Contents

1. Chapter 1 Overview
   1.1. Introduction
       Audience and Intended Use
   1.2. Irys Overview
       Environmental Specifications
       Electrical Specifications
       Irys Description
       Irys Exterior
       Front
       Right Side
       Rear Panel
       Irys Inside
   1.3. Irys Workstation Configuration
       Data Network Connections and Power
       Computer System Workflow
   1.4. First Use
   1.5. User Supplied Consumables

2. Chapter 2 Startup
   2.1. Sample Preparation
   2.2. IrysChip Preparation
   2.3. Instrument Preparation
       System Startup
   2.4. Irys ICS Main Screen Overview
       Add New User
       Configuring the User Settings and Remote Data Storage Location

3. Chapter 3 Irys Operation
   3.1. Logging In
   3.2. Loading the Sample
       Load Inlets
       The following outlines the steps necessary to load sample onto the IrysChip. Progress quickly through the following steps to minimize evaporation of the sample during this process.
       Load Outlets
       Oiling the Objective
       Forward
       Sample Detect
   3.3. Barcode
   3.4. Focus & Register
   3.5. Select Recipe
   3.6. Scanning Flowcell

4. Chapter 4 Recipe Optimization
   4.1. Creating an Optimized Recipe
       Getting Started:
       Example Scan
       Save Recipe
   4.2. Results
5. Chapter 5 Data Analysis ........................................................................................................38

6. Appendices ..........................................................................................................................39
   6.1. Appendix A - Irys Maintenance .......................................................................................39
        Introduction ......................................................................................................................39
        Basic instrument care .....................................................................................................39
        Routine Maintenance .....................................................................................................39
   6.2. Appendix B – Troubleshooting ......................................................................................40
   6.3. Appendix C – GUI Navigation Buttons ..........................................................................44
        Navigation Buttons .........................................................................................................44
   6.4. Appendix D - Terms .......................................................................................................45
   6.5. Appendix E - SMS Domain Names ..................................................................................46

7. Technical Support ................................................................................................................47
Legal Notices

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# Revision History

<table>
<thead>
<tr>
<th>Part Number 30047 Revision A</th>
<th>Date</th>
<th>Summary</th>
</tr>
</thead>
</table>
| Initial Release             | 07/28/2015 | Released per CO 0131  
Created a reformatted, rebranded workflow-styled Irys User Guide. Replaces PN 30028.  
V1.6 New Features include:  
• Generate Optimized Recipe creation  
• Multicolor live molecules  
• All-flowcell abort, customize recipe and cycle number  
• Z Stage, autofocus, system tests  
• Power supply, Micos Z Stage motor, general bug fixes |
| Revision B                  | 4/19/16    | Released per CO 0242  
Changes made to support Irys Instrument Control Software (ICS) v1.6.1:  
• Added button to cancel all scheduled pauses  
• Added pillar calibration to custom recipe creation screen  
• Removed M2 base recipe  
• Changed names of M3 to “Standard Base Recipe” and M3X to “Modified Base Recipe”  
• Enabled pop-up editing for copies of base recipes  
• Changed custom recipe workflow: lack of DNA fails a bump trial automatically  
• Fixed issues causing intermittent freezes in custom recipe creation  
• Fixed issues causing images to appear blank during custom recipe creation  
• Improved reliability of autofocus logging  
• Enabled run abort during pauses and rehydration  
• Added ability to submit password forms with the Enter key |
Safety Warnings

This guide is written and organized for use by individuals skilled in the operation and function of chemical, high voltage, and industrial light sources and their subsystems, particularly excimer lasers. It is assumed that this skill and knowledge will be used when following the procedures outlined in this guide.

Following is an explanation warnings and symbols:

### Safety Warnings

This product has a laser system classification of Class 1 which uses four embedded Class 3B lasers. With nominal outputs of 300 mW (532 nm), 140 mW (637 nm), 75 mW (473 nm) and 90 mW (785 nm) optical power (nominal wavelength).

A Class 1 laser is safe under all conditions of normal use.

A Class 3B laser is hazardous if the eye is exposed directly, but diffuse reflections such as those from paper or other matte surfaces are not harmful. Protective eyewear is typically required where direct viewing of a class 3B laser beam may occur. Class-3B lasers must be equipped with a key switch and a safety interlock. DO NOT OPEN the front cover of the Irys Instrument as you may come in contact with a Class 3B Laser.

1. Do not connect any item to the Irys Instrument unless specifically stated within this manual or if you are instructed to do so by BioNano Genomics Technical Support.
2. Do not use adjacent to or stacked with other equipment such that it is difficult to operate or disconnect from power.
3. Do not attach the power cord to an extension cord or to a multiple portable socket. Doing so may compromise shielding and/or grounding.

### Table 2: Symbols

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Exclamation Mark" /></td>
<td>Warning: Indicates a warning concerning operations that may lead to personal injury or potential damage to the Irys instrument if not performed correctly.</td>
</tr>
<tr>
<td><img src="image" alt="Power Symbol" /></td>
<td>Standby: The switch does not fully disconnect the device from its power supply but places in standby state.</td>
</tr>
<tr>
<td><img src="image" alt="USB Symbol" /></td>
<td>USB Connectivity</td>
</tr>
<tr>
<td><img src="image" alt="Ethernet Symbol" /></td>
<td>Ethernet Connectivity</td>
</tr>
</tbody>
</table>
1. **Chapter 1 Overview**

1.1. **Introduction**

Complex genomes are composed of multiploid chromosomal DNA, with each individual chromosome ranging from hundreds of thousands to hundreds of millions of base pairs in length. Once extracted from cells, these long biopolymer molecules form tight ball-like coils that are difficult to image and analyze. Irys® uses a patented method of DNA linearization to unravel the DNA and then image genomic DNA after it is loaded into NanoChannels.

BioNano Genomics has pioneered the Irys platform to perform whole genome mapping in a nanoscale fluidic environment enabling the structure of the genome to be imaged and then analyzed at the single molecule level. Irys data is suitable for a variety of applications including whole-genome sequence scaffolding and structural variation (SV) mapping. Irys System uses a straightforward and flexible process, consisting of:

1. Sample preparation — Performed using the IrysPrep sample preparation kit for your specific application.
4. Data viewing and genome analysis—Performed using IrysView®.
5. Data analysis — Data analysis begins with Image processing of the raw data off-instrument with BioNano AutoDetect software. From there data analysis progresses using IrysView and IrysSolve® software applications.

**Audience and Intended Use**

This guide contains information about the Irys system. It provides an overview of instrument components and software features, and full instructions for operating the Irys system.

This guide is for laboratory personnel and other individuals responsible for:

1. Operating the instrument
2. Performing instrument and component maintenance
3. Training personnel on the instrument

Irys system is intended for RESEARCH USE ONLY and is not for use in diagnostic procedures.

