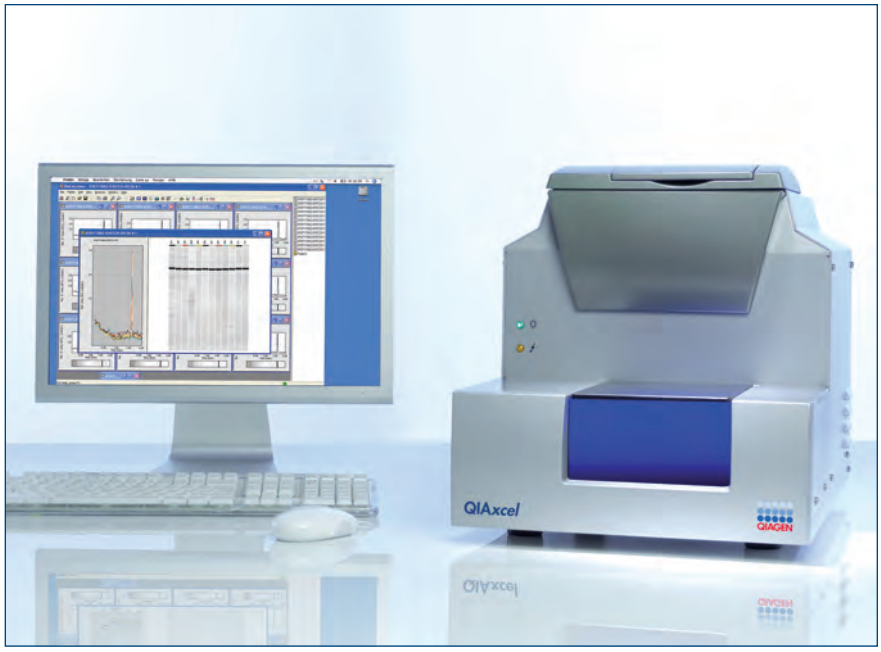
Version 1.0

QIAxcel User Manual



QIAGEN®

Sample & Assay Technologies

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1. Safety Information

1 Safety Information

Before using the QIAxcel, 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 instrument and to maintain the instrument in a safe condition.

The following types of safety information appear throughout this 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 instrument** or other equipment. Details about these circumstances are given in a box like this one.

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

1.1 Proper use

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

Perform the maintenance as described in Section 7. QIAGEN charges for repairs that are required due to incorrect maintenance.

WARNING 	**Risk of personal injury and material damage** [W2] The QIAxcel is too heavy to be lifted by one person. To avoid personal injury or damage to the instrument, do not lift the instrument alone.

WARNING 	**Risk of personal injury and material damage** [W3] Do not attempt to move the QIAxcel during operation.

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

In case of emergency, switch off the QIAxcel at the power switch at the rear of the instrument and unplug the power cord from the power outlet.

1.2 Electrical safety

Disconnect the line power cord from the power outlet before servicing.

WARNING 	**Electrical hazard** [W4] Any interruption of the protective conductor (earth/ground lead) inside or outside the instrument or disconnection of the protective conductor terminal is likely to make the instrument dangerous. Intentional interruption is prohibited. **Lethal voltages inside the instrument** When the instrument is connected to line power, terminals may be live, and opening covers or removing parts is likely to expose live parts.

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

- The line power cord must be connected to a line power outlet that has a protective conductor (earth/ground).
- Do not adjust or replace internal parts of the instrument.
- Do not operate the instrument with any covers or parts removed.
- If liquid has spilled inside the instrument, switch off the instrument, disconnect it from the power outlet, and contact QIAGEN Technical Services.

If the instrument becomes electrically unsafe, prevent other personnel from operating it, and contact QIAGEN Technical Services; the instrument may be electrically unsafe when:

- 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 stresses.

1.3 Environment

Operating conditions

WARNING 	**Explosive atmosphere** [W5] The QIAxcel is not designed for use in an explosive atmosphere.

WARNING 	**Risk of explosion** [W6] The QIAxcel is intended for use with reagents and substances supplied with QIAGEN QIAxcel Kits. Use of other reagents and substances may lead to fire or explosion.

CAUTION 	**Damage to the instrument** [C2] Direct sunlight may bleach parts of the instrument and cause damage to plastic parts. The QIAxcel must be located out of direct sunlight.

CAUTION 	**Damage to the cartridge** [C3] When in use, the gel cartridge should not be left out of the park ("WP") position of the solution tray for more than 15 minutes. Failure to comply will cause the capillary tips to dry out, affecting correct function of the cartridge. Dry tips will void the warranty. The capillary tips are made of glass and are very fragile. Take care not to knock the tips on any hard surfaces. Failure to comply will cause the capillary tips to break, affecting correct function of the cartridge. Broken tips will void the warranty.

1.4 Chemicals

WARNING 	**Hazardous chemicals** [W7] Some chemicals used with this instrument may be hazardous or may become hazardous after completion of the protocol run. 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 the instrument operators are not exposed to hazardous levels of toxic substances (chemical or biological) as defined in the applicable Material Safety Data Sheets (MSDSs) 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).

WARNING 	**Risk of fire** [W8] When cleaning the QIAxcel with alcohol-based disinfectant, leave the QIAxcel doors open to allow flammable vapors to disperse.

1.5 Waste disposal

Used labware and containers may contain hazardous chemicals. Such wastes must be collected and disposed of properly according to local safety regulations.

For information about how to dispose of the QIAxcel, see Appendix A.

1.6 Mechanical hazards

The cartridge door and sample door of the QIAxcel must remain closed during operation of the instrument.

WARNING 	**Moving parts** [W9] To avoid contact with moving parts during operation of the QIAxcel, the instrument must be operated with the cartridge door and sample door closed. If the door sensors are not functioning correctly, contact QIAGEN Technical Services.

1.7 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 wie 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'autres personnes. Les détails sur ces circonstances sont données dans un encadré semblable à celui-ci.

WARNING 	**Risk of personal injury and material damage** [W1] Improper use of the QIAxcel may cause personal injuries or damage to the instrument. The QIAxcel must only be operated by qualified personnel who have been appropriately trained. Servicing of the QIAxcel must only be performed by QIAGEN Field Service Specialists.
DE	**Verletzungsgefahr und Beschädigung des Gerätes** Die unsachgemäße Bedienung des QIAxcel kann zu einer Verletzung des Benutzers oder zur Beschädigung des Gerätes führen. Die Bedienung des QIAxcel darf nur durch qualifiziertes Personal, das entsprechend geschult wurde, erfolgen. Die Wartung des QIAxcel darf nur durch Mitarbeiter des QIAGEN Kundendienstes durchgeführt werden.
FR	**Risque de dommages corporels et matériels** L'utilisation non convenable du QIAxcel peut causer des blessures ou des détériorations de l'instrument. Le QIAxcel ne doit être utilisé que par du personnel qualifié qui a été formé de façon appropriée. Seul un ingénieur du service après-vente QIAGEN est autorisé à effectuer des travaux d'entretien sur le QIAxcel.

WARNING 	**Risk of personal injury and material damage** [W2] The QIAxcel is too heavy to be lifted by one person. To avoid personal injury or damage to the instrument, do not lift the instrument alone.
DE	**Verletzungsgefahr und Beschädigung des Gerätes** Der QIAxcel ist zu schwer um von einer Person gehoben zu werden. Um Verletzungen des Benutzers oder eine Beschädigung des Gerätes zu vermeiden ist davon abzusehen, das Gerät alleine zu heben.
FR	**Risque de dommages corporels et matériels** Le QIAxcel est trop lourd pour être soulevé par une personne. Pour éviter des dommages corporels ou matériels, ne pas soulever l'instrument tout seul.

WARNING 	**Risk of personal injury and material damage** [W3] Do not attempt to move the QIAxcel during operation.
DE	**Verletzungsgefahr und Beschädigung des Gerätes** Den QIAxcel während eines Laufes nicht bewegen.
FR	**Risque de dommages corporels et matériels** Ne pas essayer de bouger le QIAxcel pendant son fonctionnement.

WARNING 	**Electrical hazard** [W4] Any interruption of the protective conductor (earth/ground lead) inside or outside the instrument or disconnection of the protective conductor terminal is likely to make the instrument dangerous. Intentional interruption is prohibited. **Lethal voltages inside the instrument** When the instrument is connected to line power, terminals may be live, and opening covers or removing parts is likely to expose live parts.

DE	**Gefährdung durch Elektrizität** Das Gerät muss zum Betrieb immer geerdet sein. Es ist verboten, die Schutzleiter im Gerät oder in der Netzzuleitung zu trennen oder zu entfernen. **Gefährliche Spannung im Gerät** Auch in ausgeschaltetem Zustand kann an einigen Stellen im Gerät Netzspannung anliegen, wenn das Gerät am Stromnetz angeschlossen ist. Das Öffnen oder Entfernen von Gehäuseteilen kann diese stromführenden Teile freilegen.
FR	**Risque d'électrocution** Toute interruption du conducteur de protection à l'intérieur ou à l'extérieur de l'instrument, ou déconnexion du raccord du conducteur de protection (terre) peut rendre l'instrument dangereux. Il est interdit d'interrompre volontairement ce conducteur. **Présence de tensions mortelles dans l'instrument** Lorsque l'instrument est relié au secteur, les raccords peuvent être sous tension, et des parties sous tension peuvent être découvertes en ouvrant des capots ou en retirant des pièces (à l'exception de celles auxquelles il est possible d'accéder manuellement).

WARNING 	**Explosive atmosphere** [W5] The QIAxcel is not designed for use in an explosive atmosphere.
DE	**Explosionsfähige Atmosphären** Der QIAxcel darf nicht in explosionsfähigen Atmosphären betrieben werden.
FR	**Atmosphère explosive** Le QIAxcel n'est pas conçu pour fonctionner dans une atmosphère explosive.

WARNING 	**Risk of explosion** [W6] The QIAxcel is intended for use with reagents and substances supplied with QIAGEN QIAxcel Kits. Use of other reagents and substances may lead to fire or explosion.
DE	**Explosionsgefahr** Der QIAxcel ist ausschließlich mit Reagenzien und Substanzen aus den QIAxcel Kits zu benutzen. Die Benutzung von anderen Reagenzien oder Substanzen kann Feuer oder eine Explosion auslösen.
FR	**Risque d'explosion** Le QIAxcel a été conçu pour l'utilisation des réactifs et substances fournis par les kits QIAxcel. L'utilisation de réactifs et de substances autres que celles indiquées peut entrainer un risque d'incendie ou d'explosion.

WARNING 	**Hazardous chemicals** [W7] Some chemicals used with this instrument may be hazardous or may become hazardous after completion of the protocol run. 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 the instrument operators are not exposed to hazardous levels of toxic substances (chemical or biological) as defined in the applicable Material Safety Data Sheets (MSDSs) 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 in Verbindung mit diesem Gerät verwendeten Chemikalien sind gesundheitsgefährdend oder können nach Beendigung eines Protokoll-Durchlaufes gesundheits-gefährdend werden. Es sollten immer Sicherheitsbrille, zwei Paar Handschuhe und ein Laborkittel getragen werden. Der Betreiber der Anlage ist für die Gewährleistung der Sicherheit am Arbeitsplatz verantwortlich. Er hat sicherzustellen, dass die Bediener des Gerätes ausreichend geschult sind und nicht gesundheitsgefährdenden Konzentrationen toxischer Substanzen (chemischer oder biologischer) ausgesetzt sind, so wie dies in den Sicherheitsdatenblättern oder in anderen zu beachtenden Dokumenten festgelegt ist. Bei der Behandlung von Abluft und bei der Abfallbeseitigung sind alle gesetzlichen Regelungen zur Gesundheit und Sicherheit auf nationaler, regionaler und lokaler Ebene zu berücksichtigen.
FR	**Substances chimiques dangereuses** Certaines substances chimiques utilisées avec cet instrument peuvent être dangereuses ou peuvent le devenir après que le protocole ait été effectué. Toujours porter des lunettes de protection, deux paires de gants et une blouse de laboratoire. La personne responsable (par exemple le Chef du laboratoire) doit prendre les précautions nécessaires pour assurer la sécurité de l'environnement du poste de travail et pour être sûr que les opérateurs de l'instrument sont suffisamment formés et non exposés à des quantités dangereuses de substances toxiques (chimique ou biologique) comme défini dans "Material Safety Data Sheets (MSDS)" ou des documents "OSHA, ACGIH ou COSHH". L'évacuation des vapeurs et déchets doit être conforme à tous règlements et dispositions légales - au plan national, départemental et local - concernant la santé et la sécurité.

WARNING 	**Risk of fire** [W8] When cleaning the QIAxcel with alcohol-based disinfectant, leave the QIAxcel doors open to allow flammable vapors to disperse.
DE	**Feuergefahr** Beim Reinigen des QIAxcel mit einem auf Alkohol basierenden Desinfektionsmittel muss die Tür des QIAxcel offen gelassen werden, damit die brennbaren Dämpfe entweichen können.
FR	**Risque de feu** Lors du nettoyage du QIAxcel avec un désinfectant à base d'alcool, laisser la porte du QIAxcel ouverte pour permettre aux vapeurs inflammables de s'évaporer. Nettoyer le QIAxcel uniquement quand les composants de la table de travail ont refroidi.

WARNING 	**Moving parts** [W9] To avoid contact with moving parts during operation of the QIAxcel, the instrument must be operated with the cartridge door and sample door closed. If the door sensors are not functioning correctly, contact QIAGEN Technical Services.
DE	**Bewegliche Geräteteile** Um jeglichen Kontakt mit beweglichen Geräteteilen während des Laufes zu vermeiden, darf der QIAxcel nur benutzt werden, wenn die Klappen für den Proben und Cartridge Einsatz geschlossen sind. Sollten die Sensoren nicht ordnungsgemäß funktionieren, kontaktieren Sie bitten den Technischen Service von QIAGEN.
FR	**Eléments mobiles** Afin d'éviter tout contact avec les éléments mobiles du QIAxcel lorsqu'il est en marche, toujours fermer les portes de l'instrument pour les échantillons et pour la cartouche. Si les détecteurs ne fonctionnent pas correctement, contacter le Support Technique QIAGEN.

WARNING 	**Risk of overheating** [W10] To ensure proper ventilation, maintain a minimum clearance of 10 cm at the sides and rear of the QIAxcel. Slits and openings that ensure the ventilation of the QIAxcel must not be covered.
DE	**Überhitzung des Gerätes** Zur Sicherstellung einer ausreichenden Belüftung des QIAxcel muss ein Mindestabstand von 10 cm an den Seiten und an der Rückseite des Gerätes eingehalten werden. Lüftungsschlitze und –öffnungen des Gerätes nicht abdecken.
FR	**Risque de surchauffe** Laisser un espace d'au moins 10 cm sur les côtés et à l'arrière du QIAxcel pour assurer une ventilation efficace. Les grilles et prises d'air assurant la ventilation du QIAxcel ne doivent pas être couvertes.

WARNING 	**Risk of electric shock** [W11] Do not open any panels on the QIAxcel. **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 das Gehäuse des QIAxcel geöffnet werden. **Verletzungsgefahr und Beschädigung des Gerätes** Keine Pflege- und Wartungsarbeiten durchführen, die nicht in diesem Handbuch beschrieben sind.
FR	**Risque d'électrocution** Ne pas ouvrir les panneaux du QIAxcel. **Risque de dommages personnels et matériels** Réaliser uniquement la maintenance décrite spécifiquement dans ce manuel.

CAUTION 	The term CAUTION is used to inform you about situations that could result in **damage to the workstation** 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 spilling water or chemicals onto the QIAxcel. Damage caused by water or chemical spillage will void your warranty.
DE	**Beschädigung des Gerätes** Vermeiden Sie es, Wasser oder Chemikalien auf dem QIAxcel zu verschütten. Durch verschüttetes Wasser oder verschüttete Chemikalien verursachte Geräteschäden sind nicht durch die Garantie abgedeckt.
FR	**Déterioration de l'appareil** Eviter de renverser de l'eau ou des substances chimiques sur le QIAxcel. Tout dommage causé par de l'eau ou des produits chimiques mettra fin à la garantie.

CAUTION 	**Damage to the instrument** [C2] Direct sunlight may bleach parts of the instrument and cause damage to plastic parts. The QIAxcel must be located out of direct sunlight.
DE	**Beschädigung des Gerätes** Direktes Sonnenlicht kann Teile des Gerätes bleichen und Plastikteile schädigen. Der QIAxcel darf nicht ins direkte Sonnenlicht gestellt werden.
FR	**Détérioration de l'instrument** La lumière directe du soleil peut décolorer des parties de l'instrument et endommager des parties en plastique. Placer le QIAxcel en dehors de la lumière directe du soleil.

CAUTION 	**Damage to the cartridge** [C3] When in use, the gel cartridge should not be left out of the park ("WP") position of the solution tray for more than 15 minutes. Failure to comply will cause the capillary tips to dry out, affecting correct function of the cartridge. Dry tips will void the warranty. The capillary tips are made of glass and are very fragile. Take care not to knock the tips on any hard surfaces. Failure to comply will cause the capillary tips to break, affecting correct function of the cartridge. Broken tips will void the warranty.
DE	**Beschädigung der Kartousche** Die Gel Cartridge sollte nicht länger als 15 Minuten außerhalb der Parkposition ("WP") des Solution Trays aufbewahrt werden. Wird dieser Zeitrahmen überschritten, trocknen die Spitzen der Kapillaren aus. Ausgetrocknete Kapillarspitzen sind nicht durch die Garantie abgedeckt. Die Kapillarspitzen sind aus Glas und sehr zerbrechlich. Achten Sie darauf, die Spitzen nicht auf harte Oberflächen aufzusetzen. Dadurch können die Kapillaren brechen und damit die Funktion der Cartridge beeinträchtigen. Zerbrochene Kapillarspitzen sind nicht durch die Garantie abgedeckt.

FR	**Déterioration de la cartouche** Lors de l'utilisation de la cartouche de Gel, ne pas la laisser plus de 15 minutes hors de la position d'arrêt ("WP") du compartiment des liquides. Au-delà de cette période, les extrémités des capillaires risquent de se dessécher et d'influencer le bon fonctionnement de la cartouche. Des capillaires desséchées mettront fin à la garantie. Les extrémités des capillaires sont en verre et très fragiles. Faites attention à ne pas heurter une surface dure. Cela pourrait les casser et influencer le bon fonctionnement de la cartouche. Des extrémités de capillaires cassées mettront fin à la garantie.

