

# ThunderBolts™ System/RainDance Source Operator's Manual



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# CHAPTER 1

## Foreword

This chapter covers the following topics:

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# About this Manual

This manual is designed to serve the operators of the RainDance Technologies<sup>®</sup>, Inc. (hereafter called "RainDance") RainDance Source instrument. All material operating instructions, product illustrations, screen graphics, troubleshooting, error messages, and other relevant information are contained in this manual. It is the operator's responsibility to ensure that all safety instructions in this manual are strictly applied.

Where there is any conflict between this manual, the RainDance Software End User License Agreement included in the software, and the terms and conditions of sale, the order of precedence shall be as follows: (1) the RainDance Software End User License Agreement and (2) the terms and conditions.

## Intended Use

For Research Use Only. Not for use in Diagnostic Procedures.

When using ThunderBolts<sup>™</sup> consumables, the RainDance Technologies RainDance Source is an instrument that prepares picoliter-sized droplets for concentrated target enriched reactions.

When using RainDrop<sup>®</sup> consumables, the RainDance Technologies RainDance Source is an instrument that prepares picoliter-sized droplets for PCR amplification of target DNA or RNA molecules as part of the RainDrop Digital PCR System.

## Data Entry and Collection

RainDance requires that you do not enter health information identifiable to a particular person, or other information that is subject to regulatory or contractual protection, into any RainDance instrument. The reason is that such information is not protected from disclosure to service or other personnel and, as noted below, may be included in information provided to RainDance for purposes of servicing or evaluating the performance of your instrument.

Further, by requesting service for your RainDance instrument, you give RainDance consent to access and use data stored in your RainDance instrument. RainDance uses the data to troubleshoot and service the instrument in response to your service requests. RainDance also may aggregate data collected from your instrument in response to service requests with similar data from other customers and may use the aggregated data to improve instrument performance.

Your RainDance instrument is enabled with an automatic email functionality that allows RainDance to receive performance data from the instrument from time to time without your knowledge. You may choose to disable that functionality. Disabling that functionality will

prevent the instrument from sending such data to RainDance. The data collected with this automatic email functionality consists of the number of samples processed, the success rate of the samples processed, data specific to the performance of your instrument, and data that is entered by your operators. RainDance collects this data solely so that it may better understand and improve instrument performance. By allowing the functionality to remain enabled, you give RainDance permission to use the automatic email functionality.

## Design Change Disclaimer

- Due to design changes and product improvements, information in this manual is subject to change without notice. RainDance reserves the right to change product design, including illustrations, screen shots, and diagrams, at any time without notice, which may subsequently affect the contents of this manual.
- RainDance assumes no responsibility for any errors that may appear in this manual. RainDance will make every commercially reasonable effort to ensure that this manual is up-to-date and corresponds with the shipped RainDance Source instrument.
- The depictions of the workstation screens in this manual are representative only. Depending on the hardware and software versions of the system, minor differences may appear between the actual displays and those shown in this manual.

## Reproduction Disclaimer

You may make a reasonable number of copies of this manual for internal use only and only for use in connection with the RainDance Source instrument. Except as provided by the previous sentence, neither this manual nor any part of it may be reproduced, photocopied, or electronically transmitted in any way without the advanced written permission of RainDance.

## RainDance Support

If you have any difficulty running the RainDance Source instrument, contact your RainDance Support representative. [Chapter 8](#) of this manual includes a list of problems and possible solutions. The information given is general. Some applications may require additional procedures or equipment modification. Contact RainDance Support via email: [support@raindancetech.com](mailto:support@raindancetech.com), Monday through Friday, excluding holidays.



# Microsoft Windows Familiarity

- The supplied Instrument Control Software (ICS) is designed for the Microsoft® Windows® Embedded 7 operating system and uses the standard Windows interface. This manual assumes that you are familiar with the following standard techniques: clicking the mouse, highlighting an item, right-clicking, dragging, using the keyboard, interacting with dialog boxes, keyboard commands, selection techniques, and other Windows basics.
- If you require assistance with these aspects of the software user interface, refer to the Microsoft Windows documentation.

## Notes, Warnings, and Cautions

The symbols described in this section are used throughout this document to draw your attention to specific situations involving safety and proper use of the equipment. Symbols found on the instruments are listed in [Chapter 12](#).

### Notes

Notes are set apart from the body of the document with either the word **Note** or **Important**. They are meant to draw your attention to reminders and information that is important to successful operation of the RainDrop Source Instrument.

**Note:** A Note indicates a useful piece of information.

**Important:** An Important note is similar to a regular Note, except that it is meant to communicate greater weight to the issue at hand.

### Warnings

Warnings are represented by a red triangle with an exclamation point inside of it. Warnings are reserved for situations that indicate the possibility of personal injury if the instructions are not followed.



---

**Warning:** A Warning indicates a potentially hazardous situation that, if not avoided, could result in serious personal injury or death to you or others. Warnings are set within boxed rules and indented.

---

## Cautions

Cautions are represented by a blue triangle with an exclamation point inside of it. They indicate that you must follow a particular procedure in order to correctly operate the RainDance Source instrument and to avoid any possible damage to the equipment or loss of consumables.



---

**Caution:** Do not operate the RainDance Source instrument in a manner other than specified in this manual. Doing so could damage the instrument or produce erroneous results.

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**Caution:** RainDance service representatives are trained in the safe operation of the RainDance Source instrument, including accessing those areas reserved for trained service representatives.

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## Biohazard Safety Warnings

A biohazard warning indicates that the user must use precautions, for example, wearing gloves, when handling biological samples, to prevent any infections or hazards that they may cause.



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**Warning:** Follow your laboratory's procedures and regulations when handling biohazardous materials.

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**Warning:** RainDance suggests that users be professional and conscientious and take the appropriate safety measures when preparing, handling, and disposing of any biohazardous samples or waste.

---



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**Warning:** When working with biohazardous samples, or waste, *always* follow standard universal safety procedures (lab coats, safety glasses, gloves, mask, etc.).

---

In addition, users should take precautions in accordance with local, state, and national requirements.

## Laser Safety Warnings

The RainDance Source instrument contains a Class 2 barcode laser. A laser warning indicates that the user must use precautions when operating the instrument to avoid injury from the lasers.

In addition, users should take precautions in accordance with local, state, and national requirements.



Figure 1-1: Laser Safety Warning

## Safety Information

### Electrical Safety Warnings



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**Warning:** This equipment is operated with hazardous voltages that can shock, burn, or cause death. To reduce the possibility of electrical shock, do not remove any fixed panels. Ensure that all service to the system is performed only by qualified RainDance service personnel.

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**Warning:** Remove the wall plug before servicing the equipment. Never pull cords to remove the power cord from the outlet. Grasp the power cord plug and pull it from the outlet to disconnect it.

---



---

**Warning:** Do not operate the equipment with a damaged power cord.

---



---

**Warning:** Ensure that there is easy and adequate clearance to the power cord so that it can be disconnected in the event of a problem.

---



---

**Warning:** Position the power cord so that it cannot be tripped over, walked on, rolled over, crimped, bent, pinched, or accidentally pulled from the wall outlet.

---



**Warning:** Connect the equipment only to a grounded outlet.



**Warning:** This instrument is not disconnected from the AC power source (mains) as long as it is still connected to the wall outlet, even if the instrument is turned off. The primary means of disconnecting the instrument is to remove the plug from the wall outlet. Do not locate the instrument such that access to this plug is difficult.

## Mechanical Safety



**Warning:** The potential for serious injury to hands or fingers exists as a result of rotating or clamping motion. Watch your hands and fingers when opening and closing the cover. Keep your hands away from moving parts.



**Warning:** The RainDance Source instrument weighs approximately 50 lbs (22 kg). To avoid injury and damage to the instruments, do not move them without assistance from RainDance Technologies.

To move the instrument to another location, contact RainDance Support.

## Gas Pressure Safety

Do not exceed a maximum input pressure of 120 psi.

## Product Labels

Figure 1-2 shows the RainDance Source product label.

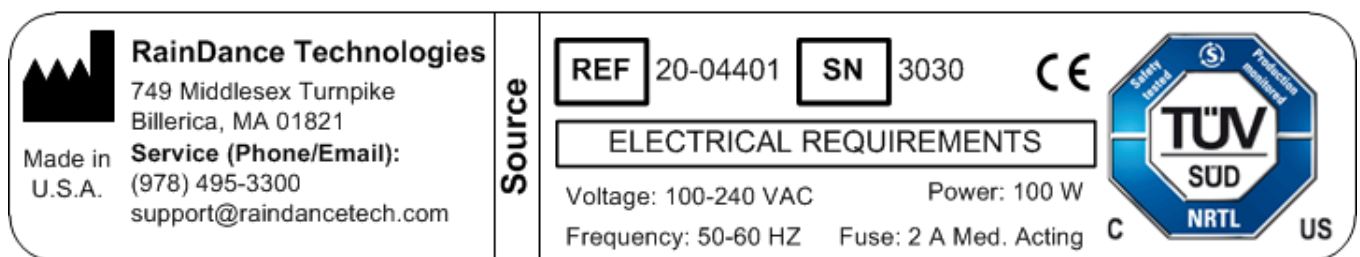


Figure 1-2: RainDance Source Product Label

# Safety Interlock

The RainDance Source instrument is equipped with an automatic safety interlock, which prevents it from operating unless its door is properly closed.

# Packing and Transport

RainDance provides initial shipping and installation. If you are considering moving the RainDance Source instrument within your laboratory, refer to Chapter 3 for the space requirements. Do not move the instrument without assistance from RainDance Technologies.

# CHAPTER 2

## Introduction

This chapter covers the following topics:

<b>RainDrop® System Overview</b>	<b>page 2-2</b>
<b>ThunderBolts™ System Overview</b>	<b>page 2-3</b>
<b>RainDance Source Instrument</b>	<b>page 2-2</b>
<b>RainDance Source Major Components</b>	<b>page 2-4</b>
<b>RainDance Source Layout</b>	<b>page 2-5</b>
<b>Oil Reservoir Fill Port</b>	<b>page 2-6</b>
<b>RainDance Source Barcode Reader</b>	<b>page 2-7</b>
<b>RainDance Source Chip</b>	<b>page 2-8</b>
<b>Handling the RainDance Source Chip</b>	<b>page 2-9</b>
<b>PCR Tube Strip</b>	<b>page 2-10</b>
<b>PCR Tube Strip Cap</b>	<b>page 2-11</b>
<b>Specifications</b>	<b>page 2-11</b>

# RainDrop<sup>®</sup> System Overview

The RainDance Source and RainDrop Sense make up the complete RainDrop (Digital PCR) System delivering absolute quantitation of specific targets. The following lists the components of RainDrop System:

- RainDance Source Instrument
- RainDrop<sup>®</sup> Sense Instrument
- Two Instrument Control (IC) Workstations (computers), one for each instrument
- Two Instrument Control (IC) Monitors, one for each instrument
- Instrument Control Cables and Peripherals
  - IC Workstation Power Cables
  - IC Monitor Power Cables
  - IC Keyboards
  - IC Mouses
  - IC Network Cables
  - IC USB Cables
  - IC FireWire Cable
- Instrument Control Software (ICS)
- RainDrop Analyst II™ Software



**Figure 2-1: RainDrop<sup>®</sup> System Components**

# ThunderBolts™ System Overview

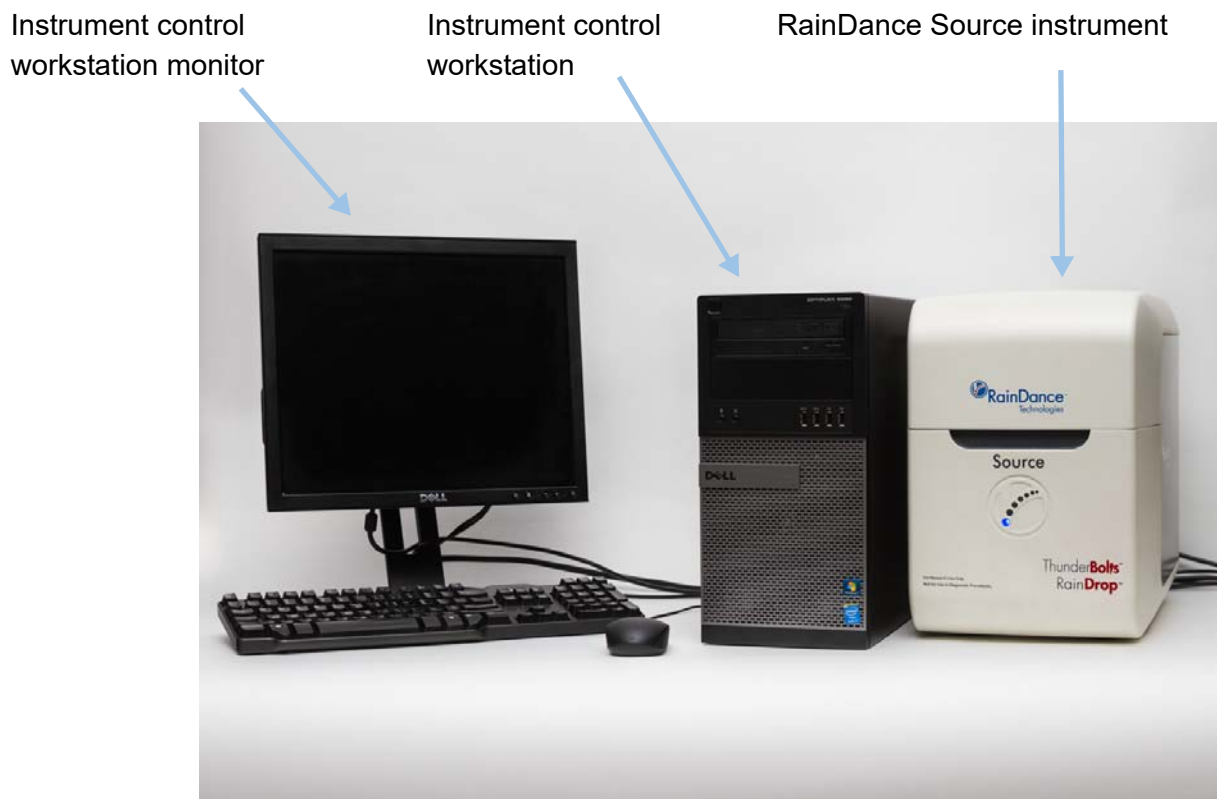
As a standalone instrument, the RainDance Source is also known as the ThunderBolts™ System. The following lists the components of ThunderBolts System:

- RainDance Source Instrument
- One Instrument Control (IC) Workstation (computer)
- One Instrument Control (IC) Monitor
- Instrument Control Cables and Peripherals
  - IC Workstation Power Cable
  - IC Monitor Power Cable
  - IC Keyboard
  - IC Mouse
  - IC Network Cables
  - IC USB Cables
  - IC FireWire Cable
- Instrument Control Software (ICS)



# RainDance Source Major Components

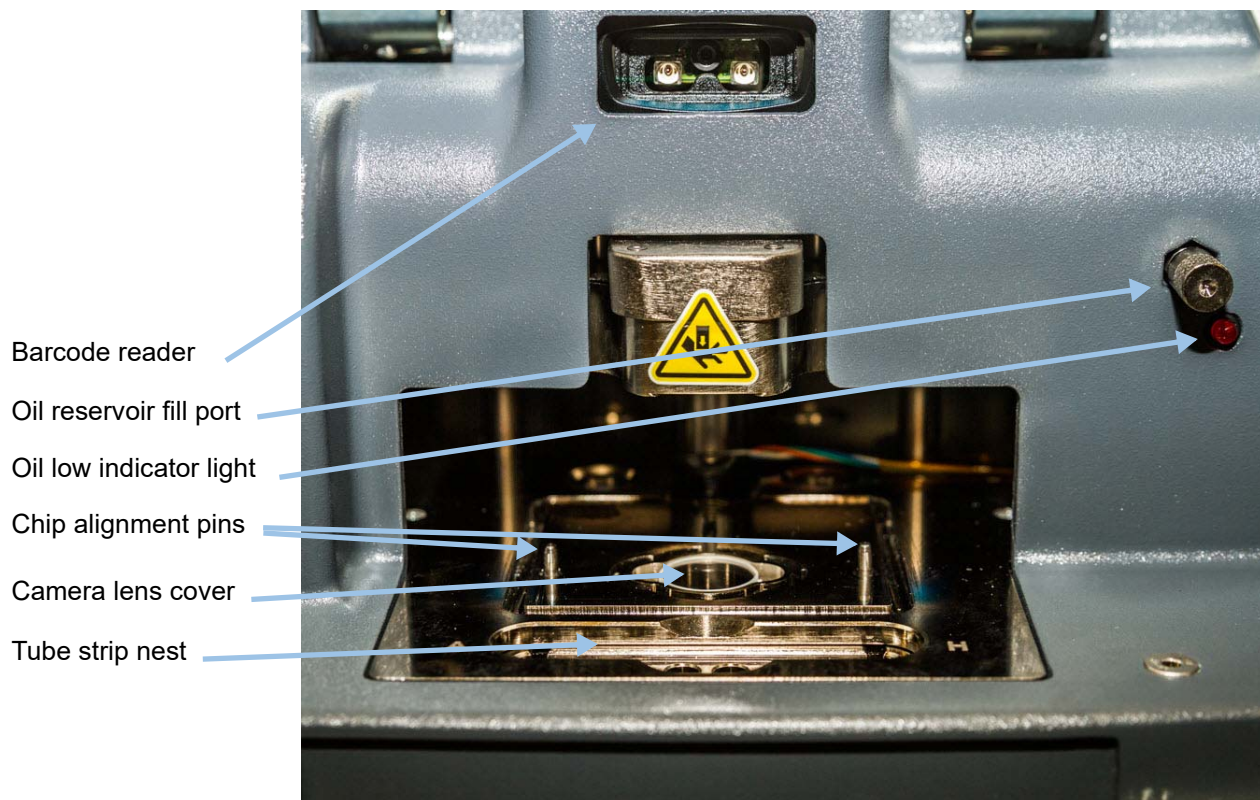
Figure 2-2 shows the major components of RainDance Source instrument.



**Figure 2-2: RainDance Source Major Components**

# RainDance Source Layout

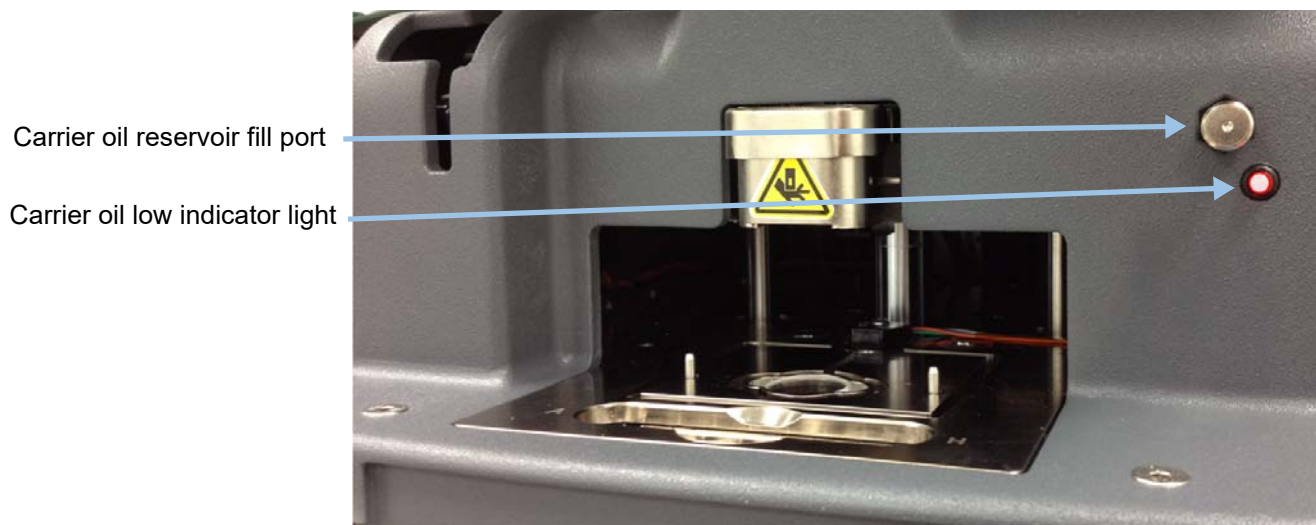
Figure 2-3 shows the layout of the RainDance Source instrument.



**Figure 2-3: RainDance Source Layout**

## Oil Reservoir Fill Port

Figure 2-4 shows the RainDance Source Oil Reservoir Fill Port.



**Figure 2-4: RainDance Source Oil Reservoir Fill Port**

## RainDrop Carrier Oil

RainDrop Carrier Oil is a specially formulated reagent consisting of oil and surfactant that is used to generate and manipulate droplets for running RainDrop assays. Use only RainDance-supplied oils to avoid damage to the instrument.

## RainDance Source Barcode Reader

The barcode reader is used to scan barcodes that identify the various components used in the RainDance Source (see [Figure 2-5](#)). The following lists the components to be scanned:

- RainDance Source Chip(s)
- RainDrop Carrier Oil
- Tube Strips (May have a user-generated barcode. Scanning is optional.)
- Other items bearing a user-generated barcode for sample tracking (within the limits of the supported barcode formats)

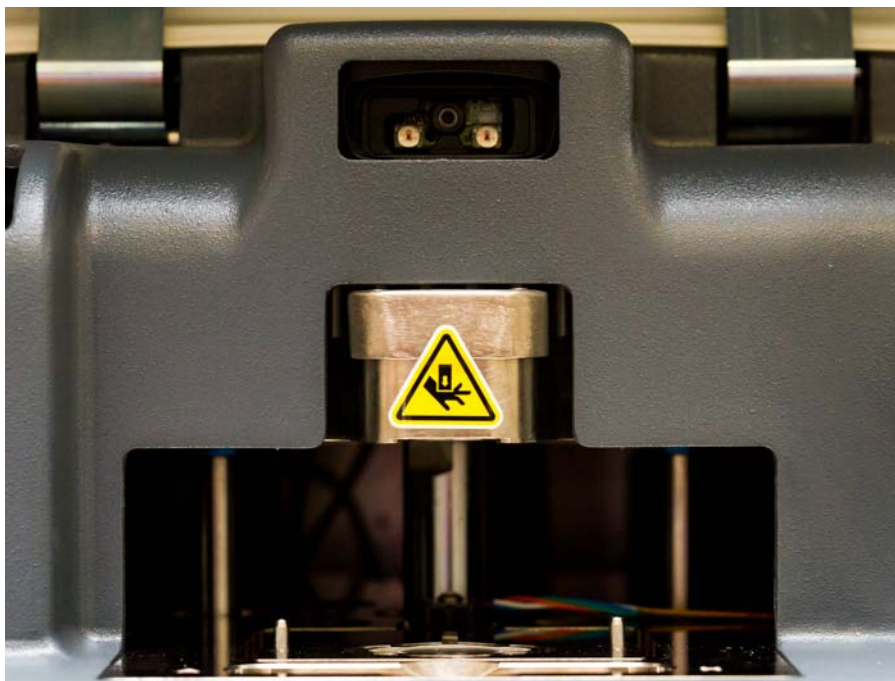


Figure 2-5: RainDance Source Barcode Reader

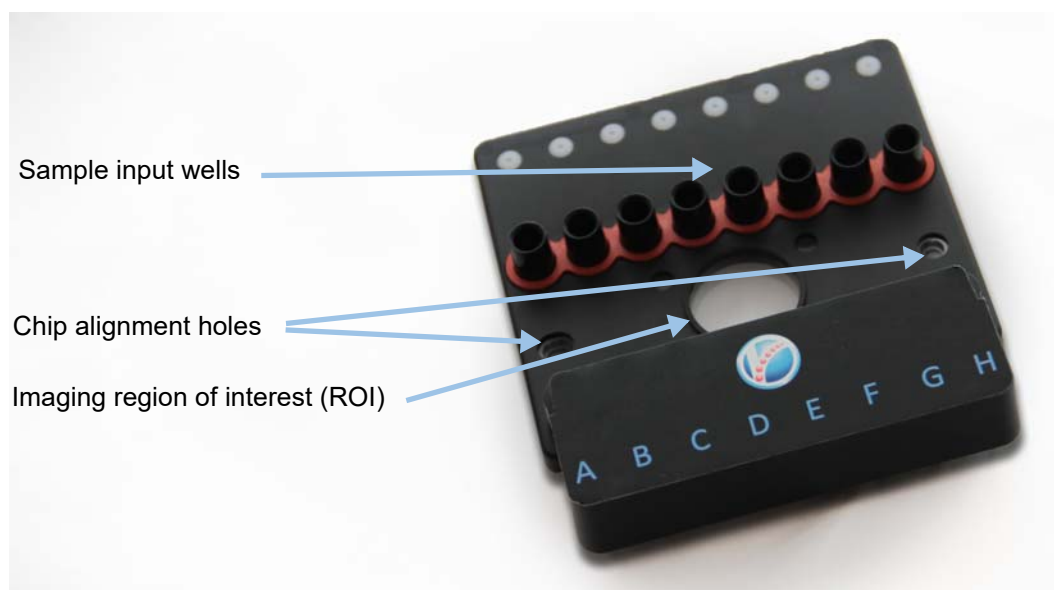
### Scanning Barcodes

Scan items as follows:

1. Click **Scan** in the ICS software. The red scanner light pulses for 10 seconds.
2. Hold the barcode on the item in front of the barcode reader. When the scanner reads the barcode, it automatically fills in the barcode information. The ICS accepts a barcode in the 2D Data Matrix format, which allows up to 96 characters of text. You may hear a subtle beep tone from the instrument when the barcode is accepted. If the scanner does not read the barcode, the ICS software displays a message and allows you to enter the barcode manually.

