



Primerdesign®

The genesig® q16  
Instruction  
Manual

# The genesig<sup>®</sup> q16 instruction manual

Congratulations on purchasing the genesig q16. The q16 is a revolutionary instrument that brings the 21st century technology of DNA testing to everyone. As well as being beautiful and highly portable, the q16 is powerful. In combination with the genesig Easy kit range the genesig q16 can be used to detect and quantify over 400 different DNA/RNA targets.



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# Connecting the machine

Unpack your genesig q16 and remove all packaging. Insert the power cable in to the power jack in the base of the instrument and plug into a power source.

The q16 can be operated in three ways

## Direct connection to Mac/PC

If you are planning to run the instrument via a direct connection to Mac/PC, plug in the Ethernet cable to the base of the instrument and connect to a spare Ethernet port on your Mac/PC.

If you have multiple genesig q16 instruments you can connect them all to the same Mac/PC via a network switch.

## Direct connection to a local area network

If you are planning to run the instrument via a local area network, plug in the Ethernet cable to the base of the instrument and connect to a spare Ethernet port on your network.

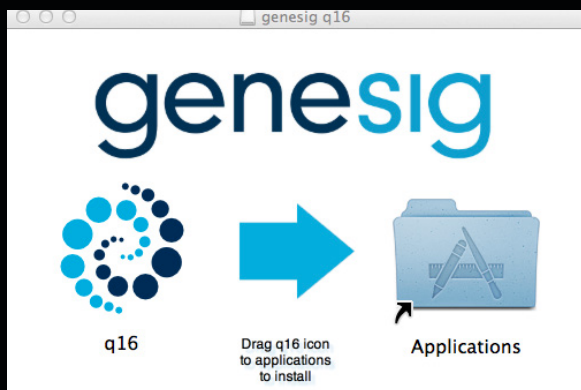
## Standalone operation via a USB drive

If you are planning to run the instrument in standalone mode no Ethernet cable connection is required. Instead a USB drive is loaded with the experiment setup data and then inserted in to the base of the q16 to initiate a run.

# Installation of software

The software requires a JavaScript runtime environment to operate successfully. If your PC/Mac does not currently support a current Java run-time environment you will be prompted to download and install an update. Follow the onscreen instructions to download and install the update and then re-start your computer.

The q16 software is provided on the USB drive shipped with your instrument. Open the installer file and follow the onscreen instructions.



