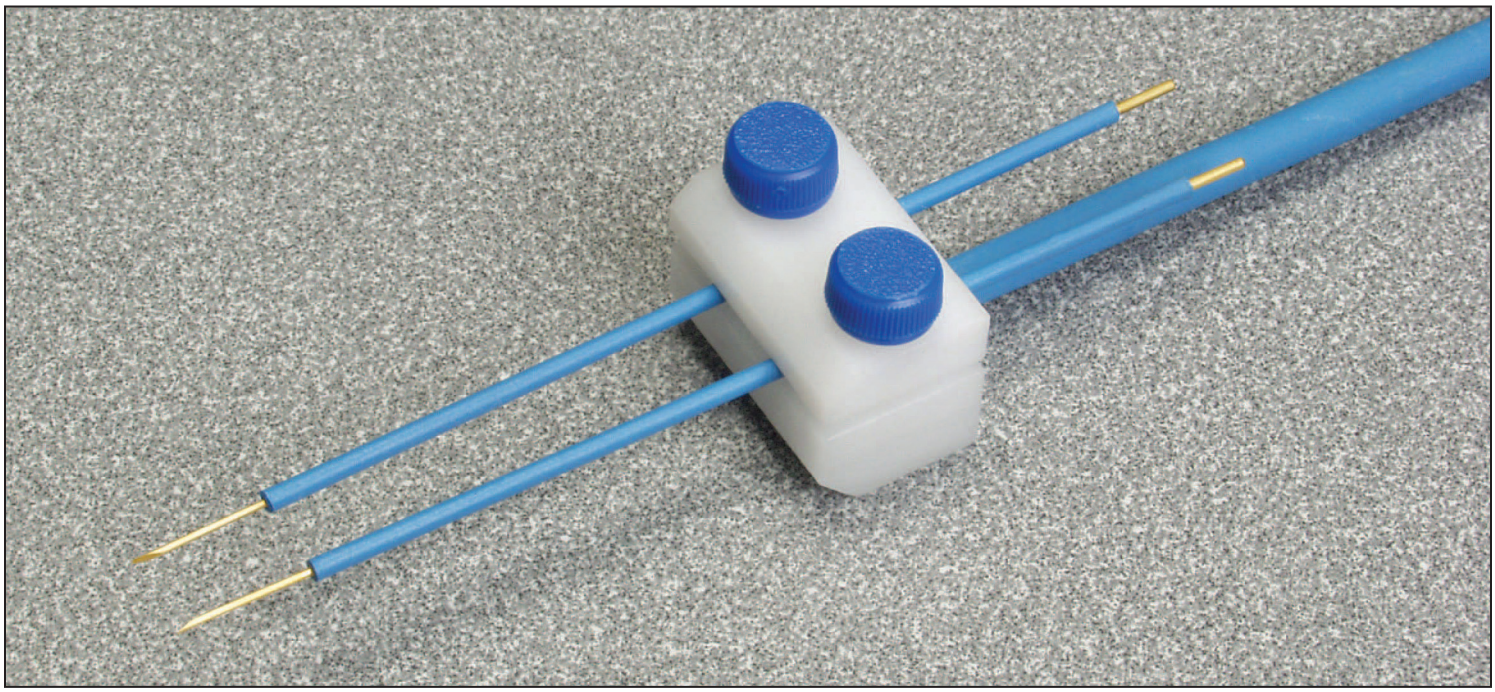
Genetrodes™

USER'S MANUAL

BTX®
HARVARD APPARATUS
The Electroporation Experts



INTRODUCTION

The BTX Genetrodes™ are needle-style reusable electrodes that are used for a variety of applications. Genetrodes™ come in five models, with each model consisting of a pair of electrodes. The Model 508 and 510 Genetrodes™ are straight electrodes with gold tips. The Model 512, 514, and 516 Genetrodes™ are bent L-shaped electrodes with gold tips. These electrodes are connected to a Micrograbber Connection Cable (45-0216) which interfaces with a BTX electroporator.

The Genetrodes™ are positioned in parallel at a predetermined gap within a tissue using the Model 515 Genetrode™ Holders.

Genetrodes™ may be cleaned with a mild detergent and sterilized with ethanol or ethylene oxide. Properly maintained Genetrodes™ have a life span of approximately 1500+ pulses, and are compatible with the ECM® 630, 830 and 2001.

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

FOR RESEARCH PURPOSES ONLY

Order No.	Model	Description
45-0113	508	Genetrode, Straight, 5 mm Gold Tip
45-0160		Genetrode Kit, Straight, 5 mm Gold Tip with holder and cables
45-0114	510	Genetrode, Straight, 10 mm Gold Tip
45-0161		Genetrode Kit, Straight, 10 mm Gold Tip with holder and cables
45-0115	512	Genetrode, L-Shaped, 5 mm Gold Tip
45-0162		Genetrode Kit, L-Shaped, 5 mm Gold Tip with holder and cables
45-0116	514	Genetrode, L-Shaped, 3 mm Gold Tip
45-0163		Genetrode Kit, L-Shaped, 3 mm Gold Tip with holder and cables
45-0117	516L	Genetrode, L-Shaped, 1 mm Gold Tip
45-0164		Genetrode Kit, L-Shaped, 1 mm Gold Tip with holder and cables
45-0203	515	Genetrode Holder

GENERAL INFORMATION

Warranty

BTX/Harvard Apparatus warranties this BTX Genetrodes™ 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 cells. 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. 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
Internet: 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:

