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TissueRuptor® II User Manual

For low-throughput disruption of biological samples using disposable probes

Sample to Insight

QIAGEN

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Introduction

Thank you for choosing the TissueRuptor II system. We are confident it will become an integral part of your laboratory.

Before using the TissueRuptor II, it is essential you read this user manual carefully and pay particular attention to the safety information. The instructions and safety information in this user manual must be followed to ensure safe operation of the TissueRuptor II and to maintain the TissueRuptor II in a safe condition.

About this user manual

This user manual provides information about the TissueRuptor II in the following sections:

1. Introduction
2. Safety Information
3. General Description
4. Installation Procedures
5. Operating Procedures
6. Maintenance Procedures
7. Troubleshooting Guide

Appendices

The appendices contain the following:

- Technical data
- Warranty terms

Intended use of the TissueRuptor II

The TissueRuptor II is intended for molecular biology applications. This product is neither intended for the diagnosis, prevention, or treatment of a disease, nor has it been validated for such use either alone or in combination with other products. Therefore, the performance characteristics of the product for clinical use (i.e., diagnostic, prognostic, therapeutic, or blood banking) are unknown.

Requirements for TissueRuptor II users

This table covers the general level of competence and training necessary for transportation, installation, use, maintenance, and servicing of the TissueRuptor II.

Task	**Personnel**	**Training and experience**
Transportation	No special requirements	No special requirements
Installation, routine use, and maintenance	Laboratory technicians or equivalent	Appropriately trained and experienced personnel
Servicing	QIAGEN Instrument Service Specialists only	

Safety Information

Before using the TissueRuptor II system, it is essential that you read this user manual carefully and pay particular attention to the safety information. The instructions and safety information in the user manual must be followed to ensure safe operation of the TissueRuptor II and to maintain the TissueRuptor II in a safe condition.

The following types of safety information appear throughout this user manual:

WARNING 	The term WARNING is used to inform you about situations that could result in personal injury to you or other persons. Details about these circumstances are given in a box like this one.

CAUTION 	The term CAUTION is used to inform you about situations that could result in damage to the TissueRuptor II or other equipment. Details about these circumstances are given in a box like this one.

Each warning (W) or caution (C) can be identified by a reference number mentioned at the top right corner of their respective boxes (e.g., [W1], [C1], etc.).

The advice given in this manual is intended to supplement, not supersede, the normal safety requirements prevailing in the user's country.

Proper use

WARNING 	**Risk of personal injury and material damage** **[W1]** Improper use of the TissueRuptor II may cause personal injuries or damage to the instrument. The TissueRuptor II should only be operated by qualified personnel who have been appropriately trained. Servicing of the TissueRuptor II should only be performed by QIAGEN Instrument Service Specialists.

The TissueRuptor II should only be used for the applications described in the *TissueRuptor II Handbook*.

Perform the maintenance as described in "Maintenance Procedures," page 36. QIAGEN charges for repairs that are required due to incorrect maintenance.

CAUTION 	**Damage to the instrument** **[C1]** Avoid spilling water or chemicals onto the TissueRuptor II. Damage caused by water or chemical spillage will void your warranty.

In case of emergency, switch off the TissueRuptor II at the power switch and unplug the power cord from the power outlet.

CAUTION 	**Damage to the instrument** **[C2]** Make sure that the TissueRuptor II probe is submerged in lysis buffer before turning the TissueRuptor II on.

Electrical safety

WARNING	**Electrical hazard** **[W2]**
	Any interruption of the protective conductor (earth/ground lead) inside or outside the TissueRuptor II or disconnection of the protective conductor terminal is likely to make the TissueRuptor II dangerous. Intentional interruption is prohibited. **Lethal voltages inside the TissueRuptor II** When the TissueRuptor II is connected to line power, terminals may be live, and opening the TissueRuptor II or removing parts is likely to expose live parts.

To ensure satisfactory and safe operation of the TissueRuptor II, follow the advice below:

- Do not adjust or replace internal parts of the TissueRuptor II.
- Do not operate the TissueRuptor II with any covers or parts removed.
- If liquid has spilled inside the TissueRuptor II, switch off the TissueRuptor II, disconnect it from the power outlet, and contact QIAGEN Technical Services.
- If the TissueRuptor II becomes electrically unsafe, prevent other personnel from operating it, and contact QIAGEN Technical Services; the TissueRuptor II may be electrically unsafe if:
  - It or the line power cord appears to be damaged.
  - It has been stored under unfavorable conditions for a prolonged period.
  - It has been subjected to severe transport damage.

Environment

Operating conditions

WARNING 	**Explosive atmosphere** **[W3]** The TissueRuptor II is not designed for use in an explosive atmosphere.

To operate the TissueRuptor II under the correct conditions, see Appendix A (page 42).

Biological safety

When handling biological material, use safe laboratory procedures as outlined in publications such as *Biosafety in Microbiological and Biomedical Laboratories, HHS* **www.cdc.gov/od/ohs/biosfty/biosfty.htm**.

Samples

Samples may contain infectious agents. You should be aware of the health hazard presented by such agents and should use, store, and dispose of such samples according to the required safety regulations.

WARNING	**Samples containing infectious agents** **[W4]**
	Some samples used with the TissueRuptor II may contain infectious agents. Handle such samples with the greatest of care and in accordance with the required safety regulations. Always wear safety glasses, 2 pairs of gloves, and a lab coat. The responsible body (e.g., laboratory manager) must take the necessary precautions to ensure that the surrounding workplace is safe, and that TissueRuptor II operators are suitably trained and not exposed to hazardous levels of infectious agents as defined in the applicable Safety Data Sheets (SDSs) or OSHA,* ACGIH†, or COSHH‡ documents. Venting for fumes and disposal of wastes must be in accordance with all national, state, and local health and safety regulations and laws.

* OSHA: Occupational Safety and Health Administration (United States of America).

† ACGIH: American Conference of Government Industrial Hygienists (United States of America).

‡ COSHH: Control of Substances Hazardous to Health (United Kingdom).