# General operation of the instrument



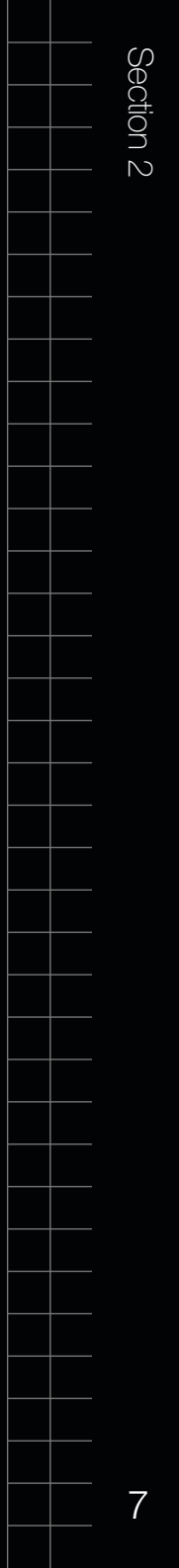
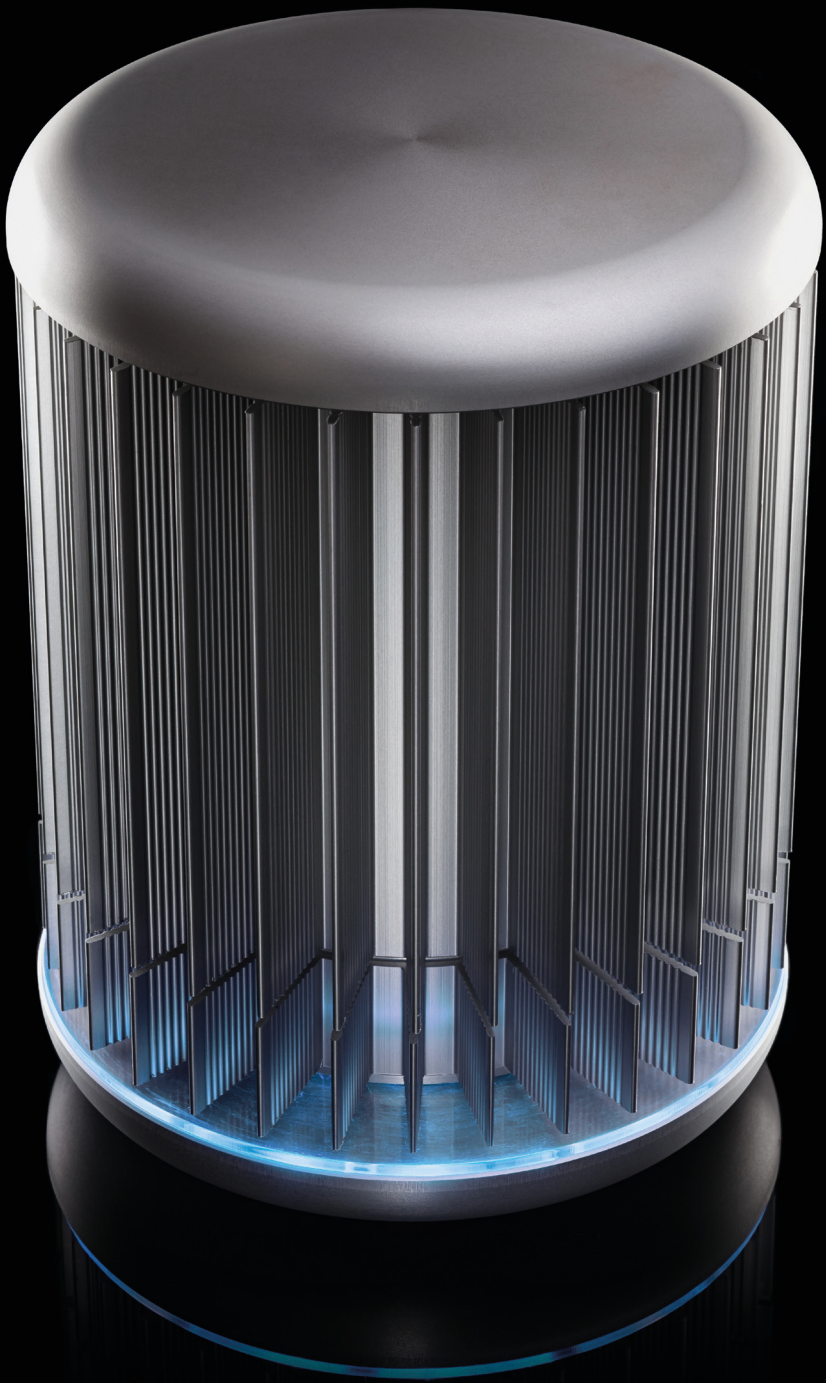
To open the q16 twist the lid a quarter turn anti-clockwise and lift. The lid is replaced by repeating this operation in reverse.

The genesig q16 uses low profile 0.2ml reaction tubes that are supplied as part of each genesig EASY kit.

**Do not use alternative reaction tubes as this may damage your instrument.**

**NEVER open a genesig q16 reaction tube after an analysis run has completed.** Dispose of them carefully and ensure that they do not open by accident, as this risks contaminating your working area and may affect future test results.

