HOLOGIC®
Diagenode

Bioruptor® Pico

Sonication System

USER GUIDE

For Short-Read Sequencing

V5 04_2025 Revision 001

Guarantee

Limited one year global warranty

Hologic Diagenode guarantees all products from any manufacturing defects as we rigorously test all products to meet strict quality standards. Hologic Diagenode warrants that all standard components of its instruments will be free of defects in materials and workmanship, unless the original quotation or accompanying documentation states a different warranty for a period of one (1) year or for a maximum or for a maximum of 210 hours of running time, six months for refurbished instruments. All warranty periods begin on the date of delivery and apply only to the first purchaser of the product. If a manufacturing defect arises and a valid claim is received within the warranty period, Hologic Diagenode, at its discretion, will repair or replace the product in accordance with the warranty terms and conditions stated herein. In case of repair or replacement of a product under warranty, Hologic Diagenode will cover the expenses to return the repaired or replacement product.

This warranty covers only manufacturing defects and does not cover any damage caused by misuse, lack of compliance to recommendations stated in the manual, neglect, accidents, abrasion, or exposure to extreme temperatures, chemical solvents, or acids. We strongly recommend that maintenance or repairs of Hologic Diagenode's products are performed by our approved Hologic Diagenode service center. Improper or incorrectly performed maintenance or repairs will void the warranty.

Technical assistance & ordering information

For the rest of the world, please contact Diagenode S.A.

Diagenode S.A.
BELGIUM | EUROPE

LIEGE SCIENCE PARK
Rue Bois Saint-Jean, 3
4102 Seraing (Ougrée) - Belgium
Tel: +32 4 364 20 50
Fax: +32 4 364 20 51

Diagenode, LLC
USA | NORTH AMERICA

400 Morris Avenue,
Suite #101
Denville, NJ 07834 - USA
Tel: +1 862 209-4680
Fax: +1 862 209-4681

diagenode.com/pages/contact

Content

Critical Steps for Maintenance and Efficient Shearing

General Warnings

DON'T

- Turn on the instrument without water
- Exceed 30 min of total sonication
- Tilt the sonication unit

DO

- Change water at least once every month
- Use deionized or distilled water
- QC your system with our DNA QC Kit

Sonication Bath Temperature

- Optimal temperature for sonication is 4°C. Sample temperature should not exceed 8°C.
- The Bioruptor Cooler (Cat. No. B02010010, B02010011, B02010012) has to be used to guarantee the automatic temperature control of the sonication bath during the entire sonication process.

Validated Tubes for the Bioruptor Pico

- DNA shearing: 0.2 ml (Cat. No. C30010020) and 0.65 ml (New Cat. No. C30010011) Bioruptor® Microtubes for DNA shearing.
- Chromatin shearing: 0.2 ml (Cat. No. C30010020) and 1.5 ml (Cat. No. C30010016) Bioruptor® Microtubes and 15 ml (Cat. No. C01020031) Bioruptor® Tubes & sonication beads.

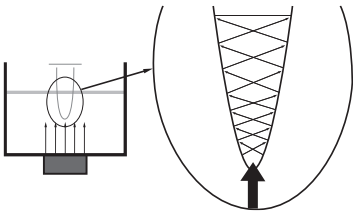
Fitting Tubes in the Tube Holder

- Place the tubes in the corresponding tube holder. Never leave empty spaces in the tube holder. Fill the empty spaces with tubes containing the same volume of water. Screw the lid on the tube holder without over-tightening it.
- Carefully place the tube holder on the holding plate.
- During sonication, samples must remain at the bottom of the tube. If needed, briefly centrifuge samples during sonication after pausing the run.

Introduction

Hologic Diagenode's Bioruptor Pico uses a gentle method of sonication to retain the integrity of DNA and/or biological complexes, including chromatin, protein-protein binding, protein-DNA complexes and other biochemical and biological assay systems. The Bioruptor Pico sonication system uses a sonication bath to generate indirect sonication waves, which emanate from an ultrasound element below the water tank. Because the system is gentler than other sonicators, the Bioruptor Pico produces better and more consistent results than with harsher sonication methods. Up to 16 closed tubes can be sonicated in parallel and the continuous rotation of tubes allows even distribution of the energy for efficient sonication. The Bioruptor Pico enables automation of sonication, guaranteeing higher reproducibility of results.