Chemicals

WARNING	**Hazardous chemicals** **[W5]**
	Some chemicals used with the TissueRuptor II may be hazardous or may become hazardous after completion of the sample disruption process. Always wear safety glasses, gloves, and a lab coat. The responsible body (e.g., laboratory manager) must take the necessary precautions to ensure that the surrounding workplace is safe and that TissueRuptor II operators are not exposed to hazardous levels of toxic substances (chemical or biological) as defined in the applicable Safety Data Sheets (SDSs) or OSHA,* ACGIH†, or COSHH‡ documents. Venting for fumes and disposal of wastes must be in accordance with all national, state, and local health and safety regulations and laws.

* OSHA: Occupational Safety and Health Administration (United States of America).

† ACGIH: American Conference of Government Industrial Hygienists (United States of America).

‡ COSHH: Control of Substances Hazardous to Health (United Kingdom).

Toxic fumes

If working with volatile solvents, toxic substances, etc., you must provide an efficient laboratory ventilation system to remove vapors that may be produced.

WARNING 	**Toxic fumes** **[W6]** Do not use bleach to clean or disinfect used labware. Bleach in contact with salts from the buffers used can produce toxic fumes.

Waste disposal

Used labware, such as sample tubes, may contain hazardous chemicals or infectious agents from the sample disruption process. Such wastes must be collected and disposed of properly according to local safety regulations. For information on how to dispose of the TissueRuptor II, see Appendix A (page 43).

Mechanical hazards

WARNING 	**Moving parts** **[W7]** Avoid contact with moving parts during operation of the TissueRuptor II. Do not place your hands and fingers on the TissueRuptor II disposable probe.

Translations of warnings and cautions

This subsection contains translations of the warnings and cautions used in this user manual. Each warning or caution has a reference number in square brackets at the top right of its box.

WARNING 	The term WARNING is used to inform you about situations that could result in personal injury to you or other persons. Details about these circumstances are given in a box like this one.
DE	WARNING (WARNUNG) Warnung weist auf Situationen und Umstände hin, die zu einer Verletzung des Benutzers oder anderer Personen führen können. Nähere Angaben zu der Art der Gefährdung und der Vermeidung solcher Situationen werden in einem Textfeld wir diesem neben der Warnung gemacht.
FR	WARNING (DANGER) La formule WARNING (DANGER) est utilisée pour avertir des situations pouvant occasionner des dommages corporels à l'utilisateur ou à d'autre personnes. Les détails sur ces circonstances sont données dans un encadré semblable a celui-ci.

WARNING 	**Risk of personal injury and material damage** **[W1]** Improper use of the TissueRuptor II may cause personal injuries or damage to the instrument. The TissueRuptor II should only be operated by qualified personnel who have been appropriately trained. Servicing of the TissueRuptor II should only be performed by QIAGEN Instrument Service Specialists.

DE	**Verletzungsgefahr und Gefahr der Beschädigung des Geräts** Die unsachgemäße Bedienung des TissueRuptor II kann zu einer Verletzung des Benutzers oder zur Beschädigung des Geräts führen. Die Bedienung des TissueRuptor II darf nur durch qualifiziertes, entsprechend geschultes Personal erfolgen. Wartungsarbeiten am TissueRuptor II sollten nur durch Mitarbeiter des QIAGEN Kundendienstes durchgeführt werden.
FR	**Risque d'accident corporel et de détérioration du matériel** L'utilisation inappropriée du TissueRuptor II peut provoquer des accidents corporels ou une détérioration de l'appareil. Le TissueRuptor II ne doit être utilisé que par du personnel qualifié ayant été convenablement formé. Seul un ingénieur du service après-vente QIAGEN est autorisé à effectuer des travaux d'entretien sur le TissueRuptor II.

WARNING 	**Electrical hazard** **[W2]** Any interruption of the protective conductor (earth/ground lead) inside or outside the TissueRuptor II or disconnection of the protective conductor terminal is likely to make the TissueRuptor II dangerous. Intentional interruption is prohibited. **Lethal voltages inside the TissueRuptor II** When the TissueRuptor II is connected to line power, terminals may be live, and opening the TissueRuptor II or removing parts is likely to expose live parts.

DE	**Gefahr durch Stromschlag** Jede Unterbrechung des Schutzleiters (Erdungs- bzw. Masseleiter) im TissueRuptor II oder außerhalb des Geräts und jede Abtrennung des Schutzleiters am Anschluss der Netzleitung erhöht die Gefahr eines Stromschlags. Eine absichtliche Unterbrechung der Schutzleiterverbindung ist verboten. **Gefährliche Spannung im TissueRuptor II** Wenn der TissueRuptor II an die Stromversorgung angeschlossen ist, können die Anschlussstellen spannungsführend sein. Durch das Öffnen des TissueRuptor II oder das Entfernen von Teilen können spannungsführende Komponenten freigelegt werden.
FR	**Danger électrique** Toute interruption du conducteur de protection (conducteur de terre/de masse) à l'intérieur ou à l'extérieur du TissueRuptor II ou toute déconnexion de la borne du conducteur de protection est susceptible de rendre le TissueRuptor II dangereux. Toute interruption intentionnelle est interdite. **Tensions mortelles à l'intérieur du TissueRuptor II** Lorsque le TissueRuptor II est relié à l'alimentation, les bornes peuvent être sous tension et l'ouverture du TissueRuptor II ou le retrait de pièces risque d'exposer des éléments sous tension.

WARNING 	**Explosive atmosphere** **[W3]** The TissueRuptor II is not designed for use in an explosive atmosphere.
DE	**Explosionsfähige Atmosphäre** Der TissueRuptor II ist nicht für den Betrieb in einer explosionsfähigen Atmosphäre ausgelegt.
FR	**Atmosphère explosive** Le TissueRuptor II n'est pas conçu pour être utilisé dans une atmosphère explosive.

