

IFC Controller MX and IFC Controller HX

User Guide



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About This Guide

IMPORTANT Before using the instrument, read and understand the safety guidelines in this document. Failure to follow these guidelines may result in undesirable effects, injury to personnel, and/or damage to the instrument or to property.

For complete safety information, see [Appendix F](#).

How to Use This Guide

This user guide provides information about setup, installation, operation, and maintenance of the IFC Controller MX and IFC Controller HX. In this document, the term “controller” refers to the IFC controller and the term “software” refers to the IFC controller software.

Safety Alert Conventions

Fluidigm documentation uses specific conventions for presenting information that may require your attention. Refer to the following safety alert conventions.

Safety Alerts for Chemicals

For hazards associated with chemicals, this document follows the United Nations Globally Harmonized System of Classification and Labelling of Chemicals (GHS) and uses indicators that include a pictogram and a signal word that indicates the severity level:

Indicator	Description
	Pictogram (see example) consisting of a symbol on a white background within a red diamond-shaped frame. Refer to the individual safety data sheet (SDS) for the applicable pictograms and hazards pertaining to the chemicals being used.
DANGER	Signal word that indicates more severe hazards.
WARNING	Signal word that indicates less severe hazards.

Safety Alerts for Instruments

For hazards associated with instruments, this document uses indicators that include a pictogram and signal words that indicate the severity level:

Indicator	Description
	Pictogram (see example) consisting of a symbol on a white background within a black triangle-shaped frame. Refer to the instrument user guide for the applicable pictograms and hazards pertaining to instrument usage.
DANGER	Signal word that indicates an imminent hazard that will result in severe injury or death if not avoided.
WARNING	Signal word that indicates a potentially hazardous situation that could result in serious injury or death if not avoided.
CAUTION	Signal word that indicates a potentially hazardous situation that could result in minor or moderate personal injury if not avoided.
IMPORTANT	Signal word that indicates information necessary for proper use of products or successful outcome of experiments.

Safety Data Sheets

Read and understand the SDSs before handling chemicals. To obtain SDSs for chemicals ordered from Fluidigm, either alone or as part of this system, go to fluidigm.com/sds and search for the SDS using either the product name or the part number.

Some chemicals referred to in this user guide may not have been provided with your system. Obtain the SDSs for chemicals provided by other manufacturers from those manufacturers.

Chapter 1: Introducing IFC Controller MX and IFC Controller HX

The IFC controller is a compact single-bay instrument that employs pneumatic pressure to precisely meter samples and reagents and to control valves within the integrated fluidic circuit (IFC). This document covers two models:

- IFC Controller MX is designed to load digital PCR IFCs (including 12.765 Digital Array™ IFC, 48.770 Digital Array IFC, and qdPCR 37K™ IFC), and 48.48 Dynamic Array™ IFC.
- IFC Controller HX is designed to load the 96.96 Dynamic Array IFC, the High-Precision 96.96 Genotyping™ IFC, Flex Six™ Gene Expression IFC, and Flex Six Genotyping IFC.

This user guide addresses the operation and maintenance of both models.

The IFC controller can control and apply pressures to different sealing zones on the IFC input/output frame to enable:

- Metering of liquids from inlet positions in the input frame to reaction chambers within the IFC
- Metering of liquids within the IFC
- Opening and closing of valves within the IFC

This user guide walks you through:

- Key features and benefits of IFC Controller MX and HX
- Installation and setup procedures
- Description of system functions

NOTE IFC Controller MX and HX are for research use only and are not for use in diagnostic procedures.

Components of the IFC Controller

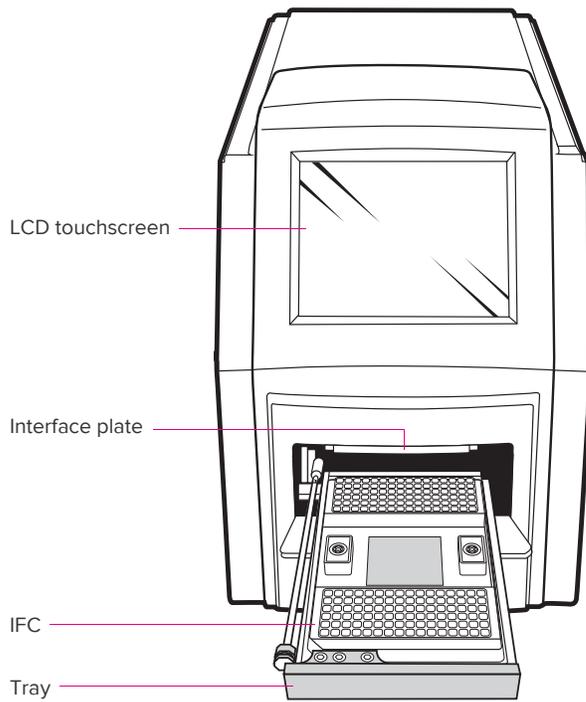


Figure 1. Front of IFC controller

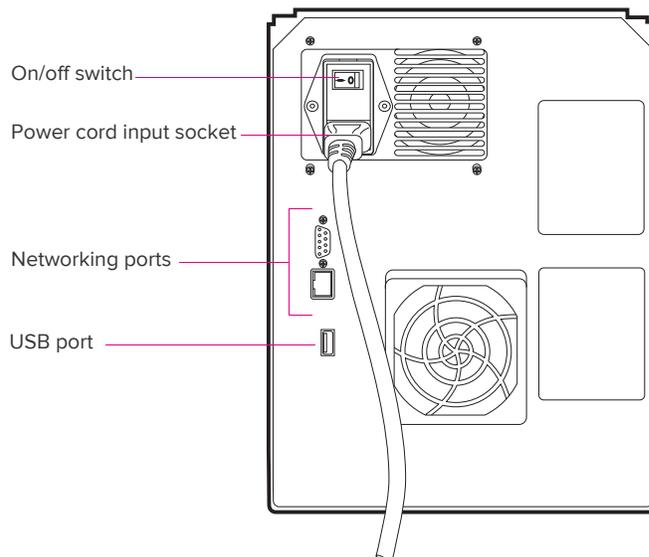


Figure 2. Back of IFC controller

Component	Purpose	Quantity
IFC controller	Controls filling of reagents and valve actuation in IFCs	1
Removable interface plate	Interface between IFC and IFC controller with pressure inlet ports	1
Power cable	Country-specific power cable to connect IFC controller to wall socket.  The instrument has a connection to protective earth through the power cord provided by Fluidigm. Ensure that the electrical receptacle provides an earth ground before connecting the power cord. Use only power cords provided by Fluidigm or power cords that meet the minimum ratings of 250V/10A, 16AWG and a length not exceed 2 meters (6 feet).	1
Fuse	Spare fuse based on country voltage	2
Removable interface plate O-rings	Spares for use if an O-ring is lost during cleaning of interface plate	4

NOTE To order additional items, contact Fluidigm sales. For phone or email contact information, go to fluidigm.com/contact.