1.2. **Irys Overview**

**Environmental Specifications**

<table>
<thead>
<tr>
<th>Environment Specifications</th>
<th>Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature range</td>
<td>20 to 27° Celsius</td>
</tr>
<tr>
<td>Dimensions:</td>
<td></td>
</tr>
<tr>
<td>Height</td>
<td>35.6 cm (14 inches)</td>
</tr>
<tr>
<td>Depth</td>
<td>65 cm (25.5 inches)</td>
</tr>
<tr>
<td>Width</td>
<td>86.4 cm (34 inches)</td>
</tr>
<tr>
<td>Mass</td>
<td>77.3 kg (170.5 pounds)</td>
</tr>
<tr>
<td>Operating altitude above sea level</td>
<td>0 to 2000 m (0 to 6562 feet)</td>
</tr>
<tr>
<td>Operating humidity range</td>
<td>15 to 65 % relative humidity</td>
</tr>
<tr>
<td>Sample environment operating temperature</td>
<td>Room temperature</td>
</tr>
<tr>
<td>Shipping and storage temperature range</td>
<td>-28 to 50° Celsius</td>
</tr>
<tr>
<td>Shipping and storage humidity range</td>
<td>0 to 90 % relative humidity</td>
</tr>
</tbody>
</table>
**Electrical Specifications**

<table>
<thead>
<tr>
<th>Electrical Specifications</th>
<th>Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating supply voltage</td>
<td>100 to 240 VAC</td>
</tr>
<tr>
<td>Line frequency</td>
<td>50/60 hertz</td>
</tr>
<tr>
<td>Power</td>
<td>≤ 250 watts</td>
</tr>
<tr>
<td>Power connector</td>
<td>Region-specific power cord supplied</td>
</tr>
<tr>
<td>Fuse type</td>
<td>T3A</td>
</tr>
</tbody>
</table>

**Irys Description**

Irys instrument is designed to simplify the imaging of single DNA molecules compared to other single molecule imagers. Capable of detecting single DNA molecules in highly parallelized NanoChannel arrays. The Irys instrument is comprised of epi-fluorescence optical-mechanical components designed and optimized to provide sensitive imaging capabilities for single molecule analysis.

IrysChip® is a semiconductor based NanoChannel array cartridge designed for use with the Irys instrument. Cartridges are placed in the instrument for sample loading and data acquisition. Each cartridge has 2 flowcells that are independently loaded with small amounts of sample during run setup. Irys then uses a low-voltage electric field to load DNA molecules into the flowcells for subsequent imaging.

Irys harnesses laser coupled epifluorescence to image individual DNA molecules after loading them into IrysChip cartridges. Imaging occurs through the underside of the cartridge with a high numerical aperture objective. Irys optical components are carefully selected and positioned to optimize imaging automation and single molecule sensitivity. This powerful combination of lasers, optics, and EMCCD detection coupled with proprietary instrument control software, maintains focus while rapidly capturing single molecule images. Imaging is conducted on multiple channels producing high signal-to-noise discrimination in real time.

**Single Molecule Confinement and Molecular Linearization**

Each NanoChannel on an IrysChip permits single DNA molecules to exist only in a linear form once loaded. Molecule overlap is avoided since this level of molecular confinement also prohibits molecules from existing side by side inside the NanoChannels.

**Consistent, Disposable, High Capacity Flowcell**

Leveraging semiconductor manufacturing, IrysChip is a single use consumable cartridge with thousands of identical, parallel NanoChannels in each flowcell. Electrophoresis flows DNA molecules through the IrysChip, first linearizing and then confining single molecules as they move through the cartridge and into the NanoChannels. In this way, tens of thousands of molecules are confined in the IrysChip and imaged while in identical environments.

![Figure 1: IrysChip Schematic](image-url)
Irys Exterior

Front
Touch Screen Monitor: Used during configuration and run setup. The graphical user interface has been designed to follow a straightforward workflow facilitating the instrument's operation and run execution.
Sample Loading Door: The sample loading door provides access to the chip loading workspace.

Right Side
Computer Power Button: ON/OFF button used to power instrument computer.
USB: dual USB 2.0 hub for user supplied peripherals.
Rear Panel

Power Connectors: Irys requires a single 100 to 240 VAC/50 to 60 Hz (+/- 10%) rated at 1.5KVA power connection with a dedicated ground.

Instrument Power Switch: The main power switch for the Irys instrument and must be turned to the ON position before the power button on the right-hand-side of the instrument can operate.

Ethernet Connectors: This port is provided for data transfer and networking.

Figure 4: Image of rear view of Irys showing power switch and connector

Irys Inside

The key components of the Irys instrument are the EM-CCD camera, filter wheel, automated XY stage, lasers and autofocusing system.

<table>
<thead>
<tr>
<th>Specification</th>
<th>Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illumination modes</td>
<td>Fluorescence excitation (primary), brightfield (auxiliary, for registration)</td>
</tr>
<tr>
<td>Excitation light source type</td>
<td>Lasers, diode, and DPSS</td>
</tr>
<tr>
<td>Number of excitation wavelengths</td>
<td>3</td>
</tr>
<tr>
<td>Excitation wavelengths</td>
<td>473 nm, 532 nm, 637 nm</td>
</tr>
<tr>
<td>Brightfield source type</td>
<td>LED</td>
</tr>
</tbody>
</table>
1.3. **Irys Workstation Configuration**

**Data Network Connections and Power**

Your information technology (IT) resource is responsible for:

1. Preparing a stable and sustainable network connection speed of > 10 MB/sec
2. Providing an internet connection for BioNano Genomics Technical Support services
3. Connecting an uninterrupted power supply battery backup system (UPS) or line conditioner
4. Allowing local administration rights for software installation and firewall modification
5. Ensuring Port 21 is open for outbound communications and remote technical support
6. Ensuring TCP connections to ports 80, 443 or 8200 are open for outbound communications and real-time monitoring

Irys Control Software (ICS), AutoDetect, and IrysView software are designed to share data access via a common storage location. IrysSolve analysis pipeline processes data on a separate, larger Linux-based compute resource.

1. Irys ICS: Performs data acquisition through control of the Irys instrument and user selected run parameters.
2. AutoDetect: Provides image processing of the raw data files generated by Irys, creating assemble-ready digitized molecule and label files for further analysis in IrysView.
3. IrysView: Analyzes and visualizes data generated by Irys instrument.
4. IrysSolve: Computational hardware/software offering, designed to run BioNano automated *de novo* assembly and structural variation detection analysis.

**Computer System Workflow**

The Irys platform typically utilizes a computer on the instrument to generate the raw data, a standalone Windows PC for raw data image processing, and IrysView data visualization and computer in a cluster or cloud-based environment for IrysSolve to perform *de novo* assembly.

Typical Irys platform workflows are diagramed below:

![Computer System Workflow](image-url)
1.4. First Use

A Field Service Engineer will complete performance testing to ensure proper installation. Calibration protocols and setting adjustments are performed during the installation and training sessions.