CAUTION 	**Damage to the cartridge** [C4] If less than 12 samples are processed, fill the empty sample wells with QX DNA or RNA Dilution Buffer. Failure to do so may cause damage to those particular capillary channels.
DE	**Beschädigung der Kartousche** Werden weniger als 12 Proben prozessiert, müssen die leeren Wells mit QX DNA oder RNA Dilution Buffer gefüllt werden. Werden die Wells nicht mit den Puffern gefüllt, können die entsprechenden Kapillaren geschädigt werden.
FR	**Déterioration de la cartouche** Si vous utilisez moins de 12 échantillons, les puits vides doivent être remplis de tampon de dilution QX ADN ou ARN. Si les puits restent vides, les capillaires non-utilisées peuvent s'abîmer.

CAUTION 	**Damage to the instrument** [C5] Do not use bleach, solvents, or reagents containing acids, alkalis, or abrasives to clean the QIAxcel.
DE	**Beschädigung des Gerätes** Es dürfen keine Bleiche noch säure- oder laugehaltige Reinigungs- oder Scheuermittel benutzt werden.

FR	**Déterioration de l'appareil** Ne pas utiliser d'eau de Javel, de solvants ou de réactifs contenant des acides, des substances alcalines ou abrasives pour nettoyer le QIAxcel.

CAUTION 	**Damage to the instrument** [C6] Only use QIAxcel Kits with the QIAxcel. Damage caused by use of other kits or chemistries will void your warranty.
DE	**Beschädigung des Gerätes** Es dürfen ausschließlich QIAxcel Kits auf dem QIAxcel benutzt werden. Geräteschäden, die durch die Verwendung von anderen Kartuschen oder Reagenzien verursacht sind, sind nicht durch die Garantie abgedeckt.
FR	**Déterioration de l'instrument** Utiliser uniquement les kits QIAxcel sur l'appareil. Tout dommage causé par l'utilisation d'un autre type de cartouches ou de chimie mettra fin à la garantie.

CAUTION 	**Damage to the instrument** [C7] Do not use detergents, alcohol, or alcohol-based disinfectants to clean the QIAxcel door.
DE	**Beschädigung des Gerätes** Zur Reinigung der QIAxcel Tür keine Detergenzien oder auf Alkohol basierenden Reinigungsmittel benutzen.
FR	**Détérioration de l'appareil** Ne pas utiliser de détergents ou de désinfectants à base d'alcool pour nettoyer la porte du QIAxcel.

1.8 Symbols on the QIAxcel

Symbol	Location	Language	Description
CE	Type plate on the back of the instrument	EN	CE mark
	Plakette auf der Rückseite des Gerätes	DE	CE-Zeichen
	Plaque à l'arrière de l'appareil	FR	Marquage CE
C US	Type plate on the back of the instrument	EN	CSA listing mark for Canada and the USA
	Plakette auf der Rückseite des Gerätes	DE	CSA-Zeichen für Kanada und die USA
	Plaque à l'arrière de l'appareil	FR	Marquage CSA pour le Canada et les Etats-Unis
	Type plate on the back of the instrument	EN	Manufacturer
	Plakette auf der Rückseite des Gerätes	DE	Hersteller
	Plaque à l'arrière de l'appareil	FR	Fabricant

Symbol	Location	Language	Description
	Type plate on the back of the instrument	EN	WEEE mark for Europe
	Plakette auf der Rückseite des Gerätes	DE	WEEE-Zeichen für Europa
	Plaque à l'arrière de l'appareil	FR	Marquage WEEE pour l'Europe

2. Introduction

2 Introduction

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

Before using the QIAxcel, 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 instrument and to maintain the instrument in a safe condition.

2.1 About this user manual

This user manual provides information about the QIAxcel in the following sections:

Safety Information

1. Safety Information
2. Introduction
3. General Description
4. Installation Procedures
5. Operating Procedures
6. BioCalculator Software
7. Maintenance Procedures
8. Troubleshooting
9. Glossary

Appendices

The appendices include the following:

- Technical data
- QIAxcel methods and accessories
- Warranty terms

2.2 General information

2.2.1 Technical assistance

At QIAGEN we pride ourselves on the quality and availability of our technical support. Our Technical Services Departments

are staffed by experienced scientists with extensive practical and theoretical expertise in sample and assay technologies and the use of QIAGEN® products. If you have any questions or experience any difficulties regarding the QIAxcel or QIAGEN products in general, do not hesitate to contact us.

QIAGEN customers are a major source of information regarding advanced or specialized uses of our products. This information is helpful to other scientists as well as to the researchers at QIAGEN. We therefore encourage you to contact us if you have any suggestions about product performance or new applications and techniques.

For technical assistance and more information, please see our Technical Support Center at www.qiagen.com/goto/TechSupportCenter or call one of the QIAGEN Technical Service Departments or local distributors (see back cover or visit www.qiagen.com).

2.2.2 Policy statement

It is the policy of QIAGEN to improve products as new techniques and components become available. QIAGEN reserves the right to change specifications at any time.

In an effort to produce useful and appropriate documentation, we appreciate your comments on this user manual. Please contact QIAGEN Technical Services.

2.2.3 Version management

This document is the *QIAxcel User Manual*, version 1.0.

2.3 Intended use of the QIAxcel

The QIAxcel is a multicapillary electrophoresis instrument, designed to perform fast and fully automated DNA fragment analysis or qualitative and quantitative RNA analysis. The QIAxcel instrument is intended to be used only in combination with QIAxcel Kits for applications described in the respective QIAxcel Kit handbooks

The QIAxcel instrument is intended for use by professional users, such as technicians and physicians trained in molecular biological techniques and the operation of the QIAxcel instrument.

2.3.1 Requirements for QIAxcel users

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

Task	Personnel	Training and experience
Transportation	No special requirements	No special requirements
Installation	Laboratory technicians or equivalent	Appropriately trained and experienced personnel familiar with use of computers and automation in general
Routine use (running methods)	Laboratory technicians or equivalent	Appropriately trained and experienced personnel familiar with use of computers and automation in general
Servicing	**QIAGEN Field Service Specialists only**	

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3. General Description

3 General Description

The QIAxcel system performs fully automated separation of DNA and RNA fragments according to their molecular weight and can process up to 96 samples per run. The QIAxcel system consists of the QIAxcel instrument, a QIAxcel Kit (containing a QIAxcel Gel Cartridge and reagents), a computer, and BioCalculator™ software, which have been optimized to work together across a wide variety of applications and provide unmatched resolution, speed, and throughput for DNA and RNA analysis.

The BioCalculator software supplied with the QIAxcel provides both electropherograms and gel images of the nucleic acid separation and can be used to perform the following types of analysis:

- Determination of the size and concentration of DNA fragments
- Determination of the ratio, concentration, and quality of total RNA, and the quality of cRNA/cDNA and fragmented RNA/DNA

3.1 QIAxcel principle

The QIAxcel uses capillary electrophoresis (CE) to enable high resolution and sensitive separation of DNA and RNA samples. This 12-channel capillary electrophoresis instrument uses disposable, multiple-use cartridges for cost-effective analysis of up to 96 samples in as little as 40 minutes.

1. The QIAxcel is set up with a gel cartridge, running buffer, and wash buffer, and calibrated using intensity markers.
2. The samples for analysis (in a 96-well plate or 12-tube strips) are placed on to the sample plate holder.
3. Desired data collection settings are selected and the samples are run through the QIAxcel Gel Cartridge.
4. Data is analyzed using the powerful BioCalculator software.

3.2 External features of the QIAxcel

Figure 1. Front view of the QIAxcel.

1	Sample door	Allows access to the sample plate holder and buffer tray holder
2	Cartridge door	Provides access to the QIAxcel Gel Cartridge
3	N_2 door	Allows insertion and removal of the N_2 cylinder
4	Power on LED (green)	Indicates instrument is ON
5	High-voltage LED (amber)	Indicates instrument's high-voltage is ON
6	N_2 regulator/cylinder	Provides N_2 pressure
7	Buffer tray	Holds QX Separation and Wash Buffers
8	Sample plate holder	Holds up to 8 strips of 12 samples or a 96-well sample plate

Figure 2. Rear view of the QIAxcel.

1	Pressure gauge	Indicates system pressure
2	Power connection	AC power input
3	1/8 OD tubing fitting	External nitrogen input*
4	RS232	RS232 connection to PC

* If using an external N_2 source, the output pressure must not exceed 75 psi. The QIAxcel is equipped with an internal regulator that will regulate the pressure provided by the external N_2 source to approximately 40 psi, which is the instrument's operating pressure.

3.3 Gel cartridges

The QIAxcel can be operated using any of the QIAxcel Kits listed in Table 1. Each kit contains a gel cartridge that has been specifically developed for particular applications. Each gel cartridge consists of a gel-matrix with a proprietary linear polymer with ethidium bromide intercalating dye.

Table 1. QIAxcel Kits

Kit	Application
QIAxcel DNA High Resolution Kit (1200)	Analysis of DNA 15 bp – 5 kb in size. 96 samples can be analyzed in <1.5 hours
QIAxcel DNA Screening Kit (2400)	Quick analysis of DNA 15 bp – 5 kb in size. 96 samples can be analyzed in just 40 minutes
QIAxcel DNA Large Fragment Kit (600)	Analysis of DNA 15 bp – 10 kb in size. 96 samples can be analyzed in <3 hours
QIAxcel RNA Quality Control Kit (1200)	Analysis of RNA quality and quantity. 96 samples can be analyzed in <1.5 hours

Each QIAxcel Kit contains the following additional reagents that are required to operate the QIAxcel:

- QX Intensity Calibration Marker — calibrates the signal intensity for each new gel cartridge
- QX DNA or RNA Separation Buffer — enables separation of DNA or RNA molecules
- QX Wash Buffer — for washing the capillary tips to prevent cross-contamination
- QX DNA or RNA Dilution Buffer — for optimization of sample concentration
- Mineral oil — for covering solutions and/or samples to prevent evaporation

- QX Alignment Marker — used in every run to calibrate the migration time variation across all channels (included in the QIAxcel RNA Quality Control Kit only, and must be purchased separately for all other kits; see ordering information, Appendix E)
- QX DNA Size Marker (for use with QIAxcel DNA Kits only) — enables creation of a reference marker table allowing DNA size and concentration determination (not included in kit; see ordering information, Appendix E).

3.4 Computer and software

The QIAxcel is shipped with BioCalculator software.

A computer with the correct specification for operation of the QIAxcel instrument and BioCalculator software is supplied as part of the QIAxcel system. However, if a different computer is used to operate the QIAxcel instrument or run the BioCalculator software, then the following requirements are necessary:

- Pentium® IV 1.8 processor or higher
- 40 GB free hard drive capacity
- 512 MB RAM
- 1024 x 768 screen resolution
- Microsoft® Windows® XP Pro with Service Pack 2
- 9-PIN Serial Port or I/O card (not provided, contact QIAGEN Technical Service for more information).

For optimal performance the desktop theme should be set to "Windows Classic".

1. Right-click an empty space on the desktop, and then select "Properties" in the pop-up menu.
2. In the "Themes" tab, select *Windows Classic* in the "Theme" drop-down menu.
3. Click "OK".

In order to use the BioCalculator software, the USB software key should be inserted into the computer's USB port. Two USB software keys are available for use with the software:

- Blue USB software key (user key) — allows instrument control and data analysis — supplied with the QIAxcel instrument
- Green USB software key (data review key) — allows data analysis only — available separately

4. Installation Procedures

4 Installation Procedures

This section provides instructions on unpacking and installing the QIAxcel.

4.1 Requirements

Site

The QIAxcel must be located out of direct sunlight, away from heat sources, and away from sources of vibration and electrical interference. Refer to Appendix A for the operating conditions (temperature and humidity). The site of installation should be free of excessive drafts, excessive moisture, excessive dust, and not subject to large temperature fluctuations.

Use a level workbench that is large enough to accommodate the QIAxcel and computer. Refer to Appendix A for the weight and dimensions of the QIAxcel.

Ensure that the workbench is dry, clean, vibration-proof, and has additional space for accessories. Approximately 72 cm (28 inches) clearance above the workbench is recommended to allow cartridge loading.

The QIAxcel must be placed within approximately 1.5 m of a properly grounded (earthed) AC power outlet. The power line to the instrument should be voltage regulated and surge protected.

Note: We recommend plugging the instrument directly into its own wall socket and not to share the socket with other lab equipment. To achieve proper capillary electrophoresis separation, do not place the QIAxcel on a vibrating surface or near vibrating objects.

WARNING	**Explosive atmosphere** [W5] The QIAxcel is not designed for use in an explosive atmosphere.

WARNING	**Risk of overheating** [W10] To ensure proper ventilation, maintain a minimum clearance of 10 cm at the sides and rear of the QIAxcel. Slits and openings that ensure the ventilation of the QIAxcel must not be covered.

Power requirements

The QIAxcel operates at:

- 100–240 V AC, 50–60 Hz, 360 VA

Ensure that the voltage rating of the QIAxcel is compatible with the AC voltage available at the installation site. Main supply voltage fluctuations are not to exceed 10% of nominal supply voltages.

Grounding requirements

To protect operating personnel, the instrument is equipped with a 3-conductor AC power cord. To preserve this protection feature, do not operate the instrument from an AC power outlet that has no ground (earth) connection.

4.2 Unpacking the QIAxcel

Before unpacking the QIAxcel, move the package to the site of installation and check that the arrows on the package point upward. In addition, check whether the package is damaged. In case of damage, contact the transporter of the package. The shockwatch/tiltwatch indicator should be white. If it is red, broken, or missing, contact the transporter of the package.

When lifting up the QIAxcel, slide your fingers under both sides of the instrument and keep your back straight.

WARNING	**Risk of personal injury and material damage** [W2] The QIAxcel is too heavy to be lifted by one person. To avoid personal injury or damage to the instrument, do not lift the instrument alone.

After unpacking the QIAxcel, check that the following documents are supplied:

- Packing list
- Warranty registration form
- *QIAxcel User Manual*
- *Quick-Start Guide*

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

Check that the QIAxcel is not damaged and that there are no loose parts. If anything is damaged, contact QIAGEN Technical Services. Make sure that the QIAxcel has equilibrated to ambient temperature before operating it.

Retain the package in case you need to transport or ship the QIAxcel in the future. Instructions for packing the QIAxcel are given in Section 4.4. Using the original package minimizes damage during transportation of the QIAxcel.

Carefully place the QIAxcel onto the workbench where it will be used. For site requirements please refer to Section 4.1.

4.3 Installing the QIAxcel

Before operating the QIAxcel:

- The transport lock must be removed
- The power cord must be installed
- The N_2-regulator/cylinder must be installed

Releasing the transport lock

The QIAxcel is delivered with a transport lock that secures the tray/transport mechanism during shipment. This transport lock must be removed before the QIAxcel can be operated.

Note: Please reinstall the transport lock whenever shipping the instrument.

Remove the transport lock as follows:

1. Open the sample door.

2. Release the transport lock securing the buffer tray/sample plate holder.
3. Keep the transport lock in case you need to transport the QIAxcel in the future.

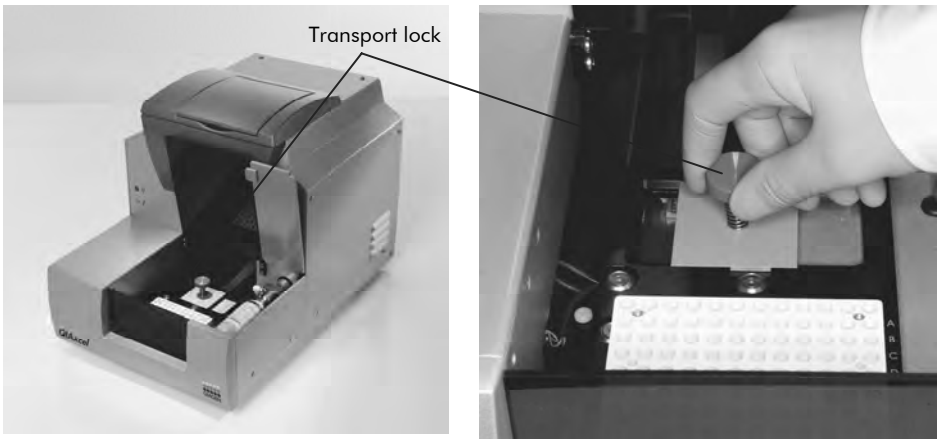


Figure 3. Removing the transport lock.

Instrument setup

Set up the QIAxcel as follows:

1. Set up the computer and monitor as described in the computer installation instructions provided with the computer.
2. Connect the RS232 serial cable from the instrument to the computer.
3. Insert the blue USB software key into the USB port of the computer.

Installation of AC power cord

Connect the QIAxcel to the power outlet as follows:

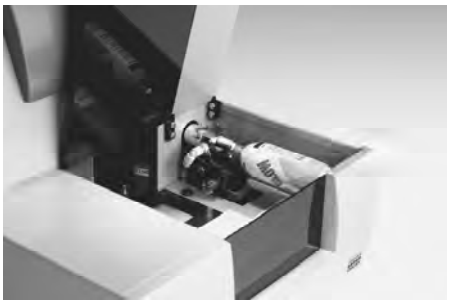
1. Ensure that the power switch of the QIAxcel is set to the off position.
2. Check that the voltage rating on the label at the back of the QIAxcel matches the voltage available at the installation site.
3. Plug the power cord into the power cord socket.
4. Plug the power cord into a grounded power outlet.

Installation of the N_2 cylinder

Important: Use only N_2 cylinders provided by QIAGEN (cat. no. 929705).

1. Ensure that the power switch of the QIAxcel is set to the off position.
2. Open the N_2 door and gently pull up on the N_2 cylinder port. Do not pull past the detent hole.
3. Screw the N_2 cylinder into the port clockwise.
4. Turn until the needle inside the port punctures the N_2 cylinder. Do not overtighten; the cylinder should only be finger tight.

5. Gently push down on the N_2 cylinder until it is in its stowed (down) position.
6. Close the N_2 door.



Installation of the BioCalculator software

For computer system requirements, please see Section 3.4. Install the BioCalculator software as follows:

From CD:

1. Place the CD in the computer's CD-ROM drive.
2. The Install Shield will guide you through the setup process. If the Install Shield does not start automatically, double-click on "My Computer" and double-click on the CD-ROM drive.
3. Select the **launch.exe** file. This will start the BioCalculator software installation.