IFC Controller Overview

IFC Controller MX and IFC Controller HX control the pressure required to precisely meter fluids to the fluid channels and control valves on the IFC using a single bay. The IFC controller is a pneumatically operated desktop instrument. It has a built-in air compressor capable of maintaining pressure at 50–80 psi, sufficient for the controller operation. The embedded PC inside the IFC controller regulates all the functions and monitors instrument performance. It has a single loading bay to hold the IFC, which is shuttled in and out of the instrument by a pneumatic cylinder. A barcode reader scans the barcode label on the IFC when it is shuttled into the instrument. The IFC controller has a touchscreen LCD display. All user-specific instructions and functions can be controlled through the touchscreen.

The instrument activates pneumatic cylinders through a set of solenoid valves and regulators. When you press Eject, the shuttle solenoid valve moves the shuttle to its ejected position, enabling the user to place an IFC on the shuttle. Similarly, the shuttle moves in when you press Load. When the shuttle is in, the IFC moves into the loading position and comes into contact with the removable interface plate to form a seal. Air pressure is directed through the interface plate into the IFC to pressurize fluids and control channels.

Technical Specifications

Electrical input voltage of the IFC Controller RX is 100–240VAC, 2.7A, 50/60Hz.

Operating Environment

IFC Controller MX and IFC Controller HX should be used in an environment that meets the following requirements.

IMPORTANT The IFC controller is for indoor use only.

Temperature	Ambient between 20 °C and 30 °C
Humidity	30%–80%, noncondensing
Pollution	Degree 2
Electrical Installation	Category II
Altitude	Up to 2,000 meters (6,562 feet) above sea level

Power Options

IFC Controller MX and HX operate through 110–230 V AC power at 50/60 Hz.

Barcode Labeling

Labels on the IFC contain the Fluidigm logo, a unique 10-character number, and a one-dimensional, Code 128 barcode. With the provided integrated barcode reader, you can use this barcode to track samples and experiments.

Regulatory Compliance

The following directives and harmonized standards were used to evaluate the safety and performance of the IFC controller:

General Regulations and Requirements

- 2014/35/EU European Parliament Low Voltage Directive
- 2014/30/EU European Parliament Directive: Electromagnetic Compatibility

Harmonized Standards

- IEC/EN 61326-1
- IEC/EN 61010-1
- IEC/EN 61010-2-010
- IEC/EN 61010-2-081
- UL Standard Number 61010-1 2nd Edition
- CAN/CSA-C22.2 No. 61010-1-04

Conformity Symbols on the Instrument

The instrument is labeled with the following conformity markings:

Conformity mark	Description
	Indicates conformity with safety requirements for Canada and the United States.
	Indicates conformity with European Union requirements for safety and electromagnetic compatibility.

Refer to [Operating Environment on page 10](#) for more detailed information on the recommended environmental conditions.

Chapter 2: IFC Controller Basics

This chapter describes how to use IFC Controller MX and IFC Controller HX.

IMPORTANT To set up the IFC controller, read the site requirements and installation instructions in [Appendix C: IFC Controller Site Requirements and Setup](#) on page 37.

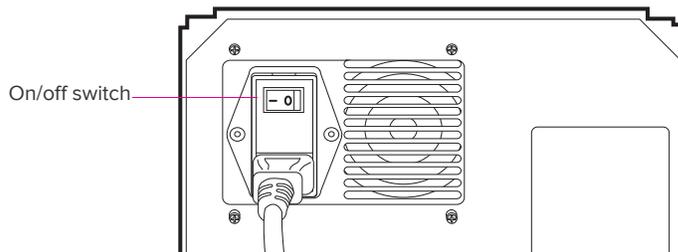


WARNING PHYSICAL INJURY HAZARD. Do not attempt to lift or move any boxed items unless you use proper lifting techniques. The IFC controller is shipped in one cardboard box that also contains a power cable and cleaning plates. Together they weigh 57.8 lb (26.2 kg).

If you choose to lift or move the instrument after it has been installed, do not attempt to do so without the assistance of others. Use appropriate moving equipment and proper lifting techniques to minimize the chance of physical injury.

Start the IFC Controller

- 1 Turn on the switch on the back of the IFC controller.



- 2 The LCD display lights up. After 10–15 seconds the initialization screen appears.



The IFC controller software starts and initializes all system components including communication protocol, position sensors, pressure sensors, valve positions, software parameters, uploading of the instrument configuration information, and calibration data.

After initialization, the instrument runs an internal health check, which includes running the air compressor until a pressure of 80 psi is reached. Then the system performs a series of pressure checks that are verified against factory settings.

In the event the compressed air pressure is out of range or there are leakages at the connections of inlet ports or accumulators, one of the following error messages appears on the screen:

- Compression pressure is out of range
- Instrument requires re-calibration
- Leak detected on port
- Leak detected on accumulator side

In all cases, contact technical support for service. For phone or email contact information, see [page 2](#).

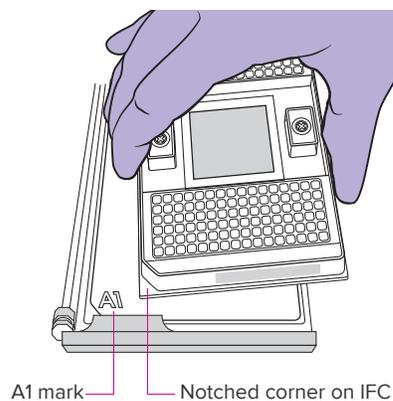
Load an IFC

For more information about using the software, see [Chapter 3: Using the IFC Controller Software](#).

- 1 At completion of power-up and instrument initialization, the Home screen appears. You may log in now or later. See [Log In on page 16](#).
- 2 Press **Eject** to move the tray out of the IFC controller.



- 3 Place the IFC onto the tray by aligning its notched corner to the A1 mark.



- 4 Press **Load Chip** to register the IFC barcode and activate script selection.

Run Scripts

- 1 Choose a prime script to run from the script selection window. The list of available scripts is defined by the IFC barcode.



If prompted to log in, see [Log In](#) on page 16.

- 2 Press **Run Script**.



A status screen provides an estimated time of completion. You can abort a session from this screen.



When the script has successfully completed, a dialog box alerts you that the script is completed and displays an Eject button.



- 3 Press **Eject** to move the IFC out of the controller.
- 4 You may now pipet into the IFC.
- 5 Return the IFC to the controller.
- 6 Run the appropriate script to introduce samples and assays into the IFC, either load or load-mix, depending on IFC type.