 пен

Note: Do not attempt to move an instrument without the assistance from BioNano Genomics. Moving carries a high risk of optical misalignment that can substantially degrade data quality. If relocation is required, please contact support@bionanogenomics.com.

1.5. User Supplied Consumables

Table 4: Available from BioNano Genomics

<table>
<thead>
<tr>
<th>Catalogue Number</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>FC-020-01</td>
<td>IrysChip v2 (1 chip)</td>
</tr>
<tr>
<td>RE-011-10</td>
<td>IrysPrep 1-Color Assembly Reagent Kit (10 reactions)</td>
</tr>
<tr>
<td>RE-111-10</td>
<td>IrysPrep DNA Stain (10 reactions)</td>
</tr>
</tbody>
</table>

Table 5: Available from Other Vendors

<table>
<thead>
<tr>
<th>Material</th>
<th>Reference or Catalog Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sparkle Optical Micro lens Cleaner</td>
<td>AJ Funk &amp; Co. 50104</td>
</tr>
<tr>
<td>Or equivalent non-ammonia, non-alcohol cleaner, or anhydrous methanol for cleaning the Objective</td>
<td></td>
</tr>
<tr>
<td>Microscope immersion oil</td>
<td>Zeiss Immersol® 518 F halogen-free</td>
</tr>
<tr>
<td>Lens cleaning wipe</td>
<td>ThorLabs Lens Tissue, Fisherbrand Lens Paper, Tiffen Lens cleaning paper</td>
</tr>
</tbody>
</table>
2. **Chapter 2 Startup**

![Diagram: Workflow Overview]

**2.1. Sample Preparation**

Samples must be prepared in advance according to IrysPrep reagent kit instructions. Log into [http://forums.bionanogenomics.com](http://forums.bionanogenomics.com) to access the current protocols.

**2.2. IrysChip Preparation**

1. Allow the IrysChip to equilibrate to room temperature while sealed in its pouch for at least 30 minutes prior to use.

   ![Note] Prematurely removing the IrysChip from its pouch will cause performance degradation.

2. Wipe off any external moisture from the pouch exterior before opening.

3. Prior to loading an IrysChip onto the stage, inspect the underside of the chip for dust and debris, which can impact performance. Gently wipe the underside of the chip with lens paper, if necessary.

   ![Note] Avoid touching the underside of the IrysChip cartridges with anything other than a lens paper. Avoid use of compressed gas when cleaning IrysChip.

**2.3. Instrument Preparation**

Follow the system startup process to initialize software and hardware components.

**System Startup**

1. Verify connection of the power and communication cables.

2. Position the touch screen display by lifting the front edge of the display until it is in a full upright position. Then, rotate the bottom of the screen to achieve a convenient viewing position.

3. Turn ON the instrument using the main power switch located on the rear of the instrument.

4. Press the power button on the right side of instrument to initialize Irys Instrument Control System (ICS).
During the power up, the touch-screen LCD should illuminate. The instrument will execute a boot-up sequence to a desktop. Double click the Irys application icon located on the desktop to launch the Irys ICS.

Once Irys ICS launches, the system will initialize hardware communication and self-diagnostics while the splash screen is displayed.

![Irys Startup Screen](image)

**2.4. Irys ICS Main Screen Overview**

The Select User screen will appear after initialization from which run set up and user profile management begins. Labels A through G are:

![Select User Screen](image)

A. **User Settings:** Use to add new user profiles and access list of existing user profiles.

B. **Status of Events:** Use to access list of recent events in the events screen. Some instrument warnings and errors are displayed here when they occur. When warnings and errors occur, the green check mark changes to a red exclamation mark or an hourglass indicating a change in instrument status. For more information, see the Troubleshooting section (Tables 9 and 10). The Events screen can be accessed through the green check/red exclamation from all Irys ICS screens without interrupting Irys ICS activities.

C. **Help:** Use to access online user guide.

D. **Exit:** Use to return to Select User screen. From Select User screen, click to safely shut down Irys ICS.

E. **Navigation Arrows:** Use right arrow to advance to the next workflow step (Click left arrow to return to previous screen).

F. **Clean:** Use to initiate cleaning cycle (use if clean cycle not carried out after previous run).

G. **Select User:** Use to activate drop-down menu showing all current usernames (<Add New User> displayed if no users exist).
Add New User

Click on the Select User drop-down menu to create a new User Name.

Once Add New User is selected, the User Settings screen opens to configure user-specific settings for the new user, after which time the new User Name will appear in the Select User drop-down menu and in the workflow settings.

Configuring the User Settings and Remote Data Storage Location

Data export occurs automatically during acquisition to the location specified in the logged in user's profile. During user profile setup, a user designated storage location must be mapped to the instrument.

1. **First Export Directory**: The primary location Irys ICS will attempt to export data to (can be local or remote). If the destination is remote, Irys ICS will require network connectivity to the storage location while the instrument is running.

2. **Second Export Directory**: Backup storage location. Irys ICS will attempt to export data here when unable to export to the first location.

3. **Email Notification**: User may opt to receive run notifications by entering email address here. “Test” button will send a test email when clicked.

4. **SMS Notification**: Instrument notification can be sent to a cellular device if a user opts to enter an SMS address here. “Test” button sends a test communication. Entry should be a ten* digit number followed by the provider domain. Example for T-Mobile USA: XXXXXXXXXX@tmomail.net

   **Note**: May be country specific. See Appendix E for most popular USA carrier SMS addresses and a web link to query your carrier’s code.

5. **Password**: A user may provide a password for account compartmentalization. This field is optional but will be required for this user login if populated (this is not intended as a security feature).
Irys ICS allows user-specific credentials to maintain account compartmentalization when needed. Credentials are not required and Irys will automatically log in as the selected user if a password has not been designated.
3. **Chapter 3 Irys Operation**

3.1. **Logging In**

1. Click on the Select User drop-down menu to select your name.
2. After selecting the user, press the Forward arrow button to proceed to the Load Sample screen.

![Select User](image)

**Figure 11: Proceed to Load Sample Screen**

3. The XY Stage will eject and the Objective will rise.

*Note:* There will be a delay in going from the Select User screen to the Load Sample screen while the system calibrates.

3.2. **Loading the Sample**

Before loading a chip, ensure that any oil has been cleaned from the objective as outlined in section 4.3. Once the XY Stage is fully ejected, place the empty IrysChip onto the XY Stage cutout with the label side up. There is only one orientation. Secure the IrysChip in place by rotating the lock bars over the corners of the chip.

*Note:* The chip should equilibrate to room temperature, while sealed in its pouch for 30 minutes, before use.

![Load IrysChip](image)

**Figure 12: Load IrysChip**
Load Inlets

The following outlines the steps necessary to load sample onto the IrysChip. Progress quickly through the following steps to minimize evaporation of the sample during this process.

