ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

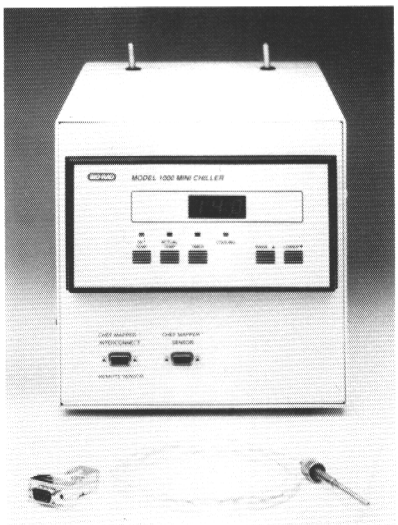
Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Find the *Bio-Rad Buffer* at our website: ***Click HERE***



Model 1000 Mini Chiller

Instruction Manual

Catalog Numbers 170-3654, 170-3655, and 170-3688

For Technical Service Call
1-800-4BIORAD
(1-800-424-6723)

BIO-RAD

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Warranty

Bio-Rad Laboratories Model 1000 Mini Chiller is warranted against defects in materials and workmanship for 1 year. If any defects occur in the instrument during this warranty period, Bio-Rad Laboratories will repair or replace the defective parts free. The following defects are specifically excluded:

1. Defects caused by improper operation.
2. Repair or modification performed by anyone other than Bio-Rad Laboratories or authorized agent.
3. Use of fittings or spare parts supplied by anyone other than Bio-Rad Laboratories or authorized agent.
4. Damage caused by accident or misuse.
5. Corrosion caused by improper buffer or solvent.

The following components are not covered under warranty:

1. Fuses
2. Tubing

Note: There are no user-serviceable parts or components inside the unit. Unauthorized service or repair may void the warranty.

For any inquiry regarding instrument operation, call Bio-Rad Technical Service at 1-(800) 4BIORAD, or contact your local representative.

For any request for repair service, determine the model number and serial number of your instrument and in the U. S. call Bio-Rad Instrument Service at 1-(800) 876-7614

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Table of Contents

		Page
Section 1	**General Information**	**1**
Section 2	**Specifications**	**2**
Section 3	**Safety Information**	**2**
Section 4	**Maintenance**	**2**
Section 5	**General Instructions**	**2**
5.1	Installation	2
5.2	External Temperature Probe	4
5.3	Operation	4
5.4	Preset Mini Chiller Shutdown	5
Section 6	**Troubleshooting Guide**	**6**
Section 7	**Main Switch Fuse Check**	**7**

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Section 2
Specifications

Model 1000 Mini Chiller

Chassis	aluminum
Dimensions	42(L) x 23(W) x 24(H) cm
Weight	14 kg
Compressor	1/12 HP
Refrigerant	CFC 12
Heat exchanger	stainless steel
Operating range	5-25° C
Cooling rate (pre-cool)	0.75° C/minute from ambient to 14° C
Cooling capacity (input power)	75 watts at 14° C
Fuse (in main power switch)	5 Amp Slo-Blow
Operating voltage:	**Catalog number:**
120 VAC/60 Hz	170-3654
220/240 VAC/50 Hz	170-3655
100 VAC/50 Hz	170-3688

Section 3
Safety Information

The Model 1000 Mini Chiller is operated in conjunction with an electrophoresis apparatus connected to a high voltage power supply. Although those components of the chiller which are in contact with the electrically charged buffer are electrically isolated, certain precautions should be taken to eliminate electric shock hazard.

1) The power supply should be off when connecting or disconnecting tubing.
2) The tubing must be firmly seated against the rubber grommets on the FLOW IN and FLOW OUT ports to prevent accidental contact with the metal tubing of the heat exchanger.
3) The safety interlock of the electrophoresis chamber lid should never be bypassed to permit operation of the instrument without the lid.

Section 4
Maintenance

When the Model 1000 Mini Chiller will not be used for an extended period of time, rinse the heat exchanger throughly with distilled water to remove all traces of electrophoresis buffer. Drain the residual water from the heat exchanger, and dry it with laboratory air.

