

# Polaris System

## Contents

<b>About This Guide</b>	<b>2</b>
Safety Alert Conventions	2
Safety Data Sheets	3
<b>Introduction</b>	<b>3</b>
Installation Time Estimate	3
Site Preparation Workflow	3
<b>Step 1: Review This Guide</b>	<b>3</b>
<b>Step 2: Review the Equipment Lists</b>	<b>4</b>
Required Equipment Supplied by Fluidigm	4
Required Equipment from Other Suppliers	4
Suggested Equipment	5
<b>Step 3: Select a Site for Polaris</b>	<b>5</b>
Harmonized Standards	5
Environmental Conditions	6
System Dimensions and Laboratory Bench Requirements	6
Electrical Requirements	8
Uninterruptible Power Supply	9
In-House Air Supply (optional)	9
<b>Step 4: Stock the Site</b>	<b>10</b>
Required Safety Equipment	10
<b>Step 5: Receive the System</b>	<b>11</b>
Delivery and System Inspection	11
Polaris System Size and Weight Specifications	11
Path Clearances	12
<b>Step 6: Place the System at the Site</b>	<b>12</b>
System Weight	13
Installation	13
<b>Appendix A: Related Documentation</b>	<b>13</b>
<b>Appendix B: Safety</b>	<b>13</b>
Instrument Safety	13
Electrical Safety	14
Chemical Safety	14

## About This Guide

**IMPORTANT** 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 [Safety on page 13](#).

### 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.
<b>DANGER</b>	Signal word that indicates more severe hazards.
<b>WARNING</b>	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.
<b>DANGER</b>	Signal word that indicates an imminent hazard that will result in severe injury or death if not avoided.
<b>WARNING</b>	Signal word that indicates a potentially hazardous situation that could result in serious injury or death if not avoided.
<b>CAUTION</b>	Signal word that indicates a potentially hazardous situation that could result in minor or moderate personal injury if not avoided.
<b>IMPORTANT</b>	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](https://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.

## Introduction

Fluidigm technical support will schedule a time to install the Polaris™ system at your site and train your staff to use the system. Before a Fluidigm service representative arrives to install the system, you need to choose and prepare your site according to the instructions in this document.

Notify your Fluidigm representative if special shipping arrangements are necessary at your site, or if you need assistance in placing the Polaris system.

## Installation Time Estimate

Installation of the Polaris is estimated to take 2 days. Site issues and other factors may delay or extend the installation time.

## Site Preparation Workflow

To choose and prepare your site for the Polaris:

- 1 Review this guide.
- 2 Review the materials and equipment lists.
- 3 Select a site for the Polaris.
- 4 Stock the site.
- 5 Receive the system.
- 6 Place the system at the site.

## Step 1: Review This Guide

Read and understand this guide for information on all Polaris system site requirements, including safety, environmental, electrical, and space requirements.

For a complete list of reagents and consumables used with the Polaris system, see the appropriate protocol. For a list of protocols, see [Appendix A: Related Documentation on page 13](#).

## Step 2: Review the Equipment Lists

### Required Equipment Supplied by Fluidigm

<input checked="" type="checkbox"/>	Product Name	Company	Part Number
<input type="checkbox"/>	Polaris system	Fluidigm	100-9009

### Required Equipment from Other Suppliers

<input checked="" type="checkbox"/>	Product Name	Company	Part Number
<input type="checkbox"/>	Two freezers and one refrigerator: one freezer at -20 °C, one freezer at -80 °C, and one refrigerator at 4° C	Major laboratory supplier	—
<input type="checkbox"/>	Two centrifuges: one for Eppendorf® Microcentrifuge tubes and one for 8-well strips for 96-well plates	Major laboratory supplier	—
<input type="checkbox"/>	Vortexer	Major laboratory supplier	—
<input type="checkbox"/>	Microcentrifuge	Major laboratory supplier	—
<input type="checkbox"/>	Pipettes (P2, P20, P200, P1000) and appropriate low-retention tips	Major laboratory supplier	—
<input type="checkbox"/>	8-channel pipettes (L20 and L50/L200) and appropriate low-retention tips	Major laboratory supplier	—
<input type="checkbox"/>	2100 Bioanalyzer®	Agilent®	G2940CA
<input type="checkbox"/>	Thermal cycler	Major laboratory supplier	—
<input type="checkbox"/>	Magnetic stand for PCR tubes	Major laboratory supplier	—
<input type="checkbox"/>	384-well fluorometer (for PicoGreen® assay)	Major laboratory supplier	—
<input type="checkbox"/>	Ice bucket	Major laboratory supplier	—
<input type="checkbox"/>	Glass bottle	Major laboratory supplier	—
<input type="checkbox"/>	Blood gas pressure regulator	Major laboratory supplier	—
<input type="checkbox"/>	Input fitting to two-stage blood gas pressure regulator*	Major laboratory supplier	—
<input type="checkbox"/>	Cylinder of gas with clean, dry, premixed gas (standard grade) containing either 5% CO <sub>2</sub> , 5% O <sub>2</sub> , and 90% N <sub>2</sub> ; or 5% CO <sub>2</sub> , 20% O <sub>2</sub> , and 75% N <sub>2</sub>	Major laboratory supplier	—
<input type="checkbox"/>	USB key with at least 2 GB storage	Any supplier	—