From the Web site, www.qiagen.com/QIAxcel :

1. Connect to the Internet and open the Web page www.qiagen.com/QIAxcel .
2. Right-click on BioCalculator to download the installation program onto your computer.
3. Double-click on the downloaded **BioCalculator.msi** file.
4. The Install Shield will guide you through the setup process.

4.4 Packing the QIAxcel

WARNING	**Risk of personal injury and material damage** [W2] The QIAxcel is too heavy to be lifted by one person. To avoid personal injury or damage to the instrument, do not lift the instrument alone.

If you need to transport the QIAxcel, package the instrument as follows:

1. Switch on the QIAxcel.
2. Switch on the computer and launch the BioCalculator software.
3. Click "Change Buffer" in the "Instrument Control" window to move the buffer tray to the front of the instrument.
4. Open the sample door and remove the buffer tray.
5. Remove the QIAxcel Gel Cartridge from the QIAxcel and store in the QX Cartridge Stand as described in Section 5.1.
6. Close the BioCalculator software and switch off the QIAxcel.
7. Reinstall the transport lock holding down the sample plate holder (see Section 4.3).
8. Disconnect the RS232 serial cable from the instrument to the computer and remove the AC power cord.
9. Place the QIAxcel into the original packaging it was shipped in.

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5. Operating Procedures

5 Operating Procedures

This section describes how to operate the QIAxcel system.

Before proceeding, we recommend that you familiarize yourself with the features of the QIAxcel by referring to Section 3.

The QIAxcel cartridge door and sample door must remain closed during operation of the instrument. Only open the doors when the instrument is not operating or when instructed to do so by the software.

Note: Opening the cartridge door or sample door during operation of the QIAxcel will cause the system to stop the action it is currently performing. Any sample run in progress cannot be recovered. However, due to the small volume of sample used, a new run can be performed.

WARNING 	**Risk of personal injury and material damage** [W3] Do not attempt to move the QIAxcel during operation.

WARNING 	**Moving parts** [W9] To avoid contact with moving parts during operation of the QIAxcel, the instrument must be operated with the cartridge door and sample door closed. If the door sensors are not functioning correctly, contact QIAGEN Technical Services.

5.1 Unpacking a QIAxcel Kit

1. Carefully read the handbook supplied with the QIAxcel Kit before starting.
2. Remove all buffer bottles from the kit. Refer to the handbook for a detailed description of the kit contents.
3. Add 10 ml QX Wash Buffer to both reservoirs of the QX Cartridge Stand (provided with the QIAxcel instrument) reservoir and cover it with 2 ml mineral oil.
4. Remove the QIAxcel Gel Cartridge from its packaging and carefully wipe off any soft gel debris from the capillary tips using a soft tissue.
5. Remove the purge cap seal from the back of the QIAxcel Gel Cartridge and place it in the QX Cartridge Stand.

   Note: A soft tissue should be used to wipe off any gel that may have leaked from the port.

   Note: Ensure that the capillary tips are submerged in QX Wash Buffer.
6. New cartridges should be allowed to stabilize in the QX Cartridge Stand for 20 minutes prior to use.

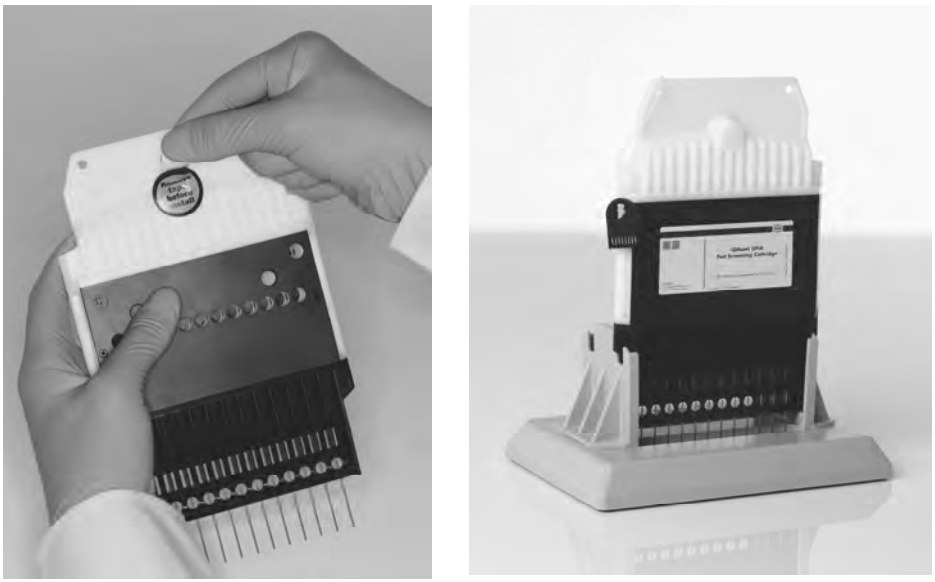


Figure 4. Preparing the QIAxcel Gel Cartridge.

5.2 Setting up the QIAxcel

5.2.1 Preparing the buffer tray

Important points before starting

- The 12-tube strip containing QX Alignment Marker should be equilibrated to room temperature (15–25°C) and centrifuged briefly before use.
- We recommend changing the alignment markers every 15–20 runs or 3 days, whichever comes first. Additional markers and buffers may need to be purchased (see ordering information in Appendix E).
- When not in use, store the 12-tube strip containing QX Alignment Marker at –20°C.
- The volumes of QX Separation Buffer and QX Wash Buffer provided are sufficient for the maximum number of runs stated on the gel cartridge.
- The 12-tube strips should fit loosely in the MARKER1 and MARKER2 positions. Tightly fitting tube strips or tube strips that are too loose may cause injection problems and damage the cartridge capillaries.
- Allow all reagents to equilibrate to room temperature before use.

Procedure

1. Wash the buffer tray in warm water using a mild detergent and rinse thoroughly with deionized or reverse-osmosis water.
2. Fill the WP and WI positions of the buffer tray with 8 ml of QX DNA or RNA Wash Buffer.
3. Fill the BUF position of the buffer tray with 18 ml of QX DNA or RNA Separation Buffer.
4. Add mineral oil to cover all 3 positions to prevent evaporation. Add 2 ml mineral oil to positions WP and WI, and add 4 ml mineral oil to position BUF.
5. Load 15 µl QX Alignment Marker into each well of a QX 0.2 ml 12-Tube Strip.

6. Add 1 drop of mineral oil to each well and insert the strip into the MARKER1 position of the buffer tray.
7. Load 15 µl QX Intensity Calibration Marker into each well of a QX Colored 0.2 ml 12-Tube Strip. Add a drop of mineral oil, and insert the strip into the MARKER2 position of the buffer tray.

5.2.2 Loading the buffer tray

1. Close the cartridge door and the sample door.
   Note: The QIAxcel cartridge and sample doors must remain closed during operation of the instrument. Opening either door during operation will cause the system to stop any action it is currently performing.
2. Click "Change Buffer" in the "Instrument Control" window to move the buffer tray to the front of the instrument.
3. Open the sample door.
4. Carefully place the filled buffer tray into the buffer tray holder.
   Be careful not to spill any solutions in the instrument or cause any cross-contamination between buffers loaded on the buffer tray.

   Note: The 12-tube strips should be positioned towards the front of the instrument with the buffers towards the back.
5. Close the sample door and click the "Park" button in the "Instrument Control" window to move the buffer tray to the WP position.

5.2.3 Installing a QIAxcel Gel Cartridge and smart key

Note: Read Section 5.1 prior to performing this procedure.

1. Remove the QIAxcel Gel Cartridge from the QX Cartridge Stand.
2. Open the cartridge door and insert the QIAxcel Gel Cartridge into the QIAxcel. The cartridge description label should be facing towards the front and the purge hole should be towards the rear of the system.

   Note: Ensure the purge cap seal has been removed as detailed in step 3.
3. Insert the smart key into the smart key socket. The smart key can be inserted in either direction.
4. Close the cartridge door.
   The cartridge ID and cartridge type will be displayed automatically in the "Instrument Control" window.
   Note: The system will not recognize the cartridge and will not operate if the smart key is not inserted.

5.3 Operating the QIAxcel

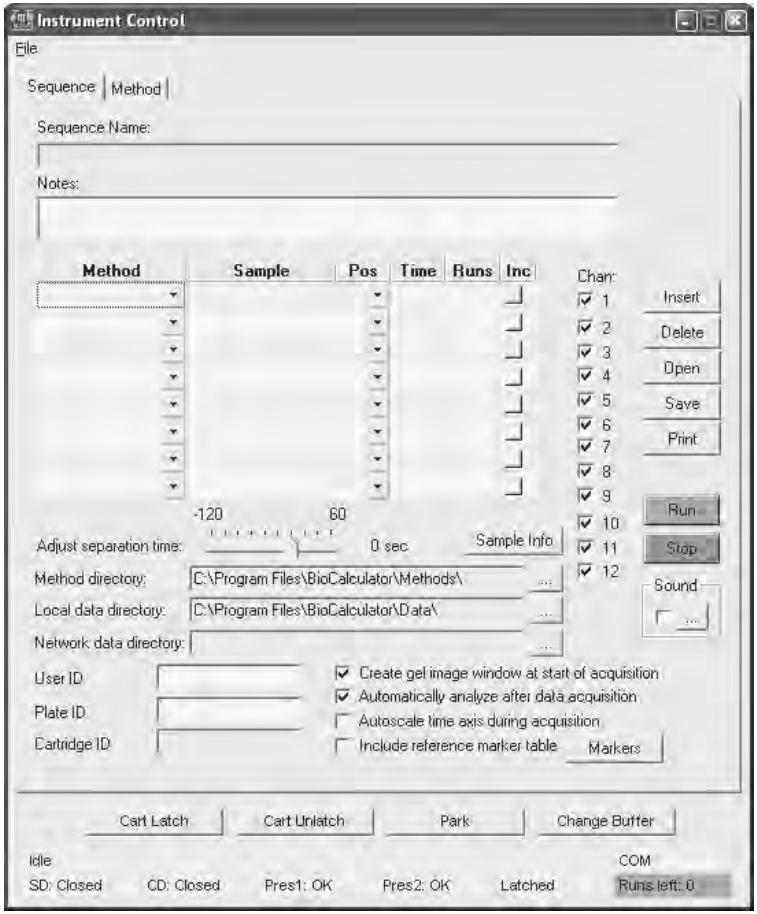
The "Instrument Control" window, which appears automatically when launching the BioCalculator software, is the user interface for the QIAxcel system.

The "Instrument Control" window contains 2 tabs — "Sequence" and "Method".

"Sequence" tab

Use this tab to enter user as well as sample information, select the separation methods to be used, and data output and storage information.

"Instrument Control" window with sequence tab selected



Sequence Name	Displays the current sequence file name. A sequence is the succession of methods being defined in this tab that are performed by the QIAxcel system.
Method	Enables selection of the method to be used for each row of samples. Click on the down-arrow to display a list of all available preinstalled methods for the specific QIAxcel Gel Cartridge inserted in the QIAxcel instrument. Multiple methods can be used for each row of samples. Each method will be performed sequentially, based on the information entered in the "Sample", "Pos", and "Runs" dialog fields.
Sample	Enter the sample filename. This name does not refer to an individual sample, but rather to a "sample group" (i.e., it describes all samples in the row). Sample names should consist of letters and/or numbers only with no spaces (i.e., ".", "/", and "@" symbols and other such characters are not allowed).
Pos	Select the sample position. Sample positions are to be entered based on the standard microplate row formatting (i.e., A–H). If no position information is entered, samples will be injected from position A, which is the default setting.

Time	Enter the sample injection time (recommendation 5–40 seconds). If no information is entered, the default setting for the method selected is used. If the signal is below the positive threshold (see Section 6.7.1), the sample injection time should be increased to give a higher signal intensity. If the signal is saturated, decrease the sample injection time.
Runs	Enter the number of runs (i.e., repeats of the same samples) that should be performed.
Inc.	Select this option to process the next sample row (i.e., if "Pos: A; Runs: 8; Inc.: enabled" are selected, processing will start at row A and continue with B through H).
Chan.	Check the channels for which data will be collected and displayed. Data are collected even if the channel is not selected; however, the data are not displayed during the analysis.
Insert	Click to insert a row into the sequence table. The row will be inserted above the currently selected row. This allows multiple methods to be performed on each row of samples, even when using a 96-well plate.
Open	Click to open a sequence file. A sequence file is a sequence of methods that has been previously used and saved.
Save	Click to save a sequence of methods as a sequence file.

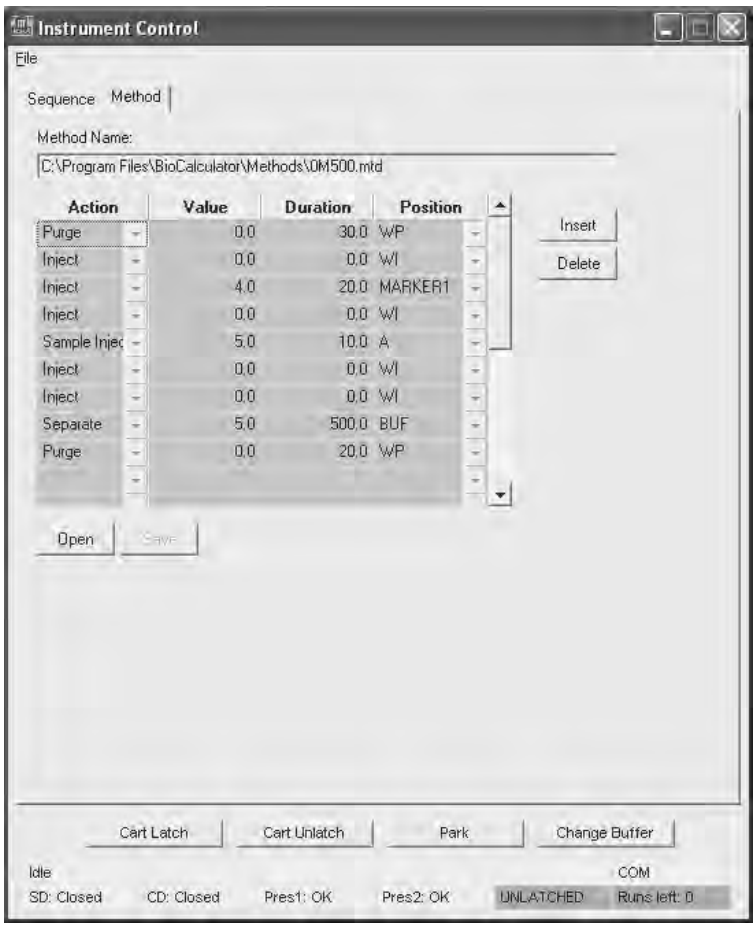
Run	Click to start the analysis of the samples loaded in the QIAxcel according to the methods selected. The cartridge will be latched automatically when the run starts.
Stop	Click to stop the sample analysis. The analysis cannot be resumed.
Adjust separation time	Increase or decrease the separation time before or during the run.
Sample Info	Sample information can be either imported from a previously created sample table (*.csv format) or manually entered. For more details, see page 5-17.
Notes	Enter notes that will be displayed/printed for each sequence.
Print	Print the sequence table.
Sound	Select an *.mp3 file for a sound or music to be played once the run is complete. Check the box to enable.
Method directory	Displays the file path on the computer's hard drive where the methods are saved. Click "…" to change the directory.
Local data directory	Choose the file path on the local drive where the data collected during the run will be stored. Click "…" to change the directory.
Network data directory	Choose the file path on the network drive where the data collected during the run will be stored. A local data directory must also be chosen when saving to the network. Click "…" to change the directory.

User ID	Enter a user name or identification. A subfolder will automatically be created under the selected data directory.
Plate ID	Enter plate identification. A sub-folder will automatically be created under the selected data directory. If a user name is entered, the Plate ID folder will be placed inside the User ID folder.
Cartridge ID	Displays the serial number and calibration status of the cartridge currently in use.
Create gel image at start of acquisition	Check this box to display data of the selected channels in a "Gel Image" window during the run.
Automatically analyze after data acquisition	Check this box to automatically analyze the data after the run is complete.
Autoscale time axis during acquisition	Check this box to autoscale each window during data acquisition.
Include reference marker table	Check this box to save the reference marker table (that was either created or uploaded) with each individual data file. When opening the data file, the reference marker table that was used will automatically be shown. See the QIAxcel handbook supplied with the kit for more information.
Markers	Click to upload a particular reference marker table to be used and saved with each individual data file. See the QIAxcel handbook supplied with the kit for more information.

"Method" tab

This tab in the "Instrument Control" window can be used to display information about the individual steps a method consists of, or to edit a method. In addition, this tab allows method parameters to be altered.

"Instrument Control" window with sequence tab selected



Method Name	Displays the file path of the folder containing the method selected in the "Sequence" tab.
Action	Lists the individual steps the QIAxcel performs during the method.
Value	Displays a value in kilovolts for each of the individual actions.
Duration	Displays the duration (in seconds) of each step.
Position	Displays the position on the buffer tray/sample plate holder that the action is performed on.
Insert	Click to insert an action into the method. The action will be inserted above the currently selected action.
Delete	Click to delete the action currently highlighted.
Open	Click to open a method.
Save	Click to save a method.

Buttons

Cart Latch	Click to latch a gel cartridge into place inside the QIAxcel. **Note**: The cartridge will be latched automatically when the run starts.
Cart Unlatch	Click to unlatch a gel cartridge for removal from the QIAxcel.

Park	Click to move the cartridge to the WP position of the buffer tray. This should be done after the buffer tray containing the necessary buffers has been inserted into the buffer tray holder.
Change Buffer	Click to move the buffer tray to the front of the instrument for easier access.

"Status Panel"

The "Status Panel" is at the bottom of the "Instrument Control" window and displays information on the status of the QIAxcel instrument.

Idle	The system is ready to perform a run.
SD	Sample door is either "Closed" or "Open".
CD	Cartridge door is either "Closed" or "Open".
Pres1	N_2 pressure: "OK" indicates adequate pressure for the sample run. "LOW" indicates that the N_2 pressure is sufficient for the current sample run; however, the N_2 cylinder should be replaced once the run has finished (see Section 7.2.2).
Pres2	N_2 pressure: "OK" indicates adequate pressure for the sample run. "LOW" indicates that the N_2 pressure is insufficient for the current sample run and the analysis will not be performed. The N_2 cylinder should be replaced as described in Section 7.2.2.
Latch/Unlatch	Status of QIAxcel Gel Cartridge engagement (i.e., latched [Latch] or unlatched [Unlatch]).

