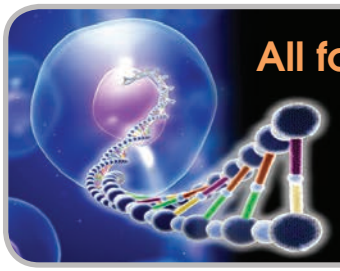
Leading the charge

for all electroporation applications

phone 508.893.8999
toll free 800.272.2775
www.btxonline.com

BTX®

a division of **Harvard Bioscience, Inc.**



All four models feature:

- High-resolution, touch-screen interface on stand-alone instrument
- Advanced safety features to protect against arcing
- Highly accurate pulse delivery
- Unbeatable technical support

Gemini X2

In Vitro Cuvette / 96 Well Applications
In Vivo • *In Utero* • *In Ovo* • Adherent Cell

The Gemini X2 system is designed for researchers who need ultimate experiment flexibility. In one easy setup, square wave and exponential decay waves can be applied to cells in any format. Electroporation of suspension cells can be achieved in cuvettes and 96 well plates. Additionally, the Gemini X2 can be paired with BTX specialty electrodes to deliver genes and drugs *in vivo, in utero, in ovo,* to *ex plant* tissues as well as adherent cells. It incorporates remote operation functionality via footswitch or PC and internal log storage of experiment data for easy optimization, quality control requirements and troubleshooting. The sky is the limit with the Gemini X2 electroporation system.

Gemini X2 Applications

- Gene Delivery
- Drug Delivery
- Gene Therapy
- Vaccine Delivery
- Bacteria Libraries
- siRNA Knockdowns

Gemini SC

In Vitro Cuvettes

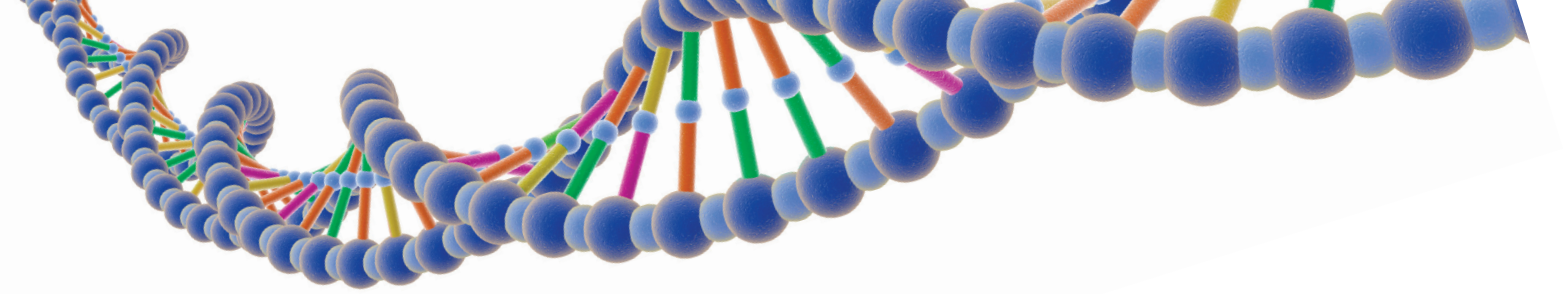
The Gemini SC system is essential for researchers electroporating cells in suspension. In one simple setup, square wave and exponential decay waves can be applied to cells in cuvettes. With a wide range of pulsing parameters, advanced safety features as well as dozens of pre-set protocols, the Gemini SC can be used in any lab requiring efficient cell transfection or transformation without the use of costly reagents. Take control of your electroporation application with the Gemini SC.