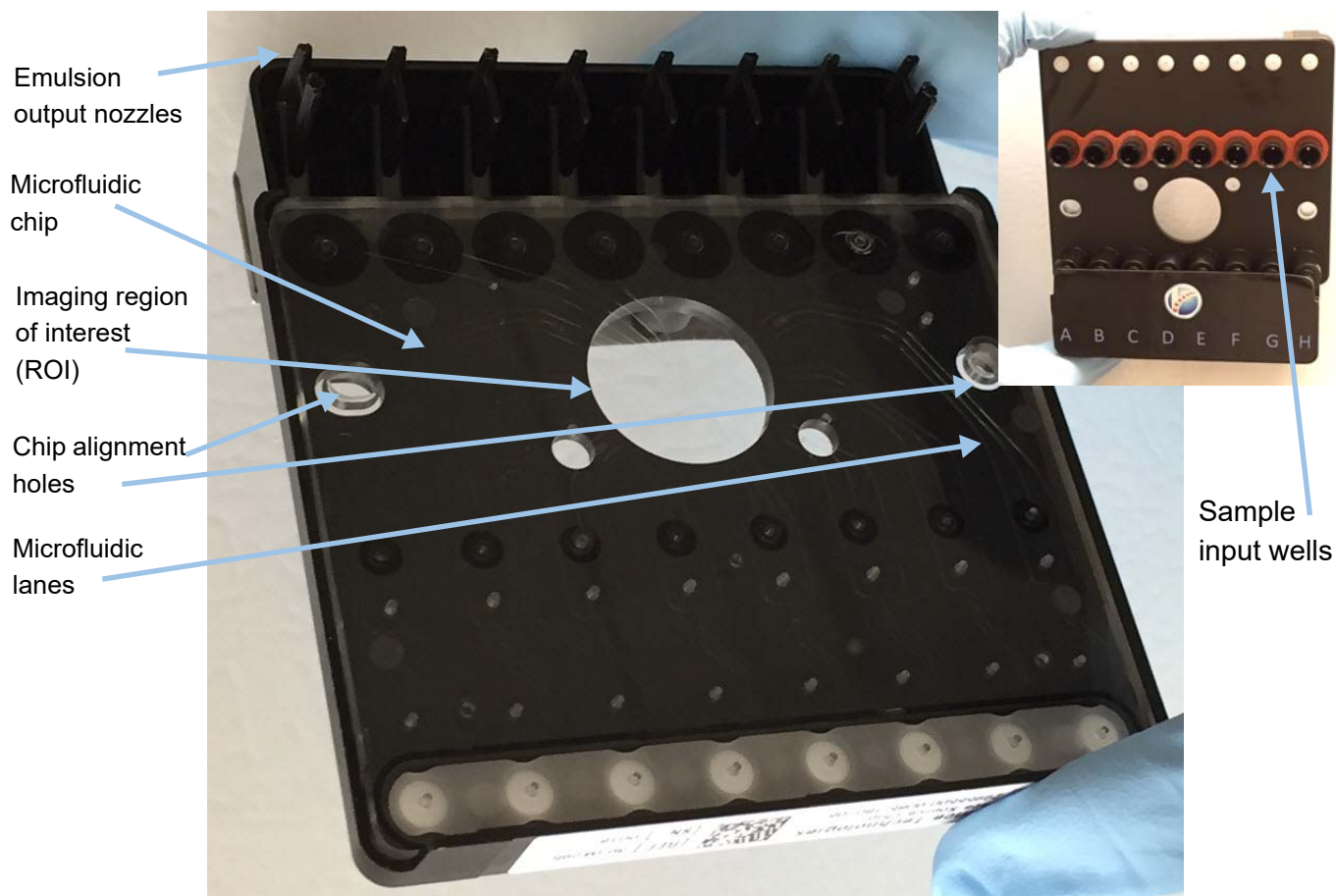
## RainDance Source Chip

The RainDance Source chip aids in the creation and collection of droplets that are then identified and counted on the RainDrop Sense instrument (RainDrop System) and for Sequencing Library preparation for NGS (ThunderBolts System). Its Sample Input Wells hold the sample prior to droplet generation. It takes the sample that you pipette into its wells and combines it with carrier oil to create an emulsion that is collected in a PCR tube strip. [Figure 2-6](#) and [Figure 2-7](#) show the RainDance Source chip. The RainDance Source chip contains eight wells into which the sample is pipetted. On the under side of the chip is a microfluidic chip. On the sides of the chip are two alignment holes that you place over the chip alignment pins on the RainDance Source instrument. Letters along its front end specify the lanes.



**Figure 2-6: Top View of the RainDance Source Chip**





**Figure 2-7: RainDance Source Chip**

**Note:** Do not touch the emulsion output nozzles. Do not allow the output nozzles to touch the table, lab bench, or any other work space since this may allow contaminating materials to enter the sample.

## Handling the RainDance Source Chip

Handle the RainDance Source chip as follows:

- Always use gloves when handling the chip.
- Grasp the chip by its sides near the oil input gaskets.
- Do not touch the sample input wells or emulsion output nozzles.
- Do not touch the clear microfluidic chip nor the imaging region of interest.
- Save the chip storage bag for later disposal of the chip.



**Caution:** Use care when removing the chip from its bag to avoid accidentally breaking the nozzles.

- RainDance recommends using a laminar flow hood when loading the chip. Place the chip only on a clean, solid bench surface. Do not place it on a lab mat or on a kim wipe.

## PCR Tube Strip

Each PCR tube strip contains eight 0.2 mL conical bottom PCR tubes that are connected. Small numbers on the tube strip indicate correct orientation. Note this orientation for later use in the RainDrop Sense instrument.

**Important:** Use only specified Axygen PCR tube strips (P/N PCR-0208-C) with the RainDance Source instrument.

Numbered  
area

Writing area

Conical  
section



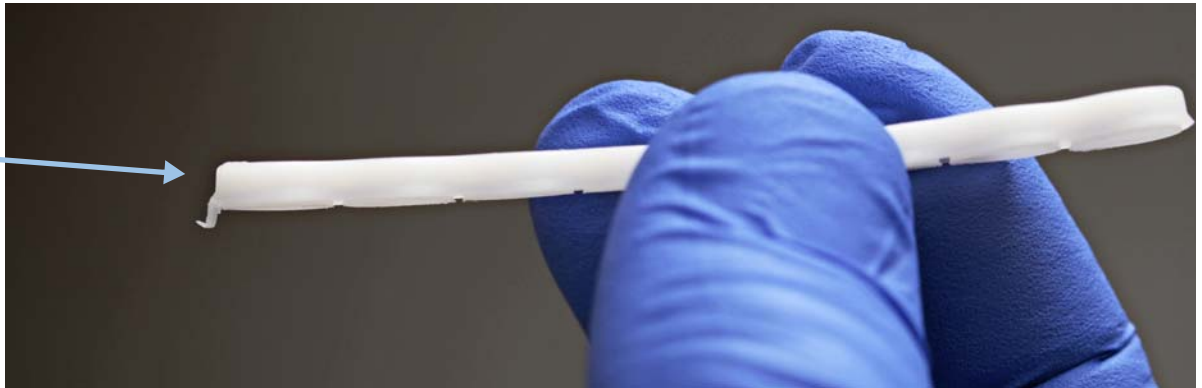
Figure 2-8: PCR Tube Strip

**Note:** Label the tubes on the writing area indicated in the above figure. Writing on the bottom part of the tube may interfere with sensors used to detect the final volume of emulsion in the PCR tube.

## PCR Tube Strip Cap

The PCR tube strip cap fits over the top of the PCR tube strip to keep the sample safe from contamination and to provide sealing for thermal cycling.

Tab identifies  
the left end of  
the cap.



**Figure 2-9: PCR Tube Strip Cap**

This custom molded cap has a specially designed puncture region inside the top sealing area. When you place the PCR tube strip (covered with this cap) into the RainDrop Sense instrument after thermal cycling, the RainDrop Sense chip makes a seal with the top surface of the cap and simultaneously punctures it to create a fluidic connection between the PCR tube strip and the microfluidic chip.

**Important:** RainDance Technologies recommends using Standard PCR Tube Strip Caps (40-06087) for thermal cycling and subsequently replacing them with the High Speed PCR Tube Strip Caps before transfer to the RainDrop Sense instrument. Axygen 8-Strip Domed PCR Tube Caps (PCR-02CP-C) may also be used for thermal-cycling if the cycler does not have an adjustable pressure heated lid. Replace the Domed Caps with Standard PCR Tube Strip Caps or High Speed Tube Strip Caps for Standard Mode or Fast Mode detection on the RainDrop Sense instrument respectively.

## Specifications

[Table 2-1](#) shows the specifications for the RainDance Source instrument. [Table 2-2](#) shows the specifications for the Instrument Control (IC) Workstation.

**Table 2-1: RainDance Source Hardware Specifications**

Requirement or Specification	Description
Width	11 inches (27.9 cm) not including the IC Workstation
Depth	17 inches (43.2 cm)
Height	15 inches (38.1 cm)
Weight	~50 lbs (~22 kg)



**Table 2-1: RainDance Source Hardware Specifications**

Power Source (Electrical)	Voltage: 100 to 240 VAC, 35 W max 1 standard grounded outlet, within 6 feet (2 meters) of the instrument
Clearance	2 inches (5 cm) in rear
Fuses	2 fuses, 2 Amperes Medium Acting
Cable Connection	USB and FireWire
Required compressed gas input pressure range	90-120 PSI (0.62 MPa – 0.82 MPa)
Capacity	8 lanes/wells per chip
Maximum Sample Throughput	1 chip (8 lanes/wells per chip) per 30 minutes with 25 uL volume
Droplet Creation	Aqueous samples are encapsulated within each droplet, surrounded by an immiscible carrier oil. The droplets are stabilized with surfactants allowing for robust manipulation both on and off the chip. Precise control of relative pressures and oil flow rates allows for creation of droplets as well as control of droplet size and spacing.
Droplet Processing	Droplets are processed on a chip that has no moving parts or valves. Samples have minimal contact with either walls or air. In addition, one-time-only chip use prevents sample cross-contamination.

**Table 2-2: Instrument Control (IC) Workstation Specifications**

Requirement or Specification	Description
<b>Instrument Control (IC) Workstation</b>	
Power	Voltage: 100-240 VAC Dell Computer: 305 W max, 45 W min Standard grounded outlet within 6 feet (2m) of the instrument
Dimensions	Width: 7.5 inches (19 cm) Depth: 17 inches (43.2 cm) Height: 16 inches (40.6 cm)
Weight	~20 lb (~9 kg)
Clearance	2 inches (5 cm) in rear
Network Connection	TCP/IP connectivity (i.e., Internet) using a standard Ethernet connector. Instruments must be placed near an active Ethernet port so the computers can be networked. The Instrument Control Software has the ability to email notifications to customers if it is networked. In addition, RainDance has software that allows us, with customer permission, to access the computers to look at log files to assist in troubleshooting and to assess instrument performance. Without Internet access, support is compromised.
<b>Instrument Control (IC) Monitor</b>	
Power	Voltage: 100 to 240 VAC Dell Monitor: 75 W max, 35 W typical Standard grounded outlet within 6 feet (2m) of the instrument
Dimensions	Width: 15 inches (38.1 cm) Depth: 10 inches (25.4 cm) Height: 19 inches (48.3 cm)
Weight	~12 lb (~5.4 kg)
Clearance	0.5 inches (1.2 cm) in all directions

**Table 2-3: Operating Environmental Requirements**

Requirement or Specification	Description
Laboratory Ambient Temperature Range	15-30°C
Ambient Temperature Fluctuation	<0.3°C per minute
Relative Humidity	5-85% RH, non-condensing
Atmospheric Pressure	101-81 kPa (1010-810 mbar) or sea level to 1800 m
Safety Compliance	IEC 61010-2010 (3rd edition), the international safety standard for laboratory equipment, including USA (UL), Canadian (CSA), and European (CENELEC/EN) differences.
Data backup	RainDance suggests using a standard backup procedure for any computer system.

# CHAPTER 3

## Installation and Setup

This chapter covers the following topics:

<b>Space Requirements</b>	<b>page 3-2</b>
<b>Connecting the RainDance Source to the Instrument Controller</b>	<b>page 3-3</b>
<b>Connecting Cables to the RainDance Source Instrument</b>	<b>page 3-3</b>
<b>Connecting Cables to the Instrument Controller</b>	<b>page 3-4</b>
<b>Gas Pressure Quality</b>	<b>page 3-6</b>
<b>Starting Up the RainDance Source Instrument</b>	<b>page 3-7</b>
<b>Relocating the RainDance Source Instrument</b>	<b>page 3-8</b>

**Important:** Only trained and certified RainDance Service Representatives may remove the RainDance Source instrument from its packaging and install it.

# Space Requirements

The RainDance Source instrument is designed to be placed in standard laboratory bench environment. The Instrument Controller (IC) Workstation can be located on either the left or right side of the instrument.

**Table 3-1: RainDance Source Dimensions (Including the IC Workstation)**

Minimum Height (door open)	28 inches (71.1 cm)
Minimum Width, with the IC Workstation computer located <b>under</b> the bench top	36 inches (91.4 cm)
Minimum Width, with the IC Workstation computer located <b>on</b> the bench top	48 inches (121.9 cm)
Minimum Depth	36 inches (91.4 cm)
Minimum Clearance Behind Instrument	2 inches (5 cm)
Weight of RainDance Source Instrument and its Components	~83 lbs (~38 kg)

**Note:** Refer to the *Pre-Site Guide* for additional installation details.

## Gas Connectivity

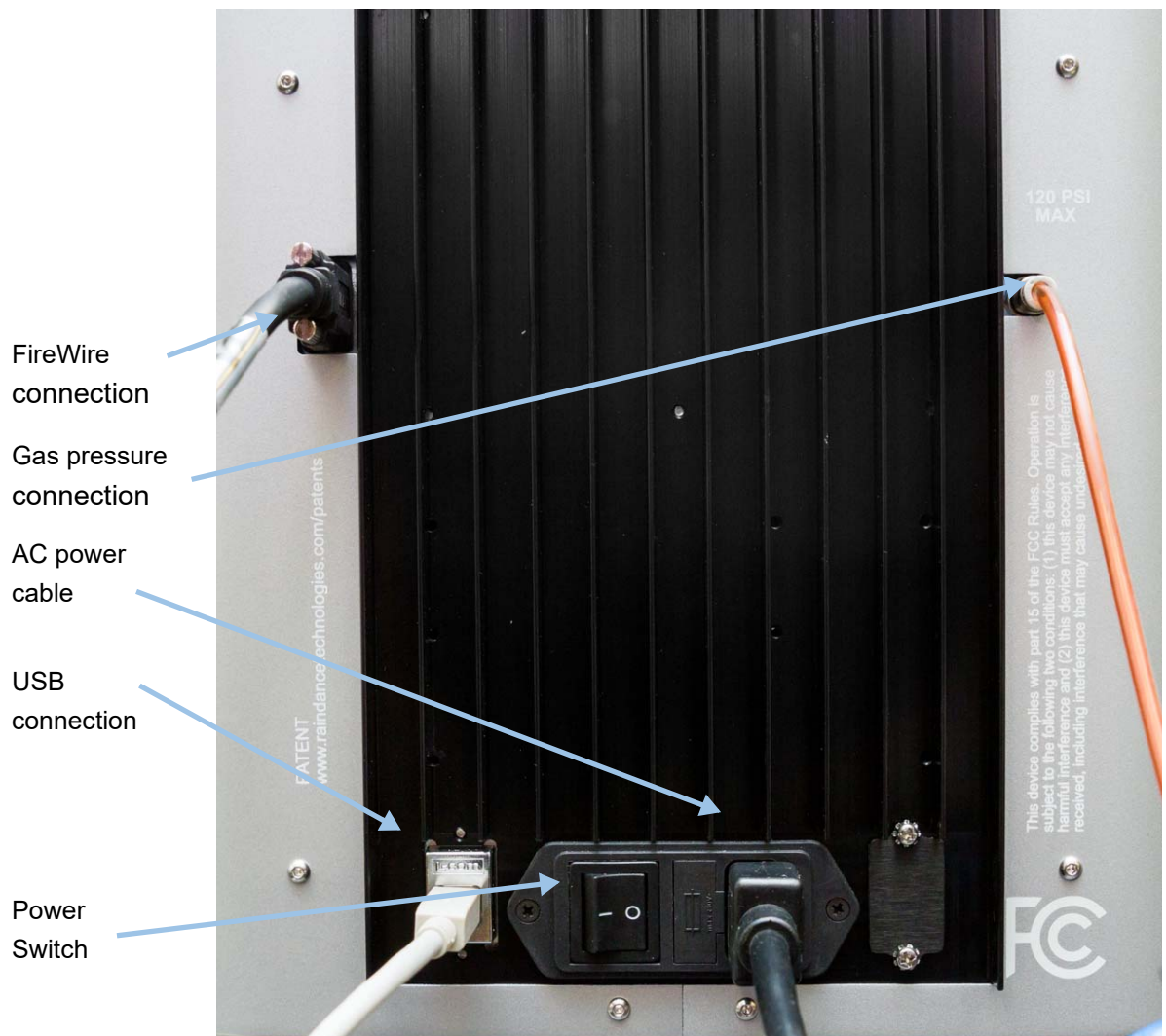
The gas source should be located near the instrument because the gas supply connection is located on the back of the instrument. See [Appendix A](#) for information on suppliers.

# Connecting the RainDance Source to the Instrument Controller

Before powering on the RainDance Source instrument and its IC Workstation, make sure all cables are properly connected as described in [“Connecting Cables to the RainDance Source Instrument”](#) on page 3-3 and [“Connecting Cables to the Instrument Controller”](#) on page 3-4.

## Connecting Cables to the RainDance Source Instrument

The RainDance Source instrument has three cable connections (AC Power Cable, USB, and FireWire) and a gas pressure connection as shown in [Figure 3-1](#).



**Figure 3-1: Cable Connections on RainDance Source**

1. Plug one end of the AC Power Cable into the Power Cable Connection and the other end into a standard grounded wall outlet.

**Important:** The Detachable Main AC Power Cable for North America or other countries with 120 VAC 50/60 Hz supply voltage provided for the RainDance Source instrument is a 3-wire cord, 18AWG, 10A, 125VAC. Never substitute a Detachable Main AC Power Cable with a lower current or voltage rating.

2. Plug the other two cables into the connections on the RainDance Source instrument as shown in [Figure 3-1](#). Plug the USB Cable into the USB connection and the FireWire Cable into the FireWire connection. Gently tighten the FireWire connection using the two thumb screws.
3. Connect one end of the gas pressure cable to the gas pressure inlet and the other end to the gas pressure source.

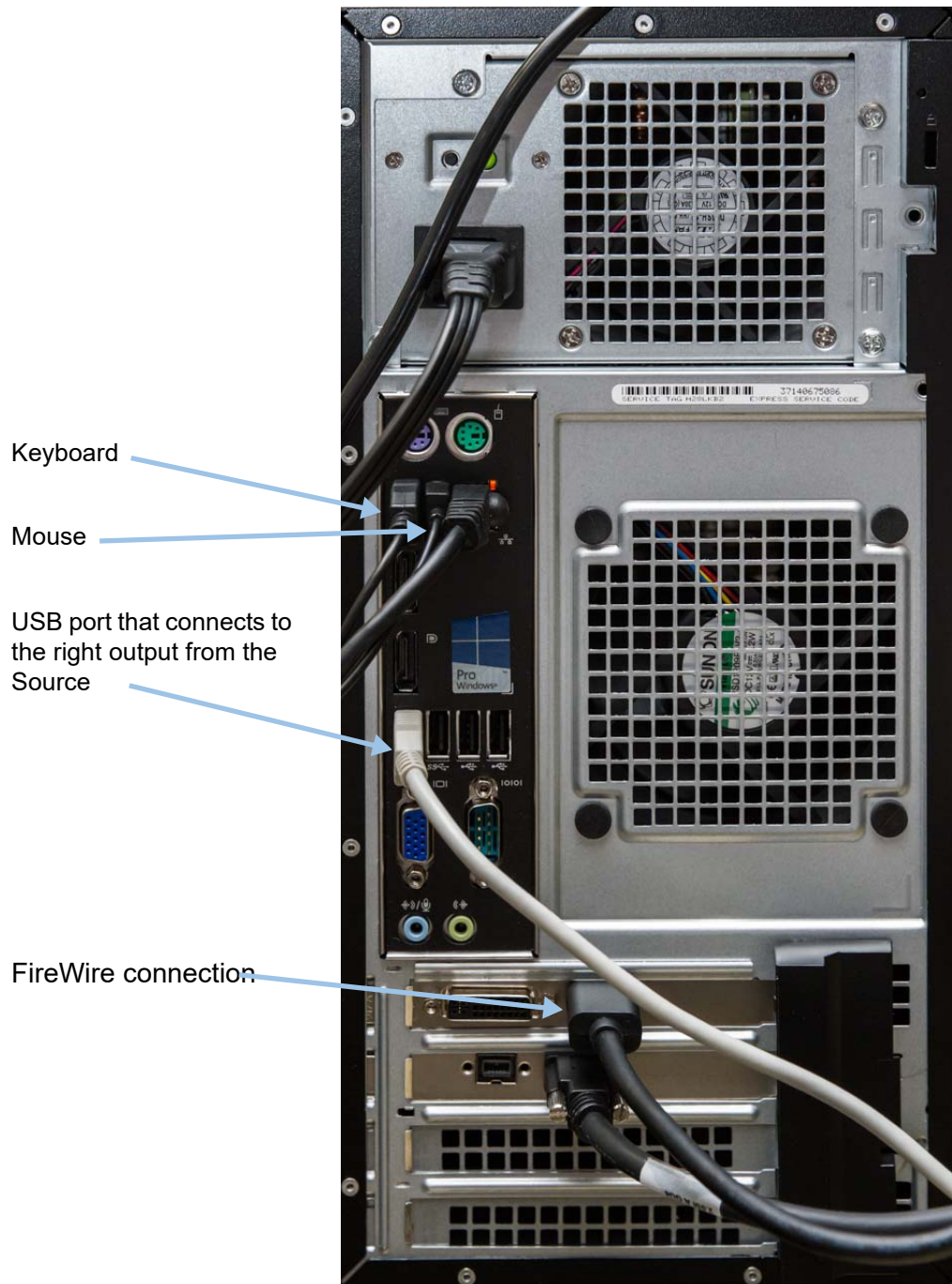
## Connecting Cables to the Instrument Controller

The IC Workstation has USB connections for:

- The mouse
- The keyboard
- The RainDance Source instrument
- The FireWire connection for the RainDance Source instrument

[Figure 3-2](#) illustrates the USB cable connections on the IC Workstation.

**Note:** It is important that all the USB cables are connected to their USB ports. Failure to connect the USB cable correctly can result in a loss of communication with the RainDance Source instrument. In addition, the USB connections on your workstation may differ from those shown in [Figure 3-2](#).



**Figure 3-2: USB Cable Connections to the IC Workstation**



1. With the IC Workstation turned off, plug the USB cables for the keyboard and mouse into the IC Workstation.

The IC Workstation has three FireWire cable connectors (see [Figure 3-3](#)).

2. Plug the FireWire cable from the RainDance Source instrument into one of the FireWire connections in [Figure 3-3](#) on the IC Workstation.



Figure 3-3: FireWire Connectors on the IC Workstation

## Gas Pressure Quality

You may use compressed argon or nitrogen. Ensure that the compressed gas system you use meets the following standards.

The input pressure must be regulated to a value within the range of 90-120 psi.

In addition, the quality must meet the ISO/DIS8573 compressed gas quality standard, Class 2 for instrument quality gas, as follows:

**Table 3-2: Gas Pressure Quality**

Oil (ppm)	0.1
Water (dew point)	-40°F (-40°C)
Dirt (μ)	1.0

# Starting Up the RainDance Source Instrument

Use the following startup sequence for the RainDance Source instrument:

1. With the RainDance Source instrument and IC Workstation turned off, ensure that all the cables have been connected properly as described in [“Connecting Cables to the RainDance Source Instrument” on page 3-3](#) and [“Connecting Cables to the Instrument Controller” on page 3-4](#).
2. Turn on the IC Workstation (on the front of the workstation).
3. Log on to the Windows 7 operating system using the RDT User account.
  - User name = RDT
  - No password

**Note:** Logging on using any other account results in ICS failures.

4. Turn on the RainDance Source instrument (located on the back of the instrument).
5. Wait one minute for the RainDance Source instrument to perform internal initialization. As the instrument initializes, the lights on the panel illuminate to indicate its status ([see Figure 3-4](#)).



**Figure 3-4: RainDance LED Lights**

6. Launch the Instrument Control Software (ICS) application as described in [Chapter 4](#).

Table 3-3 lists the LED lights that indicate the status of the instrument.

**Table 3-3: LED Lights Within the RainDance Logo**

LED Name and Illumination Pattern	Meaning
Main Power LED is solid.	Instrument is powered on.
All LEDs, except Main Power, are rotating on and off.	Instrument is operating normally.
All LEDs flashing simultaneously.	Instrument has detected an error.
All LEDs are on.	Instrument is connected to the ICS.
All LEDs except Main Power are off.	Instrument is disconnected from the ICS.

## Relocating the RainDance Source Instrument



**Caution:** The RainDance Source instrument weighs approximately 50 lbs (22 kg). To avoid injuries and damage to the instrument, do not move it without assistance from RainDance Technologies. If you want to move your instrument either within your laboratory or to another location, contact RainDance Technologies.

# CHAPTER 4

## Launching the Instrument Control Software (ICS)

This chapter covers the following topics:

<b>Introduction</b>	<b>page 4-2</b>
<b>Microsoft Windows 7 Login</b>	<b>page 4-2</b>
<b>Starting the ICS Application</b>	<b>page 4-2</b>
<b>ICS Login Levels</b>	<b>page 4-3</b>
<b>Changing the ICS Password</b>	<b>page 4-5</b>
<b>ICS Account Types</b>	<b>page 4-6</b>
<b>ICS Initialization</b>	<b>page 4-7</b>
<b>Using Tabs in the ICS</b>	<b>page 4-11</b>
<b>Navigating Through the Tabs</b>	<b>page 4-13</b>
<b>Canceling a Process</b>	<b>page 4-13</b>
<b>Completing a Process</b>	<b>page 4-13</b>
<b>Using Scan Buttons</b>	<b>page 4-14</b>
<b>Alarms, Log, and Status Tabs</b>	<b>page 4-14</b>
<b>Status Indicators</b>	<b>page 4-10</b>

# Introduction

The Instrument Control Software (ICS) controls the operation of the RainDance Source instrument.