\* Consult gas supplier.

## Suggested Equipment

<input checked="" type="checkbox"/>	Product Name	Company	Part Number
<input type="checkbox"/>	Two Biocontainment cabinets*	Major laboratory supplier	—
<input type="checkbox"/>	Imaging equipment compatible with the Polaris Single-Cell mRNA Seq IFC†	Major laboratory supplier	—
<input type="checkbox"/>	Four bracing hooks with straps to anchor bottom of Polaris to bench (Example: snap clip key chain carabiner hooks)	Major laboratory supplier	—

\* To prevent DNA contamination of lab and samples.

† See the Minimum Specifications for Imaging Cells in Fluidigm Integrated Fluidic Circuits, PN 100-5004.

## Step 3: Select a Site for Polaris

To operate the Polaris system, your site must meet the following requirements:

- Harmonized standards
- Environmental conditions
- System dimensions and laboratory bench requirements
- Electrical requirements
- Premixed gas requirements
- (Optional) In-house air supply



**WARNING** The installation location cannot be done at a site designated BioSafety Level 3 (BSL-3) or BioSafety Level 4 (BSL-4). Fluidigm does not install, service, or repair the Polaris system in areas designated BSL-3 or BSL-4.

## Harmonized Standards

The following directives and harmonized standards were used to evaluate the safety and performance of the Polaris system:

### 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 61326-2-1
- 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
- CAN/CSA-C22.2 No. 61010-2-010-04
- CAN/CSA-C22.2 No. 61010-2-010-081-04

## Environmental Conditions

Polaris is for indoor use only and should be used in an environment that meets these conditions:

Conditions	Requirements
Altitude	Polaris is for use in altitudes not exceeding 2,000 m (6,562 ft) above sea level. If your facility is located above this elevation, call technical support.
Humidity	20–80%, non-condensing
Pollution	Pollution Degree 2 rating, whereby only nonconductive pollution occurs for electrical and laboratory equipment. Polaris conforms to standard laboratory environments. Do not install the system where conductive pollutants are present.
Temperature	Ambient between 15–28 °C (59–82 °F)
Ventilation	<p>Ensure your lab space is ventilated using non-recirculating air exchanges.</p> <p>Maintain at least 10.2 cm (4 inches) of clearance at the exhaust grill exit. Polaris produces only hot air exhaust (no fumes or vapors). It has an exhaust grill exit at the back of the instrument, and the air intake is on the bottom of the instrument.</p> <p><b>IMPORTANT</b></p> <ul style="list-style-type: none"> <li>• Do not place paper or any object underneath the instrument.</li> <li>• Do not locate the system next to heat sources or cooling ducts, or in direct sunlight or extreme ambient lighting. Temperature extremes can cause system instability.</li> </ul>

## System Dimensions and Laboratory Bench Requirements

### IMPORTANT

- Your laboratory bench must support at least 181 kg (400 lb).
- During a run, be certain that the instrument is on a sturdy, immobilized lab bench that is away from vibration-generating lab equipment (such as shakers, vortexers, centrifuges, or instruments with heavy fans) and from doors that might generate vibrations when opening or closing.
- Do not place the system on a heated surface or near a source of heat.
- Position the system so the power cord can be easily disconnected.

The Polaris system is a desktop instrument. Provide a work surface that can accommodate the Polaris. To accommodate one instrument, we recommend a bench top with minimum depth of 610 mm (24 in) and width of 559 mm (22 in). There must be provisions to address seismic concerns, such as straps or other devices to secure the system to a bench or wall and a glass bottle restraint.