Chapter 3: Using the IFC Controller Software

Log In

- 1 Press **Login** at the bottom right of the screen.



- 2 Log in as **Admin** or **User**.



When entering a password for the first time:

- If you are logging in as Admin, the initial default password is: 123456
- If you are logging on as User, there is no initial default password.

For more information, see [Manage Users on page 24](#).

User Tools

After logging in as User, press **Tools** at the bottom right of the screen.



When logged in as User, these tools are available:



- **Edit User.** Allows you to change your password.
- **Settings.** Allows you to enable full logging for this session. If this option is selected, the system logs every event on the system until it is rebooted or the option is turned off. This is useful if you believe your machine is not functioning correctly. You can record what your machine is doing and export the log and share it with Fluidigm technical support for troubleshooting. By default, this option is not selected.



- **Clean System.** Allows you to manually clean the system. For more information, see [Manually Clean the System on page 34](#).
- **Export Log.** Allows you to export system activity logs if you enabled Full Logging for this Session in the Settings screen. For more information, see [Export Logs on page 25](#).

Administrator Tools

When logged in as Administrator, in addition to the User tools, you can manage users, passwords, settings, and scripts.

Press **Tools** at the bottom right of the screen.



The Tools menu appears:



Edit User

In the Edit User screen, you can edit user name, password, and email notification settings by clicking the corresponding **Edit** buttons.



If you edit email notification, a new screen appears. You can receive notifications by email or by text message.



If you select By Phone Number and Carrier, you also have to select the carrier service that you subscribe to.



Change Settings

1 Press **Settings**. Settings on this screen include:

- **Enable Full Logging for this Session.** If this option is selected, the system logs every event on the system until it is rebooted or the option is turned off. This is useful if you believe your machine is not functioning correctly. You can record what your machine is doing and export the log and share it with Fluidigm technical support for troubleshooting. By default, this option is not selected.
- **Enable Barcode.** Selected by default. The barcode reader attempts to read the barcode of every IFC. If you are running an IFC that does not have a barcode, you can disable this setting.

NOTE We recommend that you keep the barcode reader enabled. The instrument will display only those scripts that pertain to your IFC type. This helps prevent errors in script selection.

- 2 Press **Save** if you change the settings.

Settings

Enable Full Logging for this Session

Enable Barcode

Instrument Information

Serial Number: TPZ-000003

Chip supported: 109, 110, 112

Firmware Version: 1-0-1

Software Version: 1.0.3148.27369

CANCEL SAVE

Operating in Group Mode

You can operate the IFC controller in conjunction with other IFC controllers. On the instrument you wish to use as the master controller:

- 1 Select **This instrument is the group master**.

Group Mode Settings

This instrument is independent

This instrument is a group worker

This instrument is the group master

Worker List:

EDIT WORKERS

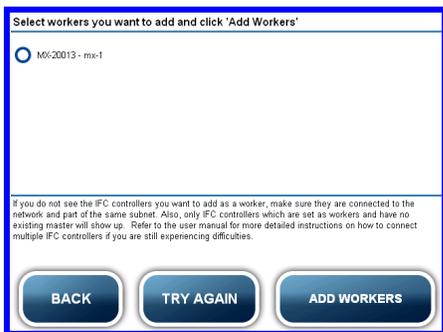
CANCEL SAVE

- 2 On the instruments you wish to link to the master controller, open Group Mode Settings and select **This instrument is the group worker**.
- 3 Return to the master IFC controller and select **Add More Workers**.

Select a worker to edit or remove from list, or add more workers

BACK ADD MORE WORKERS OK

- 4 Select the controllers to link.



- 5 Click **Add Workers**.

The master controller now has a Master Mode icon on its screen and the worker controller(s) now have a Worker Mode icon on their screen.



Master mode

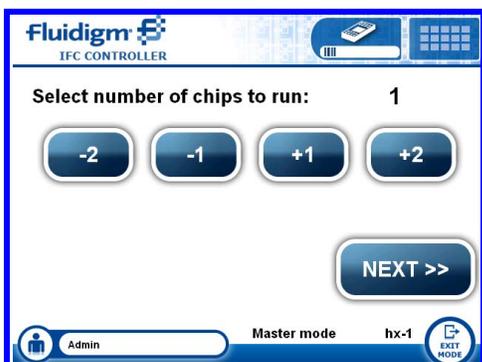


Worker mode

You can now control the worker IFC controllers remotely via the master IFC controller.

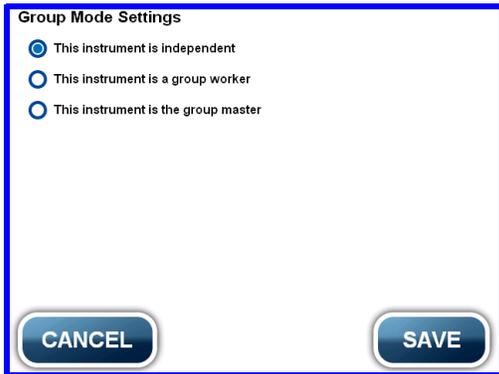
- 6 Select the number of IFCs you wish to run.

The default number is the number of IFC controllers connected via group operating mode. For example, if you have four IFC controllers linked, four will be the default number of IFCs to run. If you only want to run two, select **-2** to adjust the number.

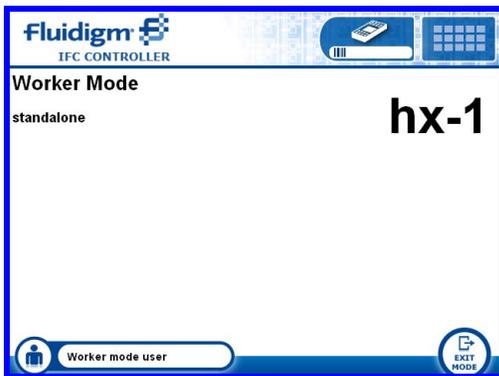


To leave the worker or master modes, click **Exit Mode**.

- 7 You can also choose to operate a system independently by selecting **This instrument is independent**.



The screen indicates it is in worker mode, independent of any other systems:



Clean System (manually)

- 1 Press **Clean System**.
- 2 Place the cleaning plate on the tray and press **Start System Cleaning**.
- 3 When the system purge is complete, the tray ejects.

For more details, see [Manually Clean the System on page 34](#).

Network Settings

Network Setting **Server**

Get IP address dynamically through DHCP
 Use static IP address

Address: 10.3.2.119 Mask: 255.255.0.0

DNS Address: 10.100.1.35 edit

Network Unit Name: hx-1 edit

CANCEL **SAVE**

On the Network Setting tab, your IT professional can network the IFC controller to your company's network and choose to get an IP address dynamically through DHCP or use a static IP address.