Gemini SC Applications

- Gene Delivery
- Drug Delivery
- Bacteria Libraries

Electroporation Cuvettes

- 1 mm, 2 mm and 4 mm Gap Sizes
- Gamma Irradiated for Sterility
- Round Cap for Easy One-Hand Removal
- Comes with Transfer Pipette
- Medical Polycarbonate
- Smooth-Polished Electrodes
- Color-Coded for Easy Identification
- Works with Most Electroporators



AgilePulse™ *In Vivo*

In Vivo

The AgilePulse *In Vivo* system is ideal for researchers requiring robust immune response for vaccine and immunization applications. Electroporation in combination with plasmid injections has shown upwards of 100-fold increase in gene expression, persistence and immunogenicity. Incorporating Pulse Agile technology, or the delivery of short, high-intensity pulses to permeate the cell membrane and low-intensity pulses to further drive DNA uptake, this setup combined with multi-needle array electrodes, will dramatically increase antigen expression. With a wide range of multi-needle arrays incorporating resistance measurement for proper placement, intradermal and intramuscular immunizations can be easily achieved. The AgilePulse *In Vivo* system can increase immune response and shorten immunization schedules. Give your experiment a boost with the AgilePulse *In Vivo* system.

AgilePulse *In Vivo* Applications

- Intradermal DNA Vaccine Delivery
- Intramuscular DNA Vaccine Delivery
- Electrochemotherapy
- Drug Delivery

AgilePulse™ MAX

Large Volume *In Vitro*

The AgilePulse MAX system has made large volume transfection easier than ever. Incorporating Pulse Agile technology, or the delivery of short, high-intensity pulses to permeate the cell membrane and low-intensity pulses to further drive plasmid uptake, this system gently and efficiently transfects up to 10 mls of sample in one run. Increase your cell transfection throughput significantly with the AgilePulse MAX system.

AgilePulse MAX Applications

- B Cell Cloning/Antibody Protein Production
- Gene Delivery
- Drug Delivery
- Large Scale Peptide Production
- Large Scale Replication-Deficient Viruses
- Cancer Immunotherapy

Electroporation Selection Guide

Which electroporator is right for you?