Section 5
General Instructions

5.1 Installation

The Model 1000 Mini Chiller is supplied with two 2 foot lengths of 1/4" tubing, two 1/4" tubing clamps, and two 3/8" to 1/4" reducers. Bio-Rad recommends that the chiller be prepared for installation as follows:

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Section 1
General Information

The Model 1000 Mini Chiller has been specifically designed as a stand alone, portable refrigerated apparatus for use with the CHEF-DR® II and CHEF Mapper™ pulsed field instruments. Electrophoresis buffer is circulated from the electrophoresis chamber by the variable speed pump, cooled directly by the liquid refrigerant in a heat exchanger within the Model 1000 Mini Chiller, and returned to the electrophoresis chamber. The heat exchanger is electrically isolated from the chassis, compressor, and plumbing to eliminate electrical shock hazard.

The chiller maintains a constant buffer temperature typically within 0.3° C of the set temperature (after stabilization) in an operating range of 5-25° C for a total buffer capacity of 2.2 liters at a flow rate of 1.0 liter/minute. Maximum buffer cooling capacity is 75 watts (255 BTU) of input power at a set temperature of 14° C.

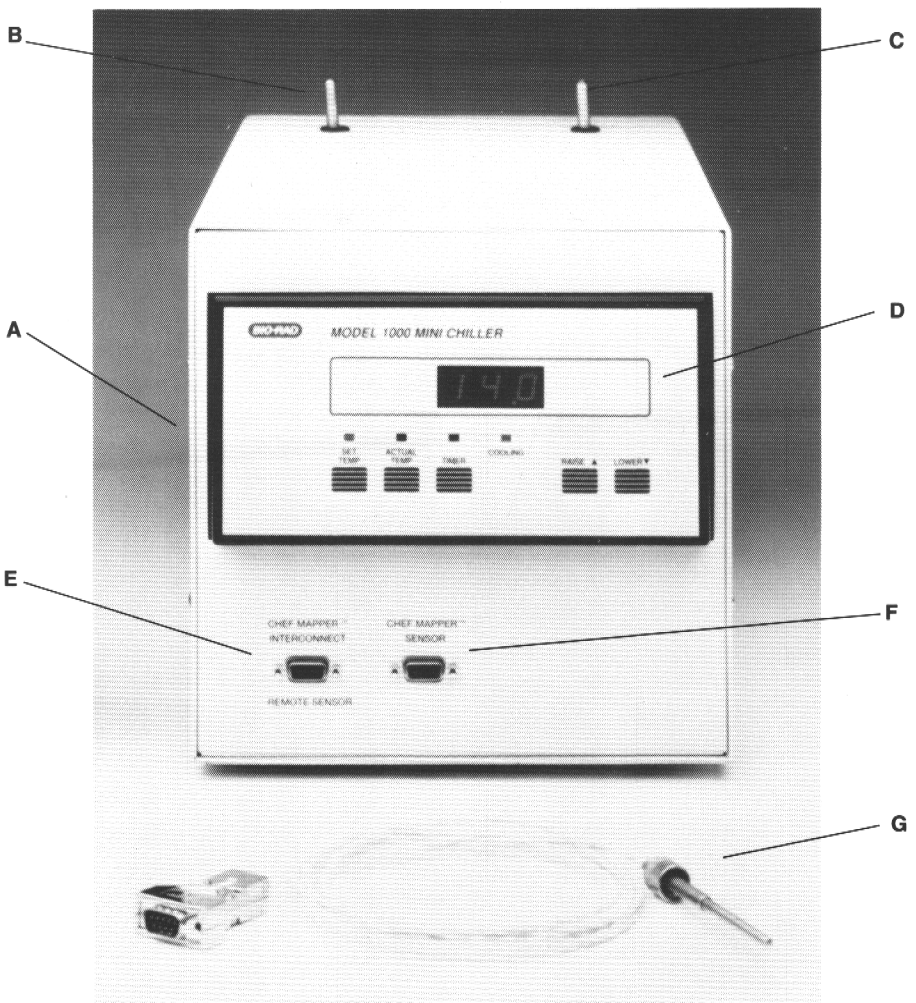


Fig. 1. Model 1000 Mini Chiller. A. Main power switch and fuse (rear of unit). **B.** FLOW IN port. **C.** FLOW OUT port. **D.** Control panel. **E.** REMOTE SENSOR/CHEF MAPPER INTERCONNECT connector. **F.** CHEF MAPPER SENSOR connector. **G.** External temperature probe.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5.2 External Temperature Probe

The external temperature probe (catalog number 170-3665; see Figure 1G) monitors buffer temperature in the electrophoresis chamber through a plastic fitting located in the lid.

