LabChip User Manual

User Manual for LabChip® GX Touch/LabChip® GXII Touch

 PN CLS151164 Rev K
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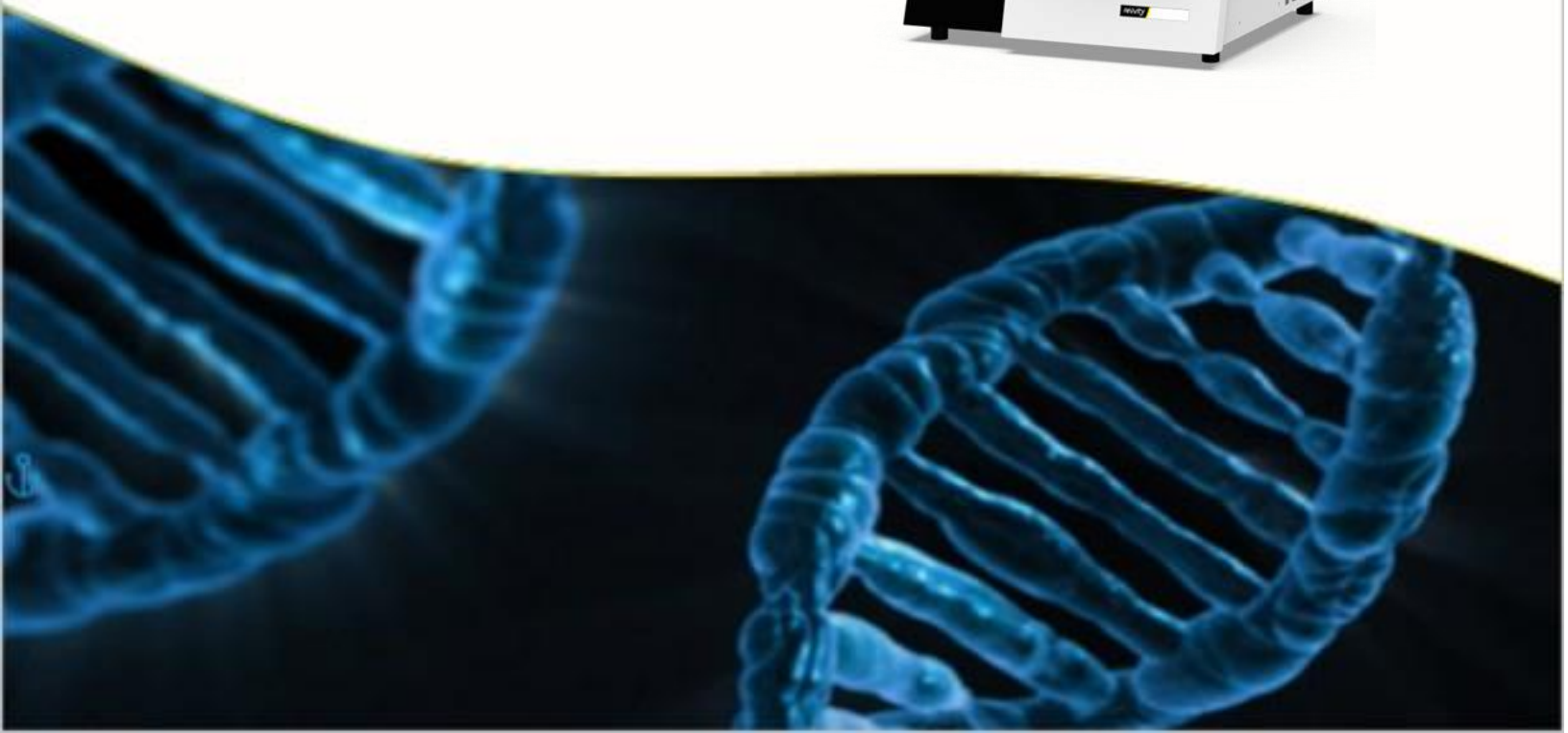
CE



Preface

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Trademarks

Content

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Proper Equipment Operation

WARNINGS

- *To reduce the risk of electric shock, do not remove the cover. No user serviceable parts inside. Refer to qualified service personnel if help is required.*
- *Use this product only in the manner described in this manual. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.*

AVERTISSEMENTS

- *Pour réduire le risque de choc électrique, ne pas retirer le couvercle. Ce produit ne contient aucune pièce pouvant être réparée par l’utilisateur. Au besoin, confier l’appareil à un réparateur qualifié.*
- *Ce produit ne doit être utilisé que comme décrit dans ce manuel. Si cet appareil est utilisé d’une manière autre que celle spécifiée par le fabricant, la protection fournie par l’appareil peut être entravée.*

Contact Us

If you have a question about a product that is not answered in this manual or online Help, or if you need assistance with this product, contact the Revvity Customer Care Center from 8:00 A.M. to 8:00 P.M., Eastern Time, Monday through Friday:

Phone: (US Toll Free): **800-762-4000**
(Worldwide): **+1 203-925-4602**

Fax: **+1 203-944-4904**

Email: L3LabChip@Revvity.com

Internet: https://www.Revvity.com

Before you call, have the following information available for the technical representative:

- Product serial number
- Software version and firmware version (found by touching the Info View button in the lower right corner of the LabChip GX Touch software)
- If applicable, the *error number* shown in the LabChip GX Touch software or in the log file.

Product Service and Customer Support Plans

Revvity offers a full range of services to ensure your success. From our original factory warranty through a comprehensive line of customer support plans, Revvity offers you Field Service Engineers and in-house Specialists who are dedicated to supporting your hardware, software and application development needs.

Phone: (US Toll Free): **800-762-4000**
(Worldwide): **+1 203-925-4602**

Fax: **+1 203-944-4904**

Email: LASService@Revvity.com

Our programs can include such useful services as:

- Preventive maintenance
- Diagnostic servicing performed on-site by Revvity field service engineers or remotely via Technical Support
- Validation performed on-site by Revvity field service engineers
- Extended use of the Revvity Technical Support Center
- Software updates
- Parts, labor, and travel expense coverage
- Other customized services upon request

Training For Your Product

Contact the Revvity Center for Training and Development for information about the availability of training courses for your product:

Phone: (US Toll Free): **800-762-4000**
(Worldwide): **+1 203-925-4602**

Fax: **+1 203-944-4904**

FCC

This device complies with part 15 of the FCC (United States Federal Communications Commission) Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation.

CE

This device complies with applicable CE rules and requirements.

NOTE

Changes or modifications to this equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

REMARQUE

Tout changement ou modification apporté à cet instrument non expressément approuvé par l'entité responsable de la conformité peut annuler l'autorisation d'opérer l'appareil accordée à l'utilisateur.

KC

This device complies with MSIP (Ministry of Science, ICT, and Future Planning) EMC Registration requirements. This instrument is registered as a Class A instrument for business use only. Product seller and user should notice that this equipment is not for household use.

A급 기기 (업무용 정보통신기기)

이 기기는 업무용으로 전자파적합등록을 한 기기이오니 판매자 또는 사용자는 이 점을 주의하시기 바라며, 만약 잘못판매 또는 구입하였을 때에는 가정용으로 교환하시기 바랍니다.

Revision History

Revision	Description of Change
L	Update for LabChip GX Touch V1.16 software changes.

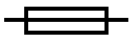
Table of Symbols

Table 1 contains symbols that identify particularly important information and alert you to the presence of hazards. These symbols may appear in this manual and/or on the product it describes.

Table 1. Important Symbols

Symbol Symbole	Description Description
	**WARNING:** Caution. Refer to the User's documentation. (ISO 7000-0434B) **AVERTISSEMENT:** Attention. Se reporter à la documentation de l'utilisateur.
	**NOTE:** A cautionary statement; an operating tip or maintenance suggestion; may result in instrument damage if not followed. **REMARQUE:** Énoncé indiquant une précaution à prendre, un conseil de fonctionnement ou une suggestion d'entretien; son non-respect peut provoquer des dommages à l'instrument.
	Hazardous voltage; risk of electric shock. (IEC 60417-6042) Tension dangereuse; risque de blessure par électrocution.
	Crush hazard. Risk of body parts, hair, jewelry, or clothing getting caught in a moving part. (ISO 3864) Danger d'écrasement. Faire attention que les parties corporelles, les cheveux, les bijoux ou les vêtements ne soient pas pris dans une pièce mobile.
	Risk of puncture injury. (ISO 3864) Risque de blessure par piqûre.
	Risk of eye injury; wear safety glasses. Risque de lésion oculaire; porter des lunettes de sécurité.
	Risk of fire. (ISO 3864) Risque d'incendie.
	Risk of poison. (ISO 3864) Risque d'empoisonnement.
	Risk of explosion. (ISO 3864) Risque d'explosion.
	Hazardous fumes. Émanations dangereuses.
	Laser light; avoid exposure. Risk of eye injury. (ISO 3864) Rayonnement laser; éviter toute exposition. Risque de lésion oculaire.
	Lifting hazard. May result in injury. (ISO 3864) Levage dangereux. Peut entraîner des blessures.

Table 1. Important Symbols (Continued)

Symbol Symbole	Description Description
	Temperature limit. (ISO 7000-0632) Limite de température.
	Use by date. (ISO 7000-2607) Utiliser par date.
	Protective ground symbol. (IEC 60417-5019) Symbole de terre de protection.
	Fuse. (IEC 60417-5016) Fusible.
	Alternating current. (IEC 60417-5032) Courant alternatif.
	On (power). |(IEC 60417-5007) Marche (alimentation).
	Off (power). (IEC 60417-5008) Arrêt (alimentation).
	CE compliance mark. Marque de conformité CE.
	Korean Certification Mark (KC Mark). Marque coréenne de certification.
	Batch Code (ISO 7000-2492)
	Catalog number. (ISO 7000-2493) Numéro de catalogue.
	WEEE symbol (EN50419:2005). Do not dispose of as unsorted municipal waste. See the Revvity website (https://www.Revvity.com) for more information.
	Signifies that the unit has passed safety tests for grounding, power line transience, and current leakage. Signifie que l'appareil a réussi les tests de sécurité pour la mise à la terre, le courant transitoire de ligne d'alimentation et la perte de courant.

Instrument Safety

The following safety information about the LabChip GX Touch/GXII Touch is included in this documentation. Read and review all safety information before operating the LabChip GX Touch/GXII Touch.

Required Training

Ensure that all personnel involved with the operation of the instrument have:

- Received instruction in general safety practices for laboratories.
- Received instruction in specific safety practices for the instrument.
- Read and understood all related MSDSs.

WARNING

Use this product only in the manner described in this manual. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Chemical Safety

WARNING

Some chemicals used with the LabChip GX Touch/GXII Touch are potentially hazardous and can cause illness.

- Read and understand the material safety data sheet (MSDS) provided by the chemical manufacturer before you store, handle, or work with any chemical or hazardous material.
- Minimize contact with and inhalation of chemicals and chemical wastes. Wear appropriate personal protective equipment when handling chemicals (e.g., safety glasses, gloves, or clothing). For additional safety guidelines consult the MSDS.
- Do not leave chemical containers open. Use only with adequate ventilation, including a fume hood, if necessary.
- Check regularly for chemical leaks or spills. If a leak or spill occurs, follow the manufacturer's cleanup procedures as recommended on the MSDS.
- After emptying waste containers, seal them appropriately.
- Comply with all local, state/provincial, or national laws and regulations related to chemical storage, handling, and disposal.

Laser Safety

WARNING

BRIGHT LIGHT HAZARD. LabChip GX /GXII Touch Instruments contain Class 3B laser diodes. The LabChip GX Touch/GXII Touch are classified as a Class 1 device because the lasers are appropriately enclosed (embedded) and indicated with Warning labels.

Complies with 21 CFR 1040.10 except for deviations pursuant to Laser Notice 50, dated June 24, 2007.

Complies with IEC 60825-1: 1993, A1: 1997, A2: 2001.

Class 1
Laser
Product

635 nm (visible red) laser source, 10 mW maximum continuous (CW)

WARNING

- *Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.*
- *NEVER remove back, side, or front panels of the instrument while the laser is powered. Panels (which, if removed, could lead to laser exposure) are marked with the label shown below:*

- *These panels are intended to be removed for service only by qualified personnel; they are not intended to be removed during operation or for maintenance by users. The only removable maintenance panel is the lower panel at the back of the instrument, which can be removed to access the back of the robot, if cleaning is necessary.*

Electrical Safety

The LabChip GX Touch/GXII Touch is powered by a UL/CSA/VDE approved 100-240 VAC, 50/60 Hz input, 5, 15, 24 VDC output power supply. Additionally, the LabChip GX Touch/GXII Touch High Voltage circuitry is current-limited to non-hazardous levels. Users should observe the following:

WARNING

Do not open the instrument enclosure. There are no user serviceable parts inside.

The wall outlet or the power cable connector on the back of the instrument should be accessible after the system's installation, to enable trained service personnel to safely disconnect power from the system during servicing.

The computer supplied with the LabChip GX Touch/GXII Touch instrument has internal lithium batteries. Batteries should not be incinerated.

WARNING

Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer's instructions.

Power Cord Selection

United States and Canada

The LabChip GX Touch/GXII Touch instrument is shipped with a NEMA 5-15 / IEC 320 power cord. If the power cord needs to be replaced, substitute power cords must be UL Listed, Type SJT or equivalent, minimum No. 18 AWG, 3-conductor with ground conductor that for safety considerations should never be disconnected or defeated. The cord’s plug to the wall must be a three-pin grounding type connector with a NEMA 5-15P (15A, 125V) plug configuration. The cord’s connector at the unit must conform to requirements for an EN 60 320/IEC 320 Standard Sheet C13 connector.

The equipment is intended to be plugged into a standard NEMA 5-15R receptacle in the wall.

International

All power cord sets must be approved by an acceptable, accredited agency responsible for evaluation in the country where the power cord set and system will be used.

The flexible cord must be <HAR> Type H05VV-F, 3-conductor, minimum 0.75 - 1 mm^2 conductor size (230 volt input). Power cord set fittings that is, the appliance coupler and wall plug, must bear the certification mark of the agency responsible for evaluation in the country where it will be used. The appliance coupler must meet the mechanical configuration of an EN 60 320/IEC 320 Standard Sheet C13 connector for mating with appliance inlet on the system.

Fuses

The LabChip GX Touch/GXII Touch instruments contain two fuses. See Changing the Fuses on page 157 for fuse replacement instructions. Contact Revvity Technical Support (see page 3) to order replacement fuses.

Mechanical Safety

The LabChip GX Touch/GXII Touch instruments have a three axis robot that moves quickly and can be a pinch hazard. Keep the front door of the instrument closed and keep hands away from the plate loading position when the robot is moving. Keep hands away from the robot when not actively placing microplates in the instrument or changing the ladder and buffer tubes. Robot access areas are marked with the warning label below:

Table of Contents

Introduction

This manual includes instructions for using the LabChip GX Touch hardware with the LabChip GX Touch software. It includes general procedures for operating the system, maintaining the instrument, troubleshooting hardware and software problems, and using the LabChip GxP option to provide compatibility with 21 CFR Part 11 requirements.

DNA, gDNA, RNA, Protein, Glycan, and Protein Charge Variant (CZE) Chips and Reagent Kits are available to run specific assays on the LabChip GX Touch/GXII Touch. The Assay Kits include the reagents and consumables required to run the specific assay. Protein, Glycan, and Protein Charge Variant assays are only supported on LabChip GXII Touch instruments.

This section contains the following information:

Usage

LabChip GX Touch software is for use with LabChip GX/GXII and GX Touch/GXII Touch instruments. LabChip GX/GXII and GX Touch/GXII Touch instruments are for Research use only. Not for use in diagnostic procedures.

Assay User and Quick Guides

Assay User Guides

Assay User Guides provide information about a specific assay. Instructions for preparing the chip, the plate, the ladder tube, and the buffer tube are included in the *LabChip GX Touch/GXII Touch Assay User Guide* for the specific assay that you are running. Detailed information about the assays, including Specifications, Safety Warnings, Preparation Procedures, Expected Results, Troubleshooting, LabChip Kit Essential Practices, and Reordering Information is also located in the *LabChip GX Touch/GXII Touch Assay User Guide* for the specific assay that you are running.

The current version of the Assay User Guides are available on the Revvity web site at:
https://www.Revvity.com.

Assay Quick Guides

Assay Quick Guides are included with each Assay Kit and include instructions for preparing the reagents and chip to run an assay.

The current version of the Assay Quick Guides are available on the Revvity web site at:
https://www.Revvity.com.

Principles of Operation

The LabChip GX Touch assays are based on traditional gel electrophoresis principles that have been transferred to a chip format. The chip format dramatically reduces separation time and provides automated sizing and quantitation information in a digital format.

The chips contain an interconnected set of microchannels that join the separation channel and buffer wells. One of the microchannels is connected to a short capillary that extends from the bottom of the chip at a 90-degree angle. The capillary sips sample from the wells of a microplate during the assay.

Some of the channels in the chip are larger than others. The larger channels contain buffer. During the chip preparation, the smaller channels and some of the wells are filled with sieving gel and buffer.

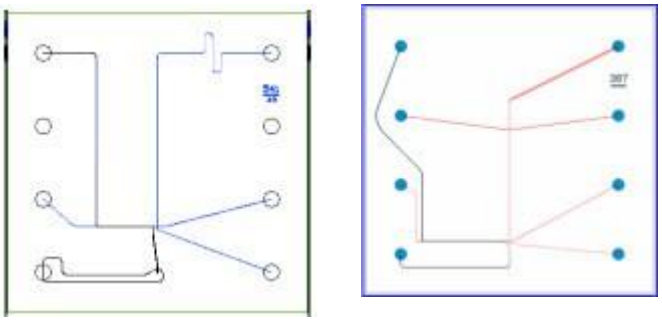


Figure 1. Examples of DNA/RNA Chip and Protein Chip Schematics

After the channels are filled, the chip functions as an integrated electrical circuit. The circuit is driven by the seven electrodes in the instrument electrode block that contact solutions in the chip wells when the front door is closed. Each electrode is connected to an independent power supply that provides maximum control and flexibility.

The polymer gel filling the smaller channels in the chip is designed to sieve DNA/RNA fragments or proteins by size as they are driven through it by means of electrophoresis, similar to using agarose or polyacrylamide gels. The sample and sieving buffers also contain a fluorescent dye that gets brighter upon binding to double-stranded DNA, RNA, or protein/SDS complex.

Principles of Operation (Continued)

In the chip, each sample is sipped from the microplate by negative pressure until a sufficient quantity is loaded in the chip. The sample is then moved electrophoretically into the central channel. As the fragments move down the central channel, they separate by size and then pass the laser, which excites the fluorescent dye bound to the molecule. The software plots fluorescence intensity versus time and produces electropherograms for each sample (see Figure 2).

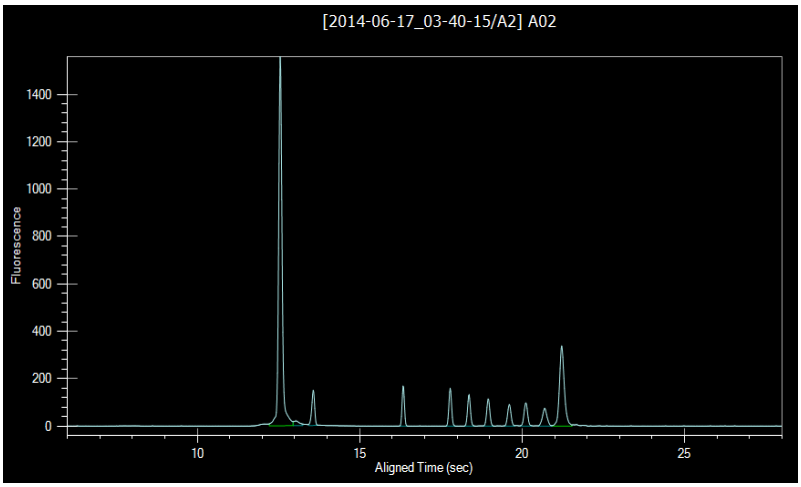


Figure 2. Electropherogram

The data can be viewed in a gel-like format on the Gel Tab to achieve the appearance of a slab gel. (The colors of the gel can be changed.)

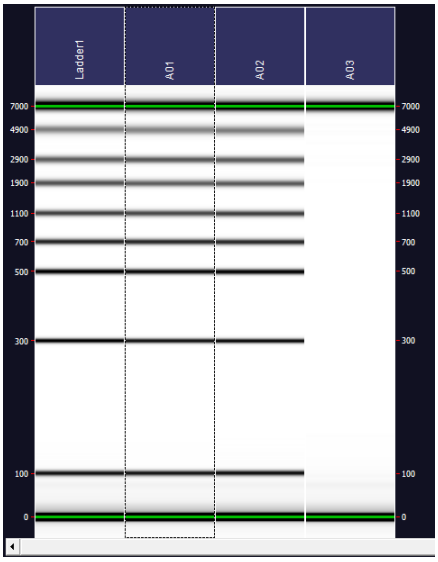


Figure 3. Gel View

Principles of Operation (Continued)

For DNA, RNA, Protein, and Glycan assays, quantitating the concentration and accurately sizing each fragment are achieved by comparing against a sizing ladder and running internal standards or “markers” with each sample. Internal standards of known concentration are mixed with the sample to aid in quantitation.

The amount of sample sipped into the chip depends on pH, salt concentration, and buffer additives. The internal standards normalize these factors so that the software can use the ratio of the area of the curve of the standard to the unknown peak to determine concentration directly. The internal standards lie slightly outside the assay range so they do not interfere with analysis.

Capillary Zone Electrophoresis (CZE) is an electrophoretic separation technique used to evaluate the charge heterogeneity of proteins in a sample. For Protein Charge Variant assays, analytes are separated based on their net charges, with molecules with a higher net charge migrating faster than those with a lower net charge.

The AAV DN DNA and Protein assays quantitate AAV ssDNA and viral capsid proteins, respectively. Using the quantity of capsid proteins and ssDNA from a known AAV standard, the software calculates the percentage of viral capsids containing ssDNA (Empty/ Full ratio) as well as the viral protein stoichiometry (VP3:VP2:VP1 ratio). The AAV Pico Protein assay quantitates three viral protein (VP1, VP2, VP3) sizes using the AAV Protein Ladder. The AAV DN DNA assay quantitates ssDNA using the ssDNA Ladder.

The pDNA assay calculates the percentage area amount of pDNA of different isoforms including supercoiled, linear, open circular (nicked), and other multimers. pDNA size for the supercoiled and linear conformations are calculated using a Revvity ladder that contains a mixture of samples of supercoiled and linear conformations.

Preparing the Instrument to Run Samples

This section includes general instructions for preparing the LabChip GX Touch instrument to run samples.

For assay-specific information, see the *LabChip GX Touch/GXII Touch Assay User Guide* for the specific assay that you are preparing to run. For instructions on preparing the chip and plate, see the *LabChip GX Touch/GXII Touch Assay Quick Guide* for the specific assay. The current version of the Assay User Guides and Quick Guides are available on the Revvity web site at: https://www.Revvity.com.

To prepare the instrument to run samples:

1 Open the LabChip GX Touch software (see page 22).

2 Clean the electrodes and the O-Rings as directed in the *LabChip GX Touch/GXII Touch Assay User Guide*.

3 Purge the pressure lines (see page 22).

4 If necessary, calibrate the optics (see page 154) and run Diagnostics (see page 167).

5 Prepare the chip for the assay as directed in the *LabChip GX Touch/GXII Touch Assay Quick Guide*.

6 Insert the chip into the instrument (see page 23).

7 For Protein Clear™ HR chips, calibrate the instrument to run Protein Clear HR Assays (see page 24).

8 If desired, prime chips before the start of a run (not available for Protein Clear HR chips). See page 25.

9 Prepare the sample plate, ladder, and buffer for the assay as directed in the *LabChip GX Touch/GXII Touch Assay Quick Guide*. If your instrument is equipped with a barcode reader, see Placing the Barcode on the Plate on page 26 to use barcodes on the sample plates.

10 If desired, define a new plate type to use a plate other than the ones listed in the software (see page 27).

11 Load the Sample Plate, Ladder tube, and Buffer tube into the instrument (see page 29).

Opening the LabChip GX Touch Software

To open the LabChip GX Touch software:

1. If the instrument is off, press the Power button on the front of the display and wait for Windows to start.
2. Touch the LabChip GX Touch icon on the Windows desktop.
3. If the LabChip GxP option is installed, the Unlock Application Window opens. Type a valid LabChip GX Touch user name and password into the text boxes and touch the **Logon** button. LabChip GX Touch user names are created in the LabChip GX Reviewer software. (For instructions on creating LabChip GX Touch user names, see the *LabChip GX Reviewer User Manual*.)
4. The LabChip GX Touch Main Window opens. The Navigation Bar displays on the left side of the LabChip GX Touch Main Window, and the Home Window displays in the center.

Purging the Pressure Lines

The LabChip GX Touch software provides a Purge Pressure Lines function to improve instrument performance. A positive pressure is applied to the lines and removes any potential liquid or debris out of the lines through the chip interface.

Purge the pressure lines at the start of each day, before inserting a chip.

To purge the pressure lines:

1. If a chip is already inserted into the instrument, remove the chip and close the chip door (see page 41).
2. Touch the **Purge Pressure Lines** button on the Home Window. The Status Window opens. The purge is complete when the Run Status displays “Purge successfully completed” and the instrument status returns to Idle.

Inserting the Chip

To insert the chip into the instrument:

1. Prepare the chip and reagents for the assay as directed in the *Assay Quick Guide*. Follow the instructions carefully to properly prepare the chip.
2. Touch the **Home** button on the Navigation Bar.
3. Touch the **Unload Chip** button on the Home Window. The chip door on the front of the instrument unlatches.
4. Lift the chip door up.
5. Place the chip into the cutout with the sipper through the hole in the chip holder.
6. Close the chip door and press down to latch the door.
7. If the chip supports multiple assays, a dialog prompts you to select the assay that the chip will be used for. Select the desired assay and touch the **OK** button.
8. If a **Protein Clear HR chip** is inserted into the instrument, calibrate the instrument to run Protein Clear HR assays (see page 24).
9. If any other chip is inserted into the instrument, the chip can be primed while preparing the first plate (see page 25).

Calibrating the Instrument to Run Protein Clear HR Assays

If a Protein Clear HR chip is inserted into the instrument, the user must calibrate the instrument to run a Protein Clear HR assay before starting the run. Calibration is performed by processing a known protein sample, and uses the results to precisely set the electrode currents for that assay to obtain consistent chip-to-chip assay results.

To calibrate the instrument to run Protein Clear HR assays:

1. Insert the Protein Clear HR chip (see page 23) OR
   Open the LabChip GX Touch software (see page 22) with the chip already inserted into the instrument.
2. Touch the **Prime and Calibrate** button on the Home Window. The Prime and Calibrate Window opens.
3. Select the plate type from the **Select Plate Type** drop-down list.
4. Select the assay from the **Select Assay** drop-down list. (To select the location of the assay file, touch the **Change Assay Folder** button and select the assay folder on the Change Assay Folder Window.)
5. Touch the **Select Well Containing Standard Sample** button to select the well that contains the VeriMAb™ sample.
6. Select the desired well from the full-size plate diagram and touch the **Done** button.
7. Touch the **Prime and Calibrate** button on the Prime and Calibrate Window.
   - If the calibration is successful, a dialog box opens indicating that the instrument is now calibrated for the Protein Clear HR assay. Touch the **OK** button.
   - If the calibration fails, a dialog box opens indicating that the calibration process failed and a Protein Clear HR assay run cannot be performed. Touch the **OK** button. Perform the recommended actions on page 175 and retry the calibration.
   - If the calibration is outside the % Purity target range or if dips from the Egrams could not be eliminated, a dialog box opens indicating that the calibration is marginal. Touch the **Yes** button to run the chip despite the issue displayed on the dialog box. Touch **No** to fix the issue. Perform the recommended actions on page 176 and retry the calibration.
8. To retry the calibration, select the **Skip Prime Step** check box on the Prime and Calibrate Window. The chip is calibrated but not primed.

Priming the Chip Before the Run

If a new chip that is **not a Protein Clear HR chip** has been inserted into the instrument, the chip is automatically primed at the start of the first run.

Since priming is a lengthy process, the chip priming can be started before starting the run. (To save time, the sample plate can be prepared while the chip is priming.)

To prime a chip before starting the run:

1. Insert the chip (see page 23).
2. Load the buffer tube (see page 29). If running a test ladder, load the ladder tube at the same time.
3. Touch the **Home** button on the Navigation Bar.
4. Touch the **Prime** button on the Home Window. The Prime Window opens.
5. On the Prime Window, select the assay for which to prime the chip on the **Assay** drop-down list. (To select the location of the assay file, touch the **Change Assay Folder** button and select the assay folder on the Change Assay Folder Window.)
6. If desired, select the **Run Test Ladder after Prime** check box to run one ladder after the prime is complete.
   If not in GxP mode, type the name of the operator in the **Operator Name** text box. (If in GxP mode, Operator Name is the first and last name of the logged in user.)
7. Touch the **Prime** button. The Prime Window displays the time left until the prime is complete.

Placing the Barcode on the Plate

For instruments equipped with a barcode reader, barcodes can be placed on the plate before loading the plate into the instrument. Figure 4 shows the size limits for the barcode label and the location on the microplate where the label should be placed. The barcode must be located on the short (portrait) end of the microplate, closest to well A1. If the barcode is not positioned properly, the barcode reader will not be able to read the barcode.

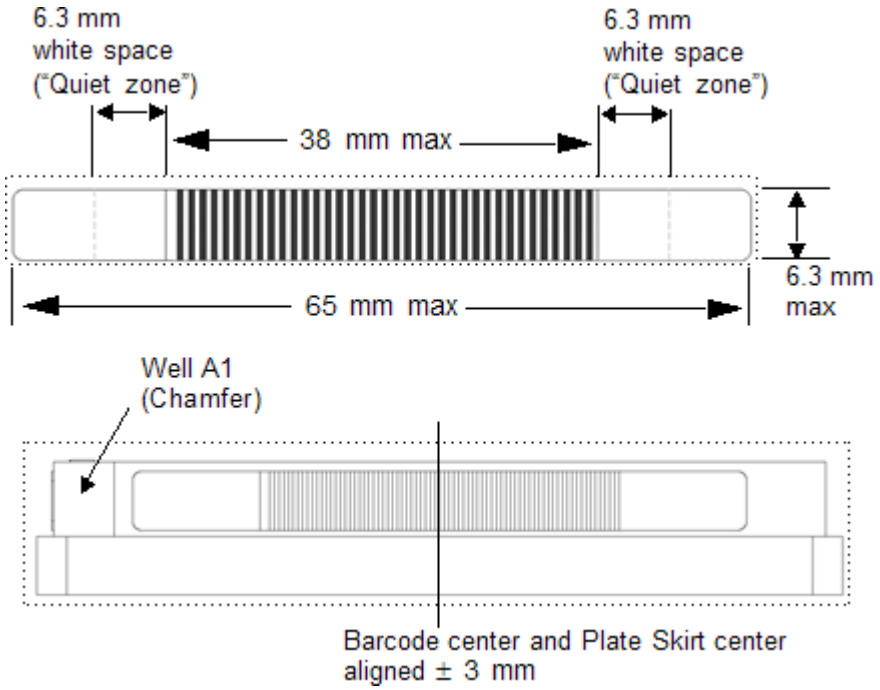


Figure 4. Barcode Label Position

Defining a New Plate Type

To use a plate other than the plates specified on the Setup Run Tab, create a new plate on the Plate Editor Tab. Use caution adding new plates. Entering wrong values on the Add Plate Window can result in damaged chips and broken sippers.

It is best to use the plate specifications provided by the plate manufacturer. If the specifications are not available, measure the plate with a caliper. Many plates have a large variation in the Z-axis location of the well bottom. Make sure the Sip Height has enough margin to accommodate this variation:

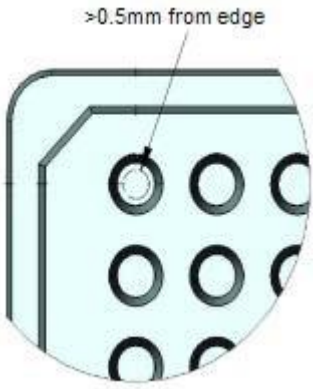
- The Minimum Sip Height should prevent the sipper from contacting the bottom of the plate.
- The Maximum Sip Height depends on the maximum sample volume and well depth.
- A Sip Height of 4mm is safe for many SBS plates, but depends on the height variation of the well bottom.

To add a new plate:

1. Touch the **Tools** button on the Navigation Bar.
2. Touch the **Plate Editor** button to open the Plate Editor Tab.
3. Touch the **Custom Plates Tab**.
4. Touch the **Add Plate** button to open the Add Plate Window.
5. Type the settings for the new plate. The diagram on the Add Plate window shows the location for each measurement. Acceptable plate parameters are:
   - PlateHeight: 0 to 16mm
   - WellDepth: 0 to 36mm
   - SipHeight: 2 to 36mm
   - (WellDepth – SipHeight) <= PlateHeight
6. Touch the **OK** button.
7. Perform a Punch Test from the Plate Editor Tab to verify the new plate settings are acceptable:
   - Cover the corner wells on the plate with a piece of the tape provided by Revvity.
   - Use an old, expired chip with a good sipper.
   - On the Plate Editor Tab, select the new plate name and touch the **Verify Plate** button.
   - Follow the onscreen instructions.

