



# Countess<sup>TM</sup> Automated Cell Counter

Catalog no. C10227

Rev. Date: 15 September 2009  
MP10227

**User Manual**



# Table of Contents

Product Contents.....	iv
Safety Information .....	v
Product Specifications .....	vii
Description of Countess™ Automated Cell Counter .....	viii
<b>Introduction.....</b>	<b>1</b>
Product Overview .....	1
<b>Methods .....</b>	<b>3</b>
Getting Started.....	3
General Guidelines .....	9
Using the Countess™ Automated Cell Counter .....	10
Cleaning and Maintenance .....	19
Updating and Calibrating the Countess™ Automated Cell Counter.....	20
Troubleshooting .....	22
Countess™ Automated Cell Counter Error Codes.....	24
<b>Appendix .....</b>	<b>25</b>
Accessory Products.....	25
Technical Support .....	26
Purchaser Notification.....	27

# Product Contents

---

**Countess™  
Automated Cell  
Counter**

The contents of the Countess™ automated cell counter are listed below:

Component	Quantity
Countess™ automated cell counter	1
Power Cord with 4 adaptor cords (for U.S./Canada/Taiwan/Japan, Europe, or UK)	1
Countess™ cell counting chamber slides	1 box of 50
Trypan blue stain (0.4%)	2 × 1 mL
Countess™ USB drive	1
Quick reference card (QRC)	1
The complete instruction manual is available on our website at <a href="http://www.invitrogen.com/countess">www.invitrogen.com/countess</a> .	
See page vii for specifications and description of the Countess™ automated cell counter.	

---

**Upon  
Receiving the  
Instrument**

Examine the instrument carefully for any damage incurred during transit. Ensure that all parts of the instrument including accessories listed above are included with the product. Any damage claims must be filed with the carrier. The warranty does not cover in-transit damage.

See page 3 to install the instrument.

Upon receipt, store trypan blue stain at room temperature.

---

# Safety Information

---

## Safety Precautions

Review and follow the safety instructions below.

- Do not install the instrument in heavy humidity such as a greenhouse or an incubator to avoid a danger of electric shock. If water or other material enters the instrument, the adaptor, or power inlet, disconnect the power cord and contact a service person. For operating environment, refer to **Product Specifications** (page vii).
- Do not touch the main plug or power cord with wet hands.
- Always ensure that the power supply input voltage matches the voltage available in your location.
- This instrument is air-cooled so its surfaces may become hot during operation. When installing the instrument, leave a space of more than 10 cm (4 inches) around it and do not place any objects between the instrument and the wall.
- Do not install the instrument on a slant or a place prone to vibrations, which induces the risk of instrument malfunction or damage of the instrument.
- Never insert any objects into the air vents of the instrument as this could result in electrical shock, personal injury, and equipment damage.
- Plug the power cord firmly into the wall outlet and AC adapter.
- To avoid potential shock hazard, make sure that the power cord is properly grounded.
- Be sure to position the equipment such that it is easy to disconnect the instrument.
- Turn off the instrument before unplugging the power cord and/or moving the instrument.
- If the instrument is broken or dropped, disconnect the power cord and contact a service person. Do not disassemble the instrument.
- Use only authorized accessories (adaptor, power cord, and USB drive).

---

*Continued on next page*

# Safety Information, Continued

## Safety Precautions, continued

- Do not use metal objects when assembling or disassembling a battery.
- Do not heat the battery or expose it to heat. For operating environment, see **Product Specifications** (page vii).
- If the instrument emits smoke, disconnect the power cord from the wall outlet and contact a service person.

## Symbols



The symbols used on Countess™ automated cell counter are explained below.

Used on the instrument to indicate a warning. Consult the manual to avoid possible personal injury or instrument damage.



Protective earth (Ground)



**WEEE** (Waste Electrical and Electronic Equipment) symbol indicates that this product should not be disposed of in unsorted municipal waste. Follow local municipal waste ordinances for proper disposal provisions to reduce the environmental impact of WEEE. Visit [www.invitrogen.com/weee](http://www.invitrogen.com/weee) for collection and recycling options.



The CE mark symbolizes that the product conforms to all applicable European Community provisions for which this marking is required. Operation of the instrument is subject to the conditions described in this manual.

The protection provided by the instrument may be impaired if the instrument is used in a manner not specified by Invitrogen.



This product conforms to UL61010-1/CSA C22.2 No. 61010-1 “Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use, Part I: General Requirements.” Instruments bearing the TUV symbol are certified by TUV Product Services to be in conformance with the applicable safety standards for the US and Canada.

# Product Specifications

---

**Countess™  
Automated Cell  
Counter  
Specifications**

**Environmental Conditions**

Operating Power	100–240 VAC, 1.5 A
Frequency	50/60 Hz
Electrical input	12 VDC, 1.0 A
Installation site:	Indoor use only
Operating Temperature:	10–35°C
Maximum Relative Humidity:	20–80%
Altitude:	≤2,000 m
Transient Category:	Installation categories II
Pollution Degree:	2
Degree of Protection:	IPX0

**Instrument Specifications**

Instrument Type:	Benchtop cell counter
Processing Time:	<1 minute
Cell Sample Range:	$1 \times 10^4$ – $1 \times 10^7$
Software:	Countess™ Software

[www.invitrogen.com/countess](http://www.invitrogen.com/countess)

Instrument Dimensions:	27 cm (w) × 20 cm (d) × 19 cm (h)
Weight:	2.1 kg (4.6 lbs)

The Countess™ automated cell counter is equipped with a camera (2.3X objective and 3.1 Mega pixel).

**Countess™ Cell Counting Chamber Slide Specifications**

Material:	Polymethyl methacrylate (PMMA)
Dimensions:	75 mm (w) × 25 mm (d) × 1.8 mm (h)
Chamber Depth:	100 µm
Chamber Volume:	10 µL

<b>Countess™ USB Drive:</b>	1 Gigabyte
-----------------------------	------------

---

# Description of Countess™ Automated Cell Counter

---

## Front View of Countess™ Automated Cell Counter

The Countess™ automated cell counter is a benchtop automated cell counter that performs cell count and viability measurements using trypan blue stain.

The front view showing various parts of the Countess™ automated cell counter is shown below.

