

# Tweezertrodes™

## USER'S MANUAL

# BTX®

HARVARD APPARATUS

The Electroporation Experts



### INTRODUCTION

The Tweezertrodes™ are reusable, tweezer style electrodes for in vivo, and in utero drug or gene delivery. Tweezertrodes™ consist of a standard 12 cm tweezer that has been modified with stainless steel or platinum circular electrodes at the tip. The gap between the electrode disks may be adjusted from under 1 mm to over 2 cm. Tweezertrodes™ are available in two sizes for stainless steel 10mm and 7mm diameters. Our Platinum Tweezertrodes™ are available in 7mm, 5mm, 3mm and 1mm diameters. Tweezertrodes™ may be cleaned with a mild detergent and sterilized with ethanol or ethylene oxide. These electrodes are connected to an electroporator with the Model 524 Connection Cable, and are compatible with the BTX ECM® 630, 830 and 2001.

**\*Note: For compatibility with older models, call BTX Technical Support.**

**IMPORTANT:** Read all Instructions, Warnings and Precautions prior to use.

FOR RESEARCH PURPOSES ONLY



Order No.	Model	Description
45-0118	520	Tweezertrode Electrode, 7 mm Diameter
45-0165	520KIT	Tweezertrode Kit, 7mm, includes cable
45-0119	522	Tweezertrode Electrode, 10 mm Diameter
45-0166	522KIT	Tweezertrode Kit, 10 mm, includes cable
45-0486		Platinum Tweezertrode, 1 mm Diameter, includes cables
45-0487		Platinum Tweezertrode, 3 mm Diameter includes cables
45-0489		Platinum Tweezertrode, 5 mm Diameter includes cables
45-0488		Platinum Tweezertrode, 7 mm Diameter includes cables
45-0204		Tweezertrode Cables

## GENERAL INFORMATION

### Warranty

BTX/Harvard Apparatus warranties this BTX Tweezertrodes™ for a period of 90 days from date of purchase. At its option, BTX/Harvard Apparatus will repair or replace the item if it is found to be defective as to workmanship or material. This warranty does not extend to damage resulting from misuse, neglect, or abuse, normal wear and tear, or accident. This warranty extends only to the original customer purchase.

**IN NO EVENT SHALL HARVARD APPARATUS BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.** Some states do not allow exclusion or limitation of incidental or consequential damages so the above limitation or exclusion may not apply to you. **THERE ARE NO IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE, OR OF ANY OTHER NATURE.**

Some states do not allow this limitation on an implied warranty, so the above limitation may not apply to you. If a defect arises within the 90 day warranty period, promptly contact: **BTX/Harvard Apparatus, 84 October Hill Road, Holliston, Massachusetts 01746-1388** using our toll free number **1-800-272-2775 (Outside the U.S. call 1-508-893-8999)**. Goods will not be accepted for return unless an RMA (Return Materials Authorization) number has been issued by our customer service department. The customer is responsible for shipping charges. Please allow a reasonable period of time for completion of repairs or replacement and return. If the unit is replaced, the replacement unit is covered only for the remainder of the original warranty period dating from the purchase of the original device. This warranty gives you specific rights, and you may also have other rights which vary from state to state.

**Note:** BTX electrodes are not recommended for use with power supplies or cables from other manufacturers. Such use is completely at the customer's own risk as it may result in damage, create unsafe conditions and will immediately void the 90 day warranty.

**IMPORTANT:** Read all Instructions, Warnings and Precautions prior to use.

### Technical & Customer Service

BTX® is the ultimate resource for technical information on the use of high voltage bacterial transformation and general electroporation of molecules and drugs into tissue. We constantly track and monitor scientific publications in this area. Our Technical Service group extracts and enters pertinent information, such as results and parameters from these papers into a Protocol database. This database is available via the BTX website. Please visit [www.btxonline.com](http://www.btxonline.com). For technical assistance, additional information or an inquiry/request for repair service, contact BTX/Harvard Apparatus Technical Support/Customer Service Group at:

**BTX®**

**A Division of Harvard Apparatus**

**84 October Hill Road**

**Holliston, MA 01746-1388 U.S.A.**

**Toll Free: 1-800-272-2775 (U.S. only)**

**Phone: 1-508-893-8999**

**Fax: 1-508-429-5732**

**E-mail: [techsupport.btx@harvardapparatus.com](mailto:techsupport.btx@harvardapparatus.com)**

**Internet: [www.btxonline.com](http://www.btxonline.com) (click on customer service)**

If outside the United States and Canada: call **1-508-893-8999** or contact your nearest BTX Distributor. A complete list of distributors is on our website.

## GENERAL SAFETY INFORMATION

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. To avoid potential hazard, use this product only as specified. Only qualified BTX personnel should perform service procedures.

### To Prevent Hazard or Injury:

#### ARCING CAN OCCUR AT HIGH VOLTAGES

An unfavorable combination of parameters such as high voltage settings and a small sample volume with a highly conductive medium might lead to flashover between the electrodes (ARC) and/or explosive evaporation of the medium. Reduce voltage or pulse length to avoid repeating this condition.

#### DO NOT OPERATE WITH SUSPECTED FAILURES

If you suspect there is damage to the product, have it inspected by qualified BTX service personnel.

#### DO NOT CONTACT ELECTRODES

To avoid fire or shock hazard, observe all ratings and markings on the product or in this manual before using the device.

#### AVOID EXPOSURE TO CONTACT

Do not insert fingers or try to remove electrode or sample during pulsing sequence.