Defining a New Plate Type (Continued)

- The instrument will move to the specified number of wells in each corner of the plate, punching holes in the tape.
- The Punch test is acceptable if the punched hole is >0.5mm from the edge of the well.



- Holes may not be perfectly centered.

Possible sources of errors:

- Sipper splay
- Plate tolerances
- Robot alignment error
- If all holes are too close to the edge (<0.5mm) in the same direction, adjust the X-Margin or Y-Margin values on the Add Plate window.

8 Select the new plate name on the Setup Run Tab when starting the run.

Loading the Plate, Ladder Tube, and Buffer Tube

To load the Sample Plate, Ladder tube, and Buffer tube into the instrument:

1 Prepare the samples and load the samples into the plate as instructed in the *Assay Quick Guide*. Follow the instructions carefully to properly prepare the plate.

2 Fill the Ladder and Buffer tubes as instructed in the *Assay Quick Guide*.

3 Touch the **Home** button on the Navigation Bar.

WARNING

Pinch Hazard. Keep hands away from plate carrier when carrier is moving.

4 Touch the **Unload Plate** button on the Home Window. The plate carrier on the left side of the instrument moves out to the loading position.

5 Place the sample plate onto the plate carrier. Place the Ladder tube and Buffer tube into the plate carrier.

6 Touch the **Load Plate** button. The plate carrier retracts into the instrument.

Running an Assay

This section includes general instructions for using the LabChip GX Touch hardware and software to run an assay: See the Assay User Guide for the specific assay you are running for detailed instructions appropriate for your assay.

To run an assay:

1. Complete the steps in the Preparing the Instrument to Run Samples section.
2. Define the parameters of the assay run (see page 31).
3. Monitor the run (see page 37).
4. If desired, edit the analysis parameters during the run (see page 38).
5. If necessary, stop the run before it completes (see page 39) and continue the stopped run if desired (see page 40).
6. Remove the Plate, Buffer Tube, and Ladder Tube (see page 41).
7. Unload the chip (see page 41). Store the chip according to the instructions in the *Assay User Guide*.
8. If necessary, wash the chip (see page 42) immediately before running the chip again.
9. At the end of the day, turn the instrument off (see page 42).

Defining the Run Parameters

To define the run parameters:

1. Touch the **Home** button and then touch the **Run** button. (If the maximum number of samples for the chip have already been run, a message displays instructions for resolving the problem.)

   The Select Wells Tab opens.

2. Select the assay to run in the **Select Assay** drop-down list. If the desired assay is not displayed, touch the **Change Assay Folder** button and select the assay folder in the Change Assay Folder Window.

3. Select the plate type in the **Select Plate Type** drop-down list. To use a plate that is not listed in the Plate Name list, see Defining a New Plate Type on page 27.

4. To use an existing run file to specify the run settings, touch the **Import Run File** button, navigate to the run file, select the desired file, and touch the **Open** button. The settings specified in the run file display in the Select Wells Tab and Setup Run Tab. To use the settings in the run file, touch the **Next** button twice and skip to step 3. For more information about run files, see page 55.

5. To sample the wells in the order in which the wells are selected in the plate diagram, select the **Selection Sip Order** check box before selecting the wells.

6. If desired, select the **Column-Wise** check box to sample the plate in column order. If not selected, the plate is sampled in row order.

Defining the Run Parameters (Continued)

7 For AAV Pico Protein and DN DNA assays, A1 is selected as the Standard well by default. To change the Standard well:

a Touch the **Select Standards** button.The Select Standards Window opens.

b Touch the well location for the **Standard**.

c Click the **Done** button to close the Select Standards window and display the selected standard well on the plate diagram.

Note: Sample Name for standards is **Standard**, the Well Label is the well location where the standard was located (usually A1 by default).

8 On the **Plate diagram**, select the wells to be sampled.

- If desired, touch the **Full Size** button to enlarge the Plate diagram to better view and select the desired wells.
- To select or clear all rows on the plate, touch the **Select All Rows** button at the top left corner of the plate.
- To select or clear all wells in a row, touch the row letter on the left side of the plate. (Clear a selected row by touching the row letter.)
- To select or clear a single column, touch the column number at the top of the plate. (Clear a selected column by touching the column number.)
- To select or clear all wells in a quadrant, touch the **1**, **2**, **3**, or **4** button.
- To select or clear single wells, touch the well.
- To select or clear adjacent wells, touch and drag over the desired wells.
- To use a Sample Names file to select the wells, see Selecting Wells using a Sample Names File on page 58.

Note: The number of sample wells that can be selected is limited to the number of samples that can be processed in one run.

Note: If more than 12 AAV samples are selected, the results will be in consecutive wells starting at well A1. The Standard sips will occur before sample 1 and before sample 13.

Defining the Run Parameters (Continued)

9 If desired, select the **Advanced Settings** check box.

- To repeatedly run the selected wells and combine the data into one data file, touch the **+** or **-** button under **Sample Sips** to select the number of times to sample the selected wells.

  Note: If Sample Sips is >1, the Well Label will start at A1 and continue row-wise or column-wise in consecutive wells. For example, if only well B1 is sipped three times, the three well labels will be A1, A2, and A3 in the data file.
- To perform the assay multiple times on the same plate, touch the **+** or **-** button under **Plate Cycles** to select number of times to run the assay.
- To randomly sample a specific percent of the selected wells, touch the **+** or **-** button under **Random Select%** to specify the percent of wells to sample during the run.

10 Touch the **Next** button  . The Setup Run Tab opens.

11 If desired, type the name of the operator in the **Operator** text box. (If the LabChip GxP option is installed, the name of the current user is automatically displayed and cannot be edited.)

12 For ProteinEXact chips that have been primed before the run (see page 25), select the **Skip Warm** and **Skip Prime** check boxes to avoid repeating the priming and warming process.

13 To read the plate barcode (if your instrument is equipped with a barcode reader), select the **Read Plate Barcode** check box. (The plate barcode can be used as part of the data file name if selected.)

14 To change the **Data Path**, touch the **Browse** button, select the desired location for the data file in the Browse for Folder window, and touch the **OK** button. If the LabChip GxP option is installed, the data file must be located in the CDR. To restore the default path, touch the **Default** button.

15 Select the **Copy to** check box to automatically create a copy of the data files. Touch the **Browse** button, select the desired location for the data files in the Browse for Folder window, and touch the **OK** button. To restore the default path, touch the **Default** button.

Defining the Run Parameters (Continued)

NOTE

If the LabChip GxP option is not installed, data files should be saved to a local folder on the computer's hard drive. Saving data files to a network drive may cause loss of data if the network connection is slow or interrupted. If the LabChip GxP option is installed and the network connection is interrupted, data files are archived in a local folder and copied to the CDR when the network connection is restored. For more information about the GxP option, see page 63.

16 If desired, select the **Create Daily Sub-Directory** check box to create a new sub-directory for data files each day.

17 To automatically export data tables, graphs, or gels, select the **Auto Export** check box. (See Selecting the Auto Export Settings on page 46 for more information about selecting data to export.)

18 To automatically print the exported data to a PDF file after the run is complete, select the **Auto Print** check box.

19 To export all data at the end of the run rather than as each well is completed, select the **Defer Export to Plate Completion** check box.

20 To add the **File Prefix, Project Name, Computer Name**, **Barcode**, **Date**, and/or **Time** to the data file name, select or clear the desired check boxes or type the desired File Prefix and Project Name. The file name components are added to the data file name in the order in which they are selected. Leave the text box blank to omit the File Prefix or Project Name from the file name.

21 If desired, type the 8-digit lot number of the Reagent Kit in the **Reagent Kit Lot Number** text box.

22 To use a Sample Names file to supply the sample names:

a Select the **Sample Names file** check box.

b Touch the **Browse** button next to **Sample Names file**.

Defining the Run Parameters (Continued)

c Select the name of the CSV file that contains the sample names and touch the **Open** button. The path and name of the file displays in the text box. (See Using Sample Names Files on page 56 for more information.)

23 To use the Sample Names file to select the wells to read, select the **Use Sample Names File for Sample Selection** check box. (For details, see page 58).

24 To use a file to supply the Expected Peaks:

a Select the **Expected Peaks File** check box.

b Touch the **Browse** button next to **Expected Peaks File**.

c Select the name of the GEP file that contains the expected peaks, and touch the **Open** button. The path and name of the file displays in the text box. (See Expected Peak File on page 186 for more information.)

25 To use a file to supply the Excluded Peaks:

a Select the **Excluded Peaks File** check box.

b Touch the **Browse** button next to **Excluded Peaks File**.

c Select the name of the GEP file that contains the excluded peaks, and touch the **Open** button. The path and name of the file displays in the text box. (See Excluded Peak File on page 186 for more information.)

Starting the Run

1. After selecting the run parameters, touch the **Next** button  on the Setup Run Tab. The Start Run Tab opens.
2. For ProteinEXact runs, type the **Total Ladder Concentration** of the reagent into the text box.
3. Review the selections displayed. To change any selections, use the **Back** and **Next** buttons to make the desired changes.
4. Touch the **Start** button to start the assay. The Status Window displays the status of the run.
5. After the run has started, you can:
   - Change the exported properties in the Well Table or Peak Table (see page 47).
   - Edit the sample names (see page 61).
   - Edit the analysis settings (see page 38).
   - View the raw data from the run (see page 49)
6. See Monitoring the Run on page 37.

Monitoring the Run

After a run is started in the LabChip GX Touch software:

1. The priming and warming steps are performed.
   - The priming step fills the channels of the chip with reagent. (Only performed if the chip holder has been opened since the last run and the chip has not been primed.)
   - The warming step allows the heater plate in the chip holder to regulate chip temperature to 30°C.
   - Data collection begins after the priming and chip warming steps are completed.
2. For ProteinEXact chips, the calibration steps are performed.
3. The Status Window displays the Chip and Run Status, the plate diagram, and an electropherogram and gel of the well currently being read.

   ProteinEXact assays display the status of the calibration steps instead of the plate diagram (see Status Window on page 96). *If the ProteinEXact calibration steps do not display, restart the software and prime the chip.*
4. After each well is completed, the well data is saved to the GX Touch data file (*.gxd) with the name shown in the Setup Run Tab.
5. To view the results for individual wells as data is acquired or after the run is finished, see page 49.
6. If analysis settings are changed during the run (see page 38), the analyzed data uses the current analysis settings if **Perform Sample Analysis** is selected on the Select Wells to View Tab.
7. To stop the run before it is complete, see page 39.
8. When the assay is complete, **Run Successfully Completed** displays in the Status line on the Status Window.
9. Remove the plate (see page 41) and/or remove the chip (see page 41) as necessary.

Editing the Analysis Settings during a Run

Specific analysis settings can be adjusted in the LabChip GX Touch software while a plate is running. If Auto Export is selected on the Setup Run Tab, the Analysis Settings cannot be changed unless the Defer Export to Run Completion check box is selected.

After a run is complete, the analysis settings can be changed to view the data, but the analysis settings cannot be saved.

To adjust the analysis settings:

1. After the run is started, touch the **Views** button and then the **Analysis Settings** button. The Analysis Settings Tab opens.
2. Change the Analysis Settings as desired. Press Enter or Tab, or move to another text box, to enable the Apply and Cancel buttons. (See Analysis Settings Tab for a description of each analysis setting.)
3. Click the **Apply** button to apply the settings to the current run. The initial analysis settings are saved as Version 0. If changes are made during the run, the analysis settings at the end of the run are saved as Version 1. Use LabChip Reviewer to view the analysis settings versions.

Stopping a Run before the Run is Complete

The run is completed automatically after reading the last selected well. If you need to stop the run before it is complete, touch the **Stop** button on the Navigation Bar. The run stops immediately. If a well is in progress, the data for that well is not saved.

A message box confirms that you want to stop the run in progress.

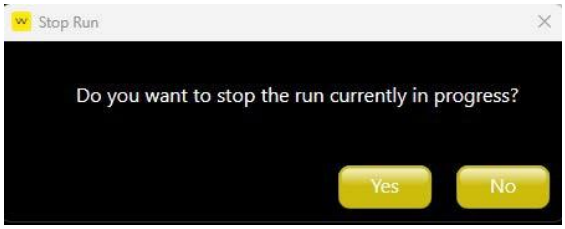


Figure 5. Stop Run Message

Touch **Yes** to stop the run. The Status line on the Status Window displays **stopped by user** as shown in Figure 6.

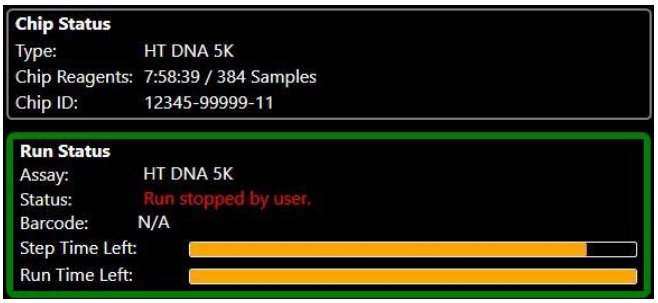


Figure 6. Stopped by User

Data for any completed wells displays in the Views Window.

To continue to read wells from an aborted run, see Continuing a Stopped Run.

Continuing a Stopped Run

If a run is stopped before it is complete, you can start a new run to read the remaining unread wells in the plate. When selecting the wells for the assay, select only the wells that were not read so that the run starts with the well that was not completed. The data is saved in a new data file. It is not added to the data file from the original run.

To continue a run:

1. Touch the **Run** button on the Home Window.
2. On the Select Wells Tab, select the wells that were not read in the previous run, beginning with the well that was in progress when the run was stopped.
3. On the Setup Run Tab, select the same options for this run as were selected for the stopped run.
4. On the Start Run Tab, touch the **Start** button to begin.

The new run starts with the well that was not completed in the previous run. A separate data file is created for the current run.

Removing the Plate, Buffer Tube, and Ladder Tube

To remove the plate, Buffer tube, and Ladder tube from the instrument when the run is complete:

1 Touch the **Home** button on the Navigation Bar.

WARNING

Pinch Hazard. Keep hands away from plate carrier when carrier is moving.

2 Touch the **Unload Plate** button on the Home Window. Wait until the plate carrier is fully extended.

3 Remove the plate from the plate carrier.

4 If necessary, clean the plate carrier with DI water or 70%-isopropanol solution.

5 Remove the Buffer and Ladder tubes if necessary.

WARNING

Pinch Hazard. Keep hands away from plate carrier when carrier is moving.

6 Touch the **Load Plate** button on the Home window to retract the plate carrier.

Removing the Chip

To remove the chip from the instrument:

1 Touch the **Home** button on the Navigation Bar.

2 Touch the **Unload Chip** button on the Home Window. The chip door on the front of the instrument unlatches.

3 Lift the chip door up.

4 Remove the chip from the chip holder.

5 Close the chip door and press down to latch the door.

Washing the Chip

Some protein samples may have components which produce data with extra peaks, spikes or other artifacts. When these artifacts are present, washing protein chips on the LabChip GXII Touch immediately before the next use can often restore data quality.

To wash the chip:

1. Prepare the chip and buffer tube as instructed in the *Assay User Guide*.
2. Insert the prepared chip and buffer tube into the instrument (see page 23).
3. Touch the **Home** button on the Navigation Bar.
4. Touch the **Wash** button on the Home Window.
5. When the wash is complete, follow the instructions in the *Assay User Guide* to run the chip.

Turning Off the Instrument

The instrument should be powered off at the end of each day. Also restart the instrument if it has been running for more than 24 hours.

To turn the instrument off, select **Start > Shutdown** on the Windows desktop to shut down the software. Using the power button to shut off the instrument may result in file corruption. Use only in case of emergency or if the computer has locked up. Use the power button to turn the instrument on.

To restart the instrument, select **Start > Restart**.

Running the instrument for more than 24 hours can result in degraded performance.

Exporting Data

The Peak Table, Well Table, Gel, Graph, or raw data can be exported automatically at the end of a run or after each well is read. Select the desired settings in the Export Settings Tab (see page 47) and then select the **Auto Export** check box on the Export Setup Tab. After the run has started, change the exported properties in the Well Table or Peak Tables if desired (see page 47).

Data can also be exported after a run is complete (see page 48).

Peak Tables and Well Tables are exported to either CSV files or XML files. CSV files can be imported into a spreadsheet program such as Microsoft® Excel.

Raw Data can be exported to a CSV file, an XML file, or to an AIA file format (a CDF file) which is used by some graphical analysis software tools.

Gel and Graph data is exported to the selected image format (i.e., BMP, GIF, JPEG, PNG, TIFF, WMF, or EMF).

This section includes the following information for using the GX Touch software to export Peak Tables, Well Tables, Gels, Graphs, or raw data:

Export Examples

This section shows export examples for the following data:

- Peak Table
- Raw Data
- Gel on page 45

Peak Table

Either a CSV file (ASCII text file in a comma-separated format) or an XML file that contains the data in all columns in the Peak Table. The peak table can be viewed in the LabChip GX Reviewer software. Figure 7 is an example of part of a Peak Table CSV file exported from a DNA assay (data truncated for this example):

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	Well	Plate	Plate Name	Plate File	Instrumer	Date_Time	Sample N	Well Labe	Chip ID	Barcode	Peak Inde	Peak Num	Migration	Height	Area	% Purity
2	1	1	Labchip_201	C:\Program	LC_GXT	2013\08\23	Ladder1	Ladder01	12345-999	N/A	1	1	12.51667	1627.029	217.3806	
3	1	1	Labchip_201	C:\Program	LC_GXT	2013\08\23	Ladder1	Ladder01	12345-999	N/A		2	13	22.36334	5.024377	
4	1	1	Labchip_201	C:\Program	LC_GXT	2013\08\23	Ladder1	Ladder01	12345-999	N/A	2	3	13.55	256.7727	26.9709	
5	1	1	Labchip_201	C:\Program	LC_GXT	2013\08\23	Ladder1	Ladder01	12345-999	N/A	3	4	16.31667	300.7886	25.78098	
6	1	1	Labchip_201	C:\Program	LC_GXT	2013\08\23	Ladder1	Ladder01	12345-999	N/A	4	5	17.76667	273.7978	26.53076	
7	1	1	Labchip_201	C:\Program	LC_GXT	2013\08\23	Ladder1	Ladder01	12345-999	N/A	5	6	18.33333	238.3375	24.57621	
8	1	1	Labchip_201	C:\Program	LC_GXT	2013\08\23	Ladder1	Ladder01	12345-999	N/A	6	7	18.93333	202.1608	22.58608	
9	1	1	Labchip_201	C:\Program	LC_GXT	2013\08\23	Ladder1	Ladder01	12345-999	N/A	7	8	19.58333	169.6319	21.34623	
10	1	1	Labchip_201	C:\Program	LC_GXT	2013\08\23	Ladder1	Ladder01	12345-999	N/A	8	9	20.08333	162.9186	21.26032	
11	1	1	Labchip_201	C:\Program	LC_GXT	2013\08\23	Ladder1	Ladder01	12345-999	N/A	9	10	20.65	105.6506	17.29154	
12	1	1	Labchip_201	C:\Program	LC_GXT	2013\08\23	Ladder1	Ladder01	12345-999	N/A	10	11	21.18333	372.6289	62.59221	
13	2	1	Labchip_201	C:\Program	LC_GXT	2013\08\23	A01	A01	12345-999	N/A	1	1	12.51667	1540.326	195.1009	
14	2	1	Labchip_201	C:\Program	LC_GXT	2013\08\23	A01	A01	12345-999	N/A	2	2	13.00187	19.59212	4.199632	2.223803
15	2	1	Labchip_201	C:\Program	LC_GXT	2013\08\23	A01	A01	12345-999	N/A	3	3	13.53726	294.3124	29.88095	12.00783
16	2	1	Labchip_201	C:\Program	LC_GXT	2013\08\23	A01	A01	12345-999	N/A	4	4	16.31461	338.2805	28.45063	11.89209

PeakTable example

Figure 7. Exported Peak Table

Excluded Peaks are not exported and are missing in the exported file. For example, if peaks 3, 5, and 7 are excluded, when the data is exported into Microsoft® Excel, peaks 3, 5, and 7 are not included.

Raw Data

Either a CSV file (ASCII text file), an XML file, or an AIA Format file that contains the signal data from the run as one file per well or multiple wells in the same file. Exported data has been smoothed using the polynomial filter.

Raw data can be exported in a **Chromatography Data Interchange Format** (formerly AIA format), which is used by some graphical analysis software tools. The Include Size Data and Export Single Table options are not available with Chromatography Data Interchange Format.

In addition to exporting time and value information, you can choose to export Size information. This information is determined based on aligned data and is used to correlate the peaks from one row to another.

Export Examples (Continued)

Below is an example of part of a raw data CSV file, including size data, exported from a DNA assay. In this example, the header is not included and data is truncated.

DATA
Time,Value,Size
0.000,-1.097,0
0.017,-1.512,0
0.033,-1.913,0
...
12.933,19.774,14
12.950,19.836,16
12.967,20.165,19
12.983,20.761,21
13.000,21.384,23
…

Gel

Exports the gels in the selected image format. Options are available to export all gels into the same image file or into a separate file for each gel. The Height selector on the Export tab determines the height, in pixels, of the exported graphic.

Figure 8 shows all gels exported to one image file.

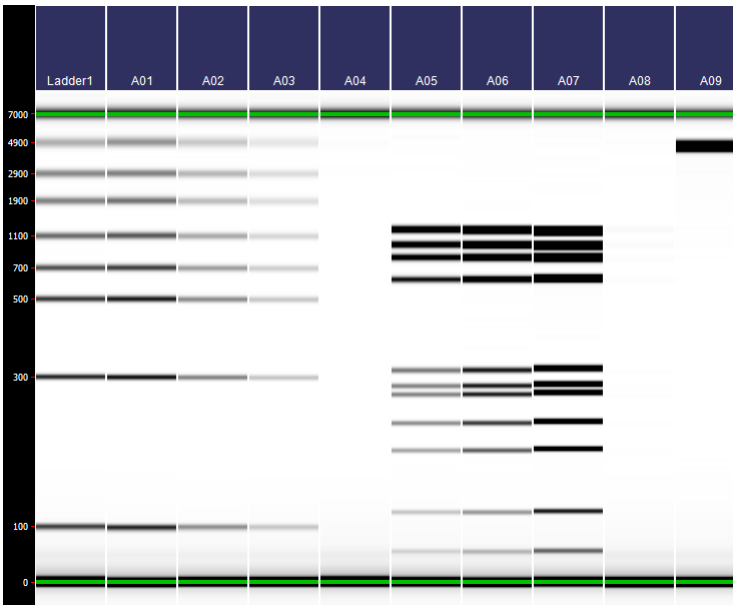


Figure 8. Exported Gels

Selecting the Auto Export Settings

The Auto Export settings specify the data to automatically export at the end of each run and specify the format for each type of data. The settings in the Export Setup tab are only used if the **Auto export** check box is selected in the Setup Run Tab.

To select the data to export:

1. Touch the **Tools** button on the Navigation Bar and then touch the **Export Setup** button to open the Export Setup Tab.
2. Touch the Export Settings Tab.
3. To export the files to a location other than the data folder, touch the **Browse** button and select the desired location for the data files. To reset the location to the default, touch the **Default** button.
4. Select the desired check boxes under **Export Selections**:
   - Select the **Export All** check box to select all check boxes.
   - To export all views of the same type to a single data file, select the **Export as Single File** check box. If selected, the gels for all wells are included in a single graphic file and the Raw Data for all wells is included in a single file.
   - If Gel is selected, touch the **+** or **-** buttons next to **Height (Pixels)** to specify the desired height of the exported gel graphic.
   - If **Raw Data** is selected, touch the AIA Format check box to export in Chromatography Data Interchange Format or clear the check box to export in CSV or XML format.
   - Select **Include Size Data** to align the data to the well's ladder (for one file per well) or to the first well (for a single data file) and include the size data in the exported Raw data file. (Not available for CZE assays, or if the AIA Format check box is selected.)
   - If **Peak Table**, **Well Table**, or **Raw Data** is selected for export, choose the desired format for the exported data files.
   - If either **Electropherogram** or **Gel** is selected, choose the desired format for the exported image files.
5. Touch **Save** to save the Export settings.
6. Start the Run (see Running an Assay on page 30).
7. After the run has started, change the exported properties in the Well Table or Peak Table if desired (see page 47).

Selecting the Exported Properties in the Well Table or Peak Table

The properties that are included in the Exported Peak Table or Well Table files can only be selected after the run is started.

NOTE

The desired properties should be selected during the Warm or Load step to ensure that all properties are exported for all wells if Single File is selected.

To change the exported data:

1. Touch the **Tools** button on the Navigation Bar.
2. Touch the **Export Setup** button to open the Export Setup Tab.
3. To change the Peak Table or Well Table export properties:
   a. Touch the Peak Properties Tab or Well Properties Tab.
   b. Move the desired properties into the **exported** list by selecting the properties and using the Left or Right arrow buttons to move the properties into the desired list.
4. The changes take effect with the next file that is exported.

Exporting Data in AIA Format

To export data in AIA format for use in third-party analysis software:

1. Touch the **Tools** button on the Navigation Bar and then touch the **Export Setup** button to open the Export Setup Tab.
2. Touch the Export Settings Tab.
3. To export the files to a location other than the data folder, touch the **Browse** button and select the desired location for the data files. To reset the location to the default, touch the **Default** button.
4. Select the **Raw Data** check box under **Export Selections**.
5. Select the **AIA Format** check box under **Raw Data Options**.
6. Touch **Save** to save the Export settings.
7. Start the Run (see Running an Assay on page 30).

Exporting a Data File after a Run is Complete

To export a data file after a run is complete:

1. If the data file is not open, open the data file (see page 54).
2. Touch the **Views** button on the Navigation Bar.
3. Touch the **Select Wells** button to open the Select Wells to View Tab.
4. Touch the **Export Plate** button to export a data file using the settings in the Export Settings Tab on the Views Window. If Peak Table or Well Table are selected for export, the exported table columns are selected in the Export Setup Tab on the Tools Window.

Viewing the Data

Data can be viewed in the Status Window or in the Views Window. Data for the current run can be viewed while the run is in progress or after the run is complete.

The Status Window displays the raw data from the run.

The Egram/Gel Tab, EGram Tab, and Gel Tab on the Views Window can display either analyzed or raw data.

This section includes the following procedures for viewing data in the LabChip GX Touch software during a run:

NOTE

After a run is complete, use the LabChip GX Reviewer software to view and analyze the plate data. The LabChip GX Reviewer software can open multiple data files in the same workspace to compare data from different plates or different runs. See the LabChip GX Reviewer User Manual for instructions.

Selecting the Well Data to View

To select the well data to overlay in the graphs on the EGram/Gel tab and the EGram tab:

1. Touch the **Views** button on the Navigation Bar.
2. Touch the **Select Wells** button to open the Select Wells to View Tab.
3. To view data from a single well:
   - **a** Clear the **Overlay** check box.
   - **b** Touch the well in the plate diagram. Only one well can be selected at a time.
4. To view data from multiple wells overlaid on the same graph:
   - **a** Select the **Overlay** check box.
   - **b** Touch each well that you want to view in the overlay graph. Multiple wells can be selected at the same time. Clearing the Overlay check box and selecting a single well clears all wells except the last selected well.
5. To display the analyzed data on the Egram/Gel Tab, EGram Tab and Gel Tab, select the **Perform Sample Analysis** check box. To display the raw data only, clear the **Perform Sample Analysis** check box
6. Use the gels in the Gel Tab or the Egram/Gel Tab to select the wells if there are multiple sips or plate cycles. Touching a well in the Select Wells to View Tab selects the well data from the last plate cycle.
7. To view the data in the Egram/Gel Tab, see page 51.
8. To view the graphs in the EGram Tab, see page 52.
9. To view the data in the Gel Tab, see page 53.
10. To view the data in the Fluorescence Intensity/Well Table Tab, see page 53.
11. See Zoom In and Zoom Out on page 54 for details on zooming graph and gel views.

Viewing Data in the Egram/Gel Tab

The Egram/Gel Tab displays a graph at the top of the tab and the gels of all the well data at the bottom of the window. The graph at the top of the window can display a single well or multiple wells overlaid in the same graph. Gels for all wells in the run display at the bottom of the window.

The wells selected on the Select Wells to View Tab display in the Egram/Gel Tab.

The wells to view can also be selected using the gels on the bottom of the Egram/Gel tab:

1. Select or clear the **Overlay** check box.
2. Touch a gel at the bottom of the tab to add the graph to the overlay. If the overlay check box is selected, the most recently added well displays at the top of the overlay graph. If the Overlay check box is not selected, only one well can be selected.
3. To change the graph display options, select the desired options in the Graph Settings on the EGram Tab.
4. To change the gel display options, select the desired options in the Gel Settings on the Gel Tab.

Graph Overlay

The graph in the Egram/Gel Tab can display multiple wells overlaid in the same graph for visual comparison. Each well is shown in a different color and line style with a legend at the top of the window. Figure 9 shows the electropherograms of two wells in the same graph.

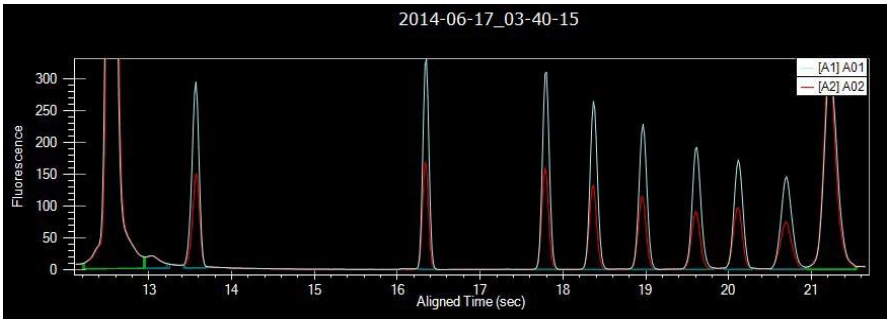


Figure 9. Graph with Multiple wells

To remove a specific sample from the graph, touch the sample that you want to remove in the Select Wells to View Tab or Egram/Gel Tab.

To display only one sample in the graph, clear the **Overlay** check box and touch one sample in the Select Wells to View Tab or Egram/Gel Tab.

Overlay Offset

Use the Overlay Offset text box on the Graph Settings to offset each of the graphs by the RFU value specified. Figure 10 shows the electropherograms of two wells in the same graph, offset by 50 RFU.

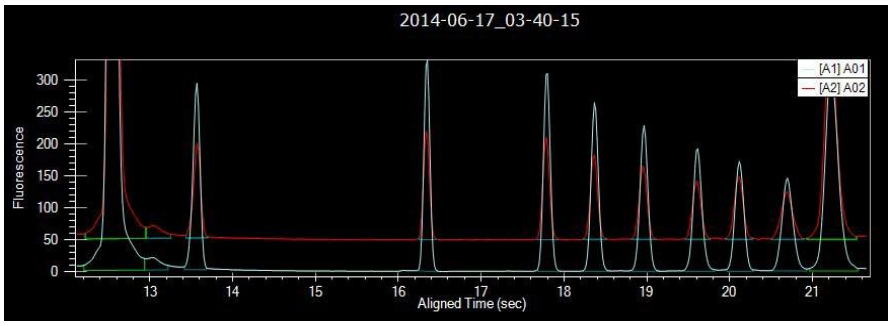


Figure 10. Overlay Offset

Viewing Graphs in the Egram Tab

The EGram Tab displays a graph containing the data from one or more completed wells. Data from multiple wells can be displayed in the same graph for visual comparison. The data file name and well name display at the top of the graph.

To navigate through the wells on a plate, touch the **Left**, **Right**, **Up**, and **Down** buttons. The Select Wells to View Tab and the Egram/Gel Tab update to display the current well.

Select the **Scale to Sample Peaks** check box to scale the view to the minimum and maximum X values of the current sample peaks. Marker and/or system peaks are ignored. (If Overlay is selected, the view scales to the sample peaks in the most recently selected well.)

Clear the **Scale to Sample Peaks** check box to scale the view to the minimum and maximum X values of all peaks, including marker peaks and system peaks.

To change the graph view options, select the **Graph Settings** check box and select the desired options in the Graph Settings.

Viewing Data in the Gel Tab

To compare the gels of all wells, view the gels in the Gel Tab.

The color, width, and contrast of the gels can be changed using the Gel Settings.

Select the Overlay check box to select multiple gels. The selected wells display in the graphs in the Egram/Gel Tab and the Gel Tab.

Viewing Data in the Fluorescence Intensity/Well Table Tab

The Fluorescence Intensity/Well Table Tab displays a Fluorescence Intensity graph at the top of the tab and the well table of all the well data at the bottom of the tab. The fluorescence intensity graph displays the data for a single well. The well table for all wells in the run displays at the bottom of the window.

The well to view can also be selected using the well table on the bottom of the Fluorescence Intensity/Well Table tab:

1. Touch a row in the Well Table at the bottom of the tab to view the graph at the top of the tab. The graph displays the Fluorescence Intensity from 33 seconds to 37 seconds.

Viewing Graphs in the Fluorescence Intensity Tab

The Fluorescence Intensity Tab displays a graph containing the data from 33 seconds to 37 seconds in one completed well. The data file name, well name, and sample name display at the top of the graph.

To navigate through the wells on a plate, touch the **Left**, **Right**, **Up**, and **Down** buttons. The Select Wells to View Tab and the Egram/Gel Tab update to display the current well.