WARNING 	**Samples containing infectious agents** **[W4]** Some samples used with the TissueRuptor II may contain infectious agents. Handle such samples with the greatest of care and in accordance with the required safety regulations. Always wear safety glasses, 2 pairs of gloves, and a lab coat. The responsible body (e.g., laboratory manager) must take the necessary precautions to ensure that the surrounding workplace is safe, and that TissueRuptor II operators are suitably trained and not exposed to hazardous levels of infectious agents as defined in the applicable Safety Data Sheets (SDSs) or OSHA,* ACGIH†, or COSHH‡ documents. Venting for fumes and disposal of wastes must be in accordance with all national, state, and local health and safety regulations and laws.
DE	**Proben, die Infektionserreger enthalten** Einige der mit dem TissueRuptor II verwendeten Proben können Infektionserreger enthalten. Gehen Sie beim Umgang mit derartigen Proben mit der größtmöglichen Vorsicht und gemäß den erforderlichen Sicherheitsbestimmungen vor. Tragen Sie immer eine Schutzbrille, zwei Paar Laborhandschuhe und einen Laborkittel. Die verantwortliche Person (z. B. der Laborleiter) muss alle erforderlichen Vorsichtsmaßnahmen treffen, um sicherzustellen, dass die unmittelbare Umgebung des Arbeitsplatzes sicher ist und die Bediener des Geräts ausreichend geschult sind. Außerdem dürfen die Grenzwerte in Bezug auf Infektionserreger, die in den entsprechenden Sicherheitsdatenblättern (SDS) oder den Vorschriften der OSHA*, ACGIH† oder COSHH‡ festgelegt sind, nicht überschritten werden. Beim Betrieb eines Abzugs und bei der Entsorgung von Abfallstoffen müssen alle Bestimmungen und Gesetze zu Gesundheitsschutz und Sicherheit am Arbeitsplatz auf Bundesebene, Landesebene und kommunaler Ebene eingehalten werden.

FR	**Échantillons contenant des agents infectieux** Certains échantillons utilisés avec le TissueRuptor II peuvent contenir des agents infectieux. Manipulez ces échantillons avec la plus grande précaution et conformément aux règles de sécurité nécessaires. Portez toujours des lunettes de protection, 2 paires de gants et une blouse de laboratoire. La personne responsable (par exemple, le directeur du laboratoire) doit prendre les précautions nécessaires afin de garantir que le lieu de travail environnant est sûr et que les opérateurs du TissueRuptor II sont convenablement formés et ne sont pas exposés à des niveaux dangereux d'agents infectieux comme cela est défini dans les fiches techniques santé-sécurité (SDS) ou dans les documents de l'OSHA, de l'ACGIH† ou du COSHH‡ applicables. L'évacuation des vapeurs et la mise au rebut des déchets doivent être effectuées conformément à toutes les réglementations et lois nationales, régionales et locales relatives à la santé et à la sécurité.

WARNING 	**Hazardous chemicals** **[W5]** Some chemicals used with the TissueRuptor II may be hazardous or may become hazardous after completion of the sample disruption process. Always wear safety glasses, gloves and a lab coat. The responsible body (e.g., laboratory manager) must take the necessary precautions to ensure that the surrounding workplace is safe and that TissueRuptor II operators are not exposed to hazardous levels of toxic substances (chemical or biological) as defined in the applicable Safety Data Sheets (SDSs) or OSHA,* ACGIH†, or COSHH‡ documents. Venting for fumes and disposal of wastes must be in accordance with all national, state, and local health and safety regulations and laws.

DE	**Gefährliche Chemikalien** Einige der mit dem TissueRuptor II verwendeten Chemikalien können unter Umständen gefährlich sein oder nach Abschluss des Probenaufschlusses gefährlich werden. Tragen Sie immer eine Schutzbrille, Laborhandschuhe und einen Laborkittel. Die verantwortliche Person (z. B. der Laborleiter) muss alle erforderlichen Vorsichtsmaßnahmen treffen, um sicherzustellen, dass die unmittelbare Umgebung des Arbeitsplatzes sicher ist. Auch dürfen die Grenzwerte in Bezug auf infektiöse Erreger, die in den entsprechenden Sicherheitsdatenblättern (SDS) oder den Vorschriften der OSHA*, ACGIH† oder COSHH‡ festgelegt sind, nicht überschritten werden. Beim Betrieb eines Abzugs und bei der Entsorgung von Abfallstoffen müssen alle Bestimmungen und Gesetze zu Gesundheitsschutz und Sicherheit am Arbeitsplatz auf Bundesebene, Landesebene und kommunaler Ebene eingehalten werden.
FR	**Produits chimiques dangereux** Certains produits chimiques utilisés avec le TissueRuptor II peuvent être dangereux ou le devenir après l'exécution du processus de broyage d'échantillon. Toujours porter des lunettes de protection, des gants et une blouse de laboratoire. La personne responsable (par exemple, le directeur du laboratoire) doit prendre les précautions nécessaires afin de garantir que le lieu de travail environnant est sûr et que les opérateurs du TissueRuptor II ne sont pas exposés à des niveaux dangereux de substances (chimiques ou biologiques) toxiques comme cela est défini dans les fiches techniques santé-sécurité (MSDS) ou dans les documents de l'OSHA, de l'ACGIH† ou du COSHH‡ applicables. L'évacuation des vapeurs et la mise au rebut des déchets doivent être effectuées conformément à toutes les réglementations et lois nationales, régionales et locales relatives à la santé et à la sécurité.

WARNING 	**Toxic fumes** **[W6]** Do not use bleach to clean or disinfect used labware. Bleach in contact with salts from the buffers used can produce toxic fumes.
DE	**Giftige Dämpfe** Verwenden Sie zur Reinigung oder Desinfektion von gebrauchten Labormaterialien keine Chlorbleiche. Die Chlorbleiche kann bei Kontakt mit Salzen aus den verwendeten Puffern giftige Dämpfe bilden.
FR	**Vapeurs toxiques** N'utilisez pas de javellisant pour nettoyer ou désinfecter le matériel de laboratoire. Le contact d'un produit à base d'eau de Javel avec des sels provenant des tampons utilisés peut produire des vapeurs toxiques.

WARNING 	**Moving parts** **[W7]** Avoid contact with moving parts during operation of the TissueRuptor II. Do not place your hands and fingers on the TissueRuptor disposable probe.
DE	**Bewegliche Geräteteile** Um den Kontakt mit beweglichen Geräteteilen während des Betriebs des TissueRuptor II auszuschließen, dürfen Hände oder Finger nicht die Einweg- oder Metallspitze des TissueRuptor IIs berühren während das Gerät eingeschaltet ist.
FR	**Eléments mobiles** Afin d'éviter le contact avec les parties mobiles de l'appareil, ne pas placer les mains ou doigts sur la sonde jetable ou en inox pendant que le TissueRuptor II est en marche.

WARNING 	**Risk of electric shock** **[W8]** Do not attempt to disassemble the motor unit of the TissueRuptor II. **Risk of personal injury and material damage** Only perform maintenance that is specifically described in this user manual.