Other editable items are:

- DNS addresses
- Network unit name

NOTE If you are networking multiple IFC controllers, you need to edit the network unit name. Controllers are delivered with the same default name.

On the Server tab, editable items include:

- Mail server
- Port number
- User name
- Password
- From

Network Setting **Server**

Mail server: [Do not use] edit Port: 0 edit

Username: [Empty] edit

Password: [Empty] edit

From: [Same as username] edit

Mail server can be used for sending notifications when scripts are completed. Each user can be configured to receive e-mail or SMS notifications to the phone number or e-mail of their choice.

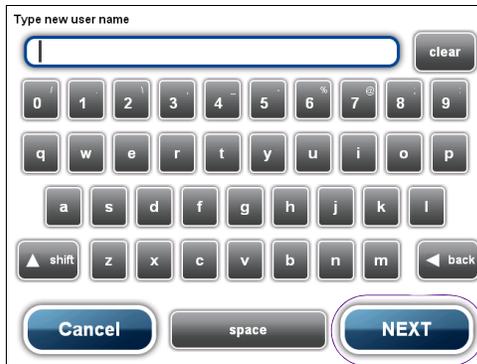
You can quickly test the settings by sending a test e-mail. test

CANCEL **SAVE**

Manage Users

Use the Manage Users screen to add, delete, and edit users.

- 1 Press **Manage Users**.
- 2 Press **Add New User**.
- 3 Use the onscreen keyboard to enter a user name.
- 4 Press **Next**.



- 5 To assign a password for this user, press **Change**. Enter a password using the onscreen keyboard.



- 6 Assign an access level by choosing **Normal** or **Administrator**.
 - Normal access level allows basic script running.
 - Administrator access level allows basic script-running and the ability to change user access and passwords and manage scripts and system settings.

- 7 Press **Save**.



The new user name appears on the login screen.

Export Logs

If you enabled Full Logging for this Session in the Settings screen, you can export system logs to a USB drive.

- 1 Press **Export Logs** from the Tools menu.
- 2 Insert your USB drive into the IFC controller USB port on the back of the instrument.
- 3 Press **Export**.



Change Time/Date

- 1 Press **Change Time/Date**. Use the blue arrows to adjust the time and date from this screen.
- 2 Press **Save** when finished.

Fluidigm IFC CONTROLLER

Year: 2008 Month: 8 Day: 20

Time: 4 : 36 : 37 AM

HOUR MINUTE SECOND

CANCEL SAVE

Manage Scripts

For more detailed information on loading and updating scripts, see [Update Software and Scripts on page 27](#).

- 1 Press **Manage Scripts**.
- 2 Add scripts from a USB drive or copy scripts to a USB drive from this screen.
Your scripts must be in a folder named “Scripts” on your USB drive in order for the IFC controller to find your scripts.
- 3 Press **Save**.

Scripts in the IFC Controller MX and IFC Controller HX Software

Available IFC controller scripts are:

Script	Description
Prime	<ul style="list-style-type: none"> • Closes appropriate valves to prevent accidental mixing of samples and assays • Prepares IFC for setup • Pressurizes control lines
Load Mix	Pressurizes samples and assays into reaction chambers and opens interface valves for mixing

Log Out

- 1 When you are finished using the IFC controller, press **Logout** at the bottom right of the screen.



- 2 Press **Log Off**.

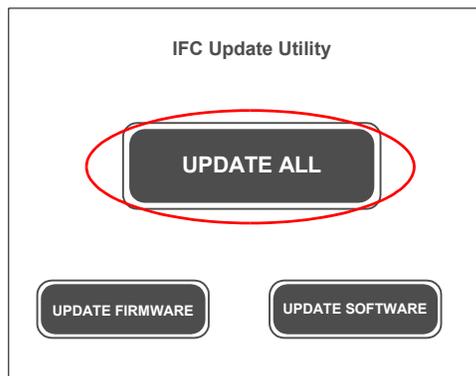


Update Software and Scripts

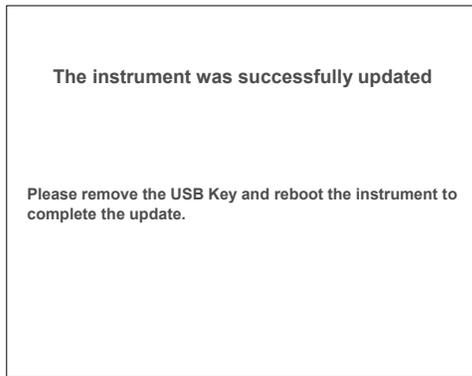
Occasionally, Fluidigm provides updates to the system software and new scripts. Check for updates on our website at fluidigm.com/software

Install Updated Software and Scripts

- 1 Turn off the IFC controller by pressing the power switch at the back of the instrument.
- 2 Insert the USB drive containing the updates into the USB port.
- 3 Turn on the IFC controller by pressing the power switch at the back of the instrument.
- 4 Press **Update All** to update the software and firmware.



A status screen shows the software/firmware was successfully updated.



- 5 Turn off the IFC controller, take out the USB drive, and turn the controller back on to reboot the system.

Load New Scripts

- 1 Log in as **Administrator**.
- 2 Press **Tools**.



- 3 Press **Manage Scripts**.
- 4 To add all of the new scripts, press **Add All Scripts from USB Key**.



You can now view, rename, or delete the individual scripts.

To select a script, press the script's name. This example shows Prime (115x).



You can now change its name or delete it.



- 5 To change the name of the selected script, press **Change** and enter a new name.
- 6 To delete unwanted scripts, press **Delete Script**.

Appendix A: Troubleshooting

Observation and Possible Course of Action

Observation	Possible Cause	Recommended Action
IFC controller failed to power on.	No AC power	Check that power cable is properly connected to both wall socket and IFC controller. Be sure power switch on wall socket is on. Turn on the instrument power switch on back panel. If using a power strip, be sure it is turned on.
	IFC controller fuse is faulty.	Refer to Fuse Replacement on page 35 and replace both fuses with the supplied replacement fuses.
No display after power is turned on.	IFC controller power supply is not fully reset.	Turn off IFC controller power switch located on back panel. Wait for 10 seconds and reboot by turning on the power switch.
Compression force is out of range.	Compression cylinder pressure is out of range.	Contact technical support. For email or phone contact information, see page 2 .
Error messages		Reboot the system. If it fails to recover, contact technical support. For email or phone contact information, see page 2 .

Appendix B: Maintenance and Decontamination

Clean the IFC Controller

This section describes how to clean and maintain your IFC controller for optimal performance.