Zoom In and Zoom Out

You can zoom in and out on data displayed in the Egram/Gel Tab, Gel Tab, and EGram Tab. The Graph and the Gel on the Egram/Gel tab both zoom to the same levels when either view is zoomed in. All tabs also zoom to the same levels.

To zoom in:

- Touch and drag on a graph or gel to enclose the region of interest. The selected area enlarges to fill the view. In the Gel tab, all lanes zoom to the same level. In a Gel, drag straight up or down in a single gel lane to zoom in. Dragging horizontally pans the view of the gels.
- You can continue zooming in until you reach the maximum magnification (the graph will not zoom in any closer).

To zoom out:

- In the EGram tab, touch the **Unzoom** button to zoom out to the previous zoom level. Touch the **Unzoom All** button to zoom out to the default view.
- In the Gel tab or the Egram/Gel tab, double-tap a gel header to zoom out to the previous zoom level.
- In the Egram/Gel tab or the EGram tab, double-tap the graph to zoom out to the previous zoom level.

Viewing a Data File after a Run is Complete

To view a data file after a run is complete:

1. Touch the **Views** button on the Navigation Bar.
2. Touch the **Select Wells** button to open the Select Wells to View Tab.
3. Touch the **Review Plate** button to open a data file to view the data. If a data file is already open, touch the **OK** button in the **Review Plate window** to clear the current plate data. Select the desired data file to open in the **Select a Data File window** and then touch the **Open** button.

Creating a Run File

A Run File contains all of the settings required to run a plate, including all the tab settings on the Run Window. Importing a Run File on the Select Wells Tab changes the settings on all tabs.

To create a run file if desired:

1. If the run will include auto export data, touch **Tools**, touch the Export Setup Tab, and then select the desired data to export. See Selecting the Auto Export Settings on page 46 for details.
2. Touch the **Home** button and then touch the **Run** button.
3. Select the desired assay, plate and sampling options and select the wells to sample on the Select Wells Tab. See Running an Assay on page 30 for details.
4. Touch the **Next** button  to open the Setup Run Tab.
5. Select the desired run options on the Setup Run Tab.
6. Touch the **Next** button to open the Start Run Tab.
7. Touch the **Export** button  . The **Save Run Parameters to File** window opens.
8. Type the desired name for the run file, select the file location, and touch the **Save** button to save the run file.

Using Sample Names Files

If desired, Sample Names files can be used to select wells to read. Sample Names files are also used to import sample names into a data file as the data file is created.

For more information about the Sample Names file format, see the *LabChip GX Reviewer User Manual*.

This section includes general instructions for using Sample Names files in the LabChip GX Touch software:

Creating a Sample Names File

Sample Names Files created in the LabChip GX Touch software can be used to specify the desired sample names for each well in a plate. The Sip order can also be specified to match the order of wells in the Sample Names file. Sample Names Files created in the LabChip GX Touch software do not contain Expected Peaks.

Existing Sample Names files can also be edited in the LabChip GX Touch software by importing the existing file, editing the sample names and user comments, and then exporting the edited file.

To create a new Sample Names file:

1. When a plate is not running, touch the **Views** button on the Navigation Bar.
2. Touch the **Sample Names** button to open the Sample Names Tab.
3. Touch the **Blank 96 Wells** or **Blank 384 Wells** button to open a blank Sample Names file with 96 or 384 rows. The default Sample Names for each well are the same as the well label.

   Or, to open an existing Sample Names file, click the **Import** button and select the desired Sample Names file (*.csv).
4. Double-tap a sample name and edit the sample name as desired. The Well Labels cannot be changed and rows cannot be added or deleted.

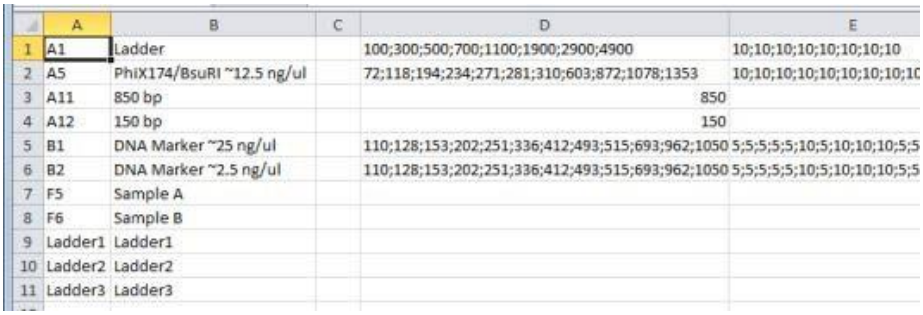
   If desired, the wells can be displayed in Row Order or Column Order using the **Row Order** and **Column Order** option buttons. Select the **By Quadrant** check box to display the wells by quadrants.
5. If desired, type comments for the samples in the **User Comments** column.
6. To save the Sample Names file, touch the **Export** button and specify the desired location and file name. The wells are saved in the same order as they are displayed in the table.

Selecting Wells using a Sample Names File

The wells to be sampled during the run can be selected using a Sample Names file. When using a Sample Names file to select the wells, only wells with an entry in the Sample Names file are selected for sampling. Use the LabChip GX Touch software, LabChip GX Reviewer software, Excel, or a LIMS to create the Sample Names file. If the file is created with Excel or a LIMS, the format must match the file format described in the *LabChip GX Reviewer User Manual*. Sample Names files that are created in LabChip GX Touch software (see page 57) always contain all 96 or 384 wells on the plate. Existing Sample Names files containing less than 96 or 384 wells can be edited but not created in the LabChip GX Touch software.

The Sample Names file used to select the samples is a CSV file that contains one row for each well to be sampled, and does not contain rows for wells that are not sampled.

Using the Sample Names file in Figure 11 to select the wells in the run will select wells A1, A5, A11, A12, B1, B2, F5, and F6 for sampling. Figure 11 shows the wells selected in the Select Wells Tab.



	A	B	C	D	E
1	A1	Ladder		100;300;500;700;1100;1900;2900;4900	10;10;10;10;10;10;10;10
2	A5	PhiX174/BsuRI ~12.5 ng/ul		72;118;194;234;271;281;310;603;872;1078;1353	10;10;10;10;10;10;10;10;10;10
3	A11	850 bp		850	
4	A12	150 bp		150	
5	B1	DNA Marker ~25 ng/ul		110;128;153;202;251;336;412;493;515;693;962;1050	5;5;5;5;5;10;5;10;10;10;5;5
6	B2	DNA Marker ~2.5 ng/ul		110;128;153;202;251;336;412;493;515;693;962;1050	5;5;5;5;5;10;5;10;10;10;5;5
7	F5	Sample A			
8	F6	Sample B			
9	Ladder1	Ladder1			
10	Ladder2	Ladder2			
11	Ladder3	Ladder3			

Figure 11. Sample Names File for Selecting Samples

. The wells in the Sample Names file cannot contain Samples in the wells selected for the standards. Figure 11 shows the wells selected in the Select Wells Tab.

Selecting Wells using a Sample Names File (Continued)

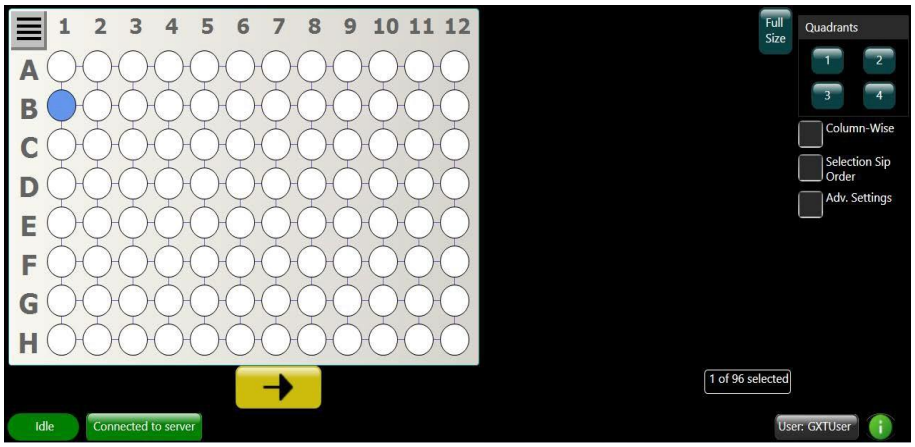


Figure 12. Selected Wells on Run Window

This Sample Names file cannot be created in the **Sample Names Editor** window in the LabChip GX Reviewer software because the files created in the Sample Names Editor window always contain one row for each well in the plate. The Sample Names files for selecting wells are typically created by a LIMS or can be created in Microsoft® Excel and are saved as a *.csv file.

To select the wells using a Sample Names file:

1. Create the Sample Names file with one row for each well to be sampled.
2. Touch the **Home** button and then touch the **Run** button.
3. Select the desired run settings on the Select Wells Tab.
4. Select at least one well in the plate diagram. It does not matter which well is selected. The **Next** button is not enabled unless at least one well is selected.
5. Touch the **Next** button  or the Setup Run Tab.
6. Select the **Sample Names file** check box.
7. Touch the **Browse** button next to the Sample Names text box, select the Sample Names file (*.csv), and touch the **Open** button.

Selecting Wells using a Sample Names File (Continued)

8 Select the **Use Sample Names file for Sample Selection** check box.

9 Select the desired options on the Setup Run Tab.

10 Touch the **Select Wells** button or click the left arrow button.

11 Select or clear the desired sipping order options: Column-wise and File Sip Order.

12 Select any other run parameters as desired, and then start the run.

Using a Barcode to Specify the Sample Names File

If your instrument is equipped with a barcode reader, the desired Sample Names file can be specified by using the plate barcode in the name of the Sample Names file. At run-time, the plate barcode is read and then the barcode is used to read the corresponding Sample Names file.

To use the plate barcode to specify the Sample Names file:

1 Decide on a location and file name format for the Sample Names files. For example, the Sample Names files can be named “Sample Names” followed immediately by the barcode on the plate.

2 Create a temporary CSV file, using “%barcode%” as a placeholder for the barcode string. For example, create a temporary file named “Sample Names%barcode%.csv” and save it in the location where the actual Sample Names files for the runs will be saved.

3 On the Select Wells Tab, select the desired run parameters.

4 On the Setup Run Tab, touch the **Browse** button next to Sample Names file, and select the CSV file that contains the %barcode% wildcard. The Use Sample Names file for Sample Selection check box is automatically selected when the Sample Names file contains the string %barcode%.

Using a Barcode to Specify the Sample Names File (Continued)

5 In the Select Wells tab, select the desired Sipping Order options: Column-wise and/or File Order.

6 Touch the **Start Run** button. The Start Run Tab opens.

7 Touch the **Export** button and save the Run file. The Run File can be imported to run multiple plates with the same settings.

8 To start the run, touch the **Start** button.

9 When the run is started, the plate barcode is read and the Sample Names file with the corresponding barcode is used to select the wells to sample. In the example above, if the plate barcode is 12345, then the file named “Sample Names12345.csv” will be used to select the wells in the run.

Editing Sample Names During a Run

The default Sample Names assigned during a run can be edited after the run starts, but before the sample well read is complete. (After the well has been read, the data is saved in the data file, and the sample name can no longer be changed.) The sample names assigned using a sample names file can also be edited before the well has been read.

1 After a run is started, touch the **Views** button on the Navigation Bar.

2 Touch the **Sample Names** button to open the Sample Names Tab. If a sample names file was specified, the names from the Sample Names File display. Otherwise, the well labels are used as the default sample names.

3 Edit the sample names as desired. (If a well has already been read, the Sample Names and Comment fields are disabled for the well and cannot be edited.)

4 Add comments to the Comment fields as desired.

5 Touch the **Apply** button to save the changes. You must touch Apply before the well read is complete.

Saving Data Files

While running an assay, the raw time series data received from the instrument is automatically saved to the data file (.gxd), one well at a time as each well is completed. The Analysis settings from the assay are also saved in the data file. If a run is stopped before it is complete, the data for all completed wells is saved in the data file. The name and location of the data file is specified in the Setup Run Tab.

This section includes general instructions for saving data files in the LabChip GX Touch software:

- Saving Data Files with LabChip GxP Option Installed
- Organizing, Retrieving, and Backing Up Data Files

Saving Data Files with LabChip GxP Option Installed

If the LabChip GxP option is installed, the raw time series data received from the instrument is saved to the CDR, one well at a time as each well is completed. If the connection to a remote CDR server is lost after a run is started, the data is saved to a local folder and copied to the CDR when the network connection is restored.

Organizing, Retrieving, and Backing Up Data Files

As you work in the LabChip GX Touch software, it is a good practice to organize the LabChip GX Touch data files.

- Create a folder in which to save the data files. If desired, each user can save data files to their own sub-folder to organize the data files.
- Review the files periodically, even if only one person uses the LabChip GX Touch software. If you are not using the LabChip GxP option, archive files you are no longer using but want to save by copying to a backup disk, and then delete unneeded files. Verify there is enough free space on the hard drive to save new plate data files. If you are using the LabChip GxP option, see LabChip GxP Option on page 63 for backup options.
- Each user in the laboratory can specify a particular data file prefix to easily differentiate data files.

A new folder can be created each day to store the data from all runs. To automatically create the folders, select the **Create Daily Sub-Directory** check box on the Setup Run Tab.

LabChip GxP Option

A LabChip GxP option is available for the LabChip GX Touch software. This option contains built-in technical controls and features specifically designed to provide compatibility with 21 CFR Part 11 requirements. Users are responsible for establishing policies and standard operating procedures that complement the capabilities provided by the software in order to ensure complete compliance to the rule.

NOTE

Using the LabChip GxP compatibility option alone does not ensure 21 CFR Part 11 compliance. Laboratory processes and procedures must comply with 21 CFR Part 11 regulations.

The LabChip GxP option ensures that assays, output data, analysis settings, event data, and backup data files are not available for editing or tampering. Data is stored in a secure folder on the local computer or on a network server. To manage LabChip GX Touch user accounts, Microsoft® SQL Server® Express is provided with the LabChip GxP option.

The LabChip GxP option requires an internal USB Key (dongle) installed inside the instrument cover. The USB Key is only to be installed by trained Revvity Service personnel.

The following procedures are included in this section:

LabChip GxP options are managed in the LabChip GX Reviewer software. Refer to the *LabChip GX Reviewer User Manual* for creating and managing user accounts, viewing and exporting the Audit trail, and maintaining the CDR database and CFR files.

Locking and Unlocking the Software

The LabChip GX Touch software with the LabChip GxP option installed allows you to lock the LabChip GX Touch software. The software also locks after it has been left unattended for an amount of time specified by the LabChip GX Touch Administrator. If the GxP option is not installed, the software does not lock.

Locking the LabChip GX Touch software prevents unauthorized users from accessing the software while you are away from the computer. After the software is locked, only the logged in user or a LabChip GX Touch Administrator can unlock the software.

User accounts are created and maintained in the LabChip GX Reviewer software. Refer to the *LabChip GX Reviewer User Manual* for instructions.

To lock the LabChip GX Touch software:

1 On the Home Window, touch the **User** button in the lower right corner. The Unlock Application Window opens on top of the LabChip GX Touch Main Window and displays the User name of the current user.

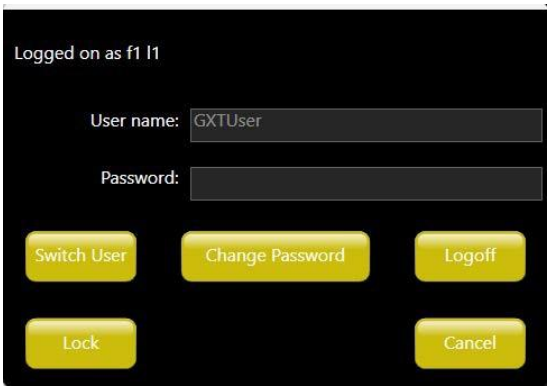


Figure 13. Login Window

2 Touch the **Lock** button. The Unlock Application Window opens and the software is locked until unlocked by the current user or an administrator.

NOTE

If a run is in progress, the run continues and the data is logged under the user name of the user that was logged in at the beginning of the run, even if another user logs in during the run.

Locking and Unlocking the Software (Continued)

To unlock the LabChip GX Touch software:

1. On the Unlock Application Window, type the password for the logged in user in the **Password** text box and touch the **Logon** button.
2. If the password for the current user is not available, type a LabChip GX Touch Administrator user name and password in the Unlock Application Window and touch the **Logon** button. The Administrator is logged into the LabChip GX Touch software and the previous user is logged out.

User Accounts

Access to the LabChip GX Touch software is controlled by user accounts when the LabChip GxP option is installed. Each user must sign into the LabChip GX Touch software from the Unlock Application Window. User accounts are managed in the LabChip GX Reviewer software. See the *LabChip GX Reviewer User Manual* for information on creating and managing user accounts. If the LabChip GxP option is not installed, the user name of the Windows user displays and cannot be changed.

Switching Users

The LabChip GX Touch software with the LabChip GxP option installed allows you to switch users during operation.

To switch users:

1. On the Unlock Application Window, touch the **Switch User** button.
2. Type the user name and password of the new user and touch the **Logon** button.

Central Data Repository (CDR)

The Central Data Repository (CDR) is a protected folder located on the local computer or on a network server. All data is saved in the CDR folder. The CDR folder is protected from changes by unauthorized users. The CDR is only used when the LabChip GxP option is installed. The CDR is maintained in the LabChip GX Reviewer software. Refer to the *LabChip GX Reviewer User Manual* for more information.

The data files can be organized into virtual folders in the CDR using the folder options in the Setup Run Tab. The folders are not actually created in the CDR folder, but are displayed in the LabChip GX Reviewer and LabChip GX Touch software to organize the data files. The LabChip GX Reviewer software enables you to create new folders, rename existing folder, and delete empty folders.

CDR Security Suggestions

To ensure proper security of data files, the LabChip GX Touch Administrator should:

1 Change the administrator password. Make sure to keep a copy of the password in a safe place. This password **cannot** be reset if forgotten. To change the administrator password:

a Log into the LabChip GX Touch software as the administrator.

b On the Home Window, touch the **User** button in the lower right corner. The Unlock Application Window opens.

c Touch the **Change Password** button. The Change Password Window opens.

d Type the current password in the **Old Password** text box.

e Type the new password in both the **New Password** and **Confirm Password** text boxes.

NOTE

Write down the administrator password and keep a copy in a safe place. The administrator password cannot be reset or recovered if forgotten or lost.

f Touch the **OK** button.

Installing New Assays

This section describes how to use the Assay Utility software to install new assays in the LabChip GX Touch software. The Assay Utility is included in LabChip GX Touch software version 1.10 or higher. New assays are available on the Revvity website at *https://www.revvity.com/category/microfluidic-analysis*

The following procedures are included in this section:

NOTE

- *Each Installable assay includes an embedded MAV (Minimum Application Version) to specify the minimum compatible version of LabChip GX Touch software.*
- *Verify the installed LabChip GX Touch software version is the same or higher than the version required for the assay*
- *The LabChip GX Touch software is available on the Revvity software download website https://www.revvity.com/category/microfluidic-analysis*

LabChip GX Touch Without GxP

When the LabChip GX Touch Software is installed in non-GxP mode, the installable assays are managed using the Assay Utility software.

See the following procedures:

Opening the Assay Utility

1. Make sure the LabChip GX Touch and LabChip GX Reviewer software are both closed.
2. In File Explorer, navigate to **C:\Program Files\ Revvity\LabChip GX Touch**.
3. Right-click on **AssayUtility.exe** and click **Run as Administrator**.
4. If you are prompted to allow the program to make changes to your computer, click the **Yes** button. The Assay Utility window opens as shown in Figure 14.

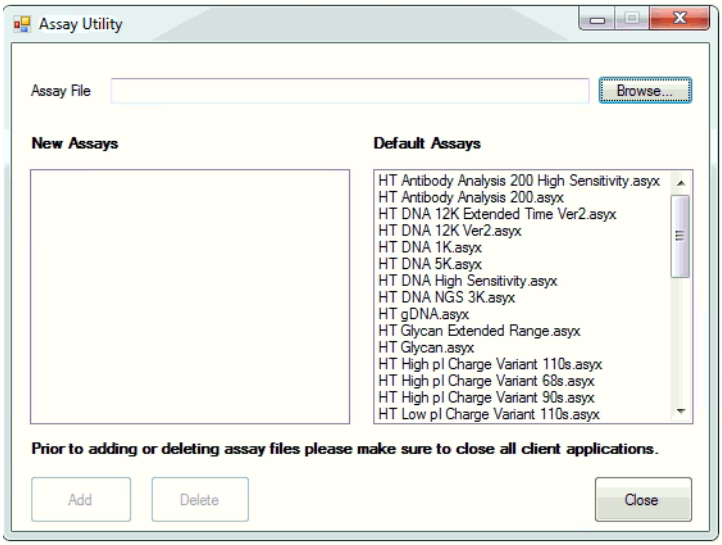


Figure 14. Assay Utility Window

The Assay Utility window displays the Default Assays on the right side and any imported Installable assays in the New Assays list on the left side. You cannot add or delete Default Assays.

NOTE

The Assay Utility window is not used with LabChip GX Touch software in GxP mode. See LabChip GX Touch in GxP Mode on page 70.

Adding or Updating an Assay

To add a new assay or update an installed assay:

1. Download the desired assay from https://www.Revvity.com/lab-products-and-services/resources/labchip-and-optimizer-software-downloads.html and verify the installed LabChip GX Touch software version is the same or higher than the version required for the assay.
2. Copy the downloaded installable assay to the LabChip GX Touch or to a location that the LabChip GX Touch can access.
3. In the Assay Utility window, click the **Browse** button.
4. Navigate to the location of the installable assay file (*.iasyx) and select the name of the installable assay that you want to add or update.
5. Verify that the LabChip GX Touch and LabChip GX Reviewer software are both closed.
6. Click the **Add** button. The installable assay is added to the default assay folder (C:\Program Files\Revvity \LabChip GX Touch\Assay) and displays in the New Assays list.

   Installation Qualification (IQ) is automatically performed on each new installable assay when adding or updating the assay.
7. Start the LabChip GX Touch software. The new assay is listed in the **Select Assay** drop-down list on the Select Wells tab when the appropriate chip is inserted in the instrument.

Deleting an Installed Assay

1. Verify that the LabChip GX Touch and LabChip GX Reviewer software are both closed.
2. In the Assay Utility window, select the assay that you want to delete in the New Assays list. Only one assay can be selected at a time.
3. Click the **Delete** button to delete the assay from the default assay folder (C:\Program Files\Revvity \LabChip GX Touch \Assay) and remove the assay from the New Assays list.

LabChip GX Touch in GxP Mode

When the LabChip GX Touch Software is installed in GxP mode, the installable assays are managed through CDR Management in the GX Reviewer software.

- Adding or Updating an Assay (GxP) on page 70
- Deleting an Installed Assay (GxP) on page 71

Adding or Updating an Assay (GxP)

To add a new installable assay to the CDR:

1. Download the desired assay from https://www.Revvity.com/lab-products-and-services/resources/labchip-and-optimizer-software-downloads.html and verify the installed LabChip GX Touch software version is the same or higher than the version required for the assay.
2. Copy the downloaded installable assay to the LabChip GX Touch or to a location that the LabChip GX Touch can access.
3. In the LabChip Reviewer software on the LabChip GX Touch instrument, click **Tools > Load Assay into CDR**. The Load Assay into CDR window opens as shown in 5.

Figure 16. Load Assay into CDR Window

4. Click the **Browse** button next to **Select CDR Assay Folder**. The CDR Browser window opens.

5 Select the folder where you want to add the new assay and click the **OK** button. The path to the selected folder displays in the text box.

6 Click the **Browse** button next to **Select Installable Assay File**. The Select File window opens.

7 Navigate to the folder where the new assay file is located, select the installable assay file (*.iasyx) that you want to install, and click the **OK** button. (Only one assay file can be selected at a time.)

8 Type the source of the assay (e.g., Revvity or Revvity Installable Assay) in the **External Source** text box. This field is required.

9 If desired, type a comment to explain the change in the CDR change log.

10 Verify that the LabChip GX Touch software is closed.

11 Click the **Load Assay** button. The assay is added to the specified CDR folder and displays in the New Assays list.

Deleting an Installed Assay (GxP)

1 Verify that the LabChip GX Touch software is closed.

2 In the LabChip Reviewer software on the LabChip GX Touch instrument, click **Tools > Load Assay into CDR**. The Load Assay into CDR window opens as shown in Figure 15.

3 Select the assay that you want to delete in the New Assays list box. Only one assay file can be selected at a time.

4 If desired, type a comment to explain the change in the CDR change log.

5 Click the **Delete** button to remove the assay from the CDR.

NOTE

- *Folder permission is checked prior to adding, updating, or deleting new assay files from CDR Assay folder.*
- *All operations, including adding, updating, and deleting, are logged.*
- *For LabChip GX Touch V1.10 and higher, custom assays cannot be added in GxP mode. Only Installable assays can be installed through CDR management.*

Software Reference

This section describes the windows in the LabChip GX Touch software. Each topic describes the options and buttons on the window, and how to open the window.

CDR/Database Server Window

Use the CDR/Database Server Window to specify the location of the CDR folder or to view the current location of the CDR folder when the LabChip GxP option is installed.

Figure 16. CDR/Database Server Window

The CDR/Database Server Window contains the following options:

Server Name / IP Address - The server name or IP address of the computer where the CDR is installed.

Test Connection button - Opens the Server Status window for use by Revvity personnel to set up and test the connections to SQL, CDR, and Data File Service. The log file generated during testing is located in C:\Program Files\Revvity\LabChip GX Touch\log \ServerDiagnostics.log.

Apply button - Connects to the CDR on the specified computer or server. If the CDR cannot be contacted due to network problems or because the CDR is not installed yet, an error message displays.

Cancel button - Closes the window without connecting to the remote CDR Server. If the LabChip GX Touch software is not connected to the CDR, assays cannot be run until the CDR is connected.

Change Assay Folder Window

The Change Assay Folder window is used to select the Assay Folder when priming a chip or running a plate.

To open the Change Assay Folder window, touch the **Change Assay Folder button** on the Prime Window or on the Select Wells Tab.

Figure 17. Change Assay Folder Window

The Change Assay Folder window contains the following options:

New Folder button - Enables you to create new assay folders.

Rename button - Enables you to rename the current assay folder.

Use the LabChip GX Reviewer software to create new assay folders.

Change Password Window

Use the Change Password Window to change the password for the current user. This window is only available if the LabChip GxP option is installed with the LabChip GX Touch software.

To open the Change Password Window, touch the **User button** on the Home Window and then touch the **Change Password button**.

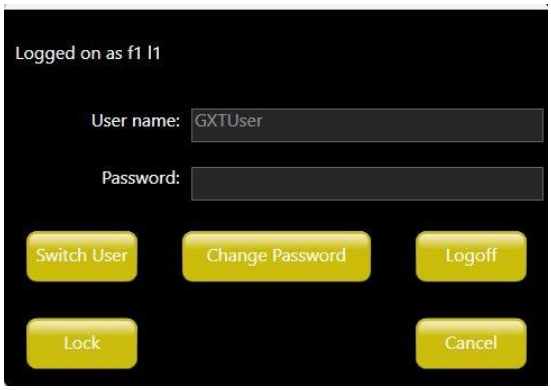


Figure 18. Change Password Window

The Change Password Window contains the following options:

Old Password - The current password for the current user.

New Password - The new password for the current user.

Confirm Password - The new password for the current user.

OK button - Saves the new password and closes the window.

Cancel button - Closes the window without saving changes to the password.

LabChip GX Touch Main Window

Use the LabChip GX Touch main window to access the Navigation Bar and Home Window. The LabChip GX Touch Main Window opens when the software is opened.

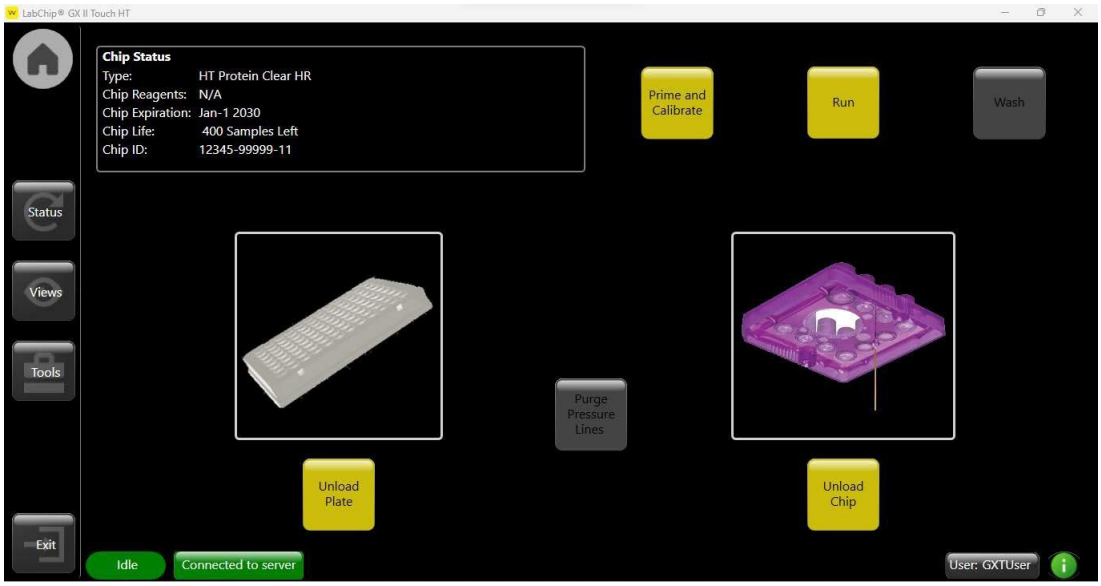


Figure 19. LabChip GX Touch Main Window

Navigation Bar

The Navigation Bar on the left side of the LabChip GX Touch Main Window provides access to the main functions of the LabChip GX Touch software. Touching a navigation button opens the corresponding window.

The Navigation bar contains the following buttons:

Home button - Opens the Home Window to start a prime, calibration, pressure line purge, run, or wash operation or to load/unload plates or chips.

Status button - Opens the Status Window to view the current status of the instrument, chip, and run. For Protein Clear HR and ProteinEXact assays, the status of prime/calibration displays.

Views button - Opens the Views Window to view data from the last completed run. After a new run is started or the software is closed, data from a completed run is no longer available in the LabChip GX Touch software. Use the LabChip GX Reviewer software to view or analyze data from previous runs.

Tools button - Opens the Tools Window to add plates, run software and hardware diagnostics, select Auto export options, calibrate the optics, or access Revvity service engineer software functions.

Exit button - Closes the LabChip GX Touch software.

Error button - Only displays if an error has occurred. Opens the Current Events Tab to view the error details and to clear the error.

Warning button - Only displays if a Warning has occurred. Opens the Current Events Tab to view the warning details and to clear the warning.

Stop button - Stops the current operation in progress. If running a plate, the run stops immediately and the current well does not finish reading. Any data collected from the current well is discarded. If priming or washing a chip, the prime or wash stops immediately.

Home Window

The Home Window displays to the right of the Navigation Bar and is used to prime a chip, calibrate a chip, wash a chip, run a plate, or purge the instrument's pressure lines. Also used to load and unload plates and chips in the instrument. The status of the instrument and user information also display.

If the LabChip GxP option is installed, the Home Window displays the CDR Server status and provides access to the Login window.

To open the Home window, touch the **Home** button on the Navigation Bar.

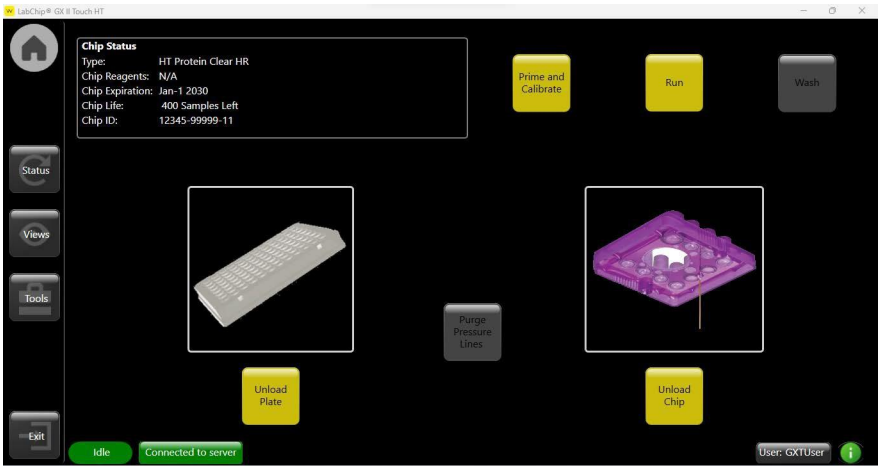


Figure 20. Home Window

The Home window contains the following buttons:

Prime - Opens the Prime Window to prime the chip (not available for Protein Clear HR chips).

Prime and Calibrate - Opens the Prime and Calibrate Window to calibrate the instrument to run Protein Clear HR assays (only for Protein Clear HR chips).

Run - Opens the Run Window to run an assay. See the *Assay User Guide* for chip preparation instructions. While an assay is running, the **Exit** button on the Navigation Bar changes to a **Stop** button to stop the run in progress. Assays that have been stopped cannot automatically be resumed. See Continuing a Stopped Run on page 40 for details on restarting a stopped assay.

Wash - Opens the Wash Window and immediately begins washing the chip. See the *Assay User Guide* for chip preparation instructions.