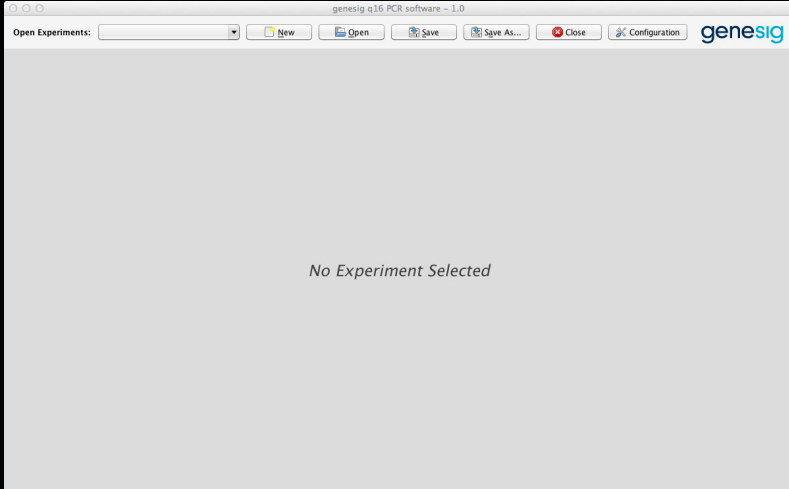




# Open the software



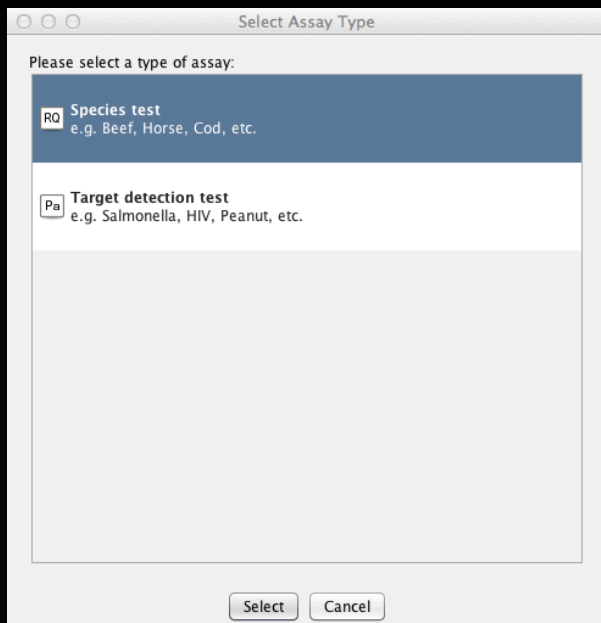
Once installed double click on the q16 software icon to open the software.



Click the 'New' button to begin a new test



# Selecting a test type



Select the type of test you wish to perform:

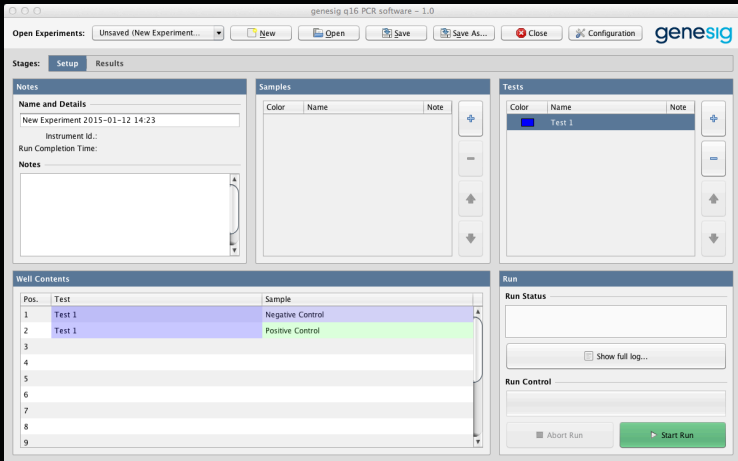
## Species test

Select this if you wish to use a genesig EASY speciation kit. This test will calculate the percentage of your sample that is a particular species e.g. you can calculate what percentage of your beefburger is horse meat.

## Target detection test

Select this if you are using a genesig EASY kit for the detection of a particular target e.g. you can test for the presence of Salmonella, HIV or various allergens. This test will also approximate the quantity of the target DNA present.

