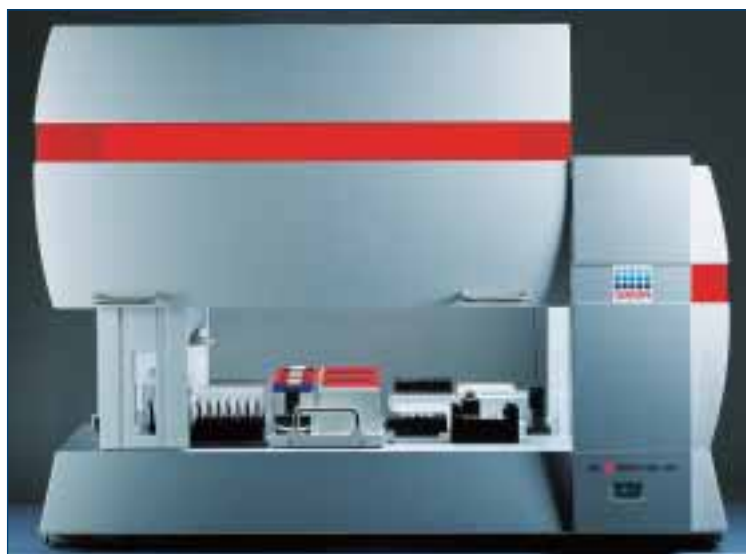


October 2004

BioRobot[®] MDx DSP User Manual



IVD

REF

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Important

This user manual contains information needed to operate the instrument safely. Before using the instrument, read the manual carefully. Translations of the user manual are available in other languages (see below) as PDF files on the CD. These PDF files are also available at www.qiagen.com/goto/DSPhandbooks, or from your local QIAGEN company or distributor as printouts.

Wichtig

Dieses Benutzerhandbuch enthält alle Informationen zur sicheren Benutzung Ihres Gerätes. Lesen Sie es bitte sorgfältig vor Benutzung des Gerätes durch. Eine Übersetzung des Handbuchs finden Sie als PDF-Datei auf der beiliegenden CD. Sie können das Handbuch auch unter www.qiagen.com/goto/DSPhandbooks herunterladen oder sich an Ihre lokale QIAGEN Filiale oder lokalen Distributor wenden, um eine gedruckte Version zu erhalten.

Important

Ce manuel d'utilisation contient les informations pour utiliser votre instrument en toute sécurité. Avant d'utiliser l'appareil, lire attentivement le manuel. Sa traduction vous est fournie sur le CD ci-joint sous format PDF. Vous pouvez aussi consulter www.qiagen.com/goto/DSPhandbooks pour télécharger le manuel ou contacter votre bureau ou distributeur local QIAGEN afin d'obtenir une copie papier.

IVD

In vitro diagnostic medical device

REF

Catalog number



Handbook



Legal manufacturer

The BioRobot MDx DSP workstation is manufactured by QIAGEN Instruments AG for QIAGEN GmbH.

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1. Safety Information

1 Safety Information

This manual contains information and warnings that must be followed by the user to ensure safe operation of the BioRobot MDx DSP workstation and to maintain the instrument in a safe condition.

Possible hazards that could harm the user or result in damage to the instrument are clearly stated at the appropriate places throughout this manual. If the instrument is used in a manner not specified by the manufacturer, the protection provided by the instrument may be impaired.

The following safety conventions are used 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.

Before using the instrument, it is essential to read this manual carefully and to pay particular attention to any advice it contains concerning hazards that may arise from use of the instrument.

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 BioRobot MDx DSP may cause personal injuries or damage to the instrument. The BioRobot MDx DSP should only be operated by qualified personnel who have been appropriately trained. Servicing of the BioRobot MDx DSP should only be performed by QIAGEN Instrument Service Specialists.

Use only QIAGEN® components, otherwise your right to make a claim under the guarantee may be invalidated. Carry out the maintenance regularly in accordance with the operating instructions. QIAGEN will charge for repairs that prove to be required due to incorrect maintenance.

1.2 Electrical safety

To ensure satisfactory and safe operation of the BioRobot MDx DSP, it is essential that the line power cord is connected to true electrical earth (ground). In case of emergency, the BioRobot MDx DSP can be stopped by pressing the power switch on the front right of the instrument.

WARNING



Electrical hazard

[W2]

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.

When working with the BioRobot MDx DSP:

- Make sure the line power cord is connected to a line power outlet that has a protective conductor (earth/ground).
- Do not attempt to make any internal adjustments or replacements.
- Do not operate the instrument with any covers or parts removed.
- If water or reagent has spilled inside the instrument, switch off the instrument and disconnect it from the line power supply. Call QIAGEN Technical Services.
- Servicing should be carried out only by QIAGEN Instrument Service Specialists.
- If the instrument becomes electrically unsafe for use, make the instrument inoperative and secure it against unauthorized or unintentional operation. Call QIAGEN Technical Services.






The instrument is likely to be electrically unsafe when:

- it shows visible damage
- the line power cord shows signs of damage
- it has been stored under unfavorable conditions for a prolonged period
- it has been subjected to severe transport stresses






Voltage rating labels

One of the following labels appears on the back of the BioRobot MDx DSP. Ensure that the voltage rating specified on the label matches the voltage available at the installation site.

BioRobot MDx DSP Label 1 (UK)


BIO  ROBOT 8000		ETI-09014820-B
MODEL: BIOROBOT MDx DSP		
SERIAL NO: XXXX		
VOLTAGE: 240 V ~50/60 Hz 800 VA		
FUSE: T10L250V  2x		
Manufactured by QIAGEN Instruments Hombrechtikon, Switzerland		 

BioRobot MDx DSP Label 2 (Rest of Europe)

BIO  ROBOT 8000		ETI-09014820-B
MODEL: BIOROBOT MDx DSP		
SERIAL NO: XXXX		
VOLTAGE: 100-115V/220-230V ~50/60Hz 800 VA		
FUSE: T10L250V  2x		
Manufactured by QIAGEN Instruments Hombrechtikon, Switzerland		 

1.3 Environment

Operating conditions

WARNING 	Explosive atmosphere [W3] The BioRobot MDx DSP is not designed for use in an explosive atmosphere. The BioRobot MDx DSP must only be used with reagents, substances, and protocols defined in the <i>BioRobot MDx DSP User Manual</i> and handbooks for QIAGEN kits that are intended for use on the BioRobot MDx DSP. Use of other reagents, substances, or protocols may lead to fire or explosion.
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The BioRobot MDx DSP will operate correctly under the following conditions:


- Indoors
- Ambient temperature of 15–32°C (59–90°F)
- Ambient relative humidity of 15–75% without condensation

Storage conditions

If you intend to store the instrument for a prolonged period of time, first contact your QIAGEN Instrument Service Specialist for advice.

1.4 Waste disposal

Waste containers may contain hazardous chemicals or infectious agents from the purification process. Such wastes must be collected and disposed of properly in accordance with the local safety regulations.

WARNING 	Toxic fumes [W4] Do not use bleach to clean or disinfect waste containers or tubing for waste liquids. Bleach in contact with salts from the buffers can produce toxic fumes.
---	---

Disposal of spare parts, which may contain hazardous chemicals or infectious agents, is done by QIAGEN Instrument Service Specialists. Users are not allowed to remove or replace any part of the system themselves. Please contact QIAGEN Technical Services to schedule a visit.

1.5 Biological safety

Specimens and reagents containing materials from humans should be treated as potentially infectious. Use safe laboratory procedures as outlined in publications such as *Biosafety in Microbiological and Biomedical Laboratories*, HHS (www.cdc.gov/od/ohs/biosfty/biosfty.htm).

Samples

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

WARNING



Samples containing infectious agents

[W5]

Some samples used with this instrument may contain infectious agents. Handle such samples with the greatest of care and in accordance with the required safety regulations.

Always wear safety glasses, 2 pairs of gloves, and a lab coat.

The responsible body (e.g., laboratory manager) must take the necessary precautions to ensure that the surrounding workplace is safe, and that the instrument operators are suitably trained and not exposed to hazardous levels of infectious agents 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)

Spare parts

Disposal of spare parts, which may contain infectious agents, is done by QIAGEN Instrument Service Specialists. Users are not allowed to remove or replace any part of the system themselves. Please contact QIAGEN Technical Services to schedule a visit.

1.6 Chemicals

<p>WARNING</p> 	<p>Hazardous chemicals [W6]</p> <p>Some chemicals used with this instrument may be hazardous or may become hazardous after completion of the protocol run.</p> <p>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.</p> <p>Venting for fumes and disposal of wastes must be in accordance with all national, state, and local health and safety regulations and laws.</p>
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* OSHA: Occupational Safety and Health Administration (United States of America)

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

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

Toxic fumes

If you work with volatile solvents, toxic substances, etc., you must provide an efficient laboratory ventilation system to remove vapors that may be produced when you are working with the BioRobot MDx DSP.

<p>WARNING</p> 	<p>Toxic fumes [W7]</p> <p>Do not use bleach to clean or disinfect the instrument. Bleach in contact with salts from the buffers can produce toxic fumes.</p>
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1.7 Mechanical hazards

The robotic arm with tip adapters and robotic handling system can move rapidly over the worktable.

The hood of the BioRobot MDx DSP worktable must remain closed for proper operation. Do not attempt to operate the BioRobot MDx DSP with the hood open.

Only add items to the worktable or remove items from the worktable when instructed to do so by the operating software or when the BioRobot MDx DSP is not in operation.

Click the "STOP" button in the QIAsoft MDx DSP software or switch off the BioRobot MDx DSP for immediate interruption of the BioRobot MDx DSP.

WARNING



Moving parts

[w8]



Keep the hood closed during operation. Never reach into the working area of the BioRobot MDx DSP when the instrument is operating.

Click the "STOP" button in the QIAsoft MDx DSP software or switch off at the power switch for immediate interruption of the instrument.

If the robotic arm should collide with another object, automatic feedback circuits cause the arm to stop and remain at this position. Before continuing, the arm must reinitialize by moving around the worktable.

Before resuming operation after a collision, check the tip adapters for damage. If necessary, contact QIAGEN Technical Services to replace them.

Encoders on each movement axis of the robotic arm and an automatic position correction feature minimize collision damage.

WARNING 	Risk of overheating [W9] Maintain a minimum clearance of 20 cm at the rear of the BioRobot MDx DSP to ensure proper ventilation. Slits and openings which ensure the ventilation of the BioRobot MDx DSP must not be covered.
WARNING 	Sharp edges [W10] The tip-disposal station can become contaminated and has parts with sharp edges. Decontaminate the tip-disposal station before removing. Do not touch any parts with sharp edges.

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2. Introduction

2 Introduction

Thank you for choosing the BioRobot MDx DSP workstation. We are confident it will become an integral part of your laboratory.

Before using the instrument, it is essential to read this manual carefully and to pay particular attention to any advice it contains concerning hazards that may arise from use of this instrument.

2.1 About this manual

This manual provides information about the BioRobot MDx DSP in the following sections:

1. Safety Information
 2. Introduction
 3. BioRobot MDx DSP — General Description
 4. Installation Procedures
 5. QIAsoft MDx DSP Operating System — Introduction
 6. General Operation
 7. Maintenance Procedures
 8. Troubleshooting
 9. Glossary
- Appendices

The Appendices contain the following:

- Technical data
- Ordering information for BioRobot MDx DSP 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 molecular biology and the use of QIAGEN products. If you have any questions regarding the BioRobot MDx DSP, 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 call one of the QIAGEN Technical Services Departments or local distributors (see back cover).

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 changes specifications at any time, in compliance with requirements of IvDD 98/79 EC.

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

2.3 Intended use of the BioRobot MDx DSP

The BioRobot MDx DSP system is designed to perform automated purification of nucleic acids for in vitro diagnostic purposes. The system is intended for use by professional users, such as technicians and physicians trained in molecular biological techniques and the operation of the BioRobot MDx DSP.

The BioRobot MDx DSP is intended to be used in combination with QIAamp[®] DSP Kits.

The BioRobot MDx DSP conforms to the requirements of IvDD 98/79 EC of the European Parliament and the Council of Ministers of 27 October 1998 concerning in vitro diagnostics.

The system is intended to be used only as a closed system. The system consists of a robotic workstation, laboratory and accessory cabinets, computer with operating software, software protocol, and sample preparation kit.

2.3.1 Requirements for BioRobot MDx DSP users

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

QIAGEN provides training with the initial installation of the BioRobot MDx DSP. For additional training, contact QIAGEN Instrument Service.

Task	Personnel	Training and experience
Transportation	QIAGEN Instrument Service Specialists only	
Installation	QIAGEN Instrument Service Specialists only	
Routine use (running protocols and performing regular, daily, weekly, and monthly maintenance)	Laboratory technicians or equivalent	Appropriately trained and experienced personnel familiar with the use of computers and automation in general
Preventive maintenance	QIAGEN Instrument Service Specialists only	
Servicing	QIAGEN Instrument Service Specialists only	

2.3.2 QIAsoft MDx DSP Operating System

The QIAsoft MDx DSP Operating System runs under the Microsoft® Windows® 2000 and Windows XP Professional operating systems, and uses typical Windows features such as tool buttons, command buttons, and dialog boxes. You should be familiar with the Windows operating environment and Windows conventions, especially the file management system. For more information, consult the Microsoft user guides.

Controlling the mouse

The following terms for controlling the mouse are used in this manual.

Action	Description
Click	Click the left mouse button.
Right-click	Click the right mouse button.
Double-click	Click the left mouse button twice in quick succession.
Select	Place the pointer over an item and click the left mouse button.
Click and drag	Place the pointer over an item, and click and hold the left mouse button. Drag the item to a new location before releasing the button.
Highlight	Place the pointer over an item and click the left mouse button. The item becomes highlighted.
Select " <u>X</u> XX/xxx"	In the menu bar, click the " <u>X</u> XX" menu and select "xxx" from the drop-down list that appears. Examples are " <u>F</u> ile/Exit" and " <u>E</u> nvironment/Execute".

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3. BioRobot MDx DSP — General Description

3 BioRobot MDx DSP — General Description

The BioRobot MDx DSP workstation is designed to perform automated purification of nucleic acids in combination with QIAamp DSP kits for in vitro diagnostic use.

The BioRobot MDx DSP provides:

- Excellent reproducibility through accurate liquid handling in combination with QIAamp DSP kits for in vitro diagnostic use
- Simplified standardization of sample preparation
- Documentation of the entire sample preparation process
- Increased safety of users through less contact with possibly infectious body fluids and organisms
- Increased productivity by combining high speed with minimal user interaction, leaving users with more time for other tasks

3.1 Components of the BioRobot MDx DSP

The BioRobot MDx DSP is controlled by an external computer. The BioRobot MDx DSP and the computer are located on the laboratory cabinet and the accessory cabinet, both of which can accommodate all necessary accessories.

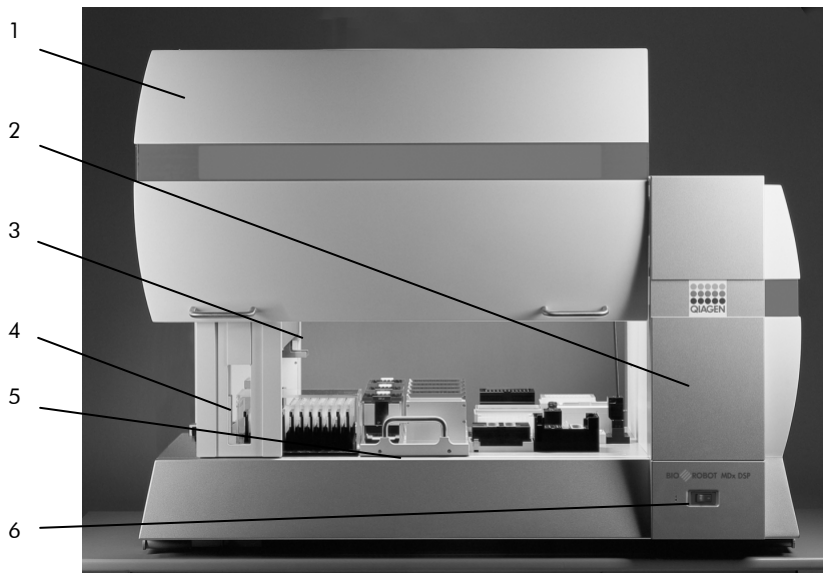
The BioRobot MDx DSP is comprised of several components, each of which performs a particular task:

- Worktable
- Worktable hood
- Tip-disposal station
- Tip-tray drawer
- Technical tower
- Robotic arm
- Robotic handling system
- Dilutor system
- High-speed dispensing system
- Wash station
- Automated vacuum system
- Cooling and heating system

General Description

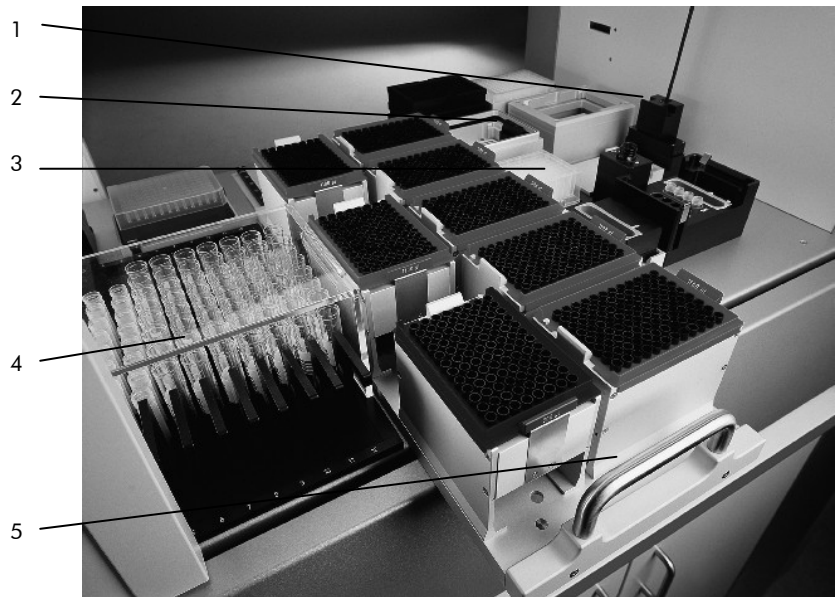
- Labware tracking system
- Sample tracking system

Front View of BioRobot MDx DSP



- | | |
|--|-----------------|
| 1. Worktable hood | 4. Robotic arm |
| 2. Technical tower | 5. Worktable |
| 3. Robotic handling system
and dilutor system | 6. Power switch |

Closeup View of BioRobot MDx DSP Worktable



- | | |
|---------------------------------|---------------------------|
| 1. High-speed dispensing system | 4. Sample tracking system |
| 2. Automated vacuum system | 5. Tip-tray drawer |
| 3. Cooling and heating system | |

Note: The tip-disposal station, the wash station, and the labware tracking system are not visible in the above 2 figures. The location of these components of the BioRobot MDx DSP will be described later in this section.

3.2 Principles of operation

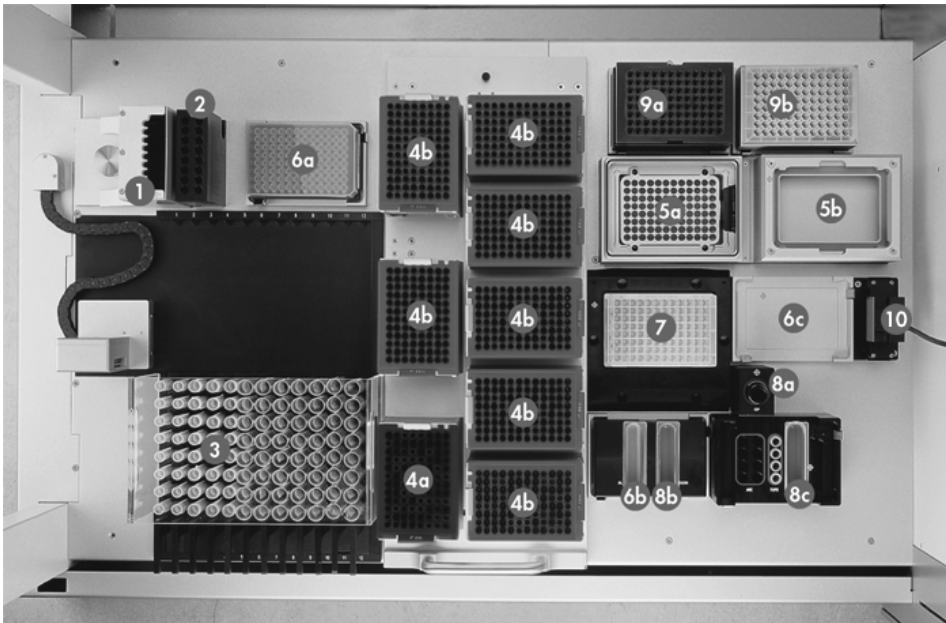
The BioRobot MDx DSP consists of various components that are controlled by the QIAsoft MDx DSP Operating System software. QIAGEN develops ready-to-run protocols that run on the QIAsoft MDx DSP software and allow the BioRobot MDx DSP to carry out automated purification of nucleic acids in combination with QIAamp DSP Kits for in vitro diagnostic applications. Each protocol is optimized for each stage of the application to be performed, from identification of samples using bar codes, through pipetting of samples and reagents, to final reporting and data analysis.