The Effect of Ultrasound on Biological Samples



The Bioruptor Pico sonication system uses ultrasound to create focused mechanical stress to shear chromatin or DNA, remove paraffin from FFPE samples, disrupt cells and homogenize tissue, or disperse chemical component, or reduce the size of liposomes. Ultrasound waves pass through the sample expanding and contracting the liquid. During expansion, negative pressures pull the molecules away from one another to form a cavity or bubble. This process is called cavitation. The bubble continues to absorb energy until it can no longer sustain itself and implodes. This produces intense focused shearing forces, that disperse and break biomolecules. The fragmentation of chromatin or DNA takes place as a consequence of this mechanical stress or shear. With the Bioruptor Pico, the entire volume of water present in the sonication bath is exposed to ultrasound, allowing all the samples to be efficiently sonicated in parallel.

Intended Use

The Hologic Diagenode Bioruptor Pico is intended for use in the precise and efficient shearing of various biological samples, including DNA, RNA, chromatin, and proteins. It employs advanced sonication technology to ensure consistent and reproducible results, making it ideal for applications in genomics, proteomics, and molecular biology research. The Bioruptor Pico is designed for general laboratory use by professionals and researchers who require high-quality sample preparation with minimal hands-on time and optimized workflow integration. This instrument is not intended for medical or clinical applications.

Caution

As indicated by the "attention" symbol (ISO 7000-0434B) on the Bioruptor cover, this instrument is liable to generate noise that may exceed standards for ultrasound in a beam around the instrument at 360 °. Exposure to sound waves of 20 to 60 kHz has not been shown to be harmful to human health. However, we recommend avoiding unnecessary exposure. Also, Hologic Diagenode recommends that pregnant women not be exposed to wavelengths of 20 to 60 kHz for an extended period of time. Finally, Hologic Diagenode also recommends limiting exposure to ultrasound and using, if necessary, a hearing protection helmet.

Technical Specifications

= Danger of crushing on the gear of the motor plate

- The power cord supplied with the instrument must be used.
- The instrument must remain close to the electrical outlet.
- If the instrument is not used in accordance with the manufacturer's instructions, safety may be compromised.
- Use only water to clean the Plexiglass. Do not use alcohol solution.

MAINTENANCE: Only Hologic Diagenode should perform maintenance on the instrument. Users should not perform maintenance.

Do not use the USB provided by Hologic Diagenode to update the instrument.

Serial Number label located at the back of your Sonication device.

V = volt

A = ampere

Hz = Hertz

Ac = Alternating current

∩∪ = Alternating current

S/N = Serial Number

T = fuse slow blow

H = breaking voltage capacity

Bioruptor® Pico Technical specifications	
Input Voltage Range	100–240 V ± 10%
Overvoltage Category	Category II
Pollution Degree	Degree 2
Input Frequency Range	50–60 Hz
Maximum Current	2–4 A
Maximum Energy Consumption	1 kWh
Ultrasonic Wave Frequency	20–60 kHz
Unit Dimensions	380 (W) x 315 (D) x 275 (H) mm
Weight	9 kg
Placement	Indoor Areas
Ambient Temperature Range	15–25°C
Maximum Relative Humidity	80%
Altitude	Up to 2,000 meters
Degree of Protection	IP21
Shearing Accessories	Tube holder for 0.2 ml tubes (Cat. No. B01201144) Tube holder for 0.65 ml tubes (Cat. No. B01201143) Tube holder for 1.5 ml tubes (Cat. No. B01201140) 15 ml sonication accessories (Cat. No. B01200016)
Shearing Consumables	0.2 ml microtubes (Cat. No. C30010020) 0.65 ml microtubes (Cat. No. C30010011) 1.5 ml microtubes (Cat. No. C30010016) 15 ml microtubes (Cat. No. C30010017) 1.5 ml microtubes & sonication beads (Cat. No. C01020031)
Throughput	0.2 ml microtubes — 16 samples 0.65 ml microtubes — 12 samples 1.5 ml microtubes — 6 samples 15 ml tubes — 6 samples
Sample Volume Range	0.2 ml microtubes — 20–100 µl 0.65 ml microtubes — 100 µl 1.5 ml microtubes — 100–300 µl 15 ml tubes — 500 µl–2 ml
Fragment Lenght Range Achievable	150–1,000bp
Working Temperature Range	2–20°C
Variable Parameters	Time ON, Time OFF, # Cycles, level of frequency
User Interface	Touchscreen with Bioruptor Pico software