# The main screen layout

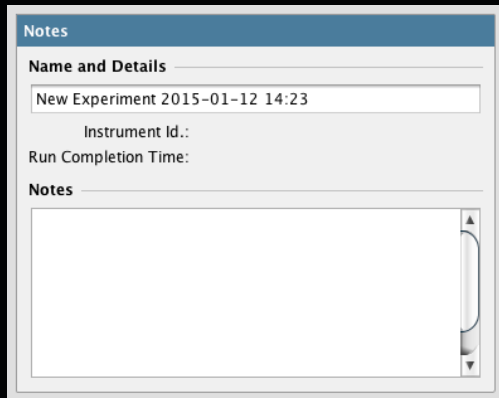


There are 2 tabs in the view. One for setting up your test and a second where your results will be displayed after the analysis is complete:



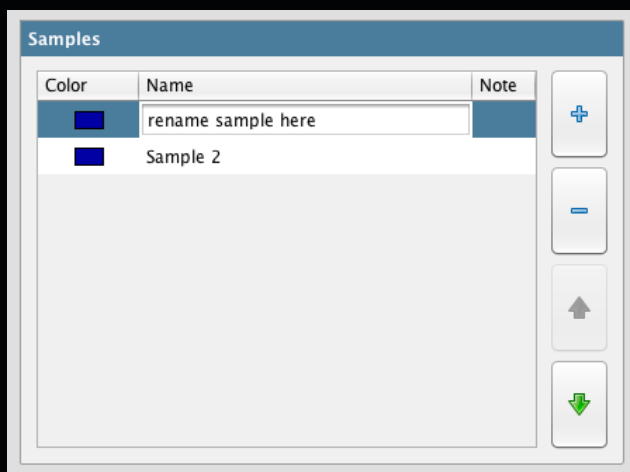
In the setup screen there are 5 simple panels to consider;

1. Notes:



Your test will be given a default name but this can be changed by clicking in the name field and entering new text. The Notes field allows you to make notes on your test if required

## 2. Samples:



# The main screen layout

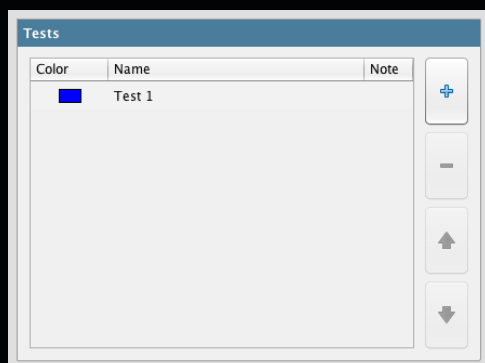
## 2. Samples cont...

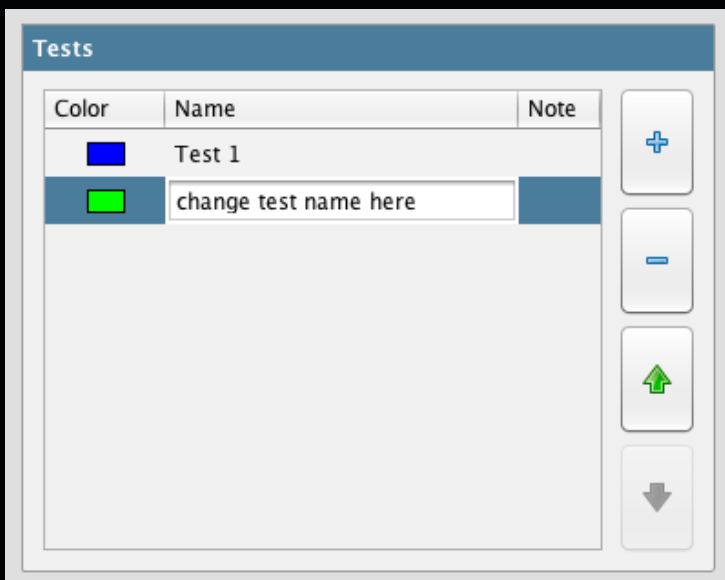
In this panel you can define how many samples you wish to test. Use the + button to add more, and the – button to remove them. You can alter the order of the samples using the up and down arrows. The software automatically limits the number of samples you can have dependent on the capacity of the instrument.

You can alter the name of your samples by clicking in the “Name” field and adding new text. You can also attach more detailed notes to a sample by clicking in the notes field and adding text.

Samples are coloured to make visual identification easier. You can alter the colour associated with each sample by double-clicking on the coloured square next to it.

