

BTX Gemini X²

All Purpose Twin Wave Electroporator



The BTX Gemini X² system, our most advanced electroporation initiative to date, is designed for electroporating all cell types in all forms giving researcher the freedom to design and control. With its twin wave power utilizing square wave and exponential decay waves in a single unit, wider & more accurate voltage and pulse length ranges and multiple pulsing capabilities in both square and exponential decay waveforms, researchers can easily and efficiently electroporate eukaryotic and prokaryotic cell in any way imaginable. Electroporating cells in vitro, and tissues/organs in vivo, in utero, in ovo and ex plate as well as in 96 well formats, researchers need only solve for C with these systems boundless possibilities.

Applications

Cuvette & 96-Well

- In Vitro cell transfection/transformation
- siRNA/RNA/miRNA
- DNA

Specialty Electrodes

- In Vivo Gene & Drug Delivery
- In Ovo Gene & Drug Delivery
- In Utero Gene & Drug Delivery
- Explant Tissue Gene Delivery
- Adherent Cell Transfection

Features & Benefits

Exponential Decay/Square Twin Waveforms

Allows researchers to select which type of waveform they would like to use to transfect eukaryotic cells or transform prokaryotic cells. Typically, eukaryotic cells respond best to square wave pulses while prokaryotic cell respond well to exponential decay wave pulses. Combining these two waveforms gives researchers total flexibility to achieve the highest efficiency for their application.

Simple User Interface

Permits intuitive touch screen or computer controlled protocol programming and execution as well as password protection of protocols and protocol delivery log storage. Logs can be accessed for quality control, optimization or troubleshooting purpose. Each system is programmable and offers unlimited protocol storage as well as dozens of proven pre-set protocols to reduce optimization time.

Pre-Pulse Resistance Measurement

Offers assurance that sample resistance is within acceptable range for electroporation. This feature protects precious sample as well as system component to safeguard against arcing.

Widest Voltage/Pulse length Range Available

Provides researchers with the widest range of voltage options available in the market. The BTX Gemini X² can achieve voltage delivery as low as 5 v and as high as 3000 v in both waveforms in addition to pulse lengths of 10 μ s to 5 s, from delicate in ovo tissue to hearty gram + bacteria, this system can do it all.

Multiple Pulsing Capabilities

Whether pulsing into cuvettes, 96 well plates, or using specialty electrodes for in vivo work, multiple pulsing abilities can mean the difference between success and failure. In both square wave and exponential decay waves, the BTX Gemini X² provides the flexibility.

Highly Accurate Pulsing

Delivers precise voltage, pulse length/time constant, pulse interval and displays the values back to the researcher allowing for visual confirmation of successful electroporation.

Revolutionary Arc Proofing Safety Features - Gives researchers peace of mind knowing that their sample and their systems are safe from troublesome arcing with enhanced 4 way safety checks through the pulsing procedure. Using two separate pre pulse, sample resistance monitoring scans to ensure proper conditions, as well as internal safety features auditing pulse progress in at the component as well as software level, arcing is dramatically decreased.

Specialty Electrodes/HT Compatibility - with functional versatility, researchers have the freedom to bring their creativity to the table. If research requires studying suspension cells, adherent cells, tissues, organs, and even whole animals in utero or in ovo, the BTX Gemini X² has corresponding accessories to ensure success, including the ability to scale up to 96 well format with the BTX HT plate handler.



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BTX Gemini X² Specifications

Square Wave Pulse Ranges	
Voltage Range	
LV Mode	5 to 500 / 1 V res
HV Mode	505 to 3000 / 5 V res
Voltage Accuracy	
LV Mode	5%
HV Mode	5%
Pulse Length Range	
LV Mode	10 μ s to 999 μ s / 1 μ s res, 1 ms to 999 ms / 1 ms res
HV Mode	10 μ s to 600 μ s / 1 μ s
Multiple Pulsing	
LV Mode	1 to 120 (10 per sample)*
HV Mode	1 to 36 (3 per sample)*
Pulse Interval	0.1 s to 10 sec
Capacitance in μF	
LV Mode	3775 μ F
HV Mode	85 μ F
Voltage Droop	20% Load < 1 K Ω , 10% Load > 1 K Ω
Exponential Decay Pulse Ranges	
Voltage Range	
LV Mode	5 to 500 / 1 V res
HV Mode	505 to 3000 / 5 V res
Voltage Accuracy	
LV Mode	5%
HV Mode	5%
Time Constant Range	
LV Mode	1 ms to 5.158 S
HV Mode	0.5 ms to 133.875 ms
Multiple Pulsing	
Multiple Pulsing	1 to 12 (Rint < 100 ohm)*, 1 to 24 (Rint > 100 ohm)*
Pulse Interval	5 to 30 sec
Capacitance in μF	
LV Mode	25 to 3275 μ F / 25 μ F res
HV Mode	10, 25, 35, 50, 60, 75, 85 μ F
Internal Resistance (in parallel with load)	
All Modes	LV 25 to 1575 Ω / 25 Ω res, HV 50 to 1575 Ω / 25 Ω res
Sample Resistance (Load) Exponential Decay or Square	
LV Mode	PL $\leq$ 100ms, load $\geq$ 8-9 Ω , PL > 100ms, load $\geq$ 100 Ω
HV Mode	Load $\geq$ 40 Ω

Other Specifications	
Charging Time	LV < 7 sec, HV < 4 sec
Monitoring	Pulse Voltage, Width, Droop % and Sample Resistance
Display	4.3 in color display
Controls	Touch Screen
Programmability	Storage over 1000 Protocols
Arc Control	Yes
Interlock Switches	Yes
Pre-Pulse Sample Resistance Check	Yes
Pulse Over Current Protection	Yes
PC Control	Yes
PC Communications	Yes
Log Report	Yes
Remote Operation	Yes
Foot Switch Control	Yes
Power Ratings	35W idle and 350 W pulsing
Input Voltage ratings	100 to 240 VAC
CE, ETL Marking, CB Scheme, EuRoHS	Yes
Dimensions (H x W x D)	12.75 x 11.25 x 8.5
Weight	~16 lb
Warranty	2 years
Atmospheric Specifications	
Operating Temperature	4°C to 40°C (40°F to 104°F)
Storage Temperature	-10°C to 70°C (14°F to 158°F)
Operating Humidity	See Chart Below
Storage Humidity	20% to 80% RH, non condensing
Mode of Operation	Continuous
Classification	Class I
Pollution	Degree 1
Installation	Category II
Supplier Name	Harvard Apparatus BTX
Supplier Address	84 October Hill Rd., Holliston, MA 01746
Supplier Phone Number	508-893-8999
Regulatory Certifications	CE, ETL (UL, CSA), WEEE, EU RoHS & CB Scheme
Safety Declarations	ANSI/UL 61010-1:2012 Ed. 3 Rev. 2012 ; CAN/CSA C22.2 No. 61010-1:2012 Ed. 3 ; IEC 61010-1:2001 Ed. 2 Corrigendum 1:2002, Corrigendum 2:2003 ; CENELEC EN 61010-1:2001 ; CB Scheme
EMC Declarations	IEC 61326-1 Ed. 1
FCC	47 CFR Part 15