## Microsoft Windows 7 Login

The Instrument Control Workstation is configured with a single Microsoft Windows 7 Operating System login. Do not edit this account or add additional accounts. Failure to comply will result in ICS failures. The default login is an administrative account. The system differentiates between upper and lower case characters.

**Note:** The RainDance Support Windows Logon is provided for service use only. Using this will result in ICS failures.

## Starting the ICS Application

The startup sequence works as follows:

1. Power on each component of the RainDance Source System in the following sequence:
  - Power on the Instrument Control Workstation and login to Windows.
  - Power on the RainDance Source instrument. Wait one minute.
2. Click the ICS icon on your desktop:



**Note:** You can also start the ICS application by selecting Windows 7 Start Program Menu, and then selecting **Start > All Programs > RainDance Technologies > Launch ICS.exe**.

**Note:** The IC Workstation must be dedicated to operating the ICS. Use it only for RainDance designated application and software uses.

The Login window opens (see [Figure 4-1](#)).

The image shows a login window for RainDance Technologies. It features two input fields: 'Username' and 'Password'. Below these fields are two buttons: 'Login' and 'Cancel'. At the bottom of the window is the RainDance Technologies logo, which consists of a stylized globe icon followed by the text 'RainDance Technologies'.

**Figure 4-1: Login Window**

3. Enter your Login information in the appropriate fields. Enter the **Username** followed by the **Password** and then click **Login** (check login information below).

**Note:** Windows 7 Usernames are not case sensitive, but passwords are. In ICS, both are case sensitive.

## ICS Login Levels

The ICS application supports two levels of access to the ICS program: User and Administrator. The ICS application is configured with two default login IDs: one for User and one for Administrator. RainDance recommends that you change the default password on each of these accounts after initial use.

**Table 4-1: ICS Default User and Administrator Login Information**

Requirement or Specification	Description
User Login Username	User
User Login Password	user
Administrator Login User Name	Admin
Administrator Login Password	admin



**Caution:** After three failed attempts to log in with the wrong password, the ICS application locks the account. You will not be able to log in to your account. If this happens, you must contact someone in your facility with an Administrator account who can either unlock or reset your password. For details, see [Chapter 7](#).

Figure 4-2 shows the message for a failed login.

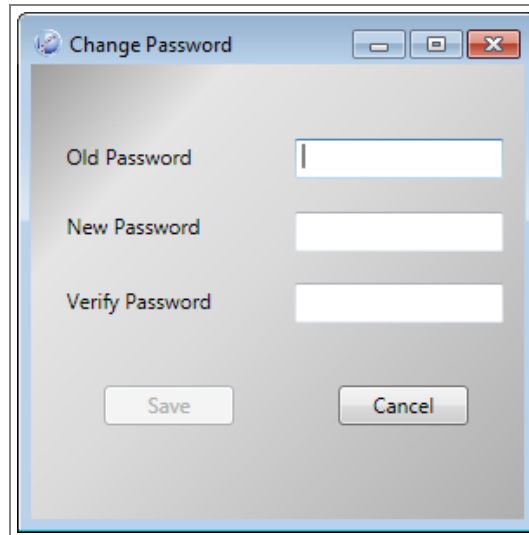
The screenshot shows a login dialog box with a light gray background. At the top, the text "Invalid username, try again" is displayed in a small, dark font. Below this, there are two labels: "Username" and "Password", both in a bold, dark blue font. Each label is followed by a white text input field with a thin blue border. Below the input fields are two buttons: "Login" and "Cancel", both with a gray gradient and rounded corners. At the bottom of the dialog box is the RainDance Technologies logo, which consists of a circular icon with a blue and red design to the left of the text "RainDance" in a large, bold, blue font, with "Technologies" in a smaller, lighter blue font below it.

**Figure 4-2: Invalid Username Message**

## Changing the ICS Password

This section describes how to change an ICS password. RainDance recommends that you change the default User and Administrator passwords after initial use.

1. Select **Change Password** from the **Home** menu. The Change Password dialog opens as shown in [Figure 4-3](#).



**Figure 4-3: Change Password Window**

2. Enter the old password in the **Old Password** field, the new password in the **New Password** field, and the new password again in the **Verify Password** field. Click **Save** when you are done to save the new password. Click **Cancel** to dismiss the dialog without saving your changes.



## ICS Account Types

Your account type defines the features you have access to (User and Administrator) within the ICS application.

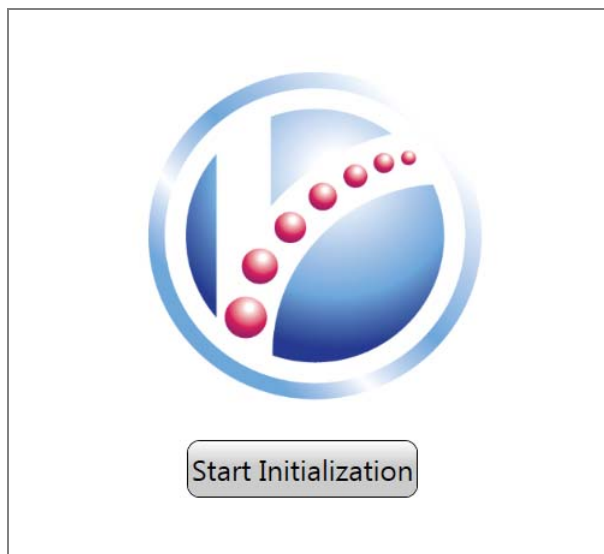
**Table 4-2: ICS Account Type**

Feature	User	Administrator
Change Passwords	X	X
Export Instrument Files	X	X
View Runs	X	X
Maintenance Actions		X
Add New Users		X
Edit Users		X
Reset Passwords		X
Unlock Passwords		X
Start Runs	X	X
Stop Runs	X	X

Depending on the type of account you login with, although the screens look the same, the pull-down menu selections available are slightly different for a User and an Administrator account. For information on the pull-down menus, see [Chapter 7](#).

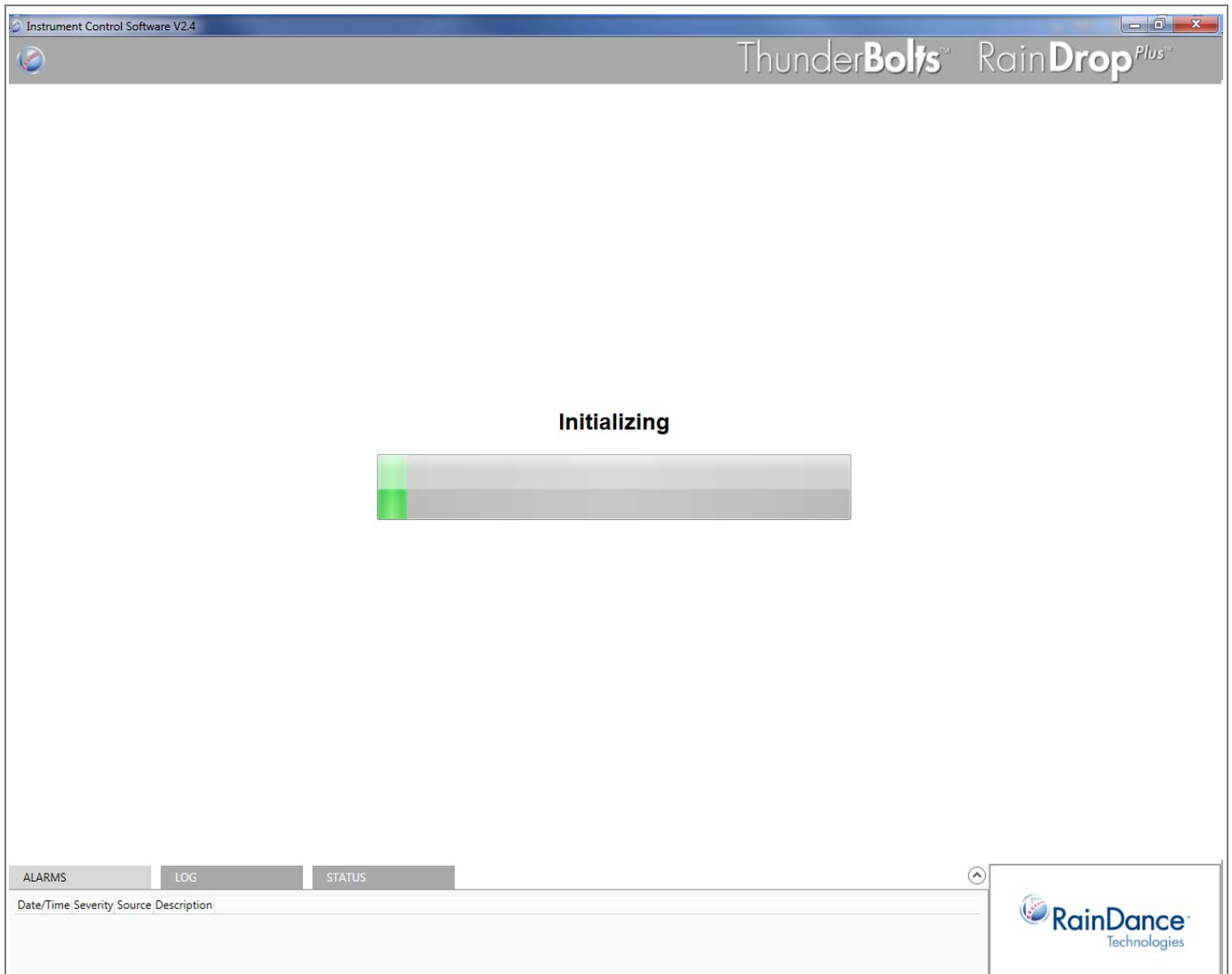
## ICS Initialization

When you log in to the instrument, the Initialization screen appears (see [Figure 4-4](#)).



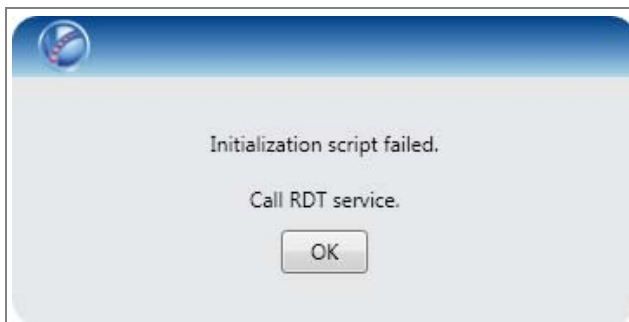
**Figure 4-4: Initialization Screen**

From the Initialization screen, click **Start Initialization** to initialize the system. A progress bar shows the progress of the initialization.



**Figure 4-5: Initialization Progress Bar**

If initialization fails, the following message appears:

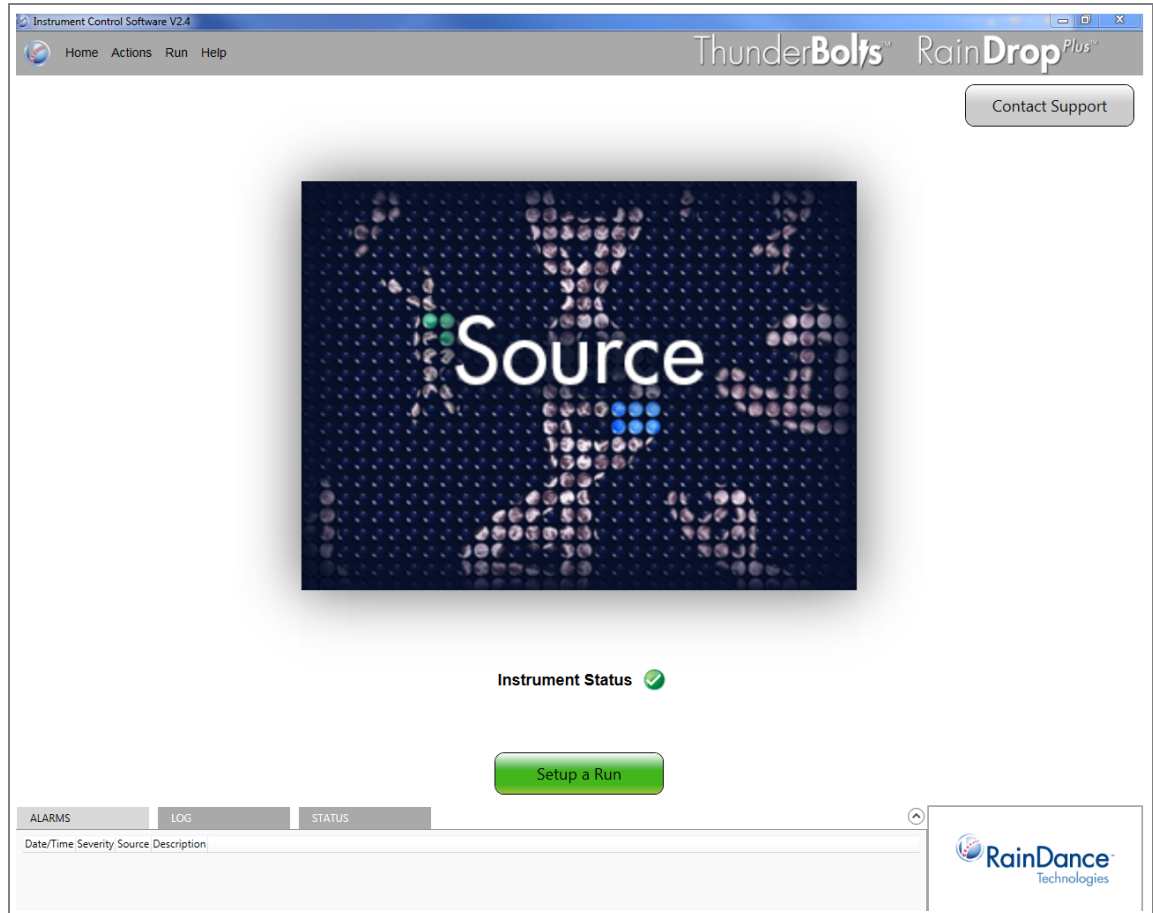


**Figure 4-6: Initialization Failure Message**

Click **OK** and contact RainDance Support. See [“RainDance Support”](#) on page 1-3.

If initialization is successful, the ICS home page is displayed (see [Figure 4-7](#)).

**Note:** All menu items are inactive until the initialization is finished.



**Figure 4-7: Home Page**

From the home page, you can Setup a Run. For more information, see [Chapter 5](#).

You can perform additional tasks by making selections from the drop down menus:




- View Runs (see [Chapter 7](#))
- Maintenance Actions (see [Chapter 8](#))
- Add New Users (Administrator only) (see [Chapter 7](#))
- Edit Users (Administrator only) (see [Chapter 7](#))

# Status Indicators

A common set of status indicators appears throughout the system indicating the status of an item or process being performed. In general, the green check mark (✓) indicator means that everything is working as expected and you can proceed. The orange exclamation point (!) indicator is a warning that means that you can continue, but that some optional fields are blank. The red X indicator means there is a problem that needs to be resolved before you can continue.

Table 4-3 show the status indicators and describes their meanings.

**Table 4-3: Status Icons**

Icon	Meaning
	<b>Ready</b> – If all icons are green check marks, the system is ready to start a run.
	<b>Warning (Run Will Proceed)</b> – If there are any orange exclamation point icons on the tabs, the run can start. These represent optional information.
	<b>Error (Run Will Not Proceed)</b> – If there are any red X icons on the tabs, there is an issue that may prevent the run from being performed.

# Using Tabs in the ICS

There are two tabs in the ICS: Run Data and Run Info. To perform a run, you will need to complete some of the fields on each of the tabs.

To ensure that all of the steps are completed correctly, a System Status on the right side of the tabs indicates the state of each of the required items. As you complete each step in the process the status icon for that step is updated. This section provides general information on what appears on the tabs and how to complete these processes.

Details on how to complete these processes are provided in [Chapter 5](#) and [Chapter 6](#). Those descriptions assume you are familiar with how to use the tabs described here.

[Figure 4-8](#) shows an example of the RainDance Source interface. The tabs required to complete the process are shown on the left side of the screen:

- Run Data
- Run Info

Instrument Control Software V2.4

Home Actions Run Help

ThunderBolts™ RainDrop<sup>Plus</sup>™

Raindance Run ID: 1609020911

**Run Data**

**Data Input**

Manual Import

**Run Name**

CH ID Barcode CH Enable Sample Name

A	Scan	✓	
B	Scan	✓	
C	Scan	✓	
D	Scan	✓	
E	Scan	✓	
F	Scan	✓	
G	Scan	✓	
H	Scan	✓	

**Source Chip**

Lot: Ser:

Barcode Input

Scan Manual

**System Status**

- ✓ Pressure Ready
- ✓ Carrier Oil Level
- ✗ PCR Tube Strip Inserted
- ✗ Chip Inserted
- ✓ Door Closed
- ✗ System Ready

Cancel Start Run

ALARMS LOG STATUS

Date/Time Severity Source Description

RainDance Technologies

Figure 4-8: Run Setup Tabs

Only one tab is visible at a time. The selected (or active) tab has a white background and the inactive tab has a transparent background (Run Data is the active tab in [Figure 4-8](#)).

To prepare for a run on the RainDance Source instrument, you must complete the following fields in the RainDance Source ICS:

- Run Data Tab:
  - Run Name
  - RainDance Source chip barcode lot and serial number
  - At least one selected lane (indicated by a green check mark)
- Run Info Tab:
  - Carrier Oil field and only if the instrument is out of oil

As you complete each tab, the ICS software updates the System Status for various items. If the green check mark is displayed, the item is ready to go. If an orange exclamation point is displayed, it means that optional fields are blank. If a red X is displayed, there are errors or

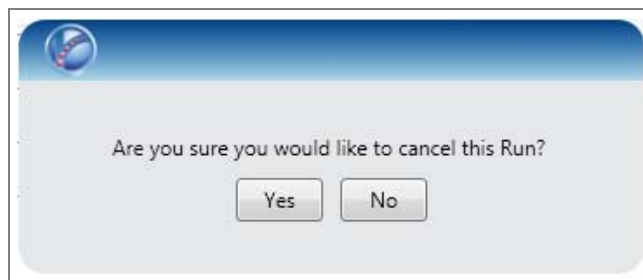
missing data required for the run (see [Table 4-3](#)). For a description of the meaning of the Status Indicators used on the tabs and throughout the system, see [“Status Indicators” on page 4-10](#).

## Navigating Through the Tabs

You can switch back and forth between the two tabs at will. Click the tab name to move to it.

## Canceling a Process

The Run Data tab has a red **Cancel** button in the lower left corner ([Figure 4-8](#)). If you click **Cancel** while a run is active, the application asks you to confirm that you want to cancel the run.



**Figure 4-9: Cancel Confirmation**

When you click **Yes**, the information you entered when you started the process is deleted, the run is canceled and you are returned to the main screen.

## Completing a Process

When you have completed each step to prepare for a run, review the System Status indicators. Ideally, all the status indicators will be green check marks, although you can still continue with orange exclamation points since they indicate only that optional fields are blank. The process cannot be started if there is even one red X (error indications) on any of the tabs.

When you are satisfied that the steps for the process are complete, click **Start Run** on the bottom right side of the **Run Data** tab. This starts the process on the RainDance Source instrument.



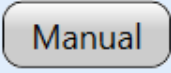
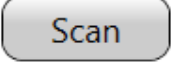
**Figure 4-10: Start Run Button**



## Using Scan Buttons

Scan buttons allow you to scan barcodes to enter information into various text fields. There are two types of Scan buttons available in the system as shown in [Table 4-4](#).

**Table 4-4: Scan Buttons**

Button	Description	Use
	Manual Scan Button	The instrument requires that you manually enter a barcode.
	Scan Button	The system allows you to scan any type of barcode.

Clicking either type of scan button activates the barcode reader on the system and allows you to scan the barcode.

If you scan the wrong type of barcode on the chip or on the oil syringe, an error message appears. ICS will not accept an invalid barcode.

## Alarms, Log, and Status Tabs

The Alarms, Log, and Status tabs are displayed on the bottom of the screen as shown in [Figure 4-11](#). Each of these tabs is described below.



**Figure 4-11: Example of Screen Showing Alarms, Log, and Status Tab at Bottom**

The **Alarms** tab is displayed by default. Click **Log** or **Status** to display that tab.

- **Alarms Tab** – This tab lists instrument errors that exist in the system. If an error appears, the system is in a warning or error state. Different errors occur during the setup of the instrument. If an error does not clear when you close the door and click Start Run, contact [support@raindancetech.com](mailto:support@raindancetech.com) for assistance.
- **Log Tab** – This tab is used for service purposes. It is used to check on the system automation.
- **Status Tab** – This tab is used for service purposes. It is used to determine the status of the instrument at different points during operation.

# CHAPTER 5

## Performing a Source Run - Digital PCR

This chapter covers the following topics:

<b>Introduction</b>	<b>page 5-2</b>
<b>Preparing the Sample</b>	<b>page 5-2</b>
<b>Gathering Supplies</b>	<b>page 5-2</b>
<b>Starting a Source Run</b>	<b>page 5-2</b>
<b>Completing the ICS Setup</b>	<b>page 5-9</b>
<b>Checking the Status Indicators</b>	<b>page 5-9</b>
<b>Completing the Run Data Tab</b>	<b>page 5-11</b>
<b>Completing the Run Info Tab</b>	<b>page 5-12</b>
<b>Completing the Run Tabs Using the Import Function</b>	<b>page 5-14</b>
<b>Using Email Notification</b>	<b>page 5-15</b>
<b>Performing the Run</b>	<b>page 5-17</b>

# Introduction

Perform the operations described in this chapter on the RainDance Source instrument. This procedure requires a number of consumables (available from RainDance Technologies and other manufacturers).

**Note:** For the list of required consumables, see [“RainDance Source Consumables and Equipment” on page A-1](#).

This chapter describes how to start a run on the RainDance Source instrument. Some of the steps involve preparing the physical components of the system and some of them take place within the ICS software.

For detailed information the ICS software, see [Chapter 4](#) and [Chapter 7](#).

## Preparing the Sample

Refer to the *RainDrop dPCR Assay Guidelines* for information on preparing the sample.

## Gathering Supplies

To start a run on the RainDance Source instrument, have the following equipment and supplies available:

- Gloves, either nitrile or latex
- Single pipettor or 8-channel pipettor and tips for sample volumes up to 50  $\mu$ L
- RainDance Source Chip
- Carrier Oil, shipped in syringes, P/N 30-07117
- 0.2 mL 8-Tube PCR Tube Strips, Axygen P/N PCR-0208-C
- PCR Tube Strip Caps, P/N 20-06087
- Tube Strip with Caps Axygen P/N PCR-0208-CP-C



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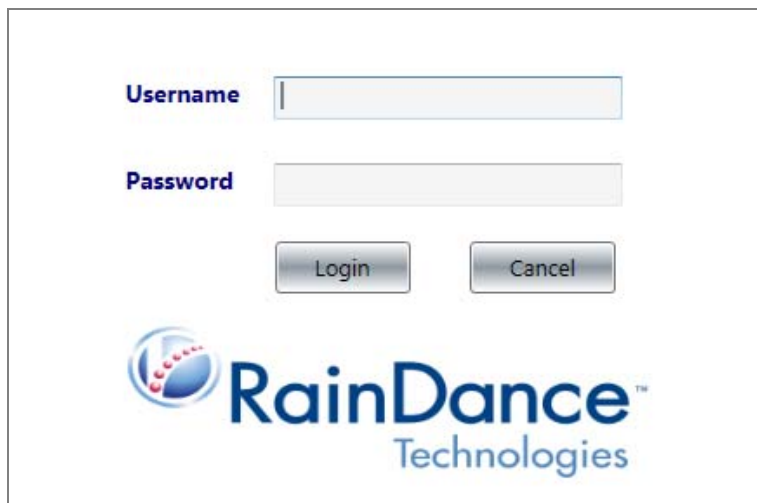
**Caution:** Use only Axygen 0.2 mL PCR tube strips.

---

## Starting a Source Run

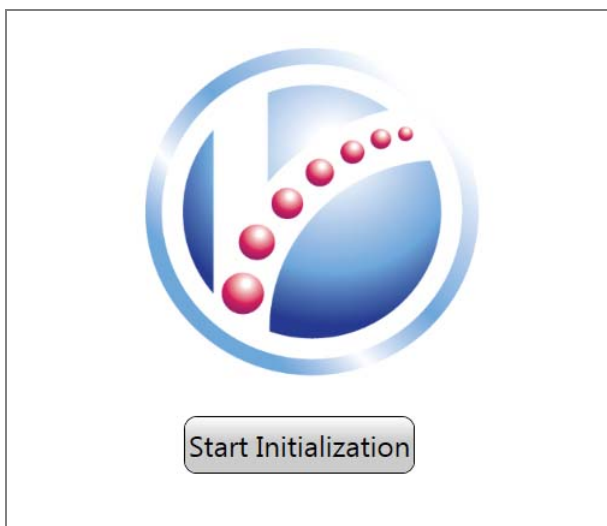
This procedure assumes you have prepared your sample and that you have assembled all the necessary equipment and supplies to begin a run on the RainDance Source instrument. In addition, it assumes that you have powered up the RainDance Source instrument as described in [Chapter 4](#).

1. Launch the ICS software for the RainDance Source instrument and log in.



**Figure 5-1: Login Screen**

2. Click **Start Initialization**.



**Figure 5-2: Initialization Screen**

3. When you click **Start Initialization**, the system automatically prepares the instrument for normal operation. It sets valves and pressures and turns the laser in the barcode reader off. In addition, it homes the motion control subsystem. Initialization takes approximately three minutes.