## 3. Tests:





You can perform multiple tests at the same time on the genesig q16. In this panel you can define how many tests you wish to perform. Use the + button to add more and the – button to remove them. You can alter the order of the tests using the up and down arrows. The software automatically limits the number of tests you can perform dependent on the capacity of the instrument.

You can alter the name of your tests by clicking in the “Name” field and adding new text. You can also attach more detailed notes to a test by clicking in the notes field and adding text.

Tests are coloured to make visual identification easier. You can alter the colour associated with each test by double-clicking on the coloured square next to it.

# The main screen layout

## 4. Well contents

Pos.	Test	Sample
1	Test 1	Negative Control
2	Test 1	Positive Control
3	Test 1	Sample 1
4	Test 1	Sample 2
5		
6		
7		
8		
9		

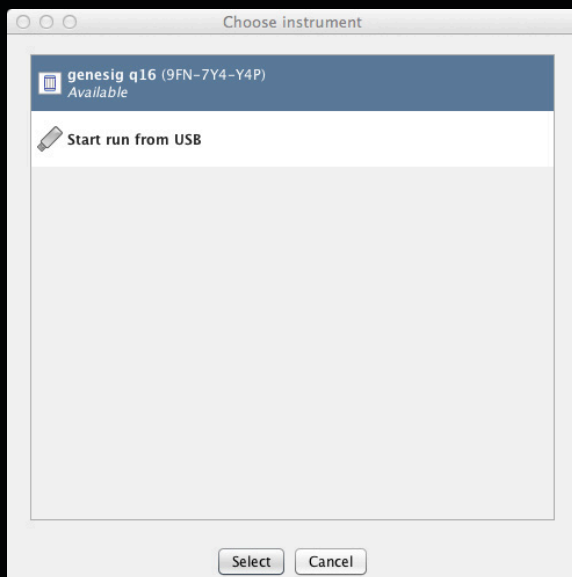
Taking in to consideration the number of tests and the number of samples you have specified, the software automatically allocates the well-position within the genesig q16 in which each sample is to be placed. Similarly the well-position of the Positive and Negative Controls are also defined automatically. Be sure to follow this carefully when loading your samples in to the instrument.

## 5. Starting the analysis



Once all of your samples have been loaded in to the instrument and the lid closed, click the “Start Run” button.





From the list select the q16 instrument that you are using and analysis will begin automatically. Alternatively you can choose to transfer the run protocol on to the USB drive that was delivered with your genesig q16. Once the run protocol is transferred insert the USB drive in to the USB port in your genesig q16 and analysis will begin automatically.

The run can be stopped at any time by clicking the “Abort Run” button. N.B. if you abort the run, discard your samples as they may be affected by the run beginning.

The status of the run and the remaining time is displayed in this panel during the analysis.

# Results

Stages: Setup Results

Once analysis is complete you can view the results of your test by clicking the “Results” tab.

If you are running the instrument direct from a USB drive, the results will be stored in a run file on the USB drive and can be opened in the software on your Mac or PC.

Summary Details

The results window has 2 further tabs. The first shows a summary of the results complete with automated analysis. The second gives a more detailed view showing the underlying raw data and is designed for advance users or for troubleshooting.

*Summary view:*

Sample Results		Details	
#	Test	Sample	Status
1	Test 1	Negative Control	
2	Test 1	Positive Control	
3	Test 1	Sample 1	POSITIVE
4	Test 1	Sample 2	POSITIVE
5			

In the summary view the samples are listed exactly as you set them up in the previous screen. The status field shows the test result as a simple, automatically analysed status.

## Detection test results

Copy Number
122,372.764
150.643

When carrying out a genesig EASY detection test quantitative analysis is carried out automatically. The number of copies of the target genome for each positive sample is calculated and displayed in the “Copy number” field.