DE	**Gefährdung durch Elektrizität** Unter keinen Umständen darf die Motor-Einheit des TissueRuptor II auseinander gebaut werden. **Verletzungsgefahr und Beschädigung des Gerätes** Führen Sie nur Pflege- und Wartungsarbeiten durch, die in diesem Handbuch beschrieben sind.
FR	**Risque d'électrocution** Ne pas démonter le moteur du TissueRuptor II. **Risque de dommages corporels et matériels** N'effectuer que la maintenance spécifiquement décrite dans ce manuel.

WARNING 	**Hazardous chemicals and infectious agents** **[W9]** The waste contains samples and reagents. This waste may contain toxic or infectious material and must be disposed of properly. Refer to your local safety regulations for proper disposal procedures.
DE	**Gefährliche Chemikalien und infektiöse Agenzien** Der Flüssigabfall kann gesundheitsgefährdende Reagenzien oder infektiöses Probenmaterial enthalten und muss gemäß den lokalen Sicherheitsvorschriften entsorgt werden.
FR	**Risques chimiques et biologiques** Les bouteilles de déchets contiennent des échantillons et des réactifs. Ces déchets peuvent contenir des agents infectieux ou toxiques et doivent être éliminés selon les règles de sécurité du laboratoire.

WARNING 	**Toxic fumes** **[W10]** Do not use bleach to clean or disinfect the TissueRuptor II. Bleach in contact with salts from the buffers used can produce toxic fumes.
DE	**Giftige Dämpfe** Zur Reinigung oder Desinfektion des TissueRuptor II darf keine Chlorbleiche verwendet werden. Die Salze der benutzten Puffer können giftige Dämpfe bilden, wenn Sie mit Chlorbleiche in Kontakt gebracht werden.
FR	**Vapeurs toxiques** Ne pas utiliser de l'eau de Javel pour nettoyer ou désinfecter le TissueRuptor II. Les sels des tampons utilisés peuvent former des gaz toxiques au contact de l'eau de Javel.

CAUTION 	The term CAUTION is used to inform you about situations that could result in damage to the TissueRuptor II or other equipment. Details about these circumstances are given in a box like this one.
DE	CAUTION (ACHTUNG) ACHTUNG weist auf Situationen und Umstände hin, die zu einer Beschädigung des Gerätes führen können. Um einen Geräteschaden zu vermeiden, muss die genannte Anleitung unbedingt befolgt werden. Nähere Angaben zu der Art der Gefährdung und der Vermeidung solcher Situationen werden in einem Textfeld wie diesem gemacht.
FR	CAUTION (ATTENTION) Le terme CAUTION (Attention) est utilisé pour signaler les situations susceptibles de provoquer des détériorations de l'instrument ou d'autre matériel. Les détails sur ces circonstances figurent dans un encadré semblable à celui-ci.

CAUTION 	**Damage to the instrument** **[C1]** Avoid contact with moving parts during operation of the TissueRuptor II. Do not place your hands and fingers on the TissueRuptor disposable probe.
DE	**Beschädigung des Gerätes** Vermeiden Sie es, Wasser oder Chemikalien auf den TissueRuptor II zu spritzen. Durch verschüttete Chemikalien oder verschüttetes Wasser verursachte Geräteschäden sind nicht durch die Garantie abgedeckt.
FR	**Détérioration de l'instrument** Ne pas renverser de l'eau ou des produits chimiques sur le TissueRuptor II. Des dommages causés par de l'eau ou des produits chimiques ne seront pas pris en charge par la garantie de l'appareil.

CAUTION 	**Damage to the instrument** **[C2]** Make sure that the tip of the TissueRuptor II probe is submerged in lysis buffer before turning the TissueRuptor II on.
DE	**Beschädigung des Gerätes** Versichern Sie sich, dass das Ende der TissueRuptor II-Spitze mit Lysepuffer bedeckt ist, bevor Sie den TissueRuptor II anschalten.
FR	**Détérioration de l'instrument** Ne pas renverser de l'eau ou des produits chimiques sur la sonde du TissueRuptor II. Des dommages causés par de l'eau ou des produits chimiques ne seront pas pris en charge par la garantie de l'appareil.

CAUTION 	**Damage to the instrument** **[C3]** Do not use bleach, solvents, or reagents containing acids, alkalis, or abrasives to clean the TissueRuptor II.
DE	**Beschädigung des Gerätes** Zur Reinigung des TissueRuptor II darf keine Chlorbleiche, Lösungsmittel, saure oder alkalische Reagenzien oder Scheuermittel verwendet werden.
FR	**Détérioration de l'instrument** Ne pas utiliser de l'eau de Javel, des produits solvents ou abrasifs, ou de réactifs contenant des acides ou des solutions alcaliques pour nettoyer le TissueRuptor II.

Symbols on TissueRuptor II

The following table lists the instrument markings found on TissueRuptor II.

Note: The markings may differ depending on the model (country of use) of the TissueRuptor II.

Symbol	Location	Description
	Type plate (attached to the cable of the instrument) and Body label	CE Mark of European Conformity
	Type plate attached to the cable of the instrument	Legal Manufacturer
	Type plate (attached to the cable of the instrument) and Body label	Serial Number

	Type plate (attached to the cable of the instrument) and Body label	Waste Electrical and Electronic Equipment (WEEE) mark for Europe
	Body label	FCC Mark of the United Stated Federal Communications Commission
	Type plate attached to the cable of the instrument	RCM Mark for Australia/New Zealand
	Type plate attached to the cable of the instrument	RoHS mark for China (the restriction of the use of certain Hazardous substances in electrical and electronic equipment)

	Type plate (attached to the cable of the instrument) and Body label	Double insulated equipment
	Type plate attached to the cable of the instrument	TÜV SÜD NRTL certification mark (Canada and USA)
	Body label	PSE certification Mark (Japan)

General Description

The TissueRuptor II is a handheld rotor–stator homogenizer designed for rapid, efficient, and flexible disruption of a variety of biological samples, including plant and animal tissues. Samples are simultaneously disrupted and homogenized by a rotating blade (rotor–stator homogenization).

Disposable probes enable flexible sample disruption in a wide range of volumes and formats. Using a separate disposable probe for each sample provides ease of use and helps to prevent cross-contamination. The transparent disposable probe also enables visual control of the sample disruption process.