Unload/Load Plate - Ejects or retracts the microplate carrier to access the microplate, buffer tube, and ladder tube.

Home Window (Continued)

Purge Pressure Lines - Forces any potential liquid or debris out of the pressure lines to improve instrument performance.

Unload Chip - Unlatches the front door to access the chip. Manually close the door to load the chip.

Instrument Status - Displays the current status of the LabChip GX Touch instrument:

- **Calibrating** - The GX Touch software is calibrating the instrument to run a Protein Clear HR or ProteinEXact assay.
- **Connecting** - The GX Touch software is connecting to the instrument.
- **Eject Plate** - The GX Touch is ejecting a plate carriage.
- **Idle** - The GX Touch is not active.
- **Open Door** - The GX Touch is opening the front door to access the chip.
- **Logon** - A user has not yet logged into the software.
- **Priming** - The GX Touch is priming a chip.
- **Purging** - The GX Touch is purging the pressure lines.
- **Retract Plate** - The GX Touch is retracting a plate carriage.
- **Startup** - The GX Touch software is initiating communication with the instrument.
- **Running** - The GX Touch is running an assay.
- **Warming** - The GX Touch is warming a chip.
- **Washing** - The GX Touch is washing a chip.

Home Window (Continued)

Server Status - Only displays if the LabChip GxP option is installed. Displays the current status of the CDR/Database server connection:

- **Connected to server** - The software is connected to the server. Touch the button to open the CDR/Database Server Window.
- **Mapping Server** - The software is locating the server name or IP address of the computer where the CDR is installed.
- **Locked by Timeout** - Displays if the software has been left unattended for an amount of time specified by the LabChip GX Touch Administrator.
- **Locked by User** - Displays if the software has been locked by the user.
- **Server is Not available** - The software is not connected to the server.
- **Server not mapped** - The software has not been mapped to a CDR server.

User button - Only displays if the LabChip GxP option is installed. Opens the Unlock Application Window to log into the software, lock the software, switch users, or change the password of the current user.

Information (i) button - Opens the **InfoView window** to access information about LabChip GX Touch software, the LabChip GX Touch online help, and the Log Zipper function.

Login Window

Use the Login Window to log in to the LabChip GX Touch software, lock the software, switch users, or change passwords when the LabChip GxP option is installed. The LabChip GX Touch software will not start until a valid user name and password are entered.

The Login Window opens when you start the LabChip GX Touch software with the LabChip GxP option installed.

Login Window (Continued)

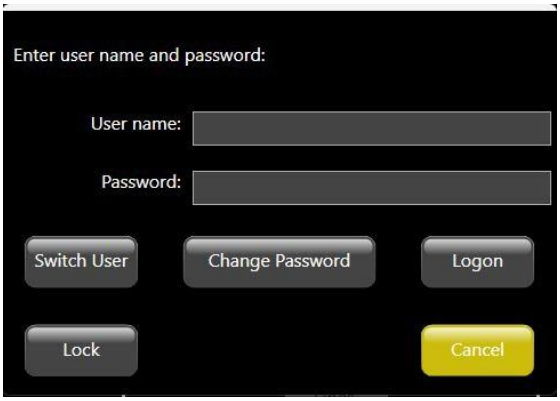


Figure 21. Login Window

The Login Window contains the following options:

Username text box - The user name to log into the LabChip GX Touch software. Each user should have a unique user name.

Password text box - The password assigned to the Username. All passwords must be at least 5 characters long and must contain at least one uppercase letter and at least one number. The User Account Policies specify additional password requirements.

NOTE

*The **Switch User**, **Change Password**, and **Lock** buttons are only available if a user is already logged into the LabChip GX Touch software.*

Switch User button - Enables the **User Name** and **Password** text boxes to enable a new user to log in. The current user is automatically logged out.

Change Password Button - Opens the Change Password Window to change the password for the current user.

Logon button - Logs in the user and closes the Login Window.

Lock button - Opens the Unlock Application Window and locks the LabChip GX Touch software. Only the current user or an administrator can unlock the software.

Cancel button - Closes the Login Window without logging the user into the software.

Prime and Calibrate Window

Use the Prime and Calibrate window to calibrate the instrument to run a Protein Clear HR assay. To open the Prime and Calibrate window, touch the **Prime and Calibrate** button on the Home Window.

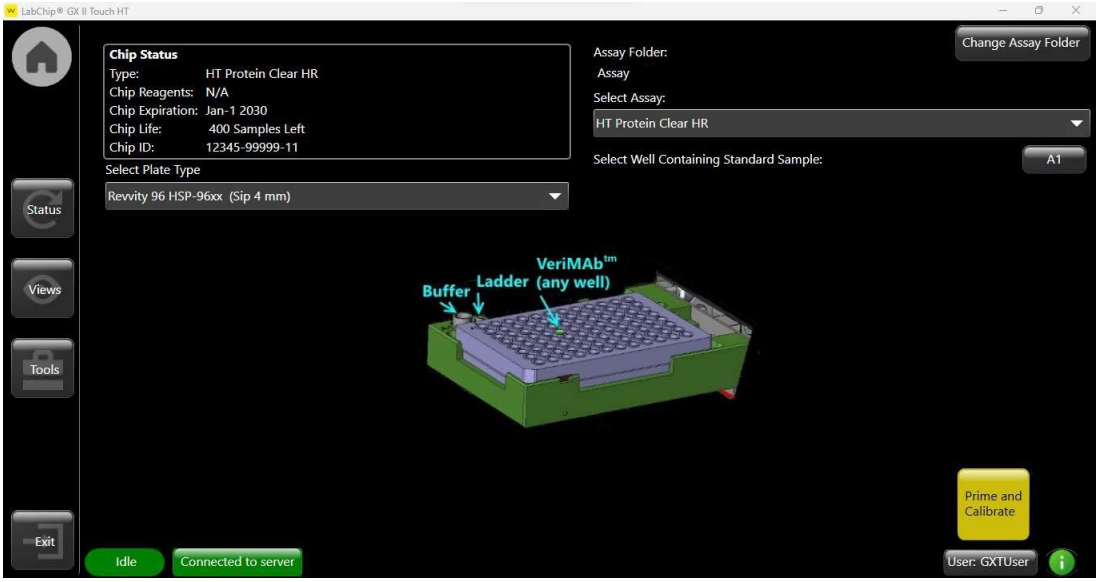


Figure 22. Prime and Calibrate Window

The Prime and Calibrate window contains the following options:

Change Assay Folder button - Touch to select the folder that contains the desired assays.

Select Assay drop-down list - Touch to select the assay to run.

A1 button - Touch to enlarge the plate diagram to select the well containing the VeriMAb sample.

Skip Prime step check box - Only displays if a Protein Clear HR chip has already been calibrated. If selected, the chip is calibrated without a second prime.

Select Plate Type drop-down list - Select the desired plate type to be used during the run.

Prime and Calibrate button - Starts the calibration process.

Prime Window

Use the Prime window to prime chips for assays other than Protein Clear HR. The chip must be primed for the same assay (or assay family) as the assay that will run on the chip. To use the chip for a different assay, wash and reprime the chip by selecting the correct assay and using the appropriate reagents. Load the buffer tube and the chip before opening the Prime window. To open the Prime window, touch the **Prime** button on the Home Window.

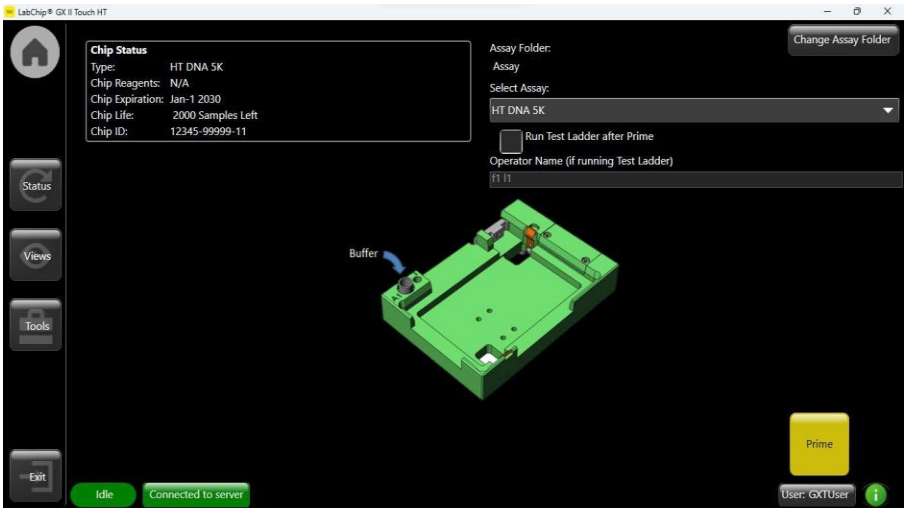


Figure 23. Prime Window

The Prime window contains the following options and buttons:

Change Assay Folder button - Touch to select the folder that contains the desired assays.

Assay - Specifies the assay for which to prime the chip. The selections available depend on the chip type and the assay type that was selected when the chip was inserted.

Run Test Ladder after Prime check box - If selected, runs one ladder well after priming is complete.

- **Operator Name text box** - if Run Test Ladder after Prime is selected, specifies the Operator Name for the Prime. In GxP mode, the name is the first and last name of the currently logged in user. If not in GxP mode, type the desired operator name.

Prime button - Starts priming the chip and displays the status of the priming step.

Run Window

Use the Run Window to define the assay run parameters. To open the Run Window, touch the **Run** button on the Home Window.

The Run Window contains the following tabs:

- Select Wells Tab
- Setup Run Tab
- Start Run Tab

Select Wells Tab

Use the Select Wells tab to select the assay, plate type, wells to read, and advanced run options. See the *Assay User Guide* for chip and sample prep instructions. To open the Select Wells tab, touch the **Run** button on the Home Window or touch the **Select Wells** tab on top of the Run Window.

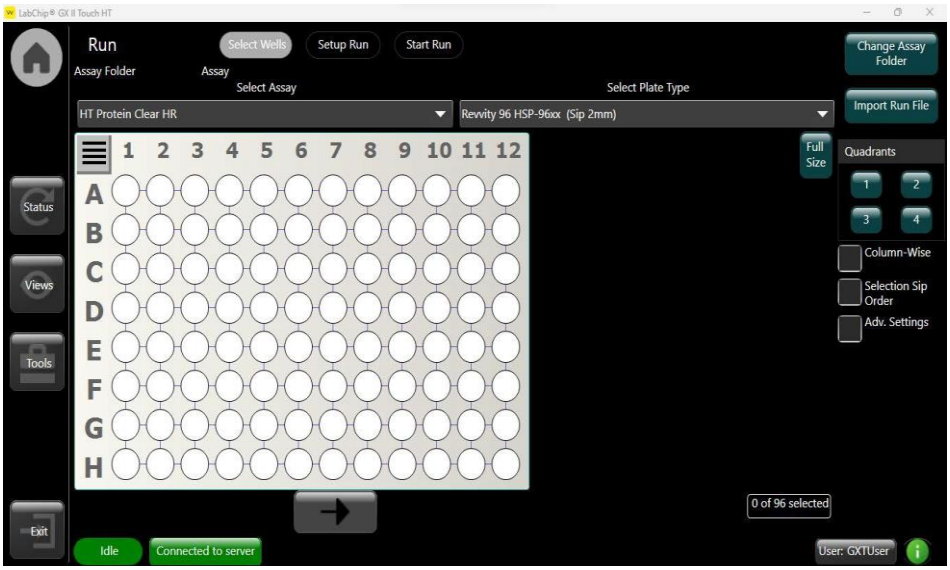


Figure 24. Select Wells Tab

The Select Wells tab contains the following options and buttons:

Change Assay Folder button - Touch to select the folder that contains the desired assays.

Select Assay drop-down list - Select the type of assay to run. The assay types available depend on the chip that is loaded in the instrument. The instrument automatically identifies the chip type when the chip is loaded in the instrument.

Select Wells Tab (Continued)

Select Plate Type drop-down list - Choose the type of plate that will be used in the run.

Select Standards button - Opens the Select Standards Window to select the wells the single AAV DN DNA or Protein Standard. Only displays when AAV DN DNA, or AAV Pico Protein is selected in the **Select Assay** drop-down list.

Import Run File button - Opens the Import Run Parameters from XML File window to select a run file to import. See Creating a Run File on page 55 for details on run files.

Plate Diagram - Select the wells to read during the run. Selected wells are blue, unselected wells are white.

- To select all rows on the plate, touch the **Select All Rows** button at the top left corner of the plate diagram.
- To select a row, touch the row letter on the left side of the plate.
- To select a column, touch the column number at the top of the plate.
- Clear a single well by touching the selected well.

Full Size button - Enlarges the Plate Diagram to full screen to enable easier selection of wells, especially when selecting wells on 384-well plates. Touch the **Done** button in the upper right corner to return to the Select Wells tab.

Quadrants - Touch the **1**, **2**, **3**, or **4** buttons to select or clear all wells in each quadrant. Any wells that are already selected are not changed unless the wells are in the specified quadrant. If all of the wells in a quadrant are selected, the quadrant button is selected and displays green. If any/all wells in a quadrant are deselected, the corresponding quadrant button is also deselected.

Column-wise check box - Specifies the order in which the wells are sampled during the assay:

- If selected, the wells in each column are sampled from top to bottom before proceeding to the next column (A1, B1, C1... A2, B2, C2...). Ladders are sipped every 12 wells, so some columns will include a ladder in the column.
- If cleared, the wells in each row are sampled from left to right before proceeding to the next row (A1, A2, A3... B1, B2, B3...). Ladders are sipped every 12 wells.

Select Wells Tab (Continued)

Selection Sip Order check box - If selected, the wells are sipped in the order in which the wells are selected. Selecting a rectangular region orders the wells from the start of the selection region to the end of the selection region, either row-wise or column-wise. If not selected, the wells are sipped in row or column order.

File Sip Order check box - This option only displays if a Sample Names File is selected on the Setup Run Tab and the **Use Sample Names File for Sample Selection** check box is selected. If selected, the wells are sipped in the order in which the wells are listed in the Sample Names File. If not selected, the wells are sipped in column-wise or row-wise order.

Advanced Settings - If selected, displays the Advanced Run Settings:

- **Sample Sips** - Specifies the number of times to run the selected wells. Each well is sampled once, and then the entire run repeats. The data from all wells is combined in one data file.
- **Plate Cycles** - Specifies how many times to repeat the assay on the plate.
- **Random Select%** - Specifies the percent of wells to randomly sample from the selected wells. For example, if 10 wells are selected, and the Random Select% is set to 50%, five wells, selected at random, will be sampled during the run.

Next button  - Opens the Setup Run Tab.

Select Standards Window

Use the Select Standards window to select the single standard for an AAV DN DNA or AAV Pico Protein assays.

- For AAV DN DNA or AAV Pico Protein assays, the single standard is sipped at the start of the run after the ladder and then after every 12 samples.

This window is only available for the following assays: AAV DN DNA or AAV Pico Protein. Click the **Select Standards** button on the Select Wells Tab to open the Select Standards window.

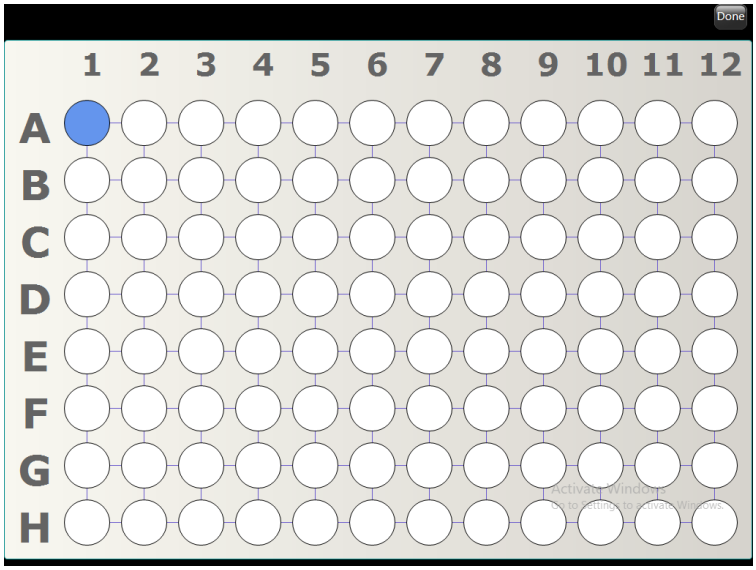


Figure 25. Select Standards Window for AAV Assays.

Select Standards Window (Continued)

Microplate diagram - Displays a 96-well or 384-well plate, based on the selected Plate Type in the Select Wells Tab. Touch the well location of the first standard. For AAV Empty-Full assays, only one standard is used.

Done button - Saves the selection and closes the Select Standards window.

Setup Run Tab

Use the Setup Run tab to specify the operator name, skip prime and skip warm options (ProteinEXact assays only), barcode options, data file options, auto export options, and auto print options. The Sample Names file, Expected Peaks file, and Excluded Peaks file are also selected on the Setup Run tab. To open the Setup Run tab, touch the **Next** button on the Select Wells Tab or touch the **Setup Run** tab on top of the Run Window.

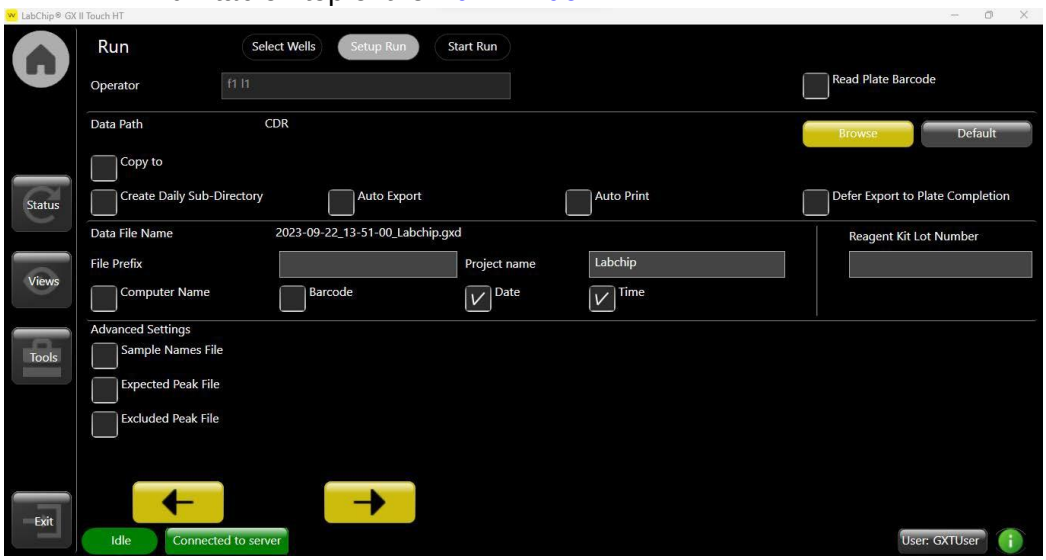


Figure 26. Setup Run Tab

The Setup Run tab contains the following options:

Operator text box - Specifies the name of the operator running the assay. The Operator Name is saved in the data file. If the LabChip GxP option is not installed, the Operator text box is optional. If the LabChip GxP option is installed, displays the first and last name of the current user and cannot be edited.

Skip Prime check box - Only displays if a ProteinEXact chip has been primed before the run. If selected, the priming process is not repeated.

Skip Warm check box - Only displays if a ProteinEXact chip has been warmed before the run. If selected, the warming process is not repeated.

Setup Run Tab (Continued)

Read Plate Barcode check box - Only displays if the instrument is equipped with a barcode reader. If selected, the LabChip GX Touch reads the customer-applied barcode on the short (portrait) end of the plate. The barcode is saved in the data file and can be used as part of the data file name.

Data Path - Specifies the location where the data file will be saved. To change the path, touch the **Browse** button. Create or select the specific folder for the new path and touch the **OK** button. If the LabChip GxP option is installed, data files are saved in folders in the CDR. Touch the **Default** button to restore the default data path.

NOTE

If the LabChip GxP option is not installed, data files should be saved to a local folder on the computer's hard drive. Saving data files to a network drive may cause loss of data if the network connection is slow or interrupted. If the LabChip GxP option is installed and the network connection is interrupted, data files are archived in a local folder and copied to the CDR when the network connection is restored.

Copy To check box - If selected, the data file is copied to the specified folder after the run is complete. To change the path, touch the **Browse** button. Touch the **Default** button to restore the default path.

Create Daily Sub-Directory check box - If selected, a new directory is created each day in the specified Data Path, and all of the data files from that day are saved in the directory. The directory name is the current date, and the format is YYYY-MM-DD, where YYYY is the year, MM is the month, and DD is the day.

Auto Export check box - If selected, data is automatically exported at the end of each run. Select the type of data to export by touching the **Tools** button and choosing the desired settings in the Export Setup Tab.

Auto Print check box - If selected, prints all exported data, except Raw Data, into a single PDF at the end of the run.

Defer Export to Plate Completion check box - If selected, all data from the run is exported at the end of the run instead of as each well is completed.

Setup Run Tab (Continued)

Data File Name text box - Read-Only text box that displays the selected format for the data file name. The file name components are added to the data file name in the order in which they are selected.

File Prefix text box - Specifies the text for the first characters of the data file name. (Optional)

Project Name text box - Specifies a project name to use in the data file name. (Optional)

Computer Name check box - If selected, adds the name of the LabChip GX Touch computer to the data file name.

Barcode check box - Only displays if the instrument is equipped with a barcode reader. If selected, the instrument reads the customer-supplied barcode on the short (portrait) edge of the microplate and includes the barcode in the data file name.

Date check box - If selected, the current date is included in the data file name. The date format is YYYY-MM-DD, where YYYY is the year, MM is the month, and DD is the day.

Time check box - If selected, the time that the run was started is included in the data file name. The time format is HH-MM-SS, where HH is the hour (00 to 24), MM is the minutes, and SS is the seconds.

Reagent Kit Lot Number - Specifies the Lot Number of the reagent kit. The lot number is saved in the data file. The Reagent Kit Lot Number can be entered in an alphanumeric 8-digit format. (Optional)

Sample Names File - If selected, specifies the file that will supply the Sample Names in the data file. Touch the **Browse** button next to Sample Names File, select the name of the CSV file that contains the sample names, and touch the **Open** button. The path and name of the file displays in the text box. Use the Sample Names Tab or Excel to create Sample Name files. See page 193 for more information about Sample Names files. To use the Sample Names file to select the wells to sample, see page 58. To select the sample names file using a plate barcode (if your instrument is equipped with a barcode reader), see page 60.

Setup Run Tab (Continued)

Expected Peak File - If selected, specifies the file that will supply the Expected Peaks for the data file. Touch the **Browse** button next to Expected Peaks File, select the name of the GEP file that contains the expected peaks, and touch the Open button. The path and name of the file displays in the text box. Use the LabChip GX Reviewer software to create the Expected Peak file. See Expected Peak File on page 186 for more information about Expected Peak files.

Excluded Peak File - If selected, specifies the file that will supply the Excluded Peaks for the data file. Touch the **Browse** button next to Excluded Peaks File, select the name of the GEP file that contains the excluded peaks, and touch the Open button. The path and name of the file displays in the text box. Use the LabChip GX Reviewer software to create the Excluded Peak file. See Excluded Peak File on page 186 for more information about Excluded Peak files.

The Setup Run tab contains the following buttons:

- **Back** - Opens the Select Wells Tab to change the selected wells or sampling options.
- **Next** - Opens the Start Run Tab.

Start Run Tab

Use the Start Run tab to review the settings for the run, and start the run if the settings are correct. To open the Start Run tab, touch the **Next** button on the Setup Run Tab or touch the **Start Run** button on top of the Run Window.

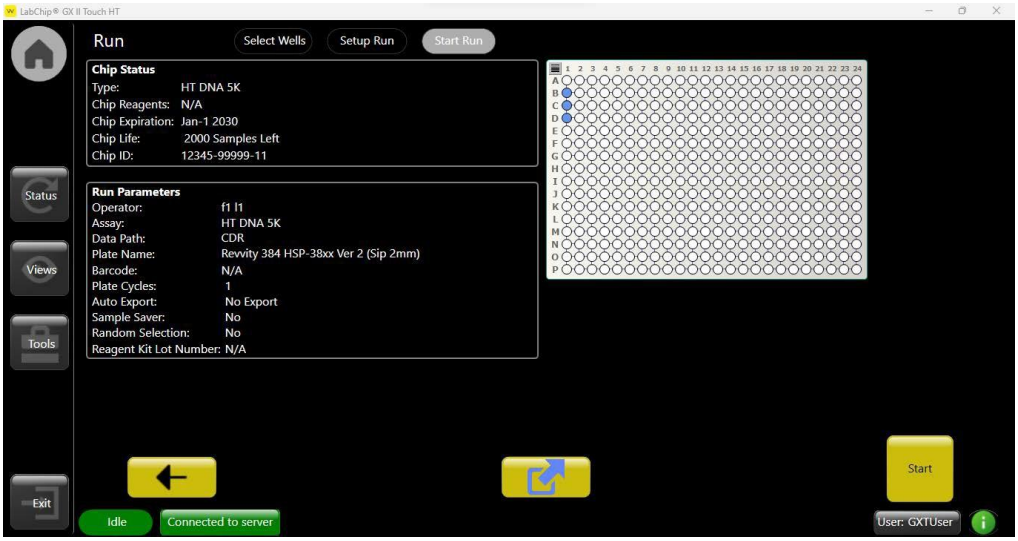


Figure 27. Start Run Tab

The Start Run Tab contains:

Chip Status - Displays the Assay Type, Chip Reagent Expiration, Chip Expiration date, Chip Life, and Chip ID.

- **Type** - Displays the type of chip in the instrument, or the assay type selected for the chip if the chip supports multiple assays.
- **Chip Reagents** - Displays the time and number of samples (whichever comes first) until the chip reagents expire. Reagent expiration depends on the chip type. The expiration time and number of samples reset whenever the front door is opened.
- **Chip Expiration** - The expiration date of the chip. The expiration date is stored on the RF ID tag on the chip.
- **Chip Life** - Displays the number of samples until the chip expires. Chip Life depends on the chip type.
- **Chip ID** - Displays a unique ID number that identifies the chip.

Run Parameters - Displays the settings selected on the Select Wells Tab and the Setup Run Tab.

Plate Diagram - The wells selected to read are blue. Wells that are not selected to read are white.

Start Run Tab (Continued)

Total Ladder Concentration text box - (ProteinEXact assays only) Type the total ladder concentration of the reagent into the text box.

Back button  - Opens the Setup Run Tab.

Export button  - Opens the **Save Run Parameters to File** window to export the current run settings to a run file (.xml).

Start button - Runs the plate using the current settings.

The Status Window opens to view the status of the run or priming and calibration.

Status Window

Use the Status window to view the status of a prime, instrument calibration, wash, or run while an operation is running or after the operation is complete. To open the Status window, touch the **Status** button on the Navigation Bar.

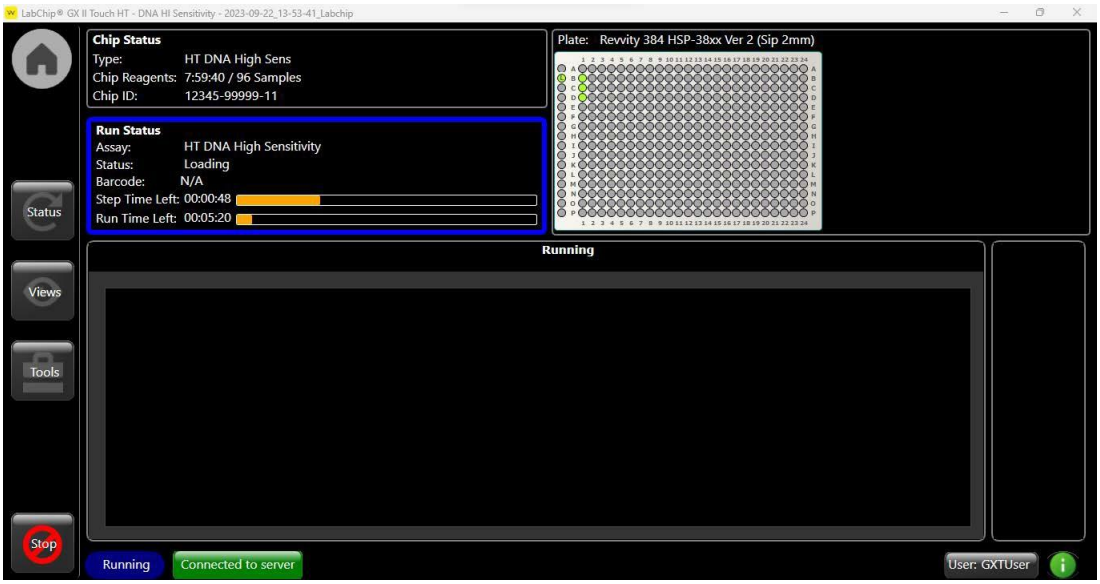


Figure 28. Status Window

The Status window displays the following information:

Chip Status - Displays the current status of the chip. The LabChip GX Touch automatically detects the chip type from an embedded RF ID tag in each chip.

- **Type** - Displays the type of chip in the instrument, or the assay type selected for the chip if the chip supports multiple assays.
- **Chip Reagents** - Displays the time and number of samples (whichever comes first) until the chip reagents expire. Reagent expiration depends on the type of chip inserted in the instrument. The expiration time and number of samples reset whenever the front door is opened.
- **Chip ID** - Displays a unique ID number that identifies the chip.

Prime/Calibrate Status (Protein Clear HR and ProteinEXact chips only) - Displays the status of the current or just completed prime and calibration.

Status Window (Continued)

- **Assay** - The name of the assay for which the instrument will be calibrated.
- **Status** - The current step of the operation in progress. For completed operations, displays the status of the last operation.
- **Step Time Left** - The time remaining until the current step in the priming/calibration completes.
- **Run Time Left** - The time remaining until the current run in the priming/calibration completes.
- **Maximum Calib. Time** - The maximum amount of time remaining until the priming/calibration completes.

Run Status - Displays the current status of the assay, prime, or wash that is currently running or about the last completed operation.

- **Assay** - The name of the assay that is running or that generated the displayed data.
- **Status** - The current step of the operation in progress. For completed operations, displays the status of the last operation.
- **Step Time Left** - The time remaining in the current step in the run.
- **Run Time Left** - The time remaining until the assay is complete.
- **Barcode** - Displays the barcode number if **Use Barcode** is selected in the Setup Run Tab. Displays **N/A** if **Use Barcode** is not selected in the Setup Run Tab.
- **Current Cycle** - Displays <CurrentPlateCycle>/ <TotalPlateCycle>, where CurrentPlateCycle is the number of the plate cycle currently executing and TotalPlateCycle is the total number of plate cycles specified in the Select Wells Tab. CurrentPlateCycle displays 0 during the priming and warming steps before reading the first well. Does not display if only one cycle is selected.

Plate Diagram - Displays the wells selected for the run in progress or the last completed run. Does not display for ProteinEXact chips.

- **Blue wells** - Well has been read.
- **Red exclamation point in wells** - An analysis error has occurred in the well, such as no lower marker detected.
- **Flashing green/orange** - Well reading is in process.
- **Green** - Well is selected for reading but not read yet.
- **Gray** - Well is not selected to be read.

Status Window (Continued)

Calibration Steps (ProteinEXact chips only) - Displays the status of the **Area Variability Test**, **Laser Calibration**, and **Verification** of the calibration. See Figure 29.

- **Flashing green/orange** - Calibration step is in process.
- **Green** - Calibration step is successful.
- **Gray** - Calibration step has not yet begun.
- **Red** - Calibration step has failed.

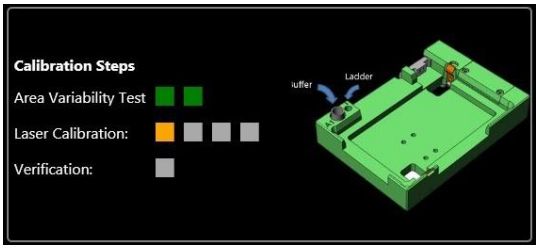


Figure 29. Calibration Steps for ProteinEXact

NOTE

If the ProteinEXact calibration steps do not display, restart the software and prime the chip.

Realtime Electropherogram of Well - Displays the electropherogram of the raw (unanalyzed) data of the well in progress during a run or prime/calibrate, or displays the last completed well. The Realtime Electropherogram does not show any peak labels or marker indicators. The labels and markers are identified after all data from the well is collected, and can be viewed in the EGram Tab in the Views Window.

Gel - Displays the Gel of the well in progress during a run or prime/calibrate, or the last completed well.

Tools Window

Use the Tools window to specify the data export settings, view or add plates, run the software IQ, run Diagnostics, and calibrate the optics. To open the Tools window, touch the **Tools** button on the Navigation Bar.

Figure 30. Tools Window

The Tools window contains the following tabs:

- Export Setup Tab
- Diagnostics Tab
- Optics Normalization Tab
- Plate Editor Tab
- Software IQ Tab
- Factory Access Tab
- Error Message Display

Export Setup Tab

Use the Export Setup tab to select the auto export options to automatically export data at the end of a run. To automatically export data, select the Auto Export check box on the Setup Run Tab. To open the Export Setup tab, touch the **Tools** button on the Navigation Bar and then touch the **Export Setup** button.