## Detection test results

Rel. Quant. %	Sensitivity
100	0.1
100	0.1
100	0.1
100	0.1
100	0.1
100	0.1

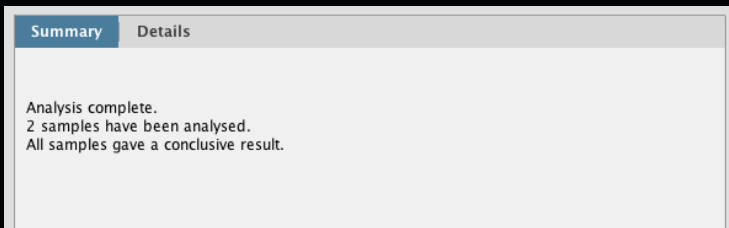
# Results

## Species test results cont...

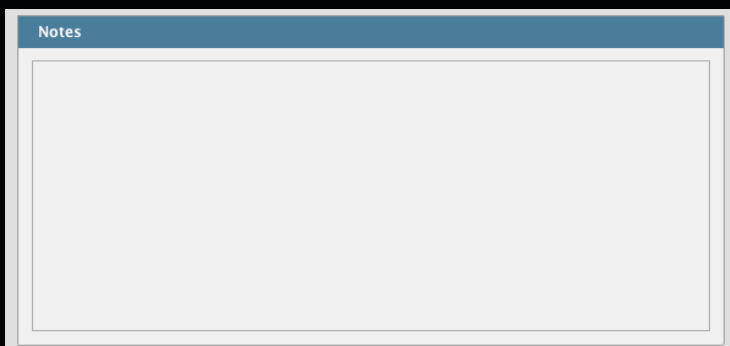
When carrying out a genesig EASY speciation test quantitative analysis is carried out automatically. The percentage of your sample that is the species of interest is displayed e.g. if your beefburger contains 10% horse meat a result of 10% will be displayed.

The q16 also automatically calculates the sensitivity of the test. The quality of your DNA sample will affect the sensitivity of testing that is possible. With a good quality sample, highly sensitive testing is possible. With a poor quality sample then testing becomes less sensitive. The figure displayed in the “Sensitivity” field shows the minimum percentage level at which results should be considered reliable. e.g. If the test sensitivity is 0.1 then any result reporting a % of target >0.1 can be considered accurate. But if less than 0.1% of the target species is reported the result may not be accurate. If a test result falls below the level of sensitivity of the test this will be recognized by the software and displayed in the “Status” field.

A text based summary of the entire analysis is displayed in the top left panel.



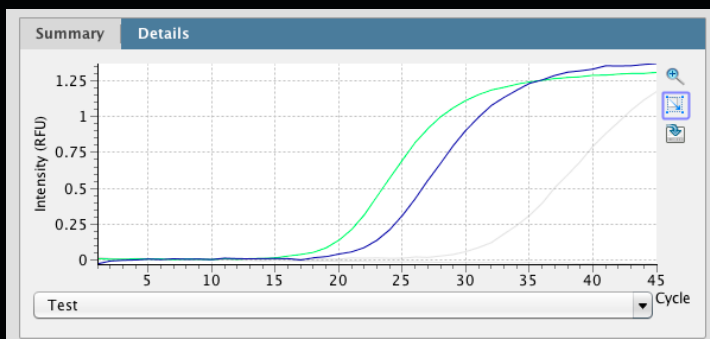
More detailed information is displayed in the top right panel.



See page 22 to understand “What do my results mean?” and for a troubleshooting guide.

Detailed results view:

The detailed results view shows the raw underlying data and is designed for advanced users and for troubleshooting.



# Results

## Detailed results view cont...

Amplification plots are visible in the top left panel. The drop down menu allows you to view the amplification plots derived from the test reaction or the Internal Extraction Control reaction.



Amplification plots can be selected by clicking and dragging the cursor over the plot of interest. Alternatively individual tests and samples can be selected from the table below to highlight the amplification plot for a given reaction.

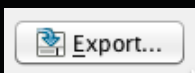


**Zooming:** Click the magnifying glass icon to select it. To zoom into the graph, move the mouse to the top left of the area you wish to zoom to. Hold down the left mouse button, and move the mouse to the bottom right of the area you wish to zoom to, and release. To zoom out again, move the mouse anywhere over the data area of the graph, then hold down the left mouse button, move the mouse a short distance up and to the left, and release the mouse button.

