QUALITEST™

Advanced Electroporator

STANDARDS

IEC 61010-1
IEC 61326-1

Advanced Electroporator – QualiEP™ Adv

An Electroporator supports controlled gene transfer by applying defined electrical pulses that temporarily permeabilize cell membranes. QualiEP™ Adv is an advanced lab Electroporator designed for method development and repeatable production of pulse conditions across a wide range of organisms and sample conductivities.

It combines microcomputer control, adjustable RC time constant behavior, selectable capacitance ranges, and programmable discharge timing to help labs tune efficiency and viability with less trial-and-error. The unit supports both exponential and square-wave pulse forms, giving you flexibility when protocols call for different pulse shaping.

QualiEP™ Adv is a practical fit for research teams running mixed workflows across bacteria, yeast, mammalian cells, and plant samples where protocols shift and parameter windows are narrow. It also supports multi-discharge sequences for experiments that require repeated pulses with defined intervals.

APPLICATIONS

Advanced Electroporator – QualiEP™ Adv Applications

- Bacterial and yeast transformation Exponential pulses and RC control help tune uptake efficiency and survival across common microbial transformation workflows. Adjustable discharge timing supports fast optimization when competency and media conductivity vary.

- Mammalian cell electroporation Square-wave capability supports many mammalian transfection methods where pulse duration and amplitude must be tightly controlled. Multi-discharge options can be used for protocols that benefit from sequential pulsing.
- Plant cell and protoplast transfection Broad capacitance and voltage ranges support optimization for plant-derived samples that can be sensitive to overheating or excessive pulse energy. Timing control helps standardize results across operators.
- Gene editing delivery workflows Electroporation is often used to introduce plasmids, mRNA, or protein complexes in development work where consistent delivery improves downstream screening and selection.
- General lab method development The wide parameter set supports DOE-style screening and SOP creation, especially when your lab needs one Electroporator for multiple sample types and research programs.


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Standards

- IEC 61010-1 – Safety requirements for electrical equipment for measurement, control, and laboratory use.
- IEC 61326-1 – EMC requirements (emissions and immunity) for laboratory and measurement equipment.

FEATURES

Advanced Electroporator – QualiEP™ Adv Key Features

- Dual pulse forms: supports both exponential decay and square-wave electroporation methods for broader protocol compatibility.
- Wide voltage coverage: high-voltage output for challenging cells and low-voltage output for sensitive samples and tuning.
- Expanded capacitance selection: fine step settings for method development and repeatable energy delivery across different buffers.
- Programmable discharge and interval timing: supports controlled pulse timing from very short to extended ranges for optimization work.
- Multi-discharge capability: allows a defined number of continuous discharges to support sequential pulsing workflows.
- Microcomputer control: improves repeatability and simplifies parameter entry for routine lab operation.