#### WEAR PROPER EYE PROTECTION DURING ELECTROPORATION

#### DO NOT OPERATE IN AN EXPLOSIVE ENVIRONMENT

#### DO NOT OPERATE IN WET/DAMP CONDITIONS

### Safety Terms and Symbols:

Terms that appear in this manual:



**WARNING.** Warning statements identify conditions or practices that could result in injury or loss of life.



**CAUTION.** Caution statements identify conditions or practices that could result in damage to these products or other property.

Symbols that may appear on the products:



Danger  
High  
Voltage



Attention  
Refer to  
Manual



Protective  
(Earth)  
Terminal



Functional  
Ground  
Terminal

# Tweezertrodes™

## OPERATION: GETTING STARTED



### WARNING HIGH VOLTAGE

Make sure the BTX electroporator is switched off before continuing.

1. Attach the Model 524 Tweezertrodes™ Connection Cable to the electrode base of the Tweezertrodes™ then plug the banana cable into the voltage output of the BTX electroporator. If using the Enhancer 3000® attach the cables to the Enhancer and then attach the cables from the Enhancer to the Generator. Refer to the Enhancer 3000® for instructions for use.
2. Following instructions for the BTX electroporator set the appropriate parameters on the generator.
3. Prepare tissue and sample for electroporation. Grasp the tissue between the electrodes and measure the inter-electrode distance. Adjust generator settings if necessary. Inject the sample into the tissue.
4. Deliver the electroporation pulse(s) to the sample.
5. Remove the electrodes carefully and prepare for the next experiment.

## APPENDIX A: SPECIFICATIONS

### Tweezertrodes™ Electrical & Technical Specifications

#### Standard Capabilities\*:

Voltage Range	0 to 200 VDC (Do not use AC current)
Pulse Length Range	1 µsec to 200 msec
Pulse Number Range	1 to 99 (depending on voltage)
Operating Temperature	5° to 40°C
Intended Use	Indoor use only
Relative Humidity	20 to 80%
Maximum Altitude	2,000 m (6,562 ft)
Pollution Degree	II
Insulation Category	CAT I

#### Physical Characteristics:

Order No.	Electrode Length:	Electrode Diameter:	Electrode Materials:
45-0118	12 mm	7 mm	Stainless Steel
45-0119	12 mm	10 mm	Stainless Steel

#### Compatibility:

Generators	ECM® 630, 830 and 2001
Monitoring	The Enhancer 3000® Monitoring System recommended

\*Depending on buffer composition and generator capability

## APPENDIX B: REPLACEMENT PARTS

Order No.	Model	Description
45-0165	520KIT	Tweezertrode Kit, 7mm, includes cable
45-0118	520	Tweezertrode Electrode, 7 mm Diameter
45-0119	522	Tweezertrode Electrode, 10 mm Diameter
45-0166	522KIT	Tweezertrode Kit, 10 mm, includes cable
45-0204	524	Tweezertrode Connection Cable
45-0059	ENHANCER3000SC	The Enhancer 3000® Monitoring System
45-0486		Platinum Tweezertrode, 1 mm Diameter, includes cables
45-0487		Platinum Tweezertrode, 3 mm Diameter
45-0488		Platinum Tweezertrode, 7 mm Diameter
45-0489		Platinum Tweezertrode, 5 mm Diameter
45-0204		Tweezertrode Cables

## APPENDIX C: TROUBLESHOOTING

Please contact BTX Technical Service at any of the numbers listed below in the event of any failure.

#### BTX®

#### A Division of Harvard Apparatus

84 October Hill Road

Holliston, MA 01746-1388 U.S.A.

Toll Free: 1-800-272-2775 (US only)

Phone: 1-508-893-8999

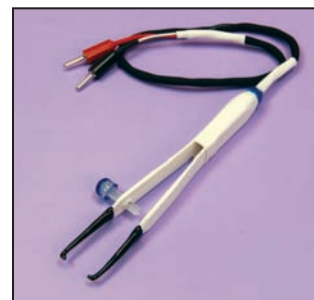
Fax: 1-508-429-5732

E-mail: techsupport.btx@harvardapparatus.com

Internet: www.btxonline.com (click on customer service)



Tweezertrode™



Platinum Tweezertrode™

## CAUTION

FOR RESEARCH USE ONLY  
NOT FOR CLINICAL  
USE ON PATIENTS

# WEEE/RoHS Compliance Statement

## EU Directives WEEE and RoHS

To Our Valued Customers:

We are committed to being a good corporate citizen. As part of that commitment, we strive to maintain an environmentally conscious manufacturing operation.

The European Union (EU) has enacted two Directives, the first on product recycling (Waste Electrical and Electronic Equipment, WEEE) and the second limiting the use of certain substances (Restriction on the use of Hazardous Substances, RoHS). Over time, these Directives will be implemented in the national laws of each EU Member State.

Once the final national regulations have been put into place, recycling will be offered for our products which are within the scope of the WEEE Directive. Products falling under the scope of the WEEE Directive available for sale after August 13, 2005 will be identified with a "wheelie bin" symbol.

Two Categories of products covered by the WEEE Directive are currently exempt from the RoHS Directive – Category 8, medical devices (with the exception of implanted or infected products) and Category 9, monitoring and control instruments. Most of our products fall into either Category 8 or 9 and are currently exempt from the RoHS Directive. We will continue to monitor the application of the RoHS Directive to its products and will comply with any changes as they apply.



- **Do Not Dispose Product with Municipal Waste**
- **Special Collection/Disposal Required**

**BTX**<sup>®</sup>

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