### Power button

The Power Button is used to turn the instrument on and off. The red status light indicates that the instrument is off; the green status light indicates that the instrument is on.

**Touchscreen display** located in the front of the instrument contains buttons for all the functions needed and displays data from the cell count.

### Slide port

The Slide port is used to insert the Countess™ cell counting chamber slide containing the sample with trypan blue into the counter for analysis.

### USB port

The USB port allows you to transfer and save the cell count data and image to your computer for record keeping and printing purposes. The USB drive supplied with the instrument or any other standard USB drive is inserted into the USB port for data transfer. See page 16 for **Transferring Data to a PC**.



---

*Continued on next page*

# Description of Countess™ Automated Cell Counter, Continued

---

## Rear and Side View of Countess™ Automated Cell Counter

The rear and side view showing various parts of the Countess™ automated cell counter.

### Power Inlet

Connect the counter to an electrical outlet using the supplied power cord and the appropriate plug, based on the electrical outlet configuration in your country.

### Image Adjustment (Focus) Knob

The Image Adjustment (Focus) knob is used to adjust the image quality to obtain better contrast between live (bright centers) and dead (dark blue centers) cells. This is important to obtain accurate cell counts and viability measurements. See page 14 for details.

### Focus Lock Knob

The Focus lock knob is used to lock the Image Adjustment (Focus) knob once the image is optimized. There is no need to use the Focus lock knob, but is available for convenience, if you are measuring multiple samples of the same cell type.

Rear View



Side View



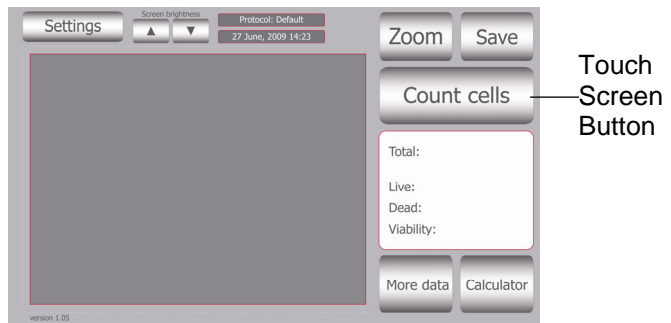
*Continued on next page*

# Description of Countess™ Automated Cell Counter, Continued

---

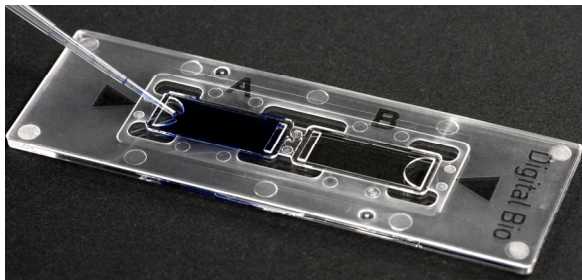
**User Interface** The touch screen user interface of the Countess™ automated cell counter is used to operate the instrument and consists of:

- The touch screen buttons to operate the instrument.
- The Digital Display shows the image of cells and sample data.



## Countess™ Cell Counting Chamber Slide

The Countess™ cell counting chamber slides are plastic, disposable enclosed chambers that hold the sample in two separate chambers (A and B) for replicates. The cell counting occurs in the central location of the counting chamber. The entire volume of cells counted is 0.4  $\mu\text{L}$ , the same as counting four (1 mm  $\times$  1 mm) squares in a standard hemocytometer.



# Introduction

## Product Overview

---

### **Countess™ Automated Cell Counter**

The Countess™ automated cell counter uses state-of-the-art optics and image analysis to automate cell counting. The Countess™ automated cell counter is a benchtop counter designed to measure cell count and viability (live, dead, and total cells) accurately and precisely, using the standard trypan blue technique.

Using the same amount of sample that you currently use with the hemocytometer, the Countess™ automated cell counter takes less than a minute per sample for a typical cell count and is compatible with a wide variety of eukaryotic cells and provides information on cell size.

The Countess™ automated cell counter offers an intuitive user interface, and provides the option to save and print cell count data using the Countess™ software (download from [www.invitrogen.com/countess](http://www.invitrogen.com/countess)) and USB drive supplied with the instrument or available separately.

The Countess™ automated cell counter is supplied with disposable Countess™ cell counting chamber slides that contain two enclosed chambers to hold the sample to allow you to measure two different samples or perform replicates of the same sample. The cell counting occurs in the central location of the counting chamber and the volume counted is 0.4 µL, the same as counting four (1 mm × 1 mm) squares in a standard hemocytometer.

See page viii for details on various parts of the counter.

---

*Continued on next page*

# Product Overview, Continued

---

## System Overview

The Countess™ automated cell counter performs viability and cell counting measurements using the trypan blue method of dead-cell staining combined with advanced image analysis.

Cell sample is mixed with trypan blue and loaded into a Countess™ cell counting chamber slide. The camera acquires cell images from the sample on the slide and the image analysis software automatically analyzes acquired cell images, and measures cell count and viability using the trypan blue stain.

A single, sample measurement within a minute provides the following data:

- Live and dead cell concentration/mL
  - Total cell concentration/mL
  - Viability (% live cells to total cells)
  - Mean diameter
  - Cell images
  - Graphical data representation
- 

## Features

Important features of the Countess™ automatic cell counter are:

- User-friendly, benchtop design for simple, fast, automated cell count and viability measurements within a minute
  - Provides data on cell size and is compatible with a wide variety of eukaryotic cells without the need for any special changes between large or small sizes
  - Measures cell concentrations ranging from  $1 \times 10^4$  to  $1 \times 10^7$  cells/mL and cells with sizes ranging from 5  $\mu\text{m}$  to 60  $\mu\text{m}$
  - Uses disposable counting chamber slides that eliminate washing steps and cross contamination between samples
  - Saves and prints cell count data including images using the Countess™ software and Countess™ USB drive
  - Presents comprehensive data with graphical reports and as a .CSV (comma separated value) file for sample comparisons
  - Allows you to gate and analyze cells based on cell size
-

# Methods

## Getting Started

### Installing the Countess™ Automated Cell Counter

- 
1. After unpacking the instrument, place the instrument on a flat, level, dry surface.
  2. Plug one end of the supplied power cord into the Countess™ instrument. To the other end attach the appropriate plug adaptor, based on the electrical outlet configuration in your country.
  3. Plug the power cord into the electrical outlet. Be sure to use only the power cord supplied with your instrument. Powering the instrument with an unapproved power cord may damage the instrument.