TissueRuptor II principle

Efficient sample disruption is a prerequisite for nucleic acid and protein purification procedures. Incomplete sample disruption can lead to significantly reduced yields and can increase the risk of clogging when using purification columns or magnetic particles. The TissueRuptor II thoroughly disrupts and simultaneously homogenizes biological samples in the presence of lysis buffer or liquid nitrogen (plant material only). The blade of the TissueRuptor II probe rotates at a very high speed causing the sample to be disrupted and homogenized by a combination of turbulence and mechanical shearing.

Features of the TissueRuptor II system

The TissueRuptor II system

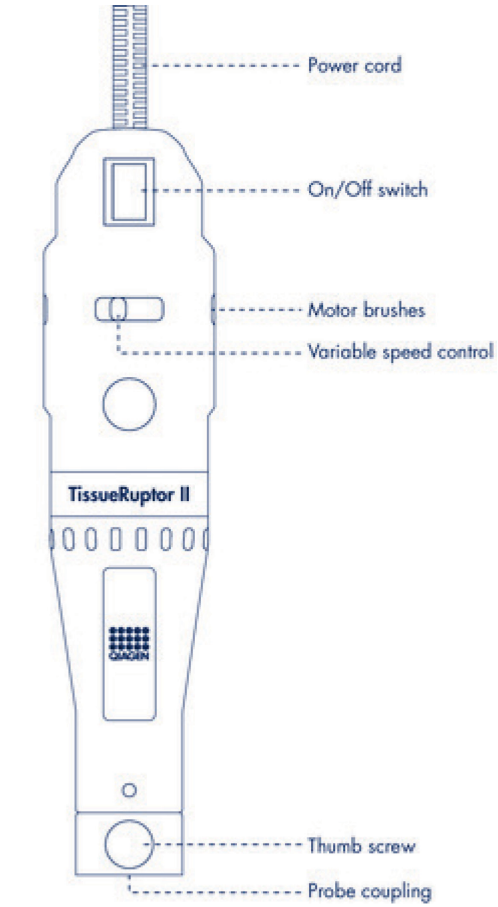


Figure 1. Schematic diagram of the TissueRuptor II.

Motor unit

The lightweight handheld motor unit provides speeds of 5,000–35,000 rpm (North America, Europe, UK, and Australia), or 5000–28,000 rpm (Japan), which drive the TissueRuptor II probe. Power is switched on and off by using the thumb slide switch located on the motor unit. When the switch is in the "off" position, the power is switched off. Sliding the switch slowly away from the "off" position switches on the power and progressively increases the speed of the motor. When the switch is set to the position farthest away from the "off" position, the motor is turning at full speed.

Probe adapter

The TissueRuptor II probe adapter enables a disposable probe to be installed onto the motor unit. The probe adapter is connected to the motor unit via the drive connect (see Figures 2 and 3).

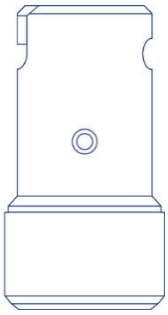


Figure 2. Adapter to be used with plastic probes.

Disposable probes

The TissueRuptor II is used with disposable probes (cat. no. 990890), which can be discarded after use. This helps to prevent cross-contamination and saves time as the probe does not have to be cleaned after homogenization of each sample. The disposable probe consists of a plastic rotor inside a plastic stator tube. For more information on TissueRuptor Disposable Probes, please refer to the *TissueRuptor II Handbook*.

Power cord

The power cord (attached to the TissueRuptor II) enables connection of the TissueRuptor II to a power outlet.

Applications

The TissueRuptor II enables disruption and homogenization of animal and human tissues as well as cells and plant tissues in a wide range of volumes and formats. For information about specific applications and protocols for sample disruption, see the *TissueRuptor II Handbook*.

Installation Procedures

Unpacking the TissueRuptor II

Before unpacking the TissueRuptor II, check whether the package is damaged. In case of damage, contact the transporter of the package.

After unpacking the TissueRuptor II, check that the following documents are supplied:

- Packing list
- Warranty registration form
- *TissueRuptor II User Manual*

Read the packing list to check that you have received all items. If anything is missing, contact QIAGEN Technical Services.

Check that the TissueRuptor II is not damaged. If anything is damaged, contact QIAGEN Technical Services. The TissueRuptor II should be stored dry when not in use.

Retain the original packaging in case you need to return the TissueRuptor II to QIAGEN for repair. Using the original packaging minimizes damage during transportation of the TissueRuptor II and avoids invalidation of your guarantee.

Installation requirements

Site requirements

The site of installation should be free of excessive moisture and dust, and should not be subjected to extreme temperature fluctuations. The TissueRuptor II must be located away from direct sunlight. The TissueRuptor II is for indoor use only.

Power requirements

The power line to the TissueRuptor II should be voltage-regulated and surge-protected. Make sure that the voltage rating of the TissueRuptor II is compatible with the AC voltage available at the installation site.

The TissueRuptor II operates at:

- 100 V AC, 50/60Hz 144W (Japan)
- 110/115/120 V AC, 60Hz 125W or 144W (North America)
- 220 V AC, 50Hz 144W (Europe, UK and Australia)

Grounding requirements

To protect operating personnel, the National Electrical Manufacturers Association (NEMA) recommends that the TissueRuptor II be correctly grounded (earthed). The TissueRuptor II housing and supplied power cord are double-insulated. The power cord should be plugged into an AC power outlet that has a ground (earth) connection.

Installing a disposable probe

The TissueRuptor II is used with disposable probes.

1. Check that the TissueRuptor II is disconnected from the power outlet.
2. Perform these steps as described in Figure 3:
   - 2a. Insert adapter into coupling.
   - 2b. Tighten thumbscrew.
   - 2c. Insert disposable probe into adapter.
   - 2d. Quarter turn clockwise to lock.

The TissueRuptor II is now ready to use.

Note: Always submerge probe in liquid before starting.