Note: A hole must be drilled in the lid of CHEF-DR II electrophoresis chambers for placement of the plastic fitting. A user-installed kit containing complete instructions and the plastic fitting is available to CHEF-DR II owners free of charge from Bio-Rad Technical Service by calling 1-800-4BIORAD.

Buffer temperature is automatically monitored at the FLOW OUT port (Figure 1C) of the Model 1000 Mini Chiller by the internal temperature sensor, but if the optional external temperature probe is attached, buffer temperature will be automatically monitored at the external probe. There are two 9-pin connectors on the front of the chiller, and connection of the external temperature to these connectors is dependent upon the model of CHEF instrument.

Note: Typically, there will be a difference of approximately 2-3° C between the actual buffer temperature monitored at the internal temperature sensor in the Model 1000 Mini Chiller, and the actual buffer temperature in the electrophoresis chamber. This difference can be observed by placing a thermometer in the electrophoresis chamber during the gel run. This difference can be compensated by reducing the set temperature of the Mini Chiller accordingly. **No compensation for this temperature difference is necessary when the external temperature probe is used since the external probe becomes the point of temperature control.**

For CHEF-DR II System

Attach the external temperature probe to the left 9-pin connector (labeled REMOTE SENSOR/CHEF MAPPER INTERCONNECT; Figure 1E). Loosen the sealing nut of the plastic fitting in the lid of the electrophoresis chamber, place the probe into the plastic fitting until the tip is immersed in the gel buffer, and gently tighten the sealing nut to hold the probe in place.

For CHEF Mapper and CHEF Mapper XA Systems

Attach the external probe to the right 9-pin connector (labeled CHEF MAPPER SENSOR; Figure 1F). Loosen the sealing nut of the plastic fitting in the lid of the electrophoresis chamber, place the probe into the plastic fitting until the tip is immersed in the gel buffer, and gently tighten the sealing nut to hold the probe in place. Attach the CHEF Mapper interconnect cable (from the CHEF Mapper power module; see CHEF Mapper manual) to the left connector (labeled REMOTE SENSOR/CHEF MAPPER INTERCONNECT; Figure 1E).

Call Bio-Rad Technical Service for information regarding the compatability of the Model 1000 Mini Chiller with other pulsed field electrophoresis systems.

5.3 Operation

After the Model 1000 Mini Chiller has been connected, the following steps should be followed for optimal operation.

1) Switch on the recirculating pump, and adjust flow rate to 1.0 liter/minute.

2) Switch on the Model 1000 Mini Chiller (main power switch is on the back panel of the unit). The temperature display will read 35.0, indicating that the unit is on (Figure 3A), and the red light above SET TEMP will illuminate (Figure 3B).

3) Enter the desired run temperature (14° C is recommended) by pressing LOWER (Figure 3G) until the desired number is reached.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

1) Attach one of the 2 foot lengths of 1/4" flexible tubing to the FLOW IN port (Figure 1B) and attach the other length to the FLOW OUT port (Figure 1C) of the chiller. Be sure that the tubing is firmly seated against the rubber grommet to prevent accidental contact with the metal heat exchanger, and avoid putting undue stress on the ports. If the tubing ever needs to be removed, slit the tubing with a sharp knife or razor blade, rather than pulling it off.

2) Secure one 1/4" clamp onto the end of each length of tubing attached to the Model 1000 Mini Chiller. The clamp must be secure to prevent air leakage into the buffer recirculation system.

3) Insert one 3/8" to 1/4" reducer into the other end of each length of tubing.

The Model 1000 Mini Chiller can now be added to the CHEF buffer circulation system as follows (see Figure 2):

1) Attach the buffer outflow tube (from the T-connector of the electrophoresis chamber) to the reducer on the length of tubing attached to the FLOW IN port. The maximum total recommended length of tubing from the T-connector to the FLOW IN port is 4 feet.

2) Attach the length of tubing from the FLOW OUT port of the chiller to the inflow port of the recirculating pump.

