices for the manufacturing and control of self-drawn capillaries are no longer necessary. Fluctuations in quality and specifications can no longer endanger your experiments.

Capillary Safe



Eppendorf Capillary Safe for TransferTips® and VacuTips

- Safe transport packaging
- Special capillary safe system protects the capillary until it is used

Information on capillary selection p. 238

Precision capillaries for ICSI

Product features in common

- Glass micro capillaries for sperm injection and the containment of egg cells
- 1 mm outer diameter
- Sterilized by validated gamma radiation
- Non-cytotoxic (continuous testing with mouse embryo test)

Special quality criteria

- FDA authorization
- Medical product certified according to European law

Precision capillaries for ICSI

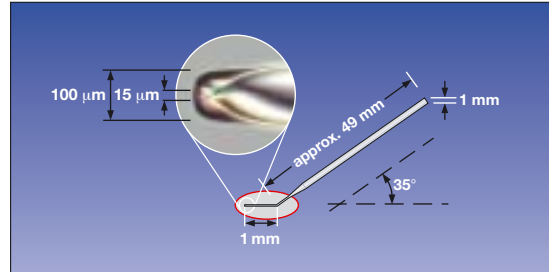
VacuTip

Glass microcapillary for holding suspension cells

(e. g. oocytes or blastocysts)

- 15 µm inner diameter,
- 100 µm outer diameter
- 35° tip angle

Other angles or diameters available as CustomTip (page 236).

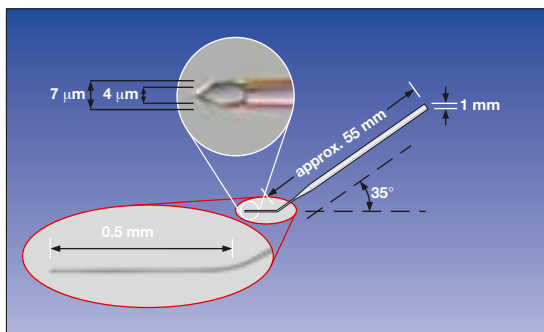


TransferTip® (ICSI)

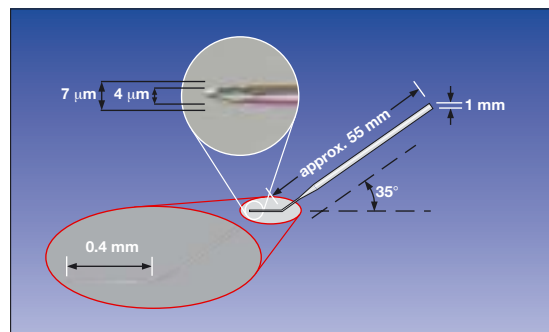
Glass microcapillary for sperm injection using the ICSI technique

- 4 µm inner diameter
- 7 µm outer diameter
- Heat-formed spike
- 35° tip angle

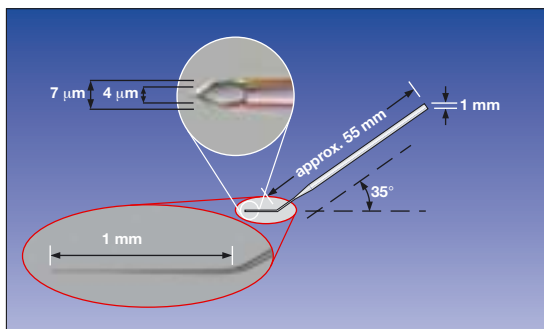
In order to be able to supply you with the ideal tool for your personal work methods, we offer you three variants of the TransferTip. These are differentiated by the length and shape of the angled flange. Other angles or diameters can be manufactured for any type as a CustomTip.



- **TransferTip®-RP,**
Rigid, parallel flange, 0.5-mm-long



- **TransferTip®-F,**
Flexible flange, 0.4-mm-long



- **TransferTip®-R,**
Rigid flange, 1-mm-long

Ordering information

Articles	Order no.
VacuTip, sterile, set of	5175 108.000
TransferTip®-RP (ICSI), sterile, set of	5175 114.000
TransferTip®-F (ICSI), sterile, set of	5175 106.008
TransferTip®-R (ICSI), sterile, set of	5175 113.004

Please enquire about our attractive staggered prices.