To **register** your Countess™ automated cell counter, visit [www.invitrogen.com/countess](http://www.invitrogen.com/countess). Enter the instrument serial number, your name, and your contact details. Registering your instrument ensures that you receive notifications of software upgrades and fast service.

4. When you are ready to use, start the Countess™ instrument by pressing the **Power** button.

---

*Continued on next page*

# Getting Started, Continued

## Optional: Installing the Countess™ Software

The Countess™ instrument is designed for stand-alone use and does not require the use of an external computer.

If you wish to archive data and generate reports, you must transfer data to your computer, and use the Countess™ software to generate and print reports (see instructions, below). Alternatively, data stored in the .CSV file may be transferred to your computer by the USB drive and imported into any spreadsheet program, without the need for Countess™ software.

**Computer requirements (Countess™ is not compatible with Macintosh Operating systems)**

- USB port (1.1 or later, 2.0 is recommended)
  - Windows XP/2000/Vista
1. Visit [www.invitrogen.com/countess](http://www.invitrogen.com/countess) and follow instructions on the page to install the Countess™ software.
  2. When the software is installed, the Countess™ automated cell counting software icon appears on your desktop.
  3. To download data, use any USB drive to capture data from your experiment and transfer data to your computer as described in **Transferring Data to a PC** (page 16).

## Start-Up Screen

When the instrument is turned on, the **Start Up** screen is displayed. Here you can proceed immediately to cell counting (page 9), set up the instrument for cell or bead count, or adjust the screen brightness.

### Start Up Screen



### Screen Brightness

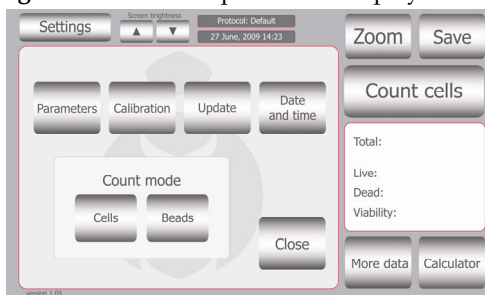
Use the scroll buttons to adjust the screen brightness.

*Continued on next page*

# Getting Started, Continued

## Settings Screen

Press **Settings** from the Start-Up screen to display Settings.



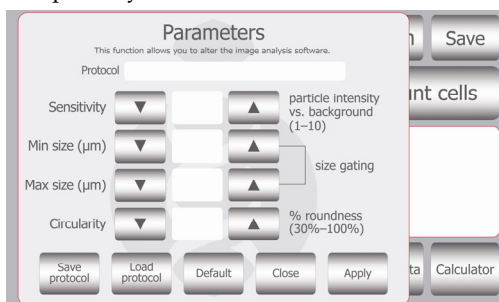
The Settings menu allows you to set up the following:

- Parameters (see below and next page for details)
- Calibration to calibrate the instrument (page 20)
- Update to install new firmware versions as they become available
- Date and Time to set up date and time (page 8)
- Count mode to operate the instrument for cell counting (choose **Cells**) or bead counting (choose **Beads**)

## Cell Mode Parameters Screen

Press **Parameters** from the Settings screen to display **Cell Mode Parameters** Screen.

The Countess™ instrument comes with pre-set parameters to match the majority of cultured cell types which can be accurately counted without changing any of the default parameters. The **Parameters** function allows you to change the image analysis algorithm for specific or mixed cell types, and the specific parameters must be determined empirically.



*Continued on next page*

# Getting Started, Continued

---

## Cell Mode Parameters Screen, continued

The Cell Mode Parameters are described below:

- **Sensitivity** (refers to the contrast of the objects from the background). Adjusting the sensitivity higher makes the instrument more sensitive to objects; useful for cells that do not stain well with trypan blue while adjusting the sensitivity lower makes the instrument less sensitive and is useful if there is a lot of background.
- **Minimum cell size** is used to select the lowest particle size to include in the count. The size is set in 1 micrometer increments. The lower range of the Countess™ instrument is 5 µm. However, you can select a minimum cell size as low as 2 µm; when a cell size outside of the usual range is selected, the numbers indicating particle size are shown in red.
- **Maximum cell size** is used to select the maximum particle size to include in the count. The size is set in 1 micrometer increments. The maximum size that can be set is 60 µm.
- **Circularity** is used to determine the objects to include in the measurement based on roundness. Increasing the value from 80% requires objects to be more round for inclusion in the measurement. Decreasing the value from 80% allows objects to be less round. Adjusting this may be useful if the cell type is not particularly circular or perhaps oddly shaped.

After modifying any parameters:

- Press **Apply** to make the changes or,
- Press **Default** to restore default parameters or,
- Press **Save** to create a protocol. Save the protocol name and user name in the appropriate fields, and press **Save** again. The protocol is now saved and appears highlighted in the protocol menu. To use the highlighted protocol, press **Apply**.

---

*Continued on next page*

# Getting Started, Continued

---

## Cell Mode Parameters Screen, continued

The screenshot shows a mobile application interface for the 'Cell Mode Parameters' screen. A central dialog box displays a list of protocols and their associated users. The list is as follows:

	Protocol	User
1	Above 10 $\mu\text{m}$	Sara
2	Bead	Lisa
3	Wide range	Lucy
4	3D	Ed
5		

Below the list are five buttons: 'Apply', 'Edit', 'Delete', 'Close', and two arrow buttons (down and up). To the right of the dialog box, a 'Save' button is visible. Below the 'Save' button, a 'Sample' button is partially visible. Further down, a 'Calculator' button is visible. The background of the application shows a vertical bar on the left and some text on the right, including '5 x 10<sup>6</sup>/mL', '4 x 10<sup>6</sup>/mL', '0 x 10<sup>6</sup>/mL', and '%'. The bottom of the screen shows a 'VERSION' label.

**Note:** Once a protocol is saved, it is available for use at any time. To access saved protocols, press **Settings > Parameters > Load Protocol**. Use the up and down arrows to find your saved protocol. Once the protocol is located, use the touch screen to highlight the protocol and press **Apply**. Once the protocol of interest is selected, count cells using the standard procedure.