Runs left	Number of runs remaining for the QIAxcel Gel Cartridge currently inserted.
COM/ NO COM	Communication status between the QIAxcel instrument and the computer (i.e., communicating [COM] or not communicating [NO COM]).

"File" menu

Settings	Select to display the "Settings" dialog box. For more details, see next page.
Detector Test	Select to perform a 1-second detector test for all 12 channels. A detector test may be performed when one or more channels in a new cartridge do not provide data signals and the baseline is flat. An output file (**detector.asc**) will be generated and saved in the main directory (**C:\Program Files\BioCalculator**).
Intensity Calibration	Select to calibrate a QIAxcel Gel Cartridge. Cartridges should only require calibration prior to their first use. See Section 5.4 for more details.
Autostart	Select to automatically display the "Instrument Control" window when the BioCalculator software is launched.
Version	Select to display the software and firmware version.

"Settings" dialog box

The "Settings" dialog box displays a number of factory set parameters. We recommend that you consult with QIAGEN Technical Services prior to altering these settings.

Comm. port	When using a laptop with a USB-to-serial port adapter, the computer port must be configured correctly. Check the "Device Manager" properties in Microsoft Windows to find the correct port number.
Rise time (s)	Increasing the rise time (the frequency of data collection) will help reduce background/baseline noise, but will decrease resolution and create broader peaks. Decreasing the rise time will help provide higher resolution and sharper peaks, but the background/baseline noise will increase. Default setting is 0.3 seconds.
Positions	This section displays the transport settings. These settings are locked and cannot be changed.
Purge	This button releases the remaining pressure from a N_2 cylinder prior to its removal. The purge lasts for 3 minutes. After the purge is complete, remove the N_2 cylinder. Refer to Section 7.2.2 for removal instructions. The purge function can also be used to clean an old gel cartridge (see Appendix C, page C-11).
Filter Check	This button starts a routine to check for a clogged or contaminated purge filter.
Leak Check	This button starts a routine to check for a N_2 leak within the system.

Entering sample information

Sample information can either be imported from a previously created sample table (*.csv format) or entered manually.

1. Click on the "Sample Info" button in the "Instrument Control" window under the "Sequence" tab.
   The "Sample Information" dialog box appears. This dialog box displays a table which is labeled according to the standard microplate format. Rows are labeled A–H and columns are numbered 1–12.
2. Sample details can be either entered manually or a previously saved sample table can be imported using the "Open" button. The imported data should be in comma separated value (*.csv) format.
   Note: When using Microsoft Excel®, row and column labels are reversed compared to the BioCalculator sample information table. Please also ensure tables created in Microsoft Excel are saved as *.csv files. The BioCalculator software will not recognize *.xls files.

5.4 Performing cartridge intensity calibration

Every new cartridge requires intensity calibration prior to sample analysis. The intensities of each capillary are normalized and a factor is applied for every subsequent run. This corrects for natural intensity reading variations between each capillary in the cartridge. The data for each cartridge intensity calibration are stored in a single file named **calibration.log**. This file is saved in the BioCalculator root directory **C:\Program Files\BioCalculator**.

If for any reason a different computer is used to the one containing the calibration.log file, the file should be transferred to the new computer. Otherwise, recalibration of the cartridge is required. Likewise, if the QIAxcel Gel Cartridge is used on a different QIAxcel instrument to the one it was calibrated on, another intensity calibration should be performed.

Running the calibration wizard

Note: The total run time for the calibration routine is about 16 minutes.

1. Launch the calibration wizard by selecting "File/Intensity Calibration" in the "Instrument Control" window.
2. Click "Start" to begin the cartridge intensity calibration.
3. Once the calibration is complete, the "Calibration Verification" dialog box will open. This will show either a "Pass" or "Fail" for each channel.
   Note: A successfully calibrated cartridge should have a normalized area calibrated range between 0.004–0.006.
4. If one or more channels fail, the calibration process should be repeated.

Cartridge intensity recalibration

1. Load QX Intensity Calibration Marker onto the buffer tray as detailed in step 7, page 5-5.
2. Launch the calibration wizard by selecting "File/Intensity Calibration" in the "Instrument Control" window.
3. Click "Recalibrate", and then "Start" to repeat the calibration routine.

5.5 Method selection

A number of default methods are available for each QIAxcel Kit. When a cartridge is installed, only the methods available for the particular cartridge type installed can be selected.

Note: If you require a custom method to be created, please contact QIAGEN Technical Services.

Each method name is an acronym, providing information on the specific QIAxcel Kit/QIAxcel Gel Cartridge being used, the sample injection time and voltage, and the separation time and voltage (see Figure 5).

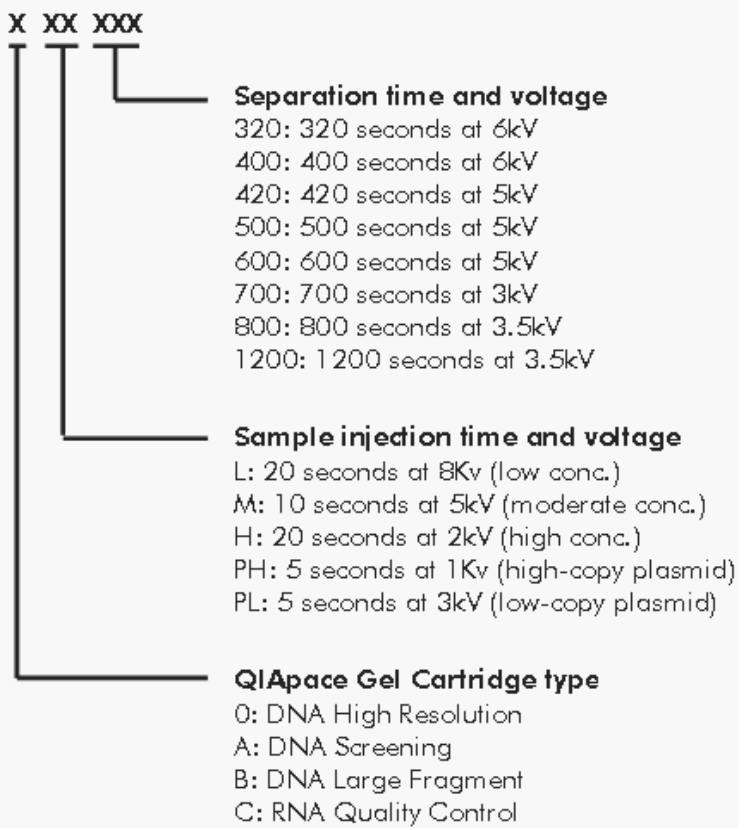


Figure 5. Method name acronyms.

For a complete list of methods available for each QIAxcel Gel Cartridge type and information regarding their associated fragment sizes and best resolution, refer to Appendix C, page C-1.

5.6 Running a method

Default methods are preinstalled on the QIAxcel. Refer to the handbook supplied with the QIAxcel Kit, or Appendix C, page C-1, to select the optimum method for your requirements.

Things to do before starting

- Carefully read the handbook supplied with the QIAxcel Kit.
- Prepare the reagents and QX Alignment Marker to be used. For instructions on how to do this, see Section 5.2, or refer to the QIAxcel Kit handbook.
  Note: A QX Alignment Marker is required for size determination.
- Prepare your samples. Refer to the handbook supplied with the QIAxcel Kit for instructions on how to do this. For optimal results, the sample solution should be pH 6–9 and should not have an ionic content greater than that of a typical PCR buffer.

CAUTION	**Damage to the cartridge** [C4] If less than 12 samples are processed, fill the empty sample wells with QX DNA or RNA Dilution Buffer. Failure to do so may cause damage to those particular capillary channels.

- **DNA samples only**: Create a DNA size marker reference table before running samples. Refer to the QIAxcel Kit handbook for instructions on how to do this.
  Important: Without a size marker reference table, the automatic analysis function will not operate.

Procedure

1. Switch on the QIAxcel at the power switch.
   The instrument automatically performs initialization tests.
2. Switch on the computer and launch the BioCalculator software. The "Instrument Control" window will appear.

3. Install the QIAxcel Gel Cartridge to be used as described in "Installing a QIAxcel Gel Cartridge and smart key", page 5-6.
4. Load the buffer tray containing the QX Alignment Marker onto the buffer tray holder as described in "Loading the buffer tray", page 5-5.
5. Load the sample strips (in position A) or a 96-well plate onto the sample plate holder.
6. Select a method according to the method options. Refer to page Appendix C for more information on the default methods available.
7. Enter the sample name, position, and number of runs in the "Instrument Control" window.
8. In the time column, enter the sample injection time (minimum: 5 s; maximum: 40 s). When left blank, the default settings for the method chosen are used.
9. To perform multiple analyses of the same row, enter the number of repeats in the "Runs" field. To run a 96-well plate, check the increments box ("Inc.") and enter 8 in the "Runs" field.
   Note: The same method and injection time will apply to all runs. Separate methods can be applied to each row of samples (see Section 5.3 for more details).
10. Select the data directory where the run data should be stored.
    Note: Subfolders will be created in the data directory by optionally entering User ID and Plate ID in the corresponding dialog box fields.
11. Click the "Sample Info" button to enter sample information for each well. Alternatively, sample information previously set up in a spreadsheet can be imported in ***.csv** file format.
12. Make sure that the separation channels to be used are checked (i.e., if running only a few samples, just check those channels which are to be used).
    Note: Unused wells should contain QX DNA or RNA Dilution Buffer to prevent damage to the channel.

13. Check “Create gel image window at start of acquisition”.
14. Check “Automatically analyze after data acquisition”.
15. Check “Include reference marker table”.
16. Click the “Marker” button to open the “Reference Markers” dialog box

    DNA samples: select either “Size/conc.” (to measure the DNA fragment size and concentration) or “Conc.” (to measure only the DNA fragment concentration) in the drop-down list. If selecting “Size/conc.”, also open the desired DNA reference marker. Ensure that the same method used to create the DNA reference marker table is used for the analysis.

    RNA samples: select “Conc.” in the drop-down list (see *QIAxcel RNA Handbook* for further instruction).
17. Check the status of the QIAxcel in the “Status Panel”. Make sure the cartridge door (CD) and sample door (SD) are closed.
18. Click “Run” to start sample processing.

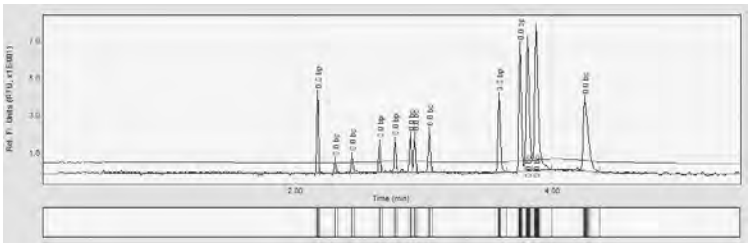
    If configured in the “Instrument Control” window, the QIAxcel can play an *.mp3 file to indicate when the run is finished.

5.7 Data acquisition

At the start of the data acquisition, provided that the correct settings are selected in the “Instrument Control window (see Section 5.3), a “Gel Image” window appears. Each individual sample will be displayed as an electropherogram and a single gel image.

All run data are stored in the defined local data directory with the defined sample names.

Electropherogram and gel image



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6. BioCalculator Software

6 BioCalculator Software

The user-friendly BioCalculator software has been specially developed for use with the QIAxcel system. The software offers interactive tools that simplify data analysis, allow quick data interpretation, and provide flexibility in viewing data and results in both electropherogram and gel image formats.

The BioCalculator software is based on a unique algorithm, that has been proven to analyze separation data more reproducibly and accurately than other chromatographic analysis package. It calculates a variety of peak properties, such as peak number, peak height, peak width, and peak area.

6.1 Menu bar commands

"File" menu

Instrument Control	Opens the "Instrument Control" window (blue USB software key only).
Open	Launches the "Open" dialog box allowing previously stored data to be imported. The "Open data only" option allows data to be imported without the stored integration parameters.
Close	Closes the currently active window, document, or folder.
Save	Saves the data file under the current file name, replacing any older version.

Save As	Saves the data file to a user-specified destination and filename. The file can be saved in 3 different formats: BioCalculator Data file (*.hda or *.hff), a multi-column ASCII file, or a result file. **Note**: The ASCII file contains raw data and optionally index, time, and/or baseline values. The result file is an ASCII file containing the peak table from the document table.
Copy	Creates a copy of the currently active document in a new document window.
Find	Allows searching of a directory and optionally its subdirectories for data files.
Properties	Displays detailed file information.
Page Setup	Changes the way a document or folder is printed.
Print Setup	Customizes the way reports are displayed, printed, and saved.
Print Preview	Provides a preview of how the printed folder or document will appear.
Print	Prints a document or folder.
Export	Creates a plate image if all data files are closed.
Exit	Closes all windows and exits the BioCalculator software.

"Folder" menu

New	Creates a new folder.
Save	Saves the folder data file under the current file name, replacing any older versions.

Export	Saves the current gel image in jpeg format.
Plate	Creates a plate image/result file of an entire 96-well plate.
Close	Closes the active window folder.
Setup	Add or remove documents in the folder. Move documents up or down to arrange how they are viewed in the folder.
Alignment & Scaling	Allows the relative scaling of different documents in an overlay view. Every data file can be rescaled independently for both the time and the signal axis.
Alignment	Calculates slopes and offsets for the X-axis in order to correlate 2 points in time for all different documents.

"Edit" menu

Copy	Copies a graph and table to the clipboard for transfer into other software programs.

"View" menu

Scale	Launches the "Scale" dialog box which allows user-defined scaling and modification of axis names.
Auto scale	Autoscales the Y-axis without changing the scale of the X-axis.
Full scale	Autoscales both the X-axis and the Y-axis.
Invert	Inverts the contrast of the gel image.
Contrast	Allows user to define the contrast of the gel image.

Individual scaling	Autoscales the contrast of each individual gel image.
Filebar	Displays all of the open data files within the window.

"Analysis" menu

Run Analysis	Analyzes the data in the gel image folder using the current parameter settings.
Abort	Stops the run analysis.
Reprocess	Updates the data in the gel image folder using altered parameter settings.
Clear results	If data from a single channel is currently selected, clears the analysis results and makes the baseline equal to that of the raw data. In the Folder View: Folder — clears the alignment analysis All documents — clears the analysis results that are in the folder
Parameters	Opens the "Parameter setup" dialog box and allows changes to be made to the parameters prior to performing data analysis (for more information, see "Data analysis", section 6.7).
Reference Markers	Opens the "Reference Marker" dialog box and allows reference marker information to be entered or existing reference marker data to be uploaded.
Settings	Opens the "Analysis Settings" dialog box to set actions that are automatically performed after data analysis (i.e., print and save data immediately after analysis).

"Window" menu

Cascade	Stacks all open windows.
Tile Horizontally	Arranges all open windows horizontally.
Tile Vertically	Arranges all open windows vertically.
Arrange Icons	Use this command to arrange the icons for minimized windows at the bottom of the main window. If there is an open window at the bottom of the main window, then some or all of the icons may not be visible because they will be underneath this window.
Split	Adjusts the view of the graph and gel image.
Close all	Closes all open windows.
File Names	Clicking a file name maximizes the file window (if minimized) and places that file on top of any other opened files.

"Help" menu

Help Topics	Displays the help file.
About	Displays information about the BioCalculator software, including its version number.

6.2 Printing

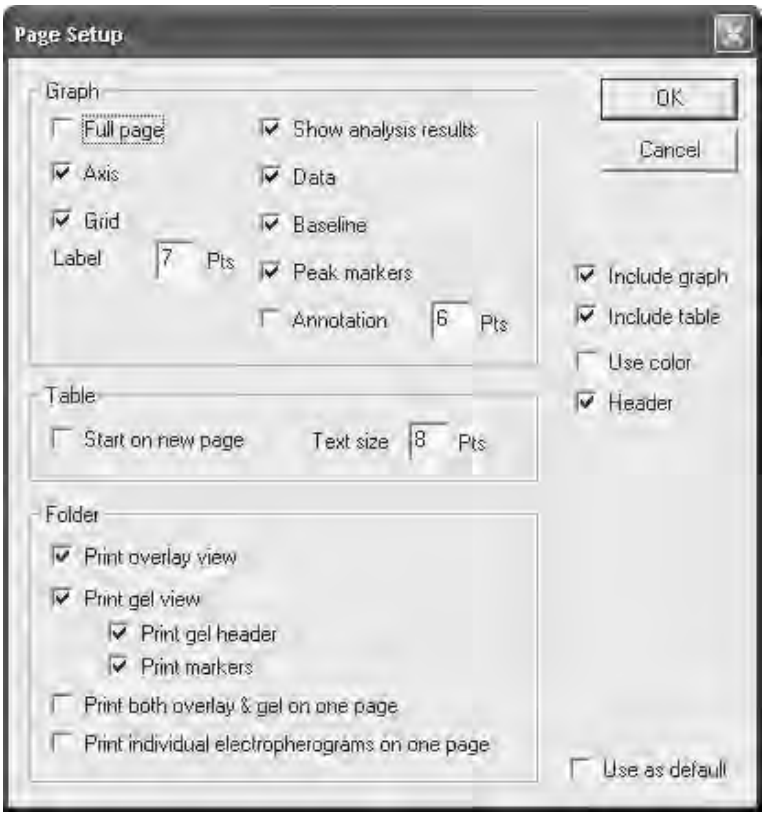
6.2.1 Page setup

The "Page Setup" dialog box can be accessed by selecting "File/Page Setup" in the BioCalculator menu bar. This dialog box can be used to alter the print appearance when printing the active window.

Note: The "Page Setup" dialog box does not alter the print properties of the results generated in the "Plate Image & Result File Creator" dialog box (see Section 6.7.2).

Note: The "Print Preview" function (accessible under "File" in the BioCalculator menu bar) enables the effects of these changes to be assessed without having to print the file.

"Page Setup" dialog box



Include graph	Select to include the electropherogram in the report.
Include table	Select to include the data table in the report.
Use color	Select to enable color output (use this option if you have a color printer and would like a color printout).
Header	If enabled, a header will be printed at the top of the page, including filename, date, time, user, and remarks. The electropherogram will be rescaled accordingly.
Use as default	If selected, the current settings will be stored in the Windows registry and used as the default. When you exit the BioCalculator and open it again, these default settings will be automatically loaded.