**Note:** If initialization fails, the ICS returns to the **Initialization** screen after about ten minutes. Contact RainDance Support for assistance. See [“RainDance Support”](#) on [page 1-3](#).

4. Click **Setup a Run**.

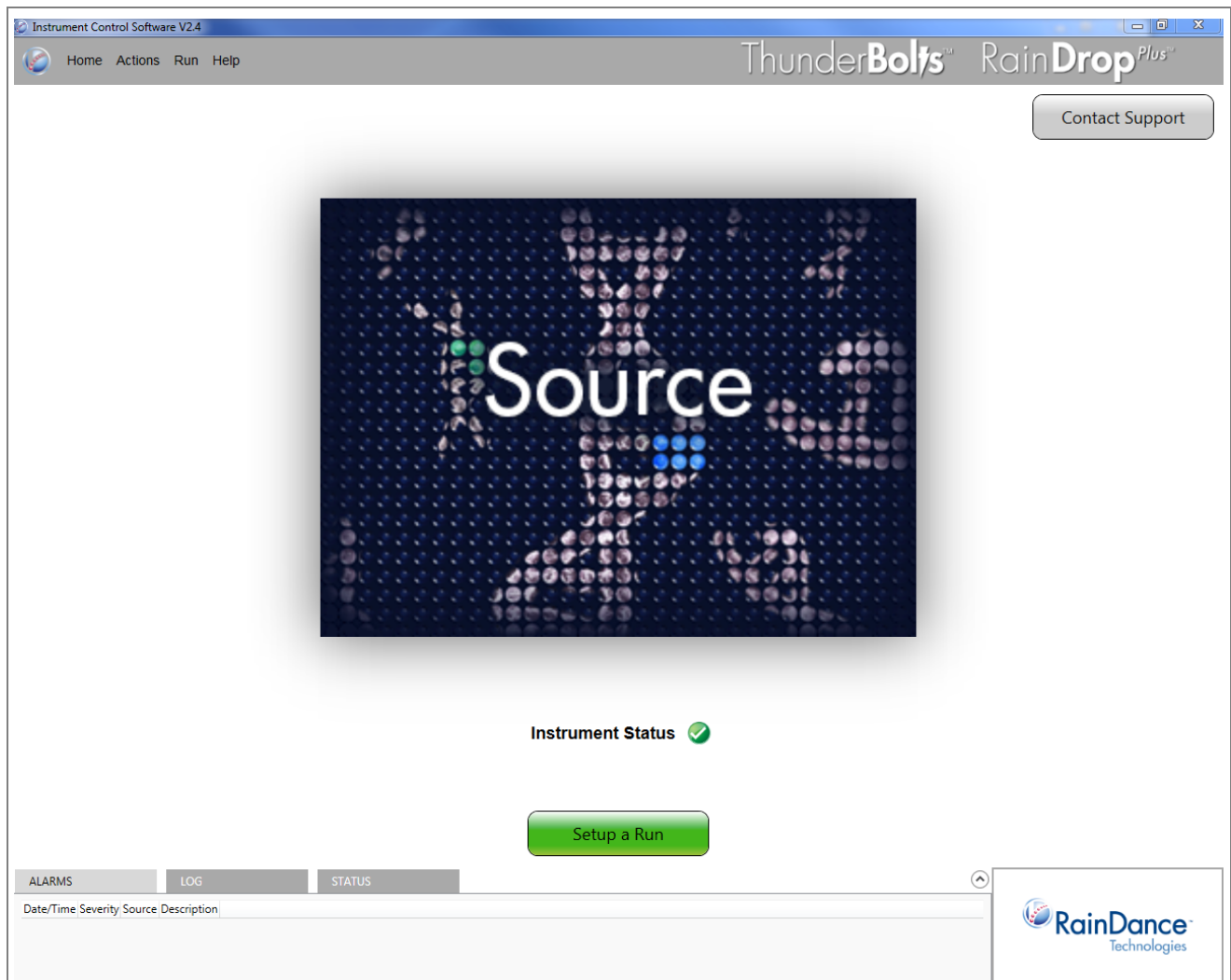


Figure 5-3: Instrument Status and Setup a Run Screen

5. Select the **Run Info** tab.

6. On the Run Info tab, click **Open Door**. The door on the RainDance Source instrument unlocks. Lift the door to the fully open position.
7. Locate a new PCR tube strip.

Each PCR tube strip contains eight 0.2 mL conical bottom tubes. Small numbers on the tube strip indicate correct orientation. Note this orientation.

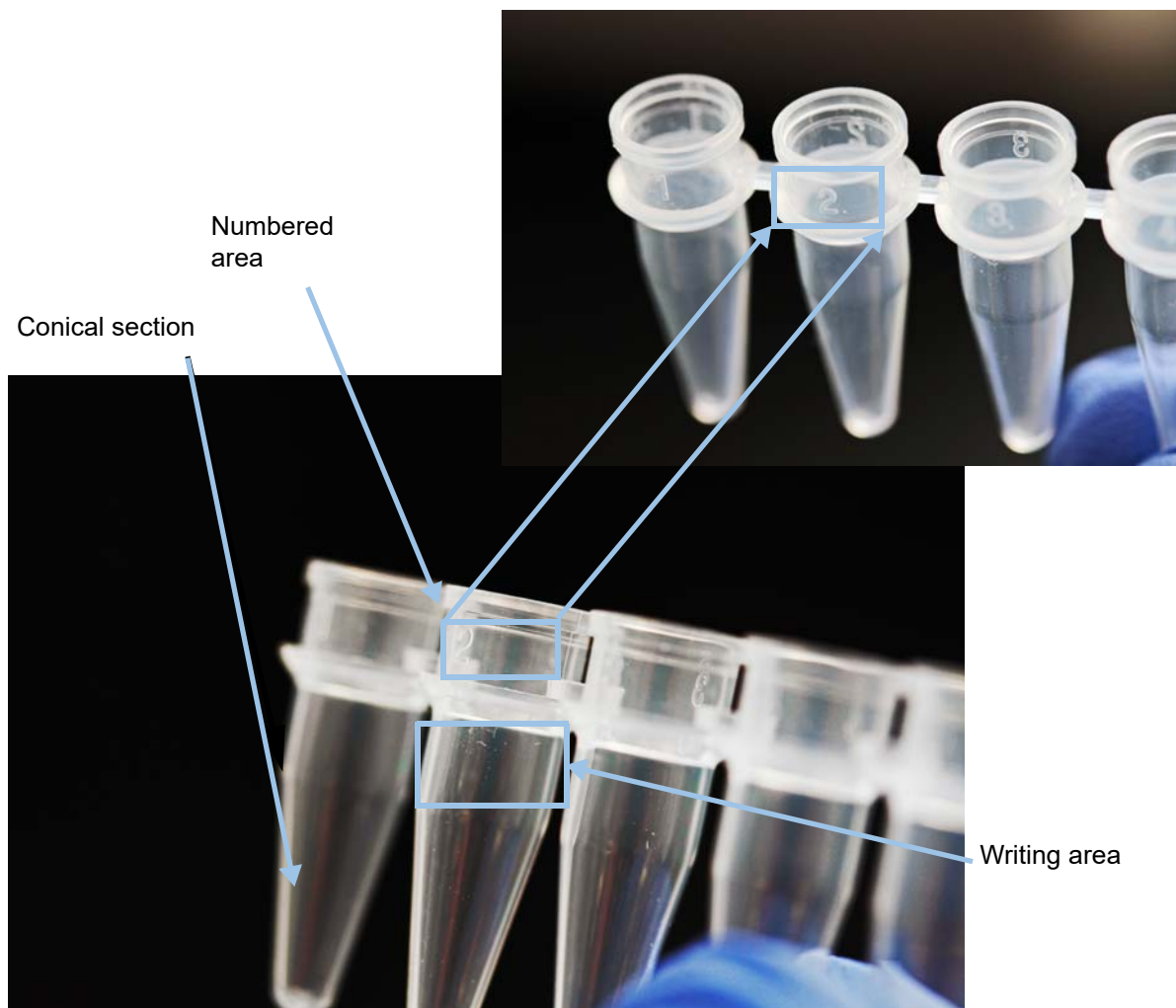


Figure 5-4: Tube Strip

**Note:** If you need to write anything on the tube strip for identification, make sure you write **above** the conical bottom section of the tube. Writing on the bottom part of the tube may interfere with sensors.

8. Insert a new tube strip into the instrument. Ensure that it is oriented correctly by placing the number 1 tube to the left. Refer to [Figure 5-6](#) to see how to orient the tube strip inside the instrument.



**Figure 5-5: Tube Strip**



**Figure 5-6: Tube Strip Inserted into the Source**

9. Remove a RainDance Source chip from its packaging; for more information on the chip, see [see “RainDance Source Chip” on page 2-8](#). Handle the chip as follows:
  - Always wear gloves when handling the chip.
  - Grasp the chip by its sides. Do not grab the chip by the oil input gaskets. Refer to [Figure 5-10](#) to see how to grasp the chip.
  - Do not touch the sample input wells or emulsion output nozzles.
  - Do not touch the clear microfluidic chip nor the imaging region of interest.



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**Caution:** Use care when removing the chip from its bag to avoid accidentally breaking the nozzles.

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- Make sure that when you place the chip on a bench, you do not allow nozzles to touch the table, lab bench, or any other work space or surface.
- Place it only on a clean, solid bench surface. RainDance recommends using a laminar flow hood for loading the chip. Do not place it on a lab mat or on a kim wipe.

10. Place the chip on the bench. Do not fill the chip while it is in your hand.



Output nozzles do not  
touch the bench.

**Figure 5-7: Source Chip Placed on a Bench**

11. Pipette the sample into the chip by loading the sample into the bottom of the sample input wells located on top of the chip. Fill all eight wells up to a maximum of 50  $\mu\text{L}$ . To do so, gently orient the tip at the bottom of the well.

**Note:** Do not pipette along the side of the well because this may cause the liquid to remain stuck to the side of the sample input well, especially with 25  $\mu\text{L}$  samples. Do not jam the tip down to the bottom of the well. This may cause the premature loss of the sample into the chip.

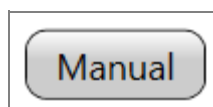




**Figure 5-8: Pipetting the Sample into the Source Chip**

12. Scan the chip by clicking **Scan** in the ICS software. The red scanner light pulses for 10 seconds. Hold the chip in front of the barcode reader. When the scanner reads the barcode, it automatically fills in the barcode information. The ICS accepts a barcode in the 2D Data Matrix format, which allows up to 96 characters of text. You may hear a subtle beep tone from the Source instrument.

If the scanner does not read the barcode, the ICS software displays a message and allows you to enter the barcode manually. To do so, click the Manual button and enter the barcode numbers from the label on the chip. In manual mode, the ICS accepts up to 99 characters of text.



**Figure 5-9: RainDance Scan Icon**

13. Insert the chip into the RainDance Source instrument. Orient the chip over the alignment pins and press down until it stops. Do not insert it at an angle. The RainDance Source instrument will not allow you to proceed until the chip is oriented properly.

**Note:** Run the RainDance Source chip immediately after loading it. Do not load a number of chips at once and allow them to wait a period of time before you run them. The sample can wick into the chip and become unusable.

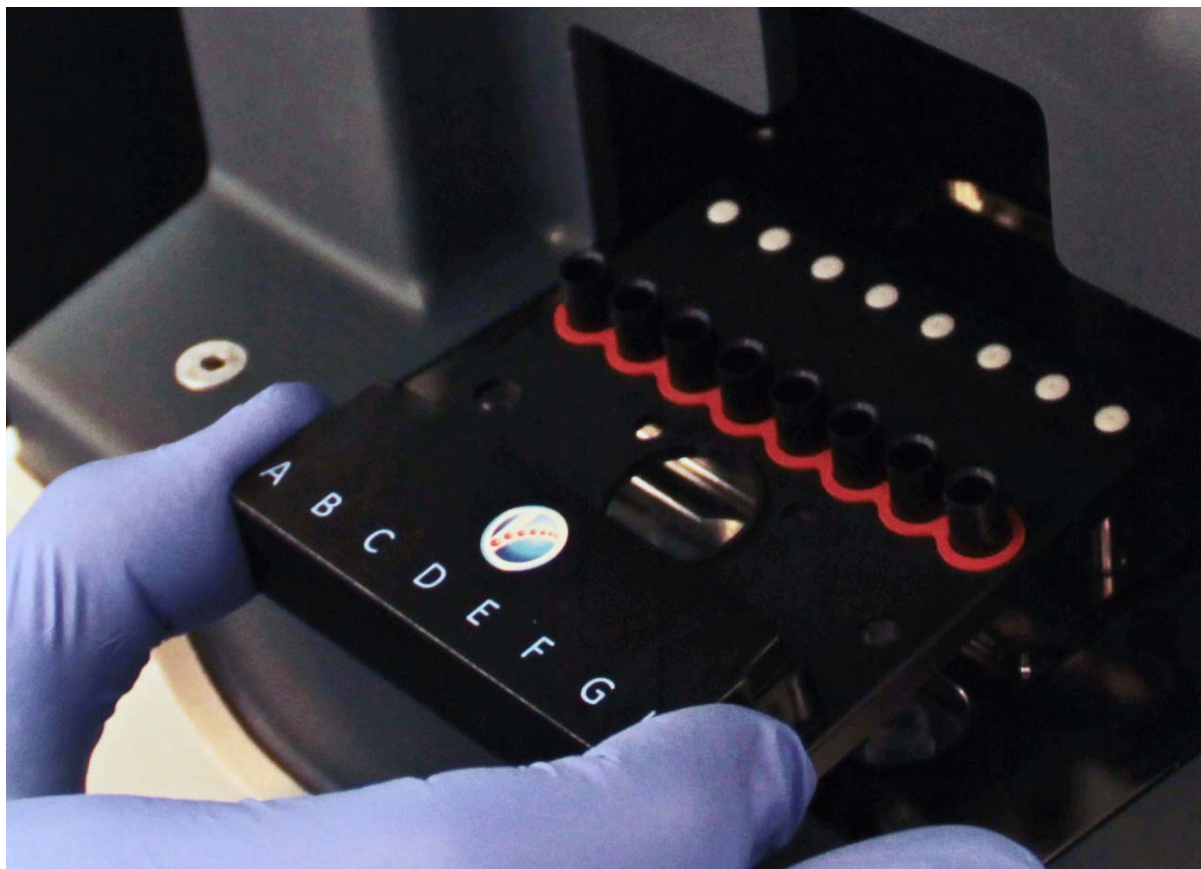


Figure 5-10: Inserting a Chip

After you insert the chip, you are done setting up the physical components.

14. Close the door on the RainDance Source instrument. Press the door down until the latch is engaged. The **Door Closed** status changes on the System Status indicators.

## Completing the ICS Setup

Before starting a run on the RainDance Source instrument, you must complete a number of setup steps. The steps ensure that the instrument is ready for operation and ensure that data about the run is provided. They include:

- Checking the status of various components
- Completing the Run Data
- Completing the required fields of the Run Info (mostly optional)

## Checking the Status Indicators

Status indicators tell you about the readiness of the instrument.

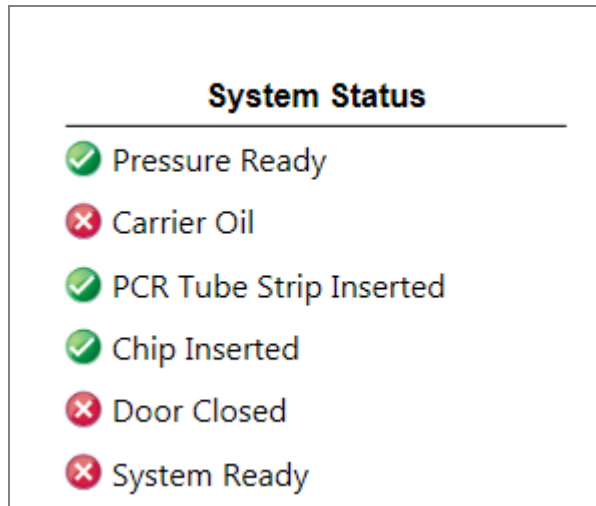


Figure 5-11: System Status

The status indicators are described in the following table.

Table 5-1: System Status Indicators

Indicator	Meaning
<b>Pressure Ready</b>	Indicates the status of the instrument gas pressure. When the pressure is sufficient, the ready indicator is displayed.
<b>Carrier Oil</b>	Indicates the status of the oil reservoir. When there is sufficient oil to complete a run, the ready indicator is displayed. A valid carrier oil lot number is required for the green check mark to be displayed.
<b>PCR Tube Strip Inserted</b>	Indicates the presence of the tube strip. When the tube strip is inserted properly into the instrument, the ready indicator is displayed.
<b>Chip Inserted</b>	Indicates the presence of the RainDance Source chip. When the chip is present and inserted properly, the ready indicator is displayed.
<b>Door Closed</b>	Indicates the status of the instrument door. When the door is properly closed, the ready indicator is displayed.
<b>System Ready</b>	Indicates the overall status of the instrument. When all the requirements of the instrument are present and ready for a run, the ready indicator is displayed.

In addition to satisfying the Status Indicators, you must also have scanned or input the barcode number from a RainDance Source chip.

## Completing the Run Data Tab

The **Run Data** tab opens after you click **Setup a Run** (see [“Starting a Source Run” on page 5-2](#)) and contains the details about the contents of the run. You can enter this information manually or it can be imported from a CSV file.

Instrument Control Software V2.4

Home Actions Run Help

ThunderBolts™ RainDrop<sup>Plus</sup>™

Run Data Raindance Run ID: 1609020911

Data Input Manual Import

Run Name

CH ID	Barcode	CH Enable	Sample Name
A	Scan	✓	
B	Scan	✓	
C	Scan	✓	
D	Scan	✓	
E	Scan	✓	
F	Scan	✓	
G	Scan	✓	
H	Scan	✓	

Source Chip

Lot: Ser:

Barcode Input Scan Manual

System Status

- ✓ Pressure Ready
- ✓ Carrier Oil Level
- ✗ PCR Tube Strip Inserted
- ✗ Chip Inserted
- ✓ Door Closed
- ✗ System Ready

Cancel Start Run

ALARMS LOG STATUS

Date/Time Severity Source Description

RainDance Technologies

Figure 5-12: Run Data Tab

Only the following fields on the **Run Data** tab are required for the run to proceed:

- Run Name
- RainDance Source chip barcode lot and serial number
- At least one selected well (indicated by a green check mark)

Your lab procedures determine how much of the optional information is necessary for your specific situation.

Table 5-2: Run Data Fields

Field Name	Meaning
<b>Run Name</b>	The name of the run. Run name is required and can contain up to 20 characters.
<b>Wells A - H</b>	The sample identifier for each tube (or lane) on the chip. These fields are not required, but you must select at least one lane.
<b>Source Chip Lot &amp; Serial Number</b>	The identifiers for each Source Chip. This information is automatically completed when you scan the chip and is required.

## Entering the Run Data

Enter the run data as follows:

1. Type the name of the run into the **Run Name** field. The field allows you to enter up to 300 characters; however, RainDance advises that you keep the name to a manageable length since it is used for the filename of the run.
2. If necessary, enter well information in one of the following ways:
  - Type the name for the lane manually. When you enter the name manually, the field limits entry to 20 characters.
  - Scan the barcode from a printout. To do so, place the printout in front of the barcode reader and click **Scan** next to the correct lane. When you enter the name using the scanner, the field limits entry to 96 characters.
  - Import the lane information as described in [see “Completing the Run Tabs Using the Import Function” on page 5-14](#).
3. All lanes are selected by default. Deselect any lanes you are not using. At least one lane must be selected in order for the run to proceed.

**Note:** The Source Chip field should already display the information you scanned earlier in [see “Starting a Source Run” on page 5-2](#).

## Completing the Run Info Tab

The fields on the Run Info tab contain information about the run. The only field on this tab that is required is the Carrier Oil field and only if the instrument is out of oil. You do not need to select this tab and complete any fields if there is a green check mark next to Carrier Oil in the system status and you do not intend to enter any of the optional information as shown in [Figure 5-13](#).

Figure 5-13: Run Info Tab

Your lab procedures determine how much of the optional information is necessary for your specific situation. Enter the optional run information as follows:

Table 5-3: Run Info Fields

Field Name	Meaning
<b>Operator</b>	The name of the person performing the run.
<b>Tube ID</b>	The identifier of the sample to be run.
<b>Run Notes</b>	Any detailed descriptive information you want stored with the run information.



## Completing the Run Tabs Using the Import Function

To complete the run tabs using the import function:

1. Click **Import** at the top of the **Run Data** tab. A dialog opens allowing you to locate and select a file to import. The CSV file type is already selected in the drop-down in the lower right corner of the dialog.

**Note:** The Import function allows you to import data only from CSV files.

2. Locate the file to import and click **Open**.
3. ICS imports only the following fields. Refer to [Table 5-4](#) for detailed information on the contents of the CSV file:
  - On the Run Data tab:
    - Run Name
    - Lane Information
  - On the Run Info tab:
    - Operator
    - Tube ID
    - Run Notes
4. Edit any of the imported fields, as necessary.
5. Complete any other of the optional fields.

**Table 5-4: Import Fields in CSV**

Line Number	Name	Value	Length
1	Run Name	Contents of the <b>Run Name</b> field on the Run Data tab. User entry identifying the run.	128
2	Operator	Contents of the <b>Operator</b> field on the Run Info tab. User entry identifying the operator.	128
3	Run Notes	Contents of the <b>Run Notes</b> field on the Run Info tab. Free-form text entered by the user.	500
4	Tube ID	Contents of the <b>Tube ID</b> field on the Run Info tab. User entry identifying the tube strip.	128
5-12	Lane Info	Contents of lanes <b>A</b> through <b>H</b> on the Run Data tab. User entry identifying the Samples.	128

## Using Email Notification

The RainDance Source instrument is located in a lab space which may be a distance from your desk or usual work area. Email Notification allows you to receive messages when a run is finished, so that you do not have to continually check the instrument. Select **Send Run Emails** on the Run Info tab. If email addresses have been entered by an Administrator, they appear in the Email Notification field. You can leave these addresses as is, edit them, or add to them. Notifications are sent to those addresses.

**Note:** Email notification does not support text messaging.

### Setting Up Email Notification (Administrator)

Setup Email Notification as needed. You do not have to edit these settings for each run. You can establish email settings and then not change them unless you need to change who is notified at the end of a run.

To enter email addresses:

1. Select **Setup Email** from the **Actions** menu. The **Email** dialog opens.
2. Enter email addresses in the **Email Notification** field, separated by semi-colons. These email addresses will appear on the Run Info tab by default.
3. Select **Send Run Emails**, if you want this to be the default action.
4. Click **Save** to save the new addresses. Click **Close** to dismiss the dialog.

### Email Messages

Email messages contain the following information:

**Table 5-5: Email Message Data**

Field Name	What is reported
<b>RainDance ID</b>	The serial number of the instrument.
<b>Run Name</b>	The name the user entered in the Run Name field prior to beginning the run. If the user does not enter a Run Name, this lists a name provided by the RainDance Source instrument.
<b>Description</b>	This field includes the comments entered by the user at run time, if any.
<b>Start Time</b>	The date and time the run was started.
<b>End Time</b>	The date and time the run ended.



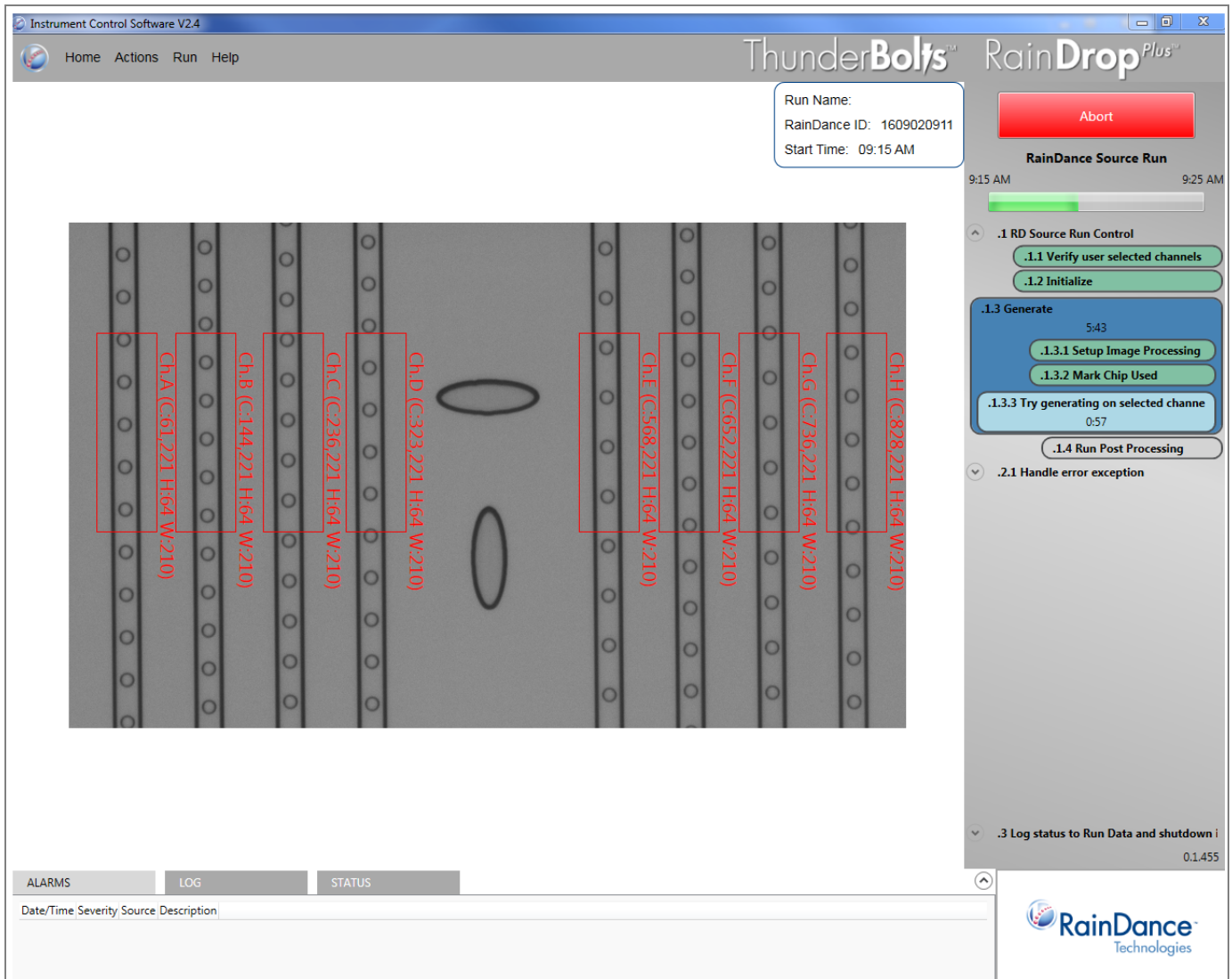
**Table 5-5: Email Message Data**

<b>Sample Info</b>	For each sample, it lists: Lane, Sample Description, CV (coefficient of variance), Read Length, and Status.
<b>Total Samples</b>	Lists the number of samples attempted.
<b>Samples Successful</b>	Lists the number of samples that successfully ran without errors.
<b>Samples Failed</b>	Lists the number of samples that generated an error. This also includes any samples not processed because the run was stopped because of a prior/fatal error.
<b>Errors</b>	List all errors encountered during the run.

