

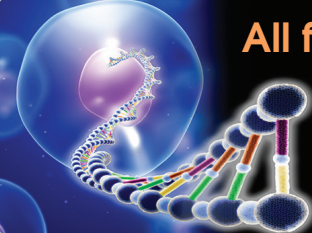


# Leading the charge

for all electroporation applications

phone 508.893.8999  
toll free 800.272.2775  
[www.btxonline.com](http://www.btxonline.com)

**BTX<sup>®</sup>**  
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
- 🔗 Vaccine Delivery
- 🔗 Drug Delivery
- 🔗 Bacteria Libraries
- 🔗 CRISPR/Cas9
- 🔗 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
- 🔗 Comes with Transfer Pipette
- 🔗 Color-Coded for Easy Identification
- 🔗 Gamma Irradiated for Sterility
- 🔗 Medical Polycarbonate
- 🔗 Works with Most Electroporators
- 🔗 Round Cap for Easy One-Hand Removal
- 🔗 Smooth-Polished Electrodes





## 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

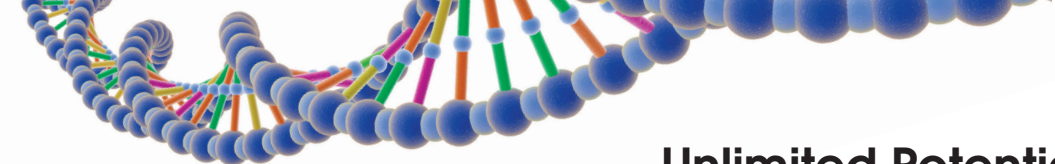
## AgilePulse™ MAX

### Large Volume *In Vitro*

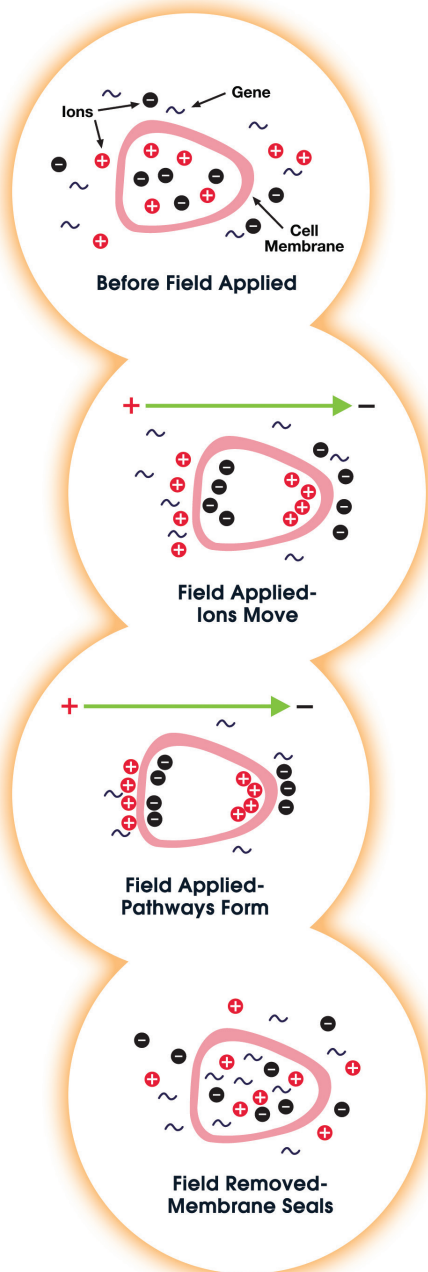
The AgilePulse MAX system has made large volume transfection easier than ever. Incorporating Pulse Agile technology, or the delivery of short, high-intensity pulses to permeate the cell membrane and low-intensity pulses to further drive plasmid uptake, this system gently and efficiently transfects up 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
- Large Scale Peptide Production
- Gene Delivery
- Large Scale Replication-Deficient Viruses
- Drug Delivery
- Cancer Immunotherapy



# 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    | 🔌 Insect Transfection                 |
| 🔌 Primary/Stem Cell Transfection | 🔌 <i>In Ovo</i> transfection          |
| 🔌 Bacterial Transformation       | 🔌 <i>In Vivo/Ex Vivo</i> Transfection |
| 🔌 Yeast Transformation           | 🔌 <i>In Utero</i> Transfection        |
| 🔌 Adherent Cell Transfection     | 🔌 Whole Organism Transfection         |
| 🔌 Plant Protoplast Fusion        | 🔌 96 Well Electroporation             |
| 🔌 Intact Plant Transformation    | 🔌 Large Volume Transfection           |

