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GIBSON ASSEMBLY® IS A REGISTERED TRADEMARK AND BIOXP™ AND Oligo Vault™ ARE TRADEMARKS OF CODEX DNA, INC.

PATENTS

CODEX DNA, INC. US PATENT NUMBERS 7,776,532, 8,435,736, AND 8,968,999.

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THE BIOXP™ 3200 SYSTEM IS A DEVICE WHICH IS INTENDED FOR THE PROCESSING OF DNA MATERIALS. THE SYSTEM IS NOT APPROVED FOR USE OTHER THAN AS EXPRESSLY SET FORTH ABOVE, AND CODEX DNA, INC. MAKES NO WARRANTIES, EXPRESS, STATUTORY, IMPLIED, OR OTHERWISE, AND CODEX DNA, INC. DISCLAIMS ALL WARRANTIES AND LIABILITY FOR DAMAGES, WHETHER DIRECT, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO DAMAGES FOR LOSS OF PROFITS, REVENUE, OR OTHER EXPENSES OR DAMAGES, OR OTHER LOSSES ARISING OUT OF ANY WARRANTY OF GREATER SCOPE OR DURATION THAN THAT SET FORTH IN THIS CODEX DNA, INC. LIMITED WARRANTY; AND f) FAILURE TO DISCLAIMER IMPLIED WARRANTIES AND LIMIT REMEDIES AND LIABILITIES, BY AND ON BEHALF OF CODEX DNA, INC.
Instrument ordering information

<table>
<thead>
<tr>
<th>Product</th>
<th>Catalog number</th>
</tr>
</thead>
<tbody>
<tr>
<td>BioXp™ 3200 system, includes 1-year warranty</td>
<td>BX 3200-02 and BX 3200-02 EU</td>
</tr>
<tr>
<td>BioXp™ 3200 system service contract, 1-year</td>
<td>BX 3200-05 and BX 3200-05 EU</td>
</tr>
</tbody>
</table>

Safety information

Manual symbols

This manual describes the use and maintenance of the Codex DNA BioXp™ 3200 system. Read this manual completely before putting the instrument into service. The following icons are used in this manual:

- **Electrical safety warning**: Failure to follow these instructions can cause harm to operators or subjects.
- **Important note**: Failure to follow these instructions can lead to damage of the system or unexpected results.

Precautions

- The radiation exposure hazard is non-critical.

Covers and exterior components which the operator may come in contact with during routine maintenance or calibration, shall operate at a voltage no greater than 25 V AC or 60 V DC.

Marking symbols on the equipment

- **Warning**: Indicates a warning concerning operations that may lead to personal injury or potential damage to the instrument if not performed correctly.
- **Caution, hot surface, do NOT touch.**
- **Conformité European**: This mark is a declaration by the manufacturer that the respective component complies with the relevant directives and standards as issued by the European Union.
- **Alternating current.**

Safety warnings

Installation

- The BioXp™ system is heavy. Do not attempt to lift or move the instrument without the assistance and supervision of colleagues. Be certain to use appropriate moving equipment and proper lifting techniques (including but not limited to making certain that you have a secure grip on the instrument before lifting, keeping your spine in a neutral position while lifting with your legs, and coordinating lifting and moving movements with all appropriate personnel). Improper lifting can cause permanent back injury.
- Use this product only as specified. If the instrument is used in a manner not specified by Codex DNA, the protection provided by the instrument may be impaired, resulting in personal injury or damage to the instrument.

Ground circuit protection

- Check the mains electricity supply plug, voltage, and frequency to confirm that the supply corresponds to the values shown on the instrument label.
- Ensure that the supply of power to the instrument is via a socket fitted with a protection device, such as a circuit breaker of the correct rating, to provide automatic power cut-off in the case of an insulation fault.
- Confirm that the mains wiring is grounded. Codex DNA declines all responsibility for any damages due to instrument non-grounding.

Main power switch

Do not position the instrument such that it is difficult to operate the main power switch.