IMPORTANT Before using a cleaning or decontamination method other than those recommended by Fluidigm, verify with Fluidigm technical support that the proposed method will not damage the equipment

IFC Controller MX and IFC Controller HX require very little maintenance other than regular cleaning of the IFC loading bay and the removable interface plate. When the system requires cleaning, a cleaning warning appears on screen.



The IFC software tracks the number of scripts run and requests cleaning according to the following schedule:

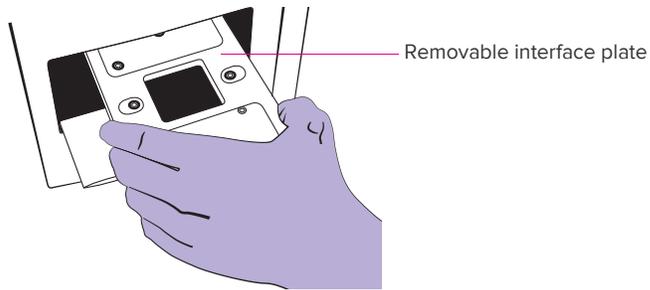
- MX: Perform interface plate cleaning after 50 scripts, system cleaning after 200 scripts.
- HX: Perform interface plate cleaning after 30 scripts, system cleaning after 120 scripts.

You can also run the cleaning protocol manually by accessing the **Clean System** script in the Tools menu.

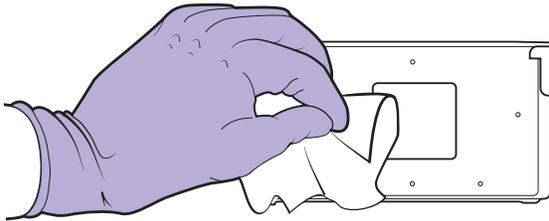
Clean the Interface Plate

The IFC controller notifies you to clean the interface plate after a designated number of scripts have been run. Cleaning of the interface plate may be performed more frequently if desired.

- 1 After the tray ejects, grasp the tab of the red interface plate and remove by pulling toward you.



- 2 Using a lint-free cloth and 70% isopropyl alcohol, gently wipe the top and bottom of the interface plate.



- 3 Reinstall the cleaned removable interface plate:
 - a Orient the plate so that “THIS SIDE UP” is facing up.
 - b Slide the plate into the guide until it stops and you hear a click.

IMPORTANT There are four black O-rings inserted on one side of the removable interface plate. Be sure they are not misplaced or removed while handling the plate. During interface plate installation, these O-rings should face up.

- 4 Press **Done** on the system screen when finished.



Clean the System

The IFC controller will notify the user to do a system clean after a designated number of scripts have been run.

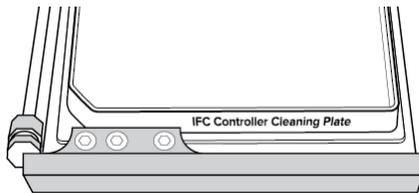
Follow the onscreen instructions:



- 1 Press **Clean**. The System Cleaning Instructions screen appears.



- 2 Place cleaning plate onto tray.



- 3 Press **Start System Cleaning**. A status screen appears.



- 4 When the system purge is complete, eject the tray.
- 5 Rinse the cleaning plate out with water and dry for next use.

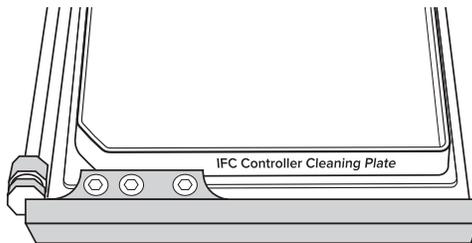
Manually Clean the System

You can manually clean the system at any time.

- 1 Eject the IFC.
- 2 Press **Tools**.
- 3 Press **Clean System**. The System Cleaning Instructions screen appears.



- 4 Place the cleaning plate on the tray and press **Start System Cleaning**.



A status screen appears.

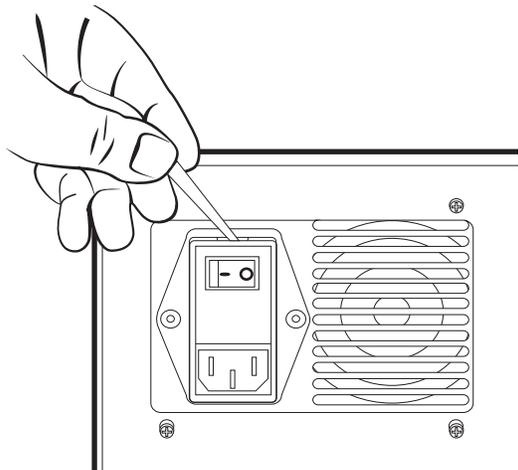


- 5 When the system purge is complete, the tray ejects.

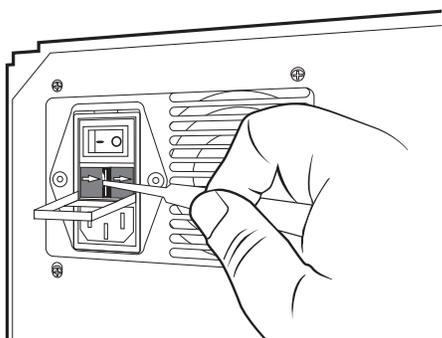
Fuse Replacement

No fuse replacement is required during installation. If the power fuse is faulty, replace it as follows. The fuse is rated 250V / 3.15A.

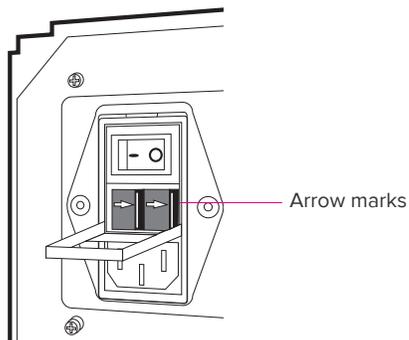
- 1 Turn off and unplug power cord from wall outlet.
- 2 Remove fuse casing from IEC inlet power switch.



- 3 Push and release fuse holder blocks as shown below.



- 4 Replace faulty fuses and reinstall the IEC filter. Follow the arrow marks in the fuse holder to match IEC casing.



Decontamination of the IFC Controller

Ensure that the IFC controller is cleaned and/or decontaminated prior to servicing the equipment, removing it from use, or transporting it for disposal. Refer to the instructions contained in this document and use only those materials specified.

Biological Agents

- 1 Using a soft cloth, apply 70% ethyl alcohol or 70% isopropyl alcohol to all accessible surfaces.
- 2 Keep surfaces wet for at least 5 minutes, then wipe dry.
- 3 Repeat steps 1 and 2 once.
- 4 Clean all decontaminated surfaces with a wet cloth to remove residual alcohol and wipe dry.