Gemini X2

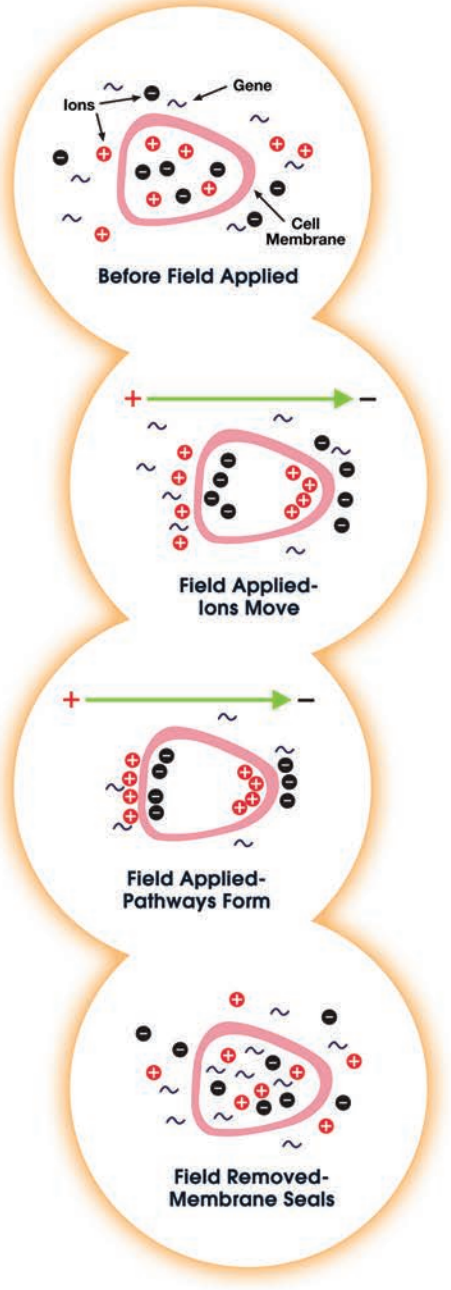
Gemini SC

AgilePulse™ *In Vivo*

AgilePulse™ MAX

Feature	All Cell Electroporation	Suspension Cell Electroporation	*In Vivo* Vaccine Electroporation	Large Volume Electroporation
Square Waveform	●	●	●	●
Multi-Pulsing Square Wave	●	●	●	●
Exponential Decay Waveform	●	●		
Multi-Pulsing Exponential Decay	●			
Resistance/Pulse Monitoring	●	●	●	●
Experiment Log Storage	●		●	●
Preprogrammed Protocols	●	●		
Unlimited Custom Protocol Storage	●	●	●	●
Remote Operation	●		●	●
PC Communications	●			
Electroporation Applications				
In Vitro (Cuvette)	●	●		●
Eukaryotic Cells	●	●	●	●
Prokaryotic Cells	●	●		
In Vivo (Specialty Electrodes)	●		●	
Ex Plant/Tissue Slice (Petri Dish Electrodes)	●			
In Ovo (Genetrodes)	●			
Adherent Cell (Petri Pulser Electrodes)	●			
96 Well (HT Plate Handler/96 Well Plates)	●			
Large Volume (Max 10 ml Chambers)				●
Dermal Immunizations (Multi Needle Array)			●	
Muscle Immunizations (Multi Needle Arrays)			●	
Specifications				
User Interface	Touch Screen	Touch Screen	Touch Screen	Touch Screen
Voltage Range	5 - 3000 V	10 - 3000 V	50 - 1000 V	50 - 1200 V
Pulse Width Range	10 µs - 999 ms	50 µs - 100 ms	5 µs - 10 ms	5 µs - 10 ms
Pulse Interval	100 ms - 30 s	100 ms - 30 s (SW only)	20 µs - 1 s	20 µs - 1 s
Data Export	USB/PC Communication	None	USB Flash Key	USB Flash Key
Dimensions (L x W x H)	12.5 x 11 x 8 in	12.5 x 11 x 8 in	12.6 x 7.9 x 15.7 in	12.6 x 7.9 x 15.7 in
Weight	15 lb	15 lb	25 lb	25 lb
Operating Temperature	10° - 40° C	10° - 40° C	10° - 40° C	10° - 40° C
Mains Voltage	100 - 250 VAC	100 - 250 VAC	100 - 250 VAC	100 - 250 VAC

Unlimited Potential for Cellular Plasmid Delivery