Hazardous chemical warning

- Chemicals used with the instrument may be hazardous.
- Always wear protective gear including safety goggles, gloves, and a lab coat when handling chemicals.
- Exercise caution when handling flammable liquids.
- Take precautions, including but not limited to installing proper ventilation systems, to ensure that the BioXp™ system laboratory is safe and that operators of the instrument will not be exposed to hazardous levels of harmful chemicals.
- Follow all national, state, and local health and safety regulations and laws.
- Use proper waste disposal in accordance with all relevant regulations.
- Refer to applicable material safety data sheets (MSDSs).
Flammable liquids: Instrument warning

- Exercise caution when using flammable liquids in the BioXp™ system to minimize the risk of fire.
- Do not use any flammable liquids in the instrument except for the liquids required in the included procedure.
- Provide adequate ventilation for the instrument to prevent the accumulation of flammable vapors.
- All sources of ignition, such as open flame or electrical spark, are not permitted near the instrument or in areas where flammable vapors may travel.
- Ensure that the instrument, all neighboring equipment, and users of the instrument are appropriately grounded to minimize the generation of static electricity.
- Do not use the ethanol reservoir if it is cracked.

Flammable liquids: Solution handling warning

- Keep flammable liquids in covered containers when not in use.
- Provide means to promptly and safely dispose of any flammable liquid leaks or spills.
- Do not transfer liquids using air pressure.
- Read applicable MSDSs.
- Store flammable liquids in cool, well-ventilated areas away from corrosives, oxidizers, and ignition sources.
- Label containers and cabinets as “flammable materials” where applicable.
- Use only approved safety vessels for flammable liquid storage.
- Ground and bond flammable liquid containers to prevent static charge build-up.
- Never pour flammable liquids down a drain or sink.
- Dispose of empty flammable containers in an approved manner.

Electrical safety warning

- Do not attach the power cord to an extension cord or to a multiple portable socket. Doing so may compromise shielding and/or grounding.
- This equipment should not be used adjacent to or stacked with other equipment. If it becomes necessary to use the BioXp™ system under these conditions, the unit should be observed to verify normal operation in this condition.
- Use only grounded mains outlets to supply instrument.
- Do not remove any panels. Panels should be removed only by trained service personnel.
- The AC power cord is the primary disconnection device for the instrument. Ensure that the point of connection is easily accessible and free of any obstructions.

Important warning: Moving parts

- Do not override the door lock. When the door is locked, the moving parts of the instrument are operational. Never attempt to physically restrict movement of instrument components.
- Interfering with moving parts may cause personal injury. Keep hands clear of moving parts while operating the instrument.
- Do not move or shift the instrument during operation.
- If the instrument shows evidence of corrosion or wear, do not attempt to manipulate or tamper with components of the instrument.

Important warning: Disconnecting the instrument

- Disconnect power to the system before clearing or performing maintenance.
- DO NOT remove any panels; panels should be removed only by qualified service personnel.
- Do not disassemble unit.

Equipment specifications

System components

- Use of other parts or materials other than those supplied with the instrument can degrade system performance and may cause safety hazards. Use only Codex DNA approved or supplied components.
- Use only Codex DNA supplied power supply cord. Use of other power cords may compromise electrical protection and could create a hazard.

Components of the BioXp™ system

- BioXp™ 3200 system
- Power cord
- RJ45 ethernet cable
- Reagent and recovery plate thermal covers
- Ethanol reservoir

Technical specifications

<table>
<thead>
<tr>
<th>Product name</th>
<th>BioXp™ 3200 system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power input voltage</td>
<td>100–240 V</td>
</tr>
<tr>
<td>Power input current</td>
<td>8.3 A max</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>16°C to 40°C</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>-18°C to 60°C</td>
</tr>
<tr>
<td>Operating and storage humidity range</td>
<td>10% to 90% (non-condensing relative humidity)</td>
</tr>
<tr>
<td>Operating altitude</td>
<td>To 2000 m</td>
</tr>
<tr>
<td>Water ingress</td>
<td>Non-immersion, protection for damp wipe only</td>
</tr>
<tr>
<td>Weight</td>
<td>63.4 kg</td>
</tr>
<tr>
<td>Dimensions (W, H, D)</td>
<td>66 cm x 53 cm x 74 cm</td>
</tr>
</tbody>
</table>

Site preparation and installation

System site preparation

For details on site preparation, safety precautions, uncrating, setup, and powering up, see the BioXp™ 3200 system remote installation and sign-off technical guide.
Getting to know the BioXp™ system

Hardware overview

Figure 1. Front and side view of the BioXp™ 3200 system.

Figure 2. The BioXp™ 3200 system deck.

1. Heated lid
2. Thermocycler
3. Purification module
4. Thermal cover
5. Reagent chiller
6. Recovery chiller
7. Reservoir retainer
8. Strip well holder
9. Tip tray retainer 1
10. Tip tray retainer 2
11. Tip tray retainer 3
12. Tip tray retainer 4
13. Waste bin

Figure 3. Dock map.