Getting to know your Bioruptor Pico System

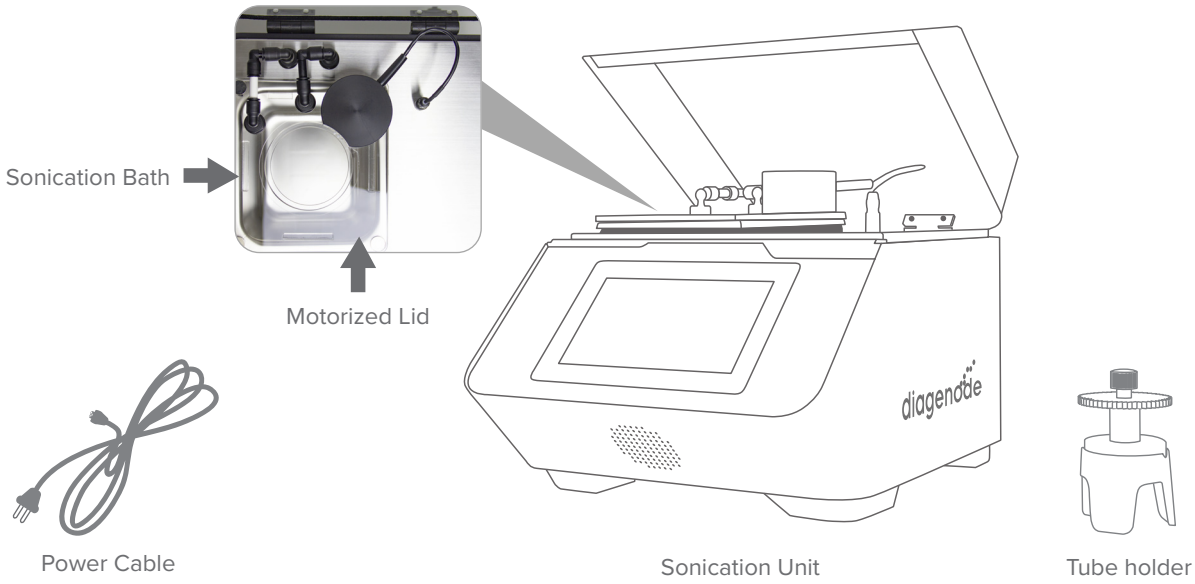


Fig. *Schematic overview of the Bioruptor Pico.*

Sonication Bath:

The sonication bath is a critical component of the instrument. The generators below the tank produce ultrasonic waves which are then transferred through water. The sonication bath requires special handling and care as described below.

Handling

The sonication unit must remain upright at all times, especially when moved. Tilting the sonication unit or handling roughly may damage the ultrasound emitter component, resulting in a substantial drop in sonication efficiency. If transportation of the apparatus is required after initial set-up, it is imperative to keep the sonication unit at a right angle to the ground during the transport at all times.

Water quality

The water bath must be filled with purified water according to specification (see table) to the fill line. Change water at least every month and clean sonication tank with a soft tissue.

WATER	GRADE OF WATER	COMPATIBILITY WITH THE BIORUPTOR
Ultrapure water	Type 1 or Type 1+	No
Deionized water	Type 2 + or Type 2	Yes
Distilled water	Type 3	Yes
Tap water	N/A	No

Water temperature

The water in the sonication bath must be kept at 4°C. Ultrasonic waves produced by the Bioruptor Pico generate heat. Drop off in sonication efficiency will occur above 8°C. To ensure preservation of the samples and to prevent damage to the instrument, it is necessary to start the sonication process with cold water and to keep it at 4°C during the sonication process.