These applications are far reaching and impact many study areas:

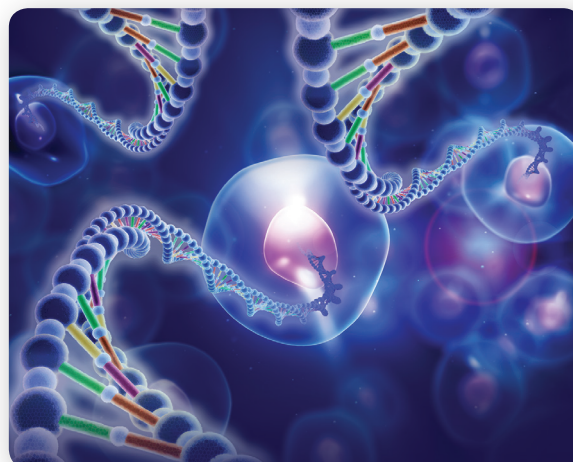
- |                                 |                                  |
|---------------------------------|----------------------------------|
| 🔌 Gene Delivery                 | 🔌 Zinc Finger Delivery           |
| 🔌 Drug Delivery                 | 🔌 Genetically Modified Crops     |
| 🔌 CRISPR/Cas9 Gene Modification | 🔌 Immunizations                  |
| 🔌 Protein Incorporation         | 🔌 cDNA Libraries                 |
| 🔌 <i>In Vitro</i> Fertilization | 🔌 B-Cell Cloning                 |
| 🔌 Neuroscience                  | 🔌 Embryo Manipulation            |
| 🔌 Cloning                       | 🔌 Drosophila Studies             |
| 🔌 Transgenic Mouse Development  | 🔌 Irreversible Electroporation   |
| 🔌 Sugar Loading                 | 🔌 Nuclear Reprogramming          |
| 🔌 Designer DNA                  | 🔌 Biofuels                       |
| 🔌 Alphavirus Transfection       | 🔌 Blood Brain Barrier Disruption |

## Benefits of Electroporation

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

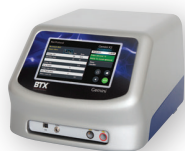
### Electroporation Advantages

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



# Electroporation Selection Guide

Which electroporator is right for you?



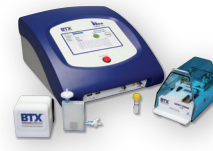
Gemini X2



Gemini SC



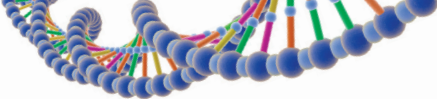
AgilePulse™ In Vivo



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	•			
<b>Electroporation Applications</b>				
<i>In Vitro</i> (Cuvette)	•	•		•
Eukaryotic Cells	•	•	•	•
Prokaryotic Cells	•	•		
<i>In Vivo</i> (Specialty Electrodes)	•		•	
<i>Ex Plant</i> /Tissue Slice (Petri Dish Electrodes)	•			
<i>In Ovo</i> (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)			•	
<b>Specifications</b>				
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 $\mu$ s – 999 ms	50 $\mu$ s – 100 ms	5 $\mu$ s – 10 ms	5 $\mu$ s – 10 ms
Pulse Interval	100 ms – 30 s	100 ms – 30 s (SW only)	20 $\mu$ s – 1 s	20 $\mu$ s – 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