THEORY & METHOD

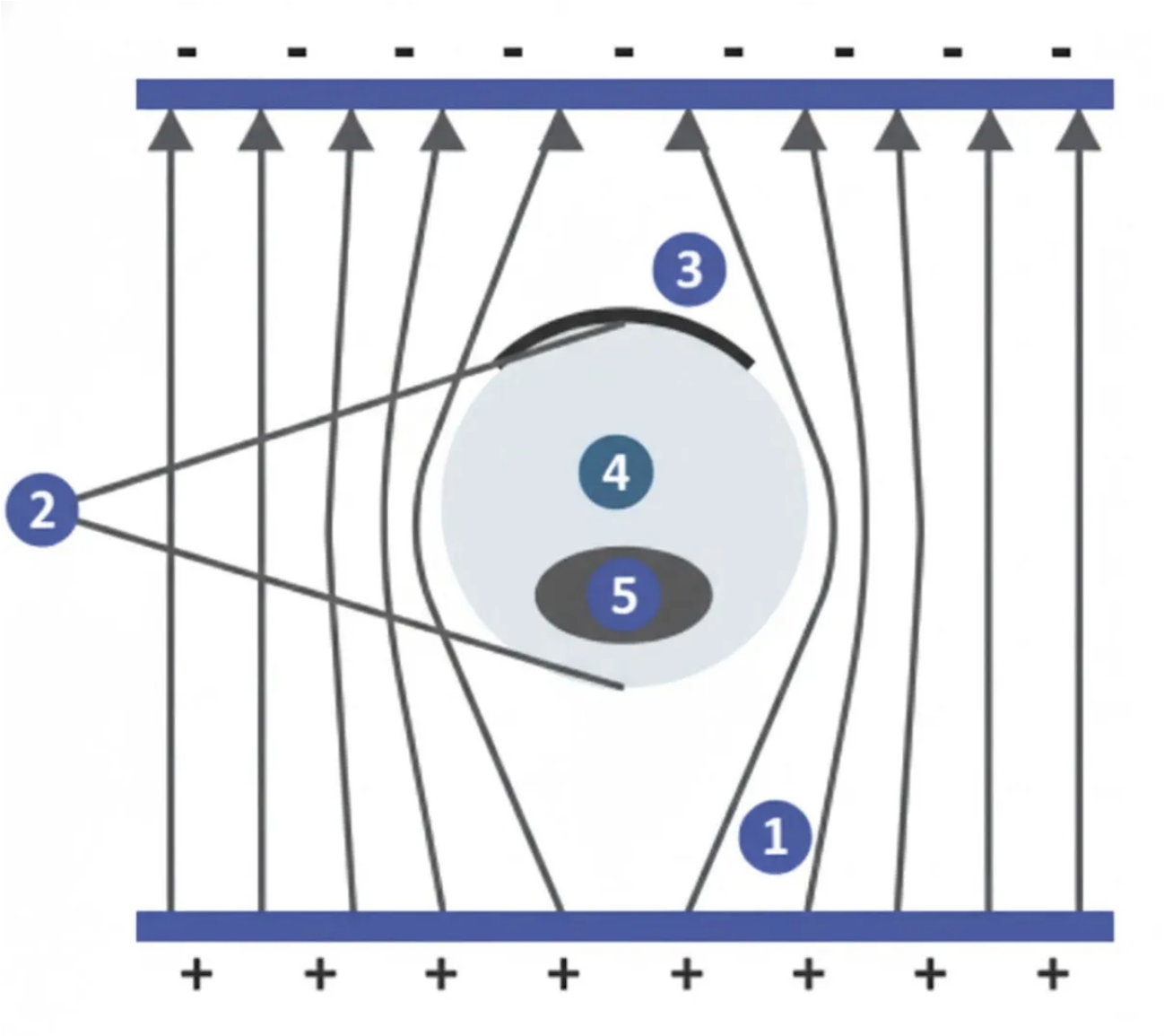
Theory and Method

Electroporation uses an electric field to create transient pores in the cell membrane. During this short window, nucleic acids or other payloads can enter the cell, followed by membrane resealing during recovery. QualiEP™ Adv supports two common pulse strategies:

- Exponential decay pulse: Energy delivery is governed by an RC network. Adjusting capacitance and resistance changes pulse energy and decay profile.
- Square wave pulse: Delivers a more constant field for a controlled duration, often used when protocols specify a fixed pulse length.

Typical workflow

1. Prepare cells and payload in an appropriate electroporation buffer.
2. Load the mixture into a compatible cuvette.
3. Select pulse form (exponential or square), voltage range, and capacitance settings.
4. Set discharge time and interval time, and choose continuous discharge count if required.
5. Apply the pulse, then immediately recover cells in growth media and proceed to culture or analysis.



Based on the visual cues, this diagram illustrates a cell or particle within an electric field, a concept often used in biology and physics to explain processes like Dielectrophoresis or Electroporation.

Here is the breakdown of what each number represents:

1. Electric Field Lines

These lines represent the direction and strength of the electric field. 1 Notice that they move from the positive bottom plate (+) toward the negative top plate (-). The way they curve around the object indicates that the object has different electrical properties (like conductivity or permittivity) compared to the surrounding fluid.

2. Field Distortion / Induced Dipole

The lines labeled "2" highlight how the external field is "bending" as it interacts with the object. This shows that the cell is becoming polarized—meaning the charges inside the cell are shifting, creating a positive side and a negative side (a dipole) in response to the plates.

3. Polarized Membrane "Cap"

This dark, curved section represents the concentration of induced charges at the cell membrane. In high-voltage scenarios, this is often the area where the membrane is most "stressed" by the electric field, which is a key concept in creating pores (electroporation).

4. Cytoplasm (Internal Medium)

This represents the interior environment of the cell. The electrical behavior of the cell depends heavily on the difference between the conductivity of this internal fluid and the external medium.

5. Nucleus or Organelle

This represents an internal structure within the cell. At certain frequencies, the electric field can actually penetrate the outer membrane (4) and interact directly with internal components like the nucleus, which is how researchers can manipulate things inside a cell without breaking it open.

TECHNICAL SPECIFICATIONS

Advanced Electroporator – QualiEP™ Adv Technical Specification

Parameter	Specification
Control Mode	Microcomputer control
Time Constant	Adjustable with RC time constant
Low Voltage Capacitance	25 μF–1575 μF (1 μF steps; 25 μF step recommended)
High Voltage Capacitance	10–60 μF (1 μF steps; 10 μF step recommended); 25 μF, 35 μF, 50 μF, 60 μF listed
Discharge and Interval Time	0.1 ms–999 ms; increment 0.1 ms
Pulse Form	Exponential and square wave
High Voltage Output Voltage	401–3000 V
Low Voltage Output Voltage	50–400 V
Power Supply Voltage	100–240 VAC, 50/60 Hz
Number of Continuous Discharges	1–9

Organism/Cell Type	Pulse (V)	Resistance (Ω)	Capacitance (μF)	Electroporation Cuvette (mm)
E. coli (set 1)	1800	200	25	1
E. coli (set 2)	2500	200	25	2
E. coli (set 3)	3000	200	25	2
A. tumefaciens	2400	200	25	1
P. aeruginosa	2500	200	25	2
S. aureus	2900	100	25	2

Organism/Cell Type	Pulse (V)	Resistance (Ω)	Capacitance (μF)	Electroporation Cuvette (mm)
B. cereus	1000	200	25	2
S. pyogenes	2100	200	50	2
L. plantarum	2000	400	25	2
Eukaryotes				
S. cerevisiae	1500	200	25	2
S. pombe	2300	200	25	2
C. albicans	1500	200	25	2
P. pastoris	2000	200	25	2

Note: Experimental conditions vary between laboratories. The parameters above are for reference only.

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