Automatic temperature control

The Bioruptor Cooler (Cat. No. B02010010, B02010011, B02010012) to guarantees the automatic temperature control of the sonication bath during the entire sonication process. The cooling system produces a regular water flow to maintain a constant water level in the tank. The integrated regulating valve ensures that water will only be replaced during the off cycle to avoid any interference between the water flow and the sonication process.

Motorized lid

The motorized lid, along with the gear plate accessory, keeps the sample tubes in constant rotation and ensures optimal position in the sonication bath during sonication. Avoid the immersion of the motor into the water.

Tube holders

Several sizes of tubes can be used with the Bioruptor Pico.

The minimum and maximum sample volume to be used with each tube is given in the table below.

TUBE SIZE	MINIMUM	MAXIMUM
0.2 ml	20 µl	100 µl
0.65 ml	100 µl	100 µl
1.5 ml	100 µl	300 µl
15 ml	500 µl	2 ml

Equipment Installation

The following pages contain information on installing your particular Bioruptor Pico model. This equipment must only be installed by personnel after reading this section. Consider all hazards even though no particular hazards have been identified during installation. Before starting installation work, turn the main switch off and secure the unit against being re-energized. No special tools are required. One square meter is needed to set-up the Bioruptor Pico.

Devices are designed to be safe under the following conditions:

Indoor use

Altitude up to 2,000 meters

Operating external temperature 15°C to 25°C (do not install the Bioruptor in a cold room)

Maximum relative humidity 80%

Transient overvoltage typically present on the MAINS supply

Degree of protection: IP21

Power plug must be grounded

POLLUTION DEGREE 2 (Normally only non-conductive pollution occurs. However, occasionally a temporary conductivity caused by condensation is expected)

Never install this equipment in a place where environmental conditions and warnings mentioned above are infringed

Installation overview

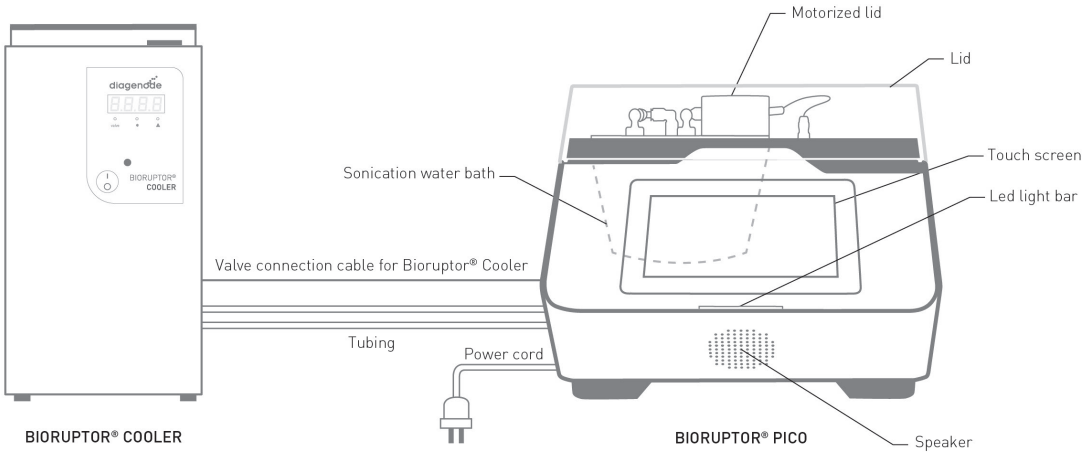


Fig. *Schematic installation overview of the Bioruptor Pico System in combination with the Bioruptor Cooler.*

Before starting the installation, turn the main switches off and make sure that the unit is not plugged into an electrical outlet.