Microcapillaries for transferring embryonic stem cells

Product features of TransferTip® (ES)

- 15 µm inner diameter
- 20 µm outer diameter
- 20° tip angle
- Rigid flange, 1-mm-long
- Heat-formed spike eases penetration
- Validated gamma radiation
- Non-cytotoxic**
- Capillary safe for optimum protection

** Continuous testing with mouse embryo test



Ordering information

Articles	Order no.
TransferTip® (ES), sterile, set of 25	5175 107.004
VacuTip, sterile, set of 25	5175 108.000

CustomTips – Capillaries according to your specifications

Product features

- Microcapillaries manufactured according to your input
- Borosilicate glass, length: 50–55 mm, outer diameter 1 mm
- Non-sterile or gamma-sterilised as required
- Non-cytotoxic (as proven by mouse embryo development test), see page 234
- Capillary Safe for optimal protection

Starting from four basic types:

- CustomTip Type I : blunt end
- CustomTip Type II : holding pipette type
- CustomTip Type III: bevelled end
- CustomTip Type IV: bevelled end and heat-formed spike

You define all other parameters yourself (see following graphics).

You will find suggestions for CustomTip for selected application in the table on the following page.

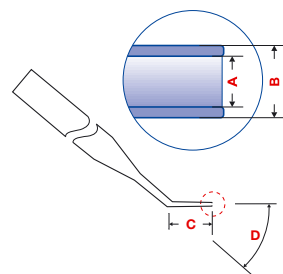
Description

Eppendorf offers CustomTips manufactured under stringent quality control according to your specifications. Ranges for variable parameters are shown in the boxes below.

CustomTip Type I: Blunt end

Applications: Microdissection, etching, biopsy etc.

A: Inner diameter of the tip	min.: 3.5 µm	max.: 150 µm
B: Outer diameter of the tip	min.: 5.5 µm	max.: 200 µm
C: Length of bevelled end	min.: 200 µm	max.: 1,000 µm
D: Angle of capillary	min.: no angle	max.: 90°
G: Front surface	jagged or rounded break	



Customer specifications Type I:

(Attention! Choose (A) inner or (B) outer diameter *alternatively!*)

A:
 B:
 C:
 D:
 G:

25 capillaries, gamma-sterilised
 25 capillaries, non-sterile

Order no.
 5175 110.005
 5175 140.001



CustomTip Type II: Holding pipette type

Applications: Holding of oocytes, blastocytes, etc.

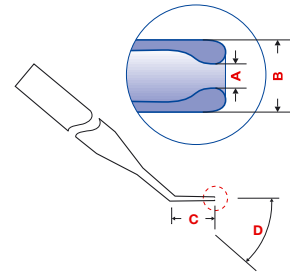
A: Inner diameter of the tip	min.: 3.5 µm	max.: 150 µm
B: Outer diameter of the tip	min.: 5.5 µm	max.: 200 µm
C: Length of bevelled end	min.: 200 µm	max.: 1,000 µm
D: Angle of capillary	min.: no angle	max.: 90°

Customer specifications Type II:
(Attention! Please choose A and B here!)

A:
B:
C:
D:

25 capillaries, gamma-sterilised
25 capillaries, non-sterile

Order no.
5175 115.007
5175 116.003



CustomTip Type III: Bevelled end

Applications: injection and cell transfer

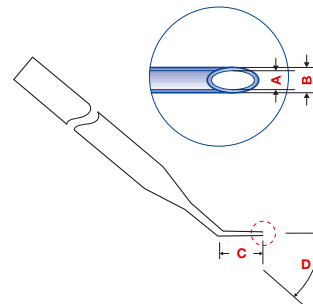
A: Inner diameter of the tip	min.: 3.75 µm	max.: 100 µm
B: Outer diameter of the tip	min.: 5.5 µm	max.: 140 µm
C: Length of bevelled end	min.: 200 µm	max.: 1,000 µm
D: Angle of capillary	min.: no angle	max.: 90°
E: Orientation of opening	side/top/bottom	
F: Flexibility	flexible/rigid	

Customer specifications Type III:
(Attention! Choose (A) inner or (B) outer diameter *alternatively!*)

A: D:
B: E:
C: F:

25 capillaries, gamma-sterilised
25 capillaries, non-sterile

Order no.
5175 111.001
5175 141.008



CustomTip Type IV: Bevelled end and heat-formed spike

Applications: injection and cell transfer

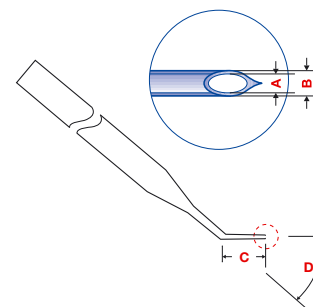
A: Inner diameter of the tip	min.: 3.75 µm	max.: 100 µm
B: Outer diameter of the tip	min.: 5.5 µm	max.: 140 µm
C: Length of bevelled end	min.: 200 µm	max.: 1,000 µm
D: Angle of capillary	min.: no angle	max.: 90°
E: Orientation of opening	side/top/bottom	
F: Flexibility	flexible/rigid	

Customer specifications Type IV:
(Attention! Choose (A) inner or (B) outer diameter *alternatively!*)

A: D:
B: E:
C: F:

25 capillaries, gamma-sterilised
25 capillaries, non-sterile

Order no.
5175 112.008
5175 142.004



** Please enquire about special prices.



Suggestions for CustomTips

The list below contains suggestions for application-specific capillaries.