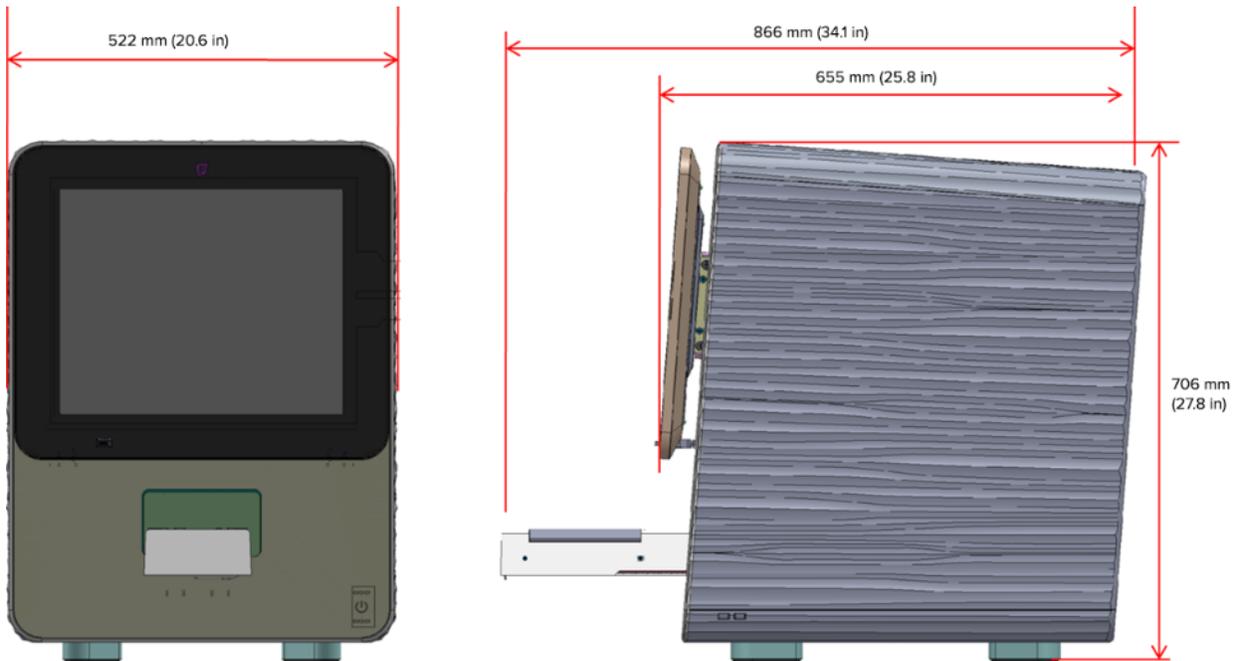
	Height	Width	Length (Depth)	Weight
<b>Instrument dimensions</b>	706 mm (27.8 in)	522 mm (20.6 in)	866 mm (34.1 in)	110 kg (242 lb)
<b>Lab bench minimum dimensions</b>	762 mm (30 in)	559 mm (22 in)	610 mm (24 in) *	

\*To keep the instrument from extending beyond the bench, we recommend a depth of at least 660 mm (26 in).

To allow for adequate air circulation and maintenance, the recommended instrument clearance is as follows:

	Front	Top	Sides	Back
<b>Minimum clearance</b>	Front: 250 mm (10 in)	Top: 460 mm (18 in)	One side: 178 mm (7 in)	Back: 100 mm (4 in)
	Front to back: 1,216 mm (47.9 in)	Top to bottom: 1,166 mm (45.9 in)	Side to side: 878 mm (34.6 in)	Front to back: 1,216 mm (47.9 in)

**IMPORTANT** At least three feet of total “service area” clearance should be available on either side of Polaris so that it can be rotated 360 degrees if required. The clearance need not be retained at all times. However, any ancillary equipment occupying that space should be easily movable.



## Electrical Requirements

Polaris requires one electrical power outlet for its CATII installation and uses 100–240 V AC power at 50–60 Hz, (10.0 amps). Power consumption is variable due to ambient conditions, such as temperature and humidity extreme, operating frequency, and mode of operation.

Customer Location	Voltage (VAC)	Frequency (Hz)	Maximum Current (A)	Typical Average Power Consumption (W)
Japan	100 ±10%	50–60 ±1%	10	Operating: 300 (Maximum: 650)
U.S., Canada	115 ±10%	50–60 ±1%	10	Operating: 300 (Maximum: 650)
Europe, Australia	230 ±10%	50–60 ±1%	10	Operating: 300 (Maximum: 650)

**IMPORTANT** Supply voltage fluctuation must not exceed 10% of the normal value. If the voltage fluctuation exceeds normal value, see [Uninterruptible Power Supply on page 9](#).

## Power Cord Requirements

Fluidigm provides a country-specific power cord.