More and more research is being done on the cellular level, and researchers need the tools to be successful in their work. Electroporation is a method of cell transfection/transformation which uses electric fields to cause cells to become temporarily permeable to allow uptake of exogenous molecules, such as DNA, siRNA, proteins or sugars.

This method is so versatile that new applications are constantly being discovered. Harvard Apparatus has opened the door for these researchers with the BTX line of electroporation products. Whether transfecting eukaryotic cells or transforming prokaryotic cells in suspension, in vivo, in ovo, large volume or in adherent or 96 well format, BTX tools are the key to your success.

Harvard Apparatus has developed four revolutionary electroporation systems covering a wide range of applications:

- Mammalian Cell Transfection
- Primary/Stem Cell Transfection
- Bacterial Transformation
- Yeast Transformation
- Adherent Cell Transfection
- Plant Protoplast Fusion
- Intact Plant Transformation
- Insect Transfection
- *In Ovo* transfection
- *In Vivo*/*Ex Vivo* Transfection
- *In Utero* Transfection
- Whole Organism Transfection
- 96 Well Electroporation
- Large Volume Transfection

These applications are far reaching and impact many study areas:

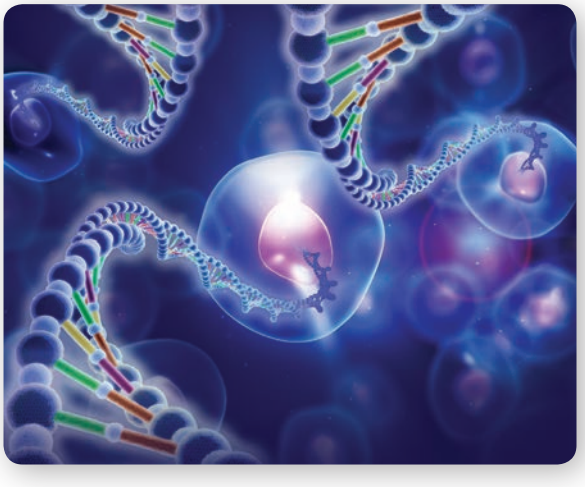
- Gene Delivery
- Drug Delivery
- Gene Transfer
- Protein Incorporation
- *In Vitro* Fertilization
- Neuroscience
- Cloning
- Transgenic Mouse Development
- Sugar Loading
- Designer DNA
- Alphavirus Transfection
- Zinc Finger Delivery
- Genetically Modified Crops
- Immunizations
- cDNA Libraries
- B-Cell Cloning
- Embryo Manipulation
- Drosophila Studies
- Irreversible Electroporation
- Nuclear Reprogramming
- Biofuels
- Blood Brain Barrier Disruption