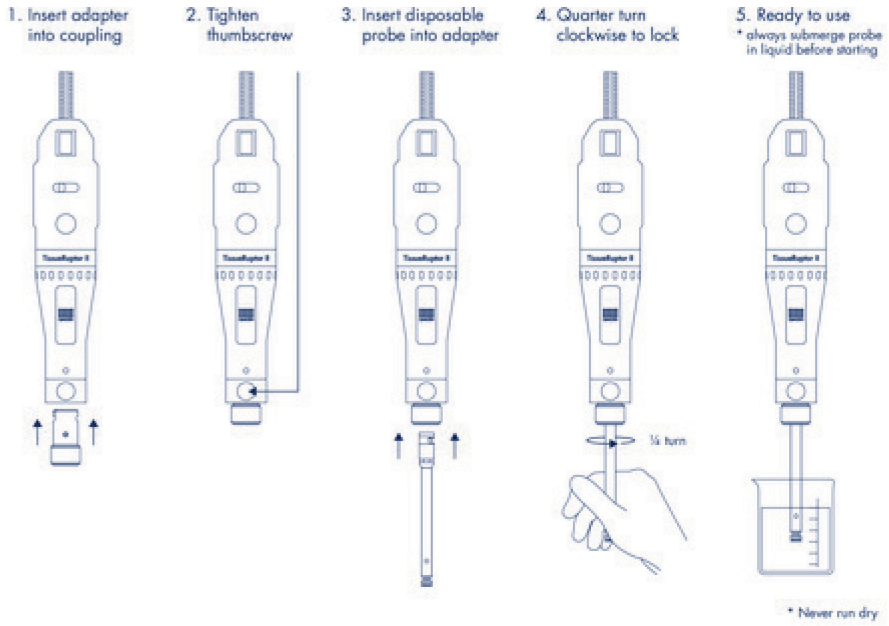


Figure 3. Attach the adapter and the plastic probes.

3. Insert TissueRuptor II probe adapter housing into the motor unit. Turn the probe to fit, then press the probe adaptor to lock.
4. To install a disposable probe, insert the flange end of the probe into the probe adapter, push it towards the motor, and twist the probe clockwise to lock it into place.
5. The TissueRuptor II is now ready for use.

Operating Procedures

This section describes how to operate the TissueRuptor II system. Before proceeding, you should familiarize yourself with the features of the TissueRuptor II by referring to page 27.

Sample disruption

The TissueRuptor II operates within a variable speed range of 5,000–35,000 rpm (North America, Europe, UK, and Australia) or 5000–28,000 rpm (Japan). Running the TissueRuptor II at full speed enables most efficient sample disruption. For detailed information about sample disruption and protocols, see the *TissueRuptor II Handbook*.

1. If a disposable probe is not already installed, follow the instructions under "Installing a disposable probe."
2. Ensure that the power switch is set to the "off" position.
3. Check that the voltage rating on the label of the homogenizer matches the voltage available at the installation site.
4. Plug the power cord into a grounded AC power outlet.
5. Place the sample to be disrupted into an appropriately sized vessel containing lysis buffer or liquid nitrogen (plant material only). Use a minimum volume of 180 µl lysis buffer in a suitably sized vessel (e.g., 2 ml microcentrifuge tube).

   Note: For efficient disruption of tissue samples, the size of the sample must not be greater than half the diameter of the TissueRuptor II probe. Cut the sample into smaller pieces, if necessary.

   Note: Solid particles, such as bones and teeth or large pieces of frozen tissue, may cause damage to the TissueRuptor II probe.

6. Place the tip of the probe into the tube containing the sample and lysis buffer or liquid nitrogen. To avoid damage to the TissueRuptor II and probe during sample disruption, make sure that the tip of the probe is submerged in the lysis buffer or liquid nitrogen. This also minimizes foaming during sample disruption.

   Note: Do not immerse disposable probes above the cone leading to the probe adapter and do not immerse the upper hole of the probe in lysis buffer since liquid may be drawn up the shaft into the motor housing.

7. Turn on the power by carefully sliding the power switch away from the "off" mark. The speed progressively increases, and when the switch is set to the position farthest away from the "off" mark, the homogenizer is running at full speed.
8. Move the tip of the probe within the sample tube during processing to increase the efficiency of disruption. The homogenization time depends on the sample type.
9. Turn off the TissueRuptor II by sliding the power switch back to the "off" position.
10. Disconnect the unit from the power outlet. Remove the probe from the probe adapter by pushing it towards the motor unit and rotating the probe counterclockwise.

Maintenance Procedures

Perform the following maintenance procedures to ensure reliable operation of the TissueRuptor II.

- Regular maintenance – after each use
- Periodic maintenance – when necessary; at least every 6 months

CAUTION 	**Damage to the instrument** **[C3]** Do not use bleach, solvents, or reagents containing acids, alkalis, or abrasives to clean the TissueRuptor II.

If solvents or saline, acidic, or alkaline solutions are spilt on the TissueRuptor II, wipe them away immediately.

Do not autoclave any part of the TissueRuptor II, except for the probe adapter and disposable probes.

WARNING 	**Risk of electric shock** **[W8]** Do not attempt to disassemble the motor unit of the TissueRuptor II. **Risk of personal injury and material damage** Only perform maintenance that is specifically described in this user manual.

Servicing

The TissueRuptor II is supplied with a warranty that lasts for 12 months, starting from the date of shipment. The warranty includes all repairs due to mechanical breakdown.

Regular maintenance

The housing of the motor unit should be wiped after use using a soft cloth moistened with a warm, mild detergent solution.

WARNING	**Toxic fumes** **[W10]**
	Do not use bleach to clean or disinfect the TissueRuptor II. Bleach in contact with salts from the buffers used can produce toxic fumes.

CAUTION	**Damage to the instrument** **[C3]**
	Do not use bleach, solvents, or reagents containing acids, alkalis, or abrasives to clean the TissueRuptor II.

Periodic maintenance

Cleaning the motor unit

Check that the TissueRuptor II is disconnected from the power outlet. The housing of the motor unit can be cleaned using a soft cloth moistened with a warm, mild detergent solution.

WARNING	**Toxic fumes** **[W10]**
	Do not use bleach to clean or disinfect the TissueRuptor II. Bleach in contact with salts from the buffers used can produce toxic fumes.

CAUTION	**Damage to the instrument** **[C3]**
	Do not use bleach, solvents, or reagents containing acids, alkalis, or abrasives to clean the TissueRuptor II.