Peak Tables and Well Tables are exported to either CSV files or XML files. CSV files can be opened in a spreadsheet program such as Microsoft® Excel®. Raw Data can be exported to a CSV file, an XML file, or to a Chromatography Data Interchange Format file (formerly AIA), which is used by some graphical analysis software tools.

Figure 31. Setup Tab

The following tabs display at the top of the Export Setup tab:

- Export Settings Tab
- Peak Properties Tab
- Well Properties Tab

Export Settings Tab

The Export Settings tab contains the following options and buttons:

Export Folder

- Specifies the location to save the exported files. All files are saved in the same location. Touch the **Browse (...)** button to select the location for the exported files. Touch the **Default** button to restore the default path.

Export Selections

- **Export All** - If selected, the Peak Table, Well Table, Raw Data, Electropherogram, and Gel data are all exported.
- **Export as Single File** - If selected, the Raw Data, Peak Table, Well Table, and Gel options each generate one file that contains all the wells in the run. If not selected, the Raw Data, Peak Table, Well Table, and Gel options each export one file per well and the export occurs as soon as the well is completed (except for assays which use Bracketed ladders, in which case the export occurs when the bracket ladder well completes).
- **Peak Table** - If selected, the data in the Peak Table is exported to a CSV or XML file.
- **Well Table** - If selected, the data in the Well Table is exported to a CSV or XML file.
- **Raw Data** - If selected, the raw (unanalyzed) data from the run is exported to a CSV, XML or AIA (Chromatography Data Interchange Format) file.
- **Electropherogram -** If selected, a graph of each well is exported in the selected image format. The file names are <plate name>_Egram_<well number>.
- **Fluorescence Intensity** - If selected, a graph of each well is exported in the selected image format. The file names are <plate name>_Fluorescence Intensity_<well number>.
- **Gel -** If selected, the gels of each well are exported in the selected image format. The file names are <plate name>_Gel_<well number>.
- **Height (pixels)** - If Gel is selected, specifies the height, in pixels, of the exported gel graphic.
- **File Naming Template** - The template for naming the data files. All exported data files use the same names. Type in the text box or add wildcard variables.

Export Settings Tab (Continued)

- **Wildcards drop-down list** - Select predefined variables to add to the name of the data files: %DATA% = datafile name, %LABEL% = well label, %NAME% = well name, %TYPE% = export type (gel, egram, etc.), %COMMENT% = user comments. When a single file for the plate is exported, the %NAME% and %LABEL% fields are blank, and any leading, trailing or duplicate separators are removed.

  The %DATA%, %TYPE%, and at least one of %NAME% or %LABEL% must be included in the template to ensure file names are unique across export types. The template will appear in Red letters if it fails to meet the minimum requirements and will not be saved.
- **Insert button** - Inserts the text selected in the Wildcard drop-down list at the cursor position in the File Naming Template text box. Each wildcard can only be inserted once in the template.

Raw Data Options

- If the **AIA Format** check box is selected, the raw data is exported to a file in the Chromatography Data Interchange Format (formerly AIA). (Include Size Data and Export as Single File are not available.)
- If the AIA Format check box is NOT selected, the raw data is exported to a CSV or XML file as specified in the File Format for Peak Table, Well Table, and Raw Data.
- If the **Include Size Data** check box is selected, the data is aligned to the well's ladder (for one file per well) or to the first well (for a single data file) and the size data is included in the exported data. If not selected, the data is not aligned to a ladder.

File Format for Peak Table, Well Table, and Raw Data

- Select the desired format for the exported data files. If CSV is selected, select the desired symbol to use to separate the data in the **CSV Delimiter** drop-down list.

File Format for Gel and Electropherogram (or Fluorescence Intensity)

- Select the desired format for the exported image files.

Peak Properties Tab

Use the Peak Properties tab to select the columns to export in the Peak Table if Peak Table is selected in the Export Settings Tab in the Tools Window. The columns available for export do not display until after the run is started.

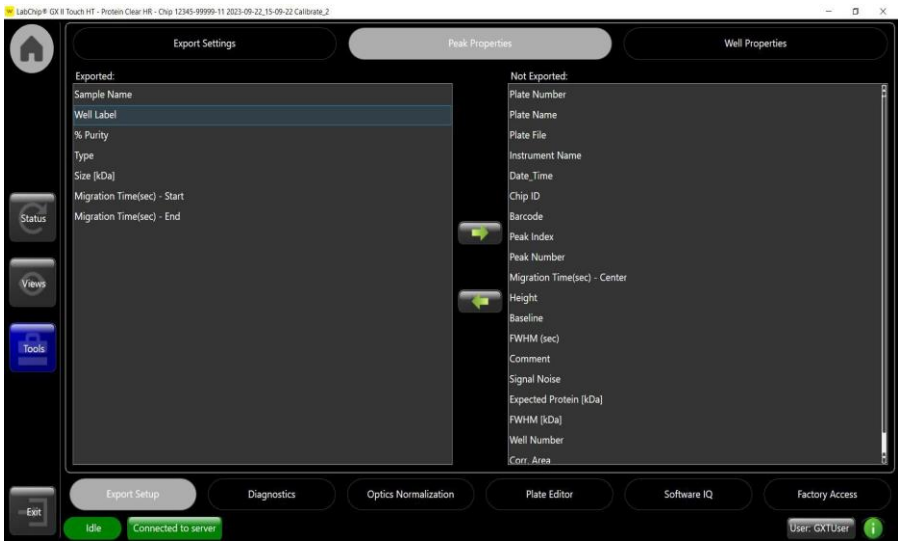


Figure 32. Peak Properties Tab

Not exported list box - Lists the columns in the Peak Table that are not included in the Exported Peak Table. The columns available depend on the type of assay that generated the data.

Exported list box - Lists the columns in the Peak Table that will be included in the exported Peak Table.

Left and Right arrow buttons - Move the highlighted table column to the Not exported or exported list boxes.

Well Properties Tab

Use the Well Properties tab to select the columns to export in the Well Table if Well Table is selected in the Export Settings Tab in the Tools Window. The columns available for export do not display until after the run is started. Note: Only the properties appropriate for the assay type are available for export.

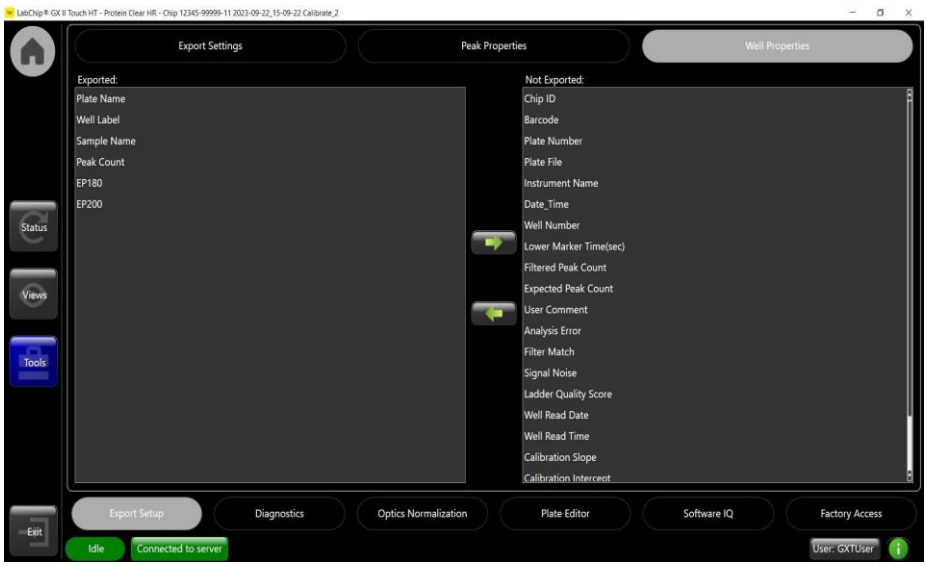


Figure 33. Well Properties Tab

Not exported list box - Lists the columns in the Well Table that are not included in the exported Well Table. The columns available depend on the type of assay that generated the data.

Exported list box - Lists the columns in the Well Table that will be included in the exported Well Table.

Left and Right arrow buttons - Move the highlighted table column to the Not exported or exported list boxes.

Diagnostics Tab

Use the Diagnostics tab to run the diagnostics tests on the LabChip GX Touch or GXII Touch instrument. All tests should be run periodically to verify proper operation of the instrument. To verify a particular function, select specific tests to run. To open the Diagnostics Tab, touch the **Tools** button on the Navigation Bar, and then touch the **Diagnostics** button

Figure 34. Diagnostics Tab

The left side of the tab displays the tests to run on the instrument. Expand each section to view all of the tests in each section. Tests selected with a check mark will run. To skip a test, touch the check box to clear the selection. Touch a section check box to select or clear all of the tests in the section.

The right side of the tab displays the results of the tests. The icon color indicates the status of each test:

- **Blue** - The test is in progress.
- **Yellow** - The test was skipped.
- **Green** - The test passed.
- **Red** - The test failed or was aborted.

Diagnostics Tab (Continued)

Run Tests button - Runs the selected tests (marked with a check mark). After all tests are complete, the **Test Report Generation** section on the right side of the tab displays the date and time when the test report was created, the name of the test report (*.log), and the location where the test report was saved. Test report files can be opened with a text editor such as Windows Notepad.

Abort button - Stops the tests in progress. Only enabled when tests are running.

Limits Report button - Generates a report of test limits. After the report is generated, the **Limits Report Generation** section at the bottom of the right side of the tab displays the date and time when the limit report was generated, the name of the limits report, and the location where the limits report was saved.

Print button - Opens the **Print Diagnostic Logs** window to print the selected report. The view of the report can be changed with the **Page Mode button, Two Page Mode button, Scroll Mode button**, and **Zoom** controls at the bottom of the right side of the tab.

Print Summary button - Opens the **Print Diagnostic Summary** window to print a summary of the selected test results.

The bottom of the window displays the status, an overall progress bar for the entire set of selected tests and a separate test progress bar for the test that is currently running.

Optics Normalization Tab

Use the Optics Normalization Tab to calibrate the instrument using Test Chip C as the calibration standard.To open the Optics Normalization Tab, touch the **Tools button** on the Navigation Bar and then touch the **Optics Normalization** button.

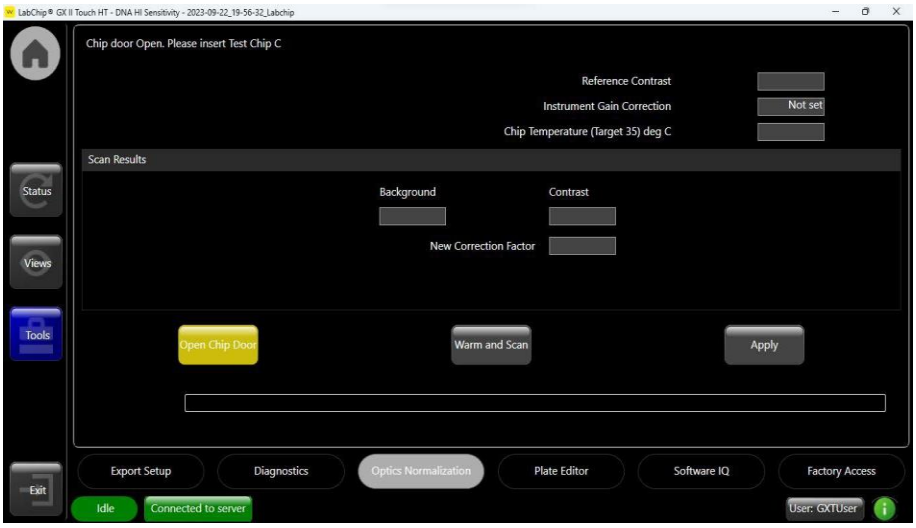


Figure 35. Optics Normalization Tab

The Optics Normalization Tab contains the following options and buttons:

Reference Contrast - The Contrast value from Test Chip C that will be compared to the scan results Contrast.

Instrument Gain Correction - The current correction factor for the instrument.

Chip Temperature (Target 35) degC - The current temperature of the chip. The chip is warmed to the target temperature to more accurately calibrate the optics.

Background - The background measured on the current instrument after focusing.

Contrast - The contrast measured on the current instrument.

New Correction Factor - The correction factor calculated from the instrument (Reference Contrast / Scan Results Contrast).

Optics Normalization Tab (Continued)

Open Chip Door button - Opens the front door to insert Test Chip C.

Warm and Scan/Scan/Abort button:

- **Warm and Scan** - Warms up the chip and laser, focuses the optics, and measures the optical contrast.
- **Scan** - Scans without the warmup (available only after a scan is complete or aborted, while laser and chip are still warmed up).
- **Abort** - Stops the scan or warm currently in progress.

Apply button - Saves the New Correction Factor to the instrument's non-volatile flash memory.

Plate Editor Tab

Use the Plate Editor tab to view, add, or change plate names and measurements. To open the Plate Editor tab, touch the **Tools** button on the Navigation Bar and then touch the **Plate Editor** button.

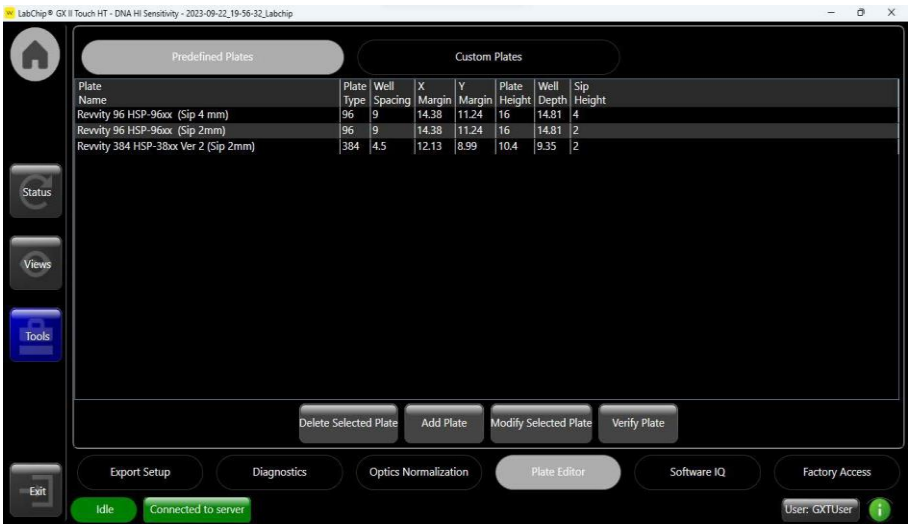


Figure 36. Plate Editor Tab

The following tabs display at the top of the Plate Editor tab:

- **Predefined Plates Tab** - Displays Revvity-defined plates. These plates are read-only and cannot be edited or deleted.
- **Custom Plates Tab** - Displays all user-created plates. Plates can be added, deleted, and modified.

Plate Editor Tab (Continued)

The Plate Editor tab contains the following options and buttons:

Plate Information table - Displays the plate information for each plate defined for use in the system. (See Add Plate Window for a description of each column.)

Delete Selected Plate button - Deletes the selected plate from the system. (Only available when a plate is selected on the Custom Plates tab.)

Add Plate button - Opens the Add Plate Window to enter the information for a new plate. (Only available when the Custom Plates tab is selected.)

Modify Selected Plate - Opens the Modify Plate Window to edit the information for the selected plate. The Modify Plate Window contains the same options as the Add Plate Window. (Only available when the Custom Plates tab is selected.)

Verify Plate button - Opens the Verify Plate window to perform a puncture test using the selected plate information. Follow the instructions in the Verify Plate window to test the settings for the selected plate.

Add Plate Window

Use the Add Plate window to add new plates to the system. To open the Add Plate window, touch the **Add Plate** button on the **Custom Plates Tab** on the Plate Editor Tab.

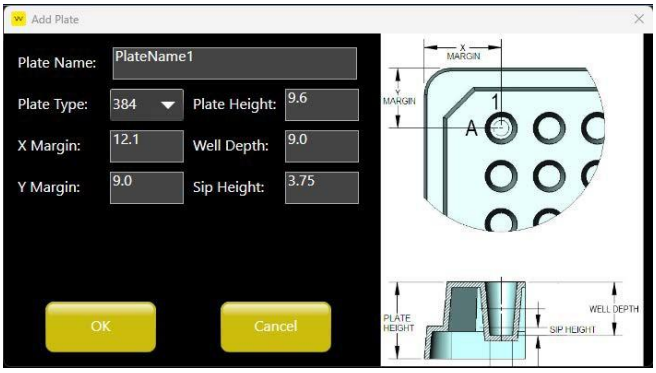


Figure 37. Add Plate Window

The Add Plate window contains the following settings:

Plate Name - Specifies the plate name that displays in the Start Run Tab.

Plate Type - Specifies the number of wells in the plate, either 96 or 384.

X Margin - The distance from the outer edge of the plate to the center of well A1 in the X direction.

Y Margin - The distance from the outer edge of the plate to the center of well A1 in the Y direction.

Plate Height - The distance from the bottom of the plate to the top of the plate.

Well Depth - The distance from the top of the plate to the bottom of the well.

Sip Height - The distance from the bottom of the well to the bottom of the sipper when the sipper is positioned to sip sample from the well.

Software IQ Tab

Use the Software IQ tab to perform the IQ test. The IQ test verifies proper installation of the LabChip GX Touch software and verifies no unauthorized changes have been made to the software. To open the Software IQ tab, touch the **Views** button on the Navigation Bar and then touch the **Software IQ** button.

The following tabs display at the top of the Software IQ tab:

- Run IQ Tab
- Detailed Result Tab

Run IQ Tab

Use the Run IQ tab to run the IQ test, view the Pass/Fail status of the test, and preview the results of the test.

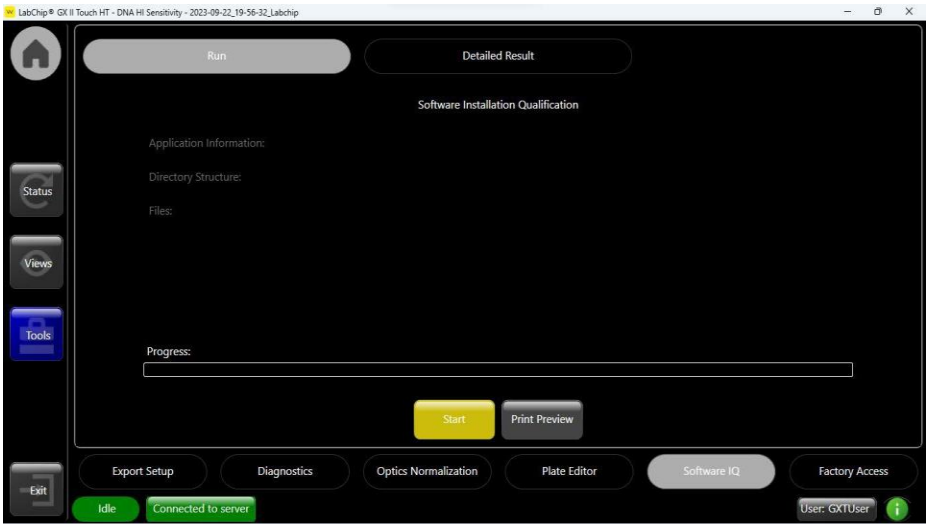


Figure 38. Run IQ tab

The Run IQ tab runs the following tests:

Application Information - Verifies that the LabChip GX Touch Registry Entries exist. If all expected registry entries are found, displays Passed. If any registry entries are missing or have been changed, displays Failed.

Directory Structure - Verifies that all original software folders exist. If all expected folders exist, displays Passed. If any folders are not found, displays Failed.

Run IQ Tab (Continued)

Files - Verifies that all files that were installed by the LabChip GX Touch software still exist. If all file exist and have not been modified, displays Passed. If any files are not found or have been modified, displays Failed.

Progress - Displays a progress bar while the IQ test is running.

Summary - Displays Passed if all tests passed. Displays Failed if any of the IQ tests failed.

Start button - Begins running the IQ.

Print Preview button - Creates a one page summary report that can be printed. Also includes export options to export the summary to Excel, PDF, or Word.

Detailed Result Tab

Use the Detailed Result tab to display the details of the Software IQ tests after the IQ has been completed. The detailed results are only available until the software is closed or another IQ test is run.

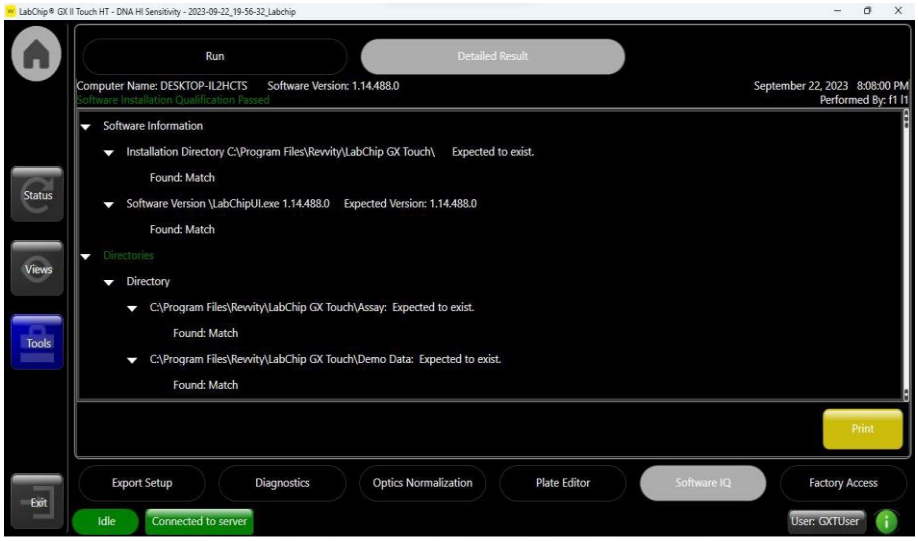


Figure 39. Detailed Result Tab

The Detailed Result tab contains the following buttons:

Print button - Opens the Print window to print the detailed Software IQ report.

Factory Access Tab

Used by Revvity Field Service Engineers. Only for use by qualified Service Engineers.

Error Message Display

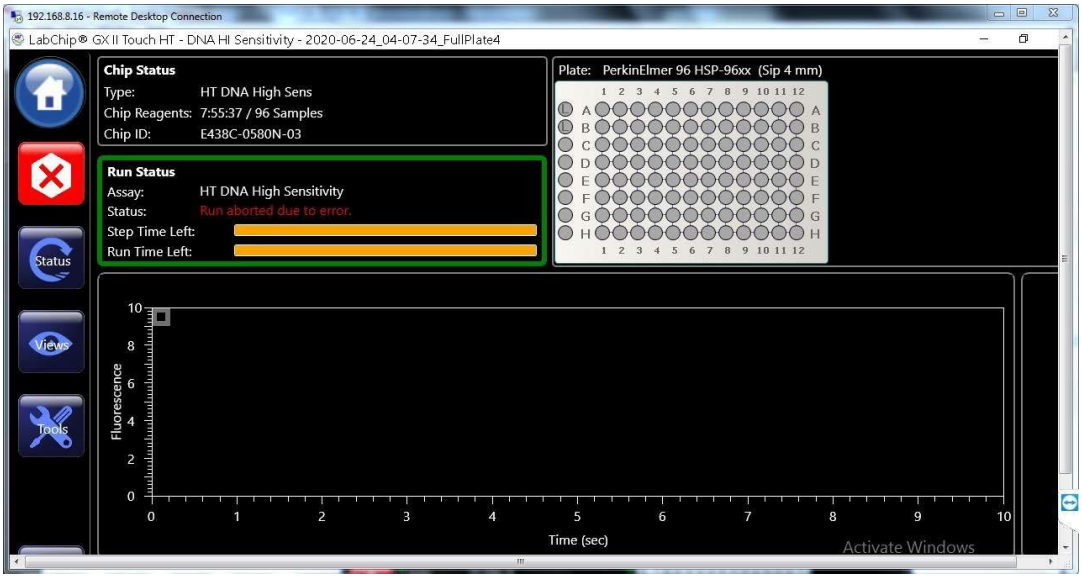


Figure 40. Error Messages

Error messages display at the bottom of the Home Window and an Error or Warning button displays on the Navigation Bar. Touch the Error or Warning button to display the event in the EventLog Tab.

Error messages can result from hardware or software problems. Most are the result of peaks not being located by the analysis algorithms of the software. This can be due to a sample or ladder peak not appearing as expected. The software settings can also cause peaks to be undetected, which can cause errors.

See Error Messages on page 162 for a list of errors and tips on preventing or resolving errors.

Unlock Application Window

Use the Unlock Application window to unlock the LabChip GX Touch software after it automatically locks or after the software is locked by the current user. The Unlock Application Window displays on top of the LabChip GX Touch software when the software is locked. (The automatic lock option is set in the LabChip GX Reviewer software.) The Unlock Application window only displays if the LabChip GxP option is installed.

Figure 41. Unlock Application Window

The Unlock Application Window contains the following options:

User name - The current user name. If the current user's password is not available, type a LabChip GX Touch administrator's user name to unlock the software and log the current user out.

Password - The password for the specified user name.

Logon button - Verifies the user name and password, and opens the LabChip GX Touch software if the user name and password are valid.

Views Window

Use the Views window to view data from completed wells in a run or calibration in progress, or in previous completed runs or calibrations. The data can be viewed and some of the Analysis Settings can be changed in the GX Touch software. To control all of the Analysis Settings, open the GXD file in LabChip Reviewer.

To open the Views window, touch the **Views** button on the Navigation Bar.

The Views window contains the following tabs:

- Select Wells to View Tab on page 118
- Egram/Gel Tab on page 120
- EGram Tab on page 121
- Gel Tab on page 125
- Fluorescence Intensity/Well Table Tab on page 128
- Fluorescence Intensity Tab on page 129
- Run Info Tab on page 130
- EventLog Tab on page 133
- Sample Names Tab on page 134
- Analysis Settings Tab on page 137

Select Wells to View Tab

Use the Select Wells to View tab to select the wells to view in the graphs in the Egram/Gel Tab and EGram Tab. Select the Overlay check box to select multiple wells. To open the Select Wells to View Tab, touch the **Views** button on the Navigation Bar and then touch the **Select Wells** button.

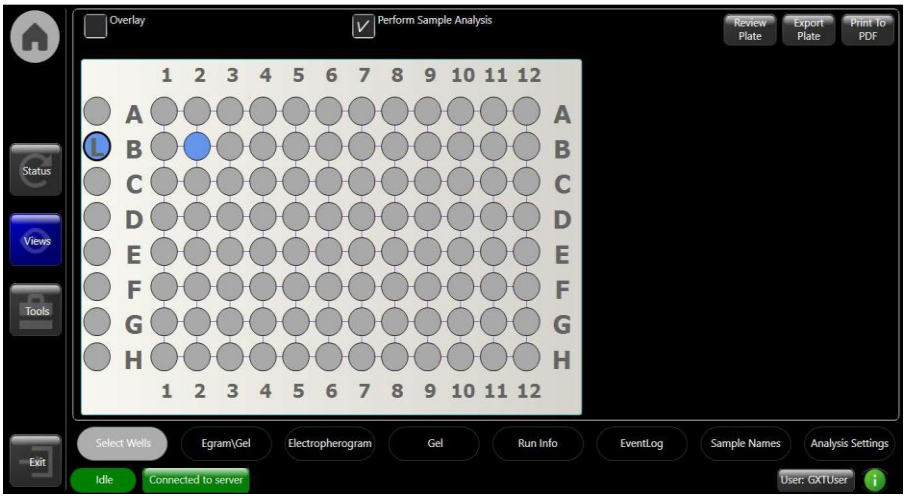


Figure 42. Select Wells to View Tab

Overlay check box - If selected, multiple wells can be selected for view. If not selected, only a single well can be selected for view.

Cycle - If Plate Cycles is greater than one, displays the cycle of the selected well. Does not display if Plate Cycles equals one.

Perform Sample Analysis check box - If selected, the analyzed data displays in the Egram/Gel Tab, EGram Tab, and Gel Tab. If not selected, the raw data displays.

Review Plate button - Opens a data file to view the data. If a data file is already open, touch the OK button in the Review Plate window to clear the current plate data. Select the desired data file to open in the Select a Data File window and then touch the Open button.

Select Wells to View Tab (Continued)

Export Plate button - Exports the plate data using the settings in the Export Settings Tab in the Tools Window. If Peak Table or Well Table are selected for export, the exported table columns are selected in the Export Setup Tab in the Tools Window.

Print to PDF button - Opens a Save Print Data to PDF File window to save the plate data selected on the Export Settings Tab as a single PDF.

Plate Diagram - Select the desired wells to view in the Egram/Gel Tab, EGram Tab, and Gel Tab. Touch a well to select it. The status of the well is indicated by the color displayed in the plate diagram as shown below.

Well Color

- **Blue** -Wells were read.
- **Gray** - Wells were not read.
- **Black Outline** - Wells are selected for Overlay view in the Egram/Gel Tab, EGram Tab, and Gel Tab ..
- **Red Exclamation Point in Well** - An analysis error has occurred in the well, such as no lower marker detected.
- **Black Exclamation Point in Well** - An analysis warning has occurred in the well.
- **S in Well** - For AAV DN DNA or AAV Pico Protein assays, the Standard sipped at the start of the run and after the first 12 samples.
- **L in Well** - The Ladder sipped based on the assay type.

Egram/Gel Tab

Use the EGram/Gel tab to view the electropherogram and gel of analyzed well data after a well is complete. To change the view in the EGram/Gel tab, see Viewing Data in the Egram/Gel Tab on page 51. To open the Egram/Gel tab, touch the **Views** button on the Navigation Bar and then touch the **Egram/Gel** button.

Figure 43. Egram/Gel Tab

The Egram/Gel tab contains:

Overlay check box - If selected, multiple graphs display in the electropherogram. Select the desired wells by touching a gel at the bottom of the tab or selecting the well in the Select Wells to View Tab. If Overlay is selected, the foremost graph is the last well selected. To bring a graph to the front, touch the gel at the bottom of the tab. The Overlay legend displays the well number and the sample name of the wells, with the front graph at the top of the list.

Scale to Sample Peaks check box - If selected, scales the view to the minimum and maximum X values of the current sample peaks. Marker and/or system peaks are ignored. (If Overlay is selected, the view scales to the sample peaks in the most recently selected well.) If not selected, scales the view to the minimum and maximum X values of all peaks, including marker peaks and system peaks.

Graph - Displays the graph of one or more wells. To change the graph settings, use the Graph Settings on the EGram Tab.

Gel - Displays a gel of each well in the run. To change the gel view settings, use the Gel Settings on the Gel Tab.

EGram Tab

The EGram Tab is a visual representation of the data from each well as an electropherogram. A single well or multiple wells can be viewed in the EGram tab.

Use the EGram Tab to view data from completed wells. To change the view in the EGram tab, see Viewing Graphs in the Egram Tab on page 52. To open the EGram tab, touch the **Views** button on the Navigation Bar and then touch the **EGram** button.

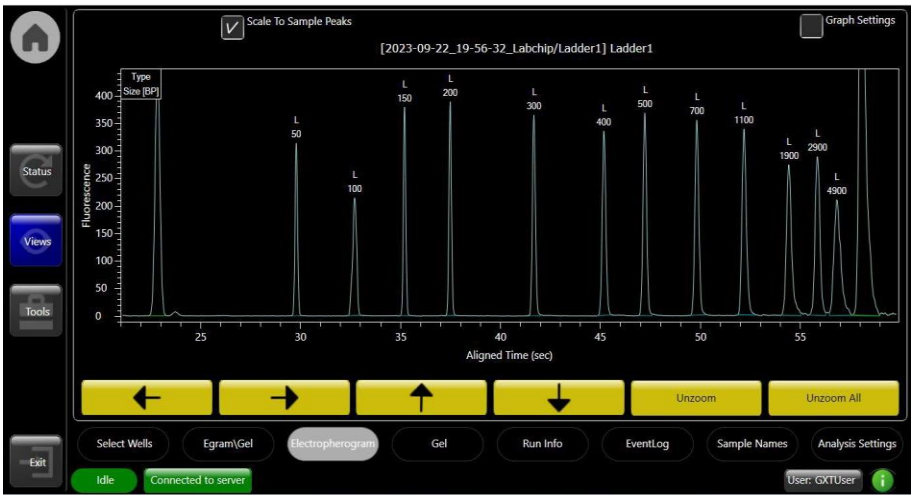


Figure 44. EGram Tab

Touch and drag over a region on the electropherogram to zoom in. Touch the Unzoom button or the Unzoom All button to zoom out.

Graph data can be exported to a graphic file at the end of the run by choosing **Auto Export** on the Setup Run Tab. (See Defining the Run Parameters on page 31 for details.)

To show or change the labels on the peaks in the graph, show the data points on the graph, show peak baselines, show smears, or change the graph colors, see Graph Settings on page 123.

While a run or calibration is in progress, the Status Window displays the raw (unanalyzed) data as it is being read from the chip.

EGram Tab (Continued)

The EGram tab contains the following options and buttons:

Scale to Sample Peaks check box - If selected, scales the view to the minimum and maximum X values of the current sample peaks. Marker and/or system peaks are ignored. If not selected, scales the view to the minimum and maximum X values of the all peaks, including marker peaks and system peaks.

Graph Settings check box - If selected, displays graph view options for the EGram tab and the graph in the EGram/Gel tab. See Graph Settings for a description of each option.

Data File Name/Well Name- The data file name and well name display above the graph. If Overlay is selected, and data from multiple wells is selected, only the Data File Name displays.

Left button - Moves the selection one well to the left of the current well.

Right button - Moves the selection one well to the right of the current well.