# Performing the Run

After you have entered the required run data, you are ready to begin the run.

1. Click the **Start Run** button. The page displays the lanes of droplets moving through the device.



**Figure 5-14: Sample of a Run in Progress**

**Note:** Sometimes the drops look like they are moving backwards, but actually they are not moving backwards. This is an artifact of the image capture process used also known as a *strobe effect*.

2. Observe the display of moving droplets. Droplets appear in the display image for all lanes. When all the sample in a lane has been dropletized, you will see larger and

inconsistent droplets. Finally, the lane will be blank. This continues until all the lanes are finished and all appear blank.

Next, the RainDance Source instrument enters an emulsion detection state while the tube strip fills with additional oil and triggers the level sensor. This stage takes approximately five to fifteen minutes, depending on the sample volume.

When this step is complete, the RainDance Source instrument displays the **Run Complete** screen. It displays information for the following fields (if they were completed prior to the run): Run Name, RainDance ID, Operator, Tube ID, status of the 8 lanes (with names, green check or red X), start time of the run, and any Run Notes.

Instrument Control Software V2.4

ThunderBolts™ RainDrop<sup>Plus</sup>

### RainDance Source Run Completion

**Run Name:**  
**RainDance ID:** 1609020911  
**Operator:**  
**Tube Strip:**

---

A ✓  
B ✓  
C ✓  
D ✓  
E ✓  
F ✓  
G ✓  
H ✓

---

**Run Status:** Run completed successfully  
**Start Time:** 9/2/2016 9:11 AM **End Time:** 9/2/2016 9:37 AM  
**Run Notes:**

Open Door Contact Support View Run Report Save and Close

ALARMS LOG STATUS

Date/Time Severity Source Description

RainDance Technologies

Figure 5-15: Run Complete Screen

Next, the device enters the rinse and recovery phase to prepare for the next run. During this phase, the door is still locked. When the rinse and recovery phase is done, the door unlocks automatically.

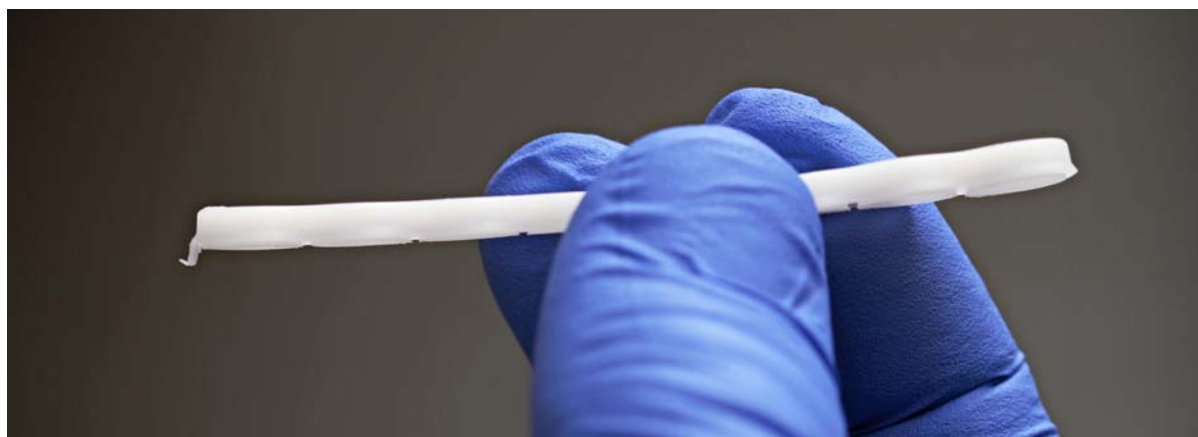
3. Lift the door to its full open position.

**Note:** If you accidentally close the door and need access, click **Open Door** to open it.

4. Remove the used chip. Place the chip into the original chip bag and discard it in a solid waste disposal container.
5. Cover the tube strip using the tube strip cap before removing the tube strip from the instrument. Orient it with the tab to the left.

**Important:** RainDance Technologies recommends using Standard PCR Tube Strip Caps (40-06087) for thermal cycling and subsequently replacing them with the High Speed PCR Tube Strip Caps before transfer to the RainDrop Sense instrument. Axygen 8-Strip Domed PCR Tube Caps (PCR-02CP-C) may also be used for thermal-cycling if the cycler does not have an adjustable pressure heated lid. Replace the Domed Caps with Standard PCR Tube Strip Caps or High Speed Tube Strip Caps for Standard Mode or Fast Mode detection on the RainDrop Sense instrument respectively.

**Note:** Cap the tube strip immediately after the run is complete to avoid loss of the sample due to evaporation.



**Figure 5-16: Tube Strip Cap**

6. Ensure that the cap is secured and the strip is tightly covered to maintain a clean sample.

**Caution:** An incomplete seal may cause the sample to evaporate during thermal cycling or to leak during the RainDrop Sense run.

**Note:** RainDance Technologies® recommends using the CapEasy Tool from Bulldog Bio (NGFGCDC01) or a similar device to help remove Axygen Dome Caps.

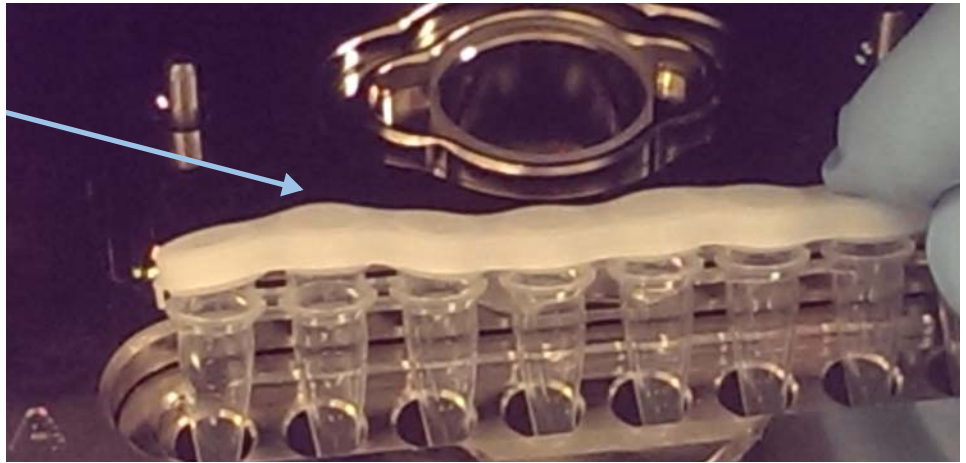
A properly covered PCR tube strip has:

- Caps firmly seated across the tube strip
- A flat cap all the way across
- Its tab oriented to the left (over number 1 on the tube strip)

An improperly covered PCR tube strip has:

- A bump or buckle
- A loosely fitting cap
- Its tab to right (over number 8 on the tube strip)

A bump in the cap



**Figure 5-17: Improperly Covered PCR Tube Strip**

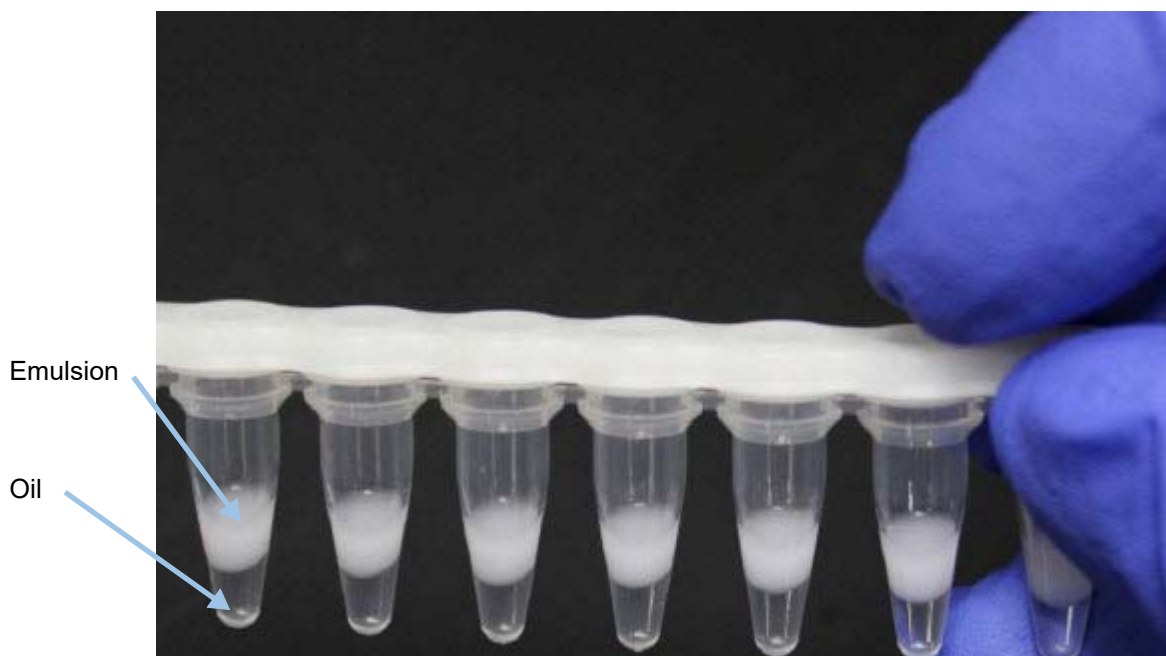


Figure 5-18: Covered Tube Strip

7. Inspect the liquid in the tubes. You should see two phases. In a 25  $\mu$ L sample, you will see the emulsion on the top (creamy white/opaque) and the oil on bottom (clear). In a 50  $\mu$ L sample, you will also see two phases, but most of what you see is emulsion. The contents of the tube should be even across the top, even if you ran a combination of 25 and 50  $\mu$ L samples; the difference is that you will see different amounts of emulsion and oil in the tubes. If any of the tubes contains different total volumes, refer to [see "Support, Customer Maintenance, and Troubleshooting" on page 8-1](#).
8. Click **Save and Close**. ICS saves the data from the run in a performance log file. The sealed sample tube strip is now ready for thermal cycling. See the *RainDrop dPCR Assay Guidelines* for thermal cycling protocols.

## Canceling a Run

If you want to stop a run after you have started filling out the Run Data tab, but *before* clicking Start Run, click **Cancel**. This brings you back to the Instrument Status and Setup a Run Screen (see [Figure 5-3](#)) and blanks out any data you have entered for this run.

If you want to stop a run *after* clicking Start Run, click the **Abort** button. This brings you to the Run Completion screen.

# CHAPTER 6

## Performing a Source Run - ThunderBolts™

This chapter covers the following topics:

<b>Introduction</b>	<b>page 6-2</b>
<b>Preparing the Sample</b>	<b>page 6-2</b>
<b>Gathering Supplies</b>	<b>page 6-2</b>
<b>Starting a Source Run</b>	<b>page 6-2</b>
<b>Completing the ICS Setup</b>	<b>page 6-9</b>
<b>Checking the Status Indicators</b>	<b>page 6-10</b>
<b>Completing the Run Data Tab</b>	<b>page 6-11</b>
<b>Completing the Run Info Tab</b>	<b>page 6-12</b>
<b>Completing the Run Tabs Using the Import Function</b>	<b>page 6-14</b>
<b>Using Email Notification</b>	<b>page 6-15</b>
<b>Performing the Run</b>	<b>page 6-17</b>

# Introduction

Perform the operations described in this chapter on the RainDance Source instrument. This procedure requires a number of consumables (available from RainDance Technologies and other manufacturers).

**Note:** For the list of required consumables, see [“RainDance Source Consumables and Equipment” on page A-1](#).

This chapter describes how to start a run on the RainDance Source instrument. Some of the steps involve preparing the physical components of the system and some of them take place within the ICS software.

For detailed information the ICS software, see [Chapter 4](#) and [Chapter 7](#).

## Preparing the Sample

Refer to the *ThunderBolts™ Cancer Panel Assay Manual* and the *ThunderBolts™ Myeloid Panel Assay Manual* for information on preparing the sample.

## Gathering Supplies

To start a run on the RainDance Source instrument, have the following equipment and supplies available:

- Gloves, either nitrile or latex
- Single pipettor or 8-channel pipettor and tips for sample volumes up to 50 µL
- RainDance Source Chip
- Carrier Oil, shipped in syringes, P/N 30-07117
- 0.2 mL 8-Tube PCR Tube Strips, Axygen P/N PCR-0208-C
- PCR Tube Strip Caps, P/N 20-06087
- Tube Strip with Caps (Axygen P/N PCR-0208-CP-C)



---

**Caution:** Use only Axygen 0.2 mL PCR tube strips.

---

## Starting a Source Run

This procedure assumes you have prepared your sample and that you have assembled all the necessary equipment and supplies to begin a run on the RainDance Source instrument. In addition, it assumes that you have powered up the RainDance Source instrument as described in [Chapter 4](#).



1. Launch the ICS software for the RainDance Source instrument and log in.



Figure 6-1: Login Screen

2. Click **Start Initialization**.

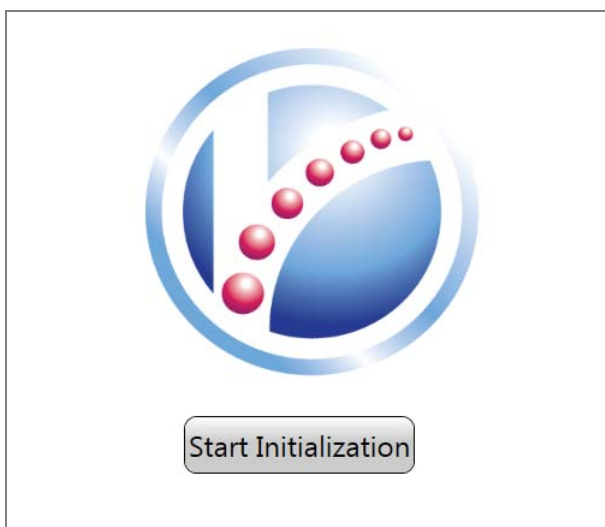


Figure 6-2: Initialization Screen

3. When you click **Start Initialization**, the system automatically prepares the instrument for normal operation. It sets valves and pressures and turns the laser in the barcode reader off. In addition, it homes the motion control subsystem. Initialization takes approximately three minutes.

**Note:** If initialization fails, the ICS returns to the **Initialization** screen after about ten minutes. Contact RainDance Support for assistance. See [“RainDance Support” on page 1-3](#).

4. Click **Setup a Run**.

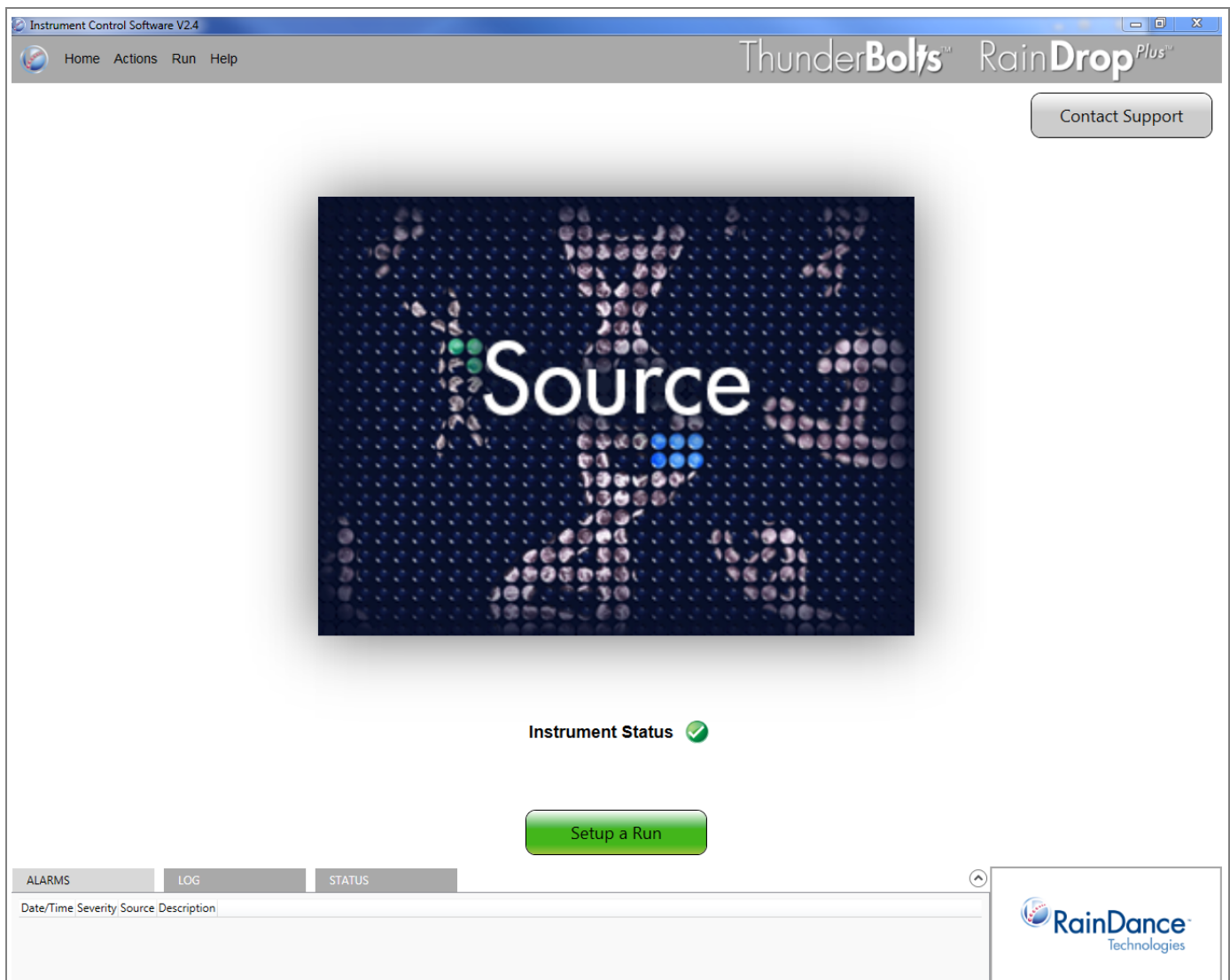


Figure 6-3: Instrument Status and Setup a Run Screen

5. Select the **Run Info** tab.

6. On the Run Info tab, click **Open Door**. The door on the RainDance Source instrument unlocks. Lift the door to the fully open position.
7. Locate a new PCR tube strip.

Each PCR tube strip contains eight 0.2 mL conical bottom tubes. Small numbers on the tube strip indicate correct orientation. Note this orientation.

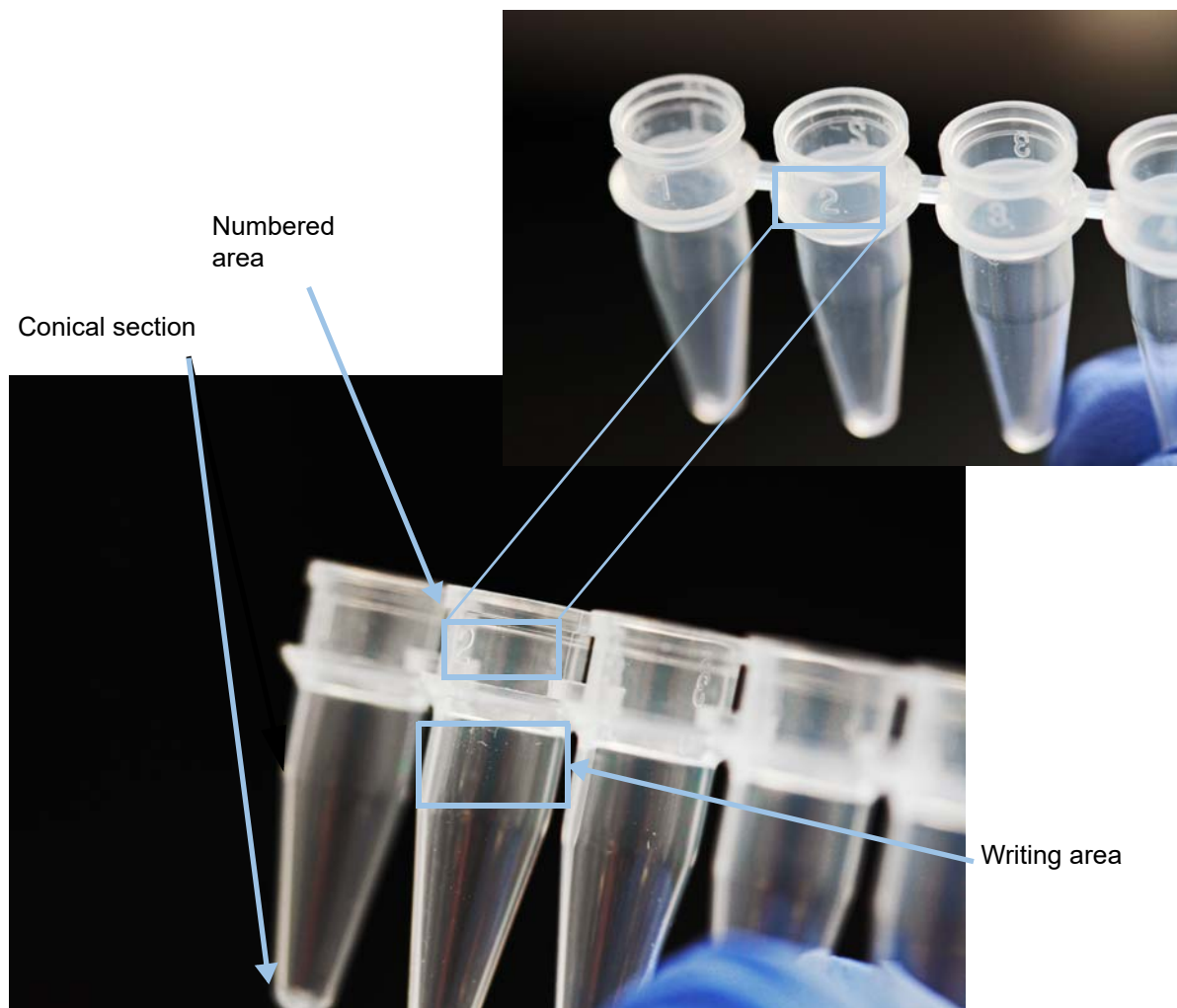


Figure 6-4: Tube Strip

**Note:** If you need to write anything on the tube strip for identification, make sure you write **above** the conical bottom section of the tube. Writing on the bottom part of the tube may interfere with sensors.

8. Insert a new tube strip into the instrument. Ensure that it is oriented correctly by placing the number 1 tube to the left. Refer to [Figure 6-6](#) see how to orient the tube strip inside the instrument.



**Figure 6-5: Tube Strip**



**Figure 6-6: Tube Strip Inserted into the Source**

9. Remove a RainDance Source chip from its packaging; for more information on the chip, see [see “RainDance Source Chip” on page 2-8](#). Handle the RainDance Source chip as follows:
  - Always wear gloves when handling the chip.
  - Grasp the chip by the by its sides. Do not grab the chip by the oil input gaskets. Refer to [Figure 6-10](#) to see how to grasp the chip.
  - Do not touch the sample input wells or emulsion output nozzles.
  - Do not touch the clear microfluidic chip nor the imaging region of interest.



---

**Caution:** Use care when removing the chip from its bag to avoid accidentally breaking the nozzles.

---

- Make sure that when you place the chip on a bench, you do not allow its nozzles to touch the table, lab bench, or any other work space or surface.
  - Place it only on a clean, solid bench surface. RainDance recommends using a laminar flow hood for loading the chip. Do not place it on a lab mat or on a kim wipe.
10. Place the RainDance Source chip on the bench. Do not fill the chip while it is in your hand.



Output nozzles do not  
touch the bench.

**Figure 6-7: Source Chip Placed on a Bench**

11. Pipette the sample into the chip by loading the sample into the bottom of the sample input wells located on top of the chip. Fill all eight wells up to a maximum of 50  $\mu\text{L}$ . To do so, gently orient the tip at the bottom of the well.

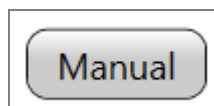
**Note:** Do not pipette along the side of the well because this may cause the liquid to remain stuck to the side of the sample input well, especially with 25  $\mu\text{L}$  samples. Do not jam the tip down to the bottom of the well. This may cause the premature loss of the sample into the chip.