---

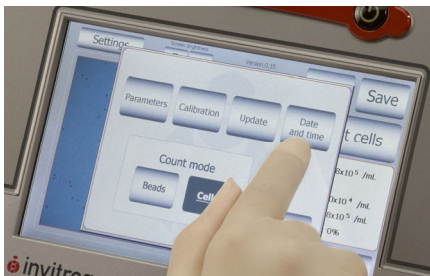
# Getting Started, Continued

---

## Date and Time Setup

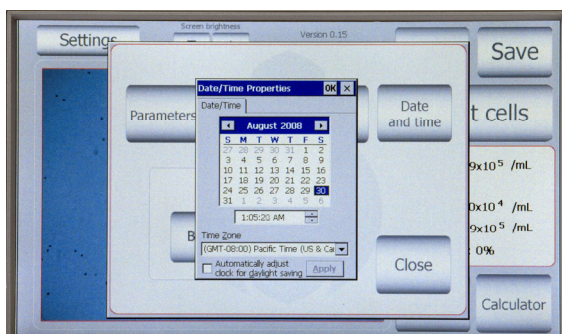
The date and time is already preset when you receive the instrument. To reset the date and time, follow these steps:

1. Turn on the Countess™ automated cell counter by pressing the **Power** button. The Start up screen is displayed after a few seconds.
2. Press **Settings** and then press **Date and Time**.



3. The **Date/Time Properties** screen is displayed. To select the month and day, scroll to the appropriate month using the arrow keys and then press the day on the calendar.

**Note:** Use a pointed object, like a stylus or pipette tip, to push the small buttons on the calendar.



4. To select the time, scroll to the appropriate time and select **Automatically adjust clock for daylight saving**, if needed. Press **Apply** or **OK** to make the date/time changes. The updated date/time is displayed on the top of the window. Once the date/time is set, there is no need to set it each time the instrument is turned on.
  5. Press **Close** to exit the screen.
-

# General Guidelines

---

## Countess™ Cell Counting Chamber Slides

The Countess™ cell counting chamber slides supplied with the counter or available separately from Invitrogen (page 25) are specially designed for use exclusively with the Countess™ automated cell counter. Use of other slides result in inaccurate cell counts and can damage the Countess™ instrument.

---



To obtain the best results, follow these recommendations:

- Wear gloves during sample handling.
  - Do not touch the optical surfaces of the Countess™ cell counting chamber slides. Hold the chamber slides by the edges.
  - Use the Countess™ automated cell counter at room temperature only (10–35°C).
  - For accurate viability count results, ensure the counting area is covered with cell suspension and count cells within 3 minutes of mixing the cells with trypan blue solution as trypan blue is toxic to cells. For best data with biological samples, we recommend counting at least two samples and taking an average.
  - The Countess™ automated cell counter is supplied pre-calibrated. To recalibrate your instrument, see page 20.
  - The Countess™ automated cell counter memory holds one set of data. Save your data to the USB drive after each reading. You may transfer the data to your PC, using the USB drive immediately as described in **Transferring Data to a PC** (page 16).
  - After using Countess™ cell counting chamber slides, appropriately dispose slides as biohazardous waste. **Do not reuse the chamber slides.**
-

# Using the Countess™ Automated Cell Counter



## Note

- The Countess™ automated cell counter is supplied precalibrated. However, if you wish to calibrate the Countess™ automated cell counter, see page 20.
- Instructions are provided in this section for preparing the cell sample with trypan blue dye for use with disposable Countess™ cell counting chamber slides for automated cell count using the Countess™ counter.
- Visit [www.invitrogen.com/countess](http://www.invitrogen.com/countess) for additional application notes, technical notes, and a list of validated cell lines including adherent, primary, and suspension cells that have been tested using the Countess™ Automated Cell Counter.

## Materials Needed

- Cell sample
- Countess™ cell counting chamber slides (supplied with the instrument or available separately, page 25)
- Trypan blue stain (0.4%); supplied with the instrument or available separately, page 25
- *Optional:* Countess™ USB drive for data transfer, supplied with the instrument or available separately (page 25)

## Cell Counting Procedure

1. Push the **Power** button to start the instrument. The Start-up screen is displayed.

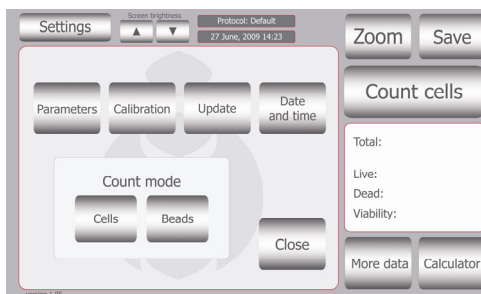


2. The Countess™ automated cell counter is preset to **Cell** mode. If you have changed the mode to bead for bead counting (page 17) or calibration (page 21), be sure to change the mode to **Cells** Mode prior to counting cells by pressing **Settings** and then **Cells**.

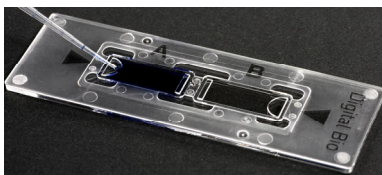
*Continued on next page*

# Using the Countess™ Automated Cell Counter, Continued

## Cell Counting Procedure, continued



3. Add 10  $\mu$ L of your sample to 10  $\mu$ L supplied trypan blue stain. Mix gently by pipetting up and down.
4. Add 10  $\mu$ L of the sample mixture to the chamber ports on one side of the Countess™ cell counting chamber slide. The two chambers of the slide are labeled "A" and "B" for easy tracking of your samples. You can count the cells from one chamber or both chambers.



5. Insert the Countess™ cell counting chamber slide, sample side A first into the slide inlet on the instrument, making sure that the sample side A is inserted completely into the instrument. You will hear a soft click, if the slide is pushed in correctly. Each chamber is counted separately.



6. Press the **Count Cells** or **Next Sample** button.

*Continued on next page*

# Using the Countess™ Automated Cell Counter, Continued

## Cell Counting Procedure, continued

7. Adjust the image by pressing the **Zoom** button. Navigate by pressing the location you like to see on the grid.



8. While viewing cells in the Zoom mode, use the Focus knob to adjust the image.

**Note:** After you have counted the first sample, you may not have to use the Focus knob again. If measuring multiple samples of the same approximate size, you may lock the Focus knob. You are able to unlock the knob later, to adjust the image.