Instrument ports and power switch

<table>
<thead>
<tr>
<th>Location</th>
<th>Label number</th>
<th>Port/inlet</th>
<th>Used to</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>USB</td>
<td>Do not use. Note: The USB port is for instrument diagnostics and is for authorized service personnel use only.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Ethernet</td>
<td>Connect to Codex’s server for system communication</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Fuse</td>
<td>Do not use</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Power switch</td>
<td>Switch power to the instrument on or off. Note: Leave the instrument on continuously.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Power inlet</td>
<td>Power the instrument</td>
<td></td>
</tr>
</tbody>
</table>

Figure 4. Power on/off switch and communications ports

Starting the BioXp™ system

Ethernet setup

The BioXp™ system requires an internet connection. Prior to connecting the instrument to the internet, be sure to test the connection. Connect the provided RJ45 ethernet cable to the ethernet port located on the rear of the unit to an available ethernet wall jack.

In order for the BioXp™ system to communicate with Codex’s server, you must open the 80/443 port. In addition, the BioXp™ system will be making an outbound SSL connection (HTTPS/SSL) to logmein.com, codexdna.com and drive.google.com. Unblock or whitelist these sites.

Start the BioXp™ system

1. Ensure that all packaging materials have been removed, including the screw that is used to secure the instrument door during shipment.
2. Turn the instrument on using the power switch located on the side of the instrument.
3. Close the instrument door. The BioXp™ system will initiate a self-check process to verify the correct functionality of motion control and other internal systems of the instrument. If the instrument is unable to perform a successful self-check it will alert the user to the problem and will prevent the instrument from operating until the problem has been addressed.
4. After the self-check, ensure that the BioXp™ system is correctly connected to the network. Note: If an error is detected during the self-check, an error message will be displayed. Follow the on-screen instructions to correct the error.

Configuring the BioXp™ system

1. Press Configuration
2. Press Network

The BioXp™ system powered on

We recommend leaving the instrument on continuously. Only turn the instrument off when necessary, such as when moving the instrument to another location. If the instrument must be turned off, toggle the power switch to the Off position.
Test the network connection
Press Test connection

If the system displays Network connection working normally, the BioXp™ system is ready for use. If you are ready to load the instrument and begin a run, refer to the appropriate deck loading instructions for your system run.

If the system displays No network detected, contact Codex DNA customer service at help@codexdna.com for assistance in resolving the connection.

Change the clock (optional)
Press Set date and time
Check Automatically get time to set the clock automatically. Then press OK.
OR
Use the up and down arrows to set the time and date manually. Then press OK.

Notes:
• Time is displayed in hours : minutes : seconds and the date is displayed in month/day/year.
• Check Observe Daylight Saving Time for automatic clock updates to DST.

Operational features of the BioXp™ system
Tracking progress during a run

Time to completion
During a run, the instrument will display the projected time remaining for the run (in hours : minutes : seconds) and the estimated time of completion, as shown in the following illustration.

Ways to track progress
You can track the progress of your reaction in a number of ways:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time to completion</td>
<td>The system estimates the time at which the run will be completed.</td>
</tr>
<tr>
<td>Time remaining</td>
<td>The system estimates the time remaining for completion.</td>
</tr>
<tr>
<td>Visual progress</td>
<td>The system provides a progress bar through the various steps to completion.</td>
</tr>
</tbody>
</table>

Note: The scale of each step is not linear. (i.e. step 1 requires much more time than step 4 but both steps are each depicted with a similarly sized time lapse bar).

Color indicators
The internal colored lights change during the run process. The colors indicate the status of the process taking place. The background color of the screen changes to indicate the following:

<table>
<thead>
<tr>
<th>Touchscreen background color</th>
<th>Indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue</td>
<td>Normal operation: run set up or run in progress</td>
</tr>
<tr>
<td>Yellow</td>
<td>System check or prompt requiring user attention</td>
</tr>
<tr>
<td>Red</td>
<td>Error message</td>
</tr>
<tr>
<td>Green</td>
<td>Processing completed</td>
</tr>
</tbody>
</table>

Cancelling a job during a run
IMPORTANT! You will not be able to reuse reagents if you cancel a job after the run has initiated and the reagent plate seal has been broken. Do not cancel a run unless absolutely necessary.

1. If you need to cancel a job during a run, slide your finger to the right across the bar on the bottom of the display screen during a run.
2. After sliding to cancel, the system will display a confirmation to cancel screen. Press YES Cancel job to end the run or No to continue the run.

If you press YES Cancel job, the instrument will display a Canceling job screen until the job cancel is complete.