**Figure 6-8: Pipetting the Sample into the Source Chip**

12. Scan the chip by clicking **Scan** in the ICS software. The red scanner light pulses for 10 seconds. Hold the RainDance Source chip in front of the barcode reader. When the scanner reads the barcode, it automatically fills in the barcode information. The ICS accepts a barcode in the 2D Data Matrix format, which allows up to 96 characters of text. You may hear a subtle beep tone from the RainDance Source instrument.

If the scanner does not read the barcode, the ICS software displays a message and allows you to enter the barcode manually. To do so, click the **Manual** button and enter the barcode numbers from the label on the chip. In manual mode, the ICS accepts up to 99 characters of text.



**Figure 6-9: RainDance Manual Scan Button**

13. Insert the chip into the RainDance Source instrument. Orient the chip over the alignment pins and press down until it stops. Do not insert it at an angle. The RainDance Source instrument will not allow you to proceed until the chip is oriented properly.



**Note:** Run the RainDance Source chip immediately after loading it. Do not load a number of chips at once and allow them to wait a period of time before you run them. The sample can wick into the chip and become unusable.

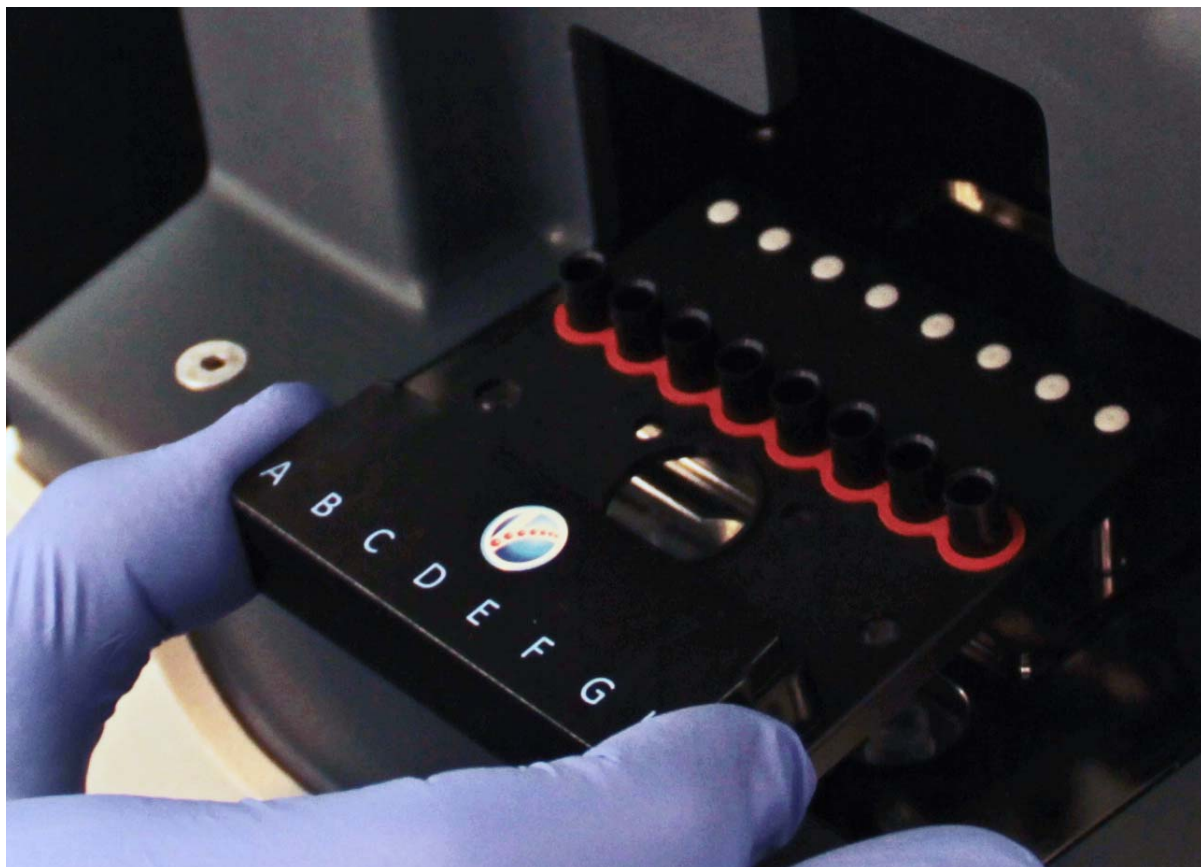


Figure 6-10: Inserting a Chip

After you insert the chip, you are done setting up the physical components.

14. Close the door on the RainDance Source instrument. Press the door down until the latch is engaged. The **Door Closed** status changes on the System Status indicators.

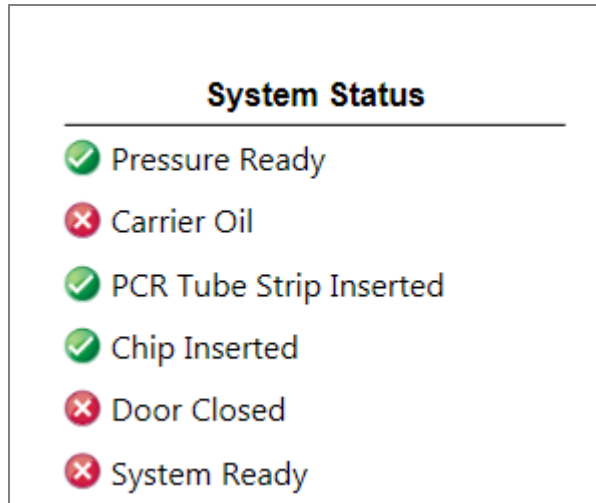
## Completing the ICS Setup

Before starting a run on the RainDance Source instrument, you must complete a number of setup steps. The steps ensure that the instrument is ready for operation and ensure that data about the run is provided. They include:

- Checking the status of various components
- Completing the Run Data
- Completing the required fields of the Run Info (mostly optional)

## Checking the Status Indicators

Status indicators tell you about the readiness of the instrument.



**Figure 6-11: System Status**

The status indicators are described in the following table.

**Table 6-1: System Status Indicators**

Indicator	Meaning
<b>Pressure Ready</b>	Indicates the status of the instrument gas pressure. When the pressure is sufficient, the ready indicator is displayed.
<b>Carrier Oil</b>	Indicates the status of the oil reservoir. When there is sufficient oil to complete a run, the ready indicator is displayed. A valid carrier oil lot number is required for the green check mark to be displayed.
<b>PCR Tube Strip Inserted</b>	Indicates the presence of the tube strip. When the tube strip is inserted properly into the instrument, the ready indicator is displayed.
<b>Chip Inserted</b>	Indicates the presence of the RainDance Source chip. When the chip is present and inserted properly, the ready indicator is displayed.
<b>Door Closed</b>	Indicates the status of the instrument door. When the door is properly closed, the ready indicator is displayed.
<b>System Ready</b>	Indicates the overall status of the instrument. When all the requirements of the instrument are present and ready for a run, the ready indicator is displayed.

In addition to satisfying the Status Indicators, you must also have scanned or input the barcode number from a RainDance Source chip.



## Completing the Run Data Tab

The **Run Data** tab opens after you click **Setup a Run** (see [“Starting a Source Run” on page 6-2](#)) and contains the details about the contents of the run. You can enter this information manually or it can be imported from a CSV file.

Instrument Control Software V2.4

Home Actions Run Help

ThunderBolts™ RainDrop<sup>Plus</sup>™

Run Data

Raindance Run ID: 1609020911

Data Input

Manual Import

Run Name

CH ID	Barcode	CH Enable	Sample Name
A	Scan	✓	
B	Scan	✓	
C	Scan	✓	
D	Scan	✓	
E	Scan	✓	
F	Scan	✓	
G	Scan	✓	
H	Scan	✓	

Source Chip

Lot: Ser:

Barcode Input

Scan Manual

System Status

- ✓ Pressure Ready
- ✓ Carrier Oil Level
- ✗ PCR Tube Strip Inserted
- ✗ Chip Inserted
- ✓ Door Closed
- ✗ System Ready

Cancel Start Run

ALARMS LOG STATUS

Date/Time Severity Source Description

RainDance Technologies

Figure 6-12: Run Data Tab

Only the following fields on the **Run Data** tab are required for the run to proceed:

- Run Name
- RainDance Source Chip barcode lot and serial number
- At least one selected well (indicated by a green check mark)

Your lab procedures determine how much of the optional information is necessary for your specific situation.

Table 6-2: Run Data Fields

Field Name	Meaning
<b>Run Name</b>	The name of the run. Run name is required and can contain up to 20 characters.
<b>Wells A - H</b>	The sample identifier for each tube (or lane) on the chip. These fields are not required, but you must select at least one lane.
<b>Source Chip Lot &amp; Serial Number</b>	The identifiers for each Source Chip. This information is automatically completed when you scan the chip and is required.

## Entering the Run Data

Enter the run data as follows:

1. Type the name of the run into the **Run Name** field. The field allows you to enter up to 300 characters; however, RainDance advises that you keep the name to a manageable length since it is used for the filename of the run.
2. If necessary, enter well information in one of the following ways:
  - Type the name for the lane manually. When you enter the name manually, the field limits entry to 20 characters.
  - Scan the barcode from a printout. To do so, place the printout in front of the barcode reader and click **Scan** next to the correct lane. When you enter the name using the scanner, the field limits entry to 96 characters.
  - Import the lane information as described in [see “Completing the Run Tabs Using the Import Function” on page 6-14](#).
3. All lanes are selected by default. Deselect any lanes you are not using. At least one lane must be selected in order for the run to proceed.

**Note:** The Source Chip field should already display the information you scanned earlier in [see “Starting a Source Run” on page 6-2](#).

## Completing the Run Info Tab

The fields on the Run Info tab contain information about the run. The only field on this tab that is required is the Carrier Oil field and only if the instrument is out of oil. You do not need to select this tab and complete any fields if there is a green check mark next to Carrier Oil in the system status and you do not intend to enter any of the optional information as shown in [Figure 6-13](#).

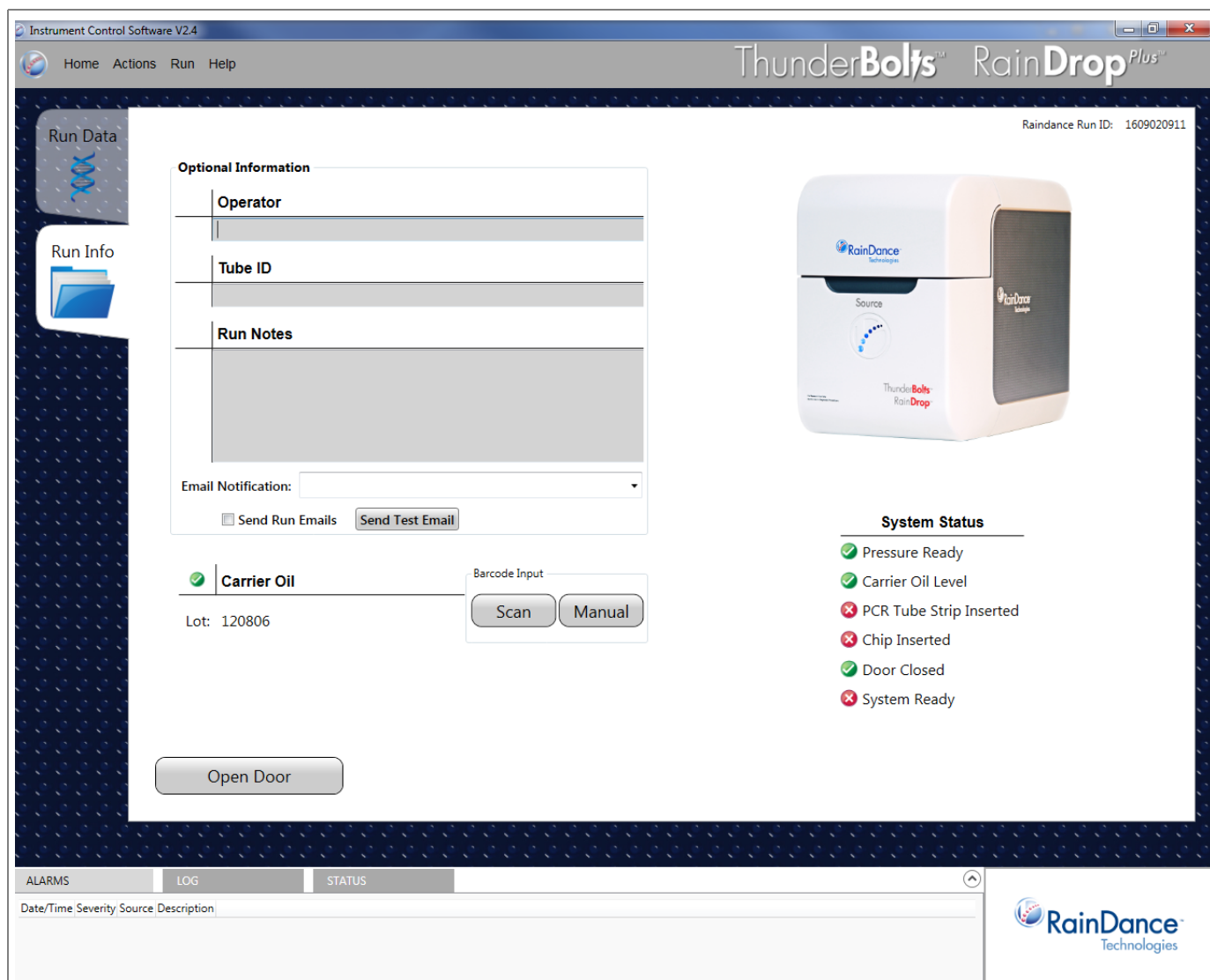


Figure 6-13: Run Info Tab

Your lab procedures determine how much of the optional information is necessary for your specific situation. Enter the optional run information as follows:

Table 6-3: Run Info Fields

Field Name	Meaning
<b>Operator</b>	The name of the person performing the run.
<b>Tube ID</b>	The identifier of the sample to be run.
<b>Run Notes</b>	Any detailed descriptive information you want stored with the run information.

## Completing the Run Tabs Using the Import Function

To complete the run tabs using the import function:

1. Click **Import** at the top of the **Run Data** tab. A dialog opens allowing you to locate and select a file to import. The CSV file type is already selected in the drop-down in the lower right corner of the dialog.

**Note:** The Import function allows you to import data only from CSV files.

2. Locate the file to import and click **Open**.
3. ICS imports only the following fields. Refer to [Table 6-4](#) for detailed information on the contents of the CSV file:
  - On the Run Data tab:
    - Run Name
    - Lane Information
  - On the Run Info tab:
    - Operator
    - Tube ID
    - Run Notes
4. Edit any of the imported fields, as necessary.
5. Complete any other of the optional fields.

**Table 6-4: Import Fields in CSV**

Line Number	Name	Value	Length
1	Run Name	Contents of the <b>Run Name</b> field on the Run Data tab. User entry identifying the run.	128
2	Operator	Contents of the <b>Operator</b> field on the Run Info tab. User entry identifying the operator.	128
3	Run Notes	Contents of the <b>Run Notes</b> field on the Run Info tab. Free-form text entered by the user.	500
4	Tube ID	Contents of the <b>Tube ID</b> field on the Run Info tab. User entry identifying the tube strip.	128
5-12	Lane Info	Contents of lanes <b>A</b> through <b>H</b> on the Run Data tab. User entry identifying the Samples.	128

## Using Email Notification

The RainDance Source instrument is located in a lab space which may be a distance from your desk or usual work area. Email Notification allows you to receive messages when a run is finished, so that you do not have to continually check the instrument. Select **Send Run Emails** on the Run Info tab. If email addresses have been entered by an Administrator, they appear in the Email Notification field. You can leave these addresses as is, edit them, or add to them. Notifications are sent to those addresses.

**Note:** Email notification does not support text messaging.

### Setting Up Email Notification (Administrator)

Setup Email Notification as needed. You do not have to edit these settings for each run. You can establish email settings and then not change them unless you need to change who is notified at the end of a run.

To enter email addresses:

1. Select **Setup Email** from the **Actions** menu. The **Email** dialog opens.
2. Enter email addresses in the **Email Notification** field, separated by semi-colons. These email addresses will appear on the Run Info tab by default.
3. Select **Send Run Emails**, if you want this to be the default action.
4. Click **Save** to save the new addresses. Click **Close** to dismiss the dialog.

### Email Messages

Email messages contain the following information:

**Table 6-5: Email Message Data**

Field Name	What is reported
<b>RainDance ID</b>	The serial number of the instrument.
<b>Run Name</b>	The name the user entered in the Run Name field prior to beginning the run. If the user does not enter a Run Name, this lists a name provided by the RainDance Source instrument.
<b>Description</b>	This field includes the comments entered by the user at run time, if any.
<b>Start Time</b>	The date and time the run was started.
<b>End Time</b>	The date and time the run ended.

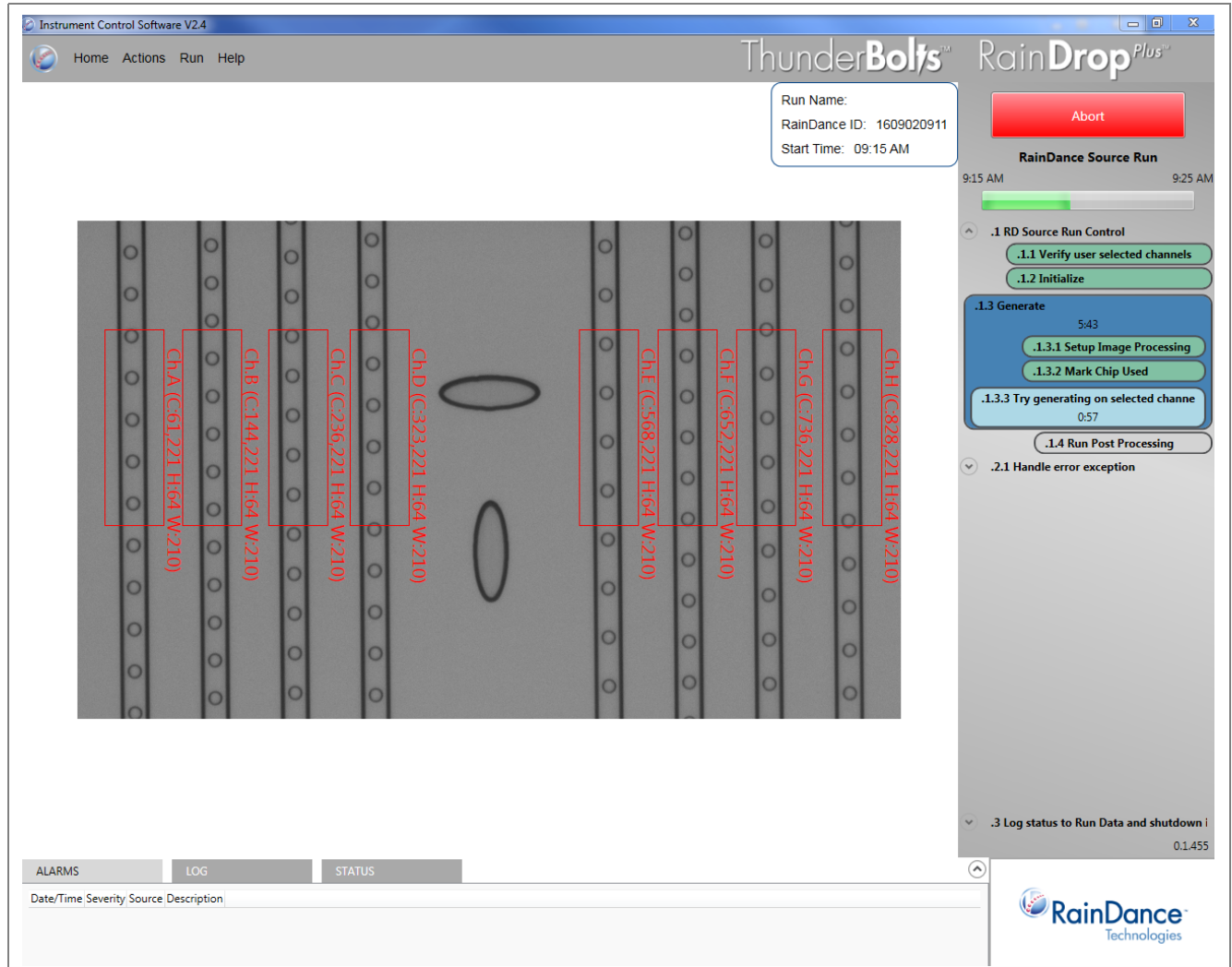
**Table 6-5: Email Message Data**

<b>Sample Info</b>	For each sample, it lists: Lane, Sample Description, CV (coefficient of variance), Read Length, and Status.
<b>Total Samples</b>	Lists the number of samples attempted.
<b>Samples Successful</b>	Lists the number of samples that successfully ran without errors.
<b>Samples Failed</b>	Lists the number of samples that generated an error. This also includes any samples not processed because the run was stopped because of a prior/fatal error.
<b>Errors</b>	List all errors encountered during the run.

# Performing the Run

After you have entered the required run data, you are ready to begin the run.

1. Click the **Start Run** button. The page displays the lanes of droplets moving through the device.



**Figure 6-14: Sample of a Run in Progress**

**Note:** Sometimes the drops look like they are moving backwards, but actually they are not moving backwards. This is an artifact of the image capture process used also known as a *strobe effect*.

2. Observe the display of moving droplets. Droplets appear in the display image for all lanes. When all the sample in a lane has been dropletized, you will see larger and inconsistent droplets. Finally, the lane will be blank. This continues until all the lanes are finished and all appear blank.

Next, the RainDance Source instrument enters an emulsion detection state while the tube strip fills with additional oil and triggers the level sensor. This stage takes approximately five to fifteen minutes, depending on the sample volume.

When this step is complete, the RainDance Source instrument displays the **Run Complete** screen. It displays information for the following fields (if they were completed prior to the run): Run Name, RainDance ID, Operator, Tube ID, status of the 8 lanes (with names, green check or red X), start time of the run, and any Run Notes.

Instrument Control Software V2.4

ThunderBolts™ RainDrop<sup>Plus</sup>

### RainDance Source Run Completion

**Run Name:**

**RainDance ID:** 1609020911

**Operator:**

**Tube Strip:**

---

A ✓  
 B ✓  
 C ✓  
 D ✓  
 E ✓  
 F ✓  
 G ✓  
 H ✓

---

**Run Status:** Run completed successfully

**Start Time:** 9/2/2016 9:11 AM **End Time:** 9/2/2016 9:37 AM

**Run Notes:**

Open Door
Contact Support
View Run Report
Save and Close

---

ALARMS | LOG | STATUS

Date/Time Severity Source Description

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**Figure 6-15: Run Complete Screen**

Next, the device enters the rinse and recovery phase to prepare for the next run. During this phase, the door is still locked. When the rinse and recovery phase is done, the door unlocks automatically and pops up slightly.



3. Lift the door to its full open position.

**Note:** As stated above, the instrument door pops up slightly after the run is complete. If you accidentally close the door and still need access, click **Open Door** to open it.

4. Remove the used chip. Place the chip into the original chip bag and discard it in a solid waste disposal container.
5. Cover the tube strip using the dome strip cap (such as Axygen P/N PCR-0208-C) before removing the tube strip from the instrument.

**Important:** RainDance Technologies recommends using standard PCR Tube Strip Caps (P/N 40-06087) for thermal cycling. Axygen 8-Strip Domed PCR Tube Caps (Axygen P/N PCR02CPC) may also be used for thermal cycling if the cycler does not have an adjustable pressure heated lid.



**Figure 6-16: Tube Strip Cap**

6. Ensure that the cap is secured and the strip is tightly covered to maintain a clean sample.

**Caution:** An incomplete seal may cause the sample to evaporate during thermal cycling.

A bump in the cap

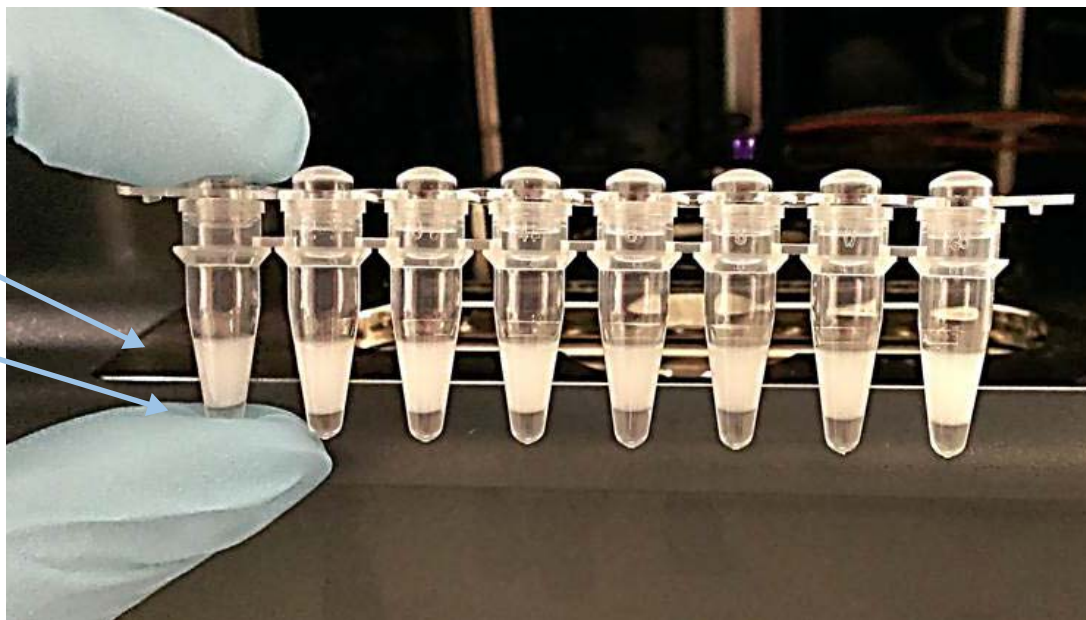


**Figure 6-17: Improperly Covered PCR Tube Strip**

**Note:** Cap the tube strip immediately after the run is complete to avoid loss of the sample due to evaporation.

Emulsion

Oil



**Figure 6-18: Covered Tube Strip**

7. Inspect the liquid in the tubes. You should see two phases. In a 40  $\mu$ L sample, you will see two phases, but most of what you see is emulsion on top and a small oil phase on the bottom. The contents of the tube should be even across the top.
8. Click **Save and Close**. ICS saves the data from the run in a performance log file. The sealed sample tube strip is now ready for thermal cycling. Refer to the *ThunderBolts Cancer Panel Assay Manual* and the *ThunderBolts Myeloid Panel Assay Manual* for thermal cycling protocols.