Cq values can be read by hovering the cursor over a given amplification plot. Cq values can also be seen in the export file.



# Exporting results



Detailed results can be exported by clicking the export button. A choice of export formats are available. e.g. .pdf  
.csv



An image file version of the amplification plots can be exported by clicking the graph export icon.

# What do my results mean?

Analysis of your data is carried out automatically by the genesig q16. The following information is designed to help you fully understand a result or to troubleshoot:

“Positive”

## Explanation

Your sample has produced a result. Your target of interest is present and you can use the reported quantity/percentage.

“Negative”

## Explanation

Your sample has produced a negative result. The target is not present in your sample.

“Test Contaminated”

## Explanation

The Negative Control should be completely free of any DNA/RNA. If you see this warning message it means that at some point during the setup, the Negative Control has been contaminated with DNA/RNA and has given a positive signal. This contamination has invalidated the test. The Positive Control and your test samples are both possible sources of contaminating DNA/RNA. The PCR tubes from previous runs will also contain very high amounts of DNA so it is important that these are carefully disposed of after each run is completed and NEVER OPENED. It may be the case that your kits have become contaminated which will lead to the same problem occurring repeatedly.

## Solutions

1. Clean your working area using a commercial solution such as “DNA remover<sup>TM</sup>” to ensure the area is DNA free at the start of your run and re-run the test.
2. If the problem persists then the kit has become contaminated and it will have to be discarded and replaced with a new kit. When you open the new kit, run a simple experiment to show that changing the kit has solved the problem. Prepare a test which includes only the Positive Control, the Negative Control and one ‘mock sample’. For the ‘mock sample’ add water instead of any sample DNA/ RNA. The result for the Negative Control and the mock sample should be negative indicating that contamination is no longer present.

## Preventive action

An ideal lab set-up has a ‘Clean area’ where the test reagents are prepared and a ‘sample area’ where DNA/RNA samples and the Positive Control DNA/ RNA are handled. The best workflow involves setting up all the test components in the clean area and then moving the tests to the sample area for sample and Positive Control addition. If this method is followed then the kit components are always kept away from possible sources of contamination. For extra security the Negative Control can be completely prepared and sealed in the clean area. The clean area should be decontaminated regularly with DNA remover to keep it clean.

# What do my results mean?

“Sample preparation failed”

## Explanation

The test has failed because the quality of the sample was not high enough. The Internal Extraction Control component identifies whether the sample has been prepared correctly or if the sample is of low quality. This error message means that this quality control test has failed and the sample is not fit for analysis.

## Solutions

1. Examine the DNA/RNA extraction protocol for any user errors, then repeat.
2. Poor samples can result from overloading the DNA/RNA extraction procedure with too much starting material. Try reducing the amount of starting material and repeat.
3. Failing to add the Internal Control Template to your sample during the DNA/RNA extraction process can also lead to a reported result of “Sample preparation failed”. Ensure that this step has not been overlooked or forgotten. If your samples are derived from an archive store or from a process separate from your genesig EASY kit; you must add in 5µl of Internal Control Template in to each 500µl of your sample to make it suitable for use on the q16.

“Positive result, poor quality sample”

### **Explanation**

The test is positive so if you are only interested in obtaining a ‘present or absent’ answer for your sample then your result is secure. However, the test contains an Internal Extraction Control component that identifies if the sample is of high quality. This quality control test has failed and the sample is not therefore of high enough quality. The exact copy number of DNA/RNA present cannot be accurately calculated in this instance. If you require quantitative information for your sample then proceed with the solutions below.

### **Solutions**

1. Examine the DNA/RNA extraction protocol for any user errors, then repeat.
2. Poor samples can result from overloading the DNA/RNA extraction procedure with too much starting material. Try reducing the amount of starting material and repeat.
3. Failing to add the Internal Control Template to your sample during the DNA/RNA extraction process can also lead to this error. Ensure that this step has not been overlooked or forgotten. If your samples have derived from an archive store or from a process separate from your genesig EASY kit; you must add in 5µl of Internal Control Template in to each 500µl of your sample to make it suitable for use on the q16.