3. When prompted, remove all materials and used or partially used consumables from the instrument deck.

Using the BioXp™ system

BioXp™ kits
The BioXp™ 3200 system builds variant DNA libraries, fragments, and clones.

BioXp™ gene fragment kit
The BioXp™ system builds 32 high-quality individual dsDNA fragments, 300 bp to 1.8 kb in length, in less than 16 hours.

BioXp™ cloning kit
Using integrated Gibson Assembly® technology, the BioXp™ system builds and clones dsDNA fragments into any custom vector, providing transformation ready products at the end of an automated run.

BioXp™ variant library kit
The BioXp™ system automates the construction of scanning and combinatorial libraries. By combining state-of-the-art robotics, liquid handling, thermocycling, and on-deck purification, the BioXp™ system significantly reduces the hands-on time required for synthetic dsDNA library construction and cloning.

Placing an order
To order custom BioXp™ kits and reagents, visit the BioXp™ kit ordering portal at www.codexdna.com. After creating an account, you will be able to upload sequences and place an orders.

Loading and running the BioXp™ system
Refer to BioXp™ gene fragment and variant library kits - Loading map and checklist or the BioXp™ cloning kits - Loading map and checklist for loading instructions.

Instrument troubleshooting

General instrument troubleshooting
Codex DNA technical services: 858.228.4115

<table>
<thead>
<tr>
<th>Issue</th>
<th>Possible solution and recommendations</th>
</tr>
</thead>
</table>
| Touchscreen does not light up | - Confirm that the power switch is in the ON position.  
- Confirm that the instrument is plugged into a working electrical outlet.  
- Verify that the plug is securely connected to the side of the instrument.  
- Contact Codex DNA technical services. |
| Power failure occurs during the run | Contact Codex DNA technical services. |
| Difficulty operating the touchscreen | Contact Codex DNA technical services. |

Deck inspection

After you load the deck and close the instrument door for a system run, the instrument performs a deck inspection, checking the location and orientation of the recovery plate, the ethanol trough, the strip handles, the 8-well strips, tips, and the system robotics.

If any anomalies are detected, the instrument displays a deck inspection failure message, similar to the screen shown on the right. If the system displays a deck inspection failure message, see the following table for recommendations.
Issue | Possible solution and recommendations
---|---
Deck inspection detected anomalies with one (or more) of the following:  
• Plate found in purification nest  
• Recovery plate not found or is rotated  
• Ethanol trough is missing or misplaced  
• Strip handle not closed | Press Stop and Fix  
• Open the door and correct the deck inspection issue.  
• After fixing the error, close the door to initiate a second deck inspection.  
• If the deck inspection error message persists more than once after you have corrected any issues, call Codex technical services.

Error messages

If you observe a red-background error screen during operation, follow the screen instructions. If directed or if the problem persists, make a note of the screen and call Codex technical services. Additional information is included in the following table.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Possible solution and recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem preventing the system from running the job</td>
<td></td>
</tr>
</tbody>
</table>
• May be caused by a barcode reading error. Open the door and confirm that all plates are properly seated in their respective retainers in the correct configuration, then press Retry.  
• Press Configuration and follow the onscreen instructions. |

Cleaning and maintenance

Cleaning instructions

• Clean the exterior of the BioXp™ system with standard cleaners and a damp cloth.  
• Clean the internal surfaces periodically using a mild detergent or 70% ethanol. Spray the cleaner onto a cloth and then use the damp cloth to wipe instrument surfaces. Do not spray any cleaners directly into the instrument.

Do not use abrasive or caustic cleaners on internal or external instrument surfaces.

Spills

Take every precaution to ensure that no liquids are spilled into the instrument. Wipe up accidental spills in and around the instrument immediately. If ethanol spills, dispose of ethanol-saturated towels according to your institutional guidelines.

In the event of hazardous material spillage

• In the event of spillage of a hazardous material, the BioXp™ system user is responsible for decontamination of the hazardous material on or inside the instrument.  
• Before using a cleaning or decontamination method other than a recommended cleaner, contact Codex DNA to verify that the proposed decontamination method will not damage the equipment.

Calibration

Calibration of the motion control system is performed by the manufacturer. Yearly verification of the system calibration is recommended for optimal performance. The instrument will perform a self check each day. A log of the self check is stored on the system and may be used by Codex DNA service technicians should any issue arise. Keeping the BioXp™ system connected to the internet ensures optimal use and analysis of the calibration log.