## Canceling a Run

If you want to stop a run after you have started filling out the Run Data tab, but *before* clicking Start Run, click **Cancel**. This brings you back to the Instrument Status and Setup a Run Screen (see [Figure 6-3](#)) and blanks out any data you have entered for this run.

If you want to stop a run *after* clicking Start Run, click the **Abort** button. This brings you to the Run Completion screen.

# CHAPTER 7

## Managing the System

This chapter covers the following topics:

<b>Introduction</b>	<b>page 7-2</b>
<b>Managing Users</b>	<b>page 7-2</b>
<b>Adding a New User</b>	<b>page 7-3</b>
<b>Editing a User</b>	<b>page 7-4</b>
<b>Deleting a User</b>	<b>page 7-7</b>
<b>Resetting Password or Unlocking an Account</b>	<b>page 7-7</b>
<b>Viewing Past Runs</b>	<b>page 7-7</b>
<b>Viewing Runs</b>	<b>page 7-7</b>

# Introduction

You must have a username and password before you can log in to the ICS application. There are two types of user accounts: Administrator and User. [Chapter 4](#) provides detailed information on logins and account types.

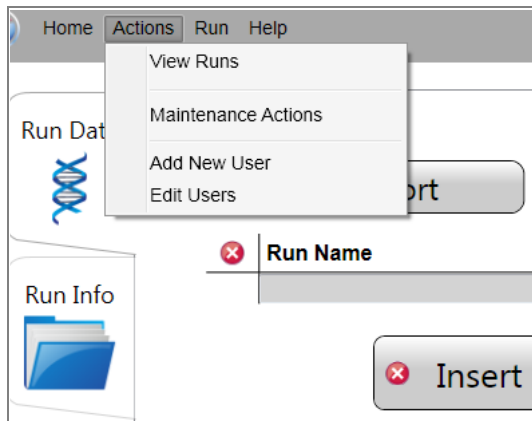
**Important:** To manage users, you must be logged in with Administrator privileges.

This chapter describes several software management functions including:

- Managing Users
- Viewing Past Runs

## Managing Users

The ICS software lets you manage user accounts from the Actions menu (see [Figure 7-1](#)).

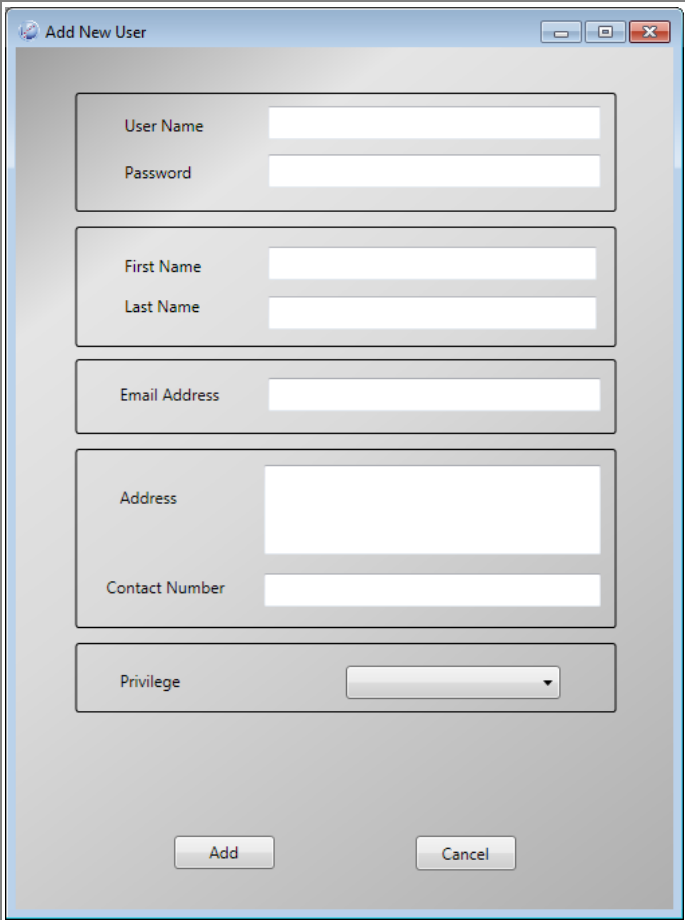


**Figure 7-1: Actions Menu**

## Adding a New User

To add a new user:

1. From the **Actions** menu, select **Add New User** (see [Figure 7-1](#)).  
The **Add New User** dialog opens (see [Figure 7-2](#)).



The screenshot shows a standard Windows-style dialog box titled "Add New User". It features a light gray background and a blue title bar with minimize, maximize, and close buttons. The form is organized into several sections: a top section for "User Name" and "Password"; a middle section for "First Name" and "Last Name"; a section for "Email Address"; a section for "Address" (with a larger text area) and "Contact Number"; and a "Privilege" dropdown menu. At the bottom, there are two buttons: "Add" and "Cancel".

**Figure 7-2: Add New User Dialog Box**

2. Enter the information for the new user as required (see [Table 7-1](#)) and click **Add** to save it or **Cancel** to dismiss the dialog without saving your entries.

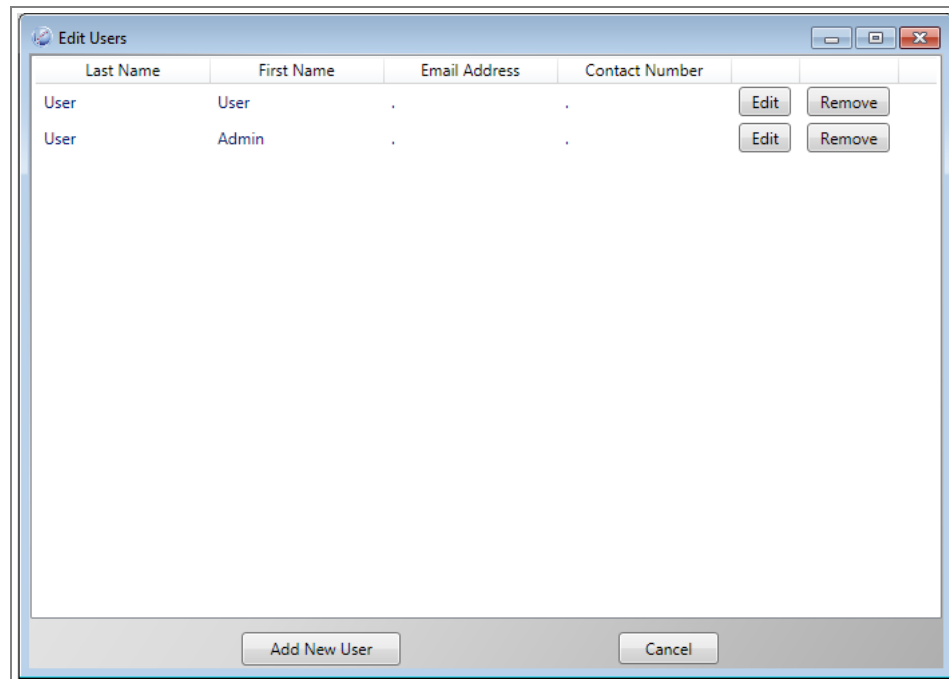
**Table 7-1: Add New User Dialog**

Field or Table Element	Description
User Name	Specifies the name you use to log in. Case sensitive. Required.
Password	Specifies the password; any alphanumeric combination is acceptable. Case sensitive. Required.
First Name, Last Name	Specifies the user's first and last names. Required.
Email Address	Specifies the user's email address. Required.
Address	Specifies the user's address. Required.
Contact Number	Specifies the user's phone number. Required.
Privilege	Specifies the user's Privilege level (Admin or User) selected from a drop-down menu. Required.
Add, Cancel buttons	Adds the user information, or cancels the process. If added successfully, a confirmation window displays.

## Editing a User

The Edit Users dialog allows a user with administrator privileges to edit the information for an existing user or remove an existing user from the database. An administrator can also add a new user from this dialog.

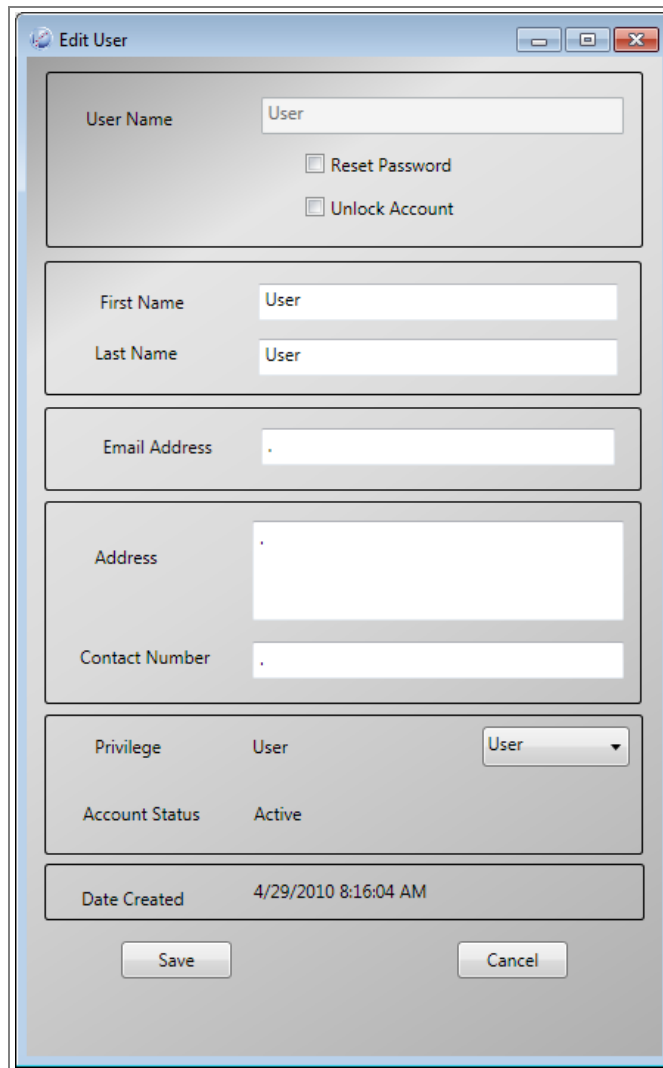
1. From the **Actions** menu, select **Edit Users** (see [Figure 7-1](#)). The Edit Users dialog opens (see [Figure 7-3](#)).



**Figure 7-3: Edit Users Dialog Box**

2. To edit the data for an existing user, click **Edit** in the row for that user. The **Edit User Information** dialog opens for the selected user (see [Figure 7-4](#)).





The image shows a Windows-style dialog box titled "Edit User". It contains several input fields and checkboxes. The "User Name" field is pre-filled with "User". Below it are two checkboxes: "Reset Password" and "Unlock Account", both of which are unchecked. The "First Name" and "Last Name" fields are also pre-filled with "User". The "Email Address" field is empty. The "Address" field is empty. The "Contact Number" field is empty. The "Privilege" field is pre-filled with "User" and has a dropdown arrow. The "Account Status" field is pre-filled with "Active". The "Date Created" field is pre-filled with "4/29/2010 8:16:04 AM". At the bottom of the dialog box are two buttons: "Save" and "Cancel".

User Name	User
<input type="checkbox"/> Reset Password	
<input type="checkbox"/> Unlock Account	
First Name	User
Last Name	User
Email Address	
Address	
Contact Number	
Privilege	User
Account Status	Active
Date Created	4/29/2010 8:16:04 AM

Save Cancel

**Figure 7-4: Edit User Dialog Box**

3. Editing user information is essentially the same as adding new user information. Edit the user information as required (see [Table 7-1](#)) and then click **Save**. Click **Cancel** button to dismiss the dialog without saving any changes.

## Deleting a User

To delete a user:

1. Select **Edit Users** from the **Actions** menu (see [Figure 7-1](#)). The **Edit Users** dialog opens as in [Figure 7-3](#).
2. Click **Remove** in the same row as the user to be deleted. The system asks you to confirm that you want to delete the user. Click **Yes** to confirm or **No** to cancel the deletion.

## Resetting Password or Unlocking an Account

After three failed attempts to log in with the wrong password, the ICS application locks the account and you are not able to log in. If this happens, you must contact someone in your facility with Administrator privileges who can either reset or unlock your password.

To reset an account:

1. Select the **Reset Password** check box in the **Edit User** dialog (see [Figure 7-4](#)). This changes the user's password to the **default password, abc123**.
2. To save the changes to the account, click **Save**. The application displays a message confirming that the changes have been saved.

To unlock an account:

1. Select the **Unlock Account** check box in the **Edit User** dialog (see [Figure 7-4](#)). This allows the user to log in again with his/her original password.
2. To save the changes to the account, click **Save**. The application displays a message confirming that the changes have been saved.

## Viewing Past Runs

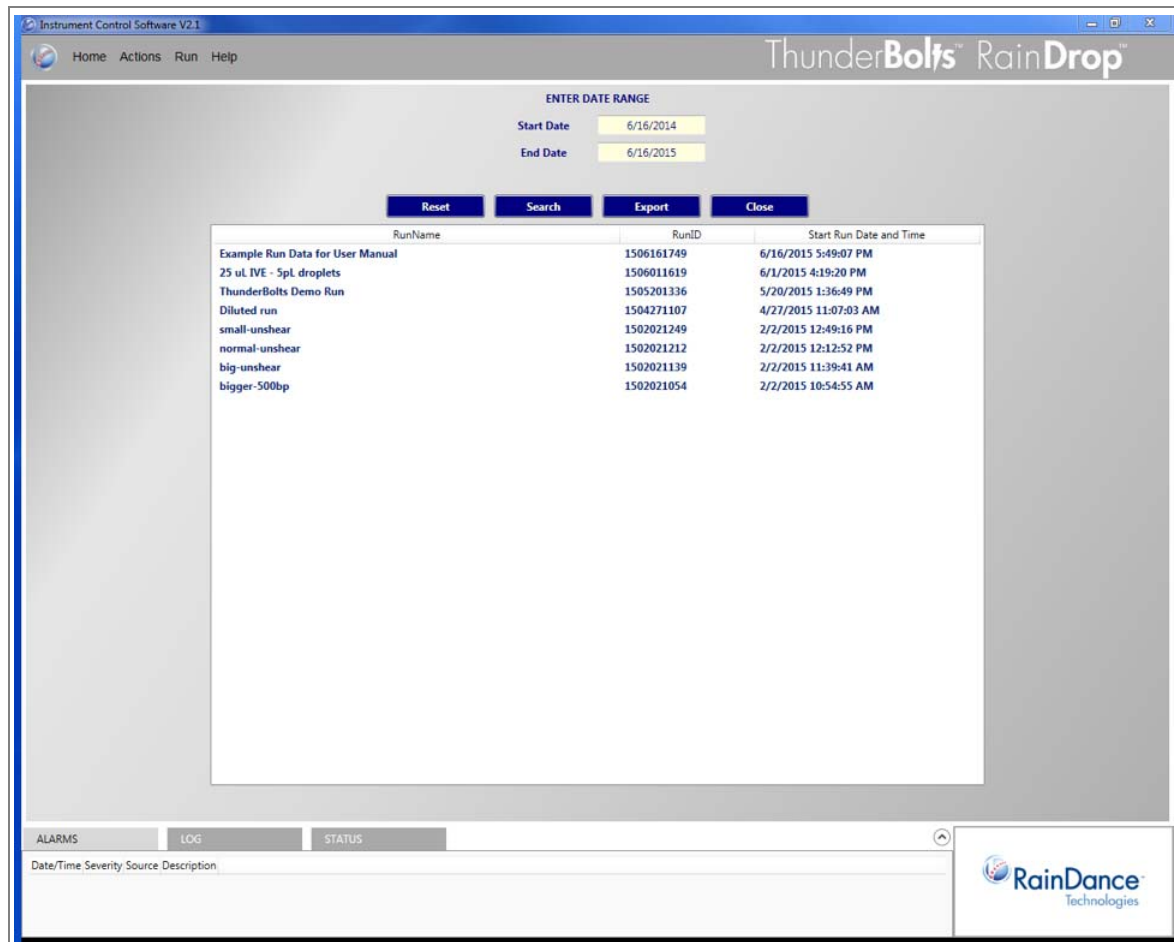
This section describes how to view previous runs. It also describes how to generate and view reports and how to export run results.

## Viewing Runs

Certain run parameters are saved by the ICS application. The ICS application lets you search for and view past run parameters by entering a specific Start Date and an End Date (inclusive) on which the run was completed.

To view a run report:

1. Select **View Runs** from the **Actions** menu (see [Figure 7-1](#)). The **View Run Report** window opens (see [Figure 7-5](#)).




**Figure 7-5: View Run Report Window**

2. Enter a date range to locate the run of interest and click **Search**. The default start and end dates are today's date, so if you want to see the run you just completed, you can just click **Search** without changing the date.

All runs that match the selected date range appear in a list below the white title bar.

3. Clicking or selecting a row in the list of runs opens the report for that run. This may take 2-5 seconds.



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## RainDance Source Run Report

Run Name:	SourceRunProcessingTest1	Operator:	M Shaheen
RainDance ID:	1610071640	Tube Strip:	817435

---

A Passed	Sample 1
B Passed	Sample 2
C Passed	Sample 3
D Passed	Sample 4
E Passed	Sample 5
F Passed	Sample 6
G Passed	Sample 7
H Passed	Sample 8

---

Run Status:	Run completed successfully		
Start Time:	10/7/2016 4:40:32 PM	End Time:	10/7/2016 5:07:10 PM
Chip Lot:	29955500-0071-160707	Chip Serial Number:	0029
Carrier Oil Lot:	080731		
Run Notes:	RainDrop Source Run Processing		

**Figure 7-6: Example of a Run Report**

Reports are divided into three sections. The first section contains:

- Run Name
- Operator
- RainDance ID (machine name)
- Tube Strip

The second section contains a summary of how the run performed. It includes:

- Channel Pass/Fail
- Sample Information

The last section lists the following:

- Start Time
- End Time
- Chip Lot
- Chip Serial Number
- Carrier Oil Lot
- Run Comments

4. From the menu bar (see [Figure 7-7](#)) you can print the report or export it to various formats, such as a PDF file or an Excel file.



**Figure 7-7: Report Menu**

5. When you are done viewing the report, close it by clicking on the **Close** box in the upper right corner of the screen. You return to the **View Runs** window so you can view additional reports if necessary.

# CHAPTER 8

## Support, Customer Maintenance, and Troubleshooting

This chapter covers the following topics:

<b>RainDance Support</b>	<b>page 8-2</b>
<b>RainDance Planned Maintenance</b>	<b>page 8-2</b>
<b>Customer Maintenance</b>	<b>page 8-2</b>
<b>Restarting the IC Workstation</b>	<b>page 8-2</b>
<b>Cleaning the RainDance Source Instrument</b>	<b>page 8-3</b>
<b>Refilling the Oil Reservoir</b>	<b>page 8-3</b>
<b>Service and Diagnostic Requirements</b>	<b>page 8-6</b>
<b>Powering Off the System</b>	<b>page 8-7</b>
<b>Powering On or Restarting the System</b>	<b>page 8-7</b>
<b>Restoring the System After a Failure</b>	<b>page 8-7</b>
<b>Support Agreement Information</b>	<b>page 8-7</b>
<b>Moving the System</b>	<b>page 8-7</b>
<b>Storing the System</b>	<b>page 8-8</b>
<b>Reinstalling/Updating ICS Application</b>	<b>page 8-8</b>
<b>Troubleshooting</b>	<b>page 8-9</b>

*Maintenance* refers to non-technical procedures you must perform to keep the system working properly. *Service* refers to tasks that are intended to be performed only by a qualified RainDance-authorized service representative. The RainDrop® System is composed of two instruments: RainDance Source and RainDrop Sense. The ThunderBolts™ System is the same as the RainDance Source. The sections in this chapter describe them separately only when each instrument requires different maintenance or service.

## RainDance Support

- RainDance Technologies provides full support for their products.
- Some troubleshooting information is provided within this chapter (see “Troubleshooting” on page 8-9). Additional self-service technical and troubleshooting information is available at [www.raindancetech.com/support](http://www.raindancetech.com/support).
- To request technical assistance from RainDance support personnel, send an email to [support@raindancetech.com](mailto:support@raindancetech.com).

## RainDance Planned Maintenance

A Planned Maintenance (PM) schedule and tasks are designed to be performed by RainDance Support personnel. The number of PMs are conducted as part of the service contract agreement. Contact RainDance Support for a recommended PM schedule.

## Customer Maintenance

This section lists the steps you should follow for proper maintenance of the RainDance Source instrument.

### Restarting the IC Workstation

Good operating practice for any Windows operating system includes restarting the operating system on a weekly basis. To perform a shutdown, select the **Start** icon the lower left corner of the screen and select **Shut down**. When the system has completed its power off routine, reboot the Windows 7 operating system on the IC Workstation as described in see “Powering On or Restarting the System” on page 8-7.

## Cleaning the RainDance Source Instrument

There is no extraordinary routine maintenance required for the instruments. Clean the chip dock of spills and residues as follows:

- Always use protective gloves.
- Use only a soft, lint-free towel to clean the chip dock; wet with either isopropanol or HFE-7100.
- Remove and clean camera lens cover if dirty.
- For DNA decontamination, RainDance recommends using HFE-7100 or DNA-ExitusPlus.



---

**Caution:** Use caution while cleaning the chip dock, specifically in the area of the camera lens cover of the Source instrument.

---

- DO NOT submerge the system in liquid or pour or spray liquid onto the system.
- Clean the IC workstation monitor window as described in its manufacturer's documentation.
- All technical maintenance or service must be performed by RainDance Support personnel.

## Refilling the Oil Reservoir

The oil reservoirs on the RainDance Source instrument must be refilled from time to time. You will know that it is time to refill the reservoir when the oil light on the front of the instrument glows red. [Figure 8-1](#) shows the RainDance Source oil reservoir fill port and the oil low indicator light in its on state.



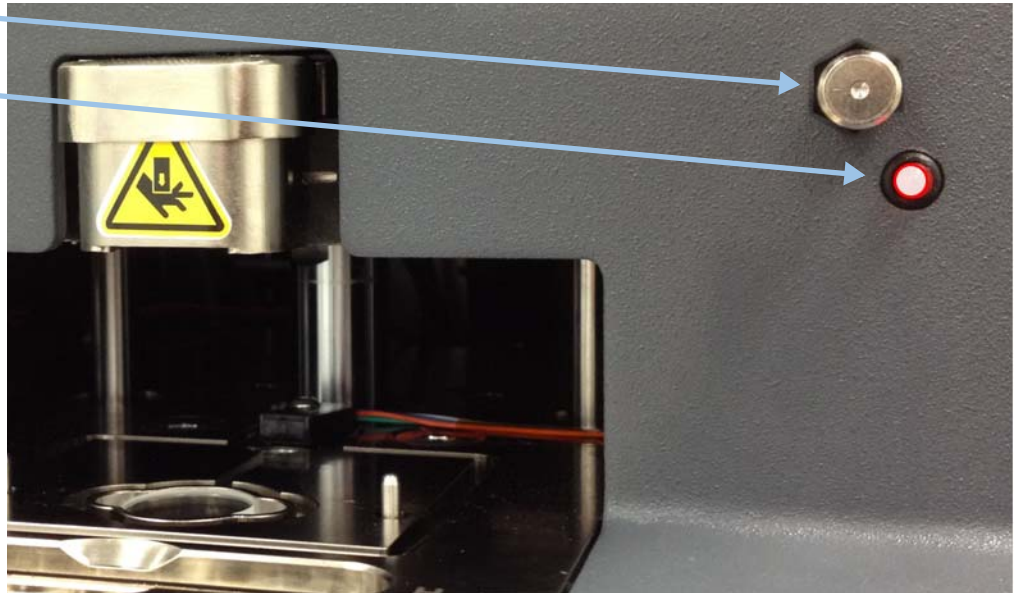
---

**Caution:** Never refill an oil reservoir unless the red light is illuminated. Failure to comply can result in an internal overflow and potential damage to the instrument.

---



Oil reservoir fill port  
Oil low indicator light  
(currently on)



**Figure 8-1: RainDance Source Oil Reservoir Fill Ports**

To refill the oil reservoir:

1. Obtain a pre-measured syringe of oil (P/N 30-07117).
2. Scan the barcode on the oil syringe. Refer to [see "Scanning Barcodes" on page 2-7](#) for more information on how to scan.
3. Remove the cap from the tip of the syringe.
4. Place a gloved finger over the end of the syringe to ensure that it does not squirt oil while you are moving it.



**Figure 8-2: Gloved Finger over Syringe**

5. Unscrew the cap that covers the oil reservoir fill port and place it in a safe place.
6. Place the tip of the syringe over the fill port and begin to turn the entire syringe clockwise. The syringe screws onto the fill port to create a tight fit.



**Figure 8-3: Syringe Connected to the Fill Port**

7. Continue to turn the syringe until it fits snugly.



---

**Caution:** Do not overtighten the syringe to the fill port.

---

8. Press the end of the syringe and inject its contents until the syringe is empty.
9. Unscrew the empty syringe and discard it in a lab-approved solid waste stream. When you are done refilling the reservoir, the oil low indicator light turns off.
10. Replace the cover on the fill port. Do not overtighten.