"Graph" panel

Full page	If selected, the electropherogram will fill the entire first page of the report. If not selected, the electropherogram will occupy just the top half of the page.
Axis	Select to include the axes labels in the print-out.
Grid	Select to include the grid in the graph print-out.
Label	Set the font size for the axes labels.

Show analysis results	If enabled and if analysis results are available, the constructed baseline and the peak markers (start, apex, and stop) will be included in the graph print-out. If "Draw full baseline" is enabled in the document view (right-click on an individual channel), the full baseline and the noise thresholds will be printed. If this option is not enabled, only the parts of the baseline under the detected peaks will be printed.
Data	Select to include the data in the graph printout.
Baseline	Select to include the baseline in the graph printout. **Note**: the baseline will only be printed if "Show analysis results" is enabled.
Peak markers	Select to include the peak markers in the graph printout. **Note**: Peak markers will only be printed if "Show analysis results" is enabled.
Annotation	Select to include peak annotation in the graph printout. To set the type of annotation (time/x, name, or both), use the "Document graph view" properties. Set the font size for the axes labels. **Note**: Peak annotation will only be printed if "Show analysis results" is enabled.

"Table" panel

Start on new page	If selected, the result table will be printed on a new page, even if the graph only occupies the top half of the first page.
Text size	Set the font size for the result table.

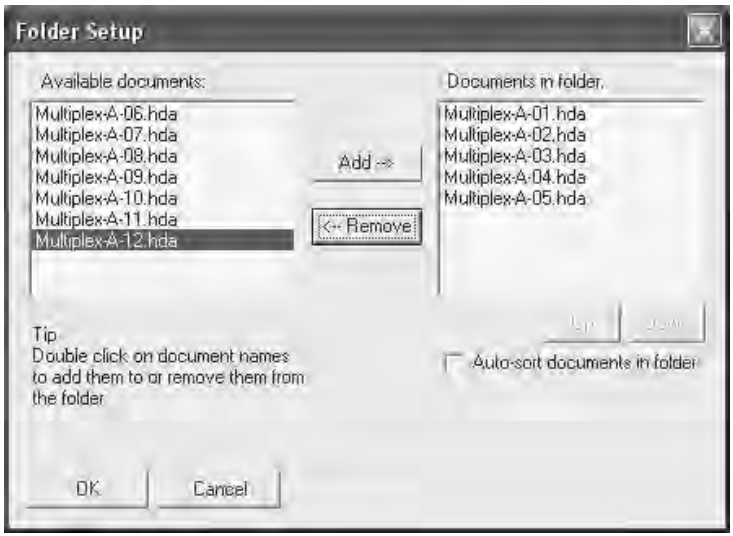
"Folder" panel

Print overlay view	If selected, the electropherograms in the folder window will be printed.
Print gel view	If selected, the gel images in the folder window will be printed.
Print both overlay and gel on one page	If selected, the electropherograms and the gel images in the folder window will be printed on one page.
Print individual electrophero-grams on one page	If selected, all the electropherograms and gel images in the folder will be vertically tiled and printed.

6.3 Folder setup

When a new folder is created by selecting "Folder" then "New folder" in the BioCalculator menu bar, it does not contain any documents. To add or remove documents, select the new folder window, and then select "Folder/Setup" in the BioCalculator menu bar.

"Folder Setup" dialog box



Note: Only 30 documents can be open at one time. Opening more than 30 documents may cause software instability.

Adding/deleting documents in a folder

To add a document to the folder, double-click the document name in the "Available documents" box or select the document name and click the "Add" button.

To delete a document from the folder, double-click the document name in the "Documents in folder" box or select the document name and click the "Remove" button.

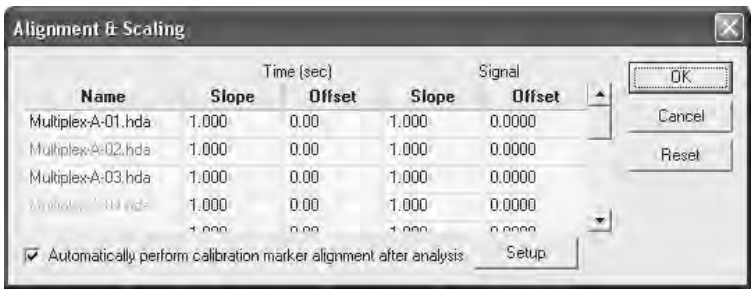
Auto-sort documents in folder

Sorts all documents in the folder in ascending order.

6.4 Folder alignment and scaling

Every data file can be rescaled independently in both the time and the signal axes. The alignment and scaling can be adjusted in the "Alignment & Scaling" dialog box which is accessed by selecting "Folder/Alignment & Scaling" in the BioCalculator menu bar.

"Alignment & Scaling" dialog box



The "Setup" button allows the alignment setup to be changed. The migration times of the markers in the first document in the gel image window can be used as a reference for alignment, or absolute migration times can be manually set and used as reference for alignment.

Alignment

Selecting "Folder/Alignment" in the BioCalculator menu bar allows automatic calculation of the slopes and offsets (for the time/X axis only) in order to correlate 2 points in time from either the gel image or electropherogram. In this function, two points can be specified on each trace (document), starting from the smaller size first, after which the BioCalculator software will automatically calculate the slope and offset for each document so that the resulting overlay will show these 2 points overlapping.

Once the alignment function is selected, the cursor will change to an up-arrow and its movement is confined to the graph area. The color of the cursor will match the color of the currently active trace.

Functional keys

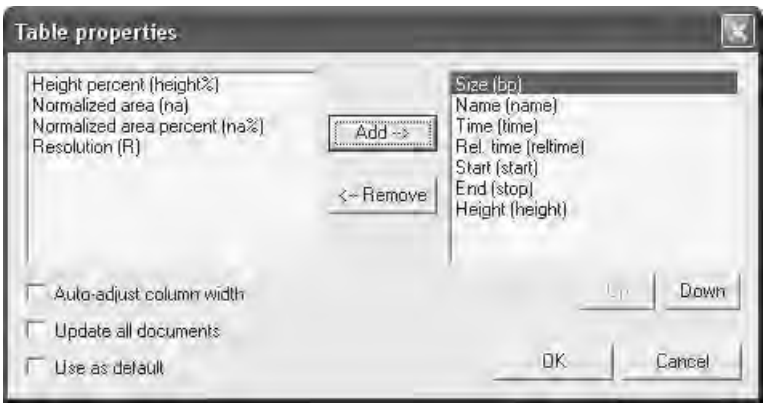
Left mouse button	Sets marker (2 markers per trace)
Esc (Escape keyboard button)	Removes the last marker set for the active trace, or exits correlation mode, if no markers have been set for this trace.
Tab	Toggles between traces/documents.
Return	Performs the actual correlation using the specified markers. If not all markers were specified, a warning message will be displayed.

Note: To allow more accurate positioning of the markers, use the zoom functionality. Be sure to align the smallest peak first.

6.5 Table properties

The “Table properties” dialog box, which can be accessed by right-clicking on the result table, allows the table fields to be altered.

“Table properties” dialog box



Adding/removing a result column

To add a result column, double-click the result type in the left box, or select the result type and click the “Add” button.

To delete a result column, double-click the result type in the right box, or select the result type and click the “Remove” button.

Changing column order

The column order can be changed by selecting the result type and clicking the "Up" or "Down" button to move it to its new relative location.

Auto-adjust column width	If "Auto-adjust column" width is selected, the table view will automatically resize the columns.
Update all documents	If "Update all documents" is selected, this table view format will be applied to all open documents.
Use as default	If "Use as default" is selected, this table view format will be used as the default for all data files being imported into the BioCalculator software.

Result types

The following is the list of result types available (the text in parenthesis is the abbreviation used in the column headers of the table):

Name (name)	Name of the peak.
Time (time)	Time/X-value for the peak maximum.
Start (start)	Start time/X-value of the peak.
End (stop)	Stop time/X-value of the peak.
Height (height)	Height of the peak at its maximum.
Height percent (height%)	Peak height relative to the sum of all peak heights.
Normalized area (na)	Also called corrected peak area. This is the peak area divided by the apex of the peak.

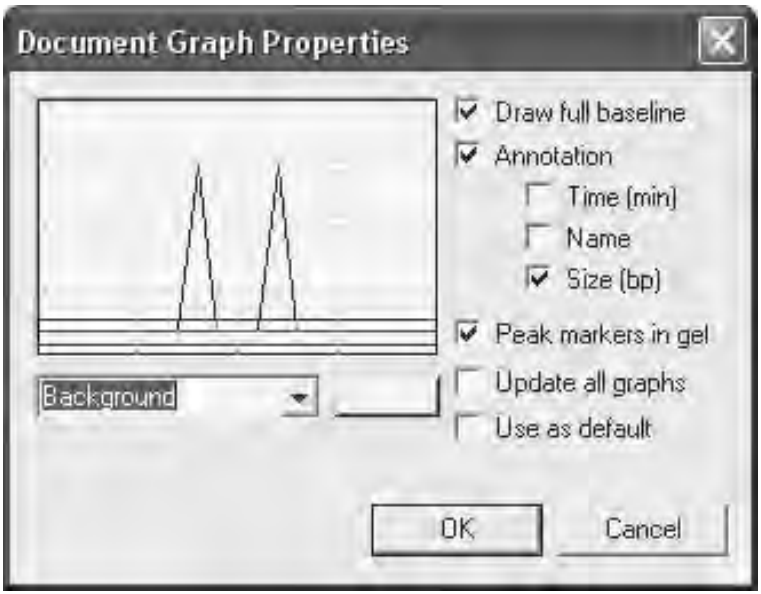
Normalized area percent (na%)	Normalized peak area relative to the sum of all normalized peak areas.
Resolution (R)	The separation resolution with respect to the previous peak is given. The first peak in the table will have an empty field here.
Size (bp)	Fragment base pair size.
Concentration (ng/µl)	Concentration of the sample solution.
Rel. time (relTime)	Relative time/X-value for the peak maximum.

Note: To highlight the result table with the corresponding peak in the electropherogram, place the mouse cursor over the desired peak.

6.6 Graph properties

To change the properties of a graph (e.g., background and foreground colors), right-click on an individual graph or folder graph and select “Properties” to open the “Document Graph Properties” or “Folder Graph Properties” dialog box respectively.

"Document Graph Properties" dialog box



Changing background and foreground colors

Using the drop-down menu, select the desired item. Then click the "Change color" button (this is the button that displays the current color setting for the item) immediately to the right of the drop-down menu. The "Color" dialog box will open, allowing a new color to be chosen for the selected item.

Draw full baseline

If "Draw full baseline" is selected, the complete constructed baseline will be drawn. If this option is not selected, only the portions of the baseline under a peak will be drawn.

Annotation

If "Annotation" is selected, all peaks will be annotated with the time (X-value for an XY data file), name, size, or all 3, depending on the settings of the "Time (min)" (X for XY data file), "Size (bp)", and "Name" check boxes.

Peak markers in gel

If "Peak markers in gel" is selected, then the color chosen for peak start and peak stop will be shown in the gel view. If not selected, no colors will be shown.

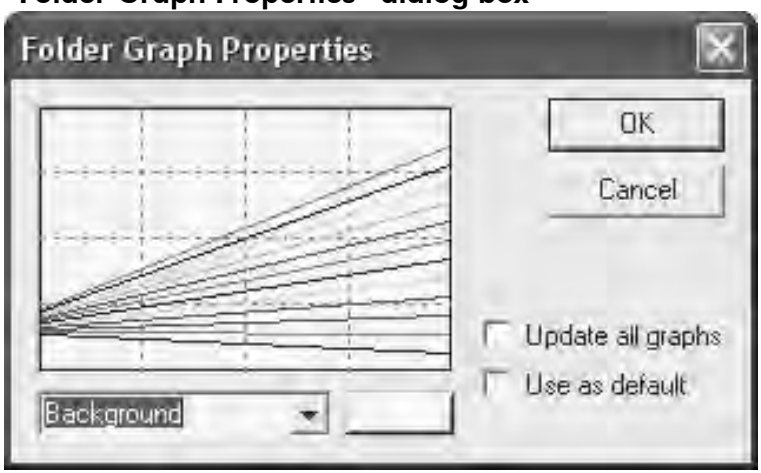
Update all graphs

If "Update all graphs" is selected, these settings will be applied to all open graphs of the same type (document and folder).

Use as default

If "Use as default" is selected, these settings will be used as the default for all new graph views of the same type (document and folder).

"Folder Graph Properties" dialog box



Changing background and foreground colors

Using the drop-down menu, select the desired item. Then click the "Change color" button (this is the button that displays the current color setting for the item) immediately to the right of the drop-down menu. The "Color" dialog box will open, allowing a new color to be chosen for the selected item.

Update all graphs

If "Update all graphs" is selected, these settings will be applied to all open graphs of the same type (document and folder).

Use as default

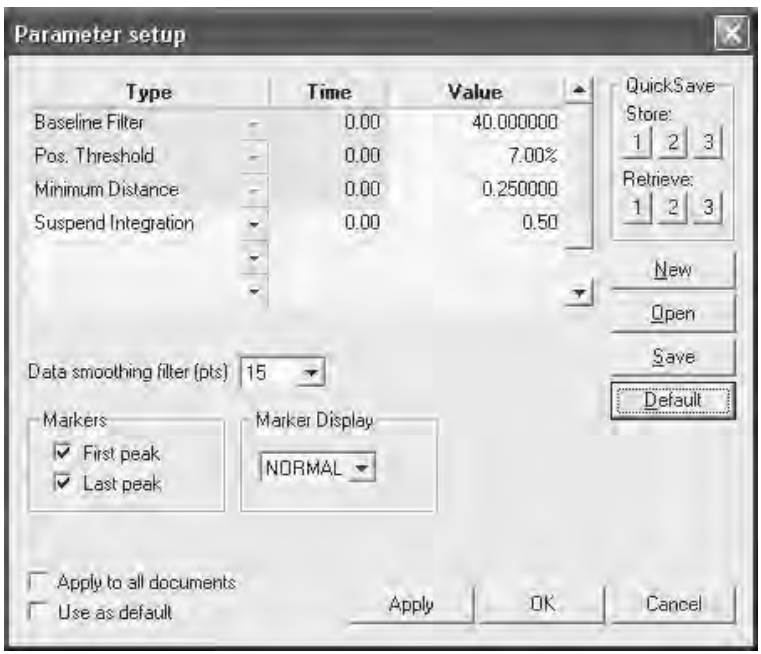
If "Use as default" is selected, these settings will be used as the default for all new graph views of the same type (document and folder).

6.7 Data analysis

6.7.1 Parameter setup

The "Parameter setup" dialog box, which can be accessed by selecting "Analysis/Parameters" in the BioCalculator menu bar, allows changes to be made to the run parameters prior to performing data analysis.

"Parameter setup" dialog box



The table consists of 3 columns. The first column is the parameter type. The second column is the time value (or X-value for a XY data set) representing the time point during the run at which the new value for this parameter takes effect. The third column contains the value for the parameter.

Baseline Filter

Value = Filter size in seconds or points for XY data

Set filter size of the modified median filter used in the baseline construction algorithm. The default median filter size is 40 for DNA analysis. Increasing or decreasing the filter size increases or reduces the peak area.

A more detail description of the algorithm can be found in the "Help" menu in the BioCalculator software.

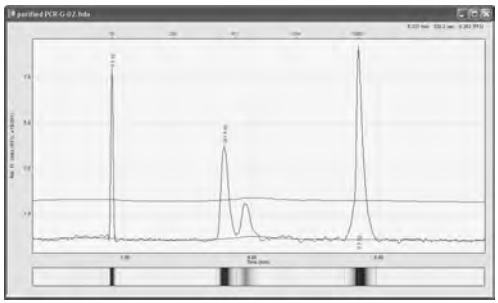
Positive threshold

The positive threshold is the height at which the peak must be in order for it to be detected. It is calculated in relation to the tallest peak in the electropherogram. For example, the top of the tallest peak in the electropherogram is considered to be 100% from the baseline. Setting the threshold to half of the tallest peak would be 50%, in which all other peaks above this threshold would be detected, and all peaks below would not be detected.

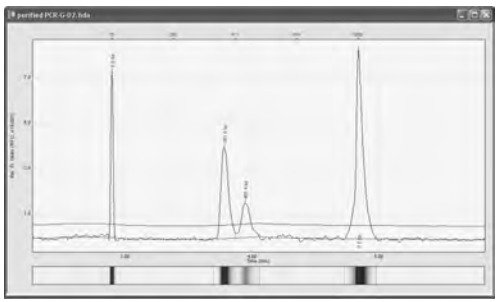
There are 2 ways to set this value:

as an absolute value expressed in actual signal units (AU) or as a percentage full scale (%FS) value, which means that this value will change from data file to data file. To enter a %FS value add "%" after the number you enter, or to enter an AU value add 'A' after the number you enter.

15% positive threshold



7% positive threshold



Minimal distance

Value = Distance (seconds)

The minimal cluster distance is defined as the shortest allowable distance between 2 potential clusters or group of peaks. The BioCalculator software will not split 2 adjacent clusters if the distance between those clusters is shorter than the minimal cluster distance. The distance between 2 clusters is defined as the distance from the point where the right slope of cluster number 1 crosses the minimal peak height threshold and the point where the left side of cluster number 2 crosses this threshold again. The minimal cluster distance is an important parameter to prevent detection of multiple clusters on a noisy tailing or fronting edge of a peak. For example, on a noisy heavily tailing peak, noise spikes could cross the minimal peak height threshold several times before the signal drops below the threshold. You can prevent the

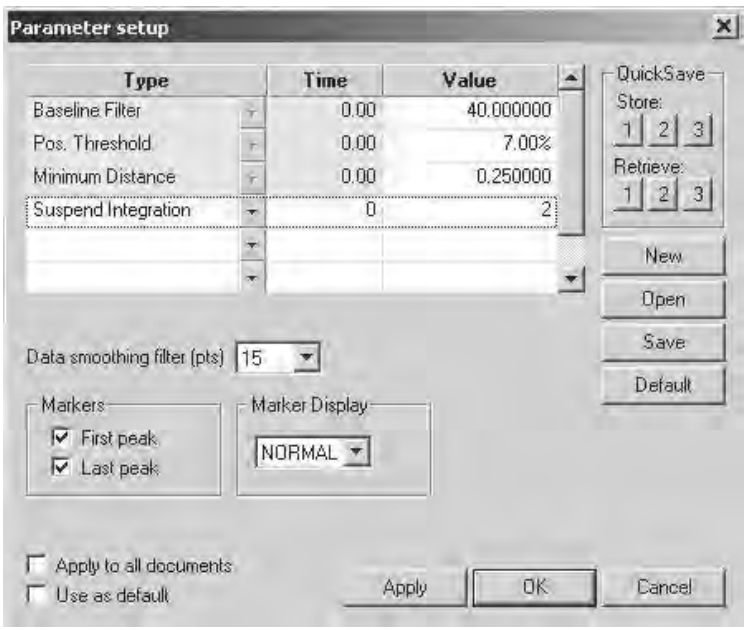
detection of all those noise peaks as separate peaks by setting a minimal cluster distance value larger than the distance between the noise spikes.