1. Open the boxes and unpack all components.

Bioruptor® Pico

Bioruptor® Cooler

2. Place the Bioruptor on a bench. (Place the Bioruptor Cooler on the bench or below the Bioruptor.)
   Important Note: *Please make sure that the Bioruptor Pico is always placed on a level surface.*
3. Place the Bioruptor Cooler on the bench or below the Bioruptor.
4. Connect the Bioruptor Pico to the Bioruptor Cooler with the cooling long red and blue isolated tubing by inserting them into the connectors (Optional: Cut the length you need for the output and input flow. Make sure there is enough slack).
5. Fill the tank of the Bioruptor Cooler with 2 - 3 liter and the sonication bath of the Bioruptor with 700 ml according to the recommendations on page 8..
6. Plug the valve connection cable into the outlet on the back side of the Bioruptor Cooler and on the Bioruptor Pico.
7. Plug the power cord into the outlet and switch on the power switch on the back side of the sonication unit.
8. Plug the power cord into the outlet of the Bioruptor Cooler.
9. Press main switch on the front side of the Bioruptor Cooler.
10. Set the temperature to 4°C.
11. Detailed operating instructions for the Bioruptor Cooler are available at page 21.

System Operation

Touch screen: Allows the user to easily program the sonication of samples.

Interface

Go & Shear: Start a new shearing protocol

User Protocols: Record your protocol

Guidelines: Recommendations for your applications

Good Practices: Critical steps for Bioruptor maintenance and efficient shearing

Maintenance: Access for administrators

Information: General information about your Bioruptor Pico

Edit: Edit the parameter

Question mark: Some notes to guide you

Settings: Visualize and change the parameters of your Bioruptor Pico

Sound: Adjust the sound level

Brightness: Adjust the brightness of the screen

Language: Choose your voice language

Dots: Go back to the top menu

Technical Support: Contact information for technical questions

Commercial Support: Contact information for commercial questions

LED Bar Light

The LED light bar allows the tracking of the processing of your samples.

The **blue** light means the system is waiting for the operator.

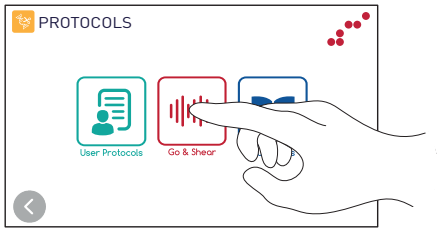
The **progressive green** light indicates the progression of the shearing process.

The **green** light indicates the end of the shearing process.

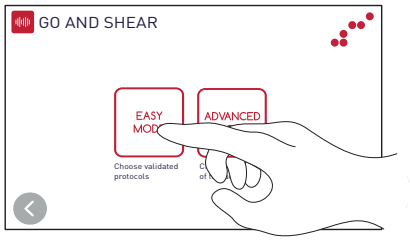
The **orange** light means the protocol is on pause.

The **red** light indicates an alert message.

Start Shearing Experiment

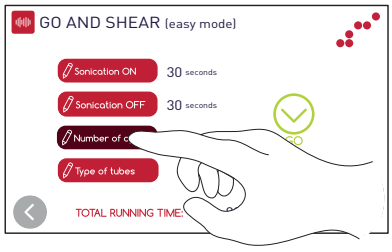


1. Click on '**Protocols**' icon of the top menu.
2. Click on '**Go & Shear**' icon to start a new protocol or click on '**User Protocols**' icon to find your pre-recorded shearing protocol.



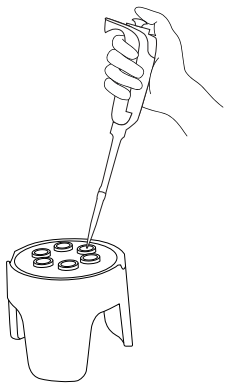
3. Select your mode. Find validated parameters on the **Easy Mode** or optimize your protocol with different levels of frequency on the **Advanced Mode**.

Enter Parameters

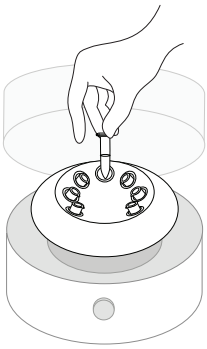


1. Enter the sonication time **ON**, the sonication time **OFF** and the number of cycles. These are the parameters controlling the shearing process:
   - the time **ON** is the time during which there is sonication;
   - the time **OFF** is the time during which there is no sonication but water circulation;
   - the cycle is made up of a time **ON** and a time **OFF**.
2. If **Easy Mode** was selected, select the tube type you plan to use. The Bioruptor will automatically swap to the correct frequency for optimal shearing of your samples. If **Advanced Mode** was selected, choose your level of frequency that is the most convenient for your application