Preventative maintenance

The BioXp™ system requires periodic cleaning and lubrication of the motion system. This procedure is ideally performed annually and is included in the optional service contract. Contact customer service for warranty and service contract inquiries.

Repair

Each BioXp™ system has been manufactured and calibrated to specifications. Do not attempt to disassemble any part of the system. Any such action will void the product warranty. In the event you should experience a product failure, please call Codex DNA technical services at 858.228.4115.

Equipment disposal

This product has parts that contain a small amount of mercury and lead in some components. Disposal of these materials may be regulated in your community due to environmental considerations. Follow local regulations for disposal of equipment or equipment accessories at the end of their life.

WEEE compliance

The BioXp™ system complies with the European Union’s Waste and Electrical and Electronic directive. For disposal or recycling information, please contact your local authorities or the electronic industry alliance: www.eiae.org.
Regulatory statements

FCC compliance statement
This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a commercial or medical installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio or television reception. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio and television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and the receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

The connection of a non-shielded equipment interface cable to this equipment will invalidate the FCC certification of this device and may cause interference levels which exceed the limits established by the FCC for this equipment. It is the responsibility of the user to obtain and use a shielded equipment interface cable with this device. If this equipment has more than one interface connector, do not leave cables connected to unused interfaces. Changes or modifications not expressly approved by the manufacturer could void the user’s authority to operate the equipment.

Guidance and manufacturer’s declaration: Emissions

All equipment and systems

<table>
<thead>
<tr>
<th>Emission tests</th>
<th>Compliance</th>
<th>Electromagnetic environment guidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>RF emissions CISPR 11</td>
<td>Group 1</td>
<td>The BioXp™ system uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.</td>
</tr>
<tr>
<td>RF emission CISPR 11</td>
<td>Class A</td>
<td>The BioXp™ system is suitable for use in all commercial establishments.</td>
</tr>
<tr>
<td>Harmonic emission IEC 61000-3-2</td>
<td>Class A</td>
<td></td>
</tr>
<tr>
<td>Voltage fluctuations IEC 61000-3-3</td>
<td>Complies</td>
<td></td>
</tr>
</tbody>
</table>

Guidance and manufacturer’s declaration: Immunity

All equipment and systems

The BioXp™ system is a Class A device and is intended for use in the electromagnetic environment specified below. The customer or user of the BioXp™ system should ensure that it is used in such an environment.

<table>
<thead>
<tr>
<th>Immunity test</th>
<th>IEC 60601 test level</th>
<th>Compliance level</th>
<th>Electromagnetic environment guidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrostatic discharge (ESD) IEC 61000-4-2</td>
<td>±6 kV contact ±8 kV air</td>
<td>±6 kV contact ±8 kV air</td>
<td>Floors should be wood, concrete, or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.</td>
</tr>
<tr>
<td>Electrical fast transient/ burst IEC 61000-4-4</td>
<td>±2 kV for power supply lines ±1 kV for input/output lines</td>
<td>±2 kV for power supply lines ±1 kV for input/output lines</td>
<td>Mains power quality should be that of a typical commercial or laboratory environment.</td>
</tr>
<tr>
<td>Surge IEC 61000-4-5</td>
<td>±1 kV differential mode ±2 kV common mode</td>
<td>±1 kV differential mode ±2 kV common mode</td>
<td>Mains power quality should be that of a typical commercial or laboratory environment.</td>
</tr>
<tr>
<td>Voltage dips, short interruptions, and voltage variations on power supply input lines IEC 61000-4-11</td>
<td>&lt; 5% UT (&gt; 95% dip in UT) for 0.5 cycle 40% UT (60% dip in UT) for 5 cycles 70% UT (30% dip in UT) for 25 cycles &lt; 5% UT (&gt; 95% dip in UT) for 5 sec.</td>
<td>&lt; 5% UT (&gt; 95% dip in UT) for 0.5 cycle 40% UT (60% dip in UT) for 5 cycles 70% UT (30% dip in UT) for 25 cycles &lt; 5% UT (&gt; 95% dip in UT) for 5 sec.</td>
<td>Mains power quality should be that of a typical commercial or laboratory environment. If the user of the BioXp™ system requires continued operation during power mains interruptions, it is recommended that the instrument be powered from an uninterrupted power supply or a battery.</td>
</tr>
<tr>
<td>Power frequency (50/60 Hz) magnetic field IEC 61000-4-8</td>
<td>3 A/m</td>
<td>3 A/m</td>
<td>Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or laboratory environment.</td>
</tr>
</tbody>
</table>

NOTE: \( U_t \) is the AC mains voltage prior to application of the test level.

Notes