Suspend integration

The "suspend integration" function turns off data collection for a defined period of time. This prevents unwanted peaks appearing in the final data. The default setting is 0–0.5 minutes, meaning any peaks shown before 0.5 minutes will not appear in the final data.

For example, to disable data collection between 0 minutes and 2 minutes, add "0" to the "Time" column and "2" to the "Value" column. This means at time point 0 the data collection will be suspended for 2 minutes.

"Parameter setup" dialog box



Additional "suspend integrations" can be applied. Once the first "suspend integration" has been entered, in the next empty row in the "Parameter set up" table, select *Suspend Integration* from the drop-down list. Enter the desired time periods as described above.

"QuickSave" panel

Store	Save up to 3 different parameter settings by clicking on buttons "1", "2", or "3".
Retrieve	Click on buttons "1", "2", or "3" to retrieve the parameter settings that were previously stored or saved.

"Markers" panel

"First peak" and "Last peak" checked	Aligns the migration times in the "Gel Image" window using both the first and last peaks. Displays "0" for the size (bp) of both the first and last peaks in the result table.
"First peak" unchecked, and "Last peak" checked	Aligns the migration times in the "Gel Image" window using only the last peak. Displays "0" for the size (bp) of the last peak in the result table.
"First peak" and "Last peak" unchecked	Does not align the migration times in the "Gel Image" window. Displays the size (bp) of the last peak in the result table according to the reference marker table.

"Marker Display" panel

Normal	Display the "First peak" and "Last peak" markers in the gel image and electropherogram.
Hide	Does not display the "First peak" and "Last peak" markers in the gel image and electropherogram.
Color	Colors the "First peak" and "Last peak" markers in the gel image and electropherogram. A custom color may be chosen.

Buttons

New	Clears the parameter entry sheet and loads all default values.
Open	Opens a previously saved analysis parameters (ANA) file. All parameters in the "Analysis Parameter" dialog box will be automatically updated.
Save	Saves the current analysis parameters to a ANA file.
Default	Loads the initial default settings used at the time of installation.

Data smoothing

Some types of data files (e.g., electropherograms) typically have a low signal-to-noise (S/N) level for the peaks of interest. The BioCalculator software has a Data Smoothing filter (pts) to post-process the data to improve on these low S/N levels by adjusting the filter points accordingly (default setting is 15pts for the Data Smoothing filter).

Note: The larger the Data Smoothing filter (pts), the lesser the data points, which results in smoother data, but also leads to lower resolution. For example, if 2 close peaks cannot be resolved, the "Data smoothing filter (pts)" should be set to "OFF" to obtain the optimum resolution.

6.7.2 Creating reports

Data can be exported in jpeg (gel images) or Microsoft Excel format.

1. Open the "Plate Image & Result File Creator" dialog box by selecting "File" and then "Export" in the BioCalculator menu bar.

   Note: All data files must be closed to use the export function.
2. Under "Plate Directory", locate and select the folder that contains the data files to be exported.
3. Under "Image/Result File Name", select or create the filename that the image/results file should be stored under.
4. In the "Files to Process" panel, select up to 96 files for export.

   Note: If the "Use these integration parameters" box is unchecked, the data files will be processed using their own stored integration parameters. If the box is checked, the data will all be processed according to the user-defined parameters that can be edited by clicking the "Params" button.

   Note: If the "Use this Reference Marker table" box is unchecked, all data files will be processed using their own stored reference marker table that was saved with the file. If no reference marker table was saved, a reference marker will not be used. If the box is checked, all data will be processed using a custom reference marker table that can be edited by clicking the "Markers" button.
5. In the "Property" panel, select the fields that should be displayed in the exported Microsoft Excel file.

6. In the "Image Format" panel, select the desired format in which the gel image should be displayed (see descriptions below) and then click "Process".

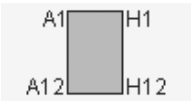
   To view the exported files, go to the directory specified in the "Image/Result File Name" field.

"Image Format" panel

Layout

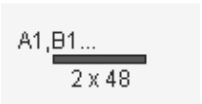
Gel image will display A1–A12 on the first row, then B1–B12 on the second row, etc.

Gel image will display H1–H12 on the first row then G1–G12 on the second row, etc.

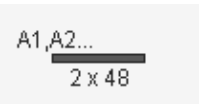


Gel image will display H1–A1 on the first row, then H2–A2 on the second row, etc.

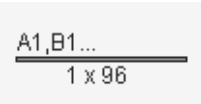
Gel image will display A1–H1 on the first row, then A2–H2 on the second row, etc.



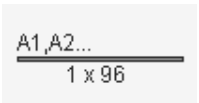
Gel image will display A1, B1, …H12 all on one row.



Gel image will display A1, A2, …H12 all on one row.



Gel image will display A1, B1, …H6 on the first row, and A7, B7, …H12 on the second row.



Gel image will display A1, A2, …D12 on the first row, and E1, E2, …H12 on the second row.

Rows/Col per page	Allows each row or column to be assigned a color, enabling each selected row or column to be saved or printed individually.
Individual Scaling	Automatically adjusts the contrast of each individual gel image
Zoom to Markers	Unwanted white space outside of the first and last marker peaks/bands is removed.
Notes	Adds up to 4 lines of notes that will be displayed on individually exported images.
File Format	Select the file format (i.e., JPEG, TIF, or BMP) for the exported image from the drop-down menu.
Display path and filename	Displays the path and the filename in the header of the exported image.
Print Images(s)	Automatically prints to the default printer once the process is finished.

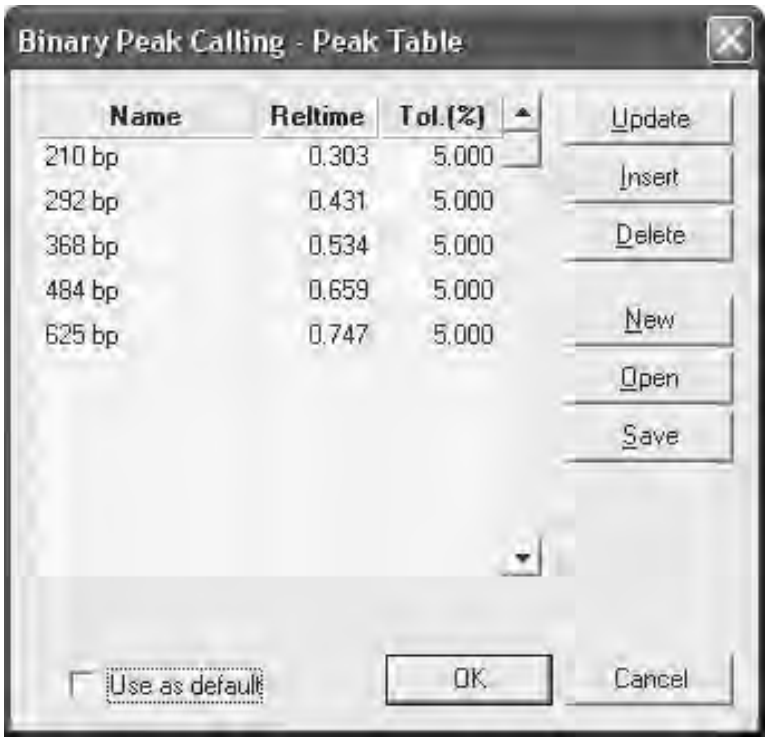
Gel panel

Resolution	Select the desired resolution from the drop-down menu. The resolution is per gel lane, not for the entire gel image.
Header	Name: Displays the sample name in the header on the top of each individual gel image. Info: Displays the sample information in the header on the top of each individual gel image. Well: Displays the sample name in the header on the top of each individual gel image.

Binary peak calling panel

Enable/Table	Create a binary peak table which will generate a ***.csv** peak table report and a ***.jpeg** file. In the peak table report, a "0" (no peak detected) or "1" (peak detected) will be assigned to a peak.

"Binary Peak Calling – Peak Table" dialog box



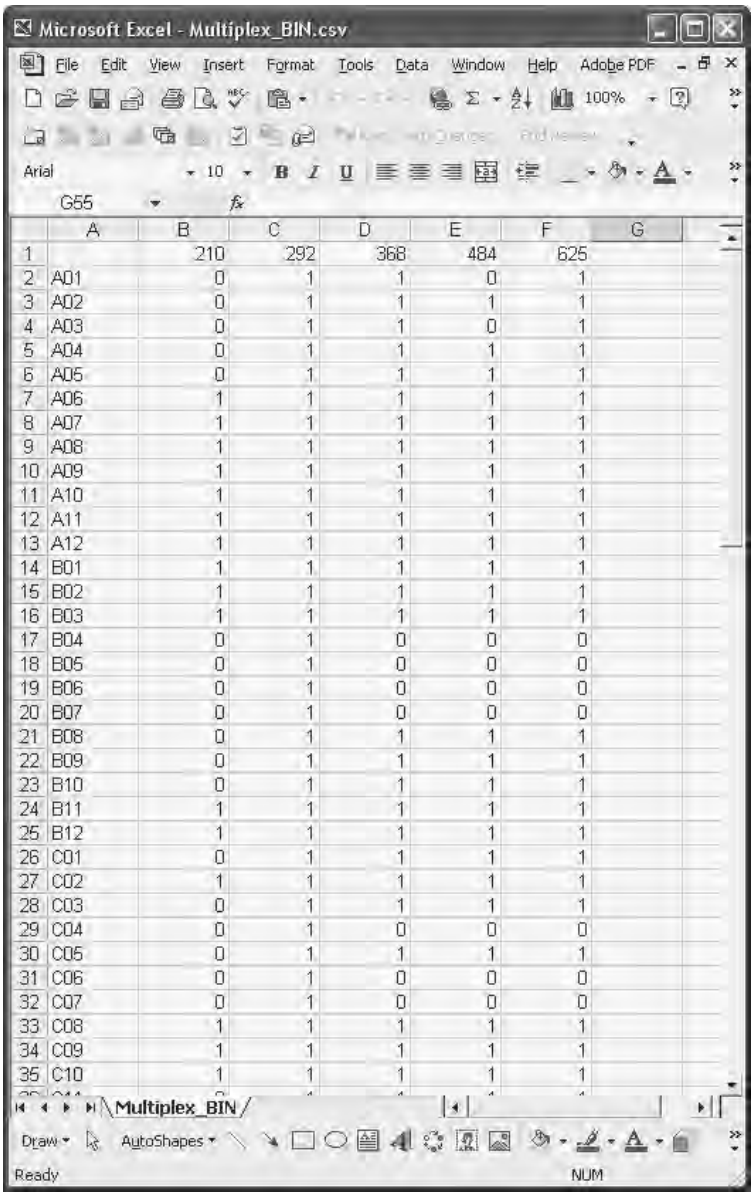
Name — Name to be displayed on the ***.csv** report (e.g., fragment size).

Reltime — The relative migration time (reltime) to determine the binary peak calling.

The reltime can be found in the result table of each individual ***.hda** datafile. It is recommended to calculate the reltime from an average of at least 12 data samples.

Tol (%) — Tolerance percentage (+/–) of the reltime to determine the binary peak calling.
The value of the Tol (%) is determined by the user based on the standard deviation % from at least 12 data samples.

Example peak table report



	A	B	C	D	E	F	G
1		210	292	368	484	625	
2	A01	0	1	1	0	1	
3	A02	0	1	1	1	1	
4	A03	0	1	1	0	1	
5	A04	0	1	1	1	1	
6	A05	0	1	1	1	1	
7	A06	1	1	1	1	1	
8	A07	1	1	1	1	1	
9	A08	1	1	1	1	1	
10	A09	1	1	1	1	1	
11	A10	1	1	1	1	1	
12	A11	1	1	1	1	1	
13	A12	1	1	1	1	1	
14	B01	1	1	1	1	1	
15	B02	1	1	1	1	1	
16	B03	1	1	1	1	1	
17	B04	0	1	0	0	0	
18	B05	0	1	0	0	0	
19	B06	0	1	0	0	0	
20	B07	0	1	0	0	0	
21	B08	0	1	1	1	1	
22	B09	0	1	1	1	1	
23	B10	0	1	1	1	1	
24	B11	1	1	1	1	1	
25	B12	1	1	1	1	1	
26	C01	0	1	1	1	1	
27	C02	1	1	1	1	1	
28	C03	0	1	1	1	1	
29	C04	0	1	0	0	0	
30	C05	0	1	1	1	1	
31	C06	0	1	0	0	0	
32	C07	0	1	0	0	0	
33	C08	1	1	1	1	1	
34	C09	1	1	1	1	1	
35	C10	1	1	1	1	1	

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7. Maintenance Procedures

7 Maintenance Procedures

The following maintenance procedures must be carried out to ensure reliable operation of the QIAxcel:

- **Cleaning of the QIAxcel**
- **Minor corrective maintenance**

Following these procedures ensures that the QIAxcel is free of dust and liquid spills.

Important: Disconnect the line power cord from the power outlet before servicing.

Servicing

The QIAxcel is supplied with a warranty that lasts for 1 year, starting from the date of shipment. The warranty includes all repairs due to mechanical breakdown. Application development, software upgrades, accessories, and disposable items are not included in the warranty.

QIAGEN offers comprehensive Service Support Agreements, including Warranty Extensions, Full Cover Support Agreements, and instrument/application training, including on-site installation. Service Support Agreements maximize productivity and ensure high performance from your instrument. In addition, service histories are fully documented and all parts are certified and guaranteed.

Contact your local QIAGEN Field Service Specialist or your local distributor for more information about flexible Service Support Agreements from QIAGEN.

7.1 Cleaning of the QIAxcel

Cleaning agents

CAUTION 	**Damage to the instrument** [C5] Do not use bleach, solvents, or reagents containing acids, alkalis, or abrasives to clean the QIAxcel.

WARNING 	**Risk of electric shock** [W11] Do not open any panels on the QIAxcel other than described in this user manual. **Risk of personal injury and material damage** Only perform maintenance that is specifically described in this user manual.

Wipe the instrument with a damp cloth only.

The sample plate holder inside the instrument should be cleaned occasionally using a moist, soft cloth.

Wash the buffer tray in warm water using a mild detergent, rinse thoroughly with deionized water or reverse-osmosis water, and let it dry before filling with fresh buffer. The buffer tray should be cleaned before using a new QIAxcel Gel Cartridge.

7.2 Minor corrective maintenance

7.2.1 Fuse replacement and cleaning

1. Switch off the QIAxcel using the main power switch.
2. Unplug the power cord from the power outlet and from the rear of the instrument.
3. Use a small flat-bladed screwdriver to remove the fuse-carrier assembly located above the area where the cord connector enters into the inlet.

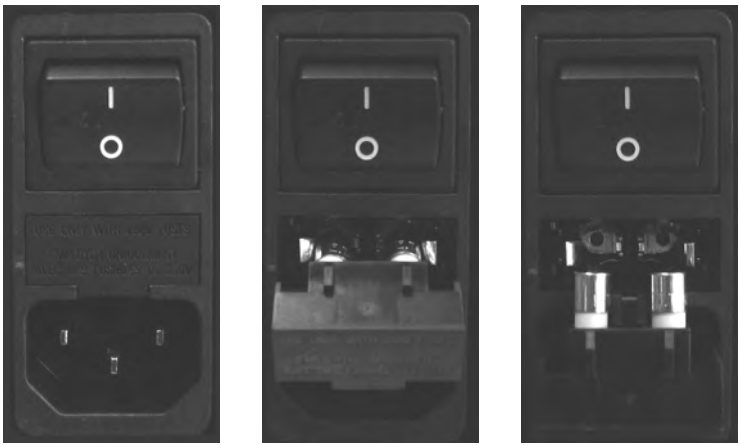

Figure 6. Replacing the fuse.

4. Replace the fuse.
   Replace only with time-delay 4 Amp 250 V fuses, marked "T4A250V" cat no. 9241178. If replacement fuses are not available, contact QIAGEN Technical Services.
5. Reinsert the fuse-carrier assembly and plug in the power cord.
6. Turn on the power and check the instrument for normal operation (i.e., check that the status changes from "NO COM" to "COM" in the status panel (see Section 5.3). If the instrument does not function normally, or continues to blow fuses, unplug the system and contact QIAGEN Technical Services.

7.2.2 N_2 cylinder replacement

Important: Only use N_2 cylinders provided by QIAGEN (cat no. 929705).

N_2 cylinders should be changed when "Pres1" and Pres2" in the "Status" panel of the "Instrument Control" window display "Low".

Dispose of empty N_2 cylinders as recyclable steel material according to your local regulations.

1. Open the sample door and remove the buffer tray.

2. Gently pull up on the N_2 cylinder port. Do not pull past the detent hole.
3. Turn the cylinder counter-clockwise to allow high-pressure N_2 to gradually leak out.

   Note: To remove a pressurized N_2 cylinder, in the "Instrument Control" window, select "File/Settings" and then click the "Purge" button. This will cause the N_2 cylinder to slowly empty.
4. Screw a new, unpunctured N_2 cylinder into the cylinder port in a clockwise direction.
5. Turn until the needle inside the port punctures the N_2 cylinder. Do not over-tighten: the cylinder should only be finger tight.
6. Gently push down on the N_2 cylinder until it is in the stowed (down) position.

7.2.3 Alternate N_2 supply

The QIAxcel external N_2 port (located at the rear of the instrument) can be supplied with clean, noncondensing compressed nitrogen. This external N_2 source can be used instead of the internal N_2 cylinder. The regulated N_2 minimum input pressure must be 50 psi (345 kPa) and the maximum input pressure should not exceed 75 psi (517 kPa).

To connect an external N_2 source, use the supplied urethane tubing (2 mm inner diameter x 3.18 outer diameter) rated for 150 psi. Additional tubing can be purchased separately (cat. no. 9018435).