These can be ordered in packs of 25 in either sterile or non-sterile format **quoting order number and CustomTip number.**

Updated list at
www.eppendorf.com

Ordering information

Capillaries	Application/ comments	CustomTip Type	A: Inner- diameter [µm]	B: Outer- diameter [µm]	C: limb length [µm]	
BactoTip	Isolating microorganisms	Type I	10	–	–	
TransferTip, MDS (150)	Transferring cell groups	Type I	150	–	1,000	
Embryo Biopsy Tip (20/30)	Blastomere biopsy (8-cell embryo, mouse)	Type I	20	–	1,000	
Embryo Biopsy Tip (30/40)	Blastomere biopsy (8-cell embryo, human)	Type I	30–35	–	1,000	
Embryo Biopsy Tip (40/50)	Blastomere biopsy (8-cell embryo, mouse)	Type I	40–45	–	1,000	
Zona Drilling Tip (10/14)	Assisted hatching and blastomere extraction	Type I	–	14	1,000	
VacuTip (15/100), with 20° angle	For human oocytes, but shallow working angle	Type II	15	100	1,000	
VacuTip (20/120)	Holding embryos	Type II	20–25	120–130	1,000	
VacuTip (20/60)	Holding small oocytes, e. g. mouse	Type II	15–20	60	1,000	
VacuTip (40/140)	Holding large oocytes,	Type II	40	135	1,000	
TransferTip F, without spike	–	Type III	5	–	1,000	
Polar Body Biopsy Tip	Polar body biopsy	Type III	11	–	1,000	
TransferTip, 15° angle	For shallower working angles	Type IV	4.5	–	1,000	
TransferTip 7 µm	Veterinary ICSI (e. g. pigs or horses)	Type IV	7	–	400	
TransferTip 8 µm	Veterinary ICSI (e. g. cattle or sheep)	Type IV	8	–	1,000	



Suggestions for CustomTips

	D: Angle	E: Orientation of opening	F: Flexibility	G: Front surface	CustomTip number	Order number for sterile capillaries	Order number for unsterile capillaries
	0°	–	rigid	jagged	99/095	5175 110.005	5175 140.001
	35°	–	rigid	jagged	02/223	5175 110.005	5175 140.001
	35°	–	rigid	round	98/023	5175 110.005	5175 140.001
	35°	–	rigid	round	00/113	5175 110.005	5175 140.001
	35°	–	rigid	round	00/114	5175 110.005	5175 140.001
	35°	–	flexible	round	98/022	5175 110.005	5175 140.001
	20	–	rigid	–	99/091	5175 115.007	5175 116.003
	35°	–	rigid	–	00/112	5175 115.007	5175 116.003
	35°	–	rigid	–	98/024	5175 115.007	5175 116.003
	35°	–	rigid	–	98/042	5175 115.007	5175 116.003
	35°	side	flexible	–	02/224	5175 111.001	5175 141.008
	30°	top	flexible	–	98/026	5175 111.001	5175 141.008
	15°	side	flexible	–	99/090	5175 112.008	5175 142.004
	35°	side	rigid	–	01/188	5175 112.008	5175 142.004
	35°	side	rigid	–	97/006	5175 112.008	5175 142.004



CELLocate®

Application

- Location of individual cells / cell groups
- Determination of cell division indices
- Measurement of cell growth and cytotoxicity
- Estimation of cell numbers

Product features

- Sterile
- Two grid sizes
- Glass thickness of 0.17 mm (cover glass) allows fluorescence analysis and greater magnification
- Easy, safe handling guaranteed by true-to-side individual packaging
- Protocol block with original grid pattern for simple, error-free protocols



Description

CELLocate (Prof. Hohenberg, Hamburg) is a sterile coverslip, which has a microgrid design that allows for quick location of cells. They are individually packaged, ensuring a contamination-free environment. Select from two grid sizes. The 55 µm version is ideal for locating individual cells, and the 175 µm size is designed for locating cell groups.

Ordering information

Article	Order no.
CELLocate®, grid size 175 µm, sterile, 80 pcs.	5245 952.009
CELLocate®, grid size 55 µm, sterile, 80 pcs.	5245 962.004