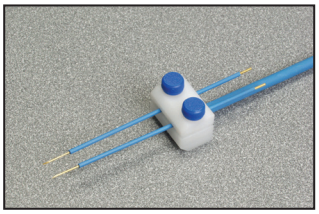
Danger High Voltage

Attention Refer to Manual

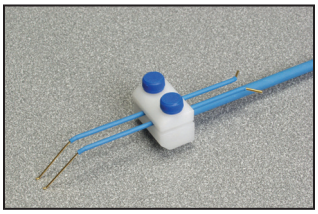
Protective (Earth) Terminal

Functional Ground Terminal

CAUTION
FOR RESEARCH USE ONLY
NOT FOR CLINICAL
USE ON PATIENTS



Straight Electrode™



L-Shaped Electrode™

OPERATION: GETTING STARTED

WARNING HIGH VOLTAGE

Make sure the BTX electroporator is switched off before continuing.

1. Using the Model 515 genetrode holder, loosen the two plastic screws and separate the top half of the positioning plate from the holder. Place the pair in pre-determined slots based on the necessary gap distance. The electrodes should extend from the holder in the opposite direction of the holder handle. Secure the electrodes by reassembling the holder and tightening the two screws.
2. Connect the red and black terminal ends of the micro-grabber cable (MA1 45-0216) to the gold plated electrode leads of the Genetrodes™.
3. Push the banana plugs of the cable into the voltage output of the BTX electroporator.
4. Prepare tissue and sample for electroporation. Apply sample to tissue just before electroporation.
5. Following instructions for the BTX Pulse Generator, set the appropriate parameters on the generator.
6. **Sharp:** Insert the Genetrode into the tissue, either independently or with the Model 515 Genetrode Holder. Maintain appropriate gap width. Secure if necessary.
7. **Blunt:** Place genetrodes on either side of the target tissue. Secure with Model 515 Genetrode holder.
8. Deliver the electroporation pulse(s) to the sample.
9. Remove the electrodes carefully and prepare for the next experiment.

APPENDIX A: SPECIFICATIONS

Genetrodes™ Electrical & Technical Specifications

Standard Capabilities*:

Voltage Range	0 to 200 VDC
Pulse Length/Time Constants Range	1 µsec to 99 msec
Pulse Number Range	1 to 99 (depending on voltage)
Operating Temperature	5º to 40ºC
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
Genetrode Holder Gap	1 to 10 mm
Electrode Tips	All electrode tips are gold plated and 0.5 mm in diameter

Physical Characteristics:

Model	Electrode Length	Tip Configuration	Shaft Configuration
508	5 mm	Sharp	Straight
510	10 mm	Sharp	Straight
512	5 mm	Blunt	L-Shaped
514	3 mm	Blunt	L-Shaped
516	1 mm	Blunt	L-Shaped

Compatibility:

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

Depending on buffer composition and generator capability

APPENDIX B: REPLACEMENT PARTS

Order No.	Model	Description
45-0113	508	Genetrode, Straight, 5 mm Gold Tip
45-0160	508KIT	Genetrode Kit, Straight, 5 mm Gold Tip with holder and cables
45-0114	510	Genetrode, Straight, 10 mm Gold Tip
45-0161	510KIT	Genetrode Kit, Straight, 10 mm Gold Tip with holder and cables
45-0115	512	Genetrode, L-Shaped, 5 mm Gold Tip
45-0162	512KIT	Genetrode Kit, L-Shaped, 5 mm Gold Tip with holder and cables
45-0116	514	Genetrode, L-Shaped, 3 mm Gold Tip
45-0163	514KIT	Genetrode Kit, L-Shaped, 3 mm Gold Tip with holder and cables
45-0117	516L	Genetrode, L-Shaped, 1 mm Gold Tip
45-0164	516KIT	Genetrode Kit, L-Shaped, 1 mm Gold Tip with holder and cables
45-0203	515	Genetrode Holder
45-0059	VIP3000SC	The Enhancer 3000® Monitoring System
45-0216		Connection Cable, Banana Plug to Micrograbber, 3.1 m (10 ft) System

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)

APPENDIX D: MAINTENANCE

WARNING

Do not attempt maintenance while the Genetrodes are connected to the pulse generator. Clean the Genetrode Holder and the gold plated electrode base of the Genetrodes with a soft cloth or tissue. If necessary, moisten the cloth or tissue with a dilute detergent solution. Clean the Genetrode tips between experiments by washing with a mild detergent using a cloth or soft bristled brush. Alternatively, the Genetrode tips can be placed into an ultrasonic water bath and cleaned with mild detergent under sonication.

WEEE/RoHS Compliance Statement

EU Directives WEEE and RoHS

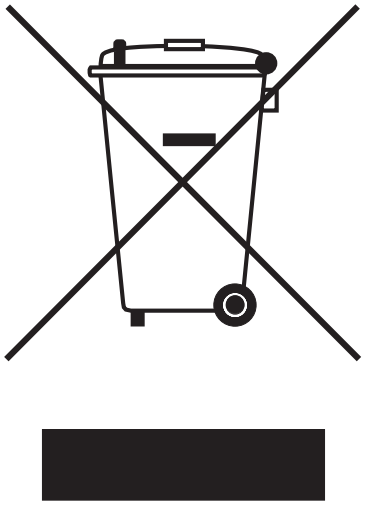
To Our Valued Customers:

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**

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