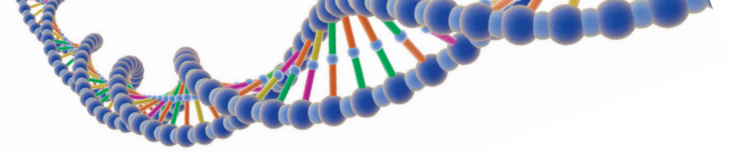
Benefits of Electroporation

Electroporation is highly efficient, non-viral, and utilizes the cells own natural properties, instead of harsh chemicals to initiate cell transfection/transformation.

Electroporation Advantages

- Highly efficient
- Not restricted by size of DNA or plasmid
- No risk of viral infection
- Results are reproducible
- No cytotoxic effects on cells
- Flexibility for use in a wide range of applications
- No incubation time required
- Fast and easy to use





Instruments & Accessories Ordering Information

Order No.	Description
Electroporation Systems	
45-2007	*BTX Gemini X2 Electroporation System includes:* Gemini X2 Generator, Cuvettes - 1 mm, 2 mm, 4mm pack of 30 (10 each), Safety Dome 2 and Cuvette Rack
45-2002	*BTX Gemini SC Electroporation System includes:* Gemini SC Generator, Cuvettes - 1 mm, 2 mm, 4mm pack of 30 (10 each), Safety Dome 1 and Cuvette Rack
45-2008	*BTX Gemini HT Electroporation System includes:* Gemini X2 Generator, Cuvettes - 1 mm, 2 mm, 4mm pack of 30 (10 each), Safety Dome 2, HT 200 Plate Handler, 1 x 2 mm gap HT Plate, 1 x 4 mm HT Plate and Cuvette Rack
45-2001	BTX Gemini SC Generator Only
45-2006	BTX Gemini X2 Generator Only
47-0400N	AgilePulse ID *In Vivo* System includes AgilePulse ID Generator, Electrode Handle and Electrodes: (qty. of 3) 4 x 4 x 2 and (qty. of 3) 6 x 4 x 2 Needle Arrays
47-0401N	AgilePulse ID Generator Only
47-0500N	AgilePulse IM *In Vivo* System includes AgilePulse IM Generator, Electrode Handle and Electrodes: (qty. of 3) 4 x 4 x 5 and (qty. of 3) 6 x 6 x 10 Needle Arrays
47-0501N	AgilePulse IM *In Vivo* Generator Only
47-0200N	AgilePulse MAX System includes Generator, Chamber Stand and 2 x 5 ml Chamber
47-0200N	AgilePulse MAX Generator only
Cuvettes	
45-0124	Cuvette Plus, 1 mm gap, 200 µl, pack of 50, Gray
45-0125	Cuvette Plus, 2 mm gap, 400 µl, pack of 50, Blue
45-0126	Cuvette Plus, 4 mm gap, 800 µl, pack of 50, Yellow
45-0140	Bulk Cuvette, 1 mm gap, 24, pack of 100, Gray Case
45-0141	Bulk Cuvette, 2 mm gap, 24, pack of 100, Blue Case
45-0142	Bulk Cuvette, 4 mm gap, 24, pack of 100, Yellow Case
Hight Throughput Plates (Gemini X2 Use Only)	
45-0462	25-Well Plate, 4 mm gap, 250 µl
45-0463	25-Well Plate, 4 mm gap, 250 µl, pack of 6
45-0466	25-Well Plate, 2 mm gap, 125 µl
45-0467	25-Well Plate, 2 mm gap, 125 µl, pack of 6
45-0450	96-Well Plate, 2 mm gap, 125 µl
45-0452	96-Well Plate, 4 mm gap, 250 µl
Reagents	
45-0802	BTXpress 5 ml
45-0803	BTXpress 5 ml with 2 mm gap, Cuvettes, pack of 50
45-0804	BTXpress 5 ml with 4 mm gap, Cuvettes, pack of 20
45-0805	BTXpress 10 ml
45-0806	BTXpress 10 ml with 2 mm gap, Cuvettes, pack of 50
45-0807	BTXpress 10 ml with 4 mm gap, Cuvettes, pack of 40
47-0002	Cytoporation Media T, 500 ml
47-0003	Cytoporation Media T4, 500 ml
Accessories	
45-0400	HT 100 Plate Handler, Manual
45-0401	HT 200 Plate Handler, Automatic
45-2020	BTX Safety Dome 1
45-2021	BTX Safety Dome 2
45-2030	BTX Gemini X2 Footswitch
45-0208	Cuvette Rack
47-0202N	AgilePulse MAX Pulse Stand
47-0420	AgilePulse *In Vivo* Foot Switch
47-0090	AgilePulse *In Vivo* Electrode Adapter
45-0465	HT 25 Well Adapter Plate
45-0468	Plate Handler Pins, pack of 25
45-0469	Plate Handler Pins, pack of 100
50-12017	Pliers for Plate Handler Removing Pins
45-00012	25 Well Plate Seal
45-00015	96 Well Plate Seal
Cables	
45-0216	Connection Cable, 3 m (10 ft), Banana to Micrograbber
45-0204	Tweezertrode Cable/Single Adapter Cable for Tissue Slice Electrode Positive
45-0503	Mini Micro Grabber Adapter Cables for Tissue Slice Chamber/L Shaped Needle Electrodes
45-0087	Micrograbber to Banana Adapter Set 45-0217
45-2031	BTX USB Cable, 2 m (6.5 ft)
45-2032	BTX USB Cable, 5 m (16.4 ft)
45-0217	Electrode Cable for Flat Electrode, 3 m (10 ft), Banana to Micrograbber
45-0088	Banana Splice F/F Adapter Set, 45-0216/45-0217
45-0090	Adapter Set Banana to Pin Tip
45-0089	Banana to Square Post Adapter Set for 45-0217