Up button - Moves the selection one well above the current well.

Down button - Moves the selection one well below the current well.

UnZoom button - Zooms out to the previous zoom level.

Unzoom All button - Zooms out and returns to the standard view.

Graph Settings

To change the settings for the graph displayed in the Egram/Gel Tab or the EGram Tab, select the **Graph Settings** check box on the right side of the EGram Tab.

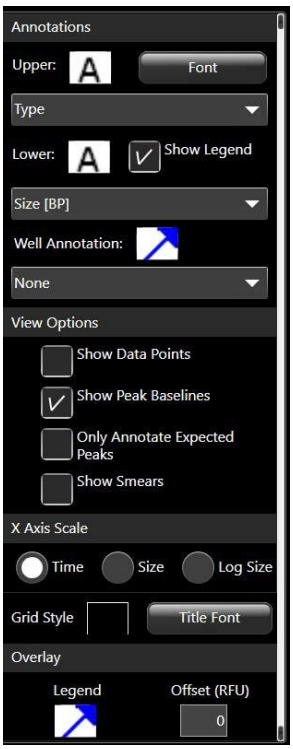


Figure 45. Graph Settings

The graph settings contain the following options:

Annotations

- **Text Orientation (A) buttons** - Specifies the orientation of the text for the upper or lower annotation: horizontal, vertical up, or vertical down.
- **Font button** - Opens the Font window to choose the font, style, and size of the text for the upper or lower annotations.
- **Upper drop-down list** - Labels each peak in the graph with the peak property selected from the drop-down list. Default is Type.
- **Show Legend check box** - If selected, the annotations legend displays in the upper left corner of the graph.
- **Lower drop-down list** - Labels each peak in the graph with a peak property selected from the drop-down list. Default is None.

- **Well Annotation Location button (arrow)** - The location of the well annotation. Touch the button to change the location: upper right, upper left, lower right, lower left, or hidden.
- **Well Annotation drop-down list** - Displays the selected well property above or below the graph.

View Options

- **Show Data Points check box** - If selected, displays a dot on the graph at the location of each data point.
- **Show Peak Baselines check box**- If selected, displays the baseline for each peak on the graph.
- **Only Annotate Expected Peaks check box** - If selected, only the peaks that are labeled as Expected Fragments, Expected Proteins or Expected Glycans display the annotations. If not selected, all peaks display the annotations.
- **Show Smears check box** - If selected, displays smears as a colored line on the trace and displays the smear baseline. This option only displays if smears are defined in the assay file.

X Axis Scale

- **Time radio button** - If selected, the unit displayed on the X Axis is time.
- **Size radio button** - If selected, the unit displayed on the X Axis is size.
- **Log Size radio button** - If selected, the unit displayed on the X Axis is size on a logarithmic scale.
- **Grid Style check box** - Displays grid lines on the graph: vertical, horizontal, both, or none. Touch the button to cycle through the grid options.

Overlay

- **Overlay Legend button** - If multiple wells are displayed in the EGram tab, specifies the location where the legend displays on the graph. The legend shows the color used for each well.
- **Overlay Offset text box**- Offsets each of the graphs on the X axis, by the RFU value specified.

Gel Tab

The Gel Tab is a visual representation of the data formatted to look like the Gel slabs that were originally used to perform electrophoretic separations. The data is shown in Time vs. Fluorescence (or digital form).

Touch a gel lane (well) to select the well. Selected wells are outlined with a dotted gray line. Wells selected in the Gel view are also selected in the Select Wells to View Tab, Egram/Gel Tab, and Gel Tab.

To open the Gel Tab, touch the **Views** button on the Navigation Bar and then touch the **Gel** button.

Figure 46. Gel Tab

For DNA assays, the upper and lower markers of all wells are aligned to the upper and lower markers of the first well in the Gel tab. For Protein and RNA assays, the lower markers of all wells are aligned to the markers of the first well in the Gel tab.

The wells selected in the Gel tab are synchronized with the wells selected in the Select Wells to View Tab, Egram/Gel Tab, and EGram Tab.

Gel Tab (Continued)

You can drag-and-drop the gel lanes to change the order of the wells for comparing two or more gel wells. To drag-and-drop a gel lane, touch the header of the lane to be moved and drag the gel lane to the desired location.

Double-tap the Gel tab to zoom out to the previous zoom level.

To change the Lane Width, Gel Contrast Range, or Gel Color, see Gel Settings.

The Gel tab contains the following options:

Overlay check box - If selected, multiple wells can be selected in the Gel tab. Touch each gel lane to select the well. The same wells are selected on the Select Wells to View Tab, Egram/Gel Tab, and EGram Tab.

Gel Settings check box - If selected, displays the gel display options for the Gel tab. See Gel Settings for a description of each option.

Gel Settings

To view the Gel Settings, select the **Gel Settings** check box on the right side of the Gel Tab.

Figure 47. Gel Settings

The following properties can be set for the Gel tab:

Lane Width - Sets the width of the gels. Select the **Auto Fit** check box to have the software automatically fit all the data, or use the slider to manually set the width.

Contrast Range - Sets the minimum and maximum Gel Band Contrast for the bands in each well. Use the sliders or type the value in the text box to change the min and max values.

Gel Colors - Touch the Foreground color or the Background color to open the Color window to choose the desired colors for the gel.

Marker Display Colorize check box - If selected, the marker bands in each well are colored. If not selected, the marker bands display in the selected Foreground color.

Lane Label Font button- Opens the Font window to change the font, style, and size of the labels in the gel headers.

Run Info Tab

Use the Run Info tab to review or print information about the last completed run or calibration. To open the Run Info Tab, touch the **Views** button on the Navigation Bar and then touch the **Run Info** button.

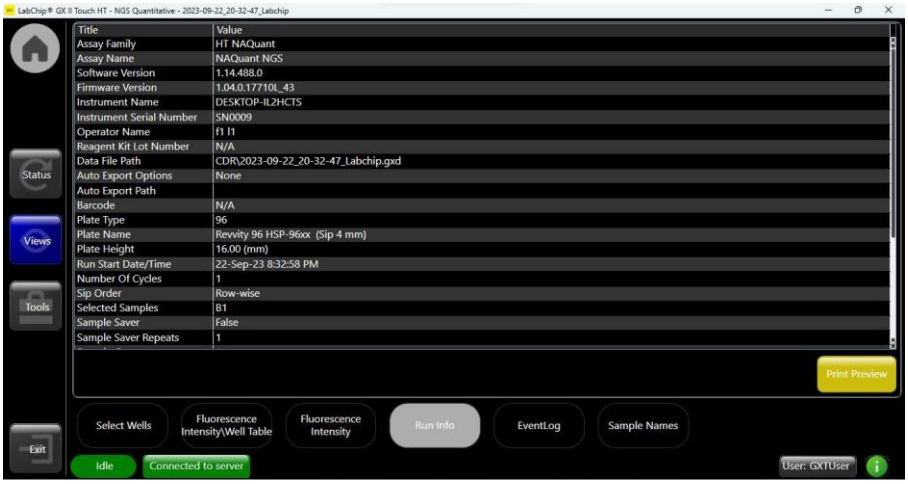


Figure 48. Run Info Tab

The Run Info tab contains the following information:

Assay Family - The assay family selected for the chip (selected when the chip is inserted in the instrument).

Assay Name - The name of the assay that was run on the plate.

Software Version - The version of LabChip GX Touch software that was used to run the plate.

Firmware Version - The version of firmware on the instrument that was used to run the plate.

Instrument Name - The name of the instrument that was used to run the plate and create the data file.

Instrument Serial Number - The serial number of the instrument that was used to run the plate.

Operator Name - The name of the operator, if specified.

Reagent Kit Lot Number - The lot number of the reagent kit that was used to run the plate. Displays N/A if the Reagent Kit Lot Number was not entered.

Data File Path - The location where the data file was saved during the run.

Run Info Tab (Continued)

Auto Export Options - Displays **AutoExport** if the Auto Export check box was selected on the Setup Run Tab. Displays **AutoPrint** if the **Auto Print** check box was selected on the Setup Run Tab. Displays **AutoExport and AutoPrint** if the Auto Export and Auto Print check boxes were selected on the Setup Run Tab. Displays **AutoExport deferred to plate completion and AutoPrint** if the Auto Export, Auto Print and Defer Export to Plate Completion check boxes were selected for the run.

Auto Export Path - Displays the path to the exported data if Auto Export was selected.

Barcode - The barcode if a barcode was read. Displays “N/A” if no barcode was read.

Plate Type - The number of wells in the plate, either 96 or 384.

Plate Name - The plate name selected in the Setup Run Tab.

Plate Height - The distance from the bottom of the plate to the top of the plate.

Run Start Date/Time - The date and time that the run was started.

Number of Cycles - The number of times to repeat the assay on the plate.

Sip Order - Column-wise or row-wise as selected on the Select Wells Tab.

Selected Samples - List of the wells selected in the run.

Sample Saver - Displays True if Sample Sips was greater than one for the run, and False if Sample Sips was one.

Sample Saver Repeats - The number of sample sips selected.

Sample Count - The number of samples processed in the run.

Well Spacing - The distance between wells on the plate.

Well Depth - The distance from the top of the plate to the bottom of the well.

Sip Height - The distance from the bottom of the well to the bottom of the sipper when the sipper is positioned to sip sample from the well.

X Margin - The distance from the outer edge of the plate to the center of well A1 in the X direction.

Run Info Tab (Continued)

Y Margin - The distance from the outer edge of the plate to the center of well A1 in the Y direction.

Chip ID - The ID number of the Chip used to run the plate.

Chip Expiration Date - The date when the chip expires.

Chip Remaining Samples - The number of samples that the chip can process before reaching the maximum number of samples.

Chip Last Prime Date/Time - The date of the last prime for the chip.

Chip Prime Count - The number of times the chip has been primed.

The following information on the Run Info Tab applies only to **Protein Clear HR assays**:

- **Calibration Iterations** - The number of attempts made to complete the last phase of the calibration (i.e., Final Percent Purity Obtained).
- **Calibration Ladder EP Mobility** - The mobility of the 120 kDa ladder peak during calibration.
- **Calibration Final DSR Applied** - The Final DSR applied during instrument calibration.
- **Final Percent Purity Obtained** - The ratio of the corrected areas of the 180 kDa and 200 kDa peaks in the calibration standard sample.
- **Calibration Max DSR Tested** - The maximum DSR tested during calibration.
- **Calibrated I0** - The current applied to electrode 0 on the chip during the separation portion of the sample processing.
- **Calibrated I2** - The current applied to electrode 2 on the chip during the separation portion of the sample processing.
- **Calibrated I6** - The current applied to electrode 6 on the chip during the separation portion of the sample processing.
- **Calibrated V7** - The current applied to electrode 7 on the chip during the separation portion of the sample processing.

EventLog Tab

Use the EventLog tab to view events and errors that occur during the current run or calibration, or during a previous run or calibration. To open the EventLog tab, touch the **Views** button on the Navigation Bar and then touch the **EventLog** button.

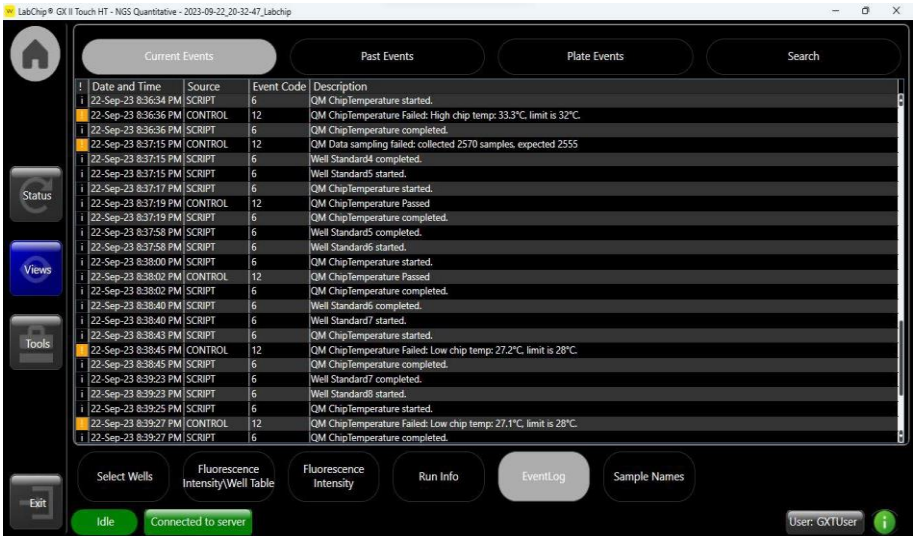


Figure 49. EventLog Tab

The following tabs display at the top of the EventLog tab:

- **Current Events Tab** - Displays the events that occurred during the current session.
- **Past Events Tab** - Displays all events from all previous sessions. If more than 10,000 events occurred, scrolling controls for Page Up (earlier events) and Page Down (later events) display.
- **Plate Events Tab** - Displays the plate events that occurred during the run of that plate.
- **Search Tab** - Use to search for specified text in past events, current events, plate events, or all events.

The tables on the EventLog tabs contain the following columns:

- **Date** - The date and time the event or error occurred.
- **Source** - The system component that generated the event or error.
- **Event Code** - The event/error ID number used by Revvity to troubleshoot errors.
- **Description** - Text describing the event or error.

Sample Names Tab

Use the Sample Names tab on the Views Window to modify sample names during the run, import a Sample Names file before a run, create blank 96 and 384 Sample Names files, and export a Sample Names file in CSV format. To open the Sample Names tab, touch the **Views** button on the Navigation Bar and then touch the **Sample Names** button.

Figure 50. Sample Names Tab

The Sample Names tab contains:

Row Order option button - If selected, the rows in the table are in order by row letter and then by column number (A1, A2, A3, etc.)

Column Order option button - If selected, the rows in the table are in order by column number and then by row letter (A1, B1, C1, etc.)

Sample Names Tab (Continued)

By Quadrant check box - If selected, the Sample Names in the table are arranged by quadrant, and then in row or column order within each quadrant.

Add Size check box - If selected, the Size column is added to the Sample Names Table.

Add Dilution check box - If selected, the Dilution column is added to the Sample Names Table.

Sample Name Table - Displays the Well Label, Sample Name and User comment for each well in the plate that is running, the plate that is open for review, or the imported Sample Names file.

- **Well Label column** - Displays the well label for each well.
- **Sample Name column** - Displays the sample names, either default names or names from an open Sample Names file. Sample Names can be edited until the well read is complete. The Sample Name is disabled after the well is read.
- **User Comment** - Displays a comment for the well. User comments can be edited until the well read is complete. The User Comment is disabled after the well is read.
- **Size** - The size of the dsDNA in BP (Base Pairs).
- **Dilution** - The dilution factor of the samples. (Current concentration x Dilution Factor = original concentration)

Import button - Opens the selected Sample Names file (*.CSV). If a run is in progress, touch the Apply button to use the sample names and user comments for any wells that have not been completed.

Export button - Saves the current sample names and user comments to a Sample Names file (*.CSV) with the specified file name. The sample names are saved in the file in the same order as displayed in the table.

Blank 96 Wells button - Opens a blank Sample Names file with 96 wells.

Blank 384 Wells button - Opens a blank Sample Names file with 384 wells.

Sample Names Tab (Continued)

Apply button - Applies the changes in the table to the currently running plate. (If a Sample Names file was used to supply the sample names, the Sample Names file is not updated. Only the sample names for the run are updated.) Changes on the Sample Names tab are automatically saved when you touch another tab or when a well in the currently running plate is completed. If changes have been made to the currently running well but the changes have not been applied before the well is complete, the changes to the current well are ignored, but any changes to the uncompleted wells are applied.

Analysis Settings Tab

Use the Analysis Settings tab to change Sample or Ladder Peak Find Settings during a run or to preview changes to analysis settings on a plate open for review. Analysis Settings can be saved before the run is complete if Auto Export is not selected. If Auto Export is selected, then Defer Export to Plate Completion must also be selected on the Setup Run Tab. Analysis Settings cannot be saved after a run is complete. To open the Analysis Settings tab, touch the **Views** button on the Navigation Bar and then touch the **Analysis Settings** button.

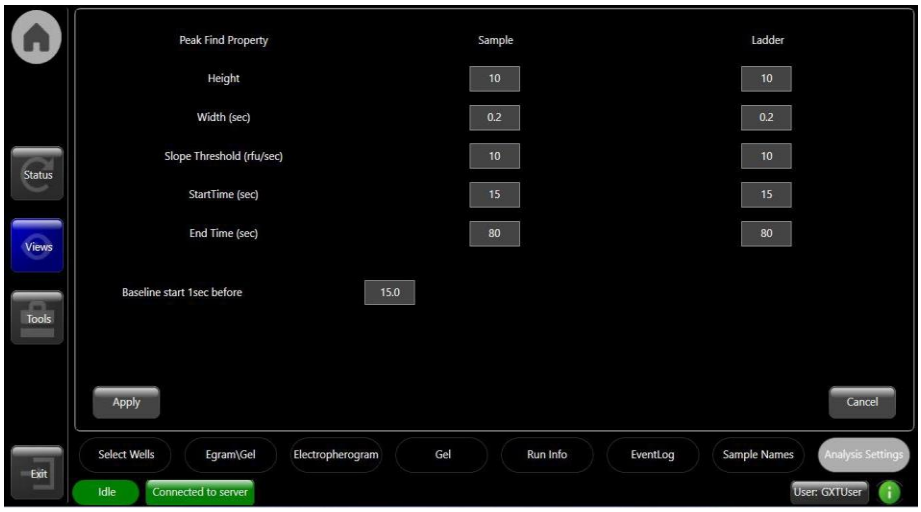


Figure 51. Analysis Settings Tab

Analysis Settings Tab (Continued)

The Analysis Settings tab displays the following settings for Sample wells and for Ladder wells:

Height - Specifies the height limit below which a peak is not detected. For each peak, the difference between the height at the Peak Start Time and the height at the Peak Apex must be greater than this value.

Width (sec) - Specifies the minimum width of a peak in seconds. Peaks narrower than this time are not detected.

Slope Threshold (rfu/sec) - Represents the amount of change in absorbance units over time required to indicate that a peak has occurred. This setting is used to detect the start and end of a peak. Increasing this setting may cause broad rolling bumps to be ignored or merge multiple bumps into a single peak. Decreasing this setting will broaden the peaks' width and potentially pick up broad bumps as peaks.

StartTime (sec) - Specifies the time after the start of a run when the first peak will be detected (any peaks appearing before this time are ignored). The Gel and Graph views will not plot data earlier than this time.

End Time (sec) - Specifies the time after which peak detection stops. The Gel and Graph views will not plot data beyond this time.

Baseline start 1sec before - Specifies the time in seconds after the start of the run when the first peak can appear. The Baseline starts 1 second before this time.

Exclude System Peaks check box - (Protein assays only) If selected, system peaks are identified and excluded from analysis.

Ladder Ratio - (Protein assays only) Time at which ladder peaks are detected as ladder peaks rather than system peaks. For example, if the ladder ratio is set to 1.5, the software multiplies the lower marker migration time x 1.5 and then begins ladder peak identification.

Minimum Sample Size - (Protein assays only) Specifies the size at which peaks are identified as sample peaks rather than system peaks (except the Lower Marker).

Apply button - Applies the changes to the current run if data is not being exported during the run.

Cancel button - Cancels changes to the window and displays the last saved values or the default values if no changes have been saved.

Wash Window

Use the Wash window to view the chip status and to start washing the chip. See the *Assay User Guide* for chip prep instructions. To open the Wash window, touch the **Wash** button on the Home Window.

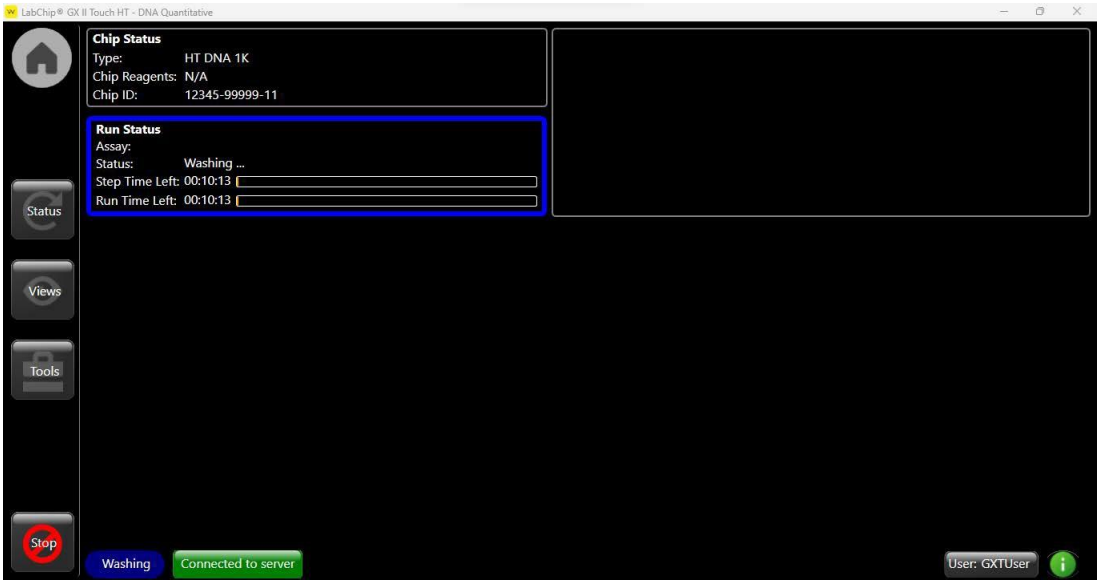


Figure 52. Wash Window

The Wash Window displays the Chip status, Run status, and Instrument status during the wash. To stop the wash step, touch the **Stop** button.

LabChip GX Touch/GXII Touch Instrument Description

This section identifies and describes the hardware components of the LabChip GX Touch/GXII Touch instruments. All of the components described in this section are the same for the GX and GXII Touch instruments. The LabChip GX Touch runs DNA and RNA assays. The LabChip GXII Touch runs DNA, RNA, Protein, Glycan, and Protein Charge Variant assays.

This section includes the following topics:

Front View

Figure 58 shows the front view of the LabChip GX Touch/GXII Touch and identifies the parts on the front of the instrument.

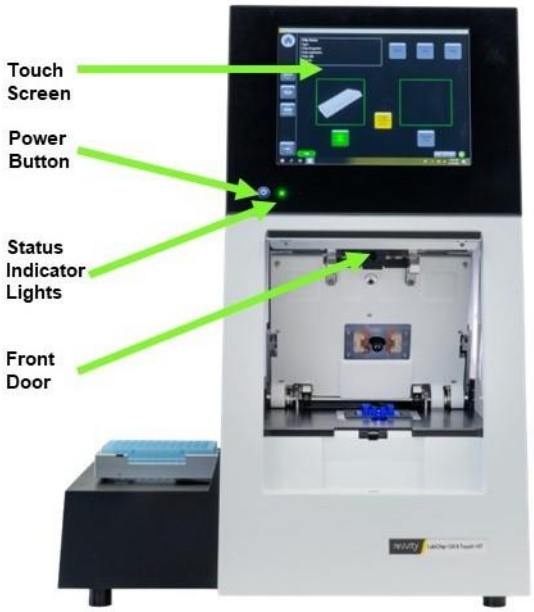


Figure 53. Front View

Front View (Continued)

Touch Screen	Displays the software to control the instrument. Touch the screen to select the desired operations.
Power Button	Turns the instrument and touch screen on. Illuminated when the instrument is on. To turn the instrument off, select **Start** > **Shutdown** on the Windows desktop to shut down the software. Using the power button to shut off the instrument may result in file corruption. Use only in case of emergency or if the computer has locked up.
Status Indicator Lights	Indicate the status of the instrument: **Not Lit** - Power is off. **Solid Green** - Power is on, GX Touch software is active, but instrument is idle. **Flashing Green** - Running an assay or a Protein Clear HR/ProteinEXact calibration. **Solid Yellow** - Power is on, but GX Touch software is not running in Windows. **Solid Red** - Power is on, GX Touch software is active, but it cannot communicate with the instrument **Flashing Red** - The instrument has failed to perform an action issued by the LabChip GX Touch software.
Front Door	Opens automatically to provide access to the chip. Use the LabChip GX Touch software to open the Front Door. When the door opens, a message displays reminding users to perform appropriate maintenance procedures (see page 152).

Rear Connectors

The rear connector is used to connect the LabChip GX Touch/GXII Touch instrument to the power supply.

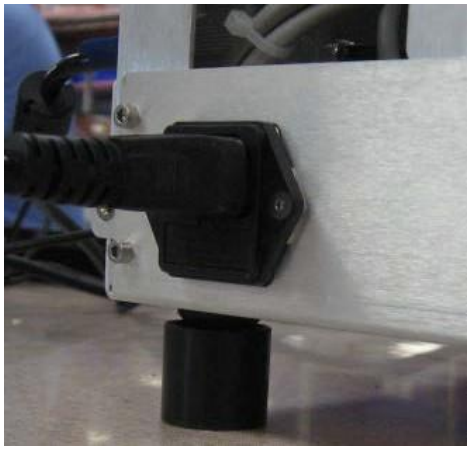


Figure 54. Rear Connector

The following connectors are located on the back of the instrument:

AC Power Cable	Plug the power cord into this connector and a power outlet.
	WARNING  *Appliance inlet is disconnecting device. Place device or equipment in a manner so that disconnecting device is accessible at all times.*

Side Connectors

The side connectors are used to connect peripherals, such as a mouse, keyboard, or external monitor, to the LabChip GX Touch/GXII Touch instrument and to connect the instrument to a network.

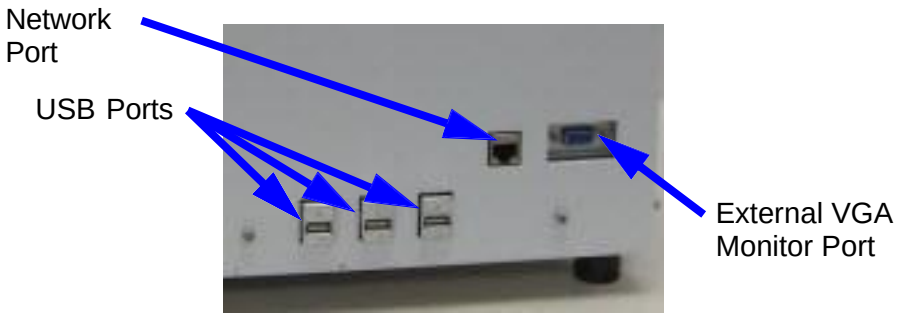


Figure 55. Side Connectors

The following connectors are located on the right side of the instrument:

(3) USB Ports	Use to connect an external USB keyboard, USB mouse, or USB drive to the instrument. (Mouse and keyboard not supplied.)
Network Port	Use to connect the instrument to a network.
VGA Monitor Port	Use to connect the instrument to an external monitor (not supplied).

Optics

The LabChip GX Touch/GXII Touch optics provide fluorescence detection (red excitation and red emission) for DNA, RNA, Protein and Glycan chips and assays.

Red Laser
The LabChip GX Touch/GXII Touch instrument includes a high intensity, long-life red diode laser to excite fluorescence on microfluidic chips. It is expected to have a lifetime of tens of thousands of operating hours.

Focusing and Alignment
The LabChip GX Touch/GXII Touch instruments use back-reflected red diode laser light for automatic chip focusing.

Photodiode Detectors
The LabChip GX Touch/GXII Touch use two silicon photodiode detectors for fluorescence detection and autofocus. Fluorescence data can be acquired and stored at rates from 20 to 120 Hz.

Optical Train
The fluorescence excitation, fluorescence detection, and autofocus optical trains contain several lenses and high efficiency interference filters. The optical trains are factory aligned and do not require adjustment.

Chip Pressure System

The pressure pump applies pressure or vacuum to the wells on the chip to move liquid through the chip. The Pressure Pump is located inside the LabChip GX Touch/GXII Touch instrument. O-Rings on the Chip Interface seal the chip wells and maintain the pressure.

Barcode Reader

The LabChip GX Touch/GXII Touch instrument may be equipped with an internal Barcode Reader. The Barcode Reader reads the customer-applied barcode on the short (portrait) edge of the microplate.

Proper selection and placement of barcode labels is critical for successful reading. See Placing the Barcode on the Plate on page 26 for specifications.

The barcode reader is internal to the system and cannot be viewed from the outside.

Microfluidic Chips

The figures below show the format and parts of the microfluidic chips used in the LabChip GX Touch/GXII Touch instruments to perform DNA, Protein, RNA, and Glycan sizing and quantitation.

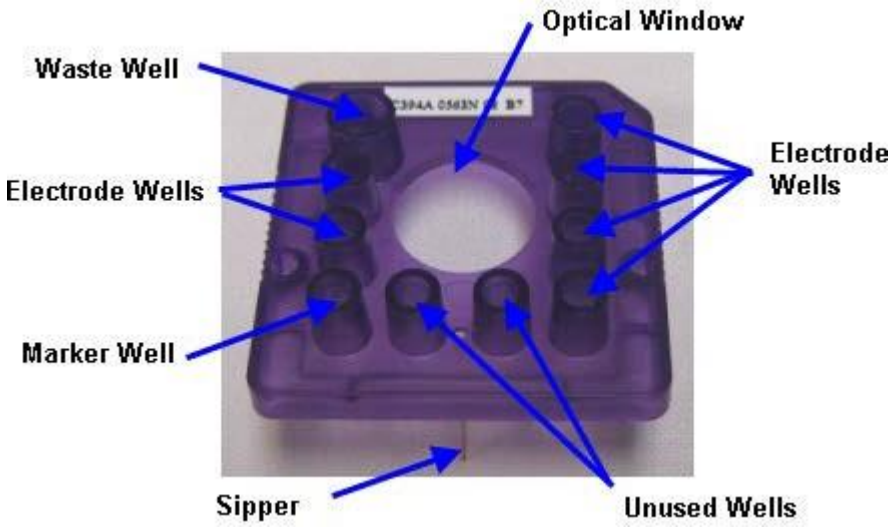


Figure 56. Top of Chip

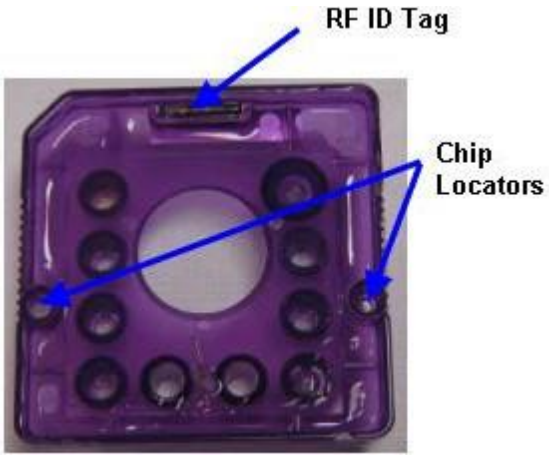


Figure 57. Bottom of Chip

Chip Interface

The Chip Interface holds the chip, provides the voltage to the chip channels to load, inject, and separate the sample, provides pressure to prime the chip with separation gel, and provides vacuum to the chip wells to pull samples from the microplate into the chip. The Chip Interface also contains a heating element to maintain a constant temperature in the chip's microfluidic channels and provides an optically black beam dump to increase sensitivity and aid fluorescence detection.

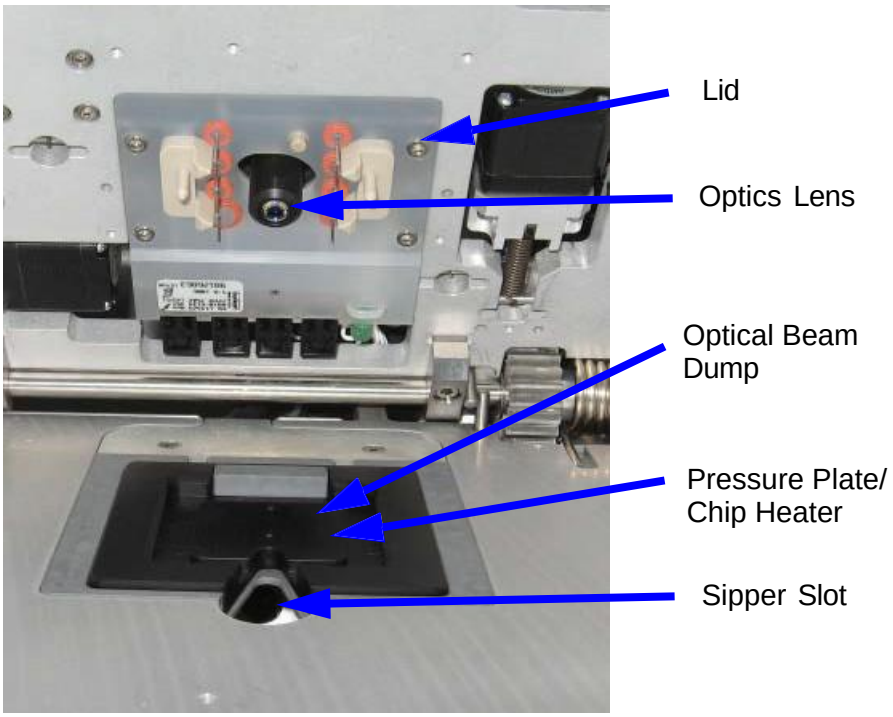


Figure 58. Chip Interface

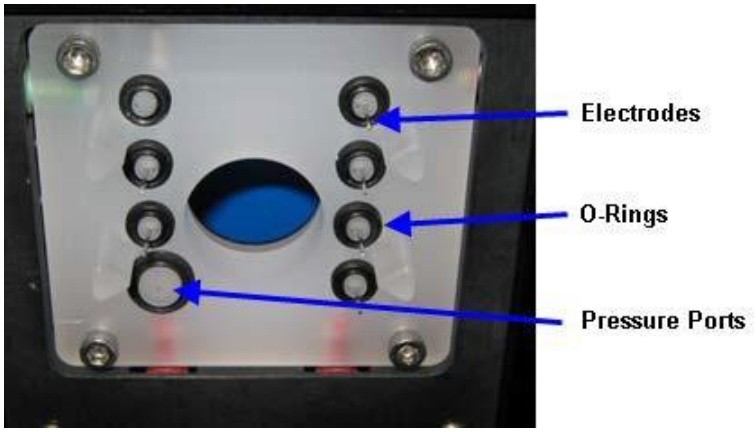


Figure 59. Chip Interface Lid

Chip Interface (Continued)

Lid	Holds the electrodes and o-rings to supply voltage and pressure to the chip.
Chip Interface	Holds the chip. The sipper on the chip extends through the sipper slot.
Optics lens	Lens for laser to illuminate chip.
Optical Beam Dump	Provides an optically dark background under the chip.
Pressure Plate with Heating Element	Maintains a constant temperature in the chip's microfluidic channels.
Electrodes	Apply voltage to the chip to move fluid through the chip and drive electrophoretic separations in the chip channels.
O-Rings	Create a seal between the chip interface lid and the chip to apply pressure or vacuum to the wells.
Pressure Port	Supplies pressure (positive or negative) to prime the chip or move samples through the chip.