# Instruments & Accessories Ordering Information

Order No.	Description
<b>Electroporation Systems</b>	
<b>45-2040</b>	<b>BTX Gemini X2 Electroporation System includes:</b> Gemini X2 Generator, Cuvettes — 1 mm, 2 mm, 4mm pack of 30 (10 each), X2 Safety Dome and Cuvette Rack
<b>45-2042</b>	<b>BTX Gemini SC Electroporation System includes:</b> Gemini SC Generator, Cuvettes — 1 mm, 2 mm, 4mm pack of 30 (10 each), SC Safety Dome and Cuvette Rack
<b>45-2044</b>	<b>BTX Gemini HT Electroporation System includes:</b> Gemini X2 Generator, Cuvettes — 1 mm, 2 mm, 4mm pack of 30 (10 each), X2 Safety Dome, HT 200 Plate Handler, 1 x 2 mm gap HT Plate, 1 x 4 mm HT Plate and Cuvette Rack
<b>45-2043</b>	BTX Gemini SC Generator Only
<b>45-2041</b>	BTX Gemini X2 Generator Only
<b>47-0400N</b>	AgilePulse ID <i>In Vivo</i> 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
<b>47-0401N</b>	AgilePulse ID Generator Only
<b>47-0500N</b>	AgilePulse IM <i>In Vivo</i> 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
<b>47-0501N</b>	AgilePulse IM <i>In Vivo</i> Generator Only
<b>47-0200N</b>	AgilePulse MAX System includes Generator, Large Volume Chamber Stand, 2 x 5 ml Large Volume Chambers, 1 x 500 ml Cytoporation Medium T, and Cuvettes 4 mm gap pack of 10
<b>47-0201N</b>	AgilePulse MAX Generator only
<b>Cuvettes</b>	
<b>45-0124</b>	Cuvette Plus, 1 mm gap, 200 $\mu$ l, pack of 50, Gray
<b>45-0125</b>	Cuvette Plus, 2 mm gap, 400 $\mu$ l, pack of 50, Blue
<b>45-0126</b>	Cuvette Plus, 4 mm gap, 800 $\mu$ l, pack of 50, Yellow
<b>45-0140</b>	Bulk Cuvette, 1 mm gap, 24, pack of 100, Gray Case
<b>45-0141</b>	Bulk Cuvette, 2 mm gap, 24, pack of 100, Blue Case
<b>45-0142</b>	Bulk Cuvette, 4 mm gap, 24, pack of 100, Yellow Case
<b>Hight Throughput Plates (Gemini X2 Use Only)</b>	
<b>45-0462</b>	25-Well Plate, 4 mm gap, 250 $\mu$ l
<b>45-0463</b>	25-Well Plate, 4 mm gap, 250 $\mu$ l, pack of 6
<b>45-0466</b>	25-Well Plate, 2 mm gap, 125 $\mu$ l
<b>45-0467</b>	25-Well Plate, 2 mm gap, 125 $\mu$ l, pack of 6
<b>45-0450</b>	96-Well Plate, 2 mm gap, 125 $\mu$ l
<b>45-0452</b>	96-Well Plate, 4 mm gap, 250 $\mu$ l
<b>Reagents</b>	
<b>45-0802</b>	BTXpress 5 ml
<b>45-0803</b>	BTXpress 5 ml with 2 mm gap, Cuvettes, pack of 50
<b>45-0804</b>	BTXpress 5 ml with 4 mm gap, Cuvettes, pack of 20
<b>45-0805</b>	BTXpress 10 ml
<b>45-0806</b>	BTXpress 10 ml with 2mm gap, Cuvettes, 2 x pack of 50
<b>45-0807</b>	BTXpress 10 ml with 4 mm gap, Cuvettes, pack of 40
<b>47-0002</b>	Cytoporation Media T, 500 ml
<b>47-0003</b>	Cytoporation Media T4, 500 ml
<b>Accessories</b>	
<b>45-0400</b>	HT 100 Plate Handler, Manual
<b>45-0401</b>	HT 200 Plate Handler, Automatic
<b>45-2020</b>	BTX Safety Dome for Cuvettes, Gemini SC
<b>45-2021</b>	BTX Safety Dome for Cuvettes, Gemini X2
<b>47-0208</b>	Safety Stand for Flatpacks, Gemini X2
<b>45-2030</b>	BTX Gemini X2 Footswitch
<b>45-0208</b>	Cuvette Rack
<b>47-0202N</b>	Stand for 5 mL Chambers, AgilePulse MAX
<b>47-0209</b>	Safety Stand for Flatpacks, AgilePulse MAX
<b>47-0420</b>	AgilePulse <i>In Vivo</i> Foot Switch
<b>45-0465</b>	HT 25 Well Adapter Plate
<b>45-0468</b>	Plate Handler Pins, pack of 25
<b>45-0469</b>	Plate Handler Pins, pack of 100
<b>50-12017</b>	Pliers for Plate Handler Removing Pins
<b>45-00012</b>	25 Well Plate Seal
<b>45-00015</b>	96 Well Plate Seal
<b>Cables</b>	
<b>45-0216</b>	Connection Cable, 3 m (10 ft), Banana to Micrograbber
<b>45-0204</b>	Adapter Cable Set for Tweezertrodes and Tissue Slice Electrode
<b>45-0503</b>	Mini Micro Grabber Adapter Cables for Tissue Slice Chamber, L Shaped Needle Electrodes, and Oocyte Electrode
<b>45-0087</b>	Micrograbber to Banana Adapter Set
<b>45-2031</b>	BTX USB Cable, 2 m (6.5 ft)
<b>45-2032</b>	BTX USB Cable, 5 m (16.4 ft)
<b>45-0217</b>	Electrode Cable for Flat Electrode, 3 m (10 ft), Banana to Banana
<b>45-0088</b>	Banana Splice F/F Adapter Set
<b>45-0090</b>	Adapter Set Banana to Pin Tip
<b>45-0089</b>	Banana to Square Post Adapter Set