Make sure the output connector on the QX Adjustable Regulator (cat. no. 9018398) can be connected to the recommended tubing.

Connect the urethane tubing from the output of the external N_2 source to the QIAxcel by firmly inserting the tubing into the fitting located on the rear panel of the instrument.

Turn on the external N_2 source pressure, and set the pressure to 50–75 psi (345–517 kPa).

7.2.4 Blocked air filter

In rare instances, the air filter that sits inside the QIAxcel instrument may become blocked with gel carryover. If this happens, contact QIAGEN Technical Services who will arrange for a QIAGEN Field Service Specialist to replace the filter.

To diagnose a blocked air filter, select “File/Settings” in the BioCalculator menu bar, and then click “Check Filter”.

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8. Troubleshooting

8 Troubleshooting

8.1 System setup

	Comments and suggestions
Instrument does not turn on	
a) Power cord not connected	Check the power connection.
b) Fuse blown	Replace the fuse.
Computer software cannot communicate with system	
a) RS232 cable is not connected between PC and system	Check the connection of the RS232 cable.
b) Incorrect COM port settings	Check the COM port setting.
No serial port in laptop computer	
Some laptops do not have a serial port	Contact the PC manufacturer to request the correct serial port connector.
BioCalculator software does not start	
a) BioCalculator software not installed	Install the BioCalculator software.
b) Blue USB software key not plugged in USB port	Plug the blue USB software key into the computer's USB port.
c) Old version of Microsoft Windows	The BioCalculator software operates with Windows XP Professional (see Section 4.3 for more details)

8.2 Operation

		Comments and suggestions
N_2 cylinders do not last long		
a)	Air leak	Check the N_2 cylinder to make sure it is tight.
b)	Internal leak if N_2 cylinder last only a couple of days	Contact QIAGEN Technical Services.
Samples tray does not move		
a)	Transport lock is in place	Remove the transport lock.
b)	Sample door is not closed	Close the sample door.
Cannot insert cartridge into system		
Cartridge installed backwards		Make sure the cartridge front cover faces the front of the system and check that the purge cap seal has been removed.
Cartridge cannot be latched		
a)	N_2 pressure low	Replace the N_2 cylinder.
b)	Cartridge door is open	Close the cartridge door.
c)	Cartridge smart key not inserted	Insert the smart key.
Cannot run system		
a)	Sample door and/or cartridge door are open	Close the sample door and/or cartridge door.
b)	Cartridge smart key not detected	Insert the cartridge smart key
c)	Pressure low	Replace the N_2 cylinder

		Comments and suggestions
d)	USB software key is missing or broken	Contact QIAGEN Technical Services.

8.3 DNA applications

		Comments and suggestions
DNA peaks signal variation in channels		
New cartridge requires calibration		Calibrate the cartridge (see Section 5.4).
Slow peak migration time in channels		
a)	Air bubbles in gel cartridge capillaries	Use the purge method (see Appendix C, page C-11) to remove air bubbles, or change the QX Separation Buffer.
b)	Current too low due to low temperature	Increase the room temperature.
c)	Current too low due to partially dry capillary tips	Use the purge method to clean the capillary tips (see Appendix C, page C-11).
Weak signal of the QX Alignment Marker		
Degraded/old QX Alignment Marker		Change the QX Alignment Marker.
No signal in channels		
a)	No samples injected	Check the volume of sample (10 µl minimum).
b)	Blocked capillary channel	Use the purge method to remove the blockage (see Appendix C, page C-11). If this does not work, replace the cartridge.
c)	Broken capillary or optical fiber in cartridge	Replace the cartridge.
d)	Light source problem (lights off)	Contact QIAGEN Technical Services.

		Comments and suggestions
e)	No purging of the cartridge/blocked purge hole	Clean the purge hole, which is located on the back of the cartridge, with a lint-free tissue or a cotton swab, or replace the QIAprep Gel Cartridge.
Loss of resolution in channels		
a)	Old gel in some channels or clogged channels	Use the purge method to fill the channels with new gel, or repeat the purge method several times to remove clogging (see Appendix C, page C-11).
b)	Saturated signals	Reduce the sample injection time.
c)	Expired cartridge	Use a new cartridge.
Broad or saturated DNA peak/band		
a)	DNA concentration too high	Dilute the DNA solution in QX DNA Dilution Buffer. Reduce the injection time. Choose a method for high DNA concentration samples (e.g., 0H500 [see Appendix C]).
b)	Broken channel with high background	Call QIAGEN Technical Services and replace cartridge.
DNA signal too low		
a)	DNA concentration too low	Increase the sample injection time. Choose a method for low DNA concentration samples (e.g., 0L500 [see Appendix C]).
b)	Salt concentration too high in sample solution	Desalt or dilute the DNA samples to reduce the salt concentration and enhance DNA injection.
Separation current (µA) too low		
a)	QX Separation Buffer is contaminated	Replace the QX Separation Buffer.
b)	Blocked capillary channel	Replace the QIAxcel Gel Cartridge.

		Comments and suggestions
Separation current (µA) too high		
a)	QX Separation Buffer contaminated	Replace the QX Separation Buffer.
b)	Salt concentration too high in sample solution	Desalt or dilute the DNA samples in QX DNA Dilution Buffer.
Data squeezed together on gel image folder		
a)	Extra peaks before the first peak or after the last peak were detected	Remove the extra peaks and reprocess the data and/or reset the parameter settings (see Appendix D).
b)	Wrong peaks were identified as the first and last peaks for alignment	Remove the extra peaks and reprocess the data and/or reset the parameter settings (see Appendix D).
c)	Upper alignment markers were missing or below the positive threshold setting	Manually add the alignment marker and reprocess the data and replace the new markers for the next run.
d)	Sample signals too strong and cause the alignment below the positive threshold setting	Dilute the samples or use the H Methods (see Appendix C) for sample analysis.
Data not aligned		
a)	Upper marker missing	Change to a new alignment marker.
b)	Migration problem due to air bubbles	Purge and run the sample again.

	Comments and suggestions
c) Migration problem due to low temperature	Increase the separation time.

No size calling in the result table

The reference marker is turned off	Select the right marker table.

Wrong size calling

a) Wrong reference marker table used	Select the right marker table.
b) Reference marker table setting problems	Make sure the number of peaks in the Reltime and size (bp) columns are equal in the reference marker table.

Upper alignment markers resolved in double peaks

High salt sample	Dilute the sample or change the parameter setting.

8.4 RNA applications

	Comments and suggestions

Alignment is off

a) The first peak is below the positive threshold	Decrease the positive threshold value (see Section 6.7.1).
b) Degraded/old calibration marker	Replace the calibration marker.

The ratio of rRNA (28S/18S) is too low

a) Multiple peaks were detected at the second rRNA bands	Increase the minimal distance value (see Section 6.7.1). Increase the data smoothing filter value (see Section 6.7.1).
b) Diffused bands cause the high baseline	Increase the baseline filter value (see Section 6.7.1).

		Comments and suggestions
c)	Tiling of the second rRNA bands	Increase the minimal distance value (see Section 6.7.1). Increase the data smoothing filter value (see Section 6.7.1). Increase the baseline filter value (see Section 6.7.1).
d)	Degraded RNA samples	Change the RNA sample.

The signal of RNA sample is too low

a)	Low RNA sample concentration	Increase the sample volume up to 5 µl. Mix an equal volume of RNA loading buffer to sample. For example, if 2 µl of RNA sample was used, mix the RNA sample with 2 µl of RNA loading buffer. Increase the sample injection time up to 60 seconds.
b)	Degraded RNA samples	Change the RNA samples.

Output more than one ratio

a)	Incorrect suspend integration settings	Increase the suspend integration value to remove the peaks before the first rRNA band (see Section 6.7.1).
b)	Unexpected background peaks were detected	Right-click on the unwanted peak to delete it.

Broad RNA peaks

a)	Degraded RNA samples	Change the RNA samples.
b)	Incomplete RNA denaturation process	Repeat the RNA denaturation process.
c)	Aged buffer	Replace the separation buffer every 25 runs.

	Comments and suggestions
Only 18S RNA peak detected	
Incomplete RNA denaturation process	Repeat the RNA denaturation process.
Calibration marker signal variation in channels	
a) New cartridge requires calibration	Calibrate the cartridge (see Section 5.4).
b) Cartridge intensity calibration is incorrect	Calibrate the cartridge (see Section 5.4).
c) Degraded/old QX Calibration Marker	Change the QX Calibration Marker.
Delayed peak migration in some channels	
a) Air bubbles in capillaries	Use the HVpurge method to remove air bubbles (see Appendix C, page C-11).
b) Air bubbles in calibration marker or RNA sample vials	Remove the air bubbles from the vials.

9. Glossary

9 Glossary

Term	Description
Buffer tray	The buffer tray is a removable plastic tray that sits in the buffer tray holder of the QIAxcel and holds QX Separation and Wash Buffers and QX Intensity and Alignment Markers.
Buffer tray holder	The buffer tray holder is located inside the QIAxcel under the sample door. The buffer tray, which holds QX Separation and Wash Buffers and QX Intensity and Alignment Markers, is placed in the buffer tray holder prior to sample analysis.
Cartridge door	The door that allows the QIAxcel Gel Cartridge to be loaded into the QIAxcel. This door should remain closed during operation of the QIAxcel.
Channel(s)	Each QIAxcel Gel Cartridge has 12 channels (capillaries) through which the samples for analysis pass.
Menu bar	A bar located at the top of the BioCalculator software window. It contains menus (e.g., "File", "Folder", "Analysis", and "Help") with various options for the user to choose from.
Method	A method is the collection of parameters that are applied to an individual sample run. A number of default methods are preinstalled. Different methods can be selected and applied in the "Instrument Control" window.
Mineral oil	For covering solutions and/or samples to prevent evaporation.
N_2 door	The N_2 door, located to the right of the sample door, allows insertion and removal of the N_2 cylinder.
Position	An area of a rack/plate that can contain something. Examples of positions include the wells of a microplate or slots in the sample plate holder.
Power switch	A button located at the back of the QIAxcel in the bottom-left corner. It allows the user to switch the QIAxcel on and off.

Term	Description
Pressure gauge	Located at the rear of the QIAxcel, the pressure gauge indicates the N_2 pressure.
Purge port	The purge port is located inside the QIAxcel instrument and aligns with the purge hole of the QIAxcel Gel Cartridge.
QX Alignment Marker	Allows sample migration time to be calibrated.
QX DNA or RNA Dilution Buffer	Allows dilution of concentrated samples.
QX DNA or RNA Separation Buffer	Enables separation of DNA or RNA molecules in the QIAxcel Gel Cartridge.
QX DNA or RNA Size Marker	Enables creation of a reference marker table allowing DNA/RNA size and/or concentration determination.
QX DNA or RNA Wash Buffer	For washing the capillary tips to prevent cross-contamination.
QX Intensity Calibration Marker	Allows calibration of the signal intensity for each new gel cartridge.
Sample door	The door that provides access to the sample plate holder and the buffer tray holder. This door should remain closed during operation of the QIAxcel.
Sample plate holder	The sample plate holder is located inside the QIAxcel under the sample door. 96-well plates or sample strips containing the samples for analysis are placed in the sample plate holder.

Term	Description
Smart key	This key attached to the QIAxcel Gel Cartridge holds information about the cartridge (i.e., cartridge identifier, calibration status, number of runs). The smart key should be inserted into the smart key socket on the QIAxcel to enable sample analysis.
Smart key socket	The smart key socket allows the QIAxcel instrument to read and display the information on the smart key.
Tool bar	A bar located below the menu bar. It contains buttons that, when clicked, allow the QIAxcel or BioCalculator software to perform an operation.
USB software key	In order to use the BioCalculator software, the USB software key should be inserted into the computer's USB port (see Section 3.4).

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Appendices

A

Appendix A

Technical data

QIAGEN reserves the right to change specifications at any time.

Environmental conditions

Operating conditions

Power	100–240 V AC, 50–60 Hz, 360 VA
Overvoltage category	II
Air temperature	15–30°C (59–86°F)
Relative humidity	10–75% (noncondensing)
Altitude	Up to 2000 m (6500 ft.)
Place of operation	For indoor use only
Pollution level	2
Environmental class	3K2 (IEC 60721-3-3)

Transportation conditions

Air temperature	–25°C to 60°C (–13°F to 140°F) in manufacturer's package
Relative humidity	Max. 75% (noncondensing)

Storage conditions

Air temperature 15°C to 30°C (59°F to 86°F) in manufacturer's package

Relative humidity Max. 75% (noncondensing)

Mechanical data and hardware features

Dimensions (door closed)	Width: 362 mm (14.25 in.) Height: 381 mm (15 in.) Depth: 559 mm (22 in.)
Dimensions (doors open)	Width: 362 mm (14.25 in.) Height: 529 mm (20.83 in.) Depth: 559 mm (22 in.)
Mass	23 kg (50 lb.)
Capacity	Up to 96 samples per run
Software	Default protocols are provided with the BioCalculator software supplied with the QIAxcel. Updated protocols are available from www.qiagen.com/QIAxcel

Waste Electrical and Electronic Equipment (WEEE)

This section provides information about disposal of waste electrical and electronic equipment by users in the European Union.

The European Directive 2002/96/EC on WEEE requires proper disposal of electrical and electronic equipment when it reaches its end of life. 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 legislation. 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.

QIAGEN accepts its responsibility in accordance with the specific WEEE recycling requirements and, where a replacement product is being supplied by QIAGEN, provides free recycling of its WEEE-marked electronic equipment in Europe. If a replacement product is not being purchased from QIAGEN, recycling can be provided upon request at additional cost. 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

We herewith declare under our sole responsibility that the product

QIAxcel, cat. no. 9001421

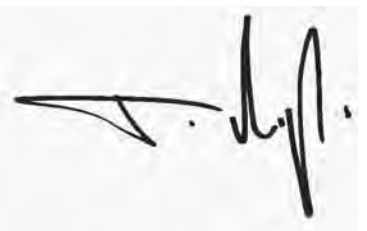
meets all applicable requirements of the following European Directives

Low Voltage Directive (LVD)	**2006/95/EC**
Electromagnetic Compatibility Directive (EMC)	**2004/108/EC**

and the relevant harmonized standards

IEC 61010-1 (Ed.2)
IEC 61010-2-081 (Ed.1)
IEC 61326-1:1997
EN 61000-3-2:2000/A1:2001
EN 61000-3-3:1995
EN 55011:1998

Hombrechtikon, November 5, 2007



CE

Pit Muggli

Director Business Excellence

QIAGEN Instruments AG

Appendix B

Cartridge tracking

This procedure allows a cartridge tracking log to be created. The tracking log, which is saved with the Cartridge ID as the file name, contains cartridge ID, number of runs left, user ID, and data directory.

1. Before the start of run, select "File" in the "Instrument Control" window. Then select "Cartridge Tracking" and ensure that "Enable" is checked.
2. Select "File" in the "Instrument Control" window and click "Cartridge tracking" and then "Location" to specify the location where the data should be stored.
3. Navigate to the selected location using Windows Explorer and open the **CartridgeID.log** file (e.g., **070220A01.log**) using Notepad or Microsoft Excel. The log displays a running log of the cartridge ID, number of runs left, user ID, and data directory for the entire life of the cartridge.
   Note: The log file will accurately keep track of the cartridge if used on the same instrument and computer. For example, if the cartridge is used on another instrument, the log file will not show any information for those runs on the other instrument.

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Appendix C

QIAxcel methods

QIAxcel DNA High Resolution methods

The QIAxcel DNA High Resolution Gel Cartridge is designed for high-resolution (2–5 bp) genotyping, high-resolution multiplex PCR, and AFLP/RFLP analysis of less than 20 fragments. The gel cartridge can separate fragment sizes ranging from 15 bp to 5 kb. The resolution depends on the fragment size and the method chosen to run the assay (see Table 2).

Table 2. Guidelines for method selection using the QIAxcel DNA High Resolution Kit

Method	Fragment size		
	100–500 bp	500 bp – 1 kb	1–5 kb
	Best resolution		
0M400* 0L400† 0H400‡	20 bp	100 bp	500 bp
0M500* 0L500† 0H500‡	10 bp	50 bp	200 bp
0M700* 0L700† 0H700‡	2–5 bp	N/A	N/A

* The 0M400, 0M500, and 0M700 methods are recommended for DNA concentrations 10–100 ng/µl (e.g., PCR products [30–40 cycles] amplified from genomic DNA). † The 0L400, 0L500, and 0L700 methods are recommended for DNA concentrations <10 ng/µl. ‡ The 0H400, 0H500, and 0H700 methods are recommended for DNA concentrations >100 ng/µl (e.g., high-yield PCR products).

M Methods

The 0M400, 0M500, and 0M700 methods are recommended for DNA concentrations 10–100 ng/µl.

Method	Sample injection voltage (KV)	Sample injection time (s)*	Separation voltage (KV)	Separation time (s)
0M400	5	10	6	400
0M500	5	10	5	500
0M700	5	10	3	700

L Methods

The 0L400, 0L500, and 0L700 methods are recommended for DNA concentrations <10 ng/µl.

Method	Sample injection voltage (KV)	Sample injection time (s)*	Separation voltage (KV)	Separation time (s)
0L400	8	20	6	400
0L500	8	20	5	500
0L700	8	20	3	700

* Sample injection time can be adjusted from 5 to 40 seconds to obtain optimal signals. Reduce the injection time if the signal is saturated, as indicated by peaks with flat tops. Increase sample injection time if the signal is below the default setting of the positive threshold of 7%.

H Methods

The 0H400, 0H500, and 0H700 methods are recommended for DNA concentrations DNA concentration >100ng/µl.

Method	Sample injection voltage (KV)	Sample injection time (s)*	Separation voltage (KV)	Separation time (s)
0H400	2	20	6	400
0H500	2	20	5	500
0H700	2	20	3	700

* Sample injection time can be adjusted from 5 to 40 seconds to obtain optimal signals. Reduce the injection time if the signal is saturated, as indicated by peaks with flat tops. Increase sample injection time if the signal is below the default setting of the positive threshold of 7%.

Note: Unpurified PCR products contain dNTPs and primers, which can contribute to the optical density (OD) and cause over estimation of the DNA concentration.

QIAxcel DNA Screening methods

The QIAxcel DNA Screening Kit is designed for low-resolution (>20bp) genotyping, low-resolution multiplex PCR, single PCR screening, plasmid DNA digestion checking, and plasmid and oligo DNA quantity checking. The gel cartridge can separate the fragment size range from 15bp to 5kb. The resolution depends on the fragment size and the method chosen to run the assay (see Table 3).