Optimize the image for analysis such that:

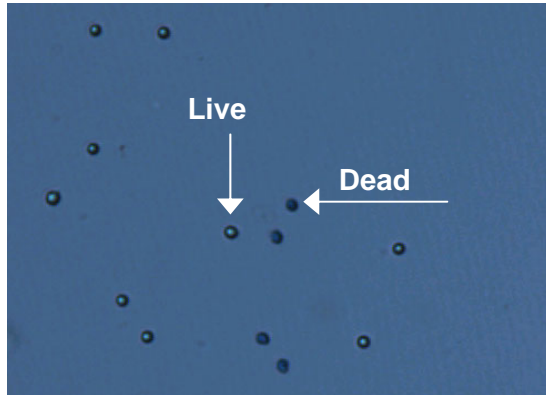
- **Live cells** have bright centers and dark edges (see image, next page)
- **Dead cells** have a uniform blue color throughout the cell with no bright centers, (see image, next page)

*Continued on next page*

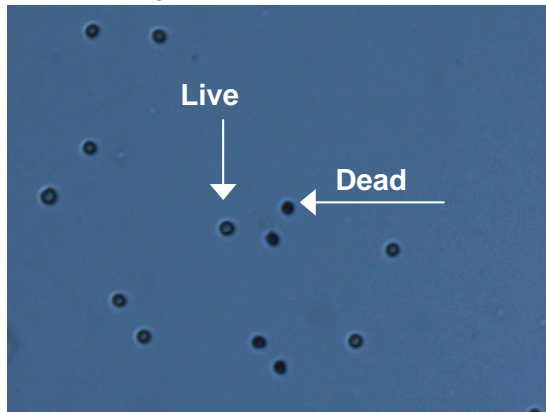
# Using the Countess™ Automated Cell Counter, Continued

## Cell Counting Procedure, continued

Correct Image



Incorrect Image



9. When you are satisfied with the image, press **Count Cells**.

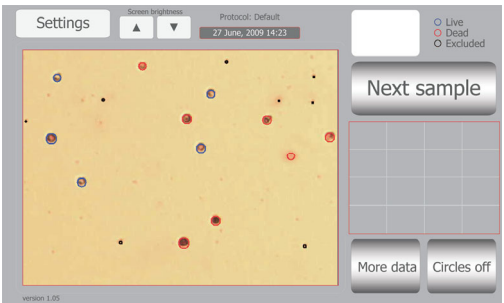


*Continued on next page*

# Using the Countess™ Automated Cell Counter, Continued

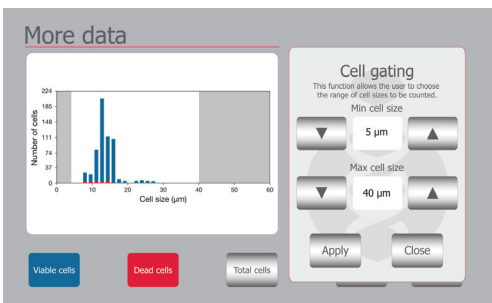
## Cell Counting Procedure, continued

10. The instrument takes approximately 30 seconds to count each sample, and the cell count for live, dead, and total cells, and percentage viability is displayed on the screen. Record the cell count, or insert a USB drive and press **Save** (see page 16).



11. After a cell count is performed, use the **Details** button to see how each cell was counted. Objects are circled in blue, red, or black. Blue indicates cells that are counted as live, red indicates cells that are counted as dead, and black indicates objects that are excluded from the count.
12. To see more details on the data as well as graphical representation of the data, press the **More Data** button.

**Note:** The data window in More Data allows you to further analyze acquired data by viewing a specific data set. The data window is set using particle size that you specify. Once the window is set, the concentrations and particles counted are recalculated to reflect the data window you set. Use the arrows to view only the window of processed data you wish to view. Once you have set the window, press Apply to view the information box with the recalculated data set specifically for the data window.



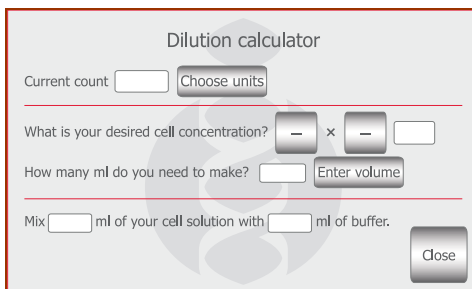
*Continued on next page*

# Using the Countess™ Automated Cell Counter, Continued

## Cell Counting Procedure, continued

After reviewing the data, press the **Close** button to return to the main screen.

The **Calculator** button allows you to quickly calculate adjustments to the cell suspension to obtain a desired concentration.



The screenshot shows the 'Dilution calculator' interface. It has a light gray background with a red border. At the top, it says 'Dilution calculator'. Below that, there are four input sections separated by horizontal lines. The first section is 'Current count' with a text input field and a 'Choose units' button. The second section is 'What is your desired cell concentration?' with a minus button, a multiplication button, another minus button, and a text input field. The third section is 'How many ml do you need to make?' with a text input field and an 'Enter volume' button. The fourth section is 'Mix' with a text input field, followed by 'ml of your cell solution with', another text input field, and 'ml of buffer.'. At the bottom right, there is a 'Close' button.

13. To count the cells in the other side of the slide chamber (side B), remove the Countess™ slide after side A is counted by pushing in the slide slightly and then pulling the slide out. Turn the slide around and reinsert into the slide inlet and repeat the procedure.



14. The Countess™ automated cell counter memory holds one set of data. To save your data for future analysis or archiving, you must record the data or save after each reading. See page 16 for **Transferring Data to a PC**.
15. After recording or saving the data, remove and discard the slide appropriately as biohazardous waste.
16. At this point, the Countess™ cell counter instrument is ready for another sample. If you are not using the instrument, press the **Power** button to turn off the instrument.

**Note:** If the touch screen is not responding, you can turn off the instrument by pressing and holding the **Power** button for 4 seconds.