Order No.	Description
<b>Specialty Electrodes</b>	
<b>45-0101</b>	Caliper Electrode 1.0 x 1.0 cm
<b>45-0102</b>	Caliper Electrode 2.0 x 2.0 cm and 1.5 x 1.5 cm
<b>45-0103</b>	Microslide 450, 0.5 mm gap, 20 $\mu$ l, pack of 10
<b>45-0104</b>	Microslide 450-1, 1 mm gap, 40 $\mu$ l, pack of 10
<b>45-0105</b>	Microslide 453, 3.2 mm gap, 650 $\mu$ l
<b>45-0106</b>	Microslide 453-10, 10 mm gap, 2.0 ml
<b>45-0107</b>	Meander Fusion Chamber, 0.2 mm gap, pack of 4
<b>45-0108</b>	Flat Electrode/Divergent Field, 1 mm gap (needs 45-0217)
<b>45-0217</b>	Electrode Cable for Flat Electrode, 10 ft, Banana to Micrograbber
<b>47-0206</b>	Flatpack Chambers, 4 mm gap, 10 ml, pack of 10
<b>45-0109</b>	Flatpack Chambers, 1.83 mm gap, 1.5 ml, pack of 50
<b>45-0110</b>	Flatpack Chambers, 0.56 mm gap, 80 $\mu$ l, pack of 50
<b>45-0113</b>	Genetropes Straight, 5 mm, Gold Tip
<b>45-0160</b>	Genetropes Straight, 5 mm, Gold Tip Kit
<b>45-0114</b>	Genetropes Straight, 10 mm, Gold Tip
<b>45-0161</b>	Genetropes Straight, 10 mm, Gold Tip Kit
<b>45-0115</b>	Genetropes L-Shape, 5 mm, Gold Tip
<b>45-0162</b>	Genetropes L-Shape, 5 mm, Gold Tip Kit
<b>45-0116</b>	Genetropes L-Shape, 3 mm, Gold Tip
<b>45-0163</b>	Genetropes L-Shape, 3 mm, Gold Tip Kit
<b>45-0117</b>	Genetropes L-Shape, 1 mm, Gold Tip
<b>45-0164</b>	Genetropes L-Shape, 1 mm, Gold Tip Kit
<b>45-0203</b>	Genetropes/Genepaddle Holder with Shaft
<b>45-0216</b>	Genetropes/Genepaddle Cable, 10 ft, Banana to Micrograbber
<b>45-0122</b>	Genepaddle Electrodes, 3 x 5 mm
<b>45-0169</b>	Genepaddles, 3 x 5 mm Kit
<b>45-0123</b>	Genepaddle Electrodes, 5 x 7 mm
<b>45-0170</b>	Genepaddles, 5 x 7 mm Kit
<b>45-0167</b>	2-Needle Array, 10 mm Kit
<b>45-0205</b>	2-Needle Array Handle, 10 mm (needs 45-0120)
<b>45-0120</b>	2-Needle Array, 10 mm, pack of 6 (needs 45-0205)
<b>45-0168</b>	2-Needle Array, 5 mm Kit
<b>45-0206</b>	2-Needle Array Handle, 5 mm (needs 45-0121)
<b>45-0121</b>	2-Needle Array, 5 mm, pack of 6 (needs 45-0206)
<b>45-0510</b>	Needle L-Shaped Platinum Electrode, 3 mm Kit
<b>45-0509</b>	Needle L-Shaped Platinum Electrode, 3 mm (needs 45-0508)
<b>45-0513</b>	Petri 7 mm Tissue Chamber Kit
<b>45-0505</b>	5mm gap Petri Dish Tissue Chamber, 8 x 5 mm Kit
<b>45-0504</b>	5mm gap Petri Dish Tissue Chamber, 8 x 5 mm (needs 45-0216)
<b>45-0506</b>	15mm gap Petri Dish Tissue Chamber, 10 x 15 mm (needs 45-0216)