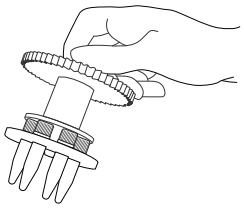
Prepare Samples



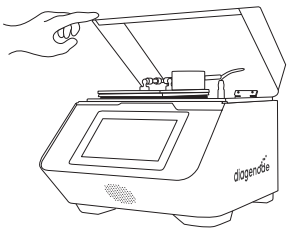
1. Fill the sonication tubes with same volume of sample. Use the recommended tubes and sample volumes for optimal shearing efficiency. Visit our Guidelines folder for more information.



2. Vortex and then spin your samples.

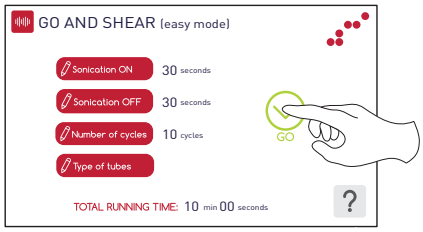


3. Fill all positions of the tube holder with your samples (or with water of same volume) and place it on the motorized lid.

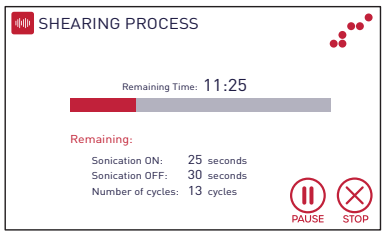


4. Close the lid to start the run. The sonication only starts when the cover is closed. The cover also prevents from any noise disturbance.

Start Processing & Monitor Progress



1. Click "**Go**" to start the shearing process. You will then be asked to check water temperature and right setting of your samples.

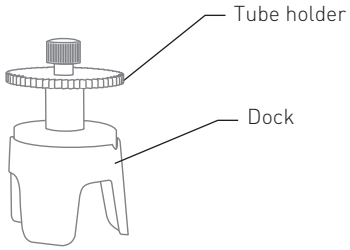


2. Once the run started, the running screen appears. The running screen indicates the elapsed time **ON**, time **OFF** and the number of cycles. A progress bar and the remaining time will be displayed on the screen. The led indicator lights up in green.

   You can pause or interrupt the shearing process by pressing the button pause or stop, respectively. If the cover will be opened during a run the sonication will automatically pause. Once the cover is again closed the machine continues with the sonication process.

3. You will get a notification on the screen once the shearing process ends successfully. Click "**OK**" to go back to the menu.

Tube Holders & Tubes



The holder is made up of a tube holder and its specific dock.

To guarantee homogeneity of chromatin or DNA shearing, the tube holders should always be completely filled with tubes. Never leave empty spaces in the tube holder. Fill the empty spaces with tubes containing the same volume of distilled water.

PRODUCT	VOLUME	CAT. NO.
Tube holder	0.2 ml	B01201144
	0.65 ml	B01201143
	1.5 ml	B01201140
Sonication accessories	15 ml	B01200016
Bioruptor® Tubes	15 ml	C30010017
Bioruptor® Tubes and sonication beads	15 ml	C01020031
Bioruptor® Microtubes	0.2 ml	C30010020
	0.65 ml	C30010011
	1.5 ml	C30010016

Maintenance Contract – Ensure Seamless Functionality

Hologic Diagenode is committed to ensuring the longevity and optimal performance of your Bioruptor®, offering maintenance services tailored to your instrument's needs. Our proactive approach to instrument care is designed to deliver peace of mind and maximize your equipment's uptime.

This annual contract includes an Essential Maintenance or a Continuity Maintenance plan and optional services for one or more instruments.

Investing in our Maintenance Contracts ensures the reliability of your Bioruptor® Pico, enhancing your daily operations. Protect your instrument, maintain seamless functionality, and achieve consistent results.

Essential

Proper maintenance is crucial for the longevity and optimal performance of your Bioruptor®. The Essential Maintenance Contract provides an all-encompassing one-year support package, ensuring comprehensive coverage for your instrument and experiments, including all manufacturing repairs.