*Continued on next page*

# Using the Countess™ Automated Cell Counter, Continued

---

## Optional: Transferring Data to a Computer

1. To archive your data or generate a printed report, insert Countess™ USB drive into the USB port.

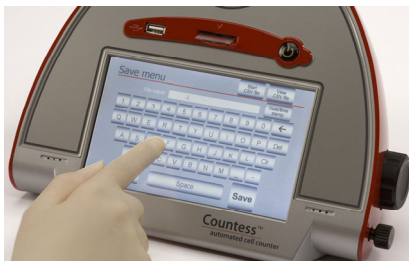
USB port ———



2. Save your data on the USB drive by pressing the **Save** button on the main screen. The image and the counting data are saved.

The numerical data is also automatically saved as a .CSV file that can be opened with any spreadsheet program. To delete all data from the .CSV file and start with a blank file, press **Start .CSV file** button.

3. Enter the file name using the keypad buttons displayed on the Save menu.



4. Transfer the Countess™ USB drive to the USB port on your PC. You may open the .CSV file using a spreadsheet program. To see the image and generate a report, use the Countess™ software.
5. Click on the Countess™ automated cell counting software icon on your PC (see **Installing the Countess™ Software**, page 4).
6. Open a file using the **Open** button. Select the saved file you wish to open.
7. Zoom in on the image obtained by clicking in the zoom grid, (this screen also allows you to examine which cells have been counted as live or dead).
8. Click on **Prepare Report** to obtain a printable version of the image and data.

---

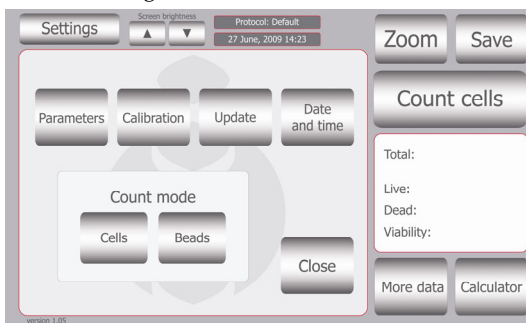
*Continued on next page*

# Using the Countess™ Automated Cell Counter, Continued

## Using the Beads Mode for Counting Beads

The Countess™ automated cell counter can also be used to count beads using the Bead mode of the instrument.

1. Push the **Power** button to start the instrument. The Start-up screen is displayed.
2. Press **Settings** and then press **Beads** to place the instrument into bead counting mode.



3. Add 10  $\mu$ L of beads to 10  $\mu$ L supplied trypan blue stain. Mix gently by pipetting up and down.
4. Add 10  $\mu$ L of the sample mixture to the chamber ports on one side of the Countess™ cell counting chamber slide as shown on page 10. You can count beads from one chamber or both chambers.
5. Insert the Countess™ cell counting chamber slide with beads into the slide inlet on the instrument as shown on page 11, making sure that the sample side is inserted completely into the instrument.
6. Press **Count Beads** button.
7. Adjust the bead image by pressing the **Zoom** button. Navigate the fields by pressing the location you like to see on the grid. Use the focus knob to adjust the image.

*Continued on next page*

# Using the Countess<sup>TM</sup> Automated Cell Counter, Continued

## Using the Beads Mode for Counting Beads, continued

8. When you are satisfied with the image, press the **Count Beads** button.



9. The instrument takes approximately 30 seconds to count each sample and the bead count is displayed on the screen. Record the bead count.
10. To count beads in the other side of the slide chamber (side B), remove the slide after side A is counted, turn the slide around, and reinsert into the slide inlet to repeat the counting procedure.
11. After counting beads, place instrument into **Cell Count** mode for counting cells by pressing **Settings** button and then pressing the **Cells** button.

# Cleaning and Maintenance

---

## Cleaning and Maintenance

Clean the surface of the Countess™ instrument with a damp cloth. To clean the LCD screen, turn off the Countess™ instrument, disconnect the power cable, and clean the LCD screen with a soft cloth lightly moistened with LCD cleansing detergent. Cleaning the screen with excessive force can damage the LCD the screen. Wipe the screen dry immediately. **Do not** reuse the counting chambers.

The Countess™ automated cell counter does not need regular maintenance. To troubleshoot problems with Countess™ cell counter, contact Technical Support (page 26). **Do not** perform any repairs or service on the Countess™ instrument to avoid damaging the instrument.

---

## Changing Battery

To change the battery:

1. Turn off the Countess™ automated cell counter and disconnect the power cord.
2. Open the battery cover at the bottom of the Countess™ automated cell counter.



3. Remove the used battery and insert a new battery (battery type CR2032).
  4. Close the battery cover. Reconnect the power cord.
  5. Reset the date and time on the counter as described on page 8.
-

# Updating and Calibrating the Countess™ Automated Cell Counter

---

## Introduction

Instructions are included below to update and calibrate the Countess™ automated cell counter to ensure its optimal performance. The update feature allows you to update the counter when new firmware versions are available. The calibration function sets the background of the instrument to a solution of trypan blue in the slide.

The Countess™ automated cell counter is supplied precalibrated. However, if you have updated the Countess™ firmware, or if you choose to use a different formulation of trypan blue that is not supplied with the instrument, you will need to calibrate the Countess™ automated cell counter.

---

## Updating the Counter

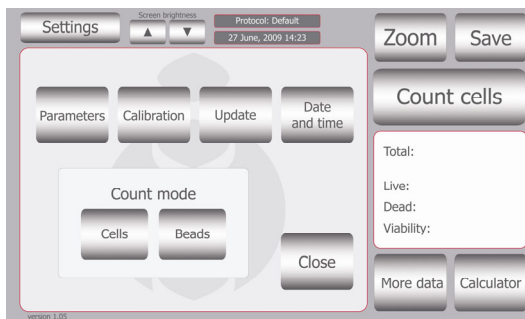
1. Save any data from the .CSV file you wish to archive as follows:  
Go to the save menu>Press **View .CSV file**>Press **Save to USB**
  2. Start a new .CSV file as follows:  
Go to the **Save Screen**>Press **Start new .CSV**>When prompted, press **OK** to erase previous data and start new .CSV file.
  3. Visit the Countess™ website at [www.invitrogen.com/countess](http://www.invitrogen.com/countess) to download the firmware which is supplied as a .zip file to your desktop.
  4. Unzip the .zip file and save the firmware to a USB drive supplied with the instrument.
  5. Insert the USB drive into the USB port on Countess™ counter.
  6. Push the **Power** button to start the instrument and press **Settings**.
  7. Press **Update**.
  8. The instrument prompts you to update, press **OK**. The update process takes a few minutes.
  9. When the update is complete, you are prompted to restart the instrument by pressing **Restart**.
  10. Once the start up screen is displayed, calibrate the instrument as described on the next page.
- 