Hazardous Chemicals

- 1 Using a soft cloth, apply 70% ethyl alcohol or 70% isopropyl alcohol to all accessible surfaces.
- 2 Before use, ensure that alcohol is compatible with the chemicals used.
- 3 Keep surfaces wet for at least 5 minutes, then wipe dry.
- 4 Repeat steps 1 and 2 once.
- 5 Clean all decontaminated surfaces with a wet cloth to remove residual alcohol and wipe dry.

Radioactive Materials

- 1 Using a soft cloth, apply an industry standard radioactivity decontaminant to all accessible surfaces.
- 2 Wipe the surfaces as directed by the decontaminant manufacturer.
- 3 Survey the instrument with an appropriate radioactivity measuring device.
- 4 Ensure that the survey results are at or below background level.

Appendix C: IFC Controller Site Requirements and Setup



WARNING PHYSICAL INJURY HAZARD. Do not attempt to lift or move any boxed items unless you use proper lifting techniques. The weight of the boxed instrument with a power cable and cleaning plates is 57.8 lb (26.2 kg).

If you choose to lift or move the instrument after it has been installed, do not attempt to do so without the assistance of others. Use appropriate moving equipment and proper lifting techniques to minimize the chance of physical injury.



CAUTION The IFC controller must be installed and operated in accordance with the manufacturer's (Fluidigm) recommendations. Failure to follow these instructions may invalidate your warranty and/or diminish the safe functioning of your instrument.

Site Requirements

To operate the IFC controller, your site should meet the following requirements:

- One electrical power outlet
- A workspace that accommodates the IFC controller

Proper Grounding/Protective Earth Connection

To reduce the risk of electrical shock, connect the IFC controller to the AC power main through a grounded power cable at the power outlet.

Electrical Requirements

The IFC controller should be plugged into a standard US-type power strip with surge protector that provides single-phase AC voltage, between 100 and 240 V (60 or 50 Hz).

IMPORTANT Do not exceed a supply voltage fluctuation over 10% of normal.

Customer Location	Voltage (VAC)	Frequency (Hz)	Maximum Current (A)	Typical Average Power Consumption (W)
Japan	100 ± 10%	50–60 ± 1%	2.7	Idle: 20 Operating: 175
USA, Canada	115 ± 10%	50–60 ± 1%	2.7	Idle: 20 Operating: 175
Europe, Australia	240 ± 10%	50–60 ± 1%	2.7	Idle: 40 Operating: 175

Power Cord Requirements

Fluidigm will provide a country-specific power cord.

Customer Location	Minimum Wire Gauge (AWG)	Maximum Length (m)	Instrument End Plug	Receptacle End Plug
All countries	16	2	IEC C13	Country-specific

Uninterruptible Power Supplies

If your local power supply is subject to frequent power interruptions, you can protect your experiment setups on the IFC controller by using an uninterruptible power supply (UPS) with these minimum requirements:

Output Power Capacity	500W (800VA)
Backup Time (Run-Time)	±30 minutes at 500W
Output Voltage	100–120 VAC
Output Connection	NEMA 5-15R

The UPS described above is sufficient to maintain power to one IFC controller.

NOTE Pressurized gas: The IFC controller has an inbuilt air pump to generate compressed air for IFC operation. No additional air supply is required.

Workspace

Provide a work surface that can accommodate the IFC controller. The following table shows the instrument dimensions and weight.

Length	Width	Height	Weight
19 in (48.3 cm)	9.5 in (24.1 cm)	13 in (33 cm)	45.4 lb (20.6 kg)

The IFC controller is designed as desktop equipment. It can be placed on a laboratory bench top. To accommodate one IFC controller, we recommend you supply a bench top with minimum depth of 25 in (63.5 cm) and width of 16 in (40.6 cm). To allow adequate air circulation, keep at least 2 in (5.08 cm) clearance behind the IFC controller. Multiple controllers can be stacked together side by side.

IMPORTANT

- Do not place the IFC controller on a heated surface or directly above a source of heat.
- Do not place the IFC controller in a position that makes it difficult to operate or disconnect from power.

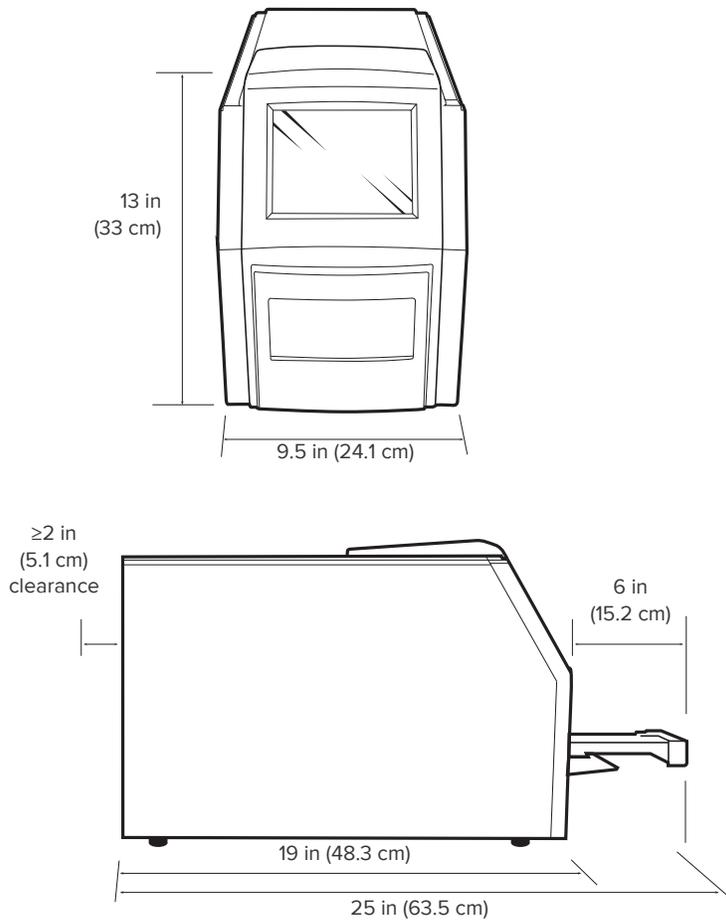


Figure 3. IFC controller dimensions

Electrical Connection

The IFC controller is a standalone desktop instrument that requires only one electrical connection (Figure 4) at the back of the IFC controller. The top left corner has an AC power input socket and a power on/off switch.