Cleaning the probe adapter and drive connect

1. Check that the TissueRuptor II is disconnected from the power outlet.
2. If a disposable probe is installed, remove it from the probe adapter by pushing it towards the motor unit and rotating the probe counterclockwise.
3. Disconnect the probe adapter and remove it from the TissueRuptor II.
4. The drive connect and probe adapter can be cleaned with a soft lint-free cloth moistened with an ethanol-based disinfectant.

Decontaminating the TissueRuptor II

Check that the TissueRuptor II is disconnected from the power outlet. The housing of the motor unit can be cleaned using a soft cloth moistened with an ethanol-based disinfectant.

WARNING	**Toxic fumes** **[W10]**
	Do not use bleach to clean or disinfect the TissueRuptor II. Bleach in contact with salts from the buffers used can produce toxic fumes.

CAUTION	**Damage to the instrument** **[C3]**
	Do not use bleach, solvents, or reagents containing acids, alkalis, or abrasives to clean the TissueRuptor II.

Using Disposable Probes

1. If a disposable probe is installed, remove it from the probe adapter by pushing it towards the motor unit and rotating the probe counterclockwise.
2. Unthread the probe adapter and remove it from the TissueRuptor II.
3. Clean the probe adapter using a soft lint-free cloth moistened with an alcohol-based disinfectant.

Cleaning disposable probes

We recommend using each disposable probe once and discarding it after use. This helps to prevent cross-contamination and saves time as the probe does not have to be cleaned after homogenization of each sample. However, if you wish to reuse the disposable probes, they can be cleaned using one of the procedures described in the table on the next page.

Note: Do not clean disposable probes with solutions containing dichloromethane or phenolic derivatives and do not expose disposable probes to UV radiation.

	Procedure
Sterilization	Autoclaving: Probes can be autoclaved up to 5 times (15 minutes, 120°C)
	Formaldehyde: Probes can be incubated for 15 minutes in a solution of 37% formaldehyde*
Biological disinfection	Alcohol: Probes can be incubated for 15 minutes in 70% ethanol*
	Formaldehyde: Probes can be incubated for 15 minutes in a solution of 37% formaldehyde

* When working with chemicals, always wear a lab coat, disposable gloves, and protective goggles. For more information, consult the appropriate safety data sheets (SDSs) available from the product supplier.

Disposable probes should not be reused if they show the following signs of degradation:

- Cracking, crazing, or brittleness in the clear stator part
- Warping of the tube
- Black particles from the rotor part are found in the disrupted sample material
- Transparent tube turns opaque

Troubleshooting Guide

General troubleshooting

		Comments and suggestions
The TissueRuptor II is connected to the power outlet but does not work		
a)	Power cord is not connected to the power outlet	Check that the power cord is connected to the power outlet.
b)	Power outlet is switched off	Check that the power outlet is switched on.
The motor unit makes a "buzzing" sound but does not work		
a)	The brushes are incorrectly installed	Check that the brushes are installed properly.
b)	The brushes are worn	Check that the brushes are not worn. If the brushes are worn, replace them with new ones.
Speed of motor unit decreases or stalls intermittently or motor unit stops completely		
a)	The brushes are incorrectly installed	Check that the brushes are installed properly.
b)	The brushes are worn	Check that the brushes are not worn. If the brushes are worn, replace them with new ones.
Disposable probe has fused and/or broken during normal operation		
Not enough lysis buffer in the sample tube		Check that the sample tube contains the correct volume of lysis buffer. Repeat sample disruption using a new disposable probe and immerse the probe further into the buffer.
Disposable probes are difficult to insert or remove from the probe adapter housing		
Components may need cleaning		See under "Periodic maintenance," page 37.
Excessive splashing in sample tube		
Level of lysis buffer too low for size of tube		Add more lysis buffer to the sample tube.

Appendix A

Technical data

QIAGEN reserves the right to change specifications at any time.

Environmental conditions

Operating conditions

Power	100 V AC, 50/60Hz 144W (Japan), 110/115/120 V AC, 60Hz 125W or 144W (North America), 220 V AC, 50Hz 144W (Europe, UK, and Australia)
Place of operation	Upper and lower limits for temperature operation; optimal temperature for operation (4°C to 40°C/39°F to 104°F, Humidity: 5% to 95% RH)

Transportation conditions

Temperature	–25°C to 60°C (–13°F to 140°F) in manufacturer's package

Storage conditions

Temperature	–25°C to 60°C (–13°F to 140°F)

Mechanical data

Dimensions	Length: 20 cm (7.9 in.) excluding power cord and adapter for disposable probes Diameter: 6 cm (2.4 in.)
Mass	550 g (1.2 lb) including power cord and power connector but excluding mass of probe
Motor speed	5,000–35,000 rpm (North America, Europe, UK, and Australia), 5000–28,000 rpm (Japan)

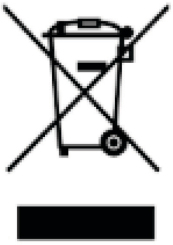
Sound level	<72 dB
Disposable probe	Probe diameter: 7 mm (0.3 in.), Probe length: 110 mm (4.3 in.)

Waste Electrical and Electronic Equipment (WEEE)

This section provides information about disposal of waste electrical and electronic equipment by users.

The crossed-out wheeled bin symbol (see below) indicates that this product must not be disposed of with other waste; it must be taken to an approved treatment facility or to a designated collection point for recycling, according to local laws and regulations.

The separate collection and recycling of waste electronic equipment at the time of disposal helps to conserve natural resources and ensures that the product is recycled in a manner that protects human health and the environment.



Recycling can be provided by QIAGEN upon request at additional cost. In the European Union, in accordance with the specific WEEE recycling requirements and where a replacement product is being supplied by QIAGEN, free recycling of its WEEE-marked electronic equipment is provided.

To recycle electronic equipment, contact your local QIAGEN sales office for the required return form. Once the form is submitted, you will be contacted by QIAGEN either to request follow-up information for scheduling collection of the electronic waste or to provide you with an individual quote.

Declaration of Conformity

Name and address of the company

QIAGEN GmbH
QIAGEN Strasse 1
40724 Hilden
Germany

An up-to-date Declaration of Conformity can be requested from QIAGEN Technical Support.

Appendix B

Warranty statement

Thank you for your purchase of QIAGEN instrumentation. Your instrument has been carefully tested to ensure optimum operating efficiency and reproducibility of results. QIAGEN warrants that all new instrumentation manufactured by QIAGEN will correspond to the product specifications and be free from defects in workmanship and materials for a period of twelve (12) months from the delivery date.