1. Using a standard pipette with a P10 pipette tip, press the plunger down and hold at the first stop. Lower the pipette tip into Nick-Label-Repair-Stain (NLRS) DNA sample and gently stir the sample with the tip. Slowly aspirate 8μL of the sample.

2. Slowly dispense the 8μL of the NLRS DNA from the loaded pipette tip into the Inlet wells of each flowcell on the IrysChip:
   - Align pipette tip over the inlet well at the front of the IrysChip and dispense slowly until the bottom of the inlet well is coated with sample solution. Continue to dispense until the entire volume of 8μL is in the port. The fluid level in the port should be either flat, or slightly convex. If it is not, add additional sample in 1-2μL increments until it is.

   **Note:** Always maintain positive pressure on the plunger to avoid introducing bubbles.

   **Note:** If more than 10μL of sample is required to achieve a flat fluid level in the inlet, contact Support after run.

3. On the Load Sample screen, click the Load Inlet checkbox to start the 2-minute timer (status bar indicator is filled at 2 minutes).

4. A virtual popup keyboard opens. Type the Flowcell Sample name in the text box and press Enter.

5. Repeat steps 1-4 for the second Flowcell inlet, using a fresh pipette tip.

![Figure 13: Load Inlet Well](image)

![Figure 14: Load the Inlets, Outlets, and Oil the Objective](image)
6. After the 2-minute timer is complete, proceed to load the Outlet well.

   **Note:** If only one flowcell is used, Irys ICS will prompt to confirm the running of only one flowcell.

**Load Outlets**

1. Slowly dispense 8μL of the NLRS DNA into the Outlet well of each flowcell at the rear of the IrysChip using the same aspiration and dispensing process described in the Load Inlet section.

2. Select the respective Load Outlet checkbox when complete.

   **Note:** Use the same NLRS reaction for both Inlet and Outlet wells of the same flowcell to prevent problems with ionic variation between the two wells.

**Oiling the Objective**

![Image of oiling the Objective]

**Figure 15: Oil the Objective**

   **Note:** Prior to oiling the Objective, ensure it has been cleaned (see Section 4.3). Failure to clean the Objective prior to oiling will result in reduced system performance.

1. Using the Zeiss oil and paddle, dispense one drop of oil onto the Objective. If a bubble forms when oil is dispensed, wipe off the Objective, clean with Sparkle, and repeat the application of the oil.

   **Note:** Do not apply excessive oil to the Objective. Enough oil should be applied to form a rounded droplet that does not run down the side of the lens.

2. Select the Oil Objective checkbox when finished oiling the Objective.

![Image of Load Sample Screen]

**Figure 16: Load Sample Screen Complete**
Forward

1. After all required tasks are complete, ensure that all sample levels are flush in the wells. If evaporation has occurred, add nuclease-free water dropwise to each well until sample level is flush. Immediately press the Forward button to proceed to Focus & Register.

2. The Status icon will change from the green checkmark to the transparent hourglass timer to indicate a process is in action.

\[\textbf{Note:}\] There are intermediate steps described below, which alert the user if the loading is out of specification.

Sample Detect

1. When the XY Stage retracts, Irys will perform a sample detection test on the IrysChip. Irys ICS will generate a warning if it detects no sample or a low sample volume:

![Error Message for Low Volume](Figure 17: Error Message for Low Volume)

2. Selecting “Yes” to fix the problem will eject the XY Stage for sample loading.

3. If sample has evaporated during the course of loading the chip, add enough nuclease-free water to bring the volume in the ports back to previous flat or slightly convex level.

3.3. Barcode

1. After the Sample Detect step, Irys reads the IrysChip barcode and moves the workflow to the Focus & Register screen.

\[\textbf{Note:}\] If unable to read the barcode, Irys will prompt to manually enter the barcode Part Number, Lot Number, and Serial Number manually in the Barcode screen. This information can be found on the IrysChip’s foil package.

![Manually Enter Barcode](Figure 18: Manually Enter Barcode)
3.4. Focus & Register

The Focus & Register workflow engages the camera and raises the Objective to the focal plane of the IrysChip. The Focus & Register screen allows for manual verification of system focusing and registering as well as manual intervention, if necessary.

1. Focus: When the workflow progresses to the Focus & Register screen, the instrument will lock onto the registration target, displaying a red circle and In Focus text to indicate focus is achieved. Refer to troubleshooting section if focus is not achieved.

2. Center and Register: Once focus is achieved, tap on the Fiducial image in the desired direction until the red circle is centered over the intersection point (Figure 19). If unable to see the Fiducial on the screen, triangles point in the direction of the fiducial.

3. When the Fiducial image is in focus and centered, press Set Fiducial.

Note: A red circle indicates the image is in focus. The Set Fiducial and Set Position buttons will become active once focus is achieved.

Figure 19: Proper Registration of Fiducial Mark

   a. Press Find Position 1. The red circle will be centered over the intersection of the single tie and crossarm.
   b. If the red circle is not centered properly over the single tie and crossarm, center it manually.
      i. Tap on the Fiducial image in the desired direction until the red circle is centered over the single tie and crossarm (Figure 20).
      ii. Press Set Position 1 to register.
5. Repeat step 4 for Find Position 2 to center the red circle over the tie and triple-crossarm (Figure 21).

6. Press Set Position 2 to register.

7. Figure 21: Set Position 2

Press the Forward arrow to go to the Select Recipe screen.

### 3.5. Select Recipe

1. Select a recipe for each flowcell. There are two base recipes in Irys, along with the ability to generate optimized recipes from any of the base recipes.
   b. Modified Base Recipe: Use when the standard base recipe is not performing optimally
   c. Generate Optimized Recipe A & B: Recommended workflow. Refer to Chapter 4 for instructions on creating an optimized recipe.

2. Select a cycle count for the IrysChip.
   a. The default cycle count is set to the maximum number of 30 cycles. Any value selected here will apply
to both flowcells. The cycle count may be changed by pressing the up and down arrow buttons.

3. Set Automatic Pauses (Optional).
   a. This allows the option to set up to two automatic pauses after designated cycles. Select cycles by using the up and down arrow buttons. Automatic Pauses can be cancelled mid run by pressing Cancel Pauses in the Scanning Flowcell screen (Figure 23).

![Select Recipe Screen](image)

Figure 22: Select Recipe Screen

4. Flowcell Settings. Each flowcell can be configured individually.
   a. Red labels: Select Red labels (analysis of the Red Label Channel is currently not supported in IrysView).
   b. Green labels: Select Green labels.
   c. Concentration time: Input a concentration time in seconds based on measured Nick Label Repair and Staining (NLRS) DNA concentration or less time for the guided loading only. (See section 5.1 for explanations). See Recipe Setup in Section 4.1 for details.