3) The maximum total recommended length of tubing from the outflow port of the recirculating pump to the electrophoresis chamber is 4 feet. Cooling capacity and efficiency will increase if shorter overall lengths of tubing are used.

This configuration is recommended (as compared to having the buffer flow through the pump first into the Model 1000 Mini Chiller) for the following reason. Residual buffer (from a previous run) can freeze in the heat exchanger of the chiller if it is turned on, but the recirculating pump is not. This frozen buffer will block the flow of buffer from the pump to the chiller, and may cause the tubing between the pump and Model 1000 Mini Chiller to come loose or burst. This could result in leakage of gel buffer from the system. In the recommended configuration, no buffer will be drawn into the pump if a blockage occurs.

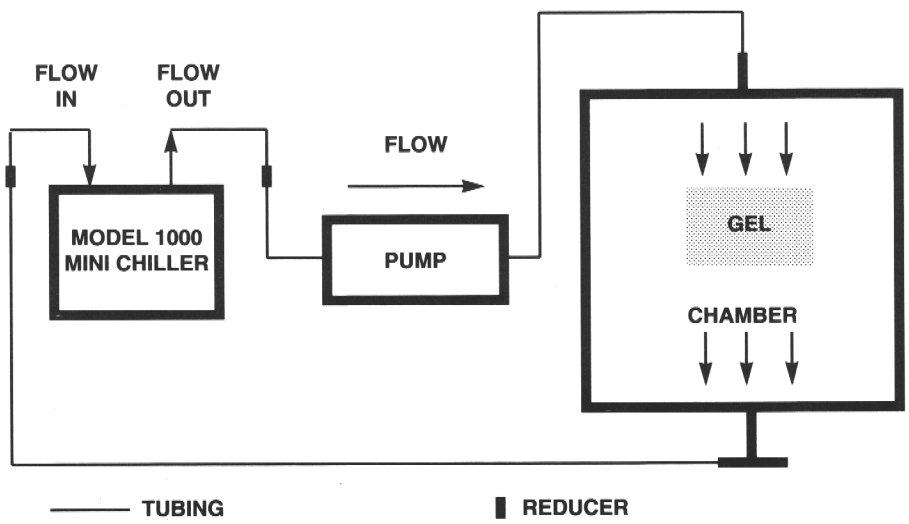


Fig. 2. Schematic diagram of Model 1000 Mini Chiller installation in CHEF-DR II or CHEF Mapper system.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

To set the internal timer, press TIMER (the red light above the button will illuminate; Figure 3D), and enter the desired run time using RAISE and LOWER (Figure 3F and 3G). The timer will begin running, and will count down to 0 in 1/10 hour (6 minute) intervals. When zero is reached, the compressor will turn off, and an alarm will sound for 10 seconds. The alarm sound can be terminated prematurely by pressing any button.

After the timer is activated, set temperature, actual temperature and time remaining can be freely monitored, without affecting chiller operation, by pressing their respective buttons. To display time remaining to shutdown, press TIMER. To inactivate the timer, press TIMER, then press LOWER until the display reads 0. The unit will now run until the main power switch of the Model 1000 Mini Chiller is turned off. To reactivate the chiller after the timer has shut-down the unit, press SET TEMP and the compressor will reactivate after the 100 second delay.

Section 6
Troubleshooting Guide

Problem	Solution
No power	Check fuse in main power switch on back panel of unit (see page 8)
	Fuse in main power switch OK; contact Bio-Rad instrument service
Power on, compressor not running	Reset timer
	Temperature set too high; lower setting
	Still in 100 second delay period
No or low buffer flow	Check tubing for kinks
	Pump flow rate too low
	Frozen buffer in heat exchanger; turn pump on, raise set temperature above ambient until buffer flow resumes, then lower set temperature to desired setting
Insufficient cooling	Pre-cool buffer to set temperature prior to beginning gel run
	Buffer concentration too high
	Buffer flow rate too high
	Electrophoresis or buffer flow conditions outside design range limits

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

4) After 100 seconds have elapsed, the compressor will engage (if the set temperature is below ambient temperature), and the red light above COOLING will illuminate (Figure 3E). This 100 second delay allows pressure equalization in the system to avoid mechanical damage.