Table 3. Guidelines for method selection using the QIAxcel DNA Screening Kit

Method	Fragment size		
	<500 bp	500 bp – 1 kb	1–5 kb
	Best resolution		
AM320* AL320† AH320‡	20 bp	100 bp	500 bp
AM420* AL420† AH420‡	20 bp	100 bp	500 bp
APH600 APL600	Uncut plasmid DNA checking		

* The AM320 and AM420 methods are recommended for DNA concentrations 10–100 ng/µl (e.g., PCR products [30–40 cycles] amplified from genomic DNA). † The AL320 and AL420 methods are recommended for DNA concentrations <10 ng/µl. ‡ The AH320 and AH420 methods are recommended for DNA concentrations >100 ng/µl (e.g., high-yield PCR products).

M Methods

The AM320 and AM420 methods are recommended for DNA concentrations 10–100 ng/µl, while method APH600 is recommended for purified high-copy plasmid DNA (50–300 ng/µl) in elution buffer.

Method	Sample injection voltage (KV)	Sample injection time (s)*	Separation voltage (KV)	Separation time (s)
AM320	5	10	6	320
AM420	5	10	5	420
APH600	1	5	6	600

L Methods

The AL320 and AL420 methods are recommended for DNA concentrations <10 ng/µl, while method APL600 is recommended for purified low-copy plasmid DNA (<50 ng/µl) in elution buffer.

Method	Sample injection voltage (KV)	Sample injection time (s)*	Separation voltage (KV)	Separation time (s)
AL320	8	20	6	320
AL420	8	20	5	420
APL600	3	5	6	600

* Sample injection time can be adjusted from 5 to 40 seconds to obtain optimal signals. Reduce the injection time if the signal is saturated, as indicated by peaks with flat tops. Increase sample injection time if the signal is below the default setting of the positive threshold of 7%.

H Methods

The AL320 and AL420 methods are recommended for DNA concentrations >100ng/µl.

Method	Sample injection voltage (KV)	Sample injection time (s)*	Separation voltage (KV)	Separation time (s)
AH320	2	20	6	320
AH420	2	20	5	420

* Sample injection time can be adjusted from 5 to 40 seconds to obtain optimal signals. Reduce the injection time if the signal is saturated, as indicated by peaks with flat tops. Increase sample injection time if the signal is below the default setting of the positive threshold of 7%.

Note: Unpurified PCR products contain dNTPs and primers, which can contribute to the optical density (OD) and cause overestimation of the DNA concentration.

QIAxcel DNA Large Fragment methods

The QIAxcel Large Fragment Kit is designed for separating small and large DNA fragment between 5 kb and10 kb. The resolution depends on the fragment size and the method chosen to run the assay (see Table 4).

Table 4. Guidelines for method selection using the QIAxcel DNA Large Fragment Kit

Method	Fragment size			
	100–500 bp	500 bp – 1 kb	1–5 kb	5–10 kb
	Best resolution			
BM800* BL800† BH800‡	2–5 bp	50 bp	100 bp	N/A
BM1200* BL1200† BH1200‡	2–5 bp	50 bp	100 bp	500 bp

* The BM800 and BM1200 methods are recommended for DNA concentrations 10–100 ng/µl (e.g., PCR products [30–40 cycles] amplified from genomic DNA). † The BL800 and BL1200 methods are recommended for DNA concentrations <10 ng/µl. ‡ The BH800 and BH1200 methods are recommended for DNA concentrations >100 ng/µl (e.g., high-yield PCR products).

M Methods

The BM800 and BM1200 methods are recommended for DNA concentrations 10–100 ng/µl.

Method	Sample injection voltage (KV)	Sample injection time (s)*	Separation voltage (KV)	Separation time (s)
BM800	5	10	3.5	800
BM1200	5	10	3.5	1200

L Methods

The BL1200 and BL800 methods are recommended for DNA concentrations <10 ng/µl.

Method	Sample injection voltage (KV)	Sample injection time (s)*	Separation voltage (KV)	Separation time (s)
BL800	8	20	3.5	800
BL1200	8	20	3.5	1200

* Sample injection time can be adjusted from 5 to 40 seconds to obtain optimal signals. Reduce the injection time if the signal is saturated, as indicated by peaks with flat tops. Increase sample injection time if the signal is below the default setting of the positive threshold of 7%.

H Methods

The BH1200 and BH800 methods are recommended for DNA concentrations >100ng/µl.

Method	Sample injection voltage (KV)	Sample injection time (s)*	Separation voltage (KV)	Separation time (s)
BH800	2	20	3.5	800
BH1200	2	20	3.5	1200

* Sample injection time can be adjusted from 5 to 40 seconds to obtain optimal signals. Reduce the injection time if the signal is saturated, as indicated by peaks with flat tops. Increase sample injection time if the signal is below the default setting of the positive threshold of 7%.

Note: Unpurified PCR products contain dNTPs and primers, which can contribute to the optical density (OD) and cause over estimation of the DNA concentration.

QIAxcel RNA Quality Control methods

The QIAxcel RNA Quality Control Gel Cartridge is designed for quality control of total RNA, cRNA, fragmented RNA, and single-stranded cDNA.

- Method CM-F-RNA is recommended for use with fragmented RNA and fragmented DNA at a concentration of 250–500 ng/µl.
- Method CM-RNA is recommended for use with total RNA at a concentration of 300–1000 ng/µl or cRNA at a concentration of 100–500 ng/µl.
- Method CL-RNA is recommended for use with total RNA at a concentration of 50–300 ng/µl or cRNA at a concentration of <100 ng/µl.

Note: Total RNA and cRNA concentrations >1 µg/µl should be diluted to 1 µg/µl in sterile DEPC water before denaturing.

Method	Sample injection voltage (KV)	Sample injection time (s)*	Separation voltage (KV)	Separation time (s)
CM-F-RNA	7	20	3	600
CM-RNA	5	20	6	600
CL-RNA	8	20	6	600

* Sample injection time can be adjusted from 5 to 40 seconds to obtain optimal signals. Reduce the injection time if the signal is saturated, as indicated by peaks with flat tops. Increase sample injection time if the signal is below the default setting of the positive threshold of 7%.

Universal methods: all gel cartridges

There are 2 built-in universal methods that can be used with all QIAxcel Gel Cartridges: Purge and HVpurge.

Purge method	The Purge method allows the user to remove air bubbles from the gel cartridge and clean the capillaries. The Purge method is not counted as a sample run, so the number of sample runs remaining is unchanged.
HVpurge method	The HVpurge method applies a high voltage (8 kilovolts) and N_2 pressure to the capillaries to correct misalignment or delays in sample migration through the capillaries. The HVpurge method is not counted as a sample run so the number of sample runs remaining is unchanged.

Note: Do not exceed a total of 10 runs (or 5 minutes) when using either a Purge or HVpurge method for any cartridge, with the exception of the QIAxcel DNA Screening Cartridge, which should not exceed a total of 5 runs or 2–3 minutes. In addition, to prevent excessive heat build-up within the gel cartridge, do not exceed more than 3 consecutive uses of the HVpurge method.

Method	Sample injection voltage (KV)	Sample injection time (s)*	Separation voltage (KV)	Separation time (s)
Purge	N/A	N/A	N/A	30
HVpurge	N/A	N/A	8	30

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Appendix D

Additional information

Integration Strategies

Generally, the best way to analyze a document is to select "Analysis/Run" in the BioCalculator menu bar.

If the analysis results using the default parameters are not satisfactory, the baseline and peak detection settings can be adjusted.

Create a custom default parameter set

If a particular set of integration parameters are found to work best for the desired application, these settings can be set as default for all future data files by selecting the "Use as default" option in the "Parameter setup" dialog box.

Create a custom default sequence table

If a particular combination of integration method, sample injection time, number of runs, data directory, and marker table are found to work best for a routine application, these settings can be set as default for all future routine analyses by saving the run condition in the instrument control panel at **C:\ProgramFiles\BioCaculator\Sequence** .

Prevent peak detection in certain sections of the electropherogram

To prevent peaks from being detected in a certain section of the electropherogram, use the "Suspend Integration" function in the "Parameter setup" dialog box to suspend integration for those sections (see Section 6.7.1).

Select the right DNA Markers and Alignment Markers

Selecting the correct markers will increase the accuracy of DNA size analysis. Select the DNA markers containing DNA fragments size close to the size of the targeted DNA fragments.

Use alignment markers with sizes close to the selected DNA markers.

Detector Test

A 1-second detector test can be performed for all 12 channels to determine the detection status of a gel cartridge. A detector test may be performed when one or more channels in a new cartridge do not provide data signals and the baseline is flat.

An output file (**detector.asc**) will be generated and saved in the main directory **C:\Program Files\BioCalculator.**

Install the gel cartridge to be tested.

In the "Instrument Control" window, click "Latch".

In the "Instrument Control" window, under "File", select "Detector Test".

The menu options will disappear when the detector test is complete.

The output file (**detector.asc**) is saved in the main program directory **C:\Program Files\BioCalculator**.

Open the detector.asc file using Notepad or Microsoft Excel.

The detector test results will display the "Cartridge ID", "Runs left", and the detector data. The detector data will show 14 columns of data. The first 12 are channels 1 through 12.

Adding or deleting a peak

Right-click on the peak for addition or deletion. Select “Add Peak” or “Delete Peak”. Reprocess the data by selecting “Analysis” and then “Reprocess” in the BioCalculator menu bar.

Saturated signals

Identifying a saturated signal

Overloading the signal by injecting highly concentrated DNA will cause the detector to saturate. Saturated signals are those in which the signal level exceeds the maximal detector limit.

A saturated signal will usually display a flat top in its electropherogram. These signals are also referred to as “clipped”.

An example saturated signal

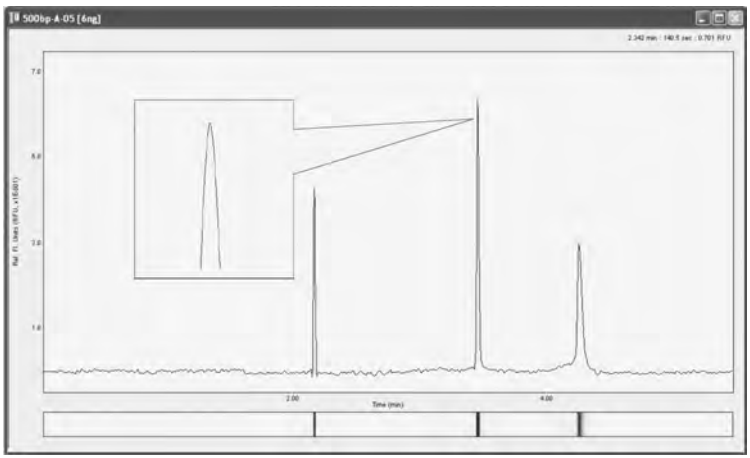
Preventing a saturated signal

There are 2 ways to prevent overloading or saturation of the signal: dilute the samples in QX DNA Dilution Buffer or inject less sample.

Less sample can be injected by either reducing the injection time or reducing the injection voltage (see Section 5.3).

An unsaturated signal will display a sharp peak in the electropherogram.

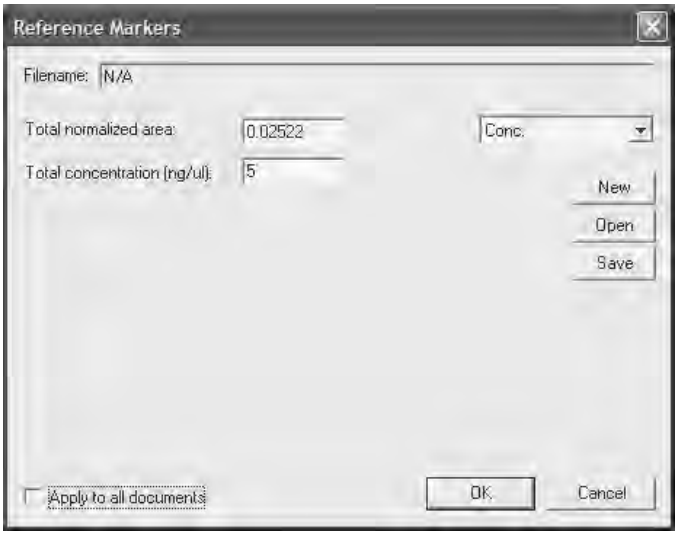
An example normal (nonsaturated) signal



Using the "Conc. Table" for DNA fragments

In order to calculate DNA fragment concentration, the DNA fragments must be within the size range of the chosen QX DNA Size Marker. If the DNA fragments fall outside the size range of the chosen QX DNA Size Marker, the "Conc. (DNA/RNA) table" can be used to calculate the fragment concentration. To do this, in the "Reference Markers" dialog enter the total normalized area (peak area divided by the apex of the peak) and the known concentration of the DNA size marker into the reference marker table.

"Reference Markers" dialog box



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Appendix E

QIAxcel accessories

Product	Contents	Cat. no.
QIAxcel	Automated system for fast and fully automated DNA fragment analysis or qualitative and quantitative RNA analysis,* BioCalculator software, 1-year warranty on parts and labor	9001421
Warranty PLUS 2, QIAxcel	2- or 3-year warranty, 1 preventive maintenance visit per year, 48-hour (2 working days) priority response, all labor, travel, and repair parts	9241202
QIAxcel Kits		
QIAxcel DNA High Resolution Kit (1200)	QIAxcel DNA High Resolution Gel Cartridge, Buffers, Mineral Oil, QX Intensity Calibration Marker, 12-Tube Strips	929002
QIAxcel DNA Screening Kit (2400)	QIAxcel DNA Screening Gel Cartridge, Buffers, Mineral Oil, QX Intensity Calibration Marker, 12-Tube Strips	929004
QIAxcel DNA Large Fragment Kit (600)	QIAxcel DNA Large Fragment Gel Cartridge, Buffers, Mineral Oil, QX Intensity Calibration Marker, 12-Tube Strips	929006
QIAxcel RNA Quality Control Kit (1200)	QIAxcel RNA Quality Control Gel Cartridge, Buffers, Mineral Oil, QX Intensity Calibration Marker, QX Alignment Marker, 12-Tube Strips	929102
Software		
BioCalculator Software Key	Software key allowing use of BioCalculator analysis software on an additional computer*	9018391

* The software key is for analysis of results only. It does not provide any instrument control functions.

Product	Contents	Cat. no.
DNA size markers		
QX DNA Size Marker pUC18/*Hae*III (50 µl)	DNA size marker with 9 fragments: 80–587 bp	929550
QX DNA Size Marker FX174/*Hae*III (50 µl)	DNA size marker with 11 fragments: 72–1353 bp	929551
QX DNA Size Marker 25bp – 1.8 kb (50 µl)	DNA size marker with 12 fragments: 25bp – 1.8 kb	929552
QX DNA Size Marker 100 bp – 3 kb (50 µl)	DNA size marker with 14 fragments: 100 bp – 3 kb	929553
QX DNA Size Marker 25–450 bp (50 µl)	DNA size marker with 17 fragments: 25 –450 bp	929555
QX DNA Size Marker 50–800 bp (50 µl)	DNA size marker with 11 fragments: 50 –800 bp	929556
QX DNA Size Marker 250 bp – 4 kb (50 µl)	DNA size marker with 11 fragments: 250 bp – 4 kb	929557
QX DNA Size Marker 250 bp – 8 kb (50 µl)	DNA size marker with 11 fragments: 250 bp – 8 kb	929558
Alignment markers		
QX Alignment Marker 15 bp/500 bp (1.5 ml)	Alignment marker with 15 bp and 500 bp fragments	929520

Product	Contents	Cat. no.
QX Alignment Marker 15 bp/1 kb (1.5 ml)	Alignment marker with 15 bp and 1 kb fragments	929521
QX Alignment Marker 15 bp/3 kb (1.5 ml)	Alignment marker with 15 bp and 3 kb fragments	929522
QX Alignment Marker 15 bp/10 kb (1.5 ml)	Alignment marker with 15 bp and 10 kb fragments	929523
QX Alignment Marker 15 bp/5 kb (1.5 ml)	Alignment marker with 15 bp and 5 kb fragments	929524
QX Alignment Marker 50 bp/500 bp (1.5 ml)	Alignment marker with 50 bp and 500 bp fragments	929525
QX Alignment Marker 50 bp/1 kb (1.5 ml)	Alignment marker with 50 bp and 1 kb fragments	929526
QX Alignment Marker 15bp/400bp (1.5 ml)	Alignment marker with 15 bp and 400 bp fragments	929527
QX Alignment Marker 50 bp/3 kb (1.5 ml)	Alignment marker with 50 bp and 3 kb fragments	929528
QX Alignment Marker 50 bp/5 kb (1.5 ml)	Alignment marker with 50 bp and 5 kb fragments	929529

Product	Contents	Cat. no.
QX RNA Alignment Marker (1.5 ml)	RNA alignment marker	929510
Calibration marker		
QX Intensity Calibration Marker (600 µl)	600 µl QX Intensity Calibration Marker	929500
Buffers		
QX DNA Dilution Buffer (15 ml)	15 ml QX DNA Dilution Buffer	929601
QX RNA Dilution Buffer (15 ml)	15 ml QX RNA Dilution Buffer	929602
QX Separation Buffer (40 ml)	40 ml QX Separation Buffer	929603
QX Wash Buffer (40 ml)	40 ml QX Wash Buffer	929604
QX Mineral Oil (50 ml)	50 ml QX Mineral Oil	929605
Accessories		
QX Cartridge Stand	QX Cartridge Stand	929701
QX Buffer Tray	QX Buffer Tray	929702
QX 0.2 ml 12-Tube Strip (80)	80 x QX 0.2 ml 12-Tube Strips	929703
QX Multicolor 0.2 ml 12-Tube Strip (80)	80 x QX Multicolor 0.2 ml 12-Tube Strips	929704

Product	Contents	Cat. no.
QX Nitrogen Cylinder (6)	6 x QX Nitrogen Cylinder	929705
QX Adjustable Regulator	QX Adjustable Regulator for attaching external N_2 cylinders to the QIAxcel instrument	9018398
QX Cartridge Purge Tool	QX Cartridge Purge Tool	9241169

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Appendix F

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 original date of shipment (see Appendix A). Repair or replacement of defective parts will be provided to the purchaser during this time period provided 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.

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