*Continued on next page*

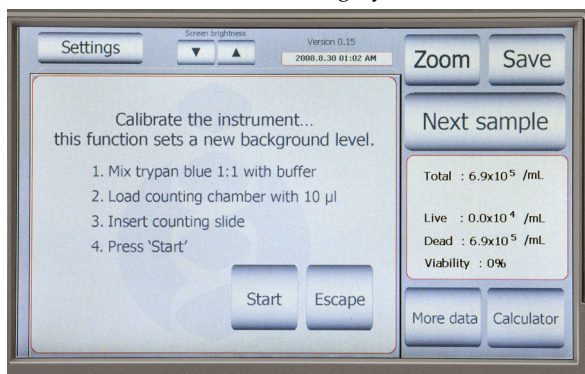
# Updating and Calibrating the Countess™ Automated Cell Counter, Continued

## Calibrating the Counter

1. Push the **Power** button to start the instrument. The Start-up screen is displayed.
2. Press **Settings** and then press **Calibration**.



3. To recalibrate the Countess™ Counter, mix 10  $\mu\text{L}$  trypan blue solution with 10  $\mu\text{L}$  of a standard buffer, such as phosphate buffered saline (PBS). Mix thoroughly.



4. Add 10  $\mu\text{L}$  of the sample mixture to the chamber ports on one side of the Countess™ cell counting slide. Press **Start**.
5. The instrument takes approximately a minute to calibrate.
6. After calibration is complete, press the **Re-start** button to restart the instrument, and proceed to cell counting.

There is no need to recalibrate each time the instrument is turned on.

# Troubleshooting

Problem	Cause	Solution
Inaccurate cell count	Sample handling	<ul style="list-style-type: none"> <li>• <b>Do not</b> insert the Countess™ cell counting chamber slide upside-down as this may introduce liquid into the instrument that could damage it.</li> <li>• <b>Do not</b> reuse the Countess™ cell counting chamber slides, as leftover dye from the previous reading may affect the next reading.</li> <li>• <b>Do not</b> use any other counting chambers such as a glass hemocytometer with the Countess™ counter as it results in inaccurate cell count and may damage the instrument.</li> <li>• Ensure that the sample covers the entire counting area and the Countess™ cell counting chamber slide is inserted completely into the counter.</li> </ul>
	Low and high readings	<p>The Countess™ automated cell counter is designed to read samples from <math>1 \times 10^4</math> cells/mL to <math>1 \times 10^7</math> cells/mL, with the highest accuracy between <math>1 \times 10^5</math> cells/mL and <math>4 \times 10^6</math> cells/mL.</p> <p>If your sample is not in this range, you may need to dilute the sample or add more cells and read the sample again.</p>
	Poor image quality	While viewing cells in the Zoom mode, use the focus knob to adjust the image to ensure that live cells have bright centers, and dead cells have dark/blue centers.
	Cell clumping	Ensure the cells are not clumped.
	--	To maintain instrument sensitivity, we recommend that you calibrate the counter each year as described on page 21.

*Continued on next page*

## Troubleshooting, Continued

Problem	Cause	Solution
Error codes	--	See page 24 for a description of error codes.
Saving and printing problems	Incorrect USB drive	<ul style="list-style-type: none"> <li>• Use the USB drive supplied with the counter or an USB 2.0 drive as some types of USB drive are not detected or recorded by the counter.</li> <li>• Do not save too many files in a USB drive as the counter may slow down to read the USB drive.</li> </ul>
	Accidentally removed the USB drive	<ul style="list-style-type: none"> <li>• Do not remove the USB drive or turn off the counter when updating.</li> <li>• Do not remove a USB drive when saving or reading data as it may damage the counter.</li> </ul>
Instrument not updating firmware	May be using a corrupted firmware file or a damaged USB drive	Download a new version of the firmware from the website on a different USB drive and try updating the firmware on the Countess™ instrument. Contact Technical Support if the problem persists.
Countess™ instrument freezes during operation	Memory is full	Erase the .CSV file. After performing a count, go directly to the save menu, press <b>Start new .CSV file</b> when prompted press <b>OK</b> to start new .CSV file.
Errors during updating the instrument	Cannot find the USB drive	Use the Countess™ USB drive supplied with the instrument or a USB drive that you routinely use with the instrument.
	Cannot find the .exe file indicating that the firmware is saved incorrectly on the USB drive	<p>Ensure the firmware files (a total of 5 files) are unzipped on the USB drive as the instrument cannot access files required for updating if they are in a folder.</p> <p>To unzip the files, double click the icon&gt;click <b>Extract</b>.</p>
	More than one firmware version on the USB drive	Erase all previous firmware versions on the USB drive and then save the new firmware version on the USB drive.

# Countess™ Automated Cell Counter Error Codes

---

**Introduction**      This section describes the error codes displayed by the Countess™ automated cell counter when it encounters a problem. Contact Technical Support (page 26) for details on error codes and if you need to send the instrument back for servicing.

Position	Reason	Message	Error code
Driver	Camera driver loading fail	System Error (E0101)  Reboot the device or refer to service personnel.	0101
	Camera driver open fail		0102
	Camera driver initializing fail		0103
	GPIO driver loading fail		0104
Preview	Camera preview fail		0201
Memory	Image buffer memory allocation fail		0301
	Camera memory allocation fail		0302

---

# Appendix

## Accessory Products

### Additional Products

The following products can be used with the Countess™ automated cell counter and are available separately from Invitrogen.

For more information, visit [www.invitrogen.com](http://www.invitrogen.com) or contact Technical Support (page 26).