5) Press ACTUAL TEMP (the red light above the button will illuminate; Figure 3C) to read the current temperature monitored at the internal temperature probe (in the FLOW OUT port), or at the external temperature probe (if attached).

6) After the Model 1000 Mini Chiller has cooled the buffer to the desired set temperature, the COOLING light will occassionally go on and off accompanied by a click. This is an indication of the refrigerant bypass valve cycling on and off to maintain average buffer temperature within 0.3° C of set temperature. Greater temperature fluctuations may occur with longer tubing length, low buffer flow rates, and/or high amounts of input power and high ambient temperatures. However, the built-in adaptive algorithm will compensate for these conditions so that the average temperature is typically within 0.3° C.

Note: Allow sufficient room for ventilation at both the front and rear of the unit. The cooling fan is in the rear.

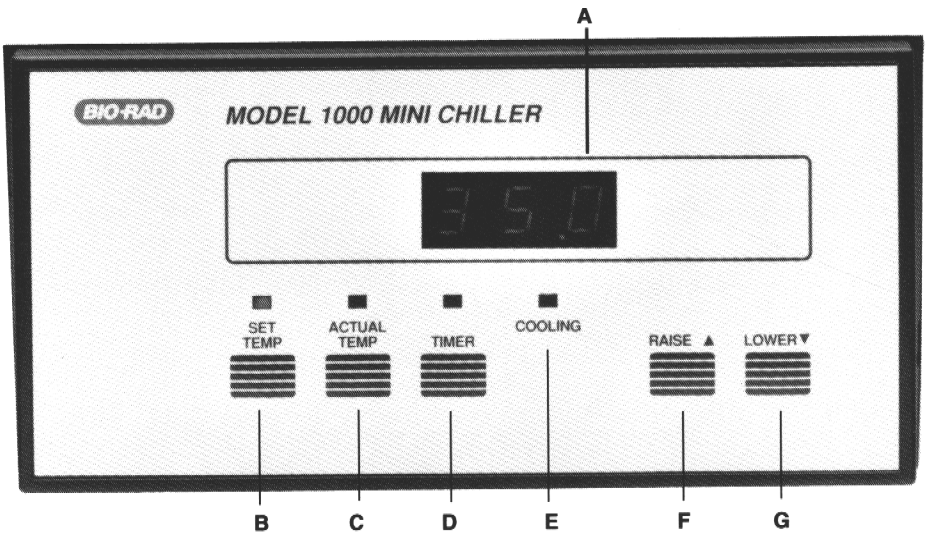


Figure 3. Control panel of Model 1000 Mini Chiller. A. Digital display (3 numerical places plus decimal point). **B.** Temperature set button and indicator light **C.** Actual temperature button and indicator light. **D.** Timer button and indicator light. **E.** Compressor running light. **F.** Raise button. **G.** Lower button.

Bio-Rad recommends that the buffer in the system be pre-cooled to the desired run temperature. The Model 1000 Mini Chiller can quickly pre-cool the system, at an approximate rate of 0.75° C/minute in the absence of input power (to pre-cool from ambient temperature to 14° C only takes 10-15 minutes), and maintains set temperature during the run. If the buffer is not pre-cooled, the presence of input power (from the electrophoresis power supply) will greatly increase the time required to bring the system to the set temperature.

5.4 Preset Mini Chiller Shutdown

The Model 1000 Mini Chiller can be programmed to shut down after a specific time interval using the internal timer. This feature is useful if the CHEF instrument has been programmed to shut down at the end of the gel run.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Problem	Solution
Unusual noise or vibration in variable speed pump	Frozen buffer in heat exchanger; see above
	Air leak from loose tubing connection
Small pool of liquid under Model 1000 Mini Chiller	Frost may form on heat exchanger under certain operating conditions, resulting in small amounts of water following Model 1000 Mini Chiller shutdown
Digital display flashes when external temperature probe is attached	External temperature probe is attached to the wrong 9-pin connector