<table>
<thead>
<tr>
<th>NLRS [DNA] (ng/µL)</th>
<th>Concentration Time (seconds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-5</td>
<td>400</td>
</tr>
<tr>
<td>6</td>
<td>350</td>
</tr>
<tr>
<td>7</td>
<td>300</td>
</tr>
<tr>
<td>8</td>
<td>250</td>
</tr>
<tr>
<td>9</td>
<td>200</td>
</tr>
<tr>
<td>10</td>
<td>150</td>
</tr>
</tbody>
</table>

5. Press the Forward button to go to either the Optimized Recipe or the Scanning Flowcell screen. For Optimized Recipes, see Chapter 4, Recipe Optimization for further instructions.

📝 Note: Once an Optimized Recipe is saved, Flowcell Settings cannot be edited for that recipe.
3.6. Scanning Flowcell

The Scanning Flowcell screen (Figure 23) allows monitoring of the loading and scanning of the IrysChip. This screen also gives the option to pause the run, rehydrate/oil, or abort the run.

![Scanning Flowcell Screen](image)

**Figure 23: Scanning Flowcell**

1. **Pause Run:** To pause, press the Pause Run button. The flowcell status will change to “Pausing Run at end of cycle,” and the system will stop scanning at a stable point, which may require up to 30 minutes to reach. Once the system is paused, select either Rehydrate/Oil or Continue Run.
   a. **Continue Run:** Press the Continue Run button to cancel the pause and continue scanning.

   *Note:* The Abort feature is unavailable during Pause Run. Irys will pause automatically if a focus failure occurs. Focus failures are logged in the Event Log and marked with a red exclamation mark.

2. **Rehydrate/Oil:**
   a. After the Pause, press the Rehydrate/Oil button to eject the XY Stage to the load position.
   b. Promptly clean the oil from the Objective and the underside of the IrysChip cartridge.
   c. Reoil the Objective.
   d. Rehydrate the sample with nuclease free water until the sample is flush with the well.
   e. Press the Forward button to retract the XY Stage and proceed to the Focus and Register screen (the Fiducial and Positions 1 and 2 will need to be registered again). Refer to Section 3.4 Focus and Register for details.
   f. Press the Forward button again to resume scanning.
4. **Chapter 4 Recipe Optimization**

Generate Optimized Recipe (also referred to as Guided Loading) initiates a stepwise process to determine the optimum conditions for a sample loading cycle. Certain processes, such as the spike, are preconfigured by the software and are not optimized during this workflow.

![IrysChip Schematic](image)

**Figure 1: IrysChip Schematic**

### 4.1. Creating an Optimized Recipe

Customization process of a base electrophoresis recipe uses empirical measurements of the following parameters:

1. **Concentration Step** - Accumulates a large amount of molecules at the lip in preparation for entry to the IrysChip. Time and voltage can be adjusted during the optimization.
2. **Bump Time** - Brings molecules that have entered the chip into the proximity of the entrance to the pillars.
3. **Load Time** - Brings the linearized DNA molecules into the NanoChannels for imaging.

**Getting Started:**

It is recommended that two independent Optimized Recipes be generated, one for each flowcell (e.g., select Generate Optimized Recipe A for one flowcell and Generate Optimized Recipe B for the other flowcell).

**Step 1: Recipe Set Up**

1. Select Generate Optimized Recipe (A or B) and the option to configure the flowcell’s settings become available, similar to selecting a base recipe (Figure 24).

![Select Recipe Screen](image)

**Figure 24: Select Recipe Screen**
2. Select the label colors appropriate for the sample.

3. Based on samples’ DNA concentration (collected at the end of Nick Label Repair and Staining protocol), enter the **starting concentration time** using the table below.

<table>
<thead>
<tr>
<th>Estimated DNA Concentration (ng/µL)</th>
<th>Starting Concentration Time (seconds)</th>
<th>Recipe Concentration Time (Seconds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-5</td>
<td>200</td>
<td>400</td>
</tr>
<tr>
<td>6</td>
<td>175</td>
<td>350</td>
</tr>
<tr>
<td>7</td>
<td>150</td>
<td>300</td>
</tr>
<tr>
<td>8</td>
<td>125</td>
<td>250</td>
</tr>
<tr>
<td>9</td>
<td>100</td>
<td>200</td>
</tr>
<tr>
<td>10</td>
<td>75</td>
<td>150</td>
</tr>
</tbody>
</table>

*Note: Starting Concentration Time is half of suggested Recipe Concentration Time to minimize pillar clogging prior to data acquisition.*

4. Select Standard Base recipe and press OK to proceed to pillar calibration (Figure 25).

![Select Base Recipe](image-url)
Step 2: Pillar Calibration

1. Calibrate pillar location using touch screen to position the red line on the screen just under the pillars and click OK (Figure 26).

![Figure 26: Pillar Calibration](image)

Step 3: Concentration

DNA will begin accumulating at the lip of the flowcell for 60 seconds while the camera is off (Figure 27).

![Figure 27: Initial Loading: Camera Off](image)

1. Click on the right and left side of the live image to move the live screen across 5 fields of view to the right and left to confirm DNA is concentrating and evenly spread.

2. Click OK to decrease voltage only if you see DNA entering into the black area (leakage). Repeat as needed until any leakage present subsides. (Refer to Troubleshooting Guide, Figure 47, for an example of DNA leakage).
Note: The OK button will be deactivated for 5 seconds after each decrease voltage click.

Step 4: Bump measurement

Once the concentration step is complete, Irys will turn off imaging and spike the DNA into the flowcell.

Note: There is no pause between the end of concentration and proceeding to spike and bump measurement. If away from the instrument, make sure to return before the concentration timer runs out.
1. After the quick spike, the camera will turn back on and a prompt to complete bump measurement will be displayed. Click OK to stop DNA movement when the wave of DNA reaches midway to the green line (the start of the pillar region). This will complete the initial bump measurement (Figure 30). Verify measurement by clicking the left and right side of the live view to locate DNA in adjacent fields of view.

![Figure 30: Bump](image)

2. Assess whether additional concentration time is needed (Figure 31).
   a. If additional concentration is needed, click Yes to automatically restart the workflow from the concentration step. Concentration is repeated with an additional 160 seconds added to the concentration time.
   b. If additional concentration is not needed, click No to proceed to bump measurement display.

![Figure 31: Concentration Time Optimization](image)
3. Bump measurement time will be displayed in a user-editable screen (Figure 32).

![Figure 32: Bump Time Optimization](image)

4. Click Yes to repeat bump. Irys will repeat the concentration and bump time measurement.  
   \* **Note:** Clicking No will bypass second bump measurement (Not recommended).  

5. The concentration timer will restart, this time without the live camera image. When the concentration timer runs out, the camera will turn back on a prompt to complete bump measurement will be displayed (Figure 33). Click OK when the wave of DNA reaches midway to the green line (start of the pillar region). This will complete the second bump measure.  
   
   \* **Note:** Irys uses a different location on the flowcell for each additional bump measurement. Before each additional bump measurement, the DNA will be concentrated and spiked into the IrysChip. For all subsequent bump measurements, there will not be a live view during the concentration step.