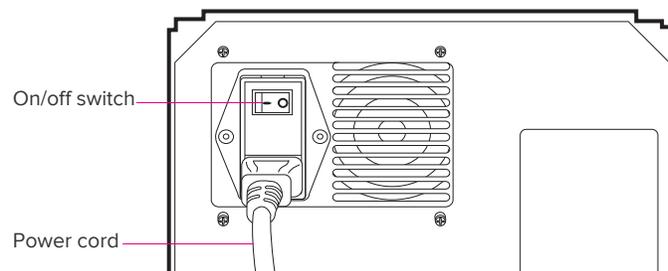


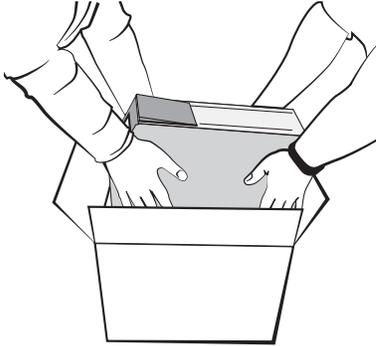
Figure 4. Electrical connection

Unpack the IFC Controller



CAUTION LIFTING HAZARD. The IFC controller is shipped in one cardboard box that also contains a power cable and cleaning plates. Together they weigh 57.8 lb (26.2 kg). Use proper lifting techniques. We recommend using at least two people to lift the IFC controller from the box.

- 1 Unpack the box near its permanent place in the lab.



- 2 Remove components from plastic wrapping.
- 3 Confirm that IFC controller, power cable, and cleaning plates are included in the box. If anything is missing, contact technical support. For phone or email contact information, see [page 2](#).

Install the IFC Controller

IMPORTANT Do not place the IFC controller on a heated surface or directly above a heat source.

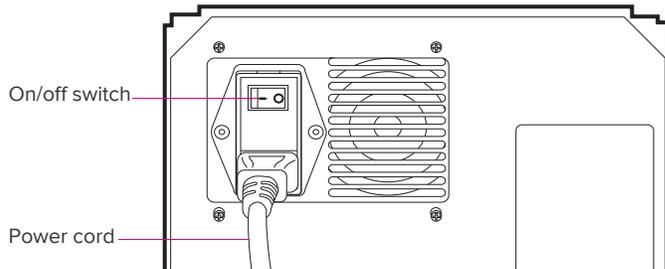
- 1 Place the IFC controller on a laboratory bench top, which must be at least 21 in (54 cm) deep and 10 in (25 cm) wide. For more details, see [Workspace on page 38](#).
- 2 Provide at least 2 in (5.1 cm) of clearance behind the controller to allow adequate air circulation. See [Figure 3 on page 39](#).

Connect the Power Cable

- 1 Connect the power cable to the IFC controller.



The instrument has a connection to protective earth through the power cord provided by Fluidigm. Ensure that the electrical receptacle provides an earth ground before connecting the power cord.



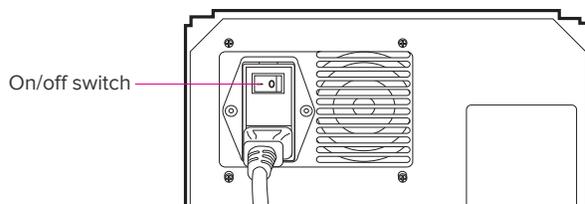
- 2 Plug in the IFC controller to an electrical outlet that provides single-phase AC voltage, between 100 and 240 volts (50 or 60 Hz). Make sure all power switches are off. No additional grounding is required.

IMPORTANT

- Current requirement is 5 amps, but the outlets must be of US standard (NEMA 1-15P) blade type. If you are not operating in the United States, Fluidigm provides a country-specific power cord.
- If your local power supply is subject to frequent power interruptions, you may protect your IFC runs on the IFC controller by using an uninterruptible power supply (UPS). For more information, see [Uninterruptible Power Supplies on page 38](#).

Power On the IFC Controller

- 1 If you are using a surge protector power strip, turn it on.
- 2 Turn on the power switch at the back of the instrument.



- 3 Wait while the IFC controller initializes. Initialization may take up to 5 minutes to complete.

IMPORTANT If prompted, ensure that the interface plate is seated properly.

NOTE The IFC controller uses a touchscreen interface. Once you power on the instrument, all interactions with the application occur by touching the screen.

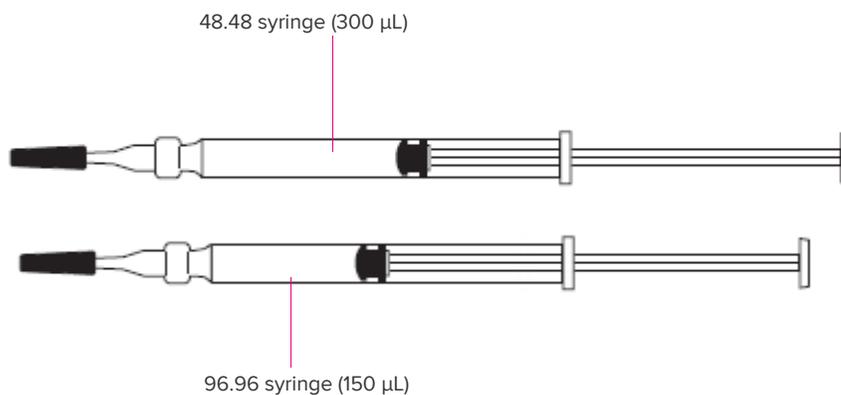
Appendix D: Loading Control Line Fluid

Unpack the Syringes

Remove syringes from packaging.

The syringes are prefilled with control line fluid according to a specific IFC type.

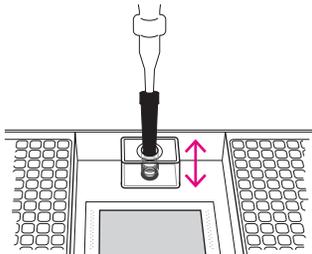
- 48.48 syringes (with 300 μL control line fluid) are used for both 48.48 Dynamic Array™ IFCs and Digital Array™ IFCs.
- 96.96 syringes (with 150 μL control line fluid) are used for 96.96 Dynamic Array IFCs only.



IMPORTANT Do not evacuate air from syringes prior to injecting control line fluid.

Actuate the Check Valves

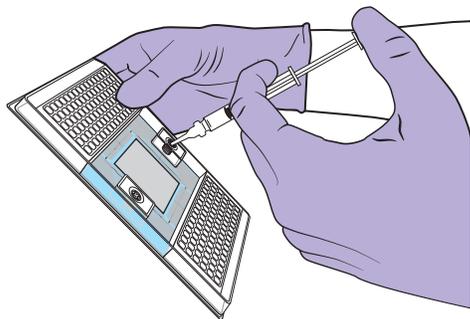
- 1 Place IFC on a flat surface.
- 2 Use syringe with shipping cap in place to actuate both check valves of the IFC with gentle pressure. Be sure syringes can move freely up and down.