Product	Quantity	Catalog no.
Countess™ Cell Counting Chamber Slides, 50 Slides (100 counts)	1 box	C10228
Countess™ Cell Counting Chamber Slides, 500 Slides (1000 Counts)	10 boxes	C10312
Countess™ Cell Counting Chamber Slides, 1250 Slides (2500 Counts)	25 boxes	C10313
Countess™ Cell Counting Chamber Slides, 2500 Slides (5000 Counts)	50 boxes	C10314
Countess™ Cell Counting Chamber Slides, 5000 Slides (10,000 Counts)	100 boxes	C10315
Countess™ power cord with four adapter cords	1 each	C10285
Countess™ USB drive	1 each	C10286
Trypan blue stain (0.4 %)	2 × 1 mL	T10282
Countess™ test beads	1 mL	C10284

# Technical Support

---

## Web Resources



Visit the Invitrogen Web site at [www.invitrogen.com](http://www.invitrogen.com) for:

- Technical resources, including manuals, vector maps and sequences, application notes, MSDSs, FAQs, formulations, citations, handbooks, etc.
  - Complete technical support contact information
  - Access to the Invitrogen Online Catalog
  - Additional product information and special offers
- 

## Contact Us

For more information or technical assistance, call, write, fax, or email. Additional international offices are listed on our web page ([www.invitrogen.com](http://www.invitrogen.com)).

### Corporate Headquarters:

5791 Van Allen Way  
Carlsbad, CA 92008 USA  
Tel: 1 760 603 7200  
Tel (Toll Free): 1 800 955 6288  
Fax: 1 760 602 6500  
E-mail:  
[tech\\_support@invitrogen.com](mailto:tech_support@invitrogen.com)

### Japanese Headquarters:

LOOP-X Bldg. 6F  
3-9-15, Kaigan  
Minato-ku, Tokyo 108-0022  
Tel: 81 3 5730 6509  
Fax: 81 3 5730 6519  
E-mail:  
[jpinfo@invitrogen.com](mailto:jpinfo@invitrogen.com)

### European Headquarters:

Inchinnan Business Park  
3 Fountain Drive  
Paisley PA4 9RF, UK  
Tel: +44 (0) 141 814 6100  
Tech Fax: +44 (0) 141 814 6117  
E-mail:  
[eurotech@invitrogen.com](mailto:eurotech@invitrogen.com)

---

# Purchaser Notification

---

## **Limited Use Label License No. 5: Invitrogen Technology**

The purchase of this product conveys to the buyer the non-transferable right to use the purchased amount of the product and components of the product in research conducted by the buyer (whether the buyer is an academic or for-profit entity). The buyer cannot sell or otherwise transfer (a) this product (b) its components or (c) materials made using this product or its components to a third party or otherwise use this product or its components or materials made using this product or its components for Commercial Purposes. The buyer may transfer information or materials made through the use of this product to a scientific collaborator, provided that such transfer is not for any Commercial Purpose, and that such collaborator agrees in writing (a) not to transfer such materials to any third party, and (b) to use such transferred materials and/or information solely for research and not for Commercial Purposes. Commercial Purposes means any activity by a party for consideration and may include, but is not limited to: (1) use of the product or its components in manufacturing; (2) use of the product or its components to provide a service, information, or data; (3) use of the product or its components for therapeutic, diagnostic or prophylactic purposes; or (4) resale of the product or its components, whether or not such product or its components are resold for use in research. For products that are subject to multiple limited use label licenses, the terms of the most restrictive limited use label license shall control. Life Technologies Corporation will not assert a claim against the buyer of infringement of patents owned or controlled by Life Technologies Corporation which cover this product based upon the manufacture, use or sale of a therapeutic, clinical diagnostic, vaccine or prophylactic product developed in research by the buyer in which this product or its components was employed, provided that neither this product nor any of its components was used in the manufacture of such product. If the purchaser is not willing to accept the limitations of this limited use statement, Life Technologies is willing to accept return of the product with a full refund. For information about purchasing a license to use this product or the technology embedded in it for any use other than for research use please contact Out Licensing, Life Technologies, 5791 Van Allen Way, Carlsbad, California 92008 or [outlicensing@lifetech.com](mailto:outlicensing@lifetech.com)

---

*Continued on next page*

# Purchaser Notification, Continued

---

## Instrument Warranty

Invitrogen (a part of Life Technologies Corporation) warrants to the original purchaser ("Purchaser") that the Instrument ("Instrument") will be free from defects in materials and workmanship for a period of one (1) year from the date of delivery. Invitrogen agrees, as its sole responsibility under this limited warranty, and upon prompt notice of a defect, to repair, replace or credit the purchase price, at its discretion, any Instrument discovered to be defective within the warranty period.

Invitrogen will credit the account within 30 days of purchase, if the instrument is in original condition. After 30 days, Invitrogen will only replace the instrument for up to a year and no credit will be issued. Invitrogen will not accept any returned instrument that was used in HIV or other infectious disease labs.

This warranty does not include repair, replacement, or refund necessitated by accident, abuse, neglect, misuse, unauthorized repair, or modification of the Instrument. The warranty will be voided if the instrument is disassembled or a customer attempted to repair the instrument. In the event that Invitrogen determines that the Instrument is in need of repair and not replacement, this Standard Warranty includes replacement parts and labor for the Instrument. This Standard Warranty does not include shipment of the Instrument to and from service location or travel cost of service engineer, the costs of which shall be borne by the Purchaser.

**This Warranty and the remedies set forth herein are exclusive and in lieu of all other express or implied warranties (including implied warranties of merchantability, fitness for a particular purpose and non-infringement), and no other warranties shall be binding upon Invitrogen. In no event shall Invitrogen be liable for any special, incidental or consequential damages resulting from the use or malfunction of this Instrument or the system With which it is used, even if such damages could be anticipated by Life Technologies Corporation.**

To obtain service during the warranty period, contact Invitrogen Technical Support for further instruction.

### OUT OF WARRANTY SERVICE

Contact Invitrogen Technical Support. We will be happy to assist you by phone at no charge. Repair service, if needed, will be billed depending on the parts replaced and labor hours needed to repair your instrument. You will be billed for shipment of the instrument to the recommended service facility.

---

©2009 Life Technologies Corporation. All rights reserved.

For research use only. Not intended for any animal or human therapeutic or diagnostic use.





**Corporate Headquarters**

5791 Van Allen Way  
Carlsbad, CA 92008

T: 1 760 603 7200

F: 1 760 602 6500

E: [tech\\_support@invitrogen.com](mailto:tech_support@invitrogen.com)

For country-specific contact information, visit our web site at [www.invitrogen.com](http://www.invitrogen.com)