<b>45-0507</b>	15mm gap Petri Dish Tissue Chamber, 10 x 15 mm Kit
<b>45-0100</b>	Petri Dish Electrode, 2 mm gap, for 10 cm Dishes
<b>45-0130</b>	Petri Pulser for 6 Well Plates/35 mm Dishes
<b>45-0490</b>	Tissue Slice Chamber, 7 x 7 mm Kit
<b>45-0491</b>	Tissue Slice Chamber 7 x 7 mm Dish (needs 45-0492, 45-0503, 45-0204)
<b>45-0492</b>	Tissue Slice Wand (+) 7 mm (needs 45-0491, 45-0503, 45-0204)
<b>45-0500</b>	Tissue Slice Chamber 10 x 10 mm Kit
<b>45-0501</b>	Tissue Slice Chamber 10 x 10 mm Dish (needs 45-0502, 45-0503, 45-0204)
<b>45-0502</b>	Tissue Slice Wand (+) 10 mm (needs 45-0501, 45-0503, 45-0204)
<b>45-0503</b>	Mini Micro Grabber Adapter Cables for Tissue Slice Chamber, L Shaped Needle Electrodes, and Oocyte Electrode
<b>45-0530</b>	Adherent Cell Electrode, 5 mm gap (needs 45-0204)
<b>45-0531</b>	Adherent Cell Electrode, 5 mm Kit
<b>45-0486</b>	Platinum Tweezertrode, 1 mm diameter Kit
<b>45-0487</b>	Platinum Tweezertrode, 3 mm diameter Kit
<b>45-0489</b>	Platinum Tweezertrode, 5 mm diameter Kit
<b>45-0488</b>	Platinum Tweezertrode, 7 mm diameter Kit
<b>45-0165</b>	Stainless Steel Tweezertrode, 7 mm diameter Kit
<b>45-0166</b>	Stainless Steel Tweezertrode, 10 mm diameter Kit
<b>45-0525</b>	Platinum Tweezertrode, 1 mm Flat Kit
<b>45-0204</b>	Adapter Cable Set for Tweezertrodes and Tissue Slice Electrode
<b>45-0493</b>	Triple Electrode Tweezertrode, 3mm
<b>45-0494</b>	Triple Electrode Tweezertrode, 5mm
<b>45-0496</b>	Oocyte Electrode Kit, Platinum plated, 1 mm gap (with cables)
<b>Specialty Electrodes (AgilePulse Systems Only)</b>	
<b>47-0000</b>	Parallel-Needle Array Handle for Ap <i>In Vivo</i>
<b>47-0040</b>	4-Needle Array, 4 mm gap, 2 mm length, AP <i>In Vivo</i> (ID)
<b>47-0043</b>	3-Needle Array, 4 mm gap, 3 mm length, AP <i>In Vivo</i> (IM)
<b>47-0045</b>	4-Needle Array, 4 mm gap, 5 mm length, AP <i>In Vivo</i> (IM)
<b>47-0050</b>	6-Needle Array, 4 mm gap, 2 mm length, AP <i>In Vivo</i> (ID)
<b>47-0060</b>	6-Needle Array, 6 mm gap, 2 mm length, AP <i>In Vivo</i> (ID)
<b>47-0070</b>	6-Needle Array, 6 mm gap, 10 mm length, AP <i>In Vivo</i> (IM)
<b>47-0080</b>	6-Needle Array, 6 mm gap, 12 mm length, AP <i>In Vivo</i> (IM)
<b>47-0086</b>	6-Needle Array, 6 mm gap, 16 mm length, AP <i>In Vivo</i> (IM)
<b>47-0204N</b>	5 ml Chamber for AgilePulse Max
<b>47-0090</b>	Electrode Adapter Box for AgilePulse <i>In Vivo</i> , for 4mm Banana Cables