![Figure 33: Complete Bump Measurement](image)
6. Click No to proceed to second bump time display (Figure 34).

![Figure 34: Concentration Optimization](image)

**Note:** Clicking Yes will automatically restart the workflow from the concentration step (160 seconds is added to concentration time). Live imaging will be inactive during this process.

7. If the bump time measurements are less than 30 seconds, and if they are within 2 seconds of each other, click No to accept the settings and proceed with the displayed optimized bump time.
   
a. If either of the above is not true (as shown in Figure 35), refer to the troubleshooting section of this guide for further instructions.

![Figure 35: Repeat Bump](image)

**Note:** Up to four of the most recent Bump Time measurements will display under Recorded Bump Time(s); Optimized Bump Time represents the average of all measurements.

**Note:** Clicking Yes will repeat bump measurement.
Step 5: Load Time Optimization

1. Click Yes to proceed with load time optimization, which will measure the time required to load DNA to the end of the nanochannels (Figure 36).

   Note: Clicking No will restart the Recipe Optimization process.

Figure 36: Option to Stop Optimization after Bump Time

   Note: A 10 minute period of intermediate loading steps will commence. A timer on the screen displays time remaining (Figure 37). The live image is inactive during this process.

Figure 37: Intermediate Loading Steps
2. Once the intermediate loading steps have completed, click OK to start final load time measurement (Figure 38). The live image becomes active.

3. Click OK when the wave of DNA reaches the Loading Zone to measure the load time (Figure 39).

   **Note:** During Load Time Optimization, the live image shows a chip position three fields of view (FOV) under the outlet. If the maximum measurable Load Time of 120 seconds is reached, a timeout will occur and ask if DNA loaded successfully. See troubleshooting section on Load Time Optimization if you don’t see DNA wave after 120s.

4. Click left and right on the live image to move the view, confirming DNA has loaded across the chip.

5. Click Yes to proceed to the next screen (Figure 40).

   **Note:** Clicking No will return to the concentration step. Refer to the troubleshooting section 6.2 for further instructions.
Irys® User Guide

For Research Use Only. Not Intended For Diagnostic Purposes.

Figure 40: Determine if Load Time Measurement was Successful

Example Scan

Irys takes backbone-only scan images of the NanoChannel Array. Each image is shown in the live view (Figure 41), and the images are then compiled into a mosaic showing a portion of the array, marking the entrance and exit (Figure 43).

Figure 41: Imaging Example Scan
Save Recipe

The final Optimized Recipe values are displayed in editable text boxes.

1. Enter the final concentration time value from Table 7 according to your initial NLRS concentration and confirm all values. Enter a name for the recipe and click Yes to save (Figure 43).

   **Note:** Clicking No returns to the Select Recipe screen.

   **Note:** Saved recipes will be displayed in the Select Recipe screen for future runs.

2. Click Forward arrow to either start the Run or begin optimization for Flowcell 2, depending on run configuration.

3. Run will initiate and continue through the number of cycles specified. Total time and estimated time of completion will be displayed.
4.2. Results

The Results screen serves as a transitional screen and provides a summarized scan information by flowcell:

a. User name
b. Sample name
c. Recipe name
d. Number of cycles run
e. Time of completion

Forward

Pressing Forward arrow advances to the Clean screen.
4.3. Clean

The Clean screen outlines the tasks to follow in order to prepare the instrument for another run or for shutdown. When entering this screen, the XY Stage will eject and the Objective will rise to the Oil position.

Figure 46: Clean Screen

1. Remove the chip from the stage: If there is an IrysChip on the XY Stage, remove it and select the checkbox.

2. Clean Oil from the Objective: If there is oil on the Objective, clean as described below. Select the checkbox once completed.
   a. To wipe off dust or excess oil from the Objective, use a lens tissue. Fold the tissue in half, hold on the left and right side and gently wipe the lens with the open center area of the tissue. Avoid touching the top of the Objective with anything except the lens tissue.
   b. Using another clean lens tissue, put a few drops of Sparkle on the tissue and following the same process to wipe the Objective, clean with Sparkle to remove any excess oil. Dry the Objective with new clean tissue.

3. Insert the Wash Cartridge: Insert the wash cartridge filled with deionized water (approximately 300μL) and check the task complete. Once checked, Irys will retract the XY Stage and begin washing the electrodes. If the incorrect wash cartridge is inserted, Irys will extend the XY Stage and request the correct cartridge be inserted. A timer of five minutes will begin once the task is complete.

4. Dry Electrodes: This button only becomes enabled after the wash task has been completed and the five minutes have lapsed. Click 'Dry Electrodes' to command Irys to eject the XY Stage and dry the electrodes. A timer of five minutes will begin once the button is pressed.

Note: If moisture droplets are observed on the electrodes, gently blot the droplets with a clean Kim wipe.

5. After 5-minutes, the dry electrodes step is complete:
   a. Press the Forward button to return to the Load Sample screen with the XY Stage extended to load another IrysChip (See Load Sample section); or
   b. Press the Exit button to return to the Select User screen.

Note: If an IrysChip was accidentally left on the instrument for multiple days, or if the electrode bundle is suspected of being contaminated, contact Customer Support.

4.4. Instrument Shutdown

Turn off the main power switch on the back panel.

Note: Leaving the main power to the system on when not in use will reduce the lifetime of the lasers.
5. Chapter 5 Data Analysis

5.1. Data Transfer for Analysis

Data analysis is performed off the instrument using the IrysView analysis software package provided with the system. Please see the IrysView user guide for more information. User-developed software may also be used.

1. Irys ICS automatically exports the data to a pre-selected network storage location during and after the run.

2. To set or change the server export location, refer to “Configuring the User Settings and Remote Data Storage Location” in section 2.4, Irys ICS Main Screen Overview.

Note: Once a transfer occurs, this data will be removed from the local drive. It is suggested that the export locations be designated as writable by the instrument but read-only for other users so that the raw information is not accidentally lost.
6. Appendices

6.1. Appendix A - Irys Maintenance

Introduction

Several maintenance and troubleshooting procedures are outlined within this section to help maintain the optimal performance of the Irys system, to properly store the instrument for extended idle period; and to troubleshoot most problems a user may encounter while using the system. It is recommended to perform these routine maintenance procedures periodically, as specified, to ensure top performance.

Basic instrument care

1. Please do not lean on or use the top of the instrument, sample door, or XY stage as a work bench.
2. Please keep the instrument area clean. It is important to keep the instrument in a clean, dust-free environment. Dust can build up on optical elements, causing degradation of data quality, or disrupt electronic components.
3. Please use proper technique when oiling objectives. Only a small drop of oil (just enough to cover the optical lens element) is needed. Be careful not to over oil, as this can cause leakage into the optical beam path or other components and lead to poor image quality or mechanical issues. Please see training video for reference. [http://www.bionanogenomics.com/support/training](http://www.bionanogenomics.com/support/training).
4. Please make sure to clean the oil off the objective and XY stage after every run (within 1 hour of run completion) or before every rehydration to limit the possibility of oil leakage into the instrument. Please see training video for reference at [http://www.bionanogenomics.com/support/training](http://www.bionanogenomics.com/support/training).
5. Cleaning electrodes after every run is mandatory to prevent buffer component/contaminants build up resulting in decreased loading performance, and to eliminate sample cross-contamination. Please use the wash chip provided to clean the electrode bundle using ddH₂O. Please empty and clean the wash cartridges after use.