Warning

DO NOT use Test Chip B in the LabChip GX Touch/GXII Touch. Putting Test Chip B into the LabChip GX Touch/GXII Touch instrument will cause permanent damage to the instrument.

High Voltage Interface

Supplies DC voltage to the separation channels in the chip via inert electrodes that are immersed in specific wells on the chip. There are 7 voltage channels for the LabChip GX Touch/GXII Touch chips. HV channels can be run in either constant voltage or constant current mode.

Microplate Carrier

The LabChip GX Touch/GXII Touch instruments contain a stepper motor driven robot that moves the microplate to be accessed by the LabChip.

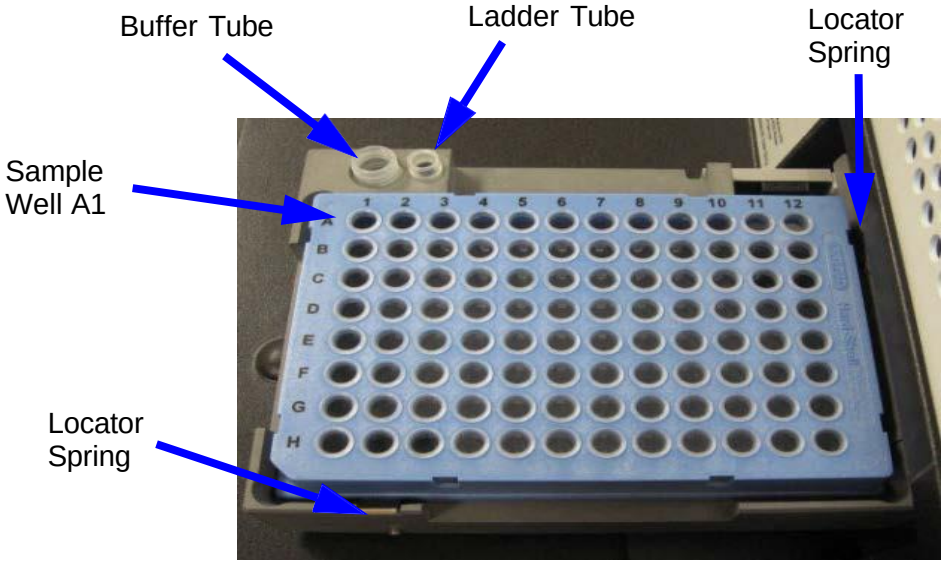


Figure 60. Microplate Carrier Parts

Microplate Carrier	Holds the microplate.
Microplate Locator Springs	Position the microplate correctly for access by the sipper on the chip.
Buffer Tube	Contains buffer to be accessed by the sipper on the chip.
Ladder Tube	Contains ladder standards to be accessed by the sipper on the chip.

Specifications

This section lists the technical specifications for the LabChip GX Touch/GXII Touch instruments. Technical specifications are subject to change without notice.

General

Size (H x W x D)	27” (69cm) x 20” (51cm) x 19” (49cm)
Weight	56 lbs. (25.5 kg)
Plate Capacity	(1) 96-well or 384-well microplate
Ventilation/Cooling	3” (77 mm) minimum space required around instrument for proper air flow.

Environmental

Operating Temperature	65° to 78°F (18° to 26°C)
Operating Humidity	20% to 70% relative humidity, noncondensing
Storage Temperature	50° to 104°F (10° to 40°C)
Transient Overvoltages	Installation Category II Overvoltage
Pollution	Pollution Degree 2
Altitude	Up to 2000m
Indoor Use Only	

Electrical

AC Input	100-240Vac, 50-60Hz (±10%)
Power Rating	300VA
Fuses	(2) 3.15A Slo-Blo® 250V, 5x20mm (P/N CLS138847)
Grounding	Through the power cord
Computer Interface	USB 2.0

Assay Voltage

Minimum Voltage/Current	-100V (limited by current)
Maximum Voltage/Current	-3000V (limited by current)

Chip Pressure

Pressure Range	+50 to -5 psig

Chip Temperature Control

Temperature Range	Ambient + 5°C to 40°C (no active cooling)
Accuracy	± 0.5°C
Thermal limit switch	65°C - 70°C

Fluorescence Detection

Detection Wavelength	Bandpass 670-725 nm
Data rates	20, 30, 40, 50, 60, 80, 100, and 120 Hz

Light Source (Red laser diode)

Warmup Time	30 seconds
Wavelength	635 nm
Power output	7.5 mW

Barcode Reader

Barcode Engine	JADAK® JE-2085
Supported Barcode Types	Code 39, Code 93, Code 128

Maintenance and Service

This section contains procedures for maintaining the LabChip GX Touch/GXII Touch instrument:

Daily

- Purging the Pressure Lines on page 22
- Cleaning the Chip Interface on page 153
- Cleaning the Instrument Electrodes on page 155

Monthly

- Cleaning the Chip Interface on page 153
- Calibrating the Optics on page 154

As Necessary

- Cleaning the Microplate Carrier on page 155
- Cleaning the Touch Screen on page 155
- Cleaning the Optics Lens on page 155
- Cleaning Test Chip C on page 156
- Changing the Fuses on page 157
- Running Software IQ on page 158
- Running Operational Qualification (OQ) on page 159

The *LabChip GX Touch/GXII Assay User Guides and Quick Guides* contain LabChip Kit Essential Practices and instructions for preparing reagents and plates. Make sure to follow the instructions to ensure the optimum performance of your instrument. The current version of the Assay User Guides and Quick Guides are available on the Revvity web site at: https://www.Revvity.com.

The cleaning and maintenance procedures are reviewed during the standard customer training provided with the initial instrument installation. If you have any questions concerning maintenance or require additional training, please contact Revvity Technical Support (see page 3).

WARNING

Laser maintenance and service should be performed only by a qualified Revvity representative.

Cleaning the Chip Interface

Cleaning the O-rings and chip interface prevents pressure leaks and current leaks. The O-rings should be cleaned daily, with a more thorough cleaning of the O-rings and chip interface monthly.

- Chip Interface Daily Cleaning
- Chip Interface Monthly Cleaning

Chip Interface Daily Cleaning

1. Inspect the inside of the chip interface and O-rings for debris.
2. Use the provided lint free swab dampened with DI water to clean the O-rings using a circular motion. If the O-rings stick to the chip or a pressure leak is detected, perform the more extensive monthly cleaning procedure below.

NOTE

Clean O-rings and electrodes with DI water only. Using 70% isopropanol repeatedly on the O-rings will cause them to dry out.

Chip Interface Monthly Cleaning

1. Remove the O-rings from the top plate of the chip interface on the LabChip GX Touch/GXII Touch instrument. Soak the O-rings in DI water for a few minutes. Clean the O-ring faces by rubbing between two fingers.
2. To reduce the occurrence of current leaks, clean the chip interface frequently. Clean the top plate of the chip interface using the provided lint free swab dampened with DI water.
3. Allow the O-rings and chip interface to air dry. Reinsert the O-rings into the chip interface lid.

Calibrating the Optics

The LabChip GX Touch software provides an Optical Calibration function using Test Chip C to calculate a correction factor for each individual LabChip GX Touch instrument. The correction factor is applied to all samples run on the instrument to provide a common absolute fluorescence across different instruments.

Run the Optics Calibration procedure (using Test Chip C) once a month, or more often if the company SOP specifies more frequent calibration or diagnostics. Optics Calibration should also be run if the Optics Calibration Test in the Diagnostics fails.

To calibrate the optics:

1. Touch the **Tools** button on the LabChip GX Touch Main Window.
2. Touch the Optics Normalization Tab.
3. Touch the **Open Chip Door** button and lift the front door.
4. Insert Test Chip C in the instrument and close the chip door.
5. Touch the **Warm and Scan** button. The laser and Test Chip warming step starts. Warm-up takes 10 minutes.
6. Wait while the scan is performed. The scan takes 5 minutes. When the scan is complete, the correction factor is calculated and displays in the **New Correction Factor** text box.
7. To apply the new calibration factor to the instrument, touch the **Apply** button. All future runs will be scaled by the new calibration factor.

Walk-Away Operation
After the scan has started, you can leave the instrument. At the end of the scan, the chip warming and laser are turned off after one minute, but the correction factor displayed in the window can be applied when the user returns to the instrument.

Correction Factor Beyond Calibration Limits Error
If the New Correction Factor is not within the factory-set limits, the text box displays an error message on a red background. Please contact Revvity technical support (see page 3) to determine the problem.

Failed to Find Focus Point
If the focus point cannot be found during a scan, retry the scan. If the error still displays and another Test Chip C is available, try the scan with a different Test Chip C. The laser and chip warming remain on for one minute to allow you to retry the scan.

Cleaning the Instrument Electrodes

The electrodes should be cleaned daily. Also clean the electrodes after running any diagnostic test using Test Chip D.

To clean the electrodes, wipe down using the provided lint free swab dampened with DI water.

Cleaning the Microplate Carrier

The microplate carrier can be cleaned with DI water or isopropyl alcohol as needed.

Cleaning the Touch Screen

Clean the touch screen as necessary.

Glass cleaner, isopropyl alcohol, or ethanol can be used on the touch screen. When cleaning, spray cleaner onto a cloth and wipe the screen with the cloth.

WARNING

Do not spray cleaner directly onto the touch screen. Always spray cleaner onto a cloth and then wipe the screen with the cloth.

Cleaning the Optics Lens

Inspect the optics lens daily and clean as necessary.

Clean the optics lens gently with an optical wipe dampened with DI Water.

WARNING

- *Do not spray cleaner directly into the instrument. Always spray cleaner onto a cloth and then wipe with the cloth.*
- *Clean the optical lens with an optical wipe and DI water only. Using other cleaning materials, or cleaning vigorously, can damage the lens.*

Cleaning Test Chip C

Before using Test Chip C, verify the test chip is clean. The chip must be clean before running Diagnostic tests.

1 Inspect the ruby crystal, chrome mask, and all glass surfaces for debris and/or fibers that may scatter light, fluoresce, or block excitation/emission light.

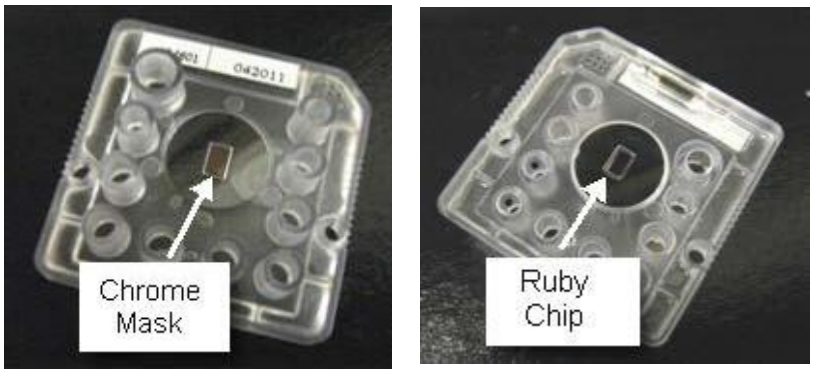


Figure 61. Top and Bottom of Test Chip C

2 Dust can be removed with a gentle air stream from oil free compressed and filtered house air or compressed air cans. Do not shake can before use. Hold can at a distance from the chip to prevent condensation.

3 To remove dyes or reagents from the Ruby crystal, chrome mask, and glass surfaces:

a Do not apply any force when cleaning.

b Use a lint free cloth and/or swabs (provided in accessory kit) dampened with 70%-Isopropanol / DI water solution.

c Remove liquid from all surfaces with a dry lint free cloth or dry swabs.

d Dry the chip completely with a gentle air stream from oil free compressed and filtered house air or compressed air cans. Do not shake can before use. Hold can at a distance from the chip to prevent condensation.

Changing the Fuses

The LabChip GX Touch/GXII Touch instruments use two fuses located in the power entry module:

(2) 3.15A Slo-Blo® 250V, 5x20mm (P/N CLS138847)

To order replacement fuses, contact Revvity Technical Support. See Contact Us on page 3.

WARNING

- *Electric shock Hazard. Disconnect the power cord before changing the fuses.*
- *For continued fire protection and correct functioning of the unit, replace fuses only with the exact part number to prevent fire.*

To replace the fuses:

1. Verify the LabChip GX Touch/GXII Touch instrument power is OFF.
2. Unplug the power cord from the instrument.
3. Use a small flat-blade screwdriver at the top of the fuse holder to gently pry the fuse holder out of the power entry module (see Figure 67).

Figure 62. Power Entry Module

4. Remove the two 3A fuses from the fuse holder (see Figure 67).

Figure 63. Fuse Holder and Fuse

Changing the Fuses (Continued)

5 Replace the blown fuse with the same part number fuse.

6 Press the fuse holder back into the power entry module until it snaps into place.

7 Plug the instrument power cord into the back of the instrument and into a suitable power outlet.

8 Press the Power button on the front of the instrument to turn the instrument on.

Running Software IQ

The Software IQ (Installation Qualification) verifies proper installation of the LabChip GX Touch software and verifies no unauthorized changes have been made to the software. The IQ can be run whenever required by your laboratory procedures.

The Installation Qualification can be used to check software installation qualification after routine computer maintenance, such as disk cleanup, after installing antivirus software, or after installing Microsoft® service packs. The Installation Qualification checks LabChip GX Touch software registry settings, the directory structure, and the integrity of each file specified for the software application.

To run the Software IQ:

1 On the LabChip GX Touch Main Window, touch the **Tools** button.

2 Touch the Software IQ Tab.

3 Touch the **Start** button. The Run IQ Tab displays the progress of the IQ test, and the Pass/Fail status of each test as it is completed.

4 To print the results, touch the **Print Preview** button and then touch the **Print** button.

5 To view the details of the IQ, touch the Detailed Result Tab. The detailed results of the IQ display. Any steps that fail display in red. To print the detailed results, touch the **Print** button.

Running Operational Qualification (OQ)

The Diagnostics Tab performs an automated Operational Qualification whenever required by your laboratory procedures.

The Diagnostics tab displays the tests that are performed on the left side of the window. The test results are displayed on the right side of the window. After all tests are complete, the test report is generated and saved to a file for review, printing, and documentation purposes.

See Diagnostics on page 167 for details on running the Diagnostics.

Troubleshooting and Diagnostics

This section contains the following topics to help troubleshoot problems with the LabChip GX Touch software:

Searching for Events in the EventLog Tab

Events and errors display in the EventLog Tab. Events and errors that occur during the current software session are displayed in the **Current Events** tab. Events and errors that occurred during previous software sessions are displayed in the **Past Events** tab.

To search for a specific event:

1. Touch the **Views** button on the Navigation Bar.
2. Touch the **EventLog** button to open the EventLog Tab.
3. Touch the **Search** button.
4. In the **Events** list, select **All Events**, **Current Events**, or **Past Events**.
5. In the **Search** text box, type the text to search for, and touch the **Search** button. The Source, Event Code, and Description fields are searched. The search results display in the **Search Result** fields.

Viewing Current Events in the EventLog Tab

The events and errors that occur during the current software session (since the software was started) display in the **Current Events** tab in the EventLog Tab.

- On the EventLog Tab, touch the **Current Events** button. The **Current Events** table displays. (These fields are read only.)

The Current Events tab contains the following columns:

Date - the date the event or error occurred.

Source - The source of the event or error.

Event Code - The event/error ID number used by Revvity to troubleshoot problems.

Description - A detailed description of the event or error that occurred.

Viewing Past Events in the EventLog Tab

All events and errors that have occurred during previous software sessions display in the **Past Events** tab in the EventLog Tab.

- On the EventLog Tab, touch the **Past Events** button. The **Past Events** table displays. (These fields are read only.)

The Past Events tab contains the following columns:

Date - The date the event or error occurred.

Source - The source of the event or error.

Event Code - The event/error ID number used by Revvity to troubleshoot problems.

Description - A detailed description of the event or error that occurred.

Error Messages

Before a run is started and while an assay is running, the instrument firmware and software checks for errors (e.g., disconnected devices, bad parameters, bad data, etc.). If an error is detected, an error or warning message displays at the bottom of the Home Window and an Error or Warning button displays on the Navigation Bar. Depending on the error, the run may continue or be aborted. Touch the Error or Warning button to display the event in the EventLog Tab. The error or warning description describes the problem and either contains information on how to resolve the problem or directs you to call Revvity Technical Support (see page 3).

For specific information about an error or warning message, touch one of the links below.

General Errors

- Device <Name> is Disconnected
- Plate Carrier Motion Blocked
- Home Timeout
- Move Timeout
- Pressure Leak Detected
- Focus Failed

Chip Warnings

- Maximum Samples Exceeded
- Chip Primed for Different Assay

LabChip GX Touch/GXII Touch Warnings

- HV Check Failed
- Current Leakage Check Failed
- Chip Temperature Warning
- GUI Cannot Connect to CFR Database

Device <Name> is Disconnected

This error message indicates that there is no communication between the software and the specified device.

Possible Causes	Recommended Actions
1. Instrument power loss.	Verify the instrument power cord is plugged in. Press the Power button on the LabChip GX Touch/GXII Touch instrument. See page 141. Restart the LabChip GX Touch software. Do not enable hibernation on the LabChip GX Touch/GXII Touch instrument. If the problem is not resolved, contact Revvity Technical Support (see page 3).
2. Computer went into hibernation.	

Plate Carrier Motion Blocked

Error Message: “Plate carrier motion blocked. Make sure tray movement is not obstructed.”

Possible Causes	Recommended Actions
1. Something is blocking the plate carrier from extending.	Remove the blockage. Restart the instrument. If the problem is not resolved, contact Revvity Technical Support (see page 3).
2. Something may have fallen inside and is blocking the robot motion.	

Home Timeout

Error Message: “Home Timeout.”

Possible Causes	Recommended Actions
1. Something is obstructing the robot motion.	Check for an object blocking the robot motion and remove the blockage. Restart the instrument. If the problem is not resolved, contact Revvity Technical Support (see page 3).
2. Robot Motor has failed.	

Move Timeout

Error Message: “Robot Failure.”

Possible Causes	Recommended Actions
1. Robot failure	Check for an object blocking the robot motion and remove the blockage. Restart the instrument. If the problem is not resolved, contact Revvity Technical Support (see page 3).

Pressure Leak Detected

Error Message: “Pressure leak detected. Check and clean the O-rings at the chip interface.”

Possible Causes	Recommended Actions
1. O-Ring missing or dirty.	Clean the O-rings (see page 153). Run the Pressure Diagnostic Tests (see page 167). If the problem is not resolved, contact Revvity Technical Support (see page 3).

Focus Failed

Error Messages:

- “Focus failed due to less than 2 peaks found during horizontal scan.”
- “Focus failed due to more than 3 peaks found during horizontal scan.”
- “Focus failed due to dry focus marks not found.”
- “Focus failed due to error in horizontal scan.”

Possible Causes	Recommended Actions
1. Focus nominal starting position is incorrect.	Run the Optics Diagnostics tests (see page 167). If the problem is not resolved, contact Revvity Technical Support (see page 3).
2. Laser or detector failure.	
3. Laser interlock switch failure.	
4. Bad or jammed focus motor.	

Maximum Samples Exceeded

Warning Message: “Maximum number of samples that can be run on this chip has been exceeded. Please install new chip.”

Possible Causes	Recommended Actions
Chip has already been used to process the maximum number of samples.	Replace the chip with a new chip. Prepare and reprime the new chip as necessary.

Chip Primed for Different Assay

Warning Message: “Assay for which chip was primed is different from run assay or unknown.”

Possible Causes	Recommended Actions
The last assay that the chip was primed for does not match the assay that is going to run.	1. Touch the No button, remove the chip, refresh with appropriate reagents, and repeat the chip priming step. 2. Touch the Yes button to skip repriming and continue with the run using the current chip.

HV Check Failed

Warning Message: “HV check failed.”

Possible Causes	Recommended Actions
1. Dirty electrode block. 2. Clogged chip.	1. Run the Current Leak Diagnostics test (see page 167). If test fails, clean o-rings and electrode block (see page 153). 2. Re-priming can sometimes clear chip clogs. Open the front door, close the door, and prime the chip. See the *LabChip GX Touch/GXII Touch Assay User Guide* for troubleshooting. 3. If the problem is not resolved, contact Revvity Technical Support (see page 3).

Current Leakage Check Failed

Warning Message: “Current leakage check failed.”

Possible Causes	Recommended Actions
Dirty electrode block.	Clean the O-rings (see page 153). Run the Current Leak Diagnostic Test (see page 167). If the problem is not resolved, contact Revvity Technical Support (see page 3).

Chip Temperature Warning

Warning Message: “Average chip temperature is out of range.”

Possible Causes	Recommended Actions
Chip heater failed.	Restart the instrument. If problem persists, contact Revvity Technical Support (see page 3).

GUI Cannot Connect to CFR Database

Warning Message: “GUI Cannot connect to CFR database. Please Remap the Server or Contact Administrator.”

Possible Causes	Recommended Actions
1. Network cable unplugged or not connected to the network.	Make sure the network cable is connected to the LabChip GX Touch (see page 144). Make sure the LabChip GX Touch is logged into the network. Make sure the computer where the CDR is installed is connected to the network.
2. Not logged into the wireless network.	Make sure the LabChip GX Touch computer is connected to the network.
3. Software has not been mapped to the CDR/Database server.	Open the CDR/Database Server Window. Type the Server Name or IP Address of the computer where the CDR Server software is installed. If this is the first time connecting to the CDR, see Cannot Connect to Remote CDR Server on page 179 for server configuration requirements.

Diagnostics

The LabChip GX Touch software contains a set of diagnostic tests to verify proper installation and operation of the LabChip GX Touch/GXII Touch instrument. These tests are not dependent on assay chemistry. To open the Diagnostics Tab, touch the **Tools** button and then touch the **Diagnostics** tab.

The following procedures are included in this section:

Running Software IQ

The Software IQ (Installation Qualification) verifies proper installation of the LabChip GX Touch software and verifies no unauthorized changes have been made to the software. The IQ can be run whenever required by your laboratory procedures.

The Installation Qualification can be used to check software installation qualification after routine computer maintenance, such as disk cleanup, after installing antivirus software, or after installing Microsoft® service packs. The Installation Qualification checks LabChip GX Touch software registry settings, the directory structure, and the integrity of each file specified for the software application.

To run the Software IQ:

1. On the Navigation Bar, touch the **Tools** button.
2. Touch the Software IQ Tab.
3. Touch the **Start** button. The Run IQ Tab displays the progress of the IQ test, and the Pass/Fail status of each test as it is completed.
4. To print the results, touch the **Print Preview** button and then touch the **Print** button.
5. To view the details of the IQ, touch the Detailed Result Tab. The detailed results of the IQ display. Any steps that fail display in red. To print the detailed results, touch the **Print** button.

Running Operational Qualification (OQ)

The Diagnostics Tab performs an automated Operational Qualification whenever required by your laboratory procedures.

The Diagnostics tab displays the tests that are performed on the left side of the window. The test results are displayed on the right side of the window. After all tests are complete, the test report is generated and saved to a file for review, printing, and documentation purposes.

Running the Instrument Diagnostics Tests

To begin running the Diagnostics tests, touch the **Run Tests** button on the Diagnostics Tab. The tests run from top to bottom, prompting you to load the correct chips or plates as required for each test. Follow the prompts. As each test is completed, the results display on the right side of the window.

Supplies Required to Run Diagnostics Tests:

- Test Chip A (Revvity P/N 760453)
- Test Chip C (Revvity P/N 760624)
- Test Chip D (Revvity P/N CLS138692)
- Test Plate with barcode label

NOTES

- *The Test Chip A and Test Chip C that are shipped with the instrument are a matched set and should always be used together. Always use the test chips that were originally shipped with the instrument.*
- *Do not use test chips from LabChip GX in the LabChip GX Touch instruments.*

WARNING

DO NOT use Test Chip B in the LabChip GX Touch/GXII Touch. Putting Test Chip B into the LabChip GX Touch/GXII Touch instrument will cause permanent damage to the instrument.

To order Test Chip A, C, or D, contact Revvity Technical Support (see page 3).

Description of Instrument Diagnostic Tests

This section includes the following information about the diagnostic tests: the test names, descriptions, potential failures, and the chip required to run the test. Touch the **Limits Report** button to display the limits for each diagnostic test.

Computer Resources Test

Any chip can be loaded

Description	Potential Cause of Failure
Memory Check	Available memory below 500 MB. System may function with lower memory but there is risk of failure if analyzing many plates.
Disk Space Check	Available disk space below 4 GB. Risk of losing data as disk space is used. Free up space on local hard drive.

System Components Test

Any chip can be loaded

Description	Potential Cause of Failure
Verify Fan Operation	Damaged fan. Contact Revvity Technical Support (see page 3).
Check Chip Cartridge Interlock	Front door is not open or closed at the correct time. Close or open front door as instructed. Interlock Switch is defective. Contact Revvity Technical Support (see page 3).
Optics Temperature	Optics temperature is not in valid range.
Chassis Temperature1	Chassis temperature is not in valid range.
RH Temperature	RH temperature is not in valid range.

Chip Interface Test

Remove chip

Description	Potential Cause of Failure
Marker Pressure Sensor Test	Pressure sensor out of calibration. Contact Revvity Technical Support (see page 3).
Marker Pressure Chip Interface Clog Test	Clog in pressure line. Contact Revvity Technical Support (see page 3).
Priming Pressure Sensor Test	Pressure sensor out of calibration. Contact Revvity Technical Support (see page 3).
Priming Pressure Chip Interface Clog Test	Clog in pressure line. Contact Revvity Technical Support (see page 3).
Sipping Pressure Sensor Test	Pressure sensor out of calibration. Contact Revvity Technical Support (see page 3).
Sipping Pressure Chip Interface Clog Test	Clog in pressure line. Contact Revvity Technical Support (see page 3).

RF Tag Test

Test Chip A required

Description	Potential Cause of Failure
Read RF Tag	Bad tag on chip. Try another chip with known good RF Tag. Problem with RF Tag reader. Contact Revvity Technical Support (see page 3).

Pressure Leak Test

Test Chip A required

Description	Potential Cause of Failure
Marker Pressure O-Ring Leak test	Pressure leak at O-rings. Clean or replace the O-rings (see page 153) and clean the chip interface. Problem with pressure lines. Contact Revvity Technical Support (see page 3).
Priming Pressure O-Ring Leak test	
Sipping Pressure O-Ring Leak test	

Chip Temperature Test

Test Chip A required

Description	Potential Cause of Failure
Chip Heater Ramp Test	Initial chip temperature not achieved in time. Temperature ramp time not within spec may indicate heater disconnected or burned out. Contact Revvity Technical Support (see page 3).

Current Leakage Test

Test Chip A required

For each pin, apply -3000V to pin and -100 to all others. Sum up currents.

Description	Potential Cause of Failure
Leakage Check: Channel (0, 1, 2, 3, 5, 6, and 7)	Source current too high or sum of sink currents too high. Clean or replace the O-rings (see page 153) and clean the chip interface. If error persists, contact Revvity Technical Support (see page 3).

Laser Test

Test Chip not required

Measures the laser readback value.

Description	Potential Cause of Failure
Laser Power Readback	Contact Revvity Technical Support (see page 3).

Plate Handler Test

Test Chip A Required

Description	Potential Cause of Failure
Plate Sensor Check Absence	Faulty sensor. Contact Revvity Technical Support (see page 3).
Plate Sensor Check Presence	

Optics Test

Test Chip A required

Description	Potential Cause of Failure
Home Optics	Optics Motor failure. Contact Revvity Technical Support (see page 3).
Focus/Laser/Detector	Incorrect initial starting position due to crash or contact of optics block with an object. Laser or detector failed. Laser power too low. Contact Revvity Technical Support (see page 3).
Laser On/Off Test	Signal level difference between On and Off states too low may indicate laser burned out or detector failure. Contact Revvity Technical Support (see page 3).

Test Chip C required

Description	Potential Cause of Failure
Optics Calibration Test	Signal out of range indicates laser, optical alignment, or filter degradation. Contact Revvity Technical Support (see page 3). If the Drift is greater than 7.5%, calibrate the optics (see page 154). If the Gain factor is not within the factory limits, contact Revvity Technical Support (see page 3).
Optics Background Test	Increase in signal when laser is turned on (background signal) is not less than the limit. Calibrate the optics (see page 154).
Optics Noise Test	If the Optics Noise is greater than the limit, calibrate the optics (see page 154). If the problem still occurs, contact Revvity Technical Support (see page 3).

HV Voltage Calibration Test

Test Chip D required

Test description: For each channel, apply -3000V while setting other channels to 0.0 uA. Ensure each channel reaches applied voltage.

Description	Potential Cause of Failure
Voltage Calibration: Channel (0, 1, 2, 3, 5, 6, and 7)	Voltage out of calibration or electrode not connected to power supply. Contact Revvity Technical Support (see page 3).

HV Current Calibration Test

Test Chip D required

Current Calibration Test: For each channel, set one channel to -3000V. Set another channel to 20ua. Set all other channels to 0ua. Current for first channel should be -20ua. Voltage for the current controlled channel should be -120V +/- 22V.

Current Stability Test: Monitor current level for 10 seconds to verify it is stable at 20ua.

Description	Potential Cause of Failure
Current Calibration: Channel (0, 1, 2, 3, 5, 6, and 7)	Current out of calibration. Electrode not connected to power supply. Contact Revvity Technical Support (see page 3).
Current Stability: Channel (0, 1, 2, 3, 5, 6, and 7)	Current out of calibration. Electrode not connected to power supply. Contact Revvity Technical Support (see page 3).

Barcode Test

Use any Chip. Test Plate required.

Description	Potential Cause of Failure
Barcode reader test	Plate missing barcode. Place barcode on plate in correct position (see page 26). Barcode is not read correctly. Barcode reader disconnected or misaligned. Contact Revvity Technical Support (see page 3).

Calibration Failures

Protein Clear HR and ProteinEXact assays undergo a Calibration process at the onset of data collection. This section describes possible causes and recommended actions for the calibration failure for each assay:

- Protein Clear HR Assay Failed Calibration
- Protein Clear HR Assay Marginal Calibration
- ProteinEXact Assay Failed Calibration

Protein Clear HR Assay Failed Calibration

The Protein Clear HR Assay may display pop-up windows indicating failed calibration outcomes. Failed calibration indicates the assay is not able to collect data.

Possible Causes	Recommended Actions
1. Poor ladder quality.	Clean the electrode block per the instructions in the Protein Clear HR assay user guide. Re-prepare the chip, making sure the reagents are fresh and the dye is completely thawed. Reload the ladder well in the plate with fresh ladder solution, and replace the VeriMAb sample in the plate with fresh VeriMAb. Retry calibration (see page 24). If the problem is not resolved, contact Revvity Technical Support (see page 3).
2. Expected peaks for 120 kDa ladder protein or standard sample proteins cannot be identified.	
3. Misidentification of peaks.	

Protein Clear HR Assay Marginal Calibration

Marginal calibration indicates data collection can proceed, but the calibrated currents are outside the validated assay parameters. For marginal calibration, collected data may be outside published assay specifications, but qualitative electropherograms can be obtained.

Possible Causes	Recommended Actions
1. Dips in EGram trace could not be eliminated.	Touch the **Yes** button to run the chip despite the issue displayed on the pop-up window. OR Touch the **No** button to fix the issues displayed on the pop-up window. To fix the issues: • Clean the electrode block per the instructions in the Protein Clear HR assay user guide. • Re-prepare the chip, making sure the reagents are fresh and the dye is completely thawed. • Reload the ladder well in the plate with fresh ladder solution, and replace the VeriMAb sample in the plate with fresh VeriMAb. • Retry calibration (see page 24). If the problem is not resolved, contact Revvity Technical Support (see page 3).
2. Could not achieve target Percent Purity values.	