3.2.1 Worktable

The BioRobot MDx DSP worktable is the location where samples are loaded and processed. The worktable contains an array of slots, which are permanent components of the worktable. Slots on the worktable include:

- Tip-disposal station
- Wash station
- Sample tracking system
- Tip-tray holders
- Cooling and heating system
- Automated vacuum system
- Microplate stations
- Reagent holders
- Multiwell-plate holders

Slots of the BioRobot MDx DSP Worktable



- | | |
|--|---|
| 1. Tip-disposal station | 6a. Microplate station (MP Slot 1) |
| 2. Wash station | 6b. Microplate station (MP Slot 2) |
| 3. Sample tracking system (<i>SamTrack</i> Slot) | 6c. Microplate station (MP Slot 3) |
| 4a. Tip-tray holders (300 μ l tips) | 7. Cooling and heating system (<i>Therm Slot</i>) |
| 4b. Tip-tray holders (1100 μ l tips) | 8a. Reagent holder for 1 bottle |
| 5a. Automated vacuum system (Vac Base) | 8b. Reagent holder for 2 troughs (located on MP Slot 2) |
| 5b. Automated vacuum system (Vac Side Top/Lid Mount) | 8c. Reagent holder for microtubes and trough |
| | 9a. Black multiwell-plate holder |
| | 9b. Silver multiwell-plate holder |
| | 10. High-speed dispensing system |

General Description

Most slots can accommodate racks, which are components of the worktable that vary depending on the protocol. Examples of racks and their corresponding slots are as follows.

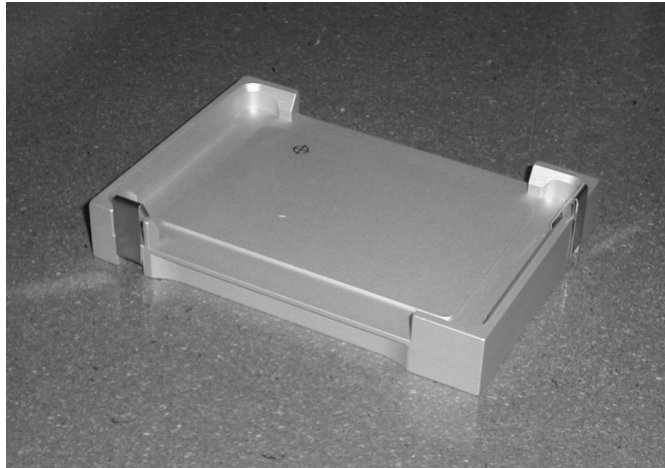
Rack	Corresponding slot
Tray of disposable filter-tips	Tip-tray holder
QIAGEN Protease bottle	Reagent holder for 1 bottle
Disposable trough	Reagent holder for 2 troughs or for microtubes and trough
Microtubes	Reagent holder for microtubes and trough
S-Block	Cooling and heating system (<i>Therm Slot</i>)
STS MDx tube holders	Sample tracking system (<i>SamTrak Slot</i>)
Channeling adapter	Black multiwell-plate holder
QIAGEN 96-well plate	Silver multiwell-plate holder

Racks are removed from the worktable at the end of each protocol.

The exact positions of the slots and racks are stored in the QIAsoft MDx DSP software. These data ensure that liquid-handling operations and movements of the robotic handling system are performed accurately.

Microplate stations

Microplate stations are slots on the worktable that can accommodate a 96-well microplate or other labware with the same base dimensions. The BioRobot MDx DSP worktable uses the following type: microplate station 8000, short, magnetic.

Microplate Station 8000, Short, Magnetic

The BioRobot MDx DSP worktable has 3 microplate stations. One of these accommodates a holder to form a new slot.

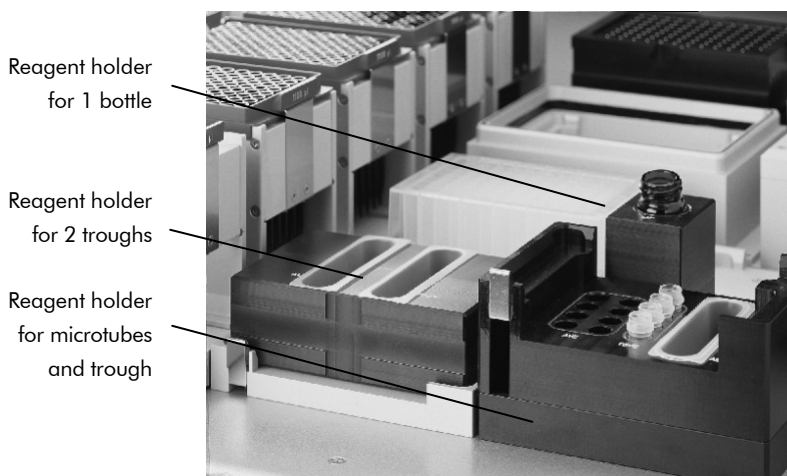
Microplate station	Additional holder
MP Slot 1	No additional holder
MP Slot 2	Holds the reagent holder for 2 troughs
MP Slot 3	No additional holder

All microplate stations can be removed from the worktable for cleaning. When returning the microplate stations, ensure that they fit properly onto the locator pins on the worktable surface.

Reagent holders

The BioRobot MDx DSP worktable contains various reagent holders for accommodating bottles, troughs, and microtubes.

Reagent Holders



These reagent holders are labeled and color-coded for ease of identification.

Reagent holder	Label	Color
Reagent holder for 1 bottle	QP	Brown
Reagent holder for 2 troughs	AL EtOH	None None
Reagent holder for microtubes and trough	AVE — for 8 x 2 ml tubes TOPE — for 4 x 1.5 ml tubes AE — for 1 trough	Purple Orange White

The reagent holder for microtubes and trough can also accommodate an elution microtube adapter carrying an Elution Microtubes CL rack. The bar code on the rack must face to the right.

Note: Disposable plastic troughs must be inserted into the reagent holders for troughs.

All reagent holders can be removed from the worktable for cleaning. When returning the reagent holder for 2 troughs, ensure that it fits properly onto its microplate station. For the other reagent holders, ensure that they fit properly onto the locator pins on the worktable surface.

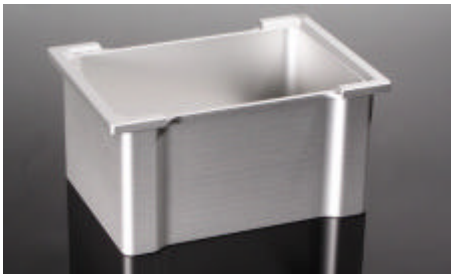
Multiwell-plate holders

The BioRobot MDx DSP worktable uses the following types of multiwell-plate holder:

- Multiwell-plate holder, tall, silver
- Multiwell-plate holder, tall, black

The silver multiwell-plate holder accommodates a QIAGEN 96-well plate (e.g., QIAamp 96 plate) only.

Multiwell-Plate Holder, Tall, Silver

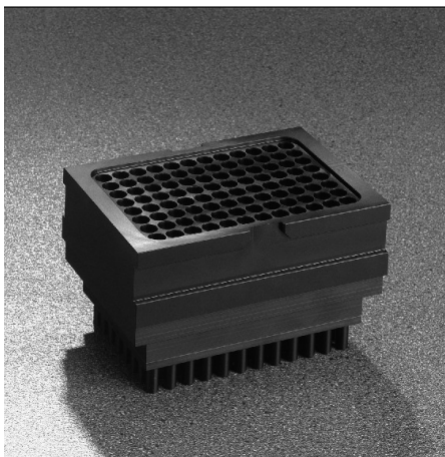


The black multiwell-plate holder accommodates the channeling adapter.

Multiwell-Plate Holder, Tall, Black



Channeling Adapter 8000



Note: The BioRobot MDx DSP worktable uses the channeling adapter 8000.

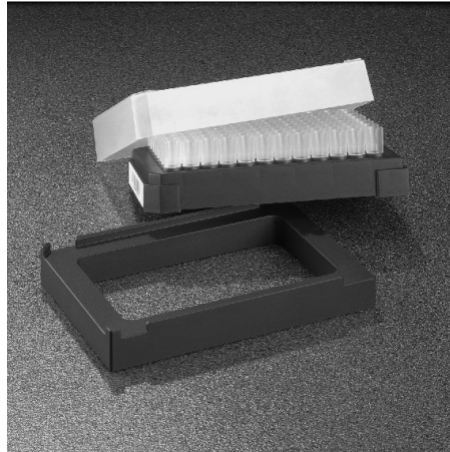
Both multiwell-plate holders can be removed from the worktable for cleaning. When returning the multiwell-plate holders, ensure that they fit properly onto the locator pins on the worktable surface.

Elution microtube adapter

The elution microtube adapter is a blue adapter that fits onto a microplate station or onto the reagent holder for microtubes and trough. The adapter itself carries a blue Elution Microtubes CL rack.

The BioRobot MDx DSP worktable uses the following type of elution microtube adapter: elution microtube adapter, type B.

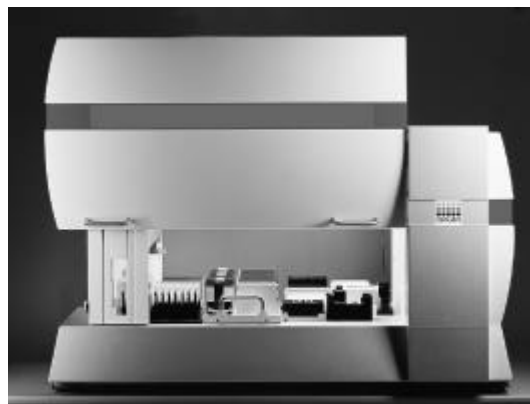
Elution Microtube Adapter, Type B, and Elution Microtubes CL Rack



3.2.2 Worktable hood

The worktable hood protects users from contact with the moving robotic arm and from potentially infectious material placed onto the worktable. The locking mechanism of the hood is controlled by the QIAsoft MDx DSP software.

BioRobot MDx DSP with Worktable Hood Opened



BioRobot MDx DSP with Worktable Hood Closed



3.2.3 Tip-disposal station

The tip-disposal station removes used disposable tips from the tip adapters on the robotic arm. The disposable tips are collected in a tip disposal bag located in the laboratory cabinet.

3.2.4 Tip-tray drawer

The tip-tray drawer is a platform on the worktable that carries tip-tray holders and can be manually pulled towards the user. With the tip-tray drawer pulled away from the worktable, the user can easily load tip trays onto the tip-tray holders without having to reach into the worktable.

Note: The tip-tray drawer does not detach from the worktable.

The correct position of the tip-tray drawer for pipetting operations is controlled via sensors by the QIAsoft MDx DSP software.

The tip-tray holders are color-coded and labeled to ensure correct loading of tip trays:

- Tip trays containing 1100 μ l disposable tips are loaded onto red tip-tray holders
- Tip trays containing 300 μ l disposable tips are loaded onto blue tip-tray holders

A tip tray can be loaded onto a tip-tray holder using only one hand. One side of the holder contains a solid clip, while the opposite side contains a flexible clip. Simply slide one end of the tip tray under the solid clip, and then press down the opposite end of the tray until it fits into place under the flexible clip.

3.2.5 Technical tower

The technical tower is the housing to the right of the BioRobot MDx DSP worktable (viewed from the front). Behind its front door is the reagent carousel, into which the user loads large reagent bottles. The contents of these bottles are dispensed by the high-speed dispensing system.

3.2.6 Robotic arm

The X, Y, Z robotic arm with the variable spacing system (V) provides accurate and precise positioning of the tip adapters and the robotic handling system on the worktable.

All X, Y, Z, and V movements are driven by DC motors with encoders.

The robotic arm is moved in the X direction (left and right) by the X-motor inside the instrument housing.

The tip adapters are mounted on the Y-slide inside the robotic arm, which moves in the Y direction (front to rear). Each tip adapter can be moved independently in the Z direction (up and down).

The BioRobot MDx DSP has the variable spacing system, which varies the spacing evenly between tip adapters. The variable spacing system allows creation of protocols that use a variety of containers with different spacing between neighboring pipetting positions. The spacing between the tip adapters is adjusted symmetrically using the variable spacing system motor (V-motor).

The robotic handling system motor (G-motor) controls the gripping function of the robotic handling system. The Z-motor controls movement in the Z direction (there are separate Z-motors for the tip adapters and an HZ-motor for the robotic handling system). The X-motor and Y-slide control movement in the X and Y direction respectively.

Pipetting positions can be specified with a resolution of less than 1 mm in X, Y, and Z directions.

3.2.7 Robotic handling system

The robotic handling system is installed on the robotic arm and is used to:

- Transport labware (e.g., QIAamp 96 plate, S-Block, Elution Microtubes CL rack) between different locations on the worktable
- Load and unload the vacuum manifold of the automated vacuum system
- Manipulate the dispenser head of the high-speed dispensing system

The robotic handling system can load and unload labware at all slots that can accommodate a 96-well microplate or equivalent. The robotic handling system and the tip adapters can only be used asynchronously.

3.2.8 Dilutor system

The BioRobot MDx DSP is equipped with 8 pipetting channels, each containing a tip adapter.

Each tip adapter can be moved independently in the Z direction, and the spacing between the tip adapters (Y direction) is variable (from 9 to 20 mm). This feature is termed the variable spacing system.

The pipetting channels are connected to precision syringe pumps, and can aspirate and dispense liquids at the reagent holders, at the vacuum manifold, at the cooling and heating system, and at the sample tracking system.

QIAGEN disposable tips containing filter barriers (300 and 1100 μ l) are available to avoid cross contamination, an

essential safety feature when processing potentially infectious material.

The dilutor system can only be used to transfer liquids from a source position, where liquid is aspirated, to a destination position, where the liquid is dispensed. Continuous dispensing of liquids from a single source position to multiple destination positions is performed using the high-speed dispensing system.

Syringe pump

The syringe pumps are computer-controlled syringes that are connected via tubing to the tip adapters and a membrane pump.

Each tip adapter has a dedicated syringe pump controlling its aspiration and dispensing function.

All parts that come into contact with liquid are made of inert materials such as stainless steel, polytetrafluoroethene (PTFE), and fluorinated ethene propene (FEP).

The membrane pump supplies system liquid from the system liquid container to the syringe pumps, and is used to flush the dilutor system and to rinse and clean the tip adapters.

Liquid detector

Each pipetting channel is equipped with a liquid sensor that enables it to detect the surface of ionic solutions and other conductive surfaces upon contact. The liquid detectors operate by monitoring the changes in capacitance between the disposable tips and the liquid.

Note: QIAGEN cannot guarantee the function of the liquid detectors if racks that are not approved by QIAGEN are used to hold samples and reagents.

The liquid detectors are used to detect sample and reagent levels. The QIAsoft MDx DSP software is informed if levels are too low. With the liquid detection feature, the immersion depth of the disposable tip in the sample during sampling is limited to usually 1–2 mm. This minimizes disposable tip contamination.

The liquid detectors are also used to detect the presence of clots in blood samples.

Note: Since the liquid detectors cannot determine the material that caused the change in capacitance, it is imperative that the disposable tips do not touch any surface other than the liquid to be detected. An error may be encountered if the disposable tips touch the side of a vessel, foam, a hand, and so on, even if the contact is insufficient to cause resistance. Avoid generating foam in the reagents and samples placed onto the worktable.

If the liquid detectors do not operate properly because of the reasons described above, the disposable tips may track down to the bottom of the sample tubes and cause liquid overflow.

Liquid level sensor system

The system liquid container, the waste container, and the vacuum trap are each equipped with a liquid level sensor. The sensors operate by monitoring changes in capacitance. They detect when there is insufficient liquid in the system liquid container, and when the maximum level in the waste container or the vacuum trap is reached. The liquid level sensors prevent working without system liquid, and prevent overflow of the waste container and vacuum trap.

3.2.9 High-speed dispensing system

The high-speed dispensing system provides high-speed dispensing of liquids through an 8-channel dispenser head that is manipulated by the robotic handling system.

The dispenser head is connected by tubing to a membrane pump and can dispense liquid to all slots to the right of the tip-tray drawer.

During operation of the high-speed dispensing system, the 8 pipetting channels are always used simultaneously.

Liquid is aspirated via a probe from bottles placed into the reagent carousel.

Protocol run times are significantly shortened due to a continuous flow of liquid and reduced arm movements. 250 μ l of liquid can be dispensed into 96 wells in less than 20 seconds.

All parts that come into contact with liquid are made of inert materials such as stainless steel, PTFE, and FEP.

Dispenser head

The dispenser head is made of Delrin® acetal resin and is equipped with 8 pipetting channels fitted with precision outlets.

Manipulation and precise positioning of the dispenser head is performed by the robotic handling system. When the high-speed dispensing system is not in use, the dispenser head is deposited at a dedicated wash station where it is held in place magnetically.

After dispensing reagents or buffers, the complete system is washed at the dedicated wash station with clean system liquid delivered by a membrane pump.

The dispenser head is connected via tubing to the membrane pump. This tubing is mounted using a roll-up mechanism to prevent any loose tubing from interfering with robotic arm movements.

Membrane pump

The computer-controlled membrane pump is located in the technical tower and provides a continuous flow of liquid for faster sample processing. The pump is connected via tubing to the dispenser head and to a probe which aspirates liquid from bottles placed into the reagent carousel.

The membrane pump ensures that accurate and consistent liquid volumes are dispensed by all 8 pipetting channels.

Reagent carousel

The reagent carousel is located in the technical tower and is accessed from the door at the front of the technical tower.

The carousel accommodates up to three 250 ml bottles (diameter 60 mm), three 500 ml bottles (diameter 72 mm), and a special system liquid bottle with a capacity of 1000 ml (provided by QIAGEN).

Liquid is aspirated from these containers by a stainless steel probe that is connected to the membrane pump. The probe moves up and the carousel turns until the required reagent bottle is positioned under the probe.

Movement of the probe in the Z direction is controlled by the P-motor and movement of the reagent carousel is driven by the R-motor.

Bar code labeled reagent bottles placed in the reagent carousel are automatically identified by a bar code reader camera (the buffer tracking system). The bar code reader camera is installed in the technical tower.

3.2.10 Wash station

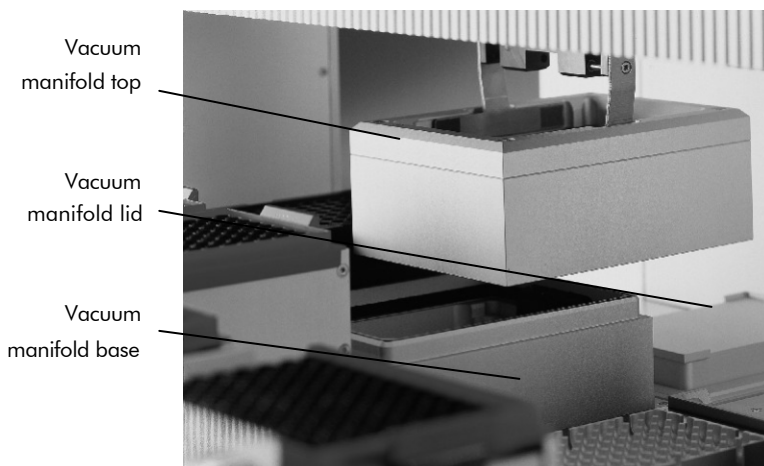
The specially designed wash station protects the worktable from splashes while the dilutor system is being flushed with system liquid. The user can adjust the volume of liquid for flushing.

3.2.11 Automated vacuum system

The automated vacuum system consists of a vacuum manifold on the BioRobot MDx DSP worktable and a vacuum trap and pump inside the laboratory cabinet. The system allows rapid and thorough filtration of wash and elution buffers through QIAGEN 96-well plates (e.g., QIAamp 96 plate).

The BioRobot MDx DSP uses the robotic handling system for automated and accurate assembly of the vacuum manifold and the labware that fit inside it (i.e., QIAGEN 96-well plate, and channeling adapter or Elution Microtubes CL).

Assembly of Vacuum Manifold by Robotic Handling System



The vacuum manifold consists of 3 parts:

Part	Location at start of protocol	Location during protocol	Comments
Vacuum manifold base	<i>Vac Base slot</i>	<i>Vac Base slot</i>	Holds Elution Microtubes CL and channeling adapter
Vacuum manifold top	<i>Vac Side Top/Lid Mount slot</i>	<i>Over vacuum manifold base</i>	Holds QIAGEN 96-well plate
Vacuum manifold lid	<i>Vac Side Top/Lid Mount slot</i>	<i>Over vacuum manifold top</i>	Provides a seal when vacuum is applied to the vacuum manifold

The vacuum manifold base is always located on the *Vac Base slot* (see page 3-5), where vacuum is applied. The user places the vacuum manifold top and lid on the *Vac Side Top/Lid Mount slot* at the start of a protocol according to the on-screen instructions. The robotic handling system transfers both parts to and from the vacuum manifold base during the protocol.

During washing of the samples in the QIAGEN 96-well plate, wash buffers pass from the plate, through the channeling adapter, and into the base of the vacuum manifold.

After the samples in the QIAGEN 96-well plate are washed, they are eluted and collected in a bar code labeled rack containing 96 Elution Microtubes CL.

3.2.12 Cooling and heating system

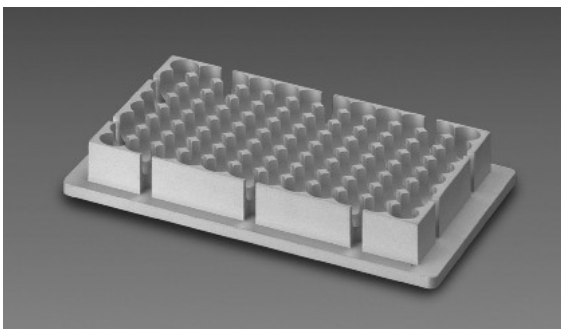
The cooling and heating system is used for fully automated on-deck cooling and heating of samples.

Heating of samples using the cooling and heating system is performed twice as fast compared to conventional heating systems due to extremely short ramp times. Thus, protocol run times are significantly shortened.

Operation of the cooling and heating system is controlled via the QIAsoft MDx DSP software. Temperatures can be set between 4°C and 80°C.

The cooling and heating system accommodates one item of labware in microplate format (e.g., a S-Block). The heat transfer adapter for microplate RB is used to ensure tight contact between the S-Block and the cooling and heating system and to allow excellent heat transfer.

Heat Transfer Adapter, Microplate RB



Always ensure that the heat transfer adapter is located in the cooling and heating system.

3.2.13 Labware tracking system

The labware tracking system consists of a hand-held bar code reader and an internal bar code reader (located on the technical tower near the upper-right corner of the worktable).

The hand-held bar code reader is for identifying the bar code of the QIAGEN kit you are using. The user holds it for a short time over the bar code and pushes the button on the grip until the QIAsoft MDx DSP software identifies the code. A beep tone indicates that the bar code is read.

The internal bar code reader is for identifying the bar codes on Elution Microtubes CL racks. These bar codes are automatically read during a protocol run.

3.2.14 Sample tracking system

The sample tracking system is used for positive sample identification. This system is factory-installed within the frame of the BioRobot MDx DSP and consists of:

- a sample transport area
- a bar code reader
- MDx STS tube holders (for carrying sample tubes)
- a sample protection shield

The sample transport area is located on the left side of the BioRobot MDx DSP worktable (viewed from the front) and stores the tube holders.

The bar code reader is used to read the bar codes on the tube holders and on the sample tubes.

The tube holders can accommodate sample tubes of the following inner diameters: 8–10 mm, 11–13 mm, and 14–16 mm (see Appendix A for appropriate tubes).

MDx STS Tube Holders with Sample Tubes



Note: Although 3 different tube sizes may be processed within a single protocol run, the tubes within a tube holder must be identical in size.

The sample protection shield prevents contamination of the sample tubes during operation of the BioRobot MDx DSP. This shield is manually placed over the tube holders that contain the primary sample tubes.

During operation of the BioRobot MDx DSP, the tube holders move out one at a time from underneath the sample protection shield, become accessible for pipetting operations, and then move back under the shield. Thus, contamination of the sample tubes by moving disposable tips is avoided.

The bar code on each tube holder serves 2 purposes:

- For ensuring that the tube holder has moved out completely from under the sample protection shield prior to pipetting operations — a bar code reader outside the sample transport area checks whether the tube holder is correctly positioned
- For indicating the dimensions of the tubes being carried by the tube holder

Note: Ensure that the bar codes on the sample tubes are oriented to the left such that they face the bar code reader.

3.2.15 Laboratory and accessory cabinets

The laboratory cabinet (left-hand side) and the accessory cabinet (right-hand side) both accommodate the BioRobot MDx DSP and computer.

The BioRobot MDx DSP is placed on top of the laboratory cabinet. The cupboards and drawers of this cabinet are for storing the:

- Waste and system liquid containers
- Vacuum trap, condensate trap, and vacuum pump
- Tip disposal bag and container for collecting used disposable tips
- BioRobot MDx DSP accessories

The computer, monitor, and keyboard are placed on top of the accessory cabinet. The cupboard of this cabinet is for storing BioRobot MDx DSP accessories.

Note: It is strongly recommended that only the cabinets supplied by QIAGEN be used with the BioRobot MDx DSP, since they are specifically designed to accommodate the workstation.

3.2.16 QIAsoft MDx DSP Operating System

The QIAsoft MDx DSP Operating System is the controlling software for the BioRobot MDx DSP.

The QIAsoft MDx DSP software operates under the Microsoft Windows 2000 and Windows XP Professional operating systems and resides in a subdirectory on the computer hard disk. The software gives the user complete control over sample processing and data handling. Clear on-screen prompts and point-and-click menus make it simple to carry out molecular biology applications. Complete documentation and sample tracking are provided in standard file formats for easy data exchange with other laboratory instruments and laboratory information management systems (LIMS).

Note: Do not install additional software onto the computer, since they may interfere with proper operation of the QIAsoft MDx DSP software.

4. Installation Procedures

4 Installation Procedures

The unpacking and installation of your BioRobot MDx DSP is carried out by a QIAGEN Instrument Service Specialist. A member of your group who is familiar with laboratory and computer equipment should be present during the installation.

4.1 Requirements

Site

The BioRobot MDx DSP must be located out of direct sunlight and away from heat sources. Refer to Appendix A for the operating conditions (temperature and humidity).

Your laboratory must have sufficient space to accommodate the laboratory and accessory cabinets plus the BioRobot MDx DSP and computer which sit on top of the cabinets. Refer to Appendix A for their dimensions.

The BioRobot MDx DSP must be placed near to 3 properly grounded (earthed) AC power outlets. The power lines to the workstation should be voltage regulated and surge protected.

Computer

The operation of the BioRobot MDx DSP requires a separate personal computer. The computer is supplied by QIAGEN. The minimum hardware and software specifications are described in Appendix A.

Contact your network administrator if you want to connect the computer to your local-area network (LAN).

Additional requirements

A regular supply of system liquid (deionized water) is required (minimum 10 liters per day, depending on the throughput).

4.2 AC power connection

Power requirements

The power requirements for the BioRobot MDx DSP are stated on the label on the rear of the instrument (see page 1-4).

BioRobot MDx DSP workstations sold in the UK operate at:

■ 240 V AC, 50/60 Hz, 800 VA

BioRobot MDx DSP workstations sold in other European countries have self-regulating power units and operate at:

■ 220–230 V AC, 50/60 Hz, 800 VA

Make sure the voltage rating of the BioRobot MDx DSP and computer are compatible with the AC voltage available at the installation site.

Grounding requirements

To protect operating personnel, the National Electrical Manufacturers' Association (NEMA) recommends that the BioRobot MDx DSP be correctly grounded (earthed). The workstation and computer are equipped with 3-conductor AC power cords that, when connected to appropriate AC power outlets, ground (earth) the equipment. To preserve this protection feature, do not operate the equipment from AC power outlets that have no ground (earth) connection.

Installation of AC power cord

Connect one end of the AC power cord to the power connector located on the rear of the BioRobot MDx DSP, and the other end to the AC power outlet. Repeat this procedure for the computer, including its monitor.

The AC line fuse (slow blow) compartment is located on the rear of the workstation. Fuses for the power supplies are specified on the label situated above the main connector. If a fuse needs to be changed, call QIAGEN Technical Services.

4.3 System delivery

Initial inspection and unpacking is performed by a QIAGEN Instrument Service Specialist prior to installation.

4.4 Hardware installation

Installation of the BioRobot MDx DSP is performed by a QIAGEN Instrument Service Specialist upon delivery.

4.5 Software installation

Installation of the QIAsoft MDx DSP Operating System is performed either before delivery of the BioRobot MDx DSP or by the QIAGEN Instrument Service Specialist at your installation site. The program, including all subdirectories and files, is stored under the directory **C:\Program Files\QIAsoft MDx DSP**.

Note: The IT administrator must grant permissions to this directory for operators using the Microsoft Windows user-rights management system.

Contact QIAGEN Technical Services if you need to reinstall software.

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5. QIAsoft MDx DSP Operating System

5 QIAsoft MDx DSP Operating System — Introduction

The QIAsoft MDx DSP Operating System software is developed exclusively for use with the BioRobot MDx DSP workstation. The software operates under the Microsoft Windows 2000 and Windows XP Professional operating systems.

To use the QIAsoft MDx DSP software, you should be familiar with using Windows applications.

The QIAsoft MDx DSP software has 3 environments that are available to the user:

- **“Execute” environment** — for running protocols
- **“Maintenance” environment** — for checking which maintenance procedures need to be performed
- **“Configuration” environment** — for configuring the software and for administration of general operators

A protocol is a set of instructions that allows the BioRobot MDx DSP to perform a molecular biology application. The handbook supplied with your QIAGEN kit will tell you which protocol you should use.

This section describes how to start the QIAsoft MDx DSP software and describes the features of each of its environments.

5.1 Starting the QIAsoft MDx DSP Operating System

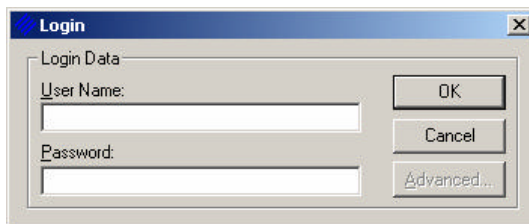
The BioRobot MDx DSP is normally left switched on (if it is switched off, refer to Section 6.1, page 6-1). If necessary, switch on the computer and wait for the Windows operating system to start up.

5.1.1 Logging in to the QIAsoft MDx DSP Operating System

You must enter a user name and password before you can access the QIAsoft MDx DSP software:

1. Select from the “Start” menu: Programs/QIAsoft MDx DSP/QIAsoft MDx DSP.

The “Login” dialog box appears.



2. Enter your user name and password in the “User Name” and “Password” dialog fields respectively.

Note: If you do not have a user name and password, see “Types of password” below.

3. Click “OK” to access the QIAsoft MDx DSP software.

Types of password

Two types of password are available to the user:

- **General Operator** — provides access to the “Execute” and “Maintenance” environments
- **Supervisor** — provides access to the “Execute”, “Maintenance”, and “Configuration” environments




The default “Supervisor” password is *Supervisor*. During installation of the BioRobot MDx DSP, the QIAGEN Instrument Service Specialist asks the user responsible for the instrument to change this password.

The user who has the “Supervisor” password can use the “Configuration” environment to create “General Operator” passwords for other users.

5.1.2 Switching between QIAsoft MDx DSP environments

To switch between the environments of the QIAsoft MDx DSP software, use one of 2 methods:

- Select the environment using the menu bar at the top of the screen
- Click a button in the status bar at the bottom of the screen

Environment	Menu bar	Status bar
Execute	Select "Environment/ Execute"	Click 
Configuration	Select "Environment/ Config"	Click 
Maintenance	Select "Environment/ Maintenance"	Click 

5.2 Software features common to all environments

You can display only one environment at a time. However, there are 2 software features that are common to all environments:

- Menu bar
- Status bar

5.2.1 Menu bar

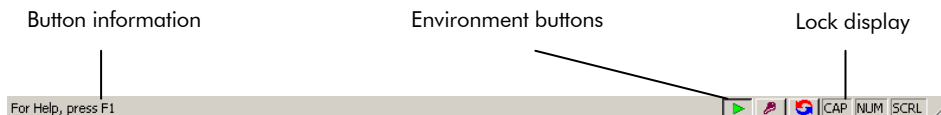
The menu bar contains menus that provide you with various options, including:

- Closing the QIAsoft MDx DSP software
- Printing information from the QIAsoft MDx DSP software (not available in the "Execute" environment)
- Changing the appearance of the environments
- Switching between environments
- Help

The menus in the menu bar vary between environments, and are described in Sections 5.3.1, 5.4.1, and 5.5.1.

5.2.2 Status bar

The status bar is located at the bottom of the screen, and contains various features.



Button information

When the pointer is placed over a button in the QIAsoft MDx DSP software, a description may appear here.

Environment buttons

Click one of these buttons to enter a different environment (see Section 5.1.2, page 5-3). A button appears “pressed” when clicked.

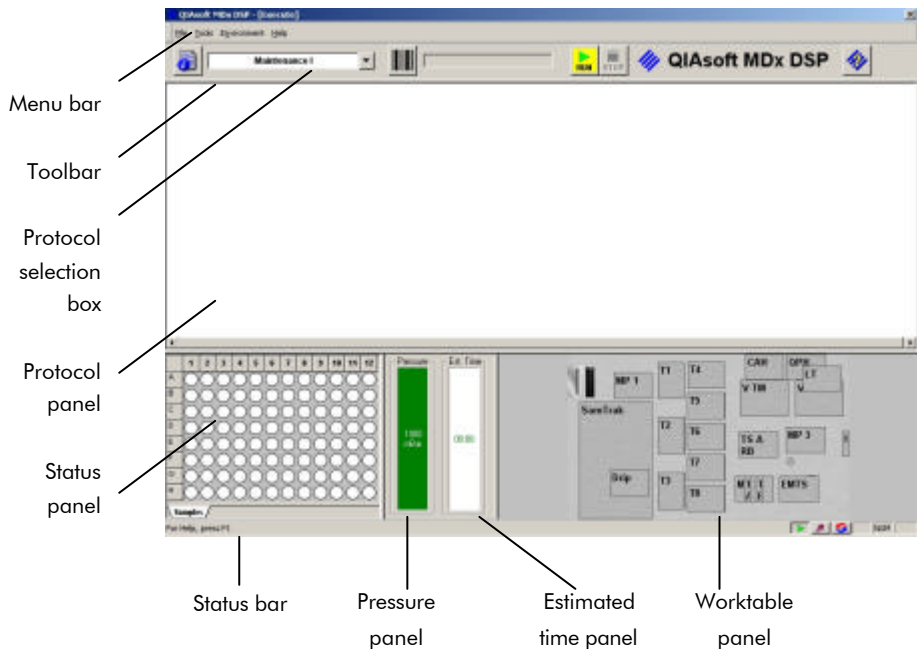
Lock display

When the “Caps Lock”, “Num Lock”, and “Scroll Lock” keys on the keyboard are activated, *CAP*, *NUM*, and *SCRL* appear here.


5.3 “Execute” environment

Use the “Execute” environment to load and run QIAGEN protocols, and to view information about the protocols.

The “Execute” environment automatically appears after you successfully log in to the QIAsoft MDx DSP software.



If you are in a different environment, use one of 2 methods to enter the “Execute” environment:

- Click the  button in the status bar
- Select “Environment/Execute” from the menu bar

The “Execute” environment displays several features:

- **Menu bar** — for selecting various options
- **Toolbar** — for selecting, running, and stopping a protocol
- **Protocol panel** — displays the structure of the protocol
- **Status panel** — displays the progress of sample processing

- **Pressure panel** — displays the pressure of the automated vacuum system
- **Estimated time panel** — displays the time until the protocol finishes
- **Worktable panel** — displays the layout of the BioRobot MDx DSP worktable

These features are described in Sections 5.3.1 to 5.3.3.

Instructions for using the “Execute” environment to load and run a protocol are provided in Section 6.2, page 6-2. In addition, refer to the handbook supplied with the QIAGEN kit you are using.

5.3.1 “Execute” environment menu bar

The menu bar contains 4 menus:

File, Tools, Environment, and Help.

The submenus of these drop-down menus are black when enabled and gray when disabled.

File menu

Exit	Closes the QIAsoft MDx DSP software.
------	--------------------------------------

Tools menu

Reinitialize Robot	Reinitializes the BioRobot MDx DSP (see Section 6.5.1, page 6-10). Select this option if there is an operational error.
Flush System	Opens the “FLUSH SYSTEM: Parameters” dialog box (see Section 6.5.2, page 6-10). For flushing the dilutor system and washing the tip adapters.
Flush Dispenser	Opens the “FLUSH DISPENSER: Parameters” dialog box (see Section 6.5.3, page 6-11). For flushing the dispenser head of the high-speed dispensing system.

Start Vacuum Pump	Opens the “VACUUM PUMP: Parameters” dialog box (see Section 6.5.4, page 6-12). For activating the vacuum pump of the automated vacuum system.
Release Reagent Rotor	Releases the reagent carousel. The reagent carousel then rotates freely and all reagent bottles can be accessed manually.
Open/Close LabHand	Opens/closes the robotic handling system.
Lock/Unlock Cover	Locks/unlocks the worktable hood.
Move to Home	Moves the tip adapters to above the wash station.
Move Arm to...	<p><i>Left</i> — moves the robotic arm to the left of the worktable</p> <p><i>Middle</i> — moves the robotic arm to the middle of the worktable</p> <p><i>Right</i> — moves the robotic arm to the right of the worktable</p>

Note: The submenus in the Tools menu are only available when the protocol is paused or stopped. Use the Tools menu only if you need to perform a maintenance procedure, troubleshoot the workstation, or reposition the components of the workstation (e.g., after power failure).

Environment menu

Execute	Select to enter the “Execute” environment (a check mark appears in the submenu). This option is selected by default when you open the QIAsoft MDx DSP software.
---------	---

Config	Select to enter the "Configuration" environment (a check mark appears in the submenu). This option is only available to users who have logged in with a "Supervisor" password.
Maintenance	Select to enter the "Maintenance" environment (a check mark appears in the submenu).

Help menu

Help Topics	Displays an index of help topics.
About QIAsoft MDx DSP	Displays information about the QIAsoft MDx DSP software, including its version number.

5.3.2 "Execute" environment toolbar

The toolbar contains 5 buttons, which allow you to start and stop a protocol run, read a protocol abstract, display an index of help topics, and enter a bar code.

The toolbar contains the protocol selection box for selecting and loading protocols.








The toolbar also contains the bar code edit field.



It is possible to enter the Q-Card bar code using the hand-held bar code reader or to enter the bar code manually and click "Enter". Some protocols can only be started after the bar code is entered.

When you click the protocol selection box, a list of packages appears. Select a package to display a list of protocols. Then select the protocol you want to load.

Button	Description
	Displays an abstract of the protocol. Do not click while a protocol is running.
	Starts a protocol run.
	Interrupts a protocol run.
	Displays an index of help topics.
	Allows entry of the Q-Card bar code. Some applications can only be started after the bar code is entered.

5.3.3 "Execute" environment panels

Protocol panel

The protocol panel is only active when a protocol is loaded. The panel shows the protocol steps.

Use the scroll-box at the bottom of the protocol panel to scroll through the entire sequence of protocol steps from left to right. The protocol step in progress is highlighted.

Status panel

The “Samples” tab contains a graphic of the sample plate or sample tubes that you loaded onto the BioRobot MDx DSP worktable. The graphic displays the status of each sample.

The following colors are used:

- *Green* — the sample has been processed
- *Blue* — the sample is being processed
- *Yellow* — the sample is to be processed
- *Red* — the sample is flagged as invalid

Worktable panel

The worktable panel contains a graphic that uses:

- Gray boxes to show the arrangement of the slots on the BioRobot MDx DSP worktable (e.g., sample tracking system, tip-tray holders, and reagent holders)
- Color bitmaps to show the racks that need to be placed onto the worktable (e.g., tip trays, bottles, troughs, and S-Blocks)

The positions of the gray boxes are fixed, while the color bitmaps that appear can vary and depend on the protocol that is currently loaded.

Pressure panel

The pressure panel indicates the pressure currently applied to the vacuum manifold of the automated vacuum system.

Depending on the protocol being executed, this panel displays:

- The exact pressure in the manifold — during application of vacuum, the displayed pressure fluctuates around a particular level
- Only the maximum pressure that must be reached in the manifold — during application of vacuum, the displayed pressure remains at a fixed level; the actual pressure may be lower than the displayed pressure

Estimated time panel

The estimated time panel provides an estimate of how many minutes and seconds are required before the protocol is finished.

5.4 “Configuration” environment

Note: Only users with a “Supervisor” password can access the “Configuration” environment.

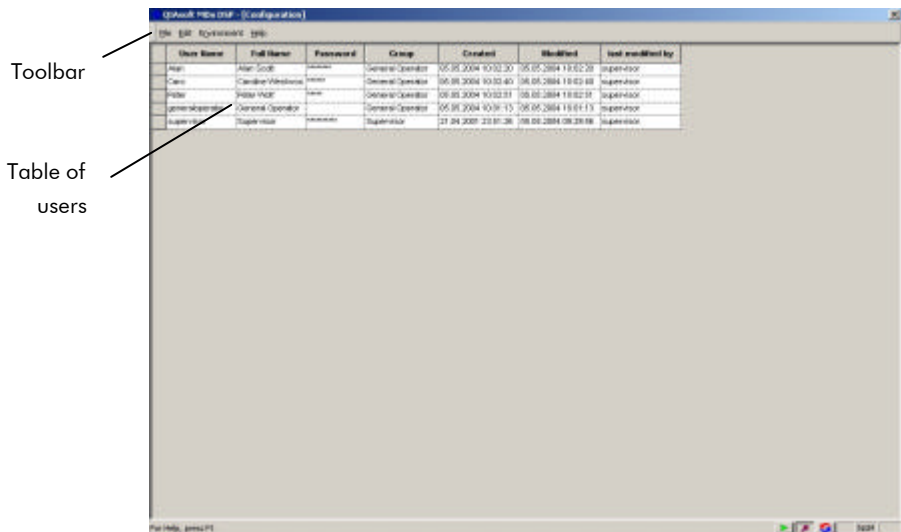
Use the “Configuration” environment to:

- Create new users for the QIAsoft MDx DSP software
- Change the settings for the QIAsoft MDx DSP software

To enter the “Configuration” environment, use one of 2 methods:

- Click the  button in the status bar
- Select “Environment/Config”

The “Configuration” environment appears and shows a table of the current users of the QIAsoft MDx DSP software.



You can now use the menu bar or toolbar to create, edit, or delete a user (Sections 5.4.2 to 5.4.4) or to change the software settings (Section 5.4.5).

5.4.1 “Configuration” environment menu bar

The menu bar contains 4 menus:

File, Edit, Environment, and Help.

The submenus of these drop-down menus are black when enabled and gray when disabled.

File menu

Save	Saves all changes you make in the “Configuration” environment.
Refresh	Undoes all changes you make in the “Configuration” environment. This option does not work if you have already saved your changes.
Print	Prints the table of users displayed in the “Configuration” environment.
Print Preview	Displays a preview of the table to be printed.
Print Setup	Allows you to set up the printer.
Exit	Closes the QIAsoft MDx DSP software.

Edit menu

Add User	Allows you to create a new user. For details, see Section 5.4.2, page 5-14.
Edit User	Allows you to change the password of the highlighted user. For details, see Section 5.4.3, page 5-15.
Delete User	Allows you to delete the highlighted user. For details, see Section 5.4.4, page 5-15.

Note: You must highlight a user in the table of the “Configuration” environment to make these submenus available.

Environment menu

Execute	Select to enter the “Execute” environment (a check mark appears in the submenu).
Config	Select to enter the “Configuration” environment (a check mark appears in the submenu).
Maintenance	Select to enter the “Maintenance” environment (a check mark appears in the submenu).
Settings	Displays the “Environment Settings” dialog box. Adjust basic software and protocol feature settings, and settings specific for the different environments. For details, see Section 5.4.5, page 5-15.

Help menu

Help Topics	Displays an index of help topics.
About QIAsoft MDx DSP	Displays information about the QIAsoft MDx DSP software, including its version number.

5.4.2 Creating a new user

Create a new user for the QIAsoft MDx DSP software in the "Configuration" environment as follows:

1. Select "Edit/Add User" in the toolbar. The "Account" dialog box appears.

The 'Account' dialog box is a standard Windows-style window with a title bar that says 'Account' and a close button (X). Inside the dialog, there are five input fields: 'User Name:', 'Full Name:', 'Password:', 'Verify Password:', and 'Group:'. The 'Group:' field is a dropdown menu. At the bottom right of the dialog are two buttons: 'OK' and 'Cancel'.

2. Complete the dialog fields as follows:

Parameter	Description
User Name	Enter a short name
Full Name	Enter the user's full name
Password	Enter a secret password
Verify Password	Re-enter the password
Group	Select <i>General Operator</i>

Note: Users must remember their user names and passwords in order to access the QIAsoft MDx DSP software. If a user in the General Operator group does not remember their password, the supervisor can create a new one. If the supervisor password is forgotten, please contact QIAGEN Technical Service.

3. Click "OK" to add the new user to the table in the "Configuration" environment.
4. Select "File/Save".

5.4.3 Changing a user's password

Change a user's password in the "Configuration" environment as follows:

1. In the table of users, highlight a user by clicking the appropriate row.
2. Double-click the highlighted user. Alternatively, select "Edit/Edit User" in the toolbar.
The "Account" dialog box appears.
3. Enter the new password into the "Password" and "Verify Password" dialog fields and click "OK".
The table is updated with the new password.
4. Select "File/Save" to save your changes.

5.4.4 Deleting a user

Delete a user from the QIAsoft MDx DSP software in the "Configuration" environment as follows:

1. In the table of users, highlight a user by clicking the appropriate row.
2. Select "Edit/Delete User".
The user disappears from the table.
3. Select "File/Save" to save your changes.

5.4.5 Changing the settings for the QIAsoft MDx DSP Operating System

You can change the settings for the QIAsoft MDx DSP software in the "Configuration" environment.

1. Select "Environment/Settings".
The "Environment Settings" dialog box appears and displays 4 tabs:
 - "Common" — settings apply to all environments
 - "Execute" — settings apply to the "Execute" environment only
 - "Maintenance" — settings apply to the "Maintenance" environment only

- “Feature” — protocol feature settings can be set (if allowed in the protocol); settings apply to protocol behavior

The contents of these tabs are described below.

2. Make your changes in the dialog box and click “OK”.

“Common” tab


Adjust basic settings for the QIAsoft MDx DSP software here.

“Program Settings” panel

- | | |
|-------------|--|
| Directories | <p>The following directories can be changed:</p> <ul style="list-style-type: none">■ Application — stores the QIAsoft MDx DSP software and all associated files■ System Data — stores files needed for software operation (after changing the directory for System Data, you are asked whether to restart QIAsoft MDx DSP to make the changes active)■ User Data — stores files generated by maintenance protocols, service protocols, and so on■ Import Data — stores files that will be imported into protocols■ Export Data — stores files that will be exported from protocols■ Report Data — stores result files generated by sample preparation protocols (i.e., those used with QIAGEN kits) |
|-------------|--|

- Message Log — stores message log and other files generated by the QIAsoft MDx DSP software for service personnel

Double-click a directory and do one of the following:

- Type in a new directory
- Click the  button to open a "Select Directory" dialog box: browse through the drives available to the computer and select a new directory

Max. Age Enter the number of days for message log files (*.msl) to be kept. After this time the files are deleted.

"Execute" tab

Adjust settings specific to the "Execute" environment here. This tab provides various options for the beeper of the BioRobot MDx DSP, which sounds whenever there is an error during operation.

No Beep when Error Occurs Select to prevent the beeper from sounding when an error is encountered.

Beep for **X** s Select to sound the beeper for **X** seconds when an error is encountered. Enter your own value for **X**.

Beep (No Time Limit) Select to sound the beeper indefinitely when an error is encountered.

Use Paging System Do not check this box.

Note: You can select only one "Beep" option at a time.

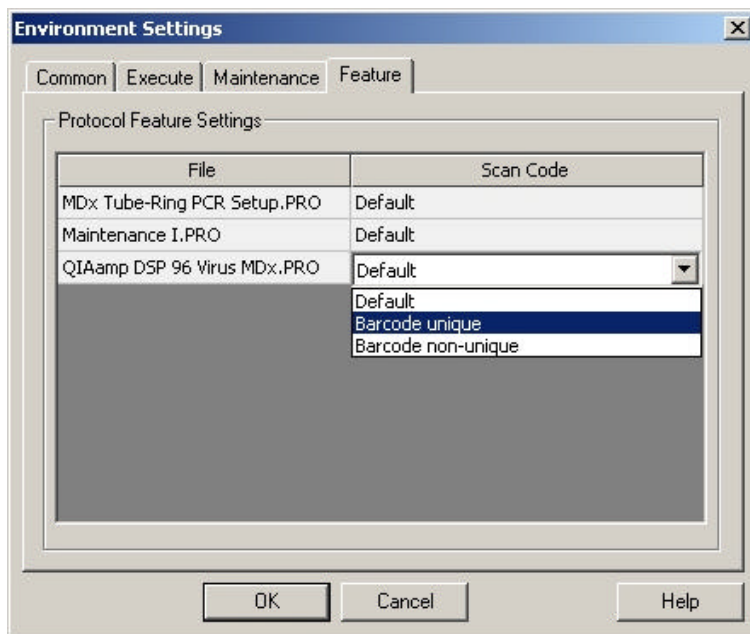
“Maintenance” tab

Adjust settings specific to the “Maintenance” environment here. This tab allows you to change the times at which the “Maintenance” environment displays new tasks in the “New Maintenance” tab. For details, see Section 5.5, page 5-19.

Daily	Select to have daily maintenance procedures displayed at either <i>12:00 AM</i> or <i>12:00 PM</i> .
Weekly	Select to have weekly maintenance procedures displayed on <i>Monday</i> , <i>Wednesday</i> , or <i>Friday</i> .
Monthly	Select to have monthly maintenance procedures displayed at the beginning (<i>Beginning</i>), middle (<i>Midmonth</i>), or end (<i>Ultimo</i>) of each month.
Biannual	Select to have preventive maintenance procedures displayed during the <i>First Quarter</i> or <i>Second Quarter</i> .

“Feature” tab

Adjust settings specific to protocol behavior here. This tab allows you to select whether identical bar codes can be used in one run or not.



Barcode unique Each sample must have a unique bar code.

Barcode non-unique It is not necessary for each sample to have a unique bar code.

Default The behavior programmed in the protocol is used.

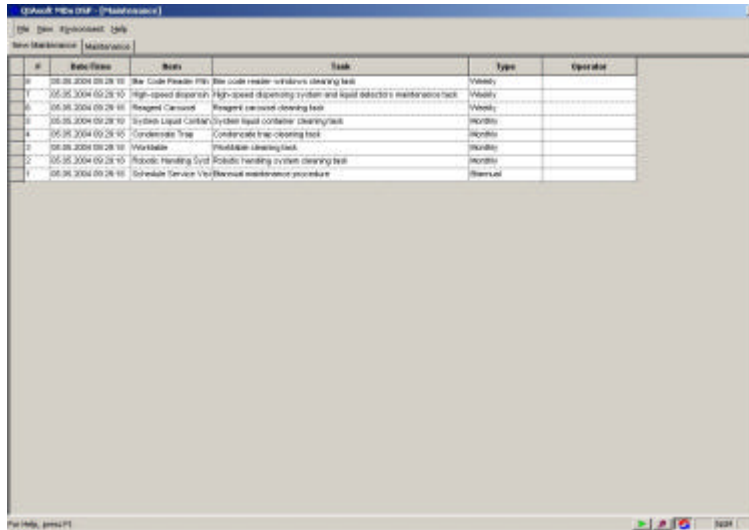
5.5 “Maintenance” environment

Use the “Maintenance” environment to check which maintenance procedures you need to perform. Refer to this environment each time you have finished working with the BioRobot MDx DSP.

To enter the “Maintenance” environment, use one of 2 methods:

- Click the  button in the status bar
- Select “Environment/Maintenance”

The “Maintenance” environment appears and displays tabular information under 2 tabs: “New Maintenance” and “Maintenance”.



The screenshot shows a window titled "QIAsoft MDx DSP - [Maintenance]". It has a menu bar with "File", "View", "Environment", and "Help". Below the menu bar are two tabs: "New Maintenance" and "Maintenance". The "Maintenance" tab is active, displaying a table with the following columns: #, Date/Time, Status, Task, Type, and Operator. The table contains 8 rows of maintenance tasks.

#	Date/Time	Status	Task	Type	Operator
1	25.05.2004 09:28:10	File Code Reader PMS	File code reader windows clearing task	Weekly	
2	25.05.2004 09:28:10	High-speed dispenser	High-speed dispensing system and liquid detector's maintenance task	Weekly	
3	25.05.2004 09:28:10	Reagent Cartridge	Reagent cartridge clearing task	Weekly	
4	25.05.2004 09:28:10	Liquid Liquid Carbin	Liquid liquid container clearing task	Monthly	
5	25.05.2004 09:28:10	Condensate Trap	Condensate trap clearing task	Monthly	
6	25.05.2004 09:28:10	Wastewater	Wastewater clearing task	Monthly	
7	25.05.2004 09:28:10	Reagent Handling System	Reagent handling system clearing task	Monthly	
8	25.05.2004 09:28:10	Schedule Service Vial	Schedule service vial maintenance procedure	Manual	

The “New Maintenance” tab shows which maintenance procedures you need to perform, while the “Maintenance” tab shows which maintenance procedures have already been performed. Refer also to “Maintenance Procedures” (Section 7) for detailed instructions on how to carry out these maintenance procedures.

5.5.1 “Maintenance” environment menu bar

The menu bar contains 4 menus:

File, View, Environment, and Help.

File menu

- Export** Opens the “Save As” dialog box. Save the information from the tab currently displayed in the “Maintenance” environment.
- Print** Prints information from the tab currently displayed in the “Maintenance” environment.

Print Preview	Displays a preview of the tab to be printed.
Print Setup	Allows you to set up the printer.
Exit	Closes the QIAsoft MDx DSP software.

View menu

Reset Desktop	Resets the appearance of the “Maintenance” environment to the default setting.
---------------	--

Environment menu

Execute	Select to enter the “Execute” environment (a check mark appears in the submenu).
Config	Select to enter the “Configuration” environment (a check mark appears in the submenu).
Maintenance	Select to enter the “Maintenance” environment (a check mark appears in the submenu).

Help menu

Help Topics	Displays an index of help topics.
About QIAsoft MDx DSP	Displays information about the QIAsoft MDx DSP software, including its version number.

5.5.2 Using the “Maintenance” environment

The “New Maintenance” tab contains a table listing the maintenance procedures that you need to perform. The following columns are displayed:

- **#** — the row number of the table
- **Date/Time** — the date and time when the maintenance procedure was issued by the software
- **Item** — the component of the BioRobot MDx DSP that requires the maintenance procedure
- **Task** — a brief description of the maintenance procedure
- **Type** — the frequency of the maintenance procedure (*Daily, Weekly, Monthly, or Biannual*)
- **Operator** — this column is empty

If there is a maintenance procedure listed in the table:

1. Double-click it and read the dialog box that appears. If necessary, refer to Section 7 for instructions on how to carry out the maintenance procedure.
2. Click “OK” to confirm that you have performed the maintenance procedure.

The maintenance procedure then moves from the “New Maintenance” tab to the “Maintenance” tab.

If desired, select the “Maintenance” tab to view maintenance procedures performed in the past. The columns in this tab are identical to those in the “New Maintenance” tab. In addition, the “Operator” column contains the user names of the users who had carried out the procedures.

Note: The “RUN” button in the “Execute” environment turns yellow if a maintenance procedure needs to be performed. This button returns to its normal color once you have confirmed that this maintenance procedure has been performed.

6. General Operation

6 General Operation

This section describes how to use the “Execute” environment of the QIAsoft MDx DSP Operating System to operate the BioRobot MDx DSP. The following instructions are provided:

- Switching on the BioRobot MDx DSP
- Running QIAGEN protocols
- Stopping QIAGEN protocols
- Handling files generated by QIAGEN protocols
- Operating individual components of the BioRobot MDx DSP
- Switching off the BioRobot MDx DSP

It is recommended that you refer to Section 5 for a description of the features of the “Execute” environment before you proceed.

6.1 Switching on the BioRobot MDx DSP

The BioRobot MDx DSP is normally left switched on.

1. Ensure that all tubing and cable connections are in order.
2. Ensure that the BioRobot MDx DSP is switched on.
The power switch is located at the front of the workstation in the bottom-right corner.
3. Switch on the connected equipment, such as the computer and printer.
4. Start the QIAsoft MDx DSP Operating System (see Section 5.1, page 5-1).
The “Execute” environment appears.
5. You can now operate the BioRobot MDx DSP.

6.2 Running QIAGEN protocols

QIAGEN protocols are already installed on your BioRobot MDx DSP. Refer to the handbook supplied with the QIAGEN kit you are using to find out which protocol to load and to obtain further details about the protocol.

6.2.1 Starting the protocol

Ensure that the BioRobot MDx DSP is switched on and that the QIAsoft MDx DSP Operating System has started (see Section 6.1, page 6-1).

1. If necessary, enter the “Execute” environment of the QIAsoft MDx DSP software (see Section 5.3, page 5-5).
2. Select the protocol from the protocol selection box.



Alternatively, click the bar code button icon, and enter the Q-Card bar code manually or with the hand-held bar code reader. Press “Enter” to select the protocol.



3. Click the “RUN” button in the toolbar to start the protocol.
The BioRobot MDx DSP then performs an initialization procedure (Section 6.2.2).

6.2.2 Initialization of the BioRobot MDx DSP

The BioRobot MDx DSP performs an initialization procedure when a protocol is started. When initialization is completed, the protocol can begin.

During initialization, the system carries out a self-test routine to check that the electronics and mechanics are functioning properly.

During initialization, the following visible actions occur:

- The tip-tray drawer initializes — if the drawer is not fully returned to the worktable, initialization stops until the user corrects this error (a dialog box appears and provides instructions)
- The tip adapters move to their minimum height above the worktable
- The robotic handling system moves to its minimum height above the worktable
- The robotic arm with tip adapters moves to the far left
- The dilutor system initializes
- The cameras of the bar code readers flash

If a problem occurs during initialization, a beeper sounds and a dialog box with an error message appears. Follow the instructions in the dialog box.

6.2.3 Setting up the worktable

The wizard asks you if you want a step-by-step guide to setting up the worktable. Regardless of your decision, the wizard will ask you to perform the following tasks:

- Empty the system liquid container, and refill it with deionized water
- Empty the waster container
- Empty the vacuum trap
- Attach a new tip disposal bag

Note: When opening the system liquid container, first disconnect the tubing, then remove the lid. After refilling the system liquid container with deionized water, first close the lid, then connect the tubing.

WARNING



Hazardous chemicals and infectious agents

[W11]

The waste contains samples and reagents. This waste may contain toxic or infectious material and must be disposed of properly. Refer to your local safety regulations for proper disposal procedures.

The level of liquid in the system liquid container, the vacuum trap, and the waste container are detected by sensors. If the

liquid levels are too high or too low, the wizard will not allow you to proceed with the protocol until the error is resolved.

Note: There is no sensor for detecting the presence or absence of the tip disposal bag.

Note: When fitting the tip disposal bag into the tip disposal container, ensure that the bag is fully open and against the walls of the container. Otherwise, ejected tips may pile up near the tip-disposal station and prevent disposal of further tips.

If you selected to have guidance in setting up the worktable, the wizard will ask you to perform further tasks that are specific to the protocol being run. Examples include the following:

- Preparing the buffers
- Placing samples, reagents, and labware (e.g., Elution Microtubes CL) on the worktable
- Placing bottles in the reagent carousel

Refer to the handbook supplied with the QIAGEN kit you are using for further details.

6.2.4 Load check

After you have set up the worktable, the BioRobot MDx DSP performs a load check, which typically consists of the following tasks:

- Checking that samples, reagents, and labware are correctly loaded
- Scanning the bar code of bottles in the reagent carousel to ensure that they are correctly loaded
- Scanning the bar code of the Elution Microtubes CL rack to ensure that it is correctly orientated
- Checking that a bar code for each sample has been entered

The protocol will not continue if the load check is unsuccessful. Follow the instructions provided by the wizard to resolve the problem.

During the load check, if the sample tracking system cannot read a bar code on a sample tube, the QIAsoft MDx DSP software will ask you to manually enter the bar code. After removing the sample tube from the sample tracking system to find out its bar code, ensure that you return the sample tube to its original position. The software cannot determine whether you have replaced the sample tube.

Refer to the handbook supplied with the QIAGEN kit you are using for specific details about the load check.

Bar codes on Elution Microtubes CL racks

The bar code on each Elution Microtubes CL rack contains 22 characters and is documented in the result file (see Section 6.4.1, page 6-6):

- Characters 1–7 — identifies the material and orientation of the microtube rack
- Character 8–17 — provides the lot number of the microtubes
- Character 18–22 — together with the other characters, identifies each individual microtube and its sample

Since each Elution Microtubes CL rack has a unique bar code, this means that each sample collected by the Elution Microtubes CL will be assigned a unique number for identification.

6.2.5 End of protocol

When the protocol has completed its molecular biology application:

- The protocol generates a result file (see Section 6.4.1, page 6-6)
- A dialog box appears and confirms that your samples have been processed
- A wizard appears and provides you with a step-by-step guide to cleaning the BioRobot MDx DSP (this is similar to Section 7.1, page 7-3)

6.3 Stopping QIAGEN protocols

You can stop a QIAGEN protocol if there is an emergency.

1. Stop a protocol using one of 2 methods:
 - Click the red “STOP” button in the toolbar
 - Click the “Stop Protocol” button in the wizard (if available)

The first option is available during all stages of a protocol run. Both options allow you to stop the run almost immediately.

The tip adapters with attached disposable tips remain at their current position. A “Robot Message” dialog box appears.

2. Click the red “STOP” button in the dialog box to stop the protocol immediately.

Note: If you stop a protocol, the “RUN” button turns yellow. Enter the “Maintenance” environment and find out which maintenance procedures need to be performed. A stopped protocol cannot be continued.

6.4 Handling files generated by QIAGEN protocols

Note: Message log files and result files are described below. It is not necessary for the user to handle other types of QIAsoft MDx DSP file.

6.4.1 Result files

Each QIAGEN sample preparation protocol creates a result file when executed. The result file presents to the user the most relevant information from the protocol run. Typically, this file consists of a header and a table.

The header includes:

- Date and time that the protocol was executed
- Names of the user, protocol, and instrument
- Q-Card information (e.g., lot number, expiration date)
- Information about related log files

The table contains the bar codes and the positions of your samples.

Note: The format of the result file varies between protocols. Refer to the handbook supplied with the QIAGEN kit you are using for further details.

By default, result files are saved in the directory **C:\Program Files\QIAsoft MDx DSP\UserData\ReportData**.

Maintenance protocols (see page 7-7) also generate their own result files.

6.4.2 Log files

Each time you run a protocol, the QIAsoft MDx DSP software creates:

- A message log file with the file extension *.msl
- A protocol communication log file with the file extension *.pcl

Both files have the same file name, but have different extensions.

The message log file contains several types of information, including:

- Date and time that the protocol was executed
- Name of the protocol
- Results of the protocol test that was automatically performed before execution of the protocol
- Commands that were executed during the protocol

The protocol communication log file contains the same information as the message log file, as well as machine code information that was sent to the BioRobot MDx DSP.

By default, the log files are saved in the directory **C:\Program Files\QIAsoft MDx DSP\UserData\LogFiles** and stored for 30 days. You can change these default settings in the "Configuration" environment (Section 5.4.5, page 5-15).

Each sample preparation protocol creates a report log file (an extended form of the result file) when executed. Report

log files have the file extension *.rtf and a file name that corresponds to the date and time that the protocol was run. Report log files are saved in the directory **C:\Program Files\QIAsoft MDx DSP\UserData\LogFiles**. It is not possible to set the time that the files are stored.

The log files provide service personnel with relevant troubleshooting information for the protocol and/or workstation if required. The files can be viewed in any text editor.

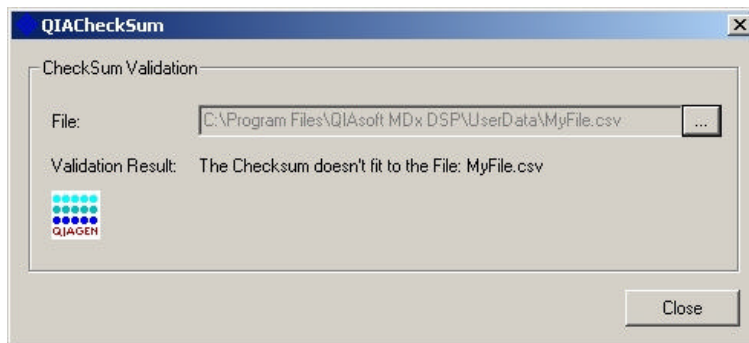
6.4.3 QIAsoft Checksum Validator

The QIAsoft Checksum Validator is a tool to check whether exported files from the QIAsoft MDx DSP software are in their original state or have been manipulated or changed.

Note: Saving a Checksum marked file in another application, such as Microsoft Excel, changes the Checksum value of the file.

To evaluate the Checksum of a file exported from the QIAsoft MDx DSP software, open the QIAsoft Checksum Validator from the “Start” menu: Programs/QIAsoft MDx DSP/QIAsoft Checksum Validator.

The “QIAChecksum” dialog box appears.



Select the file to be checked by clicking .

The QIAsoft Checksum Validator returns the validation result. The following results are possible:

Ok File was not manipulated or changed.

No Checksum There are 3 possibilities for this outcome:
found! The file
is manipulated ■ No Checksum was generated.
or contains no ■ Checksum was deleted.
checksum ■ The file was manipulated or changed.

The Checksum The calculated Checksum does not fit to the
doesn't fit to Checksum read from the file.
the file

The File-Type: The file must be in *.csv, *.txt, or *.rtf format.
myFile.xxx is
not supported!

6.5 Operating individual components of the BioRobot MDx DSP

The Tools menu of the “Execute” environment allows you to perform the following operations individually:

- Reinitializing the BioRobot MDx DSP
- Flushing the dilutor system
- Flushing the high-speed dispensing system
- Starting the vacuum pump of the automated vacuum system
- Releasing the reagent carousel
- Opening and closing the robotic handling system
- Locking and unlocking the worktable hood
- Moving the robotic arm across the worktable

You may need to use the Tools menu during the following circumstances:

- There is power failure during protocol execution and you need to return the BioRobot MDx DSP to its original state
- You click the “STOP” button during protocol execution and then need to return the BioRobot MDx DSP to its original state

- You are performing a maintenance procedure (see Section 7) and need to manipulate certain components of the BioRobot MDx DSP

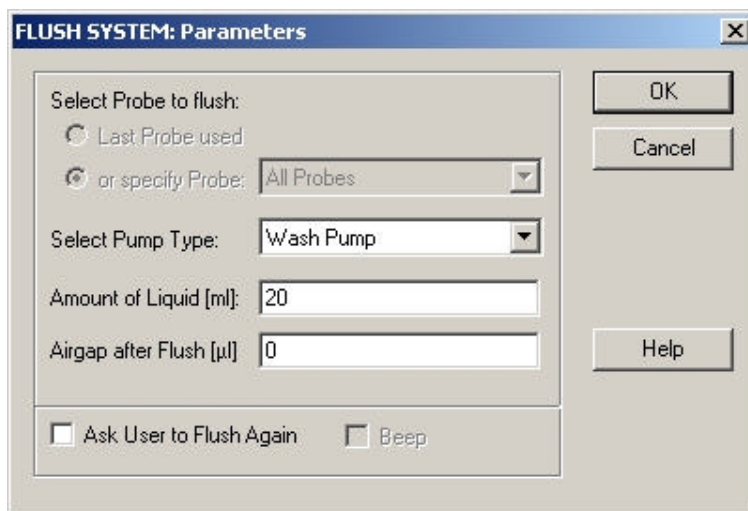
6.5.1 Reinitializing the BioRobot MDx DSP

Selecting “Tools/Reinitialize Robot” causes the BioRobot MDx DSP to perform an initialization procedure (see Section 6.2.2, page 6-2). You may need to select this option if there is an operational error during protocol execution.

6.5.2 Flushing the dilutor system

Selecting “Tools/Flush System” opens the “FLUSH SYSTEM: Parameters” dialog box, which allows you to use system liquid to:

- Flush the dilutor system
- Flush the system liquid tubing
- Wash both the inside and outside of the tip adapters



FLUSH SYSTEM: Parameters

Select Probe to flush:

☐ Last Probe used

☒ or specify Probe: All Probes

Select Pump Type: Wash Pump

Amount of Liquid [ml]: 20

Airgap after Flush [µl]: 0

☐ Ask User to Flush Again ☐ Beep

OK Cancel Help

Select this option if the dilutor system was not sufficiently cleaned after the last protocol, or if you are performing a maintenance procedure that requires flushing of the dilutor system.

Complete the dialog box as follows:

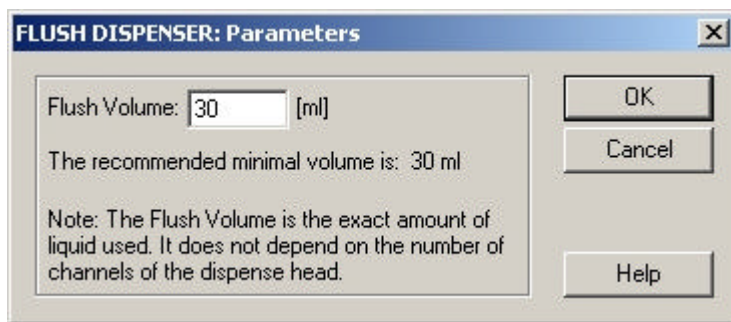
Select Pump Type	Select <i>Wash Pump</i> from the drop-down list.
Amount of Liquid	Enter, in milliliters, the volume of system liquid for flushing/washing. A volume of 25 ml is recommended.
Air Gap after Flush	Enter, in microliters, the volume of air to be aspirated into each tip adapter after washing. This option prevents dripping.

Note: The other parameters in the dialog box do not need to be completed.

After specifying the parameters, click “OK” to start the operation. If desired, click “Cancel” to close the dialog box without starting the operation.

6.5.3 Flushing the high-speed dispensing system

Selecting “Tools/Flush Dispenser” opens the “FLUSH DISPENSER: Parameters” dialog box, which allows you to use system liquid to flush the dispenser head and dispenser liquid tubing.



Select this option if the high-speed dispensing system was not sufficiently cleaned after the last protocol. Complete the dialog box as follows:

Flush Volume Enter, in milliliters, the volume of system liquid to flush the high-speed dispensing system. A recommended minimum volume is 30 ml. Do not enter values greater than 100 ml.

After specifying the parameter, click "OK" to start the operation. If desired, click "Cancel" to close the dialog box without starting the operation.

Note: Before starting operation, look at the waste container to ensure that it is not full. If the waste container is full, empty it as described in section 7.2 (page 7-4).

Note: Do not open the door of the technical tower while the dispenser is operating.

6.5.4 Starting the vacuum pump

Selecting "Tools/Start Vacuum Pump" opens the "VACUUM PUMP: Parameters" dialog box, which allows you to activate the vacuum pump and apply vacuum to the vacuum manifold.

Select this option if you need to troubleshoot the automated vacuum system.

VACUUM PUMP: Parameters

Main Parameters

Rise Time: 00:30 [mm:ss]
 Duration: 03:00 [mm:ss]
 Pressure: 800 [mBar]
 (Atmospheric press. equals 1000)
☒ Run Pump Continuously
☒ Use Vacuum Trap

Special Parameters

Hysteresis: 5 [mBar]
 Temperature: 20 [°C]

Ventilation

Natural: 00:00 [mm:ss]
 Forced: 00:20 [mm:ss]

Sample Data Tracking

☐ Sample Bound to Membrane

Press Down Feature

☐ Use Press Down Feature
 Press Down Slot: []

Pressure Progression Table

[] Options

Manifold to Use

RoboVac [v]

OK Cancel Help

Information for completing this dialog box is displayed in the tables below. After specifying the parameters, click “OK” to start the operation. If desired, click “Cancel” to close the dialog box without starting the operation.

“Main Parameters” panel

Rise Time	Enter the time, in minutes and seconds (<i>mm:ss</i>), within which the entered pressure is to be reached. An error message appears if the entered pressure is not reached within this time. Normally, a value of between 00:30 and 01:00 is required.
Duration	Enter, in minutes and seconds (<i>mm:ss</i>), the length of time for vacuum to be applied. The range is 00:05–59:59.

Pressure	<p>Enter, in millibars, the minimum pressure for the vacuum pump to reach within “Rise Time”. If this does not occur, an error message appears: there may be a vacuum system leakage.</p> <p>Pressure is maintained at the specified value if the “Run Pump Continuously” box (see below) is unchecked.</p>
Run Pump Continuously	<p>Check this box for the vacuum pressure to be unregulated. The vacuum pump runs until the “Duration” time expires.</p> <p>This box is normally checked by default. Unchecking this box enables access to the “Special Parameters” panel, which allows you to specify the parameters for regulating the vacuum pressure.</p>
Use Vacuum Trap	<p>Check this box to enable use of the vacuum trap located between the vacuum pump and vacuum manifold.</p> <p>Uncheck this box for direct connection between the vacuum pump and vacuum manifold. Any liquid that drains from the vacuum manifold could block the vacuum pump; this option is for drying samples only.</p> <p>Upon initialization and stopping of a protocol, the vacuum trap is connected to the vacuum manifold.</p> <p>Note: If liquid is poured over the heating plate of the vacuum manifold, ensure that this box is checked.</p>

"Special Parameters" panel

- Hysteresis** **Note:** "Hysteresis" is only available if the "Run Pump Continuously" box is unchecked.
- Enter, in millibars, the maximum permitted deviation above or below the value entered in the "Pressure" dialog field.
- For example, to maintain a steady pressure of 600 mbar with a deviation of <50 mbar, enter 50 for "Hysteresis" (you must first enter 600 in the "Pressure" dialog field).
- The vacuum pump activates if pressure exceeds 650 mbar and deactivates if pressure falls below 550 mbar.
- Temperature** Enter the temperature, in celsius, to be reached when vacuum is applied.

"Press Down Feature" panel

- Use Press Down Feature** Check this box to allow the robotic handling system to press down on the slot selected in the "Press Down Slot" dialog field. When the pressure specified in the "Pressure" dialog field is reached, the robotic handling system moves up.
- Press Down Slot** Select Vac Base to enable pressing down of the vacuum manifold by the robotic handling system.

"Pressure Progression Table" panel

For use by service personnel only.

"Manifold to Use" panel

Select RoboVac from the drop-down list.

“Sample Data Tracking” and “Ventilation” panels

These panels do not need to be completed.

6.5.5 Releasing the reagent carousel

Selecting “Tools/Release Reagent Rotor” allows you to manually rotate the reagent carousel.

Select this option if you need to remove bottles from the reagent carousel after interruption of a protocol, or if you want to clean the reagent carousel.

6.5.6 Opening and closing the robotic handling system

Selecting “Tools/Open LabHand” and “Tools/Close LabHand” opens and closes the robotic handling system, respectively.

Select these options if you need to release an object from the robotic handling system after interruption of a protocol, or if you want to clean the robotic handling system.

6.5.7 Locking and unlocking the worktable hood

Selecting “Tools/Lock Cover” and “Tools/Unlock Cover” locks and unlocks the worktable hood, respectively.

Select these options if you need to gain access to the worktable after interruption of a protocol, or if you need to prevent others from accessing the worktable.

Note: You must manually move the worktable hood up or down.

6.5.8 Moving the robotic arm to the home position

Selecting “Tools/Move to Home” moves the robotic arm to the wash station.

Select this option if you have interrupted a protocol run, for example, to perform a cleanup.

6.5.9 Moving the robotic arm to the left, middle, or right of the worktable

Select "Tools/Move Arm to..." and select "Left", "Middle", or "Right" to move the robotic arm to the appropriate position on the worktable.

Select this option to get better access to specific areas of the worktable.

6.6 Switching off the BioRobot MDx DSP

After you have finished working with the BioRobot MDx DSP:

1. Perform a daily maintenance procedure (see Section 7.2, page 7-4).
2. Leave the BioRobot MDx DSP switched on.
3. Close the QIAsoft MDx DSP Operating System and shut down the computer.
4. Switch off other equipment, such as the printer.

The BioRobot MDx DSP is normally left switched on. If you need to switch off the workstation, follow these steps:

1. Switch off at the power switch at the front right of the workstation.
2. Prevent other users from moving the workstation.

Note: If you want to shut down the BioRobot MDx DSP for more than a week, refer to Section 7.6, page 7-11.

If you need to move the workstation, contact QIAGEN Technical Services.

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7. Maintenance Procedures

Tip-disposal station

1. Select “Tools/Move Arm to...” and select “Left”, “Middle”, or “Right” to move the robotic arm to the appropriate position on the worktable.
2. Remove parts of the tip-disposal station from the workstation, and thoroughly spray all parts with ethanol-based disinfectant. Incubate as appropriate and wipe dry with paper towels.

Note: Do not spray the tip-disposal station while it is still in place on the BioRobot MDx DSP workstation.

WARNING**Hazardous chemicals and infectious agents**

[W11]

The waste contains samples and reagents. This waste may contain toxic or infectious material and must be disposed of properly. Refer to your local safety regulations for proper disposal procedures.

Worktable

1. Select “Tools/Move Arm to...” and select “Left”, “Middle”, or “Right” to move the robotic arm to the appropriate position on the worktable.
2. Remove all removable objects from the worktable. Examples include the tube holders and the reagent holders.
Note: The vacuum manifold base remains on the worktable.
3. Wipe the worktable, including the bar code reader areas, and the removed objects with ethanol-based disinfectant and incubate as appropriate. Then wipe with a soft cloth moistened with water and dry with paper towels. Return the objects to the worktable.

Note: Alternatively, removable objects can be sprayed with an ethanol-based disinfectant. Do not spray these objects while they are on the BioRobot MDx DSP workstation, and do not spray the BioRobot MDx DSP workstation itself.


7 Maintenance Procedures

The following maintenance procedures must be carried out to ensure reliable operation of the BioRobot MDx DSP workstation:

- **Regular maintenance** — performed between protocol runs
- **Daily maintenance** — every day
- **Weekly maintenance** — every week
- **Monthly maintenance** — every month
- **Preventive maintenance** — every 6 months

The regular, daily, weekly, and monthly maintenance procedures are performed by the user. These procedures involve the following:

- Cleaning and disinfection of the workstation to prevent microorganism growth
- Calibration and checking of the liquid detector system

<p>WARNING</p> 	<p>Risk of electric shock [W12]</p> <p>Do not open any panels on the BioRobot MDx DSP.</p> <p>Risk of personal injury and material damage</p> <p>Only perform maintenance which is specifically described in this section.</p>
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Record keeping

The “Maintenance” environment of the QIAsoft MDx DSP Operating System keeps a record in the “Maintenance” tab of daily, weekly, monthly, and preventive maintenance procedures that have been performed.

The environment also provides an up-to-date list in the “New Maintenance” tab of maintenance procedures that should be performed. For each procedure, you read a brief description of what needs to be done, carry out the procedure (refer to the instructions in this section), and then give confirmation in the software.

For details about using the “Maintenance” environment, see Section 5.5, page 5-19.

Cleaning agents

The following types of disinfectants and detergents are recommended for the cleaning of the BioRobot MDx DSP:

- Ethanol-based disinfectants for spraying onto surfaces (e.g., 25 g ethanol and 35 g 1-propanol per 100 g liquid)
- Glyoxal and quaternary ammonium salt based disinfectants for submerging worktable items (e.g., 10 g glyoxal, 12 g lauryldimethylbenzylammonium chloride, 12 g myristyldimethylbenzylammonium chloride, and 5–15% nonionic detergent per 100 g liquid)
- Anionic and nonionic surfactant based detergents for cleaning the system liquid container

Note: Ensure that the composition of disinfectants is similar to those described above.

Note: Do not use spray bottles to spray cleaning or disinfectant liquids on surfaces of the BioRobot workstation. Spray bottles should be used only for items that have been removed from the workstation.

WARNING



Toxic fumes

[W7]

Do not use bleach to clean or disinfect the instrument. Bleach in contact with salts from the buffers can produce toxic fumes.

7.1 Regular maintenance procedure

The regular maintenance procedure needs to be carried out by the user between each molecular biology application. When you run a QIAGEN protocol, the wizard will provide you with the appropriate instructions at the start and/or end of the protocol.

Typically, you need to perform the following tasks for the regular maintenance procedure:

1. Remove the samples, reagents, and disposable labware (including tip disposal bag) from the worktable and discard them.
2. Remove the channeling adapter, the multiwell-plate holders, and the elution microtube adapter from the worktable, and soak them in disinfectant according to the manufacturer's instructions.
Note: Ensure that these items are completely submerged in disinfectant and that there are no air pockets. After disinfection, rinse the items with deionized water and dry them with lint-free paper towels.
3. Soak the heating plate of the automated vacuum system with the remaining system liquid from the bottle in the reagent carousel. Start the vacuum pump by selecting "Tools/Start Vacuum Pump". Ensure that you empty the bottle completely.

WARNING**Hazardous chemicals and infectious agents**

[W11]

The waste contains samples and reagents. This waste may contain toxic or infectious material and must be disposed of properly. Refer to your local safety regulations for proper disposal procedures.

For further details of the regular maintenance procedure, refer to the handbook of the QIAGEN kit you are using.

7.2 Daily maintenance procedure

The daily maintenance procedure involves the following tasks. These tasks are listed in the “New Maintenance” tab of the “Maintenance” environment, and require confirmation from the user that they have been carried out. For details, see Section 5.5, page 5-19.

Liquid containers

1. Empty the system liquid container (from underneath the workstation) and the system liquid bottle (from the reagent carousel).

Note: When opening the system liquid container, first disconnect the tubing, then remove the lid.

Rinse the container and bottle thoroughly with fresh deionized water and refill them with fresh deionized water.

Note: After refilling the system liquid container with deionized water, first close the lid, then connect the tubing.

2. Flush the dilutor system with 30 ml deionized water by selecting “Tools/Flush System”.

3. Empty the vacuum trap and the waste container.

Note: When opening the vacuum trap, first disconnect the tubing, then remove the lid. After emptying the vacuum trap, first close the lid, then connect the tubing. The trap and container, and their lids and tubing, may be cleaned by washing with detergent and then rinsing with water.

WARNING





Hazardous chemicals and infectious agents

[W11]

The waste contains samples and reagents. This waste may contain toxic or infectious material and must be disposed of properly. Refer to your local safety regulations for proper disposal procedures.

4. **Option:** Clean the removed objects by soaking them in a glyoxal and quaternary ammonium salt based disinfectant.

WARNING 	Hazardous chemicals and infectious agents [W11] The waste contains samples and reagents. This waste may contain toxic or infectious material and must be disposed of properly. Refer to your local safety regulations for proper disposal procedures.
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WARNING 	Toxic fumes [W7] Do not use bleach to clean or disinfect the instrument. Bleach in contact with salts from the buffers can produce toxic fumes.
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7.3 Weekly maintenance procedure

The weekly maintenance procedure involves the following tasks. These tasks are listed in the “New Maintenance” tab of the “Maintenance” environment, and require confirmation from the user that they have been carried out. For details, see Section 5.5, page 5-19.

If possible, perform the daily maintenance procedure before performing the weekly maintenance procedure.

Additional equipment and reagents for weekly maintenance

- 500 ml NaCl solution (0.9% w/v)
- Bottle NaCl (0.9%), cat. no. 9016499
- 1 S-Block, cat. no. 9236897
- 1 tray of 96 Disposable Filter-Tips, 1100 µl, cat. no. 9012598
- Tube Holder, STS, MDx, 9 mm, 12 mm, or 15 mm, cat. nos. 9015970, 9015971, 9015972
- 96 tubes with bar codes (see pages A-7 and A-8 for compatible tubes)

Bar code reader windows

1. Inspect the bar code reader window of the:
 - Sample tracking system
 - Labware tracking system (both hand-held and internal)
 - Buffer tracking system
2. If the window is dirty, wipe the surface with a soft lint-free cloth moistened with a little deionized water. Then dry immediately with a dry, soft, lint-free cloth or paper towel.

CAUTION



Damage to the bar code readers

[C1]

Do not use solvents to clean the bar code reader. Solvents can damage the bar code reader window.

Liquid detector system and MultiFlow Dispense Pump

1. Start QIAsoft MDx DSP software and log in as "generaloperator".
2. Select "BR MDx DSP Maintenance Protocol Vx.y" from the protocol selection box and click "RUN".
3. A wizard appears and provides you with the necessary instructions. (See Appendix D, page D-1 for a list of these instructions and error messages.)

The calibration results are saved in a result file, named **C:\Program Files\QIAsoft MDx DSP\UserData\BR MDx DSP Maintenance Protocol Vx.y_date_time.rtf**. An example of this result file is given in Appendix D, page D-4.

Note: The result file will indicate whether calibration failed due to malfunctioning liquid detectors. If calibration fails, contact QIAGEN Technical Services.

WARNING



Toxic fumes

[W7]

Do not use bleach to clean or disinfect the instrument. Bleach in contact with salts from the buffers can produce toxic fumes.

High-speed dispensing system

1. Clean the surface of the dispenser head with a soft, lint-free cloth moistened with an ethanol-based disinfectant. Wipe away the disinfectant with a soft, lint-free cloth moistened with a small amount of deionized water.
2. Check the dispenser head nozzles for damage. If the glass capillaries are broken, the nozzles need to be replaced. Contact QIAGEN Technical Services.

CAUTION



Damage to nozzles of the high-speed dispensing system

[C2]

The nozzles of the high-speed dispensing system are fragile. Handle the dispenser head with care to prevent breakage of the glass capillaries.

WARNING



Toxic fumes


[W7]

Do not use bleach to clean or disinfect the instrument. Bleach in contact with salts from the buffers can produce toxic fumes.

Reagent carousel

Open the door of the technical tower and remove all bottles from the reagent carousel. Inspect the interior surface for splashed liquid. If splashes are present:

1. Remove the reagent carousel and wipe off the splashes.
2. Carefully spray ethanol-based disinfectant onto the interior and exterior surfaces of the reagent carousel. Ensure that the disinfectant reaches all parts of the reagent carousel.
Note: Do not spray parts while they are on the BioRobot MDx DSP workstation.
3. Wipe off the disinfectant and rinse with deionized water.
4. Wipe off any excess water and dry with lint-free paper towels.
5. Return the reagent carousel to the technical tower.

WARNING 	Toxic fumes [W7] Do not use bleach to clean or disinfect the instrument. Bleach in contact with salts from the buffers can produce toxic fumes.
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7.4 Monthly maintenance procedure

The monthly maintenance procedure involves the following tasks. These tasks are listed in the “New Maintenance” tab of the “Maintenance” environment, and require confirmation from the user that they have been carried out. For details, see Section 5.5, page 5-19.

If possible, perform the weekly maintenance procedure before performing the monthly maintenance procedure.

System liquid container

1. Remove the tubing attached to the cap of the system liquid container. Then unscrew and remove the cap. Remove the system liquid bottle from the reagent carousel.
2. Empty the system liquid container and the system liquid bottle.
3. Clean the container and bottle with strong detergent according to the manufacturer’s instructions.
4. Rinse the container and bottle 3 times with tap water to remove all traces of detergent. Repeat using deionized water.
5. Wipe the interior surface of the cap and tubing with a lint-free paper towel moistened with dilute detergent.
6. Rinse the cap and tubing 3 times with tap water to remove all traces of detergent. Repeat using deionized water.
7. Refill the system liquid container and the system liquid bottle with deionized water.
8. Close the cap of the system liquid container, and reconnect the tubing to the cap.
Return the system liquid bottle to the reagent carousel.

9. Flush the dilutor system with 30 ml deionized water by selecting “Tools/Flush System”.

Condensate trap

Note: The condensate trap is the small glass bottle connected to the vacuum pump.

1. Disconnect the condensate trap from the vacuum pump and the vacuum filter.
2. Empty the condensate trap and clean it using a glyoxal and quaternary ammonium salt based disinfectant.
3. Rinse the condensate trap 3 times with deionized water.
4. Reconnect the condensate trap to the vacuum filter and the vacuum pump.

WARNING



Hazardous chemicals and infectious agents

[W11]

The waste contains samples and reagents. This waste may contain toxic or infectious material and must be disposed of properly. Refer to your local safety regulations for proper disposal procedures.

Worktable

1. Select “Tools/Move Arm to...” and select “Left”, “Middle”, or “Right” to move the robotic arm to the appropriate position on the worktable.
2. Remove all removable objects from the worktable. In addition, remove the tip-disposal station:
 - Unscrew the knurled nut holding the tip-disposal station
 - Lift off the tip-disposal station, including the tip slideDo not remove the vacuum manifold base from the worktable.
3. Disinfect the removed objects by soaking them in a glyoxal and quaternary ammonium salt based disinfectant.
4. Rinse the removed objects 3 times with tap water to remove all traces of disinfectant. Repeat using deionized water.

5. Wipe off any excess liquid and dry with lint-free paper towels.
6. Return the objects to the worktable.

WARNING**Hazardous chemicals and infectious agents**

[W11]

The waste contains samples and reagents. This waste may contain toxic or infectious material and must be disposed of properly. Refer to your local safety regulations for proper disposal procedures.

Robotic handling system

1. Carefully wipe the 2 grips of the robotic handling system with a lint-free cloth or tissue moistened with ethanol-based disinfectant.
2. Wipe the grips with a soft cloth moistened with warm water. Then wipe off any excess liquid and dry with paper towels.

7.5**Preventive maintenance**

A pop-up window appears every 6 months, when preventive maintenance is due. The preventive maintenance procedure must be performed by a QIAGEN Instrument Service Specialist. To schedule a visit, contact QIAGEN Instrument Service 6–8 weeks before preventive maintenance is due.

7.6**Shutting down and starting up the BioRobot MDx DSP**

If the BioRobot MDx DSP is not in use for more than a week, shut down the workstation as follows:

1. Perform the daily maintenance procedure (Section 7.2, page 7-4).
2. Empty the system liquid container (from underneath the workstation) and the system liquid bottle (from the reagent carousel).

Note: When opening the system liquid container, first disconnect the tubing, then remove the lid. After

emptying the system liquid container, first close the lid, then connect the tubing.

3. Flush the dilutor system twice with 30 ml system liquid by selecting “Tools/Flush System”. This procedure purges system liquid from the tubing.
4. Flush the high-speed dispensing system twice with 30 ml system liquid by selecting “Tools/Flush Dispenser”. This procedure purges system liquid from the tubing.
5. Empty the waste container.
Note: When opening the waste container, first disconnect the tubing, then remove the lid. After emptying the waste container, first close the lid, then connect the tubing.
6. Close the QIAsoft MDx DSP software, exit the Windows operating system, and switch off the computer.
7. Switch off the BioRobot MDx DSP.

Start up the BioRobot MDx DSP as follows:

1. Follow “Switching on the BioRobot MDx DSP” (Section 6.1, page 6-1).
2. Perform the daily maintenance procedure (Section 7.2, page 7-4).

7.7 Corrective maintenance

If the BioRobot MDx DSP malfunctions even after you have performed the maintenance procedures and followed the advice in “Troubleshooting” (Section 8), contact QIAGEN Technical Services.

Do not access any electronic or hardware modules via the side panel under the worktable, inside the robotic arm, or in the liquid trays in the cabinet. Any major corrective maintenance attempted by unauthorized personnel will void your warranty.

8. Troubleshooting

8 Troubleshooting

If you need to contact QIAGEN Technical Services about an error, note down the steps leading to the error and any information given in any dialog boxes. This will help the QIAGEN Instrument Service Specialist in solving the problem.

8.1 Hardware

8.1.1 Initialization errors

Initialization errors occur when the initialization procedure cannot be completed. The beeper sounds and an "Initialization Error" dialog box appears.

The "Initialization Error" dialog box displays the module (e.g., *Module Z Motor 1*) that caused the error, the error (e.g., *Communication Error*), and the error code (e.g., *8001*).

If an initialization error occurs, follow these steps:

1. Ensure that the BioRobot MDx DSP is switched on.
2. Ensure that all connections between the computer and the BioRobot MDx DSP are secure.
3. Click "Retry Initialization".
4. If the BioRobot MDx DSP does not initialize correctly, a "Robot Message" dialog box appears.
Match the module and error code displayed in this dialog box with the module and error code listed in "Module and error code key" on page 8-2.
5. Follow the recommendations in "Module and error code key".
6. If the BioRobot MDx DSP still cannot be initialized, contact QIAGEN Technical Services.

8.1.2 Operating errors

Operating errors may occur during protocol execution. The beeper sounds and an “Error Message” dialog box appears.

The “Error Message” dialog box displays the module that caused the error (e.g., *Module Vacuum Pump*), the error (e.g., “*Pressure could not be reached.*”), and the error code (e.g., 02).

If an operating error occurs, follow these steps:

1. Match the module and error code displayed in the “Error Message” dialog box with the module and error code listed in “Module and error code key” on page 8-2.
2. Follow the recommendations in “Module and error code key”.
3. If the error persists, contact QIAGEN Technical Services.

8.1.3 Module and error code key

General

Before determining the module-specific error(s) a general classification of the error(s) is performed.

Error code	Error text	Comments and suggestions
0x4001	Port failure	Serial port could not be initialized.
0x4002	Module not responding!	Timeout while waiting for a response from the BioRobot MDx DSP.
0x8080	Software programming error: Syntax error	Invalid command set to the BioRobot MDx DSP: Contact QIAGEN Technical Services.
0x8000	Instrument Error	Contact QIAGEN Technical Services.

Module: Motor Valve

Error code	Error text	Comments and suggestions
8001	Initialization error	<p>Retry initialization using “Tools/Reinitialize Robot”.</p> <p>If the BioRobot MDx DSP still cannot be initialized, contact QIAGEN Technical Services.</p>
8002	Overload	Contact QIAGEN Technical Services.
8004	Range error	Contact QIAGEN Technical Services.
8008	Movement blocked	Contact QIAGEN Technical Services.
8200	Hardware error: check-sum invalid, contact service	Contact QIAGEN Technical Services.
8400	Error in valve movement, replace valve	Contact QIAGEN Technical Services.
8800	General firmware error: contact service	Contact QIAGEN Technical Services.
9000	General hardware error: contact service	Contact QIAGEN Technical Services.

Module: Syringe Drive

Error code	Error text	Comments and suggestions
8001	Initialization error	Retry initialization using “Tools/Reinitialize Robot”. If the BioRobot MDx DSP still cannot be initialized, contact QIAGEN Technical Services.
8002	Overload, contact service	Unwieldy dilutor movement: Contact QIAGEN Technical Services.
8004	Syringe stroke too large, protocol programming error, reduce volume	Contact QIAGEN Technical Services.
8008	Syringe stroke deviation from home, reinitialize robot	Program error or defective dilutor: Contact QIAGEN Technical Services.
8100	No valve drive	Defective valve drive: Contact QIAGEN Technical Services.
8200	Valve blocked, contact service	Dilutor valve blocked: Contact QIAGEN Technical Services.
8400	Valve movement error: contact service	Dilutor valve worn or defective: Replace the valve. Defective valve drive: Contact QIAGEN Technical Services.
8800	Syntax error	
9000	General hardware error: contact service	Contact QIAGEN Technical Services.

Module: RoboVac Pump

Error code	Error text	Comments and suggestions
8001	Initialization error	<p>Retry initialization using “Tools/Reinitialize Robot”. If the BioRobot MDx DSP still cannot be initialized, contact QIAGEN Technical Services.</p>
8002	Vacuum error: Pressure could not be reached: check for tight vacuum system (see manual for hints)	<p>Problem with automated vacuum system</p> <p>Ensure that:</p> <ul style="list-style-type: none"> ■ the vacuum manifold top and base are assembled correctly ■ the quick-disconnect couplings are connected correctly to the vacuum trap ■ the cap of the vacuum trap is tightly closed ■ vacuum tubing is not kinked, bent, or damaged ■ the “Pressure” and “Rise Time” dialog fields in the “Vacuum Pump: Parameters” dialog box are given reasonable values
8004	Programming error: Parameter out of range	<p>Problem with parameters for automated vacuum system: Check the parameters specified in the “Vacuum Pump: Parameters” dialog box.</p>

Troubleshooting

Error code	Error text	Comments and suggestions
8008	Desired Pressure not reached until timeout elapsed: Vacuum trap full: empty bottle, or vacuum trap not in place: place bottle into holder, or sensor not attached: attach sensor	Fluid level in the vacuum trap too high: Empty the vacuum trap. Vacuum trap not connected: Connect the vacuum trap.
8010	Desired pressure not reached while ventilating until timeout elapsed. Possible hardware error; measured pressure not reliable: contact service	Damaged electronics: Contact QIAGEN Technical Services.
8020	Desired pressure not reached until timeout elapsed	Contact QIAGEN Technical Services.
8080	Software programming error: Syntax error	Contact QIAGEN Technical Services.
8100	Temperature error: Sensor defective or sensor signal distorted, contact service	Switch off the BioRobot MDx DSP, wait a few minutes, and switch it on again. If the problem persists, contact QIAGEN Technical Services.

Error code	Error text	Comments and suggestions
8200	Hardware error: check-sum invalid, electronic noise or damaged electronics: contact service	Switch off the BioRobot MDx DSP, wait a few minutes, and switch it on again. If the problem persists, contact QIAGEN Technical Services.
8400	Hardware error: Atmospheric pressure not reliable or temperature sensor defective: contact service	Contact QIAGEN Technical Services.
8800	General firmware error: contact service	Contact QIAGEN Technical Services.
9000	General hardware error: contact service	Contact QIAGEN Technical Services.
A000	EEPROM contains invalid data (serial number & address)	Contact QIAGEN Technical Services.

Module: Two-Way Peristaltic Pump, One-Way Dosing Pump

Error code	Error text	Comments and suggestions
8001	Initialization error	Retry initialization using “Tools/Reinitialize Robot”. If the BioRobot MDx DSP still cannot be initialized, contact QIAGEN Technical Services.
8004	Parameter out of range	Contact QIAGEN Technical Services.
8200	Hardware error: check-sum invalid, contact service	Contact QIAGEN Technical Services.
8400	Hardware error: Fatal error: contact service	Contact QIAGEN Technical Services.
8800	General firmware error: contact service	Contact QIAGEN Technical Services.
9000	General hardware error: contact service	Contact QIAGEN Technical Services.

Module: High-Speed Pump

Error code	Error text	Comments and suggestions
8001	Initialization error	Retry initialization using "Tools/Reinitialize Robot". If the BioRobot MDx DSP still cannot be initialized, contact QIAGEN Technical Services.
8004	Movement out of range	Contact QIAGEN Technical Services.
8200	Baud rate incorrect or wrong data format, contact service	Contact QIAGEN Technical Services.
8400	Hardware error: Fatal error: contact service	Contact QIAGEN Technical Services.
8800	General firmware error: contact service	Contact QIAGEN Technical Services.
9000	General hardware error: contact service	Contact QIAGEN Technical Services.

Module: Motor, Z Motor, LabHand Z Motor

Error code	Error text	Comments and suggestions
8001	Initialization error	Retry initialization using “Tools/Reinitialize Robot”. If the BioRobot MDx DSP still cannot be initialized, contact QIAGEN Technical Services.
8002	Overload	The Z drive may be distorted. Contact QIAGEN Technical Services.
8004	Movement out of range	Instrument setup is not correct. Contact QIAGEN Technical Services.
8008	Movement blocked	Movement is obstructed. For example, for the Z-motor, when the cap of a buffer bottle has not been removed and the disposable tip cannot enter the bottle. Ensure that movement is unobstructed.
8100	Reagent rotor door open: please close door	<p>This error is only relevant for the rotor motor or dispenser Z motor.</p> <p>The front door in front of the reagent carousel is open. Close the door.</p> <p>If the door is closed and this error appears, the light barrier or the door is defective.</p>
8200	Hardware error: check-sum invalid, contact service	Switch off the BioRobot MDx DSP, wait a few minutes, and switch it on again. If the problem persists, contact QIAGEN Technical Services.
8400	Hardware error: Fatal error: contact service	Contact QIAGEN Technical Services.

Error code	Error text	Comments and suggestions
8800	General firmware error: contact service	Contact QIAGEN Technical Services.
9000	General hardware error: contact service	Contact QIAGEN Technical Services.

Module: CCD Camera

Error code	Error text	Comments and suggestions
8001	Initialization error	Retry initialization using " <u>T</u> ools/Reinitialize Robot". If the BioRobot MDx DSP still cannot be initialized, contact QIAGEN Technical Services.
8004	Parameter out of range	Retry initialization using " <u>T</u> ools/Reinitialize Robot". If the BioRobot MDx DSP still cannot be initialized, contact QIAGEN Technical Services.
8100	Reagent rotor door open: please close door	The front door in front of the reagent carousel is open. Close the door. If the door is closed and this error appears, the light barrier or the door is defective.
8200	Hardware error: check-sum invalid, contact service	Contact QIAGEN Technical Services.
8400	Hardware error: Fatal error: contact service	Contact QIAGEN Technical Services.
8800	General firmware error: contact service	Contact QIAGEN Technical Services.
9000	General hardware error: contact service	Contact QIAGEN Technical Services.

Module: VariTherm

Error code	Error text	Comments and suggestions
8001	Initialization error	Retry initialization using “Tools/Reinitialize Robot”. If the BioRobot MDx DSP still cannot be initialized, contact QIAGEN Technical Services.
8002	Temperature could not be reached	The required temperature could not be reached within the specified time, or the cooling and heating system is defective. Contact QIAGEN Technical Services.
8004	Parameter out of range	Fault due to program error: Contact QIAGEN Technical Services.
8008	Sensor signal deviation from desired value	One or more sensors detecting a certain deviation from the specified temperature: Contact QIAGEN Technical Services.
8010	Illegal temperature measurement: sensors may be defective, contact service	Contact QIAGEN Technical Services.
8020	EEPROM error: content of configuration memory invalid, contact service	Content of the configuration memory is invalid. Contact QIAGEN Technical Services.
8200	Hardware error: check-sum invalid, contact service	Contact QIAGEN Technical Services.

Troubleshooting

Error code	Error text	Comments and suggestions
8400	Hardware error: Fatal error: contact service	Contact QIAGEN Technical Services.
9000	Sensor error: Deviation between sensors or missing sensors detected	Deviation between sensors, missing sensors are detected, or uneven cooling and heating. Contact QIAGEN Technical Services.
A000	Heat sink temperature to high	Contact QIAGEN Technical Services.

Module: Option Board

Error code	Error text	Comments and suggestions
8001	Initialization error	Retry initialization using “Tools/Reinitialize Robot”. If the BioRobot MDx DSP still cannot be initialized, contact QIAGEN Technical Services.
8004	Parameter out of range	Contact QIAGEN Technical Services.
8200	Hardware error: check-sum invalid: contact service	Contact QIAGEN Technical Services.
8400	Hardware error: Fatal error: contact service	Contact QIAGEN Technical Services.
8800	General firmware error: contact service	Contact QIAGEN Technical Services.
9000	General hardware error: contact service	Contact QIAGEN Technical Services.

8.1.4 General errors that do not have error codes

Comments and suggestions

Starting the QIAsoft MDx DSP software

Error Message Contact QIAGEN Technical Services.

Error while reading from
file C:\Program
Files\QIAsoft MDx
DSP\QIAsoft.cfg
No access to QIAsoft
settings!

Error Message The validated file was modified. Contact QIAGEN
Technical Services.
The checksum is invalid
or missing. No access to
QIAsoft settings!

QIAsoft It is only possible to run one instance of QIAsoft
MDx DSP.
There is an instance of
QIAsoft already running!

QIAsoft MDx DSP There is an error in Database Engine. Possible
reasons are:
Provider Error

Code: xxx ■ QIAsoft configuration files are missing
Description: xxx ■ not enough free space on hard disk

Source: Microsoft JET
database engine Contact QIAGEN Technical Services.

Error Message The account name or the password is wrong – try
to enter it again.
Not a valid account
name or password. If the problem persists, contact QIAGEN Technical
Services.

Comments and suggestions

Error Message

Operation canceled by user

Error Message

Possible reasons are:

The Robot Configuration File 'xxx.RCF' has not been found in the data directory 'xxx'.

- rcf-file missing
- data directory changed in config-settings dialog

Please select the appropriate file in the following dialog...

Please contact your supervisor to verify whether the correct data are selected.

Initializing Data

Possible reason: data directory was changed in config-settings dialog.

Error during initialization of worktable data:

Please contact your supervisor to verify whether the correct data are selected.

To use the rotor, at least 2 slots following the naming convention 'Rotor Slot 1..n' have to be defined!

Initializing Data

The worktable data shown in the list have been manipulated.

Error during initialization of worktable data:

Contact QIAGEN Technical Services.

QIAsoft MDx DSP will be shut down.

Unable to load from file 'xxx'

Unable to load from file 'yyy'

Comments and suggestions

Initializing Data

Contact QIAGEN Technical Services.

Error loading robot
configuration data

(Note: most functions will
not work properly without
configuration data!)

Loading Robot
Configuration file failed.

Try to recover the *.RCF
file from the xxx\backup\
directory! If this is not
possible, reinstall
software.

Initializing BioRobot MDx DSP

Robot Message

Check the power and communication connections
to BioRobot MDx DSP. If problem persists, contact
QIAGEN Technical Services.

Unable to connect to
robot.

(Caused by module 'xxx')

Check if robot is switched
on and connected
properly.

Tools — flush system/dispenser vacuum pump

Error Message

Enter values within the allowed ranges listed in
Table 8.1 (page 8-19).

Missing value!

An expression is expected
in the field 'xxx'.

Error Message

Enter values within the allowed ranges listed in
Table 8.1 (page 8-19).

Field 'xxx':

Unknown variable: xxx

Comments and suggestions

Error Message

Expression in field 'xxx' is out of range! Allowed value is between xx and yy.

Enter values within the allowed ranges listed in Table 8.1 (page 8-19).

Vacuum Pump

Error Message

Error in field 'xxx': Please enter a time between xx:xx and yy:yy!

Enter values within the allowed ranges listed in Table 8.1 (page 8-19).

QIAsoft MDx DSP

Please enter a (positive) integer.

Enter values within the allowed ranges listed in Table 8.1 (page 8-19).

QIAsoft MDx DSP

Please enter an integer between xx and yy.

Enter values within the allowed ranges listed in Table 8.1 (page 8-19).

Table 8.1. Parameters for Flush Dispenser, Flush System, and Vacuum Pump

Module	Parameter	Range
Flush dispenser	Flush volume	0–100 ml
Flush	Amount of liquid	0–100 ml
	Air gap after flush	0–75 μ l
Vacuum	Rise time	00:05–15:00 (mm:ss)
	Duration	00:05–59:59 (mm:ss)
	Pressure	10–1000 mbar
	Hysteresis	1–100
	Temperature	20–75°C

Config/add user

Error Message

The chosen user name exists. Enter a new user name.

The changes you requested to the collection were not successful because they would create duplicate values in the index. Change the data in the field 'User Name' and try again.

Error Message

Verify the password. The password and verified password must be identical.

Verify the new password by retyping it in the Verify Password box and clicking OK.

Config/add or edit user

QIAsoft MDx DSP

Data have been modified.

Do you want to save?

Config settings — data or application path changed

QIAsoft MDx DSP

QIAsoft MDx DSP software uses the changed settings after a restart.

QIAsoft MDx DSP must be restarted to make your changes of the settings become active.

Restart QIAsoft MDx DSP now?

Warning

Please note: The data path has been changed previously in this session without restarting the application afterwards!

Although the Settings Dialog will show the new data path, QIAsoft is still working with the original data path which was determined when QIAsoft was started.

Original Data Path: xxxx

New Data Path xxxx\

To work with the new data path, restart QIAsoft!

This message can appear when you enter the settings dialog in the config environment and forgot to enter the closing backslash in the data path during the last session. Please verify, that your data path ends with a backslash. Confirm the settings dialog with "OK", and accept the following request to restart the QIAsoft MDx DSP software with "Yes".

Config settings — beep seconds/maximum age

QIAsoft MDx DSP

Please enter a (positive) integer.

Maintenance — export

QIAsoft MDx DSP

Contact QIAGEN Technical Services.

Disk full while accessing
xxx\YourFile.csv.

QIAsoft MDx DSP

Possibly due to exporting an empty maintenance table to a *.csv file.

COM Error

Code: 0x800a0bcd

(...)

Maintenance — confirm task

QIAsoft MDx DSP

Cache Error

Code: xxx

Description: xxx

Hint: xxx

(Source: Microsoft JET
Database Engine)

Error during database access, possibly due to the hard disk being full.

Contact QIAGEN Technical Services.

Execute — starting protocol

Protocol name

You haven't the
permission to run the
protocol!

The protocol is not allowed to be run on the BioRobot MDx DSP.

Execute — entering protocol bar code

Error Message

No protocol is assigned
to barcode xxxxx!

If the bar code was entered manually, check that it is correct.

Error Message

More than one protocol
is assigned to barcode
xxxx.

Contact QIAGEN Technical Services.

List of paths and protocol
names

Clean up your protocol
files and try again!

Execute — starting selected or entered protocol

Protocol Test failed Contact QIAGEN Technical Services.

Errors detected during
protocol test!

Please call the support
team!

Execute — start protocol

Robot Message

The door to the reagent
rotor is still opened.
Please close the door and
click continue.

Execute — scan code

Robot Message

The rack identifying
barcode on the “Samtrak
Rack” can not be read.

Error Message

Duplicate barcodes at
position X and Y!

All barcodes on the rack
in the slot Sam Trak Slot
must be unique.

Error Message

Some tubes and/or
carriages are exchanged!

Control the tubes before
automatically scanning
again!

Scan Code Reading Results

No barcodes re-found at carriage xxx. Therefore a test on possible permutations is not feasible. Control the tubes before automatically scanning again.

Execute — protocol run

Error During Protocol Run

Error in command 'xxx'.
Terminated by user.

Error during protocol run

Out of disposable tips!
Protocol must be stopped.

Robot Message

Tips cannot be removed!
Please remove manually,
then press continue!

One or more disposable tips have not been removed in the tip disposal station. Click the "Stop" button. Do not click the "Continue" button! Remove the disposable tips manually.

Note: The disposable tips may be difficult to remove. Take care when removing them.

Manual tool removal

Please remove tool. Press "open lab hand"; the lab hand will open after 5 seconds. ATTENTION: Catch the tool with your hand and place it back into its holder.

Unsafe tool state

Tool is probably mounted.

Manual tool removal

Press "continue" to perform tool removal.

General

Failed to start application xxxx

Software components are missing. Contact QIAGEN Technical Services.

File xxxx cannot be accessed

Close any other application accessing file xxxx. Exit the QIAsoft MDx DSP software, exit the Windows operating system, and switch off the computer. Switch on the computer and try to open file xxxx.

If this file still cannot be opened, contact QIAGEN Technical Services.

8.2 General troubleshooting

Comments and suggestions

Poor pipetting performance

- | | |
|---|-------------------------------------|
| a) System liquid container is empty | Refill the system liquid container. |
| b) Air gaps in system liquid tubing or syringe | Flush the dilutor system. |
| c) System liquid tubing is not correctly connected | Contact QIAGEN Technical Services. |
| d) Syringe and/or valve may be leaking | Contact QIAGEN Technical Services |
| e) Tip adapter is not adjusted correctly to the Z drive | Contact QIAGEN Technical Services. |

Wrong delivery destination

- | | |
|---------------------------------------|---|
| a) Tip adapter may be distorted | If tip adapter replacement is necessary, contact QIAGEN Technical Services. |
| b) Malfunctioning of X, Y, Z movement | Contact QIAGEN Technical Services. |

Power failure

- | | |
|---------------------------------|--|
| a) Power cord not connected | Ensure that the power cord is connected. |
| b) Power outlet not functioning | Check the power outlet by using it to operate another electrical instrument. |

Comments and suggestions

Robotic handling system drops plate

- | | |
|---|--|
| Problem with grips of robotic handling system | <p>Check the grips of the robotic handling system:</p> <ul style="list-style-type: none"> ■ If the rubber surface on the inside of the grips are damaged and need replacement, contact QIAGEN Technical Services ■ If necessary, clean the grips (see page 7-11) ■ If the problem persists, contact QIAGEN Technical Services |
|---|--|

Robotic handling system misses plate or destination

- | | |
|---|--|
| a) Plate not positioned correctly in slot | Ensure that the plate is positioned correctly in its slot. |
| b) Faulty Z drive | Contact QIAGEN Technical Services. |

Camera fails to read bar code

- | | |
|--|--|
| a) Bar codes are faulty, incorrectly positioned, or dirty | <ul style="list-style-type: none"> ■ Check the bar codes for faults ■ Ensure that the bar codes are correctly positioned ■ Ensure that the bar codes are clean; errors can also occur if the bar codes are shiny <p>If the problem persists, contact QIAGEN Technical Services.</p> |
| b) Check the CCD camera window for dirt. The window should be transparent, red in color, and free from scratches | <p>If necessary, carefully clean the window.</p> <p>If the problem persists, contact QIAGEN Technical Services.</p> |

Comments and suggestions

Vacuum error: Pressure could not be reached

- | | |
|--|--|
| a) Lid on vacuum trap is not tightly closed | Close the lid tightly. |
| b) Plate or lid is not positioned properly in the top of the vacuum manifold | Place the plate or lid properly in the top of the vacuum manifold. |
| d) Seal defect on the connectors for the vacuum trap | Change the connector; contact QIAGEN Technical Services. |
| e) Poor pump performance | See below. |

No vacuum on the vacuum pump

Vacuum pump defect, or liquid in the vacuum pump (vacuum trap overflowed)	Contact QIAGEN Technical Services.
---	------------------------------------

Tips do not attach properly

Tip-tray drawer not positioned correctly	Check that the tip-tray drawer is fully returned to the worktable. If the problem persists, contact QIAGEN Technical Services.
--	---

Comments and suggestions

Tips do not detach properly

- | | |
|--|--|
| a) Tip-disposal station is not installed correctly | Install the tip-disposal station correctly. |
| b) Either the tip disposal bag from the previous protocol run was not replaced, or the tip disposal bag was not properly inserted into the tip disposal container: discarded tips have piled up and are blocking the tip-disposal station. | Ensure that the tip disposal bag is fully open and against the walls of the tip disposal container.
If the problem persists, contact QIAGEN Technical Services. |

Comments and suggestions

Liquid detection problem

- | | |
|---|---|
| a) Small droplets or foam around the edge of small tubes are leading to premature detection | Ensure that there are no droplets or foam around the edges of small tubes. |
| b) System liquid tubing is not filled with system liquid | Fill the tubing with system liquid by selecting “Tools/Flush System”. |
| c) System liquid container is not filled with deionized water | Empty the container, and fill it with deionized water. |
| d) The system liquid in the system liquid container is contaminated | Empty and clean the container, and replace the system liquid. |
| e) Problem with liquid detectors | Run “Maintenance Protocol I” to adjust and determine the performance of the liquid detectors (this protocol also calibrates the high-speed dispensing system).
If the problem persists, contact QIAGEN Technical Services. |

Tubing system running empty

- | | |
|---|--|
| Tubing is incorrectly placed in the system liquid container | Place the tubing correctly in the system liquid container. |
|---|--|

System liquid container is empty

- | | |
|---|---|
| a) System liquid container unfilled | Fill the system liquid container with deionized water. |
| b) Sensor for the system liquid container is faulty | Check that the cable for the system liquid container sensor is connected properly.
If the problem persists, contact QIAGEN Technical Services. |

Comments and suggestions

Buildup of droplets on the tip adapters

- | | | |
|----|--|---|
| a) | Air bubble in the system liquid tubing | Flush the tubing to remove air bubbles by selecting "Tools/Flush System". |
| b) | Leak in the system liquid tubing | Tighten all tubing connections. If the problem persists, contact QIAGEN Technical Services. |

Tube holders do not move out correctly from under the sample protection shield, or several tube holders move out at the same time

- | | |
|--|--|
| The tube holders or the surface of the sample tracking system may be wet | <p>Dry the tube holders and the surface of the sample tracking system thoroughly.</p> <p>If the problem persists, contact QIAGEN Technical Services.</p> |
|--|--|

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9. Glossary

9 Glossary

Word	Description
Accessory cabinet	The cabinet which supports the computer, monitor, and keyboard, and houses BioRobot MDx DSP accessories.
Accuracy	<p>Accuracy of measurement expresses the closeness of the agreement between the value which is accepted either as a conventional true value or an accepted reference value and the value found (definition according to ICH-Q2A).</p> <p>In terms of pipetting, it describes the ability to pipet an exact average quantity of liquid.</p>
Air bubbles	Random air bubbles in the system tubing, caused by leaks in the system, and often causing erroneous pipetting.
Air gap	A bubble of air to separate the system liquid from sample or reagent, or to separate reagents aspirated sequentially. The volume of the air gap is defined in the protocol.
Automated vacuum system	Consists of the vacuum manifold on the worktable and the external vacuum trap, vacuum pump, and condensate trap. The system allows the washing and elution of samples in QIAGEN 96-well plates.
Bar code	A printed label containing digitally coded information that is readable by a bar code reader.
Bar code reader	A device containing a CCD camera that converts bar codes into visually readable characters.
Buffer tracking system	A bar code reader inside the technical tower that allows automatic identification of bar code labeled bottles loaded into the reagent carousel.
CCD camera	A charged-coupled device (CCD) camera for reading bar codes
Channeling adapter	An adapter that is loaded into the vacuum manifold by the robotic handling system. The adapter channels wash buffers from a QIAGEN 96-well plate to the base of the manifold.

Glossary

Word	Description
Command	An instruction which tells the BioRobot MDx DSP to perform an operation. A protocol contains a sequence of commands.
Condensate trap	A small glass bottle connected to the vacuum pump. It collects any liquid that escapes the vacuum trap.
Cooling and heating system	A slot on the worktable that can accommodate and cool or heat, via the heat transfer adapter, an S-Block or other equivalent labware.
Dilution	To add a diluent to, for example, a sample in a predefined ratio.
Dilutor unit	A module that consists of a syringe pump and a tip adapter and allows an attached disposable tip to aspirate and dispense liquid.
Dilutor system	The 8 dilutor units of the BioRobot MDx DSP.
Dispenser head	The 8-channel liquid-dispensing head of the high-speed dispensing system. It is positioned over the worktable by the robotic handling system.
Elution microtube adapter	A blue adapter for accommodating a blue Elution Microtubes CL rack on a microplate station or on the reagent holder for microtubes and trough.
Environment	One of several main windows of the QIAsoft MDx DSP Operating System and is dedicated to a particular function. General users have access to the "Execute", "Maintenance", and "Configuration" environments.
Error codes	Numeric codes which represent various software and hardware errors.
Execute environment	The "Execute" environment allows the user to run protocols created by QIAGEN.
Flush	An operation to clean the tip adapters and connected tubing by flushing system liquid through them. A flush also removes air bubbles from the tubing.

Word	Description
High-speed dispensing system	A system that can dispense liquid rapidly through 8 channels. The system consists of an 8-channel dispenser head that is connected via a membrane pump to bottles in the reagent carousel.
Initialization	The operation performed automatically before each protocol run to check the electronic and mechanical operation of the BioRobot MDx DSP.
Laboratory cabinet	The cabinet which supports the BioRobot MDx DSP and houses the system liquid container, waste container, vacuum pump, vacuum trap, and condensate trap.
Labware tracking system	Consists of a hand-held bar code reader and an internal bar code reader near the top-right of the worktable. The former is for identification of bar code labeled samples. The latter is for automatic identification of bar code labeled Elution Microtubes CL racks.
Layout	The arrangement of the slots and racks on the worktable.
LED	Light Emitting Diode. Used as indicators on the CCD camera and power indicator.
Liquid detector	A system that allows tips adapters with attached disposable tips to detect ionic liquids.
Locator pins	The pins on the worktable surface that hold the slots in their correct positions.
Membrane pump	<p>A pump that is connected to the syringe pumps and is for flushing the syringe pumps and their connected tip adapters with system liquid.</p> <p>Another membrane pump connects the bottles in the reagent carousel to the dispenser head, and allows liquid dispensing through the dispenser head.</p>
Menu bar	A bar located at the top of each environment of the QIAsoft MDx DSP Operating System. It contains menus with various options for the user to choose from.

Glossary

Word	Description
Microplate station	A slot on the worktable that can accommodate a 96-well microplate or other labware with the same base dimensions.
Multiwell-plate holder	A holder that fits onto the BioRobot MDx DSP worktable and can accommodate either the channeling adapter (black multiwell-plate holder) or a QIAGEN 96-well plate (silver multiwell-plate holder).
Power switch	A button located at the front of the BioRobot MDx DSP in the bottom-right corner. It allows the user to switch the workstation on and off.
Precision	Precision is the closeness of agreement between independent test results obtained under stipulated conditions. Precision depends only on the distribution of random errors and does not relate to the true value or specified value. The precision is usually expressed as the variance, standard deviation, or coefficient of variation of a series of measurements. (Definition according to ICH-Q2A).
Protocol	A protocol is created by QIAGEN and contains instructions for performing a molecular biology application. These instructions include commands that are executed sequentially by the BioRobot MDx DSP.
QIAsoft MDx DSP Operating System	The software for operating the BioRobot MDx DSP.
Rack	A rack is an item of labware that the user places into a slot on the worktable. The racks that are loaded onto the worktable vary depending on the protocol. Examples of racks include tip trays, Elution Microtubes CL, troughs, and microplates.
Reagent carousel	A rotatable bottle holder inside the technical tower. Liquid in the bottles are dispensed via the high-speed dispensing system.
Reagent holder	A slot that holds reagent vessels such as troughs, microtubes, and bottles.

Word	Description
Robotic arm	The component that supports the tip adapters and robotic handling system, and executes the X, Y, and Z movements of the system.
Robotic handling system	A pair of grips mounted on the robotic arm that allows transportation of labware across the worktable. The robotic handling system can also manipulate the dispenser head of the high-speed dispensing system.
Sample tracking system	A slot on the left-hand side of the worktable that allows automatic identification of bar code labeled sample tubes and tube holders.
Slot	A slot is an item of labware that always remains on the worktable. Examples include reagent holders, tip-tray holders, and microplate stations. A slot can usually be identified by its slot mark, which is a circle containing a cross.
Syringe	A component of the syringe pump. It is a precisely graduated glass barrel with a plunger driven by a stepper motor.
Syringe pump	A computer-controlled syringe that is connected via tubing to a tip adapter and to a membrane pump.
System liquid	The liquid for flushing the dilutor system and the high-speed dispensing system. System liquid is stored in the system liquid container and in the system liquid bottle. Deionized water can be used as system liquid.
System liquid bottle	The rectangular bottle for storing system liquid. It is located in the reagent carousel.
System liquid container	The bulk container for storing system liquid. It is located below the BioRobot MDx DSP.
Technical tower	The compartment on the right-hand side of the BioRobot MDx DSP (when viewed from the front). It contains the reagent carousel, into which large bottles are loaded.

Glossary

Word	Description
Tip adapter	A tip adapter is a probe that allows aspiration and dispensing of liquid through an attached disposable tip. The BioRobot MDx DSP has 8 tip adapters.
Tip-disposal station	A slot on the worktable where used disposable tips are discarded. The tips are collected in a tip disposal bag located inside the laboratory cabinet.
Tip-tray drawer	A platform on the worktable that carries 8 tip-tray holders and can be slid out.
Tip-tray holder	A slot on the worktable that can accommodate a tip tray containing disposable tips.
Toolbar	A bar located beneath the menu bar. It contains buttons that, when clicked by the user, allow the BioRobot MDx DSP or software to perform an action.
Vacuum manifold	A chamber located on the worktable to which vacuum is applied. The vacuum manifold consists of a vacuum manifold base, top, and lid. Assembly of the vacuum manifold is performed by the robotic handling system.
Vacuum trap	A container located between the vacuum manifold and the vacuum pump. It collects liquid that leaves the vacuum manifold.
Variable spacing system	A computer-controlled system that varies the spacing between the tip adapters.
Wash station	A slot on the worktable over which the tip adapters are positioned while the dilutor system is being flushed. Waste liquid drains from the wash station to the waste container located inside the laboratory cabinet.
Waste	The outlet of the wash station or liquid that is discarded.
Waste container	A bulk container for collecting waste fluid from the wash station. It is located below the BioRobot MDx DSP.

Word	Description
Waste tubing	Tubing for draining waste liquid from the waste outlet to the waste container.
Workstation	The BioRobot MDx DSP itself. Together with the computer, the vacuum pump and trap, the system liquid container, and the waste container, it forms a complete system.
Worktable	The area of the BioRobot MDx DSP that contains slots and racks and is accessible by the tip adapters, dispenser head, and robotic handling system.
Worktable hood	A cover at the front of the BioRobot MDx DSP that can be slid up or down. Locking of the worktable hood is controlled via the QIAsoft MDx DSP software.
X, Y, and Z movement	Describes the movement of the tip adapters, dispenser head, or robotic handling system: left to right (X), back to front (Y), and up and down (Z).
Z drive	A drive unit for moving a tip adapter in the Z direction (up and down).

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Appendices

Appendix A

Technical data


Environmental conditions

Power requirements One of 2 configurations are available:

- 240 V AC \pm 10%, 50/60 Hz, 800 VA (Australia and UK)
- 100–115/220–230 V AC \pm 10%, 50/60 Hz, 800 VA (all other countries)

Check the label on the back of the BioRobot MDx DSP (see page 1-3)

Fuses T10L250V; 2 fuses for the main power supply unit

<p>WARNING</p> 	<p>Electrical hazard [W13]</p> <p>Never install a fuse different to that stated on the label on the rear of the BioRobot MDx DSP. If a fuse needs to be changed, contact QIAGEN Technical Services.</p>
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Operating temperature 15–32°C (60–90°F)

Humidity range 15–75% relative humidity at 30°C (85°F) or below without condensation

Altitude Up to 2000 m (6500 ft.)

Place of operation For indoor use only

Storage temperature –10°C to 40°C (14–104°F)

Pollution level 2

Mechanical data and hardware features

Dimensions	Instrument:	
	Width:	1.45 m (58 in.)
	Height:	0.82 m (32 in.)
	Depth:	0.81 m (32 in.)
	Accessory cabinet:	
	Width:	0.7 m (28 in.)
	Height:	0.9 m (35 in.)
	Depth:	0.8 m (31 in.)
	Laboratory cabinet:	
	Width:	1.45 m (58 in.)
	Height:	0.9 m (35 in.)
	Depth:	0.8 m (31 in.)
Mass (weight)	Instrument:	165 kg (364 lb.)
	Small cabinet:	80 kg (176 lb.)
	Large cabinet:	150 kg (331 lb.)

Computer	<p>Recommended specifications</p> <p>Compaq® desktop computer:</p> <ul style="list-style-type: none"> ■ 1.5 GHz (or higher) ■ 256 MB RAM (or higher) ■ 20 GB hard disk ■ DVD or CD-ROM drive ■ Network card ■ Analog modem ■ 4 COM ports ■ Compaq TFT flat screen monitor ■ International keyboard ■ 3 year worldwide warranty <p>Note: Specifications are subject to change as technology improves</p>
Software	QIAsoft MDx DSP Operating System running on Windows 2000 operating system (SP2 Professional) (Language: English) or Windows XP Professional
Interface	RS 232 C/CCITT V.24 asynchronous serial ASCII
Clot detection	After aspiration of liquid from the sample tube, a clot is detected if it is in contact with both the disposable tip and the liquid in the sample tube.
Liquid detection	<p>The tip adapter with conducting disposable tip functions as a liquid detector and measures the change in capacitance when entering or leaving a liquid.</p> <p>The liquid detectors are for detecting a minimum of 500 μl sample (e.g., plasma, serum, or blood) in primary or secondary sample tubes (see <i>Sample tubes</i> below). Sensing of QIAGEN reagents in the reagent holders is performed by the load check system.</p>
Sample tubes	See the tables on page A-7 for tubes compatible with the BioRobot MDx DSP.
System liquid	Deionized water used to fill the system liquid container and system liquid bottle.

Appendix A

Tip adapter	The BioRobot MDx DSP has 8 tip adapters. Each tip adapter can be attached to QIAGEN conducting disposable tips of various sizes. Tip adapters can move independently in the Z direction as required.
Tip-adapter spacing	The spacing between the tip adapters can be varied evenly from 9 to 20 mm using the variable spacing system.
Tips	<p>QIAGEN conducting disposable filter-tips are specially molded for use with the tip adapters. The following sizes are for use with the BioRobot MDx DSP:</p> <ul style="list-style-type: none">■ Volume 300 μl, conducting■ Volume 1100 μl, conducting
Tip-disposal station	Used disposable tips are discarded at the tip-disposal station.
Wash station	A wash station flushes the system with system liquid.
Precision pipetting system	<p>Each tip adapter is connected to a high-precision syringe pump for small-volume liquid handling. The syringes can be operated independently or simultaneously.</p> <p>Volumes of 35–100 μl are pipetted with a precision of <5%.</p> <p>The accuracy and precision of the volumes pipetted in a dedicated QIAGEN protocol may vary.</p>
High-speed dispensing system	<p>Computer-controlled multiple channel dispensing device; reagent carousel equipped with capacitance-based liquid level sensing system.</p> <p>Volumes of 200–1100 μl are dispensed with an accuracy of <12% and a precision of <5%.</p> <p>The accuracy and precision of the volumes pipetted in a dedicated QIAGEN protocol may vary.</p>
Robotic handling system	A T-grip model is used for moving labware (e.g., QIAamp 96 plates, S-Blocks), adapters, and components of the vacuum manifold over the worktable.

Cooling and heating system	<p>Computer-controlled cooling and heating system with adapter for S-Blocks.</p> <p>Working temperature range: 4–80°C.</p> <p>Accuracy of temperature:</p> <ul style="list-style-type: none"> ■ System: $\pm 1.5^{\circ}\text{C}$ over the entire temperature range
Labware tracking system (hand-held)	<p>The labware tracking system (hand-held) is a hand-held CCD camera bar code reader for identifying bar code labels on samples and on the Q-Cards supplied with QIAGEN kits. The reading field is 60 mm x 10 mm.</p> <p>The following bar code types are compatible:</p> <ul style="list-style-type: none"> ■ Code 39 ■ Code 128 ■ ITF 2/5 ■ EAN 8/EAN 13, UPC A/UPC C
Labware tracking system (internal)	<p>The labware tracking system (internal) is an on-board CCD camera bar code reader for identifying bar code labeled labware, especially Elution Microtubes CL. The reading field is 65 mm x 10 mm.</p> <p>The following bar code types are compatible:</p> <ul style="list-style-type: none"> ■ Codabar ■ Code 39 ■ Code 128 ■ Industrial 2 of 5 ■ ITF ■ EAN/UPC
Buffer tracking system	<p>The buffer tracking system is a CCD camera bar code reader integrated into the technical tower. The reader identifies bar code labeled reagent and buffer bottles placed in the reagent carousel (e.g., AW2). The reading field is 65 mm x 10 mm.</p>

Sample tracking system	<p>The sample tracking system is a CCD camera bar code reader for identifying bar code labeled sample tubes. The reading field is 65 mm x 10 mm (depending on the width of the bars and on the code type).</p> <p>The following bar code types are compatible:</p> <ul style="list-style-type: none">■ Codabar■ Code 39■ Code 128■ Industrial 2 of 5■ ITF■ EAN/UPC <p>The following bar code dimensions are readable:</p> <ul style="list-style-type: none">■ Reading distance: 33 ± 5 mm■ Bar width: 0.125–1.0 mm■ Label width: 25–40 mm (including quiet zone)■ Minimum bar height: 3 mm■ Quiet zone: 10 x bar width or >5 mm
Worktable hood	<p>The worktable hood protects personnel from mechanical and biological hazards during the running of a protocol. The hood is locked by the QIAsoft MDx DSP software.</p>
Vacuum manifold	<p>The vacuum manifold can accommodate one QIAGEN 96-well plate.</p> <p>Samples can be eluted into QIAGEN Elution Microtubes CL.</p>
Vacuum pump	<p>The vacuum pump pressure is computer-controlled from atmospheric pressure (approximately 1000 mbar) down to 50 mbar.</p>
Load check system	<p>The load check system ensures that the user has loaded all necessary reagents and labware (e.g., QIAamp 96 plates, S-Blocks) onto the worktable for the application to be carried out.</p> <p>For a list of labware and reagents that are checked prior to the running of a protocol, refer to the handbook supplied with the QIAGEN kit you are using.</p>

Recommended sample tubes for the sample tracking system

The BioRobot MDx DSP is not restricted to the tubes listed below. If you prefer to use other tubes, the QIAGEN Instrument Service Specialist will test them during the installation of your BioRobot MDx DSP.

Note: Tubes with identical dimensions may be available under different catalog numbers, but with different anti-coagulants.

Tube holder, STS MDx, 15 mm (holds tubes with inner diameter of 14–16 mm)

Manufacturer/ Brand name	Volume	Height	Tube shape	Distributor	Cat. no.
BD® Falcon®	14 ml	96 mm	Round	BD	352051
BD Vacutainer®	10 ml	100 mm	Round	BD	368430/ 366457
VENOJECT® II	10 ml	100 mm	Round	Terumo®	VP-100 SHL

Tube holder, STS MDx, 12 mm (holds tubes with inner diameter of 11–13 mm)

Manufacturer/ Brand name	Volume	Height	Tube shape	Distributor	Cat. no.
Sarstedt®	7 ml	81 mm	Round	Sarstedt	60550109
VENOJECT II	5 ml	78 mm	Round	Terumo	VP-050 SDK

Tube holder, STS MDx, 9 mm (holds tubes with inner diameter of 8–10 mm)

Manufacturer/ Brand name	Volume	Height	Tube shape	Distributor	Cat. no.
BD Falcon	5 ml	75 mm	Round	BD	352063
KABE EDTA	5 ml	75 mm	Round	KABE	53101
NALGENE®	2 ml	45 mm	Cryogenic vial	Nalge	5000-0120
NUNC™	3.6 ml	60 mm	Round	Nunc	366524
NUNC	4.5 ml	80 mm	Round	Nunc	363452
Sarstedt	2 ml	45 mm	Conical	Sarstedt	72693005
Sarstedt	5 ml	75 mm	Round	Sarstedt	62526028
BD Vacutainer	6 ml	75 mm	Round	BD	367815

Appendix B

BioRobot MDx DSP accessories

Product	Contents	Cat. no.
QIAamp DSP 96 Virus MDx Kit	For 12 x 96 preps: 12 QIAamp 96 Plates, RNase-Free Buffers, QIAGEN Protease, Elution Microtubes CL, Caps, S-Blocks, Carrier RNA	61762
Disposable Filter-Tips, 1100 μ l (960)	Conducting disposable filter-tips; pack of 960	9012598
Accessory Cabinet MDx	Cabinet accommodating computer, monitor, keyboard, and additional BioRobot MDx or BioRobot MDx DSP accessories	9014783
Laboratory Cabinet MDx	Cabinet accommodating the BioRobot MDx or BioRobot MDx DSP, accessory items, vacuum trap, vacuum pump, waste and system liquid containers	9014784
Reagent Holder, 1-bottle	Holder for accommodating 1 bottle (5 ml); for use with QIAGEN Protease (QP) on the BioRobot MDx or BioRobot MDx DSP worktable	9013832
Reagent Holder, 2-trough, 20 ml	Holder for accommodating 2 disposable troughs (20 ml); for use with lysis buffer (AL) and ethanol on the BioRobot MDx or BioRobot MDx DSP worktable	9235773
Reagent Holder, microtubes and trough	Holder for accommodating 8 microtubes (2 ml), 4 microtubes (1.5 ml), and 1 disposable trough (20 ml); for use with elution buffer (AVE or AE), and elution fluid (TOPE) on the BioRobot MDx or BioRobot MDx DSP worktable	9014380

Appendix B

Product	Contents	Cat. no.
Tube Holder, STS MDx, 9 mm (12)	Holder for accommodating 8 tubes with an internal tube diameter of 8 to 10 mm in the sample tracking system; pack of 12	9015970
Tube Holder, STS MDx, 12 mm (12)	Holder for accommodating 8 tubes with an internal tube diameter of 11 to 13 mm in the sample tracking system; pack of 12	9015971
Tube Holder, STS MDx, 15 mm (12)	Holder for accommodating 8 tubes with an internal tube diameter of 14 to 16 mm in the sample tracking system; pack of 12	9015972
Tip Disposal Bags MDx	Autoclavable bags for collection and disposal of used disposable tips	Inquire
Elution Microtube Adapter, type B	Elevating platform for use with Elution Microtubes CL	9236239
Tip-Tray Holder, 300 μ l tips	Holder for accommodating a tip tray containing 96 disposable tips of 300 μ l capacity	9013868
Tip-Tray Holder, 1100 μ l tips	Holder for accommodating a tip tray containing 96 disposable tips of 1100 μ l capacity	9014003
Channeling Adapter 8000	Adapter for vacuum-processing foaming solutions through multiwell plates using the vacuum system on the BioRobot 8000, BioRobot MDx, or BioRobot MDx DSP	9013928
Disposable Troughs, 20 ml (10)	Troughs holding up to 20 ml of liquid; pack of 10	9232764
Heat Transfer Adapter, microplate RB	Adapter for accommodating a 96-well microplate RB (or an S-Block) on the cooling and heating system	9011756
S-Blocks (2)	96-well blocks with 2 ml wells (Simport)	9236897

Product	Contents	Cat. no.
Microplate Station 8000, Short, Magnetic	Station for accommodating a 96-well plate (or other labware with the same base dimensions) on the BioRobot 8000, BioRobot MDx, or BioRobot MDx DSP worktable	9015924
Multiwell-Plate Holder, tall, black	Holder for accommodating the channeling adapter on the BioRobot MDx or BioRobot MDx DSP worktable	9238178
Multiwell-Plate Holder, tall, silver	Holder for accommodating multiwell plates on the BioRobot MDx or BioRobot MDx DSP worktable	9238177
Reagent Holder Tube Ring	Holder for tube ring in PCR applications	9232752
Bottle NaCl (0.9%)	Bottle for NaCl (0.9%) positioned in the reagent carousel	9016499
System Liquid Bottle	Bottle for system liquid positioned in the reagent carousel	9014796
Nalgene Closure Cap	Caps for waste, vacuum, and system liquid containers when not connected to the workstation	9238604

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Appendix C

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. 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. The shipper will pay all transport fees.

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.

Appendix D

Display messages for BR MDx DSP Maintenance Protocol V1.0

The messages displayed by the software protocol during the weekly maintenance protocol (see page 7-7) are listed below. The numbers of the messages listed below correspond to the numbers of the messages displayed by the software.

Note: Some of the display messages listed below may not appear during the protocol run (e.g., error messages).

3. Scan or enter the bar code of the Tube Holder rack type.
Valid types: [009 | 012 | 015 | 100]
4. You entered an invalid Tube Holder rack type
5. Inner diameter sample tubes is set to
6. The SIMULATION MODE is enabled! Some robot functions will not be executed!
7. The robotic arm will move to the right if you click <Next>!
8. This protocol checks the Liquid Detection System and the proper function of the MultiFlow Dispenser.
9. Close the worktable hood.
10. The Reportfile is saved for documentation in the directory:
11. Protocol finished.
12. Pull the tip-tray drawer outwards.
13. Discard the tip tray.
14. Remove the S-Block.
15. Empty the tip-waste bag.
16. Close the Reagent Rotor door.

17. Remove the tube holders from the sample tracking system.
18. Push the tip-tray drawer into the working position.
28. Place the S-Block into the Therm Slot / Adapter (RB).
29. Remove the sample protection shield.
30. Fill all sample tubes of tube holders 1, 6, and 12 with 2 ml of NaCl (0.9%), and load them onto the sample tracking system.
31. Load the other 9 tube holders, loaded with sample tubes, onto the sample tracking system (sample tubes empty or full).
34. Open the worktable hood.
37. Manually pipet 1000 μ l of NaCl (0.9%) into wells A9|H9 of a new S-Block. Make sure all other wells are empty!
38. Place one red tip tray with 1100 μ l disposable tips into the red tip-tray holder 4.
40. Attach an empty tip-waste bag.
41. Disconnect the tubing of the system liquid container and remove the lid.
42. Refill the container with deionized water. Close the lid and reconnect the tubing.
43. Empty the container. Close the lid and reconnect the tubing.
44. Place the 500 ml bottle filled with a minimum of 250 ml NaCl (0.9%) into Reagent RotorSlot 2.
46. Place the system liquid bottle filled with a minimum of 600 ml deionized water into RotorSlot 8.
47. Remove any tube holders from the sample tracking system!
53. Disconnect the tubing of the waste container and remove the lid.
57. Press <Continue> to proceed with the protocol.

- 66. Flow rate of the MultiFlow Dispense Pump in the Robot Configuration
- 67. Remove the 500 ml bottle filled with NaCl (0.9%) from Reagent RotorSlot 2.
- 68. Replace the sample protection shield.
- 71. The robotic arm moves to the left if you click <Continue>!
- 72. Test Result
- 74. The Maintenance Protocol has detected failures.
- 75. Please contact QIAGEN Service Personnel.
- 84. The Informationfile of the sample tubes is not available
- 85. The Default values for the inner diameter of the sample tubes will be used.
- 87. Press <Stop Protocol> to stop.

Example of test report from BR MDx DSP Maintenance Protocol V1.0

The calibration results from the weekly maintenance protocol are saved in a result file, named **C:\Program Files\QIAsoft MDx DSP\UserData\BR MDx DSP Maintenance Protocol V1.0_date_time.rtf** . An example of this result file is given below.

Test Report: BR MDx DSP Maintenance Protocol V1.0

Test Results:

Module	Function Test	Result	Date
Liquid Detection	Liquid Detection	PASSED	08.Sep.2004
MultiFlow Dispenser	Dispense	PASSED	08.Sep.2004

Liquid Detection Test results:

Test ID 1+2, Position: sample tracking system / tube holder 1,6+12

Tube holder rack type: SIS012, (5) Inner diameter sample tubes is set to: 10.5 mm

Test ID 3-5, Position: Therm Slot / Adapter (RB) / S-Block

Test ID	Testsubject	Limit min.[steps]	Limit max.[steps]	Measured [steps]	Result
1	Max. Deviation to Mean/well on sample tracking system / tube holder		30	11.00	PASSED
2	Min. Detectionposition/ well sample tracking system / tube holder	50		587.09	PASSED
3	Max. Deviation to Mean/well on S-Block		30	12.00	PASSED
4	Min. Detectionposition/ well on S-Block (except empty wells)	50		628.00	PASSED
5	Max. Detectionposition/ well on S-Block (empty wells)		50	0.00	PASSED

MultiFlow Dispenser, Dispense Test results:

Position: Therm Slot / Adapter (RB) / S-Block

(66) Flow rate of the MultiFlow Dispense Pump in the Robot Configuration: 412.00 ul/s.

Testsubject	Limit max.[%]	Measured[%]	Result
Max. Accuracy / A3 H8	12	4.32292	PASSED
Max. CV / A3 H8	5	3.43979	PASSED

BioRobot: BioRobot_MDx_DSP_SNxxxx**Robot Configuration:** BIOROBOT_MDx_DSP**QIAsoft:** MDx DSP 1.0.0.5**Message Log File:** 040908AB.MSL**Test Protocol:** SOW-00000136-000-A_BR MDx DSP Maintenance Protocol.PRO**Date/Time:** 08.Sep.2004, 15:49

OPERATOR: generaloperator , NAME: _____ ,

SIGN: _____

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