## Service and Diagnostic Requirements

- The system checks its status at start-up automatically. The ICS application prevents runs when it detects a system failure or not ready condition.
- The hardware is designed to facilitate field replacement of subsystems and/or subsystem components as required.
- There are no user serviceable parts inside the RainDance Source instrument. For safety reasons, those components have limited access.
- All technical maintenance or service is provided by RainDance Support.

# Powering Off the System

Follow this sequence to turn the system off:

1. Exit the ICS application.
2. Power off the instrument by turning off the switch on the rear of the instrument.
3. Power off the IC Workstation by selecting the **Start** icon and then selecting **Shut down**.
4. Press the **Power** button on the monitor to turn it off.

# Powering On or Restarting the System

Refer to [see “Starting the ICS Application” on page 4-2](#).

# Restoring the System After a Failure

In most cases, the RainDance Source instrument automatically resets after a failure. You can start subsequent runs without manual intervention.

**Note:** Never start another run until the root cause of the failure is identified and resolved.

# Support Agreement Information

For detailed information on Support Agreements, go to [www.raindancetech.com/support](http://www.raindancetech.com/support) and click on the **Support Agreement** link.

# Moving the System



---

**Warning:** The RainDance Source instrument weighs approximately 50 lbs (22 kg). To avoid injury and damage to the instrument, do not move it without assistance from RainDance Technologies.

---

To move the instrument to another location, contact RainDance Support.

# Storing the System

- For short term storage (less than 30 days) of the instruments:
  - Remove any chips and PCR tube strips from the instruments.
  - Leave the Carrier Oil from the last run in the instruments.
  - Close the door.
  - Power off the instruments.
  - Turn off gas supply.
- For long term storage of the instrument, contact RainDance Support for help.

## Reinstalling/Updating ICS Application

The ICS application is installed and tested during installation. You are not required to perform any installation or maintenance of ICS. Any new version of ICS that is user-installable includes instructions for installation.

# Troubleshooting

The following table lists some problems that you may observe while working with the RainDance instrument. The table is divided into three columns as follows:

- Observed Problem
- Possible Cause
- Corrective Actions and Comments

**Table 8-1: Troubleshooting the RainDance Source System**

Observed Problem	Possible Cause	Corrective Actions and Comments
There is a red X on the <b>Instrument Status and Setup a Run</b> screen.	The gas pressure is not connected or is not adequate.	Ensure that the gas pressure cable is connected properly and that the gas pressure is sufficient. Click <b>Start Run</b> . A dialog box opens listing the reason(s) the run cannot start. If you continue to have problems, contact RainDance Support. See <a href="#">RainDance Support on page 1-3</a> .
The ready indicator next to the Chip Inserted System Status displays a red X even after I insert a chip.	The chip barcode has not been scanned. The instrument does not detect a properly inserted chip. The chip is not inserted properly, may not be seated well, or is not aligned with the chip alignment pins.	Scan the chip's barcode before use. Shut down the software and instrument, then restart the instrument, wait 1 minute, and restart the software and scan the barcode again, then place it in the instrument. Check for debris on the surface of the deck. Clear away any debris or dust. If the chip is still not recognized, try another chip and contact RainDance support. See <a href="#">RainDance Support on page 1-3</a> .

**Table 8-1: Troubleshooting the RainDance Source System**

<p>The System Status indicator for PCR Tube Strip Inserted displays a red X even when the tube strip is inserted.</p>	<p>You are using an incorrect PCR tube strip, meaning that it is not an Axygen tube strip.</p>	<p>If you detect the problem before starting the run, remove the incorrect PCR tube strip, obtain the correct tube strip and restart the run. See <a href="#">PCR Tube Strip</a> on page 2-10.</p> <p>If you detect the problem after a Source run, transfer the contents of tube strip to a proper tube. You can expect to lose up to 25% of the sample due to loss during pipetting.</p>
<p>There are no droplets being created for one of the lanes.</p>	<p>There is no sample (in one or more of the sample wells) and that lane is selected on the Run Data tab of the ICS (see <a href="#">Completing the Run Data Tab</a> on page 5-11). The lane will fail.</p> <p>There is too much DNA, 1g (&gt;3kb) fragments tend to be sticky.</p> <p>Samples sat in the chip longer than five minutes.</p>	<p>Verify correct volumes are pipetted properly into wells.</p> <p>Recheck quantitation. Fragment DNA to &lt;3kb.</p> <p>Run promptly after loading samples.</p>
<p>Some of the expected lanes were not processed. The sample remains in the Source Chip sample wells.</p>	<p>You did not select the lanes on the Run Data tab of the ICS (see <a href="#">Completing the Run Data Tab</a> on page 5-11) that represent the lanes on the Source Chip that contain sample.</p>	<p>You cannot reuse the chip. You may be able to recover the part of the sample that is not lost to pipetting. Extract the sample from the failed chip and rerun it on a new chip.</p>
<p>One of the lanes fails, displays erratic droplet formation, inconsistent droplet counts, or uneven droplet spacing.</p>	<p>Sample may be improperly sheared, may have too much DNA, or may have contaminants such as fibers that interfere with droplet formation. Refer to the <i>RainDrop Assay dPCR Guidelines</i> for information in preparing the sample.</p>	<p>The sample is lost. Make sure the DNA is properly sheared. Try diluting the sample and generating droplets. Filter materials through a 0.2 micron filter to remove debris and contaminants.</p>

**Table 8-1: Troubleshooting the RainDance Source System**

One of the tubes does not contain any droplets. In addition, the run may stop prematurely if emulsion is not detected.	<p>Emulsion is not detected because the emulsion sensor is tripped. This may be due to one of the following:</p> <ul style="list-style-type: none"> <li>• the tube strip is dirty</li> <li>• the tube strip contains writing in the conical area</li> <li>• the tube strip was partially filled prior to your using it</li> <li>• there is a static problem that pulls the emulsion down the side of the tube</li> <li>• tube strip is not installed properly</li> </ul>	The sample is lost.
The ICS displays a message that the chip I inserted has been used before.	You are attempting to run a chip that has already been run.	<p>You must use a new chip for each run.</p> <p>No partial runs using a subset of wells are supported.</p>
The ICS displays a message that the barcode for samples is invalid.	You are attempting to use a barcode format (for samples) that is not supported by the barcode reader.	You must use a supported barcode format or manually enter the barcode information for samples. The ICS accepts a barcode in the 2D Data Matrix format, which allows up to 96 characters of text.



**Table 8-1: Troubleshooting the RainDance Source System**

I am not receiving emails, even though I have entered an email address.	<p>You have entered an invalid email address. The system does not detect undelivered emails.</p> <p>There may be a connectivity issue with your network.</p>	<p>If you are not receiving email messages at the end of the run, check the email addresses you have entered for accuracy.</p> <p>Check with your IT department to be sure you are properly connected.</p> <p>When setting up a run, ensure that the Send Run Emails check box is selected.</p> <p>Click the <b>Send Test Email</b> button to see if you have solved the problem.</p>
Oil is leaking from the bottom of the instrument.	Oil was added before the light came on.	<b>Do not</b> refill the oil reservoir until the oil light comes on.
There is dirt, debris, or oil residue on the chip dock of the instrument.	<p>The instrument has not been properly cleaned.</p> <p>There may have been a previous oil leak, spill, or dust build up.</p>	Clean the instrument according to the instructions in <a href="#">Cleaning the RainDance Source Instrument on page 8-3</a> .
The <b>Alarms</b> tab or <b>Log</b> tab displays an error message. The ICS displays an error message in a dialog box.	A known error has occurred. The ICS may suggest a way for you to deal with the error.	Follow the instructions provided by the error message. If no instructions are provided, verify that the instrument has power and verify that all cable connections are secure. See <a href="#">Connecting the RainDance Source to the Instrument Controller on page 3-3</a> . Contact RainDance Support if the problem is not resolved. See <a href="#">RainDance Support on page 1-3</a> .

# CHAPTER 9

## Waste Management

This chapter covers the following topics:

<b>Introduction and Disclaimer</b>	<b>page 9-2</b>
<b>Classification of Waste</b>	<b>page 9-2</b>
<b>Anticipated Typical Waste Stream Composition</b>	<b>page 9-3</b>
<b>Recommended Waste Stream Disposal</b>	<b>page 9-4</b>

# Introduction and Disclaimer

The waste stream from the RainDance Source includes fluorocarbon oil-emulsified aqueous samples and wetted solid materials (PCR tubes, chips, etc.). The following guidelines are intended to assist the customer in communicating with Environmental Health and Safety staff and/or commercial waste disposal service providers. The following guidelines are not definitive. The Customer is solely responsible for complying with applicable laws and regulations with respect to waste management and disposal.

**Important:** The Customer must dispose of all waste in accordance with all applicable environmental laws and regulations.

## Classification of Waste

- Depending on applicable environmental laws and regulations, the waste stream may be treated as hazardous **chemical** waste.
- Depending on applicable environmental laws and regulations, the waste stream may **not** be classified as **mixed** hazardous waste.

**Important:** If the DNA sample is classified as infectious by the institution that operates the RainDance Source instrument, it is **not** considered the normal waste stream. Refer to the institution's EH&S regulations.

- The customer may be required to certify to the chemical waste disposal service provider that the normal waste stream is non-infectious.
- Consult applicable laws and regulations to determine if fluorinated materials present in the waste stream are regulated.
- Customers should consult with local authorities to determine specific state and local requirements.

# Anticipated Typical Waste Stream Composition

During normal workflow operation, for every 96 samples run on the RainDance Source instrument, approximately 500 g of waste is generated. The following approximate composition of the waste stream is expected if all consumables and waste reagents are combined into a single waste stream:

**Table 9-1: Solids Appearing in Waste Stream**

Material	Source Waste Amount (wt %)
Fluorocarbon oil (from Carrier and Drive Oil)	6.4
Fluorosurfactant (from Carrier and Drive Oil)	1.4
Water	Trace
DNA, polymerase, DNTPs, buffer salts	Trace
Commercial polymers (for example, poly(etheretherketone), polyethylene, polycarbonate, polypropylene, COC)	92

Figure 9-1 and Figure 9-2 show images of solid waste.



**Figure 9-1: Syringe**



Figure 9-2: Source Chip

## Recommended Waste Stream Disposal

- Depending on applicable environmental laws and regulations, the waste stream, which contains fluorinated chemicals, should be incinerated in an industrial or commercial facility in the presence of a combustible material.
- Combustion products will include hydrofluoric acid.
- The incineration facility must be capable of handling halogenated, particularly fluorinated, materials.
- Depending on applicable environmental laws and regulations, the non-infectious aqueous samples and the solid materials (chips, tube strips, and caps, etc.) do not need to be separated from the fluorinated oil.
- Depending on applicable environmental laws and regulations, all components can be collected in a single container, and the container can be incinerated as miscellaneous lab debris.
- Customers should consult with local authorities to determine specific state and local requirements.

# CHAPTER 10

## Customer Care Information

This chapter covers the following topics:

<b>General Care Information</b>	<b>page 10-2</b>
<b>Consumables</b>	<b>page 10-2</b>

# General Care Information

RainDance's Customer Care group can help you with:

- Placing an order
- Expediting a shipment
- Contacting the proper personnel
- Inquiring about other special sales requests

To contact RainDance Customer Care, email us at: [customercare@raindancetech.com](mailto:customercare@raindancetech.com).

Contact RainDance Customer Care to:

- Order a RainDance Source instrument or other RainDance products
- Track a shipment
- Determine availability
- Check on installation
- Return products
- Issue a complaint or compliment
- Request training classes

# Consumables

Order consumables from RainDance or your RainDance-authorized distributor. Use only RainDance products or RainDance-approved products in your RainDance Source instrument. RainDance shall not be liable for damage to or malfunction of the system that it deems was caused by the use of unauthorized materials.

# CHAPTER 11

## Regulatory Information

This chapter covers the following topics:

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<b>Source Instrument Declaration of Conformity</b>
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<b>page 11-2</b>
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***For Research Use Only. Not for use in diagnostic procedures.***



# Source Instrument Declaration of Conformity

		<b>Declaration of Conformity</b>		<b>No.:</b> DOC-1004	
<b>Product:</b>	RainDance Source	<b>Manufacturer:</b> RainDance Technologies 749 Middlesex Turnpike Billerica, MA 01821 Telephone No. (978) 495-3300 <a href="http://www.raindancetechnologies.com/">http://www.raindancetechnologies.com/</a>			
<b>Model No.:</b>	20-04401				
<b>Serial No.:</b>	31XX – and greater				

The undersigned hereby declares, on behalf of RainDance Technologies of Billerica, MA 01821, that the above-referenced product, to which this declaration relates, is in conformity with the provisions of:

**Directives/Requirements:**

Document No.	Title	Edition/DOI
2014/30/EU	OFFICIAL JOURNAL OF THE EUROPEAN COMMUNITIES COUNCIL DIRECTIVE ON ELECTROMAGNETIC COMPATIBILITY	29 March 2014
CFR Title 47	CFR TITLE 47 FCC PART 15 SUBPART B, CLASS A	Current
ICES-003, Issue 6, Class A	SPECTRUM MANAGEMENT AND TELECOMMUNICATIONS POLICY INTERFERENCE-CAUSING EQUIPMENT STANDARD – DIGITAL APPARATUS	Issue 4/Feb-04
2006/95/EC	COUNCIL DIRECTIVE ON LOW VOLTAGE EQUIPMENT SAFETY	12 Dec 2006
BSMI CNS-13438, Class A	TAIWAN BSMI (BUREAU OF STANDARDS, METROLOGY AND INSPECTION) – EMISSIONS TESTING FOR INFORMATION TECHNOLOGY EQUIPMENT: REQUIREMENTS FOR MEASUREMENTS ABOVE 1GHZ AND CONDUCTED EMISSIONS ON TELECOMMUNICATION PORTS	Current
VCCI V-3/2014.04, Class A	VOLUNTARY CONTROL COUNCIL FOR INTERFERENCE BY INFORMATION TECHNOLOGY EQUIPMENT (VCCI)	2012
ACMA AS/NZS CISPR 11:2009 + A1:2010, Class A	INDUSTRIAL SCIENTIFIC AND MEDICAL (ISM) RADIO-FREQUENCY EQUIPMENT – ELECTROMAGNETIC DISTURBANCE CHARACTERISTICS – LIMITS AND METHODS OF MEASUREMENT	19 May 2010

**Tests:**

Document No.	Title	Edition/DOI
EN 61326-1 IEC 61326-1	ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL AND LABORATORY USE – EMC REQUIREMENTS INDUSTRIAL LIMITS	2013 2012
EN 55011:2009 +A1:2010 Group 1 Class A	INDUSTRIAL, SCIENTIFIC AND MEDICAL EQUIPMENT. RADIO-FREQUENCY DISTURBANCE CHARACTERISTICS. LIMITS AND METHODS OF MEASUREMENT	2010
EN 61000-6-1 IEC 61000-6-1	ELECTROMAGNETIC COMPATIBILITY - GENERIC IMMUNITY STANDARD PART 1: RESIDENTIAL, COMMERCIAL AND LIGHT INDUSTRY	2005
EN 61000-4-2 IEC 61000-4-2	ELECTROMAGNETIC COMPATIBILITY (EMC) PART 4: TEST AND MEASUREMENT TECHNIQUES – SECTION 2 ELECTROSTATIC DISCHARGE IMMUNITY TEST	2009 2008
EN 61000-4-3 IEC 61000-4-3	ELECTROMAGNETIC COMPATIBILITY (EMC) PART 4: TESTING AND MEASUREMENT TECHNIQUES – SECTION 3 RADIATED, RADIO-FREQUENCY (RF) IMMUNITY TEST	2006 2006
EN 61000-4-3 IEC 61000-4-3	AMENDMENT A1 – ELECTROMAGNETIC COMPATIBILITY (EMC)	2008 2007
EN 61000-4-3 IEC 61000-4-3	AMENDMENT A2 – ELECTROMAGNETIC COMPATIBILITY (EMC)	2010 2010
EN 61000-4-4 IEC 61000-4-4 Corr (2007)	ELECTROMAGNETIC COMPATIBILITY (EMC) PART 4: TESTING AND MEASUREMENT TECHNIQUES – SECTION 4 ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST	2004

**Figure 11-1: Source Instrument Declaration of Conformity**

	<b>Declaration of Conformity</b>	<b>No.:</b> DOC-1004
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Document No.	Title	Edition/DOI
EN 61000-4-4 IEC 61000-4-4	AMENDMENT A1 – ELECTROMAGNETIC COMPATIBILITY (EMC)	2010 2010
EN 61000-4-5 IEC 61000-4-5 Corr (2009)	ELECTROMAGNETIC COMPATIBILITY (EMC) PART 5: TESTING AND MEASUREMENT TECHNIQUES – SECTION 5 SURGE IMMUNITY TEST	2006 2005
EN 61000-4-6 IEC 61000-4-6	ELECTROMAGNETIC COMPATIBILITY (EMC) PART 6: TESTING AND MEASUREMENT TECHNIQUES – SECTION 6 IMMUNITY TO CONDUCTED DISTURBANCES, INDUCED BY RADIO FREQUENCY FIELDS	2009 2008
EN 61000-4-8 IEC 61000-4-8	ELECTROMAGNETIC COMPATIBILITY (EMC) PART 4: TESTING AND MEASURING TECHNIQUES SECTION 8 POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST	2010 2009
EN 61000-4-11 IEC 61000-4-11	ELECTROMAGNETIC COMPATIBILITY (EMC), PART 11: TESTING AND MEASUREMENT TECHNIQUES - SECTION VOLTAGE DIPS, SHORT INTERRUPTIONS AND VOLTAGE VARIATIONS IMMUNITY TEST	2004 2004
IEC/EN 61010-1	SAFETY REQUIREMENTS FOR ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL, AND LABORATORY USE - PART 1: GENERAL REQUIREMENTS	2010 (3 <sup>rd</sup> Edition)
IEC/EN 61010-2-081/A1	SAFETY REQUIREMENTS FOR ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL AND LABORATORY USE - PART 2-081: PARTICULAR REQUIREMENTS FOR AUTOMATIC AND SEMI-AUTOMATIC ANALYTICAL EQUIPMENT FOR ANALYSIS AND OTHER PURPOSES	2003
UL 61010-1	ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL, AND LABORATORY USE; PART 1: GENERAL REQUIREMENTS	R/2008 (2 <sup>nd</sup> Edition)
CAN/CSA C22.2 No. 61010-1	SAFETY REQUIREMENTS FOR ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL, AND LABORATORY USE - PART 1: GENERAL REQUIREMENTS	R/2009
CAN/CSA C22.2 No. 61010-2-081	SAFETY REQUIREMENTS FOR ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL, AND LABORATORY USE - PART 2-081: PARTICULAR REQUIREMENTS FOR AUTOMATIC AND SEMI-AUTOMATIC LABORATORY EQUIPMENT FOR ANALYSIS AND OTHER PURPOSES	R/2009

<b>Test Provider:</b>	Compliance Worldwide, Inc., - 357 Main Street Sandown, NH 03873
<b>Reference:</b>	Test Report Number <b>426-16</b> (October 4, 2016) and <b>431-16</b> (September. 14 <sup>th</sup> – 22 <sup>nd</sup> , 2016)

<b>Test Provider:</b>	TÜV SÜD America Inc., - 10 Technology Drive, Suite #2 Peabody MA 01960
<b>Reference:</b>	Technical Report No. <b>DI1204808-000</b> (2013-01-31)

The Technical Construction File required by this Directive is maintained at the corporate headquarters of: RainDance Technologies 749 Middlesex Turnpike, Billerica, MA 01821.

 Andrew D. Connerty - Director, Quality Assurance	October 18, 2016 Date of Issue	Billerica, MA Place of Issue
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




**Figure 11-1 (continued): Source Instrument Declaration of Conformity**

# CHAPTER 12

## Symbol Glossary

The symbols in the following table are used on the RainDance Source instrument.

**Table 12-1: Symbol Glossary**

Symbol Name	Symbol Illustration	Definition
AC symbol		Alternating current
Ground symbol in circle		Protected earth (ground)
“ ” on Power Switch		ON
“0” on Power Switch		OFF
Fuse symbol		Fuse
Lightening bolt in triangle		Dangerous Voltage
Laser safety		A laser warning indicates that the user must use precautions when operating the instrument to avoid injury from the lasers.
Pinch point		Keep hands and fingers clear.

# APPENDIX A

## RainDance Source Consumables and Equipment

This chapter provides a list of customer-supplied consumables and equipment required to operate the RainDrop® System or the ThunderBolts™ System. [Table A-1](#) provides a list of consumables, their associated part numbers and other ordering information.



**Caution:** Where RainDance part numbers are indicated, use only RainDance-specified consumables to avoid damage to the instrument.

**Table A-1: Part Numbers for Customer-Supplied Consumables**

Customer-Supplied Consumable	Source/Part Number or Suggested Manufacturers
RainDrop® Consumable Kit - supports 96 samples and includes the following: <ul style="list-style-type: none"><li>• RainDance P/N 30-06085 (carton of 12 Source Chips plus 13 PCR Tube Strip Caps)</li><li>• RainDance P/N 30-06086 (carton of 12 Sense Chips plus 13 High Speed Tube Strip Caps)</li><li>• RainDance P/N 30-07117 Carrier Oil Syringe (3)</li></ul>	RainDance P/N 20-04410
RainDrop® Consumable Kit - supports 480 samples and includes five (5) RainDance P/N 20-04410 kits	RainDance P/N 20-04411
0.2 mL 8-Tube PCR Tube Strips, Clear	Axygen P/N PCR-0208-C
0.2 mL 8-Tube PCR Tube Strips and Caps	Axygen P/N PCR-0208-CPC
0.2 mL 8-Tube PCR Tube Caps	RainDance P/N PCR-02CP-A
Gas Installation Kit (Refer to Pre-Installation Site Prep Document #LCN 50-07597)	RainDance P/N 20-07591



**Table A-1: Part Numbers for Customer-Supplied Consumables**

ThunderBolts™ Cancer Panel (48 Sample) Pack	RainDance P/N 20-07215
ThunderBolts™ Cancer Panel (24-sample) Pack	RainDance P/N 20-07217
ThunderBolts™ Myeloid Panel (48-sample) Pack	RainDance P/N 20-07216
ThunderBolts™ Myeloid Panel (24-sample) Pack	RainDance P/N 20-07218
ThunderBolts™ Open Source (96-well) Pack	RainDance P/N 20-07206
ThunderBolts™ Open Source (48-well) Pack	RainDance P/N 20-07208
Gas Source with 4mm O.D. polyurethane tubing with in-line shutoff valve	<p>In the US:</p> <ul style="list-style-type: none"> <li>• <a href="http://www.grainger.com/Grainger/ATP-Tubing-1PBR5?Pid=search">http://www.grainger.com/Grainger/ATP-Tubing-1PBR5?Pid=search</a></li> <li>• <a href="http://www.coleparmer.com/Product/PTFE_Tubing_2_48_x_4m_m_25_ft_pk/EW-06605-53">http://www.coleparmer.com/Product/PTFE_Tubing_2_48_x_4m_m_25_ft_pk/EW-06605-53</a></li> </ul> <p>In the EU:</p> <ul style="list-style-type: none"> <li>• <a href="http://www.smc.eu/portal/WebContent/digital_catalog/jsp/view_product_configurator.jsp?dc_product_id=49694&amp;part_number=TU0425R1-20&amp;basket_product_id=726514&amp;load_content_from=save_product_link">http://www.smc.eu/portal/WebContent/digital_catalog/jsp/view_product_configurator.jsp?dc_product_id=49694&amp;part_number=TU0425R1-20&amp;basket_product_id=726514&amp;load_content_from=save_product_link</a></li> </ul>
Adaptor to attach 4mm O.D. tubing to male ¼ inch adaptor on regulator	<p>In the US:</p> <ul style="list-style-type: none"> <li>• <a href="http://www.coastpneumatics.com/KQF04-02.html">http://www.coastpneumatics.com/KQF04-02.html</a></li> </ul>

**Table A-1: Part Numbers for Customer-Supplied Consumables**

4mm in-line shut off valves	<p>In the US:</p> <ul style="list-style-type: none"> <li>• <a href="http://www.mcmaster.com/#catalog/119/444/=n4vr4p_scroll%20down%20to%20PN4764K45">http://www.mcmaster.com/#catalog/119/444/=n4vr4p_scroll down to PN4764K45</a></li> </ul> <p>In the EU:</p> <ul style="list-style-type: none"> <li>• <a href="http://www.smc.eu/portal/WebContent/digital_catalog/jsp/view_product_configurator.jsp?dc_product_id=25151">http://www.smc.eu/portal/WebContent/digital_catalog/jsp/view_product_configurator.jsp?dc_product_id=25151</a></li> </ul>
Gas tubing splitter (if running both instruments from same air tank)	<p>In the US:</p> <ul style="list-style-type: none"> <li>• <a href="http://www.grainger.com/Grainger/LEGRIS-Union-Tee-1PEU3?cm_sp=IO--IDP--RR_VTV70300505&amp;cm_vc=IDPRRZ1">http://www.grainger.com/Grainger/LEGRIS-Union-Tee-1PEU3?cm_sp=IO- -IDP- -RR_VTV70300505&amp;cm_vc=IDPRRZ1</a></li> </ul> <p>In the EU:</p> <ul style="list-style-type: none"> <li>• <a href="http://www.smc.eu/portal/WebContent/digital_catalog/jsp/view_product_configurator.jsp?dc_product_id=88174">http://www.smc.eu/portal/WebContent/digital_catalog/jsp/view_product_configurator.jsp?dc_product_id=88174</a></li> </ul>

**Note:** Carrier Oil and Drive Oil syringes contain the same oil, used for different purposes.

For information about equipment and reagents used in assay development, refer to the *RainDance dPCR System Assay Guidelines*.

LCN 50-04343 Rev. B

Date of Issue: December 2016

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