Continuity

Maximize your Bioruptor® performance with our comprehensive one-year contract. Enhance reliability and prevent downtime to ensure your research continues uninterrupted.

Visit our website to learn more about our Maintenance Contracts

diagenode.com/categories/bioruptor-maintenance

Annual Maintenance Contracts for Bioruptor® Pico

Essential Maintenance Contract (G01030041)

- **Services Included:**
  - Unlimited technical support.
  - Priority assistance (response within 1 business day).
  - One Bioruptor® Pico DNA QC kit (C40010002).
  - Bioruptor® Pico Tube holder for 0.65 ml tubes (B01201143) for the first year.
  - Maintenance service for one year, covering repair for manufacturing errors, corrective maintenance service including spare parts.
  - Free firmware updates.
  - Transport costs.
  - Equipment for safe transport.
  - Voucher for Bioruptor® Pico consumables.

Continuity Maintenance Contract (G01030062)

- **Services Included:**
  - Everything in the Essential Maintenance Contract.
  - Consumable replacement due to instrument failures.
  - Preventive Annual Service.
  - Replacement Bioruptor® Pico throughout the contract period.

Validity and Acquisition

- **Contract Duration:**
  - 12 months, subject to termination by either party if the terms are not respected. Services will then be invoiced based on Hologic Diagenode rates.
- **Acquisition:**
  - The purchase of Bioruptor® Pico includes a one-year subscription to the Essential Maintenance Contract, effective from the installation date.
  - The contract can be extended up to five years.

- The Continuity Maintenance Contract can be subscribed at the time of purchase or anytime during the warranty period.
- Subscription outside the warranty period is allowed if the annual service is included in the first year.
- Necessary repairs identified during the mandatory service are not covered and will be invoiced separately.
- Extensions are not automatic and must be requested before the current contract expires. Hologic Diagenode reserves the right to refuse an extension.

- **Price list and payment:**
  - The total price of the maintenance contract is indicated on the quote accepted and signed by the customer.
  - The payment for the contract indicated in the quote must be made within 30 days of the invoice.

Equipment Coverage

- **Covered Equipment:**
  - Bioruptor® Pico
  - Bioruptor® Cooler

Hologic Diagenode Obligations

- **Response Time:**
  - Within one business day of customer request.
- **Corrective Maintenance:**
  - If equipment fails or DNA QC results do not meet standards, Hologic Diagenode will assess and perform necessary maintenance.
  - Maintenance is conducted at Hologic Diagenode production site in Liège, Belgium, including shipping and technical assistance.
  - Replacement parts are covered under the Essential or Continuity Maintenance Contracts.
- **Annual Service:**
  - Annual service includes a review of equipment conditions, electrical and mechanical procedures, sonication bath polishing, calibration, effectiveness testing, and full cleaning.
  - The cooling system service is excluded; only the sonication device is serviced.
  - Ordinary wear and tear parts are not covered.

- **Service Duration:**
  - Estimated at two to three weeks, excluding transport.
- **Service Performance:**
  - Hologic Diagenode commits to using all necessary means for maintenance performance.
  - Results are provided in a maintenance report, assessing equipment efficiency based on DNA fragment size and coefficient of variation.

Customer Obligations

- **Payment:**
  - Payment must be made within 30 days of the invoice.
- **Proper Use and Maintenance:**
  - Customers must follow recommended usage and maintenance guidelines. The contract does not cover damage from accidents, negligence, misuse, incorrect programming, power disturbances, or natural disasters.
- **Quality Control Compliance:**
  - Suspected malfunctions must be submitted for quality control per the DNA QC Kit protocol.
- **Cooperation:**
  - Customers must provide necessary documents/information and allow expert access to the equipment.
- **Acknowledgement:**
  - Customers must acknowledge service receipts and sign the report.
- **Non-renewal or Termination:**
  - If the contract expires or is terminated due to non-compliance, customers will be invoiced for services based on Hologic Diagenode rates.

Revision history

VERSION	DATE	DESCRIPTION OF MODIFICATIONS
001 Version 5 04_2025	April 2025	- Manual rebranding - Maintenane Contract addition (page 18) - Update warranty information

www.diagenode.com