Section 7
Main Switch Fuse Check

1) Turn the unit around so that the back of the unit is facing forward, and locate the black plastic assembly containing the main power switch and power cord receptacle on the lower left corner.
2) Turn the unit off and remove the main power cord from the receptacle (grasp the female plug, not the cord, and pull gently).
3) Insert a small-blade, flat screwdriver into the narrow slot directly above the main power switch and twist firmly. This slot can be seen from above when looking down at the main power switch. The front cover will open, revealing a light gray fuse holder on the right side directly below the main power switch.
4) Using the screwdriver, gently pull the fuse holder forward (out). Remove the fuse from the holder and examine. If the fuse is obviously burned, replace it with a 5 Amp, 250 V Slo-Blow fuse. Otherwise, check the fuse with a volt-ohm meter.
5) Place the fuse holder into the right slot below the main power switch such that the arrow on the fuse holder points in the same direction as the two arrows on the inside of the front cover. Press the fuse holder firmly into place, then close the front cover by pressing firmly at the top corners.
6) Replace the power cord. The unit is now ready for operation. If the unit still does not turn on, or the fuse burns again, contact Bio-Rad instrument service.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

BIO-RAD

Chemical Division

3300 Regatta Boulevard
Richmond, California 94804
Telephone 415 232-7000
Fax: 415 232-4257

Eastern Regional Office, *P.O. Box 1229, 85A Marcus Dr., Melville, New York 11747 • Phone (516) 756-2575 • Fax (516) 756-2594*
European Headquarters, *Bio-Rad Laboratories, Dreve du Senechal, 19, B-1180 Brussels • Phone 02 375 59 70 • Fax 02 374 61 62*
Canada, *Bio-Rad Laboratories (Canada) Ltd., 5149 Bradco Boulevard, Mississauga, Ontario L4W 2A6 • Phone (416) 624-0713 • Fax (416) 624-3019*
Australia, *Bio-Rad Laboratories Pty Limited, P.O. Box 371, North Ryde, N.S.W. 2113 • Phone 02-805-5000 • Fax 02-805-1920*
Austria, *Bio-Rad Laboratories Ges.m.b.H., Auhofstrasse 78D, A-1130 Wien • Phone 0222/82 89 01 • Fax 0222/82 85 629*
Belgium, *Bio-Rad Laboratories S.A./N.V., Begoniastraat 5, B-9810 Nazareth • Phone 091-85 55 11 • Fax 091-85 65 54*
France, *Bio-Rad S.A., 94/96 rue Victor Hugo, B.P. 220, 94203 Ivry Sur Seine Cedex• Phone 01-4960 6834 • Fax 01-4671 2467*
Germany, *Bio-Rad Laboratories GmbH, Heidemannstraße 164, Postfach 45 01 33, D-8000 München 45• Phone 0-89-318 84-0 • Fax 0-89-318 84 100*
Pacific, *Bio-Rad Laboratories, Unit 1111, 11/F., New Kowloon Plaza, 38, Tai Kok Tsui Road, Tai Kok Tsui, Kowloon, Hong Kong • Phone 7893300 • Fax 7891257*
Italy, *Bio-Rad Laboratories SRL,Via Cellini, 18/A, I-20090 Segrate Milano • Phone 02-21609.1• Fax 02-21609-399*
Spain, *Bio-Rad Laboratories, S. A. Avda Valdelaparra 3, Pol. Ind. Alcobendas, E-28100 Alcobendas, Madrid • Phone 1/6617085 • Fax 91/6619698*
Japan, *Nippon Bio-Rad Laboratories, K. K., Sumitomo Seimei Kachidoki Bldg 5-3-6 Kachidoki, Chuo-Ku, Tokyo 104 • Phone 03-3534-7665 • Fax 03-3534-8497*
The Netherlands, *Bio-Rad Laboratories B. V., Fokkerstraat 10, 3905 KV Veenendaal • Phone 08385-40666 • Fax 08385-42216*
Switzerland, *Bio-Rad Laboratories AG, Kanalstrasse, 17, CH-8152 Glattbrugg • Phone 01-810 16 77 • Fax 01-810 19 33*
United Kingdom, *Bio-Rad Laboratories Ltd., Bio-Rad House, Maylands Avenue, Hemel Hempstead, Herts HP2 7TD • Phone 0442-232552 • Fax 0442-259118*
New Zealand, *Bio-Rad Laboratories, P.O. Box 100-051, North Shore Mail Centre, Auckland 10 • Phone 09/443/3099 • Fax 09/443/3097*

Printed in USA

591 91-0440

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP