

October 2010

---

# QIAvac 24 Plus Handbook

For vacuum processing of QIAGEN<sup>®</sup> spin  
columns



---

WWW.QIAGEN.COM

Trademarks: QIAGEN®, QIAamp®, QIAprep®, QIAquick®, MinElute®, RNeasy® (QIAGEN Group); Pall® (Pall Corporation); Tween® (ICI Americas Inc.).

Registered names, trademarks, etc. used in this document, even when not specifically marked as such, are not to be considered unprotected by law.

© 2004–2010 QIAGEN, all rights reserved.

# Contents

<b>Kit Contents</b>	<b>4</b>
<b>Storage</b>	<b>5</b>
<b>Product Use Limitations</b>	<b>5</b>
<b>Product Warranty and Satisfaction Guarantee</b>	<b>5</b>
<b>Technical Assistance</b>	<b>5</b>
<b>Safety Information</b>	<b>6</b>
<b>Quality Control</b>	<b>6</b>
<b>Introduction</b>	<b>7</b>
<b>Protocols</b>	
■ <b>Processing QIAprep, QIAquick, MinElute, and RNeasy Spin Columns on the QIAvac 24 Plus</b>	<b>10</b>
■ <b>Processing QIAamp Mini Spin Columns on the QIAvac 24 Plus</b>	<b>11</b>
■ <b>Processing QIAamp DSP, QIAamp Midi, and QIAamp Maxi Spin Columns on the QIAvac 24 Plus</b>	<b>13</b>
<b>Troubleshooting Guide</b>	<b>14</b>
<b>References</b>	<b>14</b>
<b>Appendix A: Assembling the Vacuum System (QIAvac 24 Plus, QIAvac Connecting System, and Vacuum Pump).</b>	<b>15</b>
<b>Appendix B: Testing the QIAvac 24 Plus and the QIAvac Connecting System</b>	<b>21</b>
<b>Appendix C: Cleaning and Decontaminating the QIAvac 24 Plus</b>	<b>23</b>
<b>Appendix D: Handling and Maintenance of the QIAvac 24 Plus</b>	<b>25</b>
<b>Appendix E: Vacuum Regulator</b>	<b>27</b>
<b>Ordering Information</b>	<b>28</b>

## Kit Contents

<b>QIAvac 24 Plus</b>	
<b>Catalog no.</b>	<b>19413</b>
QIAvac 24 Plus Vacuum Manifold	1
Luer Plugs	24
Screw Cap	1
Quick-Coupling Female Connector	1
Vacuum Adapter	1
Cleaning Adapter	1
Handbook	1

<b>QIAvac Connecting System</b>	
<b>Catalog no.</b>	<b>19419</b>
Tray (preassembled with: sterile filter, vacuum gauge, vacuum regulator, and regulator connecting tube)	1
Waste Bottles	2
Vacuum Pump Connecting Tube	1
Waste Bottle Connecting Tube	1
Manifold Connecting Tube	1
Connecting Accessories Box (screw cap valve, 24 VacValves, pump adapter set, and main vacuum valve)	1
Handbook	1

<b>Vacuum Pump</b>			
<b>Catalog no.</b>	<b>84000</b>	<b>84010</b>	<b>84020</b>
Vacuum Pump	1 (100 V, 50/60 Hz)	1 (115 V, 60 Hz)	1 (230 V, 50 Hz)
Exhaust Filter	1	1	1

## Storage

The QIAvac 24 Plus is shipped at room temperature (15–25°C), and should be stored dry and clean at room temperature. Refer to page 23 for details on cleaning the QIAvac 24 Plus.

## Product Use Limitations

The QIAvac 24 Plus is designed for vacuum processing of QIAGEN spin columns in parallel.

All due care and attention should be exercised in the handling of many of the materials described in this text. We recommend all users of QIAGEN® products to adhere to the NIH guidelines that have been developed for recombinant DNA experiments, or to other applicable guidelines.

## Product Warranty and Satisfaction Guarantee

QIAGEN guarantees the performance of all products in the manner described in our product literature. The purchaser must determine the suitability of the product for its particular use. Should any product fail to perform satisfactorily due to any reason other than misuse, QIAGEN will replace it free of charge or refund the purchase price. We reserve the right to change, alter, or modify any product to enhance its performance and design. If a QIAGEN product does not meet your expectations, simply call your local Technical Service Department or distributor. We will credit your account or exchange the product — as you wish.

A copy of QIAGEN terms and conditions can be obtained on request, and is also provided on the back of our invoices. If you have questions about product specifications or performance, please call QIAGEN Technical Services or your local distributor (see back cover).

## Technical Assistance

At QIAGEN we pride ourselves on the quality and availability of our technical support. Our Technical Service 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 or experience any difficulties regarding the QIAvac 24 Plus or QIAGEN products in general, please 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 Service Departments or local distributors (see back cover).

## **Safety Information**

When working with chemicals, always wear a suitable lab coat, disposable gloves, and protective goggles. For more information, please consult the appropriate material safety data sheets (MSDSs). These are available online in convenient and compact PDF format at [www.qiagen.com/ts/msds.asp](http://www.qiagen.com/ts/msds.asp) where you can find, view, and print the MSDS for each QIAGEN kit and kit component.

## **Quality Control**

As part of the stringent QIAGEN quality assurance program, the performance of the QIAvac 24 Plus, QIAvac Connecting System, and Vacuum Pump is monitored routinely. All components are tested separately to ensure highest performance and reliability.

## Introduction

The QIAvac 24 Plus is designed for fast and efficient vacuum processing of up to 24 QIAGEN spin columns in parallel (Tables 1 and 2). Samples and wash solutions are drawn through the column membranes by vacuum instead of centrifugation, providing greater speed and reduced hands-on time in purification procedures. QIAprep<sup>®</sup>, QIAquick<sup>®</sup>, MinElute<sup>®</sup>, and RNeasy<sup>®</sup> spin columns are inserted directly into the luer slots of the QIAvac 24 Plus manifold, while QIAamp<sup>®</sup> spin columns are processed on the QIAvac 24 Plus using VacConnectors to avoid cross contamination and VacValves to handle different sample flow rates. VacConnectors and VacValves can also be used with QIAprep, QIAquick, and MinElute spin columns, if desired. For maintenance of the QIAvac 24 Plus, please refer to the handling guidelines on page 25.

In clinical diagnostic laboratories it is essential to use the QIAvac 24 Plus manifold in combination with the QIAvac Connecting System (cat no. 19419) and QIAGEN CE-certified Kits (e.g., QIAamp DSP DNA Blood Mini Kit\* and QIAamp DSP Virus Kit\*).

QIAamp Midi and Maxi spin columns can also be processed using the QIAvac 24 Plus. However, due to the large solution volumes used, the QIAvac Connecting System is required.

To set up and operate the QIAvac 24 Plus for a particular application, refer to the instructions given on:

- page 10 for QIAprep, QIAquick, MinElute, and RNeasy spin columns
  - page 11 for non-DSP QIAamp Mini and QIAamp MinElute spin columns
  - page 13 for QIAamp DSP, QIAamp Midi and QIAamp Maxi spin columns
- as well as the detailed vacuum protocols provided in the individual kit handbooks.

\* These products are not available in all countries; please inquire.

**Table 1. QIAGEN Research Kits Compatible with the QIAvac 24 Plus**

<b>Application</b>	<b>Kit</b>	<b>Accessories</b>
Plasmid minipreps	QIAprep Spin Miniprep Kits	–
DNA cleanup	QIAquick PCR Purification Kits	–
	QIAquick Gel Extraction Kits	–
	QIAquick Nucleotide Removal Kits	–
	MinElute PCR Purification Kits	–
	MinElute Gel Extraction Kits	–
	MinElute Reaction Cleanup Kits	–
Total RNA purification	RNeasy Mini Kits	VacConnectors*
M13 ssDNA purification	QIAprep Spin M13 Kit	–

\* Optional accessory to prevent cross-contamination.

**Table 2. QIAGEN Clinical Kits Compatible with the QIAvac 24 Plus**

<b>Application</b>	<b>Kit</b>	<b>Accessories</b>
Genomic and viral DNA purification from blood and body fluids	QIAamp DNA Blood Kits	VacConnectors and VacValves
	QIAamp DNA Mini Kit	VacConnectors and VacValves
Viral RNA purification from plasma, serum, and cell-free body fluids	QIAamp Viral RNA Mini Kit	VacConnectors and VacValves
Viral DNA and RNA purification from plasma, serum, and cell-free body fluids	QIAamp MinElute Virus Vacuum Kit	VacConnectors and VacValves
Genomic DNA purification from human whole blood for in vitro diagnostic purposes	QIAamp DSP DNA Blood Mini Kit	VacConnectors* and VacValves
Viral DNA and RNA purification from human plasma or serum samples for in vitro diagnostic purposes	QIAamp DSP Virus Kit	VacConnectors* and VacValves

\* Supplied with kit.

# Protocol: Processing QIAprep, QIAquick, MinElute, and RNeasy Spin Columns on the QIAvac 24 Plus

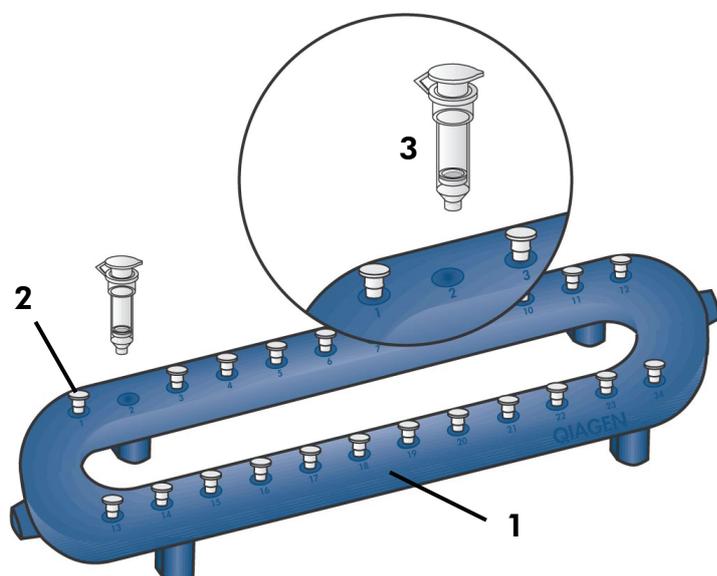
## Procedure

1. Insert up to 24 spin columns into the luer slots of the QIAvac 24 Plus. Close unused luer slots with luer plugs.
2. Connect the upper threaded hole of the QIAvac 24 Plus manifold to a vacuum source. For nucleic acid purification follow the vacuum protocol in the relevant kit handbook.

**Note:** Ensure that the vacuum source is connected to the upper threaded hole of the QIAvac 24 Plus and the lower threaded hole is tightly sealed using the screw cap. To prevent liquid entering the vacuum source, connection of the vacuum source to the lower threaded hole should only be undertaken when using the QIAvac Connecting System.

For the correct setup of the QIAvac 24 Plus see "Setting up the QIAvac 24 Plus manifold", page 15.

3. After sample processing, discard the liquid waste in the QIAvac 24 Plus and clean the QIAvac 24 Plus (see "Cleaning and Decontaminating the QIAvac 24 Plus", page 23).



**Figure 1** Setting up the QIAvac 24 Plus with QIAprep, QIAquick, MinElute, or RNeasy Mini Spin Columns.

1. QIAvac 24 Plus vacuum manifold
2. Luer slot closed with luer plug
3. Spin column\*

\* Not included with the QIAvac 24 Plus. Included in appropriate purification kits.

# Protocol: Processing Non-DSP QIAamp Mini and QIAamp MinElute Spin Columns on the QIAvac 24 Plus

A vacuum pump capable of producing a vacuum of at least –900 mbar (e.g., QIAGEN Vacuum Pump, see Ordering Information, page 28) is required.

QIAamp Mini and QIAamp MinElute spin columns are processed on the QIAvac 24 Plus using VacConnectors and VacValves. VacValves are inserted directly into the luer slots of the QIAvac 24 Plus manifold and ensure a steady flow rate, facilitating parallel processing of samples of different natures (e.g., whole blood and plasma), volumes, or viscosities. They should be used if sample flow rates differ significantly in order to ensure consistent vacuum. VacConnectors are disposable connectors that fit between QIAamp Mini or QIAamp MinElute spin columns and VacValves. They prevent direct contact between the spin column and VacValve during purification, thereby avoiding any cross-contamination between samples. VacConnectors are discarded after a single use.

## Equipment to Be Supplied by User

- VacConnectors, cat. no. 19407
- VacValves (24), cat. no. 19408

## Procedure

- 1. Connect the QIAvac 24 Plus to a vacuum source. If using the QIAvac Connecting System, connect the system to the manifold and vacuum source as described in Appendix A, page 15.**
- 2. Insert a VacValve into each luer slot of the QIAvac 24 Plus that is to be used. Close unused luer slots with luer plugs or close the inserted VacValve.**

VacValves should be used if flow rates of samples differ significantly to ensure consistent vacuum.

- 3. Insert a VacConnector into each VacValve.**

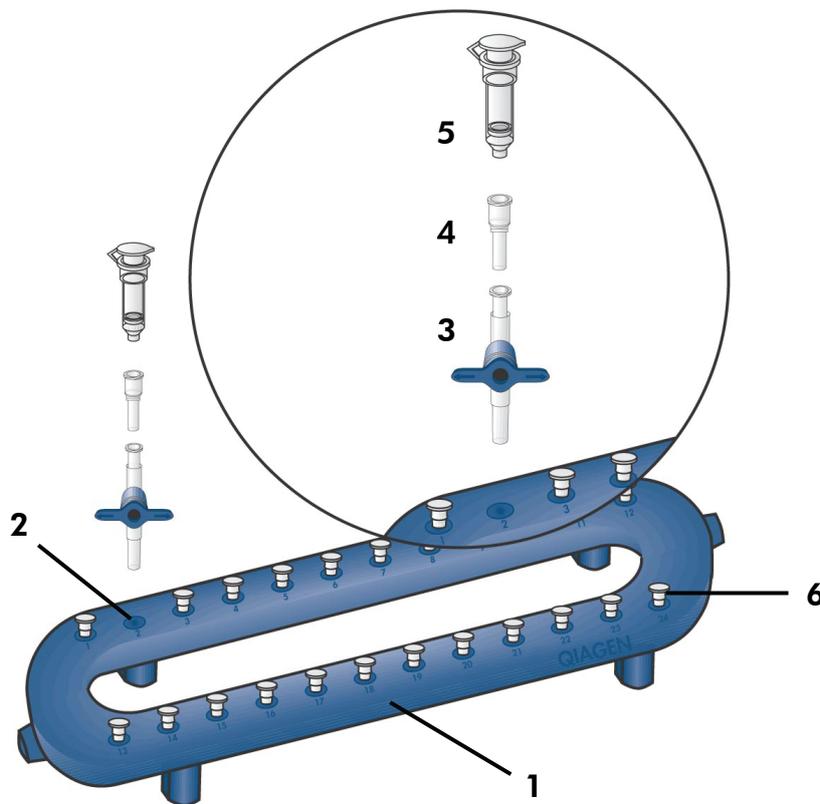
Perform this step directly before starting the purification to avoid exposure of VacConnectors to potential contaminants in the air.
- 4. Place the QIAamp Mini or QIAamp MinElute spin columns into the VacConnectors on the manifold.**
- 5. For the QIAamp MinElute Virus Vacuum Kit: Insert an Extension tube into each QIAamp MinElute column.**

6. For nucleic acid purification, follow the vacuum protocol in the appropriate QIAamp handbook. Discard the VacConnectors appropriately after use.

**Note:** Each VacValve can be closed individually when the sample is completely drawn through the spin column, allowing parallel processing of samples of different volumes or viscosities.

7. After processing samples, clean the QIAvac 24 Plus (see “Cleaning and Decontaminating the QIAvac 24 Plus”, page 23).

**Note:** Buffers AL, AVL, and AW1 used in QIAamp procedures are not compatible with disinfecting agents containing bleach. See the appropriate QIAamp handbook for safety information.



**Figure 2** Setting up the QIAvac 24 Plus with QIAamp spin columns using VacValves and VacConnectors.

1. QIAvac 24 Plus vacuum manifold
2. Luer slot of the QIAvac 24 Plus
3. VacValve\*
4. VacConnector\*
5. QIAamp Mini spin column†
6. Luer slot closed with luer plug

\* Not included with the QIAvac 24 Plus. Must be purchased separately.

† Not included with the QIAvac 24 Plus. Included in appropriate purification kits.

# Protocol: Processing QIAamp DSP, QIAamp Midi, and QIAamp Maxi Spin Columns on the QIAvac 24 Plus

QIAamp DSP, QIAamp Midi, and QIAamp Maxi spin columns are processed on the QIAvac 24 Plus using VacConnectors and VacValves. VacValves are inserted directly into the luer slots of the QIAvac 24 Plus manifold (Figure 2) and ensure a steady flow rate, facilitating parallel processing of samples of different natures, volumes, or viscosities. VacConnectors are disposable connectors that fit between QIAamp spin columns and VacValves. They prevent direct contact between the spin column and VacValve during purification, thereby avoiding any cross-contamination between samples. VacConnectors are supplied with the respective diagnostic kit and should be discarded after use. Once used, VacConnectors are potentially contaminated and should be disposed of as biohazard waste.

## Equipment to Be Supplied by User

- VacConnectors\*, cat. no. 19407
- VacValves (24)†, cat. no. 19408

\* Supplied with QIAamp DSP Kits.

† Supplied with the QIAvac Connecting System.

## Procedure

- 1. Connect the QIAvac 24 Plus to the vacuum source using the QIAvac Connecting System (for more details see Appendix A, page 16).**
- 2. Insert a VacValve into each luer slot of the QIAvac 24 Plus that is to be used. Close unused luer slots with luer plugs or close the inserted VacValve.**
- 3. Insert a VacConnector into each VacValve.**  
Perform this step directly before starting the purification to avoid exposure of VacConnectors to potential contaminants in the air.
- 4. Place a QIAamp spin column into each VacConnector on the manifold.**
- 5. For the QIAamp DSP Virus Kit: Insert a Column Extender into each QIAamp MinElute column.**

- 6. For nucleic acid purification, follow the vacuum protocol in the appropriate QIAamp handbook. Discard the VacConnectors appropriately after use.**

**Note:** After use the VacConnectors are potentially contaminated and should be disposed of as biohazard waste.

Each VacValve can be closed individually when the sample is completely drawn through the spin column, allowing parallel processing of samples of different volumes or viscosities.

- 7. After processing of samples, clean and decontaminate the QIAvac 24 Plus (see “Cleaning and Decontaminating the QIAvac 24 Plus”, page 23).**

## Troubleshooting Guide

The scientists in QIAGEN Technical Services are always happy to answer any questions you may have about either the information and protocols in this handbook or molecular biology applications (see back cover for contact information).

## References

QIAGEN maintains a large, up-to-date online database of scientific publications utilizing QIAGEN products. Comprehensive search options allow you to find the articles you need, either by a simple keyword search or by specifying the application, research area, title, etc.

For a complete list of references, visit the QIAGEN Reference Database online at [www.qiagen.com/RefDB/search.asp](http://www.qiagen.com/RefDB/search.asp) or contact QIAGEN Technical Services or your local distributor.

# Appendix A: Assembling the Vacuum System (QIAvac 24 Plus, QIAvac Connecting System, and Vacuum Pump)

## Setting up the QIAvac 24 Plus vacuum manifold

To use the QIAvac 24 Plus without the QIAvac Connecting System, set up the manifold as follows.

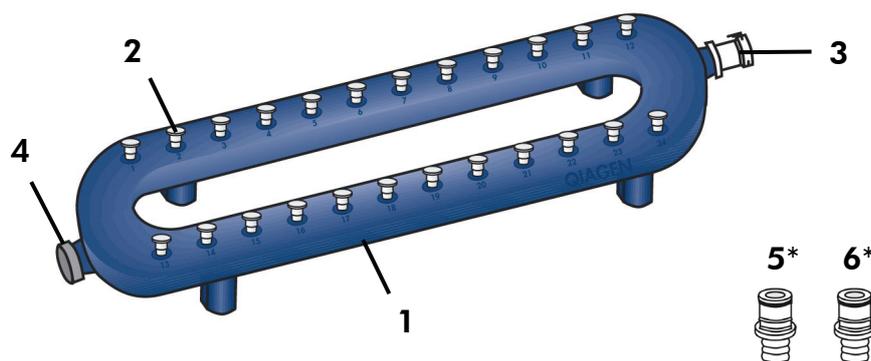
### Procedure

1. Place the manifold (1) on a flat, planar surface, ensuring that the lower threaded hole is on the left side.
2. Attach the quick-coupling female connector (3) to the upper threaded hole of the manifold by turning clockwise. Carefully tighten the quick-coupling female using a wrench.

**Note:** Over-tightening of the quick-coupling female connector may damage the manifold.

**Important:** Do not connect the vacuum source to the lower threaded hole on the QIAvac 24 Plus, as this will cause liquid to enter the vacuum source.

3. Connect the vacuum source to the quick-coupling female connector (3) using the vacuum adapter (5).
4. Close the lower threaded hole of the manifold using the screw cap (4).



**Figure 3** Setting up the QIAvac 24 Plus vacuum manifold for use without the QIAvac Connecting System.

- |                                    |                      |
|------------------------------------|----------------------|
| 1. QIAvac 24 Plus vacuum manifold  | 4. Screw cap         |
| 2. Luer slot with luer plug        | 5. Vacuum adapter*   |
| 3. Quick-coupling female connector | 6. Cleaning adapter* |

\* Identical components.

## Setting up the QIAvac 24 Plus, QIAvac Connecting System, and Vacuum Pump

In combination with the QIAvac Connecting System, the QIAvac 24 Plus can be used as a flow-through system. The sample flow-through is collected in a separate waste bottle. Set up the QIAvac 24 Plus manifold, Connecting System and Vacuum Pump as follows.

### Setting up the QIAvac 24 Plus

#### Procedure

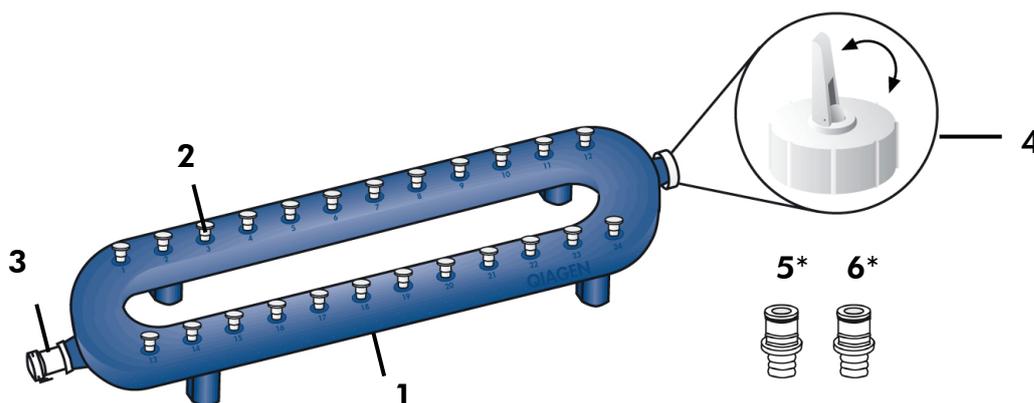
1. Place the manifold (1) on a flat, planar surface, ensuring that the lower outlet is on the left side.
2. Attach the quick-coupling female connector (3) to the lower threaded hole of the manifold by turning clockwise. Carefully tighten the quick-coupling female connector (3) using a wrench.

**Important:** Over-tightening of the quick-coupling female connector may damage the manifold.

3. Close the upper threaded hole of the manifold using the closed screw cap valve (4; supplied with the QIAvac Connecting System).

**Note:** The screw cap valve is closed when the lever is flush with the top of the valve. The screw cap valve is open (venting the manifold) when the lever sticks out of the valve.

**Important:** Do not use the screw cap supplied with the manifold when using the QIAvac Connecting System.



**Figure 4A** Setting up the QIAvac 24 Plus vacuum manifold for use with the QIAvac Connecting System.

- |                                    |                      |
|------------------------------------|----------------------|
| 1. QIAvac 24 Plus vacuum manifold  | 4. Screw cap valve*  |
| 2. Luer slot with luer plug        | 5. Vacuum adapter†   |
| 3. Quick-coupling female connector | 6. Cleaning adapter† |

\* Supplied with QIAvac Connecting System. † Identical components.

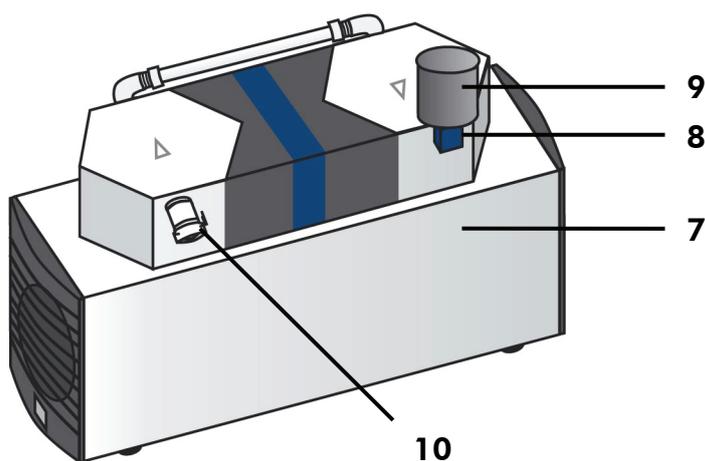
## Setting up the QIAGEN Vacuum Pump

### Procedure

1. Remove the pre-fitted inlet and outlet adaptors from the vacuum pump by turning them anticlockwise.
2. Open the connecting accessories pack (supplied with the QIAvac Connecting System) containing the pump quick coupling, the blue adapter piece, and the white sealing ring.
3. Place the white sealing ring onto the threaded part of the blue adapter piece and screw into the exhaust outlet of the vacuum pump. Ensure that the adapter piece (8) sits tightly and the threaded outlet hole, on the adapter piece, faces upwards. Screw the exhaust filter (9; supplied with Vacuum Pump) clockwise into the threaded outlet hole of the blue adapter piece.
4. Attach the quick coupling (10), supplied with the QIAvac Connecting System, to the vacuum pump inlet by turning clockwise. Tighten the coupling using a wrench.

**Warning!** Ensure that the pump quick coupling is fixed to the **left-hand inlet** of the vacuum pump and the pump filter with its adapter is fixed in the **right-hand exhaust** outlet. Exchanging these connections will lead to a sudden increase in pressure within the manifold and possible destruction.

**Note:** Each time that the vacuum pump is disconnected, ensure that all connections are correctly replaced and that the pump generates a vacuum after reconnection.



**Figure 4B** Setting up the QIAGEN Vacuum Pump

- |   |                                      |
|---|--------------------------------------|
| 7. Vacuum pump  | 9. Exhaust filter                    |
| 8. Blue exhaust-filter adapter and white sealing ring | 10. Quick coupling attached to inlet |

## Setting up the QIAvac Connecting System

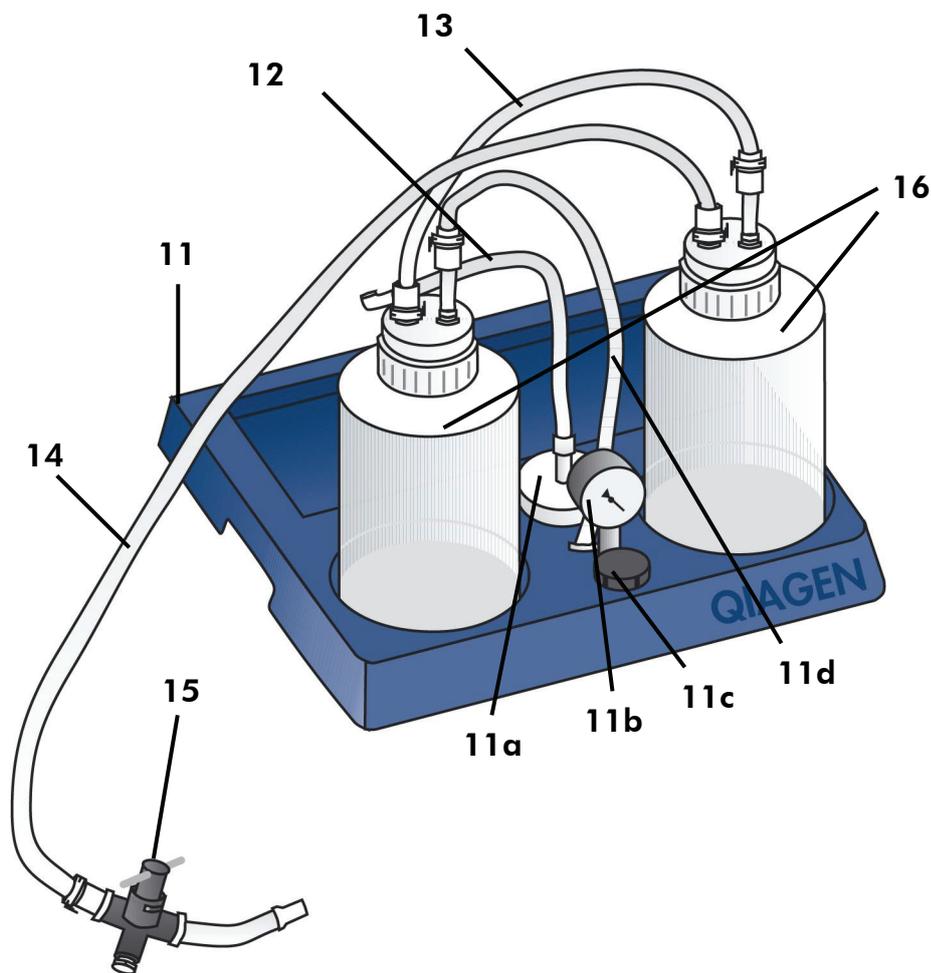
Install the vacuum system on a flat, planar surface. Avoid direct sunlight, heat and humidity. The complete installed system is shown in Figure 5, page 20.

### Procedure

1. Place the tray (11) in the desired location. Place the vacuum pump (7) in the large rectangular recess of the tray.
2. Attach the vacuum pump connecting tube (12; with nut and angled quick coupling) to the sterile filter (11a) by rotating the nut clockwise. Attach the angled quick connector (12) to the pump quick coupling (10).
3. Place the waste bottles (16) into the round recesses of the tray.
4. Attach the unconnected end of the regulator connecting tube (11d; coming from the tray) to the female port on the left-hand waste bottle.
5. Connect the waste bottles (16) together using the waste bottle connecting tube (13).
6. Attach one end of the manifold connecting tube (14) to the male quick coupling on the right-hand side waste bottle (16). Attach the other end to the main vacuum valve (15). Connect the tubing from the main vacuum valve (15) to the quick coupling on the QIAvac 24 Plus vacuum manifold (3).

**Note:** The quick coupling adapter should be attached to the lower threaded hole of the vacuum manifold (see "Setting up the QIAvac 24 Plus"). Use of the upper threaded hole would cause liquid to collect in the manifold.

**Note:** The operation of the vacuum system should be checked each time it is assembled (see Appendix B, page 21).



**Figure 4C** Setting up the QIAvac Connecting System.

11. Tray, pre-assembled with:

11a. Sterile filter

11b. Vacuum gauge

11c. Vacuum regulator

11d. Regulator connecting tube

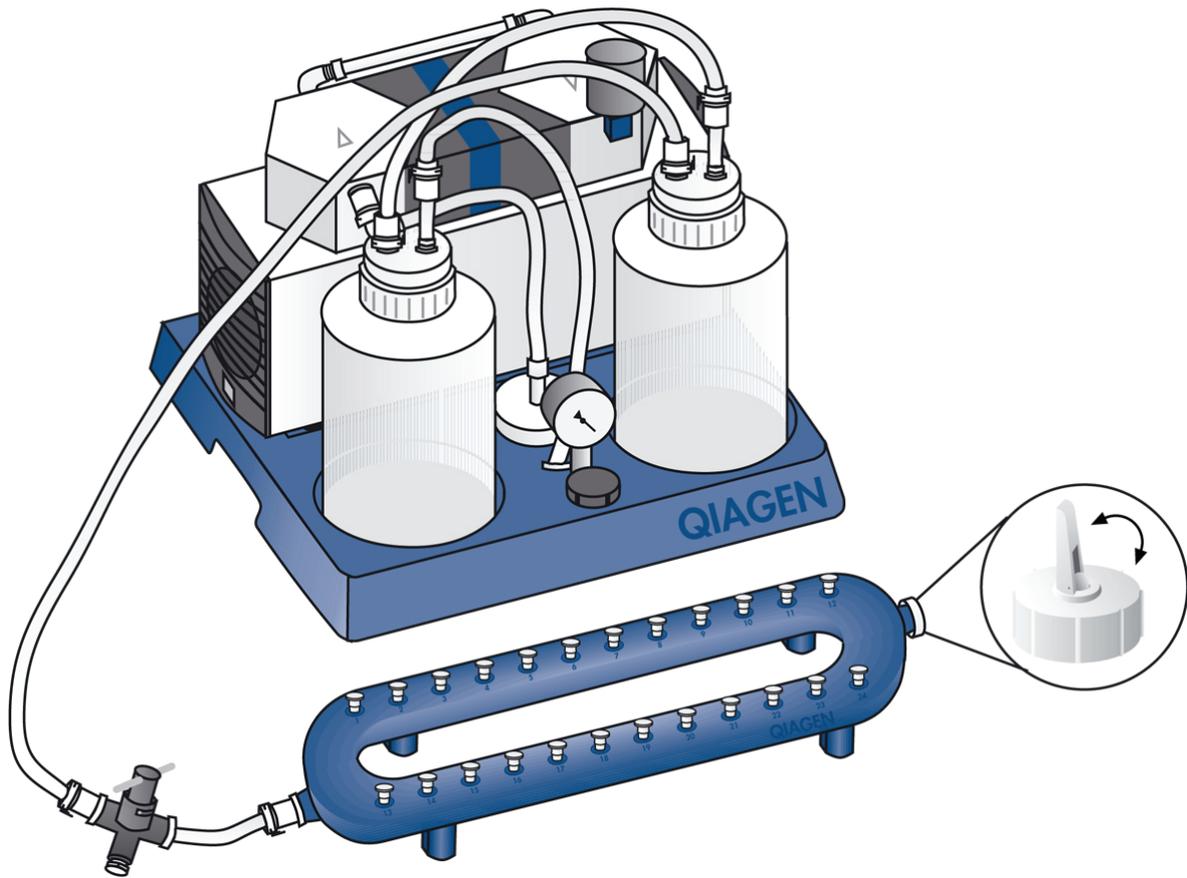
12. Vacuum pump connecting tube (with nut and angled quick coupling)

13. Waste bottle connecting tube

14. Manifold connecting tube

15. Main vacuum valve

16. Waste bottles



**Figure 5** QIAvac 24 Plus, QIAvac Connecting System, and Vacuum Pump.

## Appendix B: Testing the QIAvac 24 Plus and the QIAvac Connecting System

The QIAvac 24 Plus and the QIAvac Connecting System should be tested before performing a nucleic acid purification procedure.

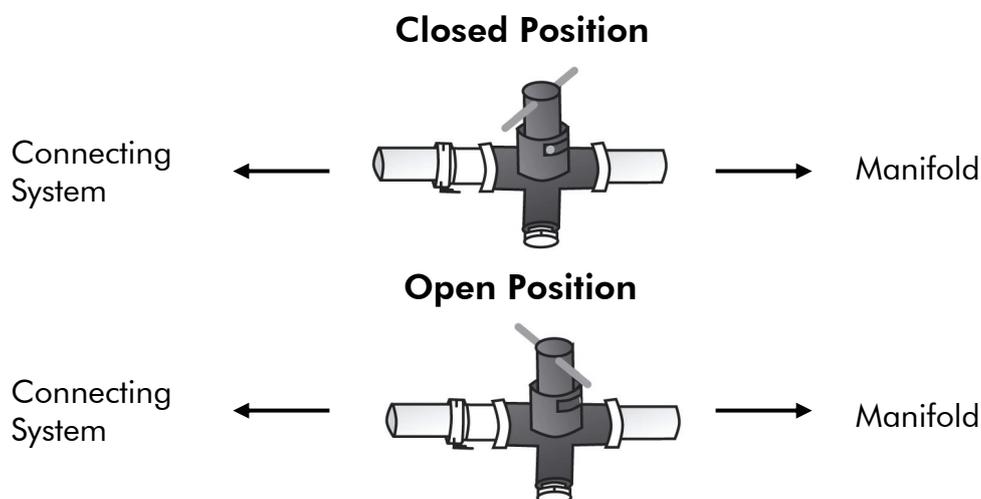
**Warning!** Ensure that the pump quick coupling is fixed to the **left-hand inlet** of the vacuum pump and the pump filter with its adapter is fixed in the **right-hand exhaust** outlet. Exchanging these connections will lead to a sudden increase in pressure within the manifold and possible destruction.

**Note:** Each time that the vacuum pump is disconnected, ensure that all connections are correctly replaced and that the pump generates a vacuum after reconnection.

### Procedure

1. **Plug the power cord of the vacuum pump into a grounded power outlet.**  
**Note:** Do not use a three-to-two plug adapter.
2. **Ensure that the caps on the waste bottles are tightly closed.**
3. **Ensure that all quick couplings are seated properly.**
4. **Insert a VacValve or luer plug into each of the 24 positions on the vacuum manifold. Ensure the VacValves are closed.**
5. **Close the main vacuum valve as shown in Figure 6.**
6. **Switch on the vacuum pump by pressing the power switch.**

Vacuum is now applied to the QIAvac Connecting System.



**Figure 6** Main vacuum valve in the closed and open position.

- 7. Wait for the needle of the vacuum meter to stabilize. If the needle indicates the vacuum is below –800 mbar, the QIAvac Connecting System is connected correctly and ready to use.**

If the needle takes a long time to stabilize, the in-line sterile filter may need to be replaced (see “Replacement of worn parts”, page 26). If the needle does not reach –800 mbar, check the connections of the QIAvac Connecting System.

- 8. Open the main vacuum valve to apply the vacuum to the QIAvac 24 Plus manifold.**

Wait approximately 1 minute for the needle of the vacuum meter to stabilize. If the vacuum is below –600 mbar, the manifold is ready to use. If the vacuum does not reach –600 mbar, check that the luer plugs or VacValves are seated properly, the VacValves are closed, and the screw cap valve is closed tight.

- 9. Once the vacuum pressure has been determined, release the vacuum by using the screw cap valve (see page 16), opening a VacValve, or removing a luer plug from the manifold.**

- 10. Switch off the vacuum pump and proceed to nucleic acid vacuum purification protocol.**

For nucleic acid purification follow the QIAvac 24 Plus vacuum protocol in the relevant handbook.

## Appendix C: Cleaning and Decontaminating the QIAvac 24 Plus

The QIAvac 24 Plus should be regularly cleaned to maintain optimum performance. The QIAvac 24 Plus must also be decontaminated before removal from the laboratory. Two cleaning protocols are described below. The cleaning protocol chosen depends upon whether the QIAvac 24 Plus is used as a stand-alone waste reservoir, or as a flow-through device in combination with the QIAvac Connecting System. Perform the cleaning procedure after each use to avoid sample contamination.

### Important points before starting

- When working with chemicals, always wear a suitable lab coat, disposable gloves, and protective goggles. For more information, consult the appropriate material safety data sheets (MSDSs), available from the product supplier.
- Do not use cleaning materials that contain abrasives.
- If the vacuum manifold is still not clean after following the procedures below, soak the vacuum manifold in warm detergent solution for at least 4 hours. Then repeat the procedure.
- Sample-preparation waste and some buffers contain guanidine hydrochloride and/or guanidine thiocyanate (for details, see the handbook of the QIAGEN kit being used). Mixing of these solutions with sodium hypochlorite (bleach) can form highly reactive compounds. See the kit handbook for safety information.
- If liquid containing guanidine salt is spilt, clean with suitable laboratory detergent and water. If the spilt liquid contains potentially infectious agents, clean the affected area first with laboratory detergent and water, and then with 1% (w/v) sodium hypochlorite.
- Check regularly the liquid level of the right waste bottle and empty the bottle before it is completely filled. Only the right waste bottle should contain waste liquid. The left waste bottle is an overflow trap only. A full waste bottle and overflow trap facilitates the entry of liquid waste into the pump, causing damage or loss of performance.

### Reagents to be supplied by user

For cleaning the QIAvac 24 Plus after stand-alone use:

- Standard laboratory detergent

For cleaning the QIAvac 24 Plus and QIAvac Connecting System after combined use:

- Standard laboratory detergent
- Standard laboratory disinfectant
- Ethanol (70%)
- Optional: 1% w/v, Sodium hypochlorite (bleach)

### **Cleaning the QIAvac 24 Plus after standalone use**

#### **Procedure**

- 1. Disconnect the manifold from the vacuum source.**
- 2. Remove the vacuum adapter (5) from the quick-coupling female connector (3) on the manifold and insert the cleaning adapter (6).**
- 3. Allow liquid waste to drain out of the manifold.**
- 4. Rinse the inside and outside of the QIAvac 24 Plus vacuum manifold and associated components with laboratory detergent solution and distilled water.**
- 5. Allow the manifold to air-dry.**

### **Cleaning the QIAvac 24 Plus and QIAvac Connecting System after combined use**

#### **Procedure**

- 1. Disconnect the vacuum manifold from the QIAvac Connecting System.**
- 2. Remove the VacValves and soak in laboratory detergent solution. Rinse thoroughly using water, then in 70% (v/v) ethanol. Wipe dry or allow to air-dry.**
- 3. Spray the QIAvac 24 Plus manifold with standard laboratory disinfectant and allow to soak for at least 10 minutes.**
- 4. Thoroughly rinse outside of the manifold in 70% (v/v) ethanol then water.**

**Note:** If desired, the interior and exterior of the vacuum manifold and VacValves can be cleaned with 1% (w/v) sodium hypochlorite. For this cleaning step it is important that all waste and buffers are completely drained from the manifold as they contain chaotropic salts, which can react with sodium hypochlorite. This cleaning procedure may reduce the operating life of the QIAvac 24 Plus manifold, due to the aggressive nature of sodium hypochlorite.

5. **Disconnect the manifold connecting tube (14) and the waste bottle connecting tube (13) from the right-hand waste bottle (16). Open the waste bottle and dispose of liquid waste.**
6. **Clean the waste bottle, waste bottle cap, and manifold connecting tube with standard laboratory disinfectant and water.**
7. **Unplug the vacuum pump.**
8. **Wipe the surface of the vacuum pump and tray using standard laboratory disinfectant then water. Wipe dry the surface of the vacuum pump.**

## **Appendix D: Handling and Maintenance of the QIAvac 24 Plus**

The following guidelines should be followed when working with the QIAvac24 Plus.

- Always place the QIAvac 24 Plus on a secure bench top or work area. If dropped, the QIAvac 24 Plus manifold may crack.
- Always store the QIAvac 24 Plus clean and dry. For cleaning procedures see “Cleaning and Decontaminating the QIAvac 24 Plus”, page 23).
- The components of the QIAvac 24 Plus are not resistant to certain solvents (Table 3, page 26). If these solvents are spilled on the unit, rinse it thoroughly with water.
- To ensure consistent performance, do not apply silicone or vacuum grease to any part of the QIAvac 24 Plus manifold.
- Always use caution and wear safety glasses when working near a vacuum manifold under pressure.
- Contact QIAGEN Technical Services or your local distributor for information concerning spare or replacement parts.

**Table 3. Chemical Resistance Properties of the QIAvac 24 Plus**

<b>Resistant to:</b>		
Acetic acid	Chaotropic salts	Chlorine bleach
Chromic acid	Concentrated alcohols	Hydrochloric acid
SDS	Sodium chloride	Sodium hydroxide
Tween <sup>®</sup> 20	Urea	
<b>Not resistant to:</b>		
Benzene	Chloroform	Ethers
Phenol	Toluene	

**Replacement of worn parts**

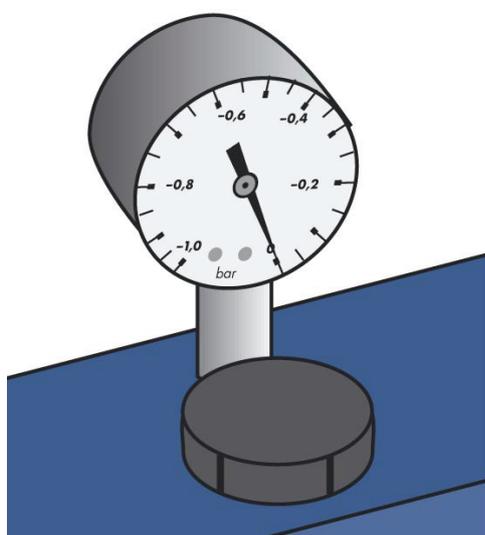
Replace the screw filter if it becomes blocked or damp. To replace the filter (**11a**), disconnect the angled quick coupling from the vacuum pump. Remove the filter tube by rotating the nut counterclockwise. Unscrew the used filter by turning the filter counterclockwise. Reverse this procedure to insert a new filter. Screw filters are available from Pall Corporation (cat. no. 4400).

Tubing should be replaced if discolored or cracked.

## Appendix E: Vacuum Regulator

The Vacuum Regulator measures the pressure difference between the inside and outside of a vacuum system in millibars\* (Figure 7). Use of the Vacuum Regulator makes it easy to monitor the pressure generated by the vacuum source, ensuring that it is sufficient for the appropriate QIAGEN purification chemistry.

### Vacuum Regulator



**Figure 7** Schematic diagram of the Vacuum Regulator.

\* Note: the design of the scale is subject to change. The vacuum pressure may be indicated in millibars or in bars (as seen in the figure).

**Table 4. Conversion Table for Pressure Units**

<b>To convert from millibars (mbar) to:</b>	<b>Multiply by:</b>
Millimeters of mercury (mm Hg)	0.75
Kilopascals (kPa)	0.1
Inches of mercury (inch Hg)	0.0295
Torrs (Torr)	0.75
Atmospheres (atm)	0.000987
Pounds per square inch (psi)	0.0145

## Ordering Information

Product	Contents	Cat. no.
QIAvac 24 Plus	Vacuum Manifold for processing 1–24 spin columns: includes QIAvac 24 Plus Vacuum Manifold, Luer Plugs, Quick Couplings	19413
QIAvac Connecting System	System to connect vacuum manifold with vacuum pump: includes Tray, Waste Bottles, Tubing, Couplings, Valve, Gauge, 24 VacValves	19419
Vacuum Pump (100 V, 50/60 Hz)	Universal vacuum pump	84000
Vacuum Pump (115 V, 60 Hz)	Universal vacuum pump	84010
Vacuum Pump (230 V, 50 Hz)	Universal vacuum pump	84020
VacValves (24)	24 valves for use with the QIAvac 24 Plus	19408
VacConnectors (500)	500 disposable connectors for use with QIAamp spin columns on luer slots or VacValves	19407
Vacuum Regulator	For use with QIAvac manifolds	19530
<b>Related products</b>		
<b>QIAprep Spin Miniprep Kit — for purification of up to 20 µg high-purity plasmid DNA</b>		
QIAprep Spin Miniprep Kit (50)	For 50 high-purity plasmid minipreps: 50 QIAprep Spin Columns, Reagents, Buffers, Collection Tubes (2 ml)	27104
QIAprep Spin Miniprep Kit (250)	For 250 high-purity plasmid minipreps: 250 QIAprep Spin Columns, Reagents, Buffers, Collection Tubes (2 ml)	27106

<b>Product</b>	<b>Contents</b>	<b>Cat. no.</b>
<b>QIAquick PCR Purification Kit — for purification of PCR products, 100 bp to 10 kb</b>		
QIAquick PCR Purification Kit (50)	For purification of 50 PCR reactions: 50 QIAquick Spin Columns, Buffers, Collection Tubes (2 ml)	28104
QIAquick PCR Purification Kit (250)	For purification of 250 PCR reactions: 250 QIAquick Spin Columns, Buffers, Collection Tubes (2 ml)	28106
<b>QIAquick Nucleotide Removal Kit — for oligonucleotide (17–40mers) and DNA (40 bp to 10 kb) cleanup from enzymatic reactions</b>		
QIAquick Nucleotide Removal Kit (50)	50 QIAquick Spin Columns, Buffers, Collection Tubes (2 ml)	28304
QIAquick Nucleotide Removal Kit (250)	250 QIAquick Spin Columns, Buffers, Collection Tubes (2 ml)	28306
<b>QIAamp DNA Blood Mini Kit — for purification of up to 12 µg genomic, mitochondrial, or viral DNA from blood and related body fluids</b>		
QIAamp DNA Blood Mini Kit (50)	For 50 DNA minipreps: 50 QIAamp Mini Spin Columns, QIAGEN Protease, Reagents, Buffers, Collection Tubes (2 ml)	51104
QIAamp DNA Blood Mini Kit (250)	For 250 DNA minipreps: 250 QIAamp Mini Spin Columns, QIAGEN Protease, Reagents, Buffers, Collection Tubes (2 ml)	51106
<b>QIAamp DNA Blood Midi Kit — for purification of up to 60 µg genomic, mitochondrial, or viral DNA from blood and related body fluids</b>		
QIAamp DNA Blood Midi Kit (20)	For 20 DNA midipreps: 20 QIAamp Midi Spin Columns, QIAGEN Protease, Buffers, Collection Tubes (15 ml)	51183

<b>Product</b>	<b>Contents</b>	<b>Cat. no.</b>
QIAamp DNA Blood Midi Kit (100)	For 100 DNA midipreps: 100 QIAamp Midi Spin Columns, QIAGEN Protease, Buffers, Collection Tubes (15 ml)	51185
<b>QIAamp DNA Blood Maxi Kit — for purification of up to 600 µg genomic, mitochondrial, or viral DNA from blood and related body fluids</b>		
QIAamp DNA Blood Maxi Kit (10)	For 10 DNA maxipreps: 10 QIAamp Maxi Spin Columns, QIAGEN Protease, Buffers, Collection Tubes (50 ml)	51192
QIAamp DNA Blood Maxi Kit (50)	50 QIAamp Maxi Spin Columns, QIAGEN Protease, Buffers, Collection Tubes (50 ml)	51194
<b>QIAamp DNA Mini Kit — for purification of genomic, mitochondrial, bacterial, parasite, or viral DNA</b>		
QIAamp DNA Mini Kit (50)	For 50 DNA preps: 50 QIAamp Mini Spin Columns, QIAGEN Proteinase K, Reagents, Buffers, Collection Tubes (2 ml)	51304
QIAamp DNA Mini Kit (250)	For 250 DNA preps: 250 QIAamp Mini Spin Columns, QIAGEN Proteinase K, Reagents, Buffers, Collection Tubes (2 ml)	51306
<b>QIAamp Viral RNA Mini Kit — for purification of viral RNA from cell-free body fluids</b>		
QIAamp Viral RNA Mini Kit (50)	For 50 RNA preps: 50 QIAamp Mini Spin Columns, Carrier RNA, Collection Tubes (2 ml), RNase-free Buffers	52904
QIAamp Viral RNA Mini Kit (250)	For 250 RNA preps: 250 QIAamp Mini Spin Columns, Carrier RNA, Collection Tubes (2 ml), RNase-free Buffers	52906

Product	Contents	Cat. no.
<b>QIAamp MinElute Virus Vacuum Kit — for simultaneous purification of viral RNA and DNA from plasma, serum, and cell-free body fluids</b>		
QIAamp MinElute Virus Vacuum Kit (50)	For 50 minipreps: 50 QIAamp MinElute Columns, QIAGEN Protease, Carrier RNA, Buffers, Extension Tubes (3 ml), Collection Tubes (1.5 ml)	57714
<b>QIAamp DSP DNA Blood Mini Kit — for isolation and purification of genomic DNA from human whole blood for in vitro diagnostic purposes</b>		
QIAamp DSP DNA Blood Mini Kit	For 50 preps: QIAamp Mini Spin Columns, Buffers, Reagents, Tubes, VacConnectors, and Multi-Language Handbook	61104
<b>QIAamp DSP Virus Kit — for purification of viral nucleic acids from human plasma and serum for in vitro diagnostic purposes</b>		
QIAamp DSP Virus Kit	For 50 preps: QIAamp MinElute Columns, Buffers, Reagents, Tubes, Column Extenders, VacConnectors; includes Multi-language Handbook	60704
<b>MinElute PCR Purification Kit — for purification of PCR products (70 bp to 4 kb) in low elution volumes</b>		
MinElute PCR Purification Kit (50)	50 MinElute Spin Columns, Buffers, Collection Tubes (2 ml)	28004
MinElute PCR Purification Kit (250)	250 MinElute Spin Columns, Buffers, Collection Tubes (2 ml)	28006
<b>MinElute Gel Extraction Kit — for gel extraction of DNA fragments (70 bp to 4 kb) in low elution volumes</b>		
MinElute Gel Extraction Kit (50)	50 MinElute Spin Columns, Buffers, Collection Tubes (2 ml)	28604
MinElute Gel Extraction Kit (250)	250 MinElute Spin Columns, Buffers, Collection Tubes (2 ml)	28606

<b>Product</b>	<b>Contents</b>	<b>Cat. no.</b>
<b>MinElute Reaction Cleanup Kit — for cleanup of DNA (70 bp to 4 kb) from enzymatic reactions</b>		
MinElute Reaction Cleanup Kit (50)	50 MinElute Spin Columns, Buffers, Collection Tubes (2 ml)	28204
MinElute Reaction Cleanup Kit (250)	250 MinElute Spin Columns, Buffers, Collection Tubes (2 ml)	28206
<b>RNeasy Mini Kit — for purification of up to 100 µg total RNA from animal cells or tissues, yeast, or bacteria</b>		
RNeasy Mini Kit (50)	50 RNeasy Mini Spin Columns, Collection Tubes (1.5 ml and 2 ml), RNase-free Reagents and Buffers	74104
RNeasy Mini Kit (250)	250 RNeasy Mini Spin Columns, Collection Tubes (1.5 ml and 2 ml), RNase-free Reagents and Buffers	74106

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

**Notes**

**Notes**

**Notes**

**www.qiagen.com**

**Australia** ■ Orders 1-800-243-800 ■ Fax 03-9840-9888 ■ Technical 1-800-243-066

**Austria** ■ Orders 0800-28-10-10 ■ Fax 0800-28-10-19 ■ Technical 0800-28-10-11

**Belgium** ■ Orders 0800-79612 ■ Fax 0800-79611 ■ Technical 0800-79556

**Brazil** ■ Orders 0800-557779 ■ Fax 55-11-5079-4001 ■ Technical 0800-557779

**Canada** ■ Orders 800-572-9613 ■ Fax 800-713-5951 ■ Technical 800-DNA-PREP (800-362-7737)

**China** ■ Orders 86-21-3865-3865 ■ Fax 86-21-3865-3965 ■ Technical 800-988-0325

**Denmark** ■ Orders 80-885945 ■ Fax 80-885944 ■ Technical 80-885942

**Finland** ■ Orders 0800-914416 ■ Fax 0800-914415 ■ Technical 0800-914413

**France** ■ Orders 01-60-920-926 ■ Fax 01-60-920-925 ■ Technical 01-60-920-930 ■ Offers 01-60-920-928

**Germany** ■ Orders 02103-29-12000 ■ Fax 02103-29-22000 ■ Technical 02103-29-12400

**Hong Kong** ■ Orders 800 933 965 ■ Fax 800 930 439 ■ Technical 800 930 425

**Ireland** ■ Orders 1800 555 049 ■ Fax 1800 555 048 ■ Technical 1800 555 061

**Italy** ■ Orders 800-789-544 ■ Fax 02-334304-826 ■ Technical 800-787980

**Japan** ■ Telephone 03-6890-7300 ■ Fax 03-5547-0818 ■ Technical 03-6890-7300

**Korea (South)** ■ Orders 080-000-7146 ■ Fax 02-2626-5703 ■ Technical 080-000-7145

**Luxembourg** ■ Orders 8002-2076 ■ Fax 8002-2073 ■ Technical 8002-2067

**Mexico** ■ Orders 01-800-7742-639 ■ Fax 01-800-1122-330 ■ Technical 01-800-7742-436

**The Netherlands** ■ Orders 0800-0229592 ■ Fax 0800-0229593 ■ Technical 0800-0229602

**Norway** ■ Orders 800-18859 ■ Fax 800-18817 ■ Technical 800-18712

**Singapore** ■ Orders 1800-742-4362 ■ Fax 65-6854-8184 ■ Technical 1800-742-4368

**Spain** ■ Orders 91-630-7050 ■ Fax 91-630-5145 ■ Technical 91-630-7050

**Sweden** ■ Orders 020-790282 ■ Fax 020-790582 ■ Technical 020-798328

**Switzerland** ■ Orders 055-254-22-11 ■ Fax 055-254-22-13 ■ Technical 055-254-22-12

**UK** ■ Orders 01293-422-911 ■ Fax 01293-422-922 ■ Technical 01293-422-999

**USA** ■ Orders 800-426-8157 ■ Fax 800-718-2056 ■ Technical 800-DNA-PREP (800-362-7737)