Order No.	Description
Specialty Electrodes	
45-0101	Caliper Electrode 1.0 x 1.0 cm
45-0102	Caliper Electrode 2.0 x 2.0 cm and 1.5 x 1.5 cm
45-0103	Microslide 450, 0.5 mm gap, 20 µl, pack of 10
45-0104	Microslide 450-1, 1 mm gap, 40 µl, pack of 10
45-0105	Microslide 453, 3.2 mm gap, 650 µl
45-0106	Microslide 453-10, 10 mm gap, 2.0 ml
45-0107	Meander Fusion Chamber, 0.2 mm gap, pack of 4
45-0108	Flat Electrode/Divergent Field, 1 mm gap (needs 45-0217)
45-0217	Electrode Cable for Flat Electrode, 10 ft, Banana to Micrograbber
45-0109	Flatpack Chambers, 1.83 mm gap, pack of 50
45-0110	Flatpack Chambers, 0.56 mm gap, pack of 50
45-0113	Genetrodes Straight, 5 mm, Gold Tip
45-0160	Genetrodes Straight, 5 mm, Gold Tip Kit
45-0114	Genetrodes Straight, 10 mm, Gold Tip
45-0161	Genetrodes Straight, 10 mm, Gold Tip Kit
45-0115	Genetrodes L-Shape, 5 mm, Gold Tip
45-0162	Genetrodes L-Shape, 5 mm, Gold Tip Kit
45-0116	Genetrodes L-Shape, 3 mm, Gold Tip
45-0163	Genetrodes L-Shape, 3 mm, Gold Tip Kit
45-0117	Genetrodes L-Shape, 1 mm, Gold Tip
45-0164	Genetrodes L-Shape, 1 mm, Gold Tip Kit
45-0203	Genetrodes/Genepaddle Holder with Shaft
45-0216	Genetrodes/Genepaddle Cable, 10 ft, Banana to Micrograbber
45-0122	Genepaddle Electrodes, 3 x 5 mm
45-0169	Genepaddles, 3 x 5 mm Kit
45-0123	Genepaddle Electrodes, 5 x 7 mm
45-0170	Genepaddles, 5 x 7 mm Kit
45-0167	2-Needle Array, 10 mm Kit
45-0205	2-Needle Array Handle, 10 mm (needs 45-0120)
45-0120	2-Needle Array, 10 mm, pack of 6 (needs 45-0205)
45-0168	2-Needle Array, 5 mm Kit
45-0206	2-Needle Array Handle, 5 mm (needs 45-0121)
45-0121	2-Needle Array, 5 mm, pack of 6 (needs 45-0206)
45-0510	Needle L-Shaped Platinum Electrode, 3 mm Kit
45-0509	Needle L-Shaped Platinum Electrode, 3 mm (needs 45-0508)
45-0513	Petri 7 mm Tissue Chamber Kit
45-0505	Petri Dish Tissue Chamber, 5 x 5 mm Kit
45-0504	Petri Dish Tissue Chamber, 5 x 5 mm (needs 45-0216)
45-0506	Petri Dish Tissue Chamber, 15 x 15 mm (needs 45-0216)
45-0507	Petri Dish Tissue Chamber, 15 x 15 mm Kit
45-0100	Petri Dish Electrode, 2 mm gap, 90 mm Well Dish Kit
45-0130	Petri Pulser for 6 Well Plates/35 mm Well Kit
45-0490	Tissue Slice Chamber, 7 x 7 mm Kit
45-0491	Tissue Slice Chamber 7 x 7 mm Dish (needs 45-0492, 45-0503, 45-0204)
45-0492	Tissue Slice Wand (+) 7 mm (needs 45-0491, 45-0503, 45-0204)
45-0500	Tissue Slice Chamber 10 x 10 mm Kit
45-0501	Tissue Slice Chamber 10 x 10 mm Dish (needs 45-0502, 45-0503, 45-0204)
45-0502	Tissue Slice Wand (+) 10 mm (needs 45-0501, 45-0503, 45-0204)
45-0503	Mini Micro Grabber Adapter Cables for Tissue Slice Chamber/L Shaped Needle Electrodes
45-0530	Adherent Cell Electrode, 3 mm gap (needs 45-0204)
45-0531	Adherent Cell Electrode, 3 mm Kit
45-0486	Platinum Tweezertrode, 1 mm diameter Kit
45-0487	Platinum Tweezertrode, 3 mm diameter Kit
45-0489	Platinum Tweezertrode, 5 mm diameter Kit
45-0488	Platinum Tweezertrode, 7 mm diameter Kit
45-0165	Stainless Steel Tweezertrode, 7 mm diameter Kit
45-0118	Stainless Steel Tweezertrode, 7 mm diameter (needs 45-0204)
45-0166	Stainless Steel Tweezertrode, 10 mm diameter Kit
45-0119	Stainless Steel Tweezertrode, 10 mm diameter (needs 45-0204)
45-0524	Platinum Tweezertrode, 1 mm Flat (needs 45-0204)
45-0525	Platinum Tweezertrode, 1 mm Flat Kit
45-0204	Tweezertrode Cable/Single Adapter Cable for Tissue Slice Electrode Positive
Specialty Electrodes (AgilePulse Systems Only)	
47-0090	Electrode Adapter Box for AgilePulse In Vivo
47-0000	Parallel-Needle Array Handle for Ap In Vivo
47-0040	4-Needle Array, 4 mm gap, 2 mm length, AP *In Vivo* (ID)
47-0043	3-Needle Array, 4 mm gap, 3 mm length, AP *In Vivo* (IM)
47-0045	4-Needle Array, 4 mm gap, 5 mm length, AP *In Vivo* (IM)
47-0050	6-Needle Array, 4 mm gap, 2 mm length, AP *In Vivo* (ID)
47-0060	6-Needle Array, 6 mm gap, 2 mm length, AP *In Vivo* (ID)
47-0070	6-Needle Array, 6 mm gap, 10 mm length, AP *In Vivo* (IM)
47-0080	6-Needle Array, 6 mm gap, 12 mm length, AP *In Vivo* (IM)
47-0086	6-Needle Array, 6 mm gap, 16 mm length, AP *In Vivo* (IM)
47-0204N	5 ml Chamber for AgilePulse Max
47-0090	Electrode Adapter Box for AgilePulse *In Vivo*
47-0206	10 ml Chamber for AgilePulse Max