Repair or replacement of defective parts will be provided to the purchaser during this time period provided that the QIAGEN instrumentation is operated under conditions of normal and proper use, but not for damage caused by the customer. If any part or subassembly proves to be defective, it will be repaired or replaced at QIAGEN's sole option, subsequent to inspection at the factory, or in the field by an authorized factory representative, provided that such defect manifested under normal and proper use.

Limitation of warranties and remedies

THE FOREGOING WARRANTY IS QIAGEN'S SOLE AND EXCLUSIVE WARRANTY, AND REPAIR OR REPLACEMENT OF DEFECTIVE PARTS IS THE SOLE AND EXCLUSIVE REMEDY. THERE ARE NO OTHER WARRANTIES OR GUARANTEES, EXPRESS OR IMPLIED. THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY EXCLUDED, TO THE FULLEST EXTENT PERMITTED BY LAW. (NOTE: SOME STATES DO NOT PERMIT DISCLAIMERS OF IMPLIED WARRANTIES SO THIS LIMITATION MAY NOT APPLY TO YOU). WITH THE EXCEPTION OF THE ABOVE-REFERENCED REPAIR OR REPLACEMENT REMEDY, QIAGEN SHALL HAVE NO OBLIGATION OR LIABILITY OF ANY NATURE WHATSOEVER WITH RESPECT TO THE QIAGEN INSTRUMENTATION, WHETHER ARISING IN CONTRACT, TORT, STRICT LIABILITY, OR OTHERWISE, INCLUDING BUT NOT LIMITED TO, LIABILITY FOR INDIRECT,

CONSEQUENTIAL, INCIDENTAL AND/OR SPECIAL, PUNITIVE, MULTIPLE AND/OR EXEMPLARY DAMAGES AND/OR OTHER LOSSES (INCLUDING LOSS OF USE, LOST REVENUES, LOST PROFITS, AND DAMAGE TO REPUTATION), EVEN IF SUCH DAMAGES WERE FORESEEN OR FORSEEABLE, OR WERE BROUGHT TO QIAGEN'S ATTENTION. IN NO EVENT SHALL QIAGEN'S LIABILITY TO YOU EXCEED THE PURCHASE PRICE OF THE PRODUCT.

Liability clause

QIAGEN shall be released from all obligations under its warranty in the event repairs or modifications are made by persons other than its own personnel, except in cases where the Company has given its written consent to perform such repairs or modifications.

All materials replaced under this warranty will be warranted only for the duration of the original warranty period, and in no case beyond the original expiration date of original warranty unless authorized in writing by an officer of the Company. Read-out devices, interfacing devices and associated software will be warranted only for the period offered by the original manufacturer of these products. Representations and warranties made by any person, including representatives of QIAGEN, which are inconsistent or in conflict with the conditions in this warranty shall not be binding upon the Company unless produced in writing and approved by an officer of QIAGEN.

Ordering Information

Product	Contents	Cat. no.
TissueRuptor II (120V, 60Hz, US)	Handheld rotor-stator homogenizer 120V, 60 Hz (for North America), 5 TissueRuptor Disposable Probes	9002755
TissueRuptor II (100 V, 50/60 Hz, JP)	Handheld rotor-stator homogenizer 100 V, 50/60 Hz (for Japan), 5 TissueRuptor Disposable Probes	9002754
TissueRuptor II (230V, 50/60 Hz, EU/CH)	Handheld rotor-stator homogenizer, 230 V, 50/60 Hz (for Europe [excluding UK and Ireland]), 5 TissueRuptor Disposable Probes	9002756
TissueRuptor II (230 V, 50/60 Hz, UK)	Handheld rotor-stator homogenizer, 230 V, 50/60 Hz (for UK and Ireland), 5 TissueRuptor Disposable Probes	9002757
TissueRuptor II (230 V, 50/60 Hz, AUS)	Handheld rotor-stator homogenizer, 230 V, 50/60 Hz (for Australia), 5 TissueRuptor Disposable Probes	9002758
TissueRuptor Disposable Probes (25)	25 nonsterile plastic disposable probes for use with the TissueRuptor II	990890

For up-to-date licensing information and product-specific disclaimers, see the respective QIAGEN kit handbook or user manual. QIAGEN kit handbooks and user manuals are available at **www.qiagen.com** or can be requested from QIAGEN Technical Services or your local distributor.

Document Revision History

Date	Changes
R2 12/2018	Updated speed and power specifications for different countries. Layout updates.
R3 03/2019	Added the Symbols on the TissueRuptor II Homogenizer section; Updated procedure for installing a disposable probe; Updated procedure for cleaning the probe adapter and drive connect; Updated procedure for using disposable probes
R4 3/2022	Revised the power operating conditions of the instrument through the different regions (Japan; North America; and Europe, UK, and Australia). Editorial and layout changes.

Notes

Notes

Limited License Agreement for TissueRuptor II

Use of this product signifies the agreement of any purchaser or user of the product to the following terms:

1. The product may be used solely in accordance with the protocols provided with the product and this handbook and for use with components contained in the kit only. QIAGEN grants no license under any of its intellectual property to use or incorporate the enclosed components of this kit with any components not included within this kit except as described in the protocols provided with the product, this handbook, and additional protocols available at www.qiagen.com. Some of these additional protocols have been provided by QIAGEN users for QIAGEN users. These protocols have not been thoroughly tested or optimized by QIAGEN. QIAGEN neither guarantees them nor warrants that they do not infringe the rights of third-parties.
2. Other than expressly stated licenses, QIAGEN makes no warranty that this kit and/or its use(s) do not infringe the rights of third-parties.
3. This kit and its components are licensed for one-time use and may not be reused, refurbished, or resold.
4. QIAGEN specifically disclaims any other licenses, expressed or implied other than those expressly stated.
5. The purchaser and user of the kit agree not to take or permit anyone else to take any steps that could lead to or facilitate any acts prohibited above. QIAGEN may enforce the prohibitions of this Limited License Agreement in any Court, and shall recover all its investigative and Court costs, including attorney fees, in any action to enforce this Limited License Agreement or any of its intellectual property rights relating to the kit and/or its components.

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