Routine Maintenance

✏️ Note: Read all safety information and warnings before operating or performing routine maintenance on the Irys system.

Washing the Electrode Bundle

Electrodes: The electrode bundle requires cleaning after every run. Additional washing may be required depending on the sample type. Follow the cleaning instructions at the end of the run to ensure proper operation of the electrodes.

System Enclosure Cleaning and Care

Use a damp lint free cloth with mild detergent when cleaning the instrument enclosure. While wiping the surfaces, care must be taken to prevent liquids from dripping inside the enclosure, where they may come into contact with electrical components.

✏️ Note: Do NOT use abrasives when cleaning the enclosure as they will damage the surface.

XY-Stage Cleaning Protocol

Use a damp lint free cloth with mild detergent when cleaning the XY stage plenum, which holds the IrysChip.

LCD Touch Screen Cleaning and Care

Use a damp lint free cloth with mild detergent when cleaning the LCD touch screen display.
6.2. Appendix B – Troubleshooting

The troubleshooting portion of this section includes a troubleshooting guide and instructions for locating and resolving problems that may occur. If enabled in the user settings, an email or SMS will be sent when the run pauses or aborts. More complex issues/problems should be deferred to a qualified Service Representative.

Table 8: Instrument Failure Modes and Troubleshooting.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Symptom/Cause</th>
<th>Things to Check</th>
</tr>
</thead>
</table>
| Instrument failure            | Instrument fails to turn ON                        | 1. Make sure instrument is plugged in and main power switch and power button are ON.  
|                               |                                                    | 2. Check for blown fuses, or tripped circuit breakers (including GFCI outlets), ensure instrument is plugged in. |
| LCD display is blank          | LCD fails to turn ON, but instrument is ON         | Touch screen is inoperable, contact Customer Support.                            |
| LCD is ON, but accepts no input| Touch screen is inoperable                        | 1. Reboot the system using an external keyboard and mouse to control system.   
|                               |                                                    | 2. Cycle power the instrument to reboot, try touch screen again.                
<p>|                               |                                                    | 3. If re-booting does not correct the problem, contact Customer Support.        |
| LCD is ON, but dark           | Instrument is in “sleep” mode                      | Touch the screen to exit “sleep” mode                                           |
| Bar code scanner failure      | Scanner failure                                    | Verify instrument is ON and functioning, see instrument failure                 |
|                               | Bar code is illegible                              | Check the label and see if something is covering or obscuring the label         |
|                               | Chip is too far away from reader                   | Make sure chip is seated correctly in XY-stage                                  |
|                               | Scanner reads barcode, but no data is recorded     | Contact Customer Support.                                                       |
| No signals seen in ANY channel| Instrument is inoperable                          | Contact Customer Support.                                                       |
| An open dialog box with a message saying validation errors, followed by Irys ICS shut down. | | Contact Customer Support. |</p>
<table>
<thead>
<tr>
<th>Problem</th>
<th>Symptom/Cause</th>
<th>Things to Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focus &amp; Register</td>
<td>Image out of focus: Unable to reach focus target or imaging at focus target is blurry.</td>
<td>1. Note the absence of a red circle in the live imaging view.  &lt;br&gt;2. If so, press Stop Lens and then press Search For Focus, which engages a search algorithm to find focus. Allow the search to proceed for approximately two minutes.  &lt;br&gt;3. If still not in focus, press the Stop Lens button and manually attempt to find focus using the Up and Down Arrow buttons until the image looks sharp and in focus.  &lt;br&gt;4. If focus is achieved, press the Autofocus button. If focus is unsuccessful, reoil lens and try again. If still unsuccessful, contact Support.</td>
</tr>
<tr>
<td>Focus &amp; Register</td>
<td>Image out of focus: Bubbles or moving artifacts in oil during live imaging.</td>
<td>1. Determine if the oil on the Objective is distorting the clear image, looking for bubbles, visual warping of parts of the image, or movement of oil front or elements after live view moves to new fiducial location.  &lt;br&gt;2. Check oil bottle for particulates in the oil, discard if present.  &lt;br&gt;3. Press Reoil Objective. Then follow the steps for cleaning and oiling the Objective.  &lt;br&gt;4. Note the presence or absence of bubbles in the oil or on underside of the chip.  &lt;br&gt;5. Press the Retract Stage button (previously the Reoil button) to initiate the automatic focusing process again. This action can be repeated until the Objective is properly oiled.  &lt;br&gt;6. Once the XY Stage retracts, return to normal workflow and allow Irys to focus on the IrysChip.</td>
</tr>
<tr>
<td>Sample Loading</td>
<td>Sample not detected</td>
<td>1. Open system and inspect sample level in ports.  &lt;br&gt;2. If sample level is significantly lower than initial loading, add nuclease free water to ports return sample level to original volume (typically flat surface level).  &lt;br&gt;3. If sample is not significantly lower, ignore message and continue with normal operation.  &lt;br&gt;4. On next run chip run cycle power the instrument to reboot and contact customer support if this does not resolve the issue.</td>
</tr>
<tr>
<td>Bump time troubleshooting</td>
<td>After 4 cycles, cannot get 2 adjacent bump times within 2 seconds of each other.</td>
<td>Contact customer support.</td>
</tr>
<tr>
<td>Bump time troubleshooting</td>
<td>Two adjacent bump times are greater than 30 seconds, but within 2 seconds of each other</td>
<td>Contact customer support.</td>
</tr>
<tr>
<td>Oiling Issues</td>
<td>Image fluctuates when moving between focus region and/or the two fiducial positions</td>
<td>1. Press Reoil Objective.  &lt;br&gt;2. Follow the steps for cleaning and oiling the Objective. Then press the Retract Stage button (previously the Reoil button) to initiate the automatic focusing process again. This action can be repeated until the Objective is properly oiled.  &lt;br&gt;3. Once the XY Stage retracts, return to previous workflow</td>
</tr>
</tbody>
</table>
**Problem** | **Symptom/Cause**  | **Things to Check**
--- | --- | ---
Load Time optimization troubleshooting | Not enough DNA has loaded, or no DNA has loaded during load time optimization. | 1. If inadequate DNA is observed at final load time measurement, or if loading times out before DNA is observed, note the amount of DNA that was present during the concentration, spike and load steps before proceeding.  
2. Click no to return to the Concentration, Spike, and Bump Time Optimization steps.  
3. If the amount of DNA observed in the previous concentration, spike and load was adequate (similar to user guide images), continue using standard base recipe. If insufficient DNA was observed in the previous concentration, spike and bump, continue using modified base recipe.  
4. Contact support after 3 rounds of pressing No button for sparse DNA or if 3 successive timeouts occur.