# What do my results mean?

"Test failed"

## Explanation

The Positive Control is present to show that all aspects of the test are working correctly together. This error message shows that the quality control test has failed and the test as a whole is invalidated. This finding indicates that a problem has occurred in the reaction set-up part of the experiment and has nothing to do with sample preparation.

## Solutions

1. Check the entire workflow to look for any user errors during test set-up and repeat the test e.g. have the right colour pipettes and solutions been used with the correct tubes?
2. A component of the test may have 'gone off' due to handling errors, incorrect storage or exceeding the shelf life. Open a new kit and run a simplified test which includes only the Positive Control, the Negative Control and one 'mock sample'. For the 'mock sample' add water instead of any sample DNA/RNA. If the Positive Control works, the mock sample will now be called as a negative result indicating that all the components of this kit are working correctly.
3. Ensure the positive and negative controls are inserted into the correct wells of your q16.



“Positive result lower than test sensitivity”

### **Explanation**

The test is positive so if you are only interested in obtaining a ‘present or absent’ answer for your sample then your result is secure as a positive test. However, if the calculated percentage falls outside the accurate range for the test the exact percentage cannot accurately be calculated. Nonetheless a semi-quantitative result can be reported based on the “test sensitivity” column. e.g. If the “test sensitivity” is reported at “1%” then the sample can be reported as “positive test with less than 1% contamination”.

### **Solutions**

1. A higher quality of sample containing more DNA will yield a more sensitive test. Try increasing the amount of sample that is added to the reaction.
2. If this is not possible, check the sample preparation protocol to check for any user errors during reaction setup and repeat the sample preparation.
3. Poor samples can result from overloading the DNA/ RNA extraction procedure with too much starting material. Try reducing the amount of starting material and repeat the sample preparation.

# What do my results mean?

“Test failed and is contaminated”

## Explanation

The Positive Control is indicating test failure, and the Negative Control is indicating test contamination. Please read the “Test Failed” and “Test Contamination” sections of this technical support handbook for a further explanation.

## Solutions

1. For appropriate solutions, read both the “Test failed” and “Test Contaminated” sections of this handbook.

“Low level of sample DNA ”

## Explanation

The test has failed because neither the sample quality nor quantity was high enough. The Internal Control component identifies the total quantity of sample from which the species percentage is calculated. This signal may be low if the sample is of low quality, or if a low amount of sample was tested. In either case the sample will not be fit for analysis.

## Solutions

1. Try increasing the amount of sample that is added to the reaction.
2. If this is not possible, check the DNA/RNA extraction protocol for any user errors and repeat.

3. Poor samples can result from overloading the DNA/ RNA extraction protocol with too much starting material. Try reducing the amount of starting material and repeat the sample preparation.

# Troubleshooting

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If you have problems while installing your product software, try these solutions:

## Problem

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Network connection problems

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Unusual looking data:

If your test results are not as you expect and you can see that the raw data looks unusual – poor quality amplification plots etc.

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Failed results:

The instrument is reporting failed results

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## Solution

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The software can connect to one or more instruments via an Ethernet network. There are two ways of configuring the network to allow this:

**Standard Network:** The software and instruments will connect automatically to a standard network, where TCP/IP addresses are assigned automatically by a DHCP server. Connect the instrument to the network in the same way you would connect a printer, using the supplied Ethernet cable to connect to a wall socket or network switch/hub. The software will automatically connect to the instrument when it has been turned on.

**Direct Network.** The software and instruments can also be used on a local network that does NOT have automatic address assignment. Ask your network administrator to help you set up in this instance. IP address “169.254.88.1” / Subnet Mask “255.255.0.0”

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Bubbles in your reaction tubes can cause problems. Tap the tubes on a work surface or shake them down to burst any bubbles before placing them in to the q16. Make sure that the contents of each tube have collected at the base of the tube.

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Check that you have put all reaction tubes in the correct wells. If the positive and negative controls are in the wrong place this will cause problems.

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For more information please  
visit [www.genesig.com](http://www.genesig.com)

genesig kits are sold for general laboratory and  
research use only. Please feel free to contact us  
for free advice or technical support.

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