ProteinEXact Assay Failed Calibration

The ProteinEXact Assay may display pop-up windows indicating failed calibration outcome only. Failed calibration indicates the assay is not able to collect data.

Possible Causes	Recommended Actions
1. Standard area measurement is outside assay validation range.	Re-prepare the chip, making sure the reagents are fresh, and retry calibration by performing another run (see page 30). AND/OR Calibrate the Optics (see page 154). If the problem is not resolved, contact Revvity Technical Support (see page 3).
2. Expected standard arrival time is outside assay validation range.	Perform the Removing Sipper Clogs procedure described in the *ProteinEXact Assay User Manual.* Re-prepare the chip, making sure the reagents are fresh. Retry calibration. If the problem is not resolved, contact Revvity Technical Support (see page 3).

Troubleshooting Assay Problems

For problems with assays, see the *Assay User Guide* for the specific assay you are running. The Assay Guides contain common problems that may occur for each type of assay, and suggested solutions to resolve the problems.

The current version of the Assay User Guides are available on the Revvity web site at: https://www.Revvity.com.

If the problem is not resolved by following the suggestions in the Assay User Guide, contact Revvity Technical Support (see page 3).

Software Problems

If any of the following software problems occur, follow the suggestions to correct the problem:

- Cannot Save a File
- Computer Software Lock-Ups
- Cannot Connect to Remote CDR Server

Cannot Save a File

File has been saved as a Read Only file.

If editing an existing file, verify the file is not Read Only. If it is, the title bar shows Read Only after the file name. Read-only files can be edited and saved with a new name or in a new location with the same name, but cannot be saved over the original file.

Hard drive is full.

Verify there is sufficient free space on the hard drive to save the file. If not, clear some space on the hard drive. Archive files that are not being used to another location.

If sufficient space is available, close all open applications and then restart the computer. After the computer restarts, open another file, and save it to verify the Save function is working properly.

LabChip GX Touch software is corrupted.

Reinstall the software. If the problem persists, contact Revvity Technical Support (see page 3).

Computer Software Lock-Ups

If a computer or software lock-up occurs:

1. If the LabChip GxP option is installed, type your user name and password on the Unlock Application Window.
2. If this is not successful, or if the LabChip GxP option is not installed, try to exit and then restart the LabChip GX Touch software.
3. If this is not successful, exit the LabChip GX Touch software using the **Task Manager**: (Access the Task Manager through the Control Panel.)
4. If the **Task Manager** cannot be accessed, try one or all of the following:
   - If a keyboard is connected, press the **Ctrl**, **Alt**, and **Delete** keys on the keyboard simultaneously.
   - Perform a hard reboot by turning off the computer (press and hold the Power button) and then restarting it.
5. Contact Revvity Technical Support (see page 3).

Cannot Connect to Remote CDR Server

If experiencing trouble connecting to the CDR server computer:

- Ensure server security is not blocking the following server side services from receiving incoming connections:
  - Sqlservr.exe TCP/1433 UDP/1434
  - SVNserve.exe TCP/3690 UDP/3690
- Ensure that the server computer is reachable from the GX Touch client by pinging it from DOS Command window on the client computer.
- Verify that the network provides a DNS for name to IP mapping.
  - The Windows Name Service will not work for name mapping the SVN connection.
  - If the server computer does not have an entry in the DNS, the server IP address must be used for mapping and the IP address must be assigned statically.

Zipping the Log Files

The GX Touch Log Zipper Utility zips the LabChip GX Touch log files and system info files and places the resulting Diagnostics Log zip file in the specified folder or on the computer desktop. This utility packages all of the log and diagnostic files together so the files can be emailed to Revvity Technical Support.

The GX Touch Log Zipper Utility can be accessed from the Information Window (see Log Zipper Accessed from Information Window on page 180) or the Windows Start Menu (see Log Zipper Accessed from Start Menu on page 181).

Log Zipper Accessed from Information Window

To zip the LabChip GX Touch diagnostics logs from the Information window:

1. In the LabChip GX Touch software, touch the Information (*i*) button in the lower right corner of any window to open the InfoView window.
2. Touch the **Log Zipper** tab.
3. If desired, touch the **Browse** button to change the destination folder of the zip file. By default, the zip file is saved to the current user's desktop.
4. Touch the **Zip** button. The Diagnostics Log zip file is saved to the specified folder. The file name is DiagnosticsLog-<date>_<time>.zip, where <date> format is YYYY-MM-DD and <time> format is hh-mm-ss.
5. Touch the **Close** button to close the InfoView window.

Log Zipper Accessed from Start Menu

To zip the LabChip GX Touch diagnostics logs from the Start Menu:

1 On the Windows desktop, select **Start** > **All Programs > Revvity > LabChip GX Touch Log Zipper**. The GX Touch Log Zipper windows opens.

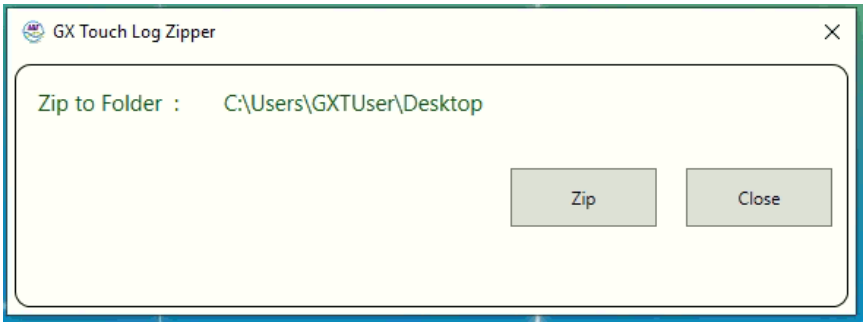


Figure 64. GX Touch Log Zipper Window

2 Touch the **Zip** button. The Diagnostics Log zip file is saved to the current User's computer desktop. The file name is DiagnosticsLog-<date>_<time>.zip, where <date> format is YYYY-MM-DD and <time> format is hh-mm-ss.

3 To save a copy of the file, either rename the file or move the file to a different location.

4 Touch the **Close** button to close the GX Touch Log Zipper window.

Glossary of Terms

This Glossary includes explanations and examples of the following terms:

Apex

After locating a start point, the peak find algorithm looks for the first negative slope value and saves the previous point as the apex. If the value of the apex is less than the minimum peak height limit, the algorithm starts looking for a new peak.

Assay File

File used by the LabChip GX Touch software to specify assay and default analysis settings, such as Ladder and marker sizes and concentrations, peak find settings, expected peaks, and excluded peaks. LabChip GX Touch assay files have an .asyx file extension. If the LabChip GxP option is installed, all assay files are stored in the CDR and are version controlled. Analysis settings in the assay file cannot be changed in the LabChip GX Touch software. To change the analysis settings, open the data file in the LabChip GX Reviewer software.

Default assays are released by Revvity and included with the LabChip GX Touch software. Default assays are tested for data acquisition and data analysis. Default assays cannot be added, deleted, or changed.

Installable assays are released by Revvity have not been included with the LabChip GX Touch software. Installable assays have an iasyx file extension. Installable assays can be added, updated, or deleted from the LabChip GX Touch software. Installable assays are available from the Revvity website. See “Installing New Assays” on page 67 for details.

Custom assays are default assays that have been modified to meet specific needs. Acquisition and analysis parameters can be modified. Custom assays have the same asyx file extension as default assays, but they must be saved with different filenames. The modified functions in custom assays have not been verified by Revvity.

Baseline

A baseline is established just after the start time setting. After the overall baseline is established, a local baseline is calculated for each peak to compensate for baseline drift.

Baseline Subtraction can use either Spline fit or Rolling Ball fit for the baseline curve algorithm.

- **Spline** - Creates a smooth line fit to the baseline data points and subtracts this smooth fit from the data. The Threshold determines how much the baseline fit follows changes in the data. Lowering the Threshold below the default value of 20 allows the baseline fit to ignore regions that are slow changes of real signal peaks and not baseline drift. This spline curve is not constrained to remain below the signal and may produce negative signal values when subtracted from the signal.

For isolated peaks, the local peak baseline is a straight line connecting the start point of the peak with the end point. For peaks that are very close together, an average baseline is used when the value between the peaks does not drop to the actual baseline.

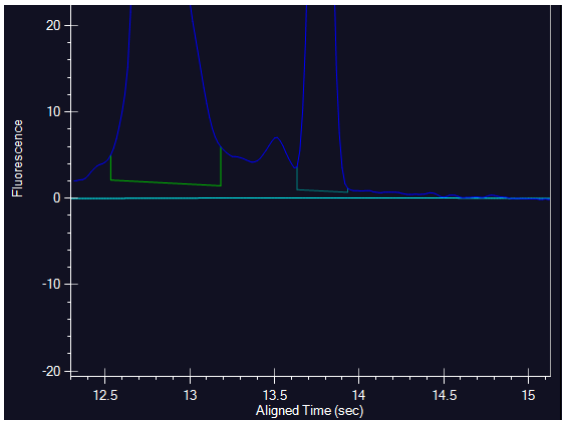


Figure 65. Baselines

Bubble

If the tip of a pipette is not positioned below the liquid level in the well, bubbles can result. If a large bubble forms at the bottom of a well, remove the sample from the well, pipette the sample back into the well, and continue with the loading procedure.

Data Files

While running an assay, the raw data received from the instrument is automatically saved to the plate data file (*.gxd). As the data from each single well is received, it is saved to the data file. The name of the data file is specified in the Setup Run Tab. If a run is stopped before the run is complete, the data file contains the data for the completed wells. If the LabChip GxP option is installed, the data files are located in the CDR.

The data file contains the data from the read, assay information, analysis settings, and run information for the run.

Data Points

Data points are determined by the data collection rate set in the assay properties. Select the **Show Data Points** option in the Graph Settings to displays the data points used to generate the graph.

DNA Assay Analysis

DNA samples contain two marker peaks outside the limits of the DNA fragment sizes the assay is designed to detect. The ladders contain the same two marker peaks. The sample data is aligned to the ladder data by matching the peak times of the two markers in the sample data with the same two markers in the ladder data. The size of each sample peak is calculated by linear interpolation between the known ladder peak migration time and size using the peak aligned migration time. The analysis settings can be changed in the LabChip GX Reviewer software to perform the interpolation using a local third order polynomial fit to the time instead of the size relationship provided by the ladder.

The concentration of the sample peaks is calculated using the known area and concentration of the ladder peaks. The molarity of each sample peak is calculated using the sample concentration, the DNA fragment size (in base pairs) attributed to the peak, and the known molecular weight of the DNA base pair.

pDNA analysis differs from normal DNA analysis in that the molecules are separated in the gel matrix based on their conformation, in addition to size. Supercoiled, linear and open-circular (nicked) conformations are able to be separated. Supercoiled and linear sizing calculations are performed based on a Revvity Ladder. The ladder contains 3 supercoiled peaks which are used to generate a point-to-point fit for supercoiled peaks, and 3 linear peaks which are used to generate a point-to-point fit for linear peaks.

Electrokinetic Forces

Electrokinetic forces are used to move, switch, mix, and separate the nucleic acid samples. Active control over voltage gradients directs the movement of materials using the phenomenon of electroosmotic flow or electromigration.

Electroosmotic Flow

A phenomenon that results from an electrical double layer formed by ions in the fluid and surface electrical charges immobilized on the capillary walls. When an electric field is applied, the bulk solution moves towards one of the electrodes. This phenomenon can be used to move fluids through microfabricated channels

Electrophoresis

A technique of separating molecules on the basis of their mobility. An electrical potential is applied across a capillary containing a sample in a fluid medium. Positive molecules migrate towards the cathode and negative molecules migrate towards the anode at different speeds depending on their electrophoretic mobility.

End Point

The peak find algorithm looks for a leveling off when the value of the slope is less than the value set for the slope threshold. This is marked as the end point of the peak.

End Time

This setting determines the time after the start of a run before which the last peak or fragment will be located (any peaks appearing after this time are ignored). Analysis settings can only be changed when reviewing LabChip GX Touch data in the LabChip GX Reviewer software.

Excluded Peak File

Excluded Peak files are used to import Excluded Peaks into a data file as the data file is created. The Excluded Peak file contains the size or time of the excluded peaks, the color used to identify each excluded peak, and a name for each excluded peak. Excluded Peak Files are created in the LabChip GX Reviewer software. See the *LabChip GX Reviewer User Manual* for details on creating the Excluded Peak file.

Expected Peak File

Expected Peak files are used to import Expected Peaks into a data file as the data file is created. The Expected Peak file contains the size or time of the expected peaks, the color used to identify each expected peak, and a name for each expected peak. Expected Peak Files are created in the LabChip GX Reviewer software. See the *LabChip GX Reviewer User Manual* for details on creating the Expected Peak file.

GXD Files

The file extension for data files created in the LabChip GX Touch software. See Data Files.

Hardware Diagnostics

Whenever a run begins, the instrument checks for errors (*e.g.,* defective high-voltage supplies, missing conductivity between wells, etc.). If an error is detected, a message box displays and the run stops. The message box describes the problem and either contains information on how to resolve the problem or directs you to call Revvity Technical Support (see page 3).

Inflection Threshold

Peaks that are very close together are identified as a single peak if the peaks do not have a clear valley between them. The Inflection Threshold property splits peaks based on the slope. The inflection threshold defines the value that the slope minimum must be below to trigger a splitting of the peak. As the threshold is increased, more peak splitting occurs. Analysis settings can only be changed when reviewing LabChip GX Touch data in the LabChip GX Reviewer software.

Lab-on-a-Chip

The generic term for a microfluidic product, signifying a chemical process or material movement taking place on a microchip. In contrast to analysis in a standard laboratory that relies on human intervention at several stages to manipulate or observe samples and record results, the self-contained lab-on-a-chip represents an almost hands-free technology.

Ladder

Ladders are used to align the data and calculate the size of data peaks. (Protein Charge Variant assays do not use ladders or markers.) The Ladder tube is located in the back right corner of the microplate carrier, next to the buffer tube. The Ladder is sipped before the first well and then after every 12 wells. The ladder is analyzed before sample analysis starts.

The peak sizes and markers defined for the ladder in the assay are assigned consecutively, starting with the first peak detected in the ladder. If too few peaks are detected in the ladder well, analysis stops and an error is generated. Peaks appearing above the upper marker do not have to be detected.

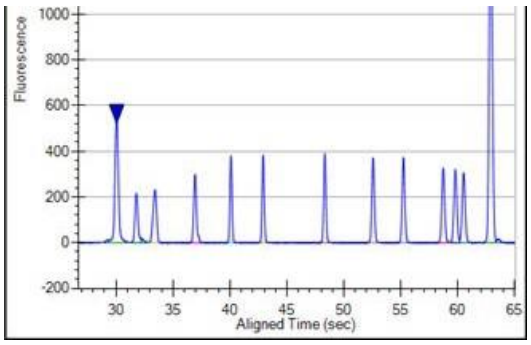


Figure 66. Ladder Graph

Lower Marker

An internal standard that is added to a sample in a well to assist in determining size and concentration of the sample. For DNA, Protein, and RNA assays, the lower marker is the same as the first peak in the ladder. Protein Charge Variant assays do not use ladders or markers.

Log Files

The LabChip GX Touch software log file displays in the EventLog Tab. The log file maintains a running record of all events that occur with the instrument while it is online with the software and records all events that occur in the software. Each event specifies the date and time of the event, source of the event, the event code, and a description of the event.

Microfluidics

The miniaturization of chemical processes generally pertaining to systems involved in the control of fluid flow. This includes pumps, valves, jets, and microchannels.

Optical Calibration

The LabChip GX Touch/GXII Touch instrument reads fluorescence of a laser-illuminated dye attached to compounds present in a sample. The absolute value of this fluorescence has little meaning as all computed quantizations, such as concentration, are derived from ratios of fluorescence to known standards found in the supplied ladder. Due to component variations in the optical subsystem, the same sample delivers different absolute fluorescence on different instruments, making it difficult to compare the e-grams of similar samples run on different instruments. To provide a more consistent absolute fluorescence for visual comparisons, an optical calibration process is included in the LabChip GX Touch software.

The Optical Calibration uses a calibrated test chip (Test Chip C), which has a stable, dry fluorescent material embedded in the channel. Test Chip C is provided with all new instruments. Test Chip C is factory-calibrated with a reference contrast value written in the chip RF tag. Each instrument uses this test chip to determine an optical gain correction factor, which will scale its optical response to a common standard.

Peak Baseline

A local peak baseline is calculated for each peak. For isolated peaks, the local peak baseline is a straight line connecting the start point with the end point. For peaks that are very close together, an average baseline is used when the value between the peaks does not drop to the actual baseline. The peak baseline for two peaks is shown in Figure 72.

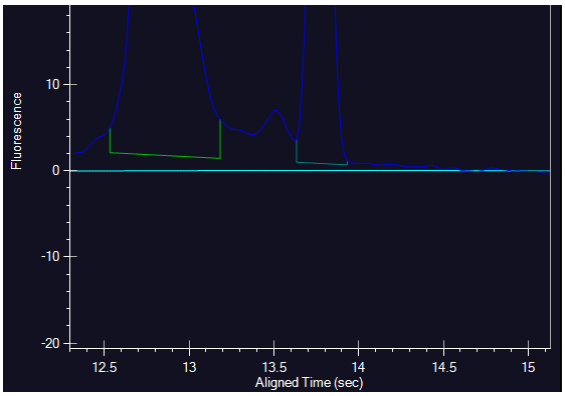


Figure 67. Peak Baselines

The peak baseline algorithm starts at the earliest peak and checks whether the end point is within a certain distance from the start of the next peak. When a cluster of peaks is detected, the peak baseline is the line joining the first peak's start to the last peak's end. The start and end points of adjacent peaks in the cluster are averaged to the same point so that no gaps exist between peaks.

Peak Identification

From the smoothed data, peaks are identified using a hill-climbing algorithm running along the smoothed data and its first derivative.

The peak baseline is drawn across the peak bottom by taking local averages just outside the peak start and end points and connecting the two points. The peak height, measured from the apex down to the peak baseline, must exceed the minimum peak height specified in the analysis settings for the bump to be identified as a peak. Analysis settings can only be changed when reviewing LabChip GX Touch data in the LabChip GX Reviewer software.

The peak start, end, and baseline can be viewed in the EGram Tab by selecting the **Show Peak Baselines** option in the Graph Settings. The area of each peak is determined by trapezoidal integration of the peak signal between peak boundaries and above the peak baseline.

Protein Assay Analysis

Protein assays utilize a chemistry that generates an extra set of peaks (system peaks) just above the lower marker that should not be included in the analysis. These system peaks must be identified and excluded from further quantitative analysis. For ladder analysis, peaks occurring after the lower marker less than the “Ladder Ratio” analysis setting, are tagged system peaks to avoid confusion with legitimate ladder peaks.

Protein samples contain a single lower marker. Alignment to a single marker does not provide enough constraints to align large proteins, so data is aligned to two ladders, one sipped just before the sample wells and another sipped just after the sample wells. The second ladder is called the bracket ladder. Samples are scaled so the sample’s lower marker is nearly aligned with both ladder lower markers. The scaling is weighted by the proximity in sip time to each ladder. The sample sipped closest to the primary ladder is scaled to align more closely to the primary ladder and the sample sipped just before the bracket ladder is scaled to align most closely to the bracket ladder. Then each sample is shifted in time so the sample's lower marker aligns exactly with the primary ladder lower marker.

After alignment, the size of the protein producing each peak is calculated from the aligned peak time using a log (size) versus 1/(Time-T0) fit to the primarily ladder peaks of known size and measured migration time. T0 is determined empirically as the time offset which delivers the best straight line fit to the ladder data, The value of T0 used for the fit is exported in the Well Table.

To determine sample peak concentration, the peak areas are first corrected to compensate for the fact that the fluorescence intensities are sampled at a constant time interval so slower moving proteins spend more time under the detector than fast moving proteins. The peak concentration is then calculated using the ladder peak areas and concentration for the ladder. Analysis settings can only be changed when reviewing LabChip GX Touch data in the LabChip GX Reviewer software.

To quantitize the sample peak concentration based on a different standard, the new standard must be added into each sample well at a known concentration. The analysis settings provide a Sample Peak Quantitation option using the peak area and concentration of the User Standard instead of the ladder concentrations. Analysis settings can only be changed when reviewing LabChip GX Touch data in the LabChip GX Reviewer software.

Protein Charge Variant Assay

Capillary Zone Electrophoresis (CZE) is an electrophoretic separation technique used to evaluate the charge heterogeneity of proteins in a sample. The LabChip GXII Touch performs a microfluidic adaptation of this technique for the Protein Charge Variant Assay. For Protein Charge Variant assays, the separation channel does not contain a polymer gel because the analytes are not separated by size.

Protein Charge Variant assays separate analytes based on differences in their net charge: molecules with a higher net charge migrate faster than those with a lower net charge. The relative difference in migration speeds (and therefore the resolution) between molecules of different pI is higher when the pH of the running buffer is closer to the pIs of the molecules.

For the HT Protein Charge Variant assay, the pH of the running buffer is less than the pIs of the variants, so molecules have a net positive charge. Variants that are more basic (have a higher pI) than others appear earlier in electropherogram. The software can be used to track expected variants, based on migration time, and to determine the relative amount of each variant, based on peak area.

Protein Charge Variant assays do not use ladders or markers to align the data. The size of a peak is not calculated, only the % Rel amount of each peak. Protein Charge Variant assays and data files do not include any ladder or marker parameters or options. Analysis settings can only be changed when reviewing LabChip GX Touch data in the LabChip GX Reviewer software.

RNA Assay Analysis

RNA analysis initially progresses similarly to DNA analysis except that the baseline for RNA peaks is calculated using a spline-fit, much like the baseline used for the Baseline Subtraction option. However, this computed fit is not subtracted from the data; instead it is used to determine the peak height and to limit the peak extends.

The RNA ladder is similar to the DNA ladder but does not contain an upper marker. RNA sample data is aligned with the lower maker and then the sample peaks are sized using point-to-point interpolation between ladder peaks. The most prominent peaks found within predefined size windows are identified as ribosomal rRNA genes 5S, 18S and 28S (for eukaryote RNA), 16S and 23S (for prokaryote RNA).

For the purpose of quantitizing the full RNA content in the sample, a straight-line baseline is drawn across the bottom of the sample by finding the local averages about its endpoint. Trapezoidal integration from the straight-line baseline to the data signal is used to calculate the total RNA area. Integration is performed from the end of the lower marker to the endpoint of the area baseline. The range from the end of the 5S to the start of the 18S peak is termed the Fast Area. This area is calculated in the same way as the total RNA area.

For the purpose of quantitizing the rRNA peaks, a two-point baseline is drawn across the bottom of each peak identified as rRNA and the area is computed. These areas and rRNA peak heights and some relevant ratios are exported in the Well Table. A combination of the quantities is used to assess the quality of the RNA sample. Analysis settings can only be changed when reviewing LabChip GX Touch data in the LabChip GX Reviewer software.

Sample Names File

Sample Names files are used to import sample names into a data file as the data file is created. The Sample Names File can also contain expected peaks or Size and Dilution factors. The sample names file is created in the LabChip GX Reviewer or LabChip GX Touch software. See the *LabChip GX Reviewer User Manual* for details on creating the sample names file in LabChip GX Reviewer. Sample Name that contain 96 wells or 384 wells can be created in the LabChip GX Touch software (see page 57).

Start Time

This setting determines the time after the start of a run when peaks will be detected. Any peaks appearing before this time are ignored. Analysis settings can only be changed when reviewing LabChip GX Touch data in the LabChip GX Reviewer software.

Revvity Product Warranty

Revvity, Inc. (“Revvity”) provides a limited warranty to the original purchaser of each product (each, a “Warranty”), as set forth below. Please note that extended warranty and support plans are available for purchase, under separate agreement. Please contact Revvity customer support for more information.

I. LIMITED WARRANTY.

LabChip GX Touch/GXII Touch Instrument Warranty: Revvity warrants to the original purchaser (“Customer”) that at the time of shipment to the Customer, the LabChip GX Touch/GXII Touch instrument (“Instrument”) is free from defects in materials and workmanship, and shall substantially conform to its published specifications.

Microfluidic Chips Warranty: Revvity warrants to Customer that at the time of shipment to the Customer, the microfluidic chips (each, a “Chip”) are free from defects in material and workmanship, and shall substantially conform to the Chips published specifications. A “defect” for purposes of this Chip Warranty is defined as any failure that occurs during analysis of the first one hundred (100) samples being run on a Chip. Customer shall only use solvents and/or reagents supplied by Revvity or expressly recommended by Revvity in conjunction with the use of the Chip.

Software and Firmware: Revvity warrants that such software and firmware will conform to Revvity’s program manuals current at the time of shipment to Customer when properly installed on the processor and properly used in accordance with the software's end user license agreement; provided, however, that Revvity does not warrant that the operation of the processor or software or firmware will be uninterrupted or error-free.

EXCEPT IN THE CASE OF AN AUTHORIZED DISTRIBUTOR OF REVVITY, AUTHORIZED IN WRITING BY REVVITY TO EXTEND THIS WARRANTY TO DISTRIBUTOR'S CUSTOMERS, THE WARRANTY HEREIN APPLIES ONLY TO THE CUSTOMER AND MAY NOT BE ASSIGNED, SOLD OR OTHERWISE TRANSFERRED TO ANY THIRD PARTY.

II. WARRANTY PERIOD.

Unless otherwise stated in a purchase order, quotation or other purchase and sale documentation agreed to in writing by Revvity, the warranty period begins upon the date of shipment and shall continue for a period of (i) one (1) year for an Instrument; (ii) sixty (60) days for Chips; and (iii) ninety (90) days for software and firmware (each, a “Warranty Period”). Customer must notify Revvity of any Warranty claim prior to expiration of the Warranty Period. Notwithstanding anything to the contrary contained herein, the Warranty Period for data processing equipment, including data storage devices, processors, printers, terminals, communication interfaces, tape drives and all similar devices, is in all cases limited to ninety (90) days from the date of shipment to Customer.

III. EXCLUSIONS, LIMITATIONS AND CUSTOMER RESPONSIBILITY.

Instrument Exclusions: It is recognized that some parts by their nature may not function for the Warranty Period applicable to the Instrument. Therefore, the following are expressly excluded from the Warranty described in Section I above:

- chromatography columns, filaments, energy sources, lamps, power amplifier tubes, graphite tubes, sample cell holders, burner and furnace chambers, nebulizers, and other similar parts referenced in the Instrument's applicable operating manual;
- equipment or accessories which are identified on applicable price lists, quotations, special promotional materials for which this limited Warranty may be further limited. Included within this category are items produced by third party manufacturers (as to which Revvity passes to Customer the warranty it has been provided by the manufacturer) and items which are sold at specially reduced prices with reduced warranty protection (in some cases, extended warranty protection may be available at an increased price); and
- loss, damage, or defects resulting from transportation to the Customer' facility, improper or inadequate maintenance by Customer, Customer-supplied software or interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the Instrument or improper site preparation or maintenance.

Chip Exclusions: The Chip Warranty described in Section I above does not extend to any Chip which has been:

- the subject of an accident, misuse, or neglect;
- modified by a party other than Revvity;
- used in a manner not in accordance with the instructions contained in the product's user manual;
- used with solvents and/or reagents not supplied by Revvity and/or recommended in writing by Revvity; and/or
- used for an assay or application which has not been approved by Revvity.

Customer Responsibilities: In order for a product to be covered under any Warranty described herein, Customer must comply with the following terms:

- The product must be used under normal installation and application conditions as described in the applicable product's user manual
- The product must be maintained as described in the applicable user manual.
- When Revvity provides telephone, fax, or email support, Customer is responsible for completing any necessary documentation required by Revvity for the provision of any services.

- Customer must perform the appropriate level of revalidation required as a result of any maintenance or service provided.
- For on-site services, Customer must ensure that the site where the product is located is safe for Revvity personnel to enter, prior to Revvity performing any services under this Warranty. Revvity reserves the right to refuse to service the products covered under this warranty, if the Customer's site where the product is located is hazardous to the health and safety of Revvity personnel.

Limitations:

- The Warranty only covers products manufactured by Revvity. Any warranties that may be applicable to third party components shall be provided by the respective manufacturers or suppliers of such third party components, and Revvity shall use reasonable efforts to assist the customer in securing the benefits of any such warranties.
- Damage to limited-life parts caused by insufficient maintenance or cleaning practices or unauthorized applications are not covered under Warranty.
- Failure of the Customer to comply with the aforementioned “Customer Responsibilities” will void any applicable Warranty.
- Any hardware or software covered under Warranty that is altered will void the Warranty, unless such alteration is performed by Revvity or an approved Revvity vendor.
- Any product that has been subject to misuse, accident, negligence or improper transportation, handling, installation, storage, use, or maintenance shall not be covered under any applicable Warranty.
- Many Revvity products require the use of Revvity Automation Certified Disposables for proper operation. These may include, but are not limited to: pipet tips, seals, labels and filters. Use of a Revvity product with any disposables other than the specified Revvity Automation Certified Disposables will void any applicable Warranty.
- All software products are subject to the applicable software end user license agreement included with the software product.
- Any Warranty provided herein shall apply only to products within the country of original delivery. Products transferred outside the country of original delivery, either by Revvity at the direction of Customer or by Customer's actions subsequent to delivery, may be subject to additional charges prior to any warranty repair or replacement of such products based on the actual location of such products and Revvity's warranty and/or service surcharges for such location(s).

IV. REMEDIES, DISCLAIMER AND LIMITATIONS OF LIABILITY.

Warranty Disclaimer: TO THE MAXIMUM EXTENT PERMISSIBLE UNDER APPLICABLE LAW, REVVITY EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES OF ANY KIND, EXPRESS, IMPLIED OR STATUTORY, INCLUDING WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY OR SATISFACTORY QUALITY, FITNESS FOR A PARTICULAR PURPOSE, NONINFRINGEMENT OF THIRD PARTY RIGHTS, AND ANY IMPLIED WARRANTIES ARISING FROM COURSE OF DEALING OR COURSE OF PERFORMANCE. REVVITY DOES NOT WARRANT THAT THE FUNCTIONS CONTAINED IN ANY SOFTWARE WILL MEET THE CUSTOMER'S REQUIREMENTS, OR THAT THE OPERATION OF ANY SOFTWARE WILL BE UNINTERRUPTED OR ERROR-FREE, OR THAT DEFECTS IN ANY SOFTWARE WILL BE CORRECTED. NO ORAL OR WRITTEN INFORMATION OR ADVICE GIVEN BY REVVITY SHALL CREATE A WARRANTY OR IN ANY WAY INCREASE THE SCOPE OF THIS WARRANTY. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OF IMPLIED WARRANTIES, SO THE ABOVE EXCLUSION MAY NOT APPLY TO THE CUSTOMER. THE TERMS OF THIS DISCLAIMER DO NOT AFFECT OR PREDJUDICE THE STATUTORY RIGHTS OF A CONSUMER ACQUIRING REVVITY PRODUCTS OTHERWISE THAN IN THE ORDINARY COURSE OF BUSINESS, NEITHER DO THEY LIMIT OR EXCLUDE ANY LIABILITY FOR DEATH OR PERSONAL INJURY CAUSED BY REVVITY'S NEGLIGENCE.

Remedies: As Customer's sole and exclusive remedy under this Warranty, Revvity agrees either to repair or replace, at Revvity's sole option, any part or parts of such product which, under proper and normal conditions of use, prove(s) to be defective within the applicable Warranty Period. Alternatively, Revvity may at any time, in its sole discretion, elect to discharge its warranty obligation hereunder by accepting the return of any defective product pursuant to the terms set forth herein and refunding the purchase price paid by Customer. THE REMEDIES PROVIDED HEREIN ARE CUSTOMER'S SOLE AND EXCLUSIVE REMEDIES. REVVITY NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON TO ASSUME FOR IT ANY OTHER LIABILITY IN CONNECTION WITH THE DESIGN, MANUFACTURE, SALE, DELIVERY, INSTALLATION, SERVICE OR USE OF THE PRODUCTS.

Limitations of Liability: REGARDLESS OF WHETHER ANY REMEDY SET FORTH HEREIN FAILS OF ITS ESSENTIAL PURPOSE OR OTHERWISE, IN NO EVENT WILL REVVITY, ITS AFFILIATES, ITS LICENSORS OR SUPPLIERS BE LIABLE TO CUSTOMER OR ANY THIRD PARTY UNDER ANY LEGAL THEORY OF LIABILITY FOR ANY LOSS OF PROFITS OR REVENUE, LOSS OR INACCURACY OF DATA, INTERRUPTION OF BUSINESS, COST OF SUBSTITUTION, INTERRUPTION, DELAY, LOSS RESULTING FROM SYSTEM OR SYSTEM SERVICE FAILURE, BREACHES IN SYSTEM SECURITY, OR ANY OTHER INDIRECT, SPECIAL, CONSEQUENTIAL, EXEMPLARY OR INCIDENTAL DAMAGES OF ANY NATURE, EVEN IF REVVITY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES AND WHETHER OR NOT SUCH DAMAGES ARE FORESEEABLE. IN NO EVENT WILL THE LIABILITY OF REVVITY, ITS AFFILIATES, ITS LICENSORS OR SUPPLIERS EXCEED THE GREATER OF ONE U.S. DOLLAR OR THE PURCHASE PRICE RECEIVED BY REVVITY FROM CUSTOMER FOR THE PRODUCTS. Some jurisdictions do not allow the exclusion or limitation of liability for consequential or incidental damages, so the above exclusion may not apply.

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