**Table 9: Irys Error Messages**

<table>
<thead>
<tr>
<th>Error Message</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>User Access Denied</td>
<td>Try correct password</td>
</tr>
<tr>
<td>Sending alert message through mail server</td>
<td>Check User Settings.</td>
</tr>
<tr>
<td>Moving XY Stage</td>
<td>Cold boot instrument. If problem persists, contact support.</td>
</tr>
<tr>
<td>No valid recipe in the system</td>
<td>Check for recipe in C:\Irys\DefaultRecipes folder.</td>
</tr>
<tr>
<td>Output folder verification</td>
<td>Check accessibility of output folder through Windows Explorer.</td>
</tr>
<tr>
<td>Creating output directory</td>
<td>Check accessibility of output folder through Windows Explorer.</td>
</tr>
<tr>
<td>Could not set filter wheel speed during initialization.</td>
<td>Contact support.</td>
</tr>
<tr>
<td>XY Stage Limits are not set correctly. Contact support.</td>
<td>Contact support.</td>
</tr>
<tr>
<td>LoadPosition1Y :{0} does not match LoadPosition2Y :{1}</td>
<td>Contact support</td>
</tr>
<tr>
<td>All other error messages not listed.</td>
<td>Cold boot instrument. If problem persists, contact support.</td>
</tr>
</tbody>
</table>
### Table 10: Irys Warning Messages

<table>
<thead>
<tr>
<th>Warning Message</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incorrect barcode, no wash chip detected.</td>
<td>Manually enter chip barcode information.</td>
</tr>
<tr>
<td>Focus lost. Pausing run, please rehydrate and continue</td>
<td>Clean and re-oil objective and back of chip and continue run.</td>
</tr>
<tr>
<td>Laser cleaning incomplete - Scan {0}, FC {3}, step number {1} of {2}</td>
<td>Ignore</td>
</tr>
<tr>
<td>Cannot save autofocus values to file</td>
<td>Check Windows permissions for export folder.</td>
</tr>
<tr>
<td>Copying files to export folder {0}: {1}</td>
<td>Check Windows permissions for export folder.</td>
</tr>
<tr>
<td>Unable to read barcode (timeout).</td>
<td>Manually enter chip barcode information.</td>
</tr>
<tr>
<td>No data found in barcode image bitmap</td>
<td>Manually enter chip barcode information.</td>
</tr>
<tr>
<td>Capturing barcode image bitmap</td>
<td>Manually enter chip barcode information.</td>
</tr>
<tr>
<td>Unable to read barcode</td>
<td>Manually enter chip barcode information.</td>
</tr>
</tbody>
</table>

![Image of Irys User Interface]

**Figure 47: Leakage Example.**
### 6.3. Appendix C – GUI Navigation Buttons

#### Navigation Buttons

<table>
<thead>
<tr>
<th>Button</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Help Button" /></td>
<td>The Help button appears on every screen. It accesses the indexed Irys User Guide with topic search capabilities.</td>
</tr>
<tr>
<td><img src="image" alt="Close Button" /></td>
<td>This button will shut down the system software from the Select User screen. This button will return to the Select User screen from any other screen.</td>
</tr>
<tr>
<td><img src="image" alt="OK Button" /></td>
<td>This status icon indicates that the system is operating correctly.</td>
</tr>
<tr>
<td><img src="image" alt="Busy Icon" /></td>
<td>This status icon indicates that the system is busy.</td>
</tr>
<tr>
<td><img src="image" alt="Alert Icon" /></td>
<td>Alert indicator. If you press it, you can get a log of all the notifications.</td>
</tr>
<tr>
<td><img src="image" alt="Directional Buttons" /></td>
<td>Directional buttons.</td>
</tr>
<tr>
<td><img src="image" alt="Abort and Return" /></td>
<td>Abort run and return to main screen (only visible during scanning).</td>
</tr>
</tbody>
</table>
6.4. **Appendix D - Terms**

1. **Irys** – a high resolution imaging instrument capable of single molecule detection.
2. **Irys System** – a complete platform for fluorescently staining, imaging, detecting and analyzing single molecules.
3. **IrysChip** – a disposable cartridge that contains a silicon chip with 2 embedded NanoChannel array flowcells, each with an inlet and outlet well.
4. **NanoChannel array** – the location within the IrysChip that linearizes the DNA sample.
5. **Inlet and Outlet port** – a location on the chip where sample or buffer is introduced.
6. **Run** – a single analysis on a NanoChannel array.
7. **E-field** – the electrical conditions that determine the flow of DNA through the NanoChannel array.
8. **Recipe** – a set of pre-configured instrument settings that determines the outcome of a run.
## 6.5. Appendix E - SMS Domain Names

### Table 8: SMS Domain Settings

<table>
<thead>
<tr>
<th>USA most popular</th>
<th>Where ########## is your phone number without the country code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metro PCS</td>
<td>##########@mymetropcs.com</td>
</tr>
<tr>
<td>T-Mobile</td>
<td>##########@tmomail.net</td>
</tr>
<tr>
<td>Verizon Wireless</td>
<td>##########@vtext.com</td>
</tr>
<tr>
<td>AT&amp;T</td>
<td>##########@txt.att.net</td>
</tr>
<tr>
<td>Sprint PCS</td>
<td>##########@messaging.sprintpcs.com</td>
</tr>
<tr>
<td>Nextel</td>
<td>##########@messaging.nextel.com</td>
</tr>
<tr>
<td>Cricket</td>
<td>##########@sms.mycricket.com</td>
</tr>
<tr>
<td>US Cellular</td>
<td>##########@email.uscc.net</td>
</tr>
<tr>
<td>Cingular (GSM)</td>
<td>##########@cingulame.com</td>
</tr>
<tr>
<td>Cingular (TDMA)</td>
<td>##########@mmode.com</td>
</tr>
</tbody>
</table>

For more SMS Domain names, contact your mobile phone carrier or find on a free open texting website such as [http://www.opentextingonline.com/emailtotext.aspx](http://www.opentextingonline.com/emailtotext.aspx).
7. **Technical Support**

You can contact BioNano Genomics for technical support by telephone, e-mail or through the Internet. You can retrieve BioNano Genomics user documentation, MSDSs, certificates of analysis, frequently asked questions, and other related documents from www.bionanogenomics.com/support or by request through e-mail and telephone.

To contact Technical Support by E-Mail: support@bionanogenomics.com

Technical Support Telephone: 1.858.888.7600

Technical Support Telephone Hours: Monday through Friday, 9:00am to 5:00pm, PST

Customer Support Website: www.BioNanoGenomics.com/support