Insert the Syringe Tip into the Check Valve

IMPORTANT Control line fluid on the IFC or in the inlets makes the IFC unusable.

- 1 Hold syringe firmly in one hand with tip facing up and away from IFC. Remove the shipping cap with the other hand.
- 2 Hold IFC at a 45-degree angle. Gently insert syringe tip into check valve opening. The tip should be fully inserted.

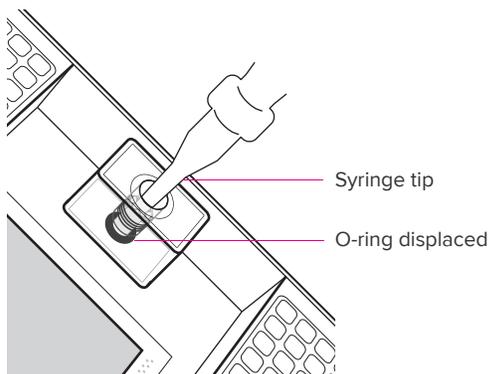


IMPORTANT Be careful not to bend syringe tip.

- 3 Visually confirm that check valve is open. O-ring seal at bottom of valve should be pushed down and moved to the side.

Inject Control Line Fluid

- 1 Inject control line fluid while maintaining 45-degree angle to allow fluid to flow away from O-ring.
- 2 Slowly inject control line fluid by pushing down on syringe plunger. Control line fluid will flow into accumulator through open check valve.



- 3 After fully depressing plunger, wait ~5 seconds before withdrawing syringe.
- 4 Check to make sure O-ring returns to its normal position after syringe is removed.

IMPORTANT The IFC is now ready for the IFC prime script on the controller. Pipet samples and assays within 60 minutes of IFC prime step.

Appendix E: Related Documentation

This document is intended to be used in conjunction with these related documents:

Document Title	Part Number
Biomark™ HD Data Collection User Guide	100-2451
Biomark/EP1™ Data Collection User Guide	68000127
Real-Time PCR Analysis User Guide	68000088
SNP Genotyping Analysis User Guide	68000098
Digital PCR Analysis User Guide	68000100
Melting Curve Analysis User Guide	68000118
Control Line Fluid Loading Procedure	68000132
Gene Expression with the Flex Six IFC Using Fast/Standard TaqMan® Assays Quick Reference	100-7251

Appendix F: Safety

IMPORTANT For translations of the instrument safety information, see Safety Information for Genomics Instruments (PN 101-6810).

General Safety

In addition to your site-specific safety requirements, Fluidigm recommends the following general safety guidelines in all laboratory and manufacturing areas:

- Use the appropriate personal protective equipment (PPE): safety glasses, fully enclosed shoes, lab coats, and gloves, according to your laboratory safety practices.
- Know the locations of all safety equipment (fire extinguishers, spill kits, eyewashes/showers, first-aid kits, safety data sheets, etc.), emergency exit locations, and emergency/injury reporting procedures.
- Do not eat, drink, or smoke in lab areas.
- Maintain clean work areas.
- Wash hands before leaving the lab.

Instrument Safety

The instrument should be serviced by authorized personnel only.



WARNING Do not modify this instrument. Unauthorized modifications may create a safety hazard.



WARNING BIOHAZARD. If you are putting biohazardous material on the instrument, use appropriate personal protective equipment and adhere to Biosafety in Microbiological and Biomedical Laboratories (BMBL), a publication from the Centers for Disease Control and Prevention, and to your lab's safety protocol to limit biohazard risks. If biohazardous materials are used, properly label the equipment as a biohazard. For more information, see the BMBL guidelines online at [cdc.gov/biosafety/publications/index.htm](https://www.cdc.gov/biosafety/publications/index.htm).



WARNING PHYSICAL INJURY HAZARD. Do not attempt to lift or move any boxed or crated items unless you use proper lifting techniques. The IFC controller is shipped in one cardboard box that also contains a power cable and cleaning plates. Together they weigh 57.8 lb (26.2 kg).
If you choose to lift or move the instrument after it has been installed, do not attempt to do so without the assistance of others. Use appropriate moving equipment and proper lifting techniques to minimize the chance of physical injury.



CAUTION PINCH HAZARD. The instrument door and tray can pinch your hand. Make sure your fingers, hands, and shirtsleeves are clear of the door and tray when loading or ejecting an integrated fluidic circuit (IFC).



CAUTION HOT SURFACE HAZARD. The thermal cyclers chuck gets hot and can burn your skin. Use caution when working near the chuck.



CAUTION HOT SURFACE HAZARD. Never press down on the integrated fluidic circuit (IFC) when it is on the thermal cyclers chuck. If you encounter a vacuum problem, turn off the system, allow it to cool down, and remove the IFC. Clean the bottom of the IFC and/or chuck surface with a lint-free cloth and 70% isopropyl alcohol.



CAUTION HOT SURFACE HAZARD. Make sure the chuck has had time to cool. It can get very hot and cause burn injury.

Symbols on the Instrument

The following table describes the hazard symbols that may be used in this document or on labels on the instrument.

Symbol	Description
	Hazard. Consult the user guide for further information.
	Hot surface hazard. Do not touch; potential for personal injury.
	Biohazard.
	Electricity hazard. Indicates high electricity levels and a threat of electric shock from machines and/or equipment in the vicinity. You may suffer severe injuries or death.
	Pinch hazard. Indicates where pinch hazards exist. Exercise caution when operating around these areas.
	Lifting hazard.
	Power switch is in the Off position.
	Power switch is in the On position.
	Protective conductor terminal (main ground). It must be connected to earth ground before any other electrical connections are made to the instrument.
	To minimize negative environmental impact from disposal of electronic waste, do not dispose of electronic waste in unsorted municipal waste. Follow local municipal waste ordinances for proper disposal provision. Contact customer service for information about responsible disposal options.

Electrical Safety

NOTE The main power disconnect is on the rear panel of the instrument.



WARNING ELECTRICAL HAZARD. DO NOT REMOVE THE COVERS. Electrical shock can result if the instrument is operated without its protective covers. No internal components are serviceable by the user.



WARNING ELECTRICAL HAZARD. Plug the instrument into a properly grounded receptacle with adequate current capacity.

Chemical Safety

The responsible individuals must take the necessary precautions to ensure that the surrounding workplace is safe and that instrument operators are not exposed to hazardous levels of toxic substances. When working with any chemicals, refer to the applicable safety data sheets (SDSs) provided by the manufacturer or supplier.



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For technical support visit
fluidigm.com/support.