Customer Location	Minimum Wire Gauge (AWG)	Maximum Length (m)	Instrument End Plug	Receptacle End Plug
Japan, US, Canada	14	2	IEC C13	Country-specific
Europe, Australia	16	2	IEC C13	Country-specific

## Receptacle Requirements

When connecting this instrument to a receptacle, check with your facilities manager to make sure the circuit will not be overloaded. If you are connecting multiple instruments to the same electrical receptacle or circuit, be sure the sum of all the instruments' maximum current draw is within the circuit's current limit. Receptacles must be grounded. Polaris requires only one grounded electrical connection.



### IMPORTANT

- 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 m (6 feet).
- Do not use extension cords.

## Disconnecting Power

In case of emergency, you must be able to immediately disconnect the main power supply to the instrument.

## Uninterruptible Power Supply

Fluidigm strongly recommends that you protect your Polaris system with an uninterruptible power supply (UPS) with voltage regulating capability, such as an APC Smart-UPS™ (APC, PN SRT3000XLW-IEC or equivalent) with battery power (APC, PN SRT96BP or equivalent), to prevent any damage to the equipment due because of power fluctuations. For customers who will connect the instrument to backup power in the event of power loss, Fluidigm recommends purchasing sufficient UPS battery power to support the transition from UPS to backup power at your site. We recommend checking with your site's Facilities department for their guidelines on how much time they recommend.

Conditions	Requirements
UPS type	Double conversion online (AC to DC to AC for cleanest power)
Output power capacity	2.7 kW/3.0 kVA)
Power factor	0.9
Backup time (run time)	7 minutes (for a longer backup time, install additional battery packs)
Power draw (load)	175 W

## In-House Air Supply (optional)

The Polaris system has an internal compressor to generate compressed air and draws in ambient air by default. To use in-house compressed air, attach 1/4-inch tubing into the air inlet on the back of the system. The allowable pressure input is listed on the back of the instrument.

For detailed instructions on enabling use of in-house air, see the Polaris System User Guide (PN 100-9580).

It is strongly recommended that you use a clean, dry air (CDA) system whenever possible to help prevent corrosion within the pneumatic system. Connect your CDA system with 1/4 in tubing to the compressed air inlet on the back of the Polaris instrument and regulate the incoming air to 70–90 psi or 4.8 to 6.2 bar of CDA.

## Premixed Gas Requirements

Polaris allows you to use either of the following clean, dry, premixed gas (standard grade):

- Blood gas: 5% CO<sub>2</sub>, 5% O<sub>2</sub>, and 90% N<sub>2</sub>
- Mixed gas: 5% CO<sub>2</sub>, 20% O<sub>2</sub>, and 75% N<sub>2</sub>

The gas pressure regulator must be capable of accurately regulating between 22 and 25 psi.

Attach the appropriate connector to the regulator for premixed gas. Connect the gas tubing from the connector to the premixed gas inlet of the instrument.

One 50 lb tank of premixed gas can maintain instrument operation for ~1 month under normal operating conditions.

## Step 4: Stock the Site

**IMPORTANT** Safety personnel at your company must ensure that:

- Safety policies to protect laboratory personnel from potential harm are established and are followed by personnel.
- All necessary safety devices and equipment are in the laboratory or in close proximity.

### Required Safety Equipment

Fluidigm expects your laboratory to have safety policies in place to protect laboratory personnel from potential harm. We expect that appropriate safety practices are followed at all times.

Safety equipment that must be at the installation location includes:

- Adequate ventilation, including vent line/fume hood if available
- Safety shower
- Eyewash station
- Biohazard waste container
- Applicable SDSs
- Protection from potentially infectious biological material, hazardous chemicals, and radiation that may be present in the area where the Fluidigm service representative will be working
- Spill cleanup equipment
- First-aid equipment
- Eye and hand protection
- Fire extinguisher
  - You are responsible for providing an appropriate fire extinguisher for use on or near Polaris.
  - The fire extinguishers must be appropriate for use on chemical and electrical fires and be approved by your local fire marshal or other authority having jurisdiction in your area.

## Step 5: Receive the System

Because the Polaris system weighs approximately 110 kg/242 lb (136 kg/300 lb crated), consider where it is going to be delivered and how to get it to and into your laboratory.

**IMPORTANT** Do not tip the Polaris crate on end. Tipping the Polaris instrument damages the instrument hardware and electronics.

### Delivery and System Inspection

For new Polaris system installations, you can anticipate receiving:

- Polaris system, crated
- Instrument accessories, boxed
- Reagent kit, if ordered

Use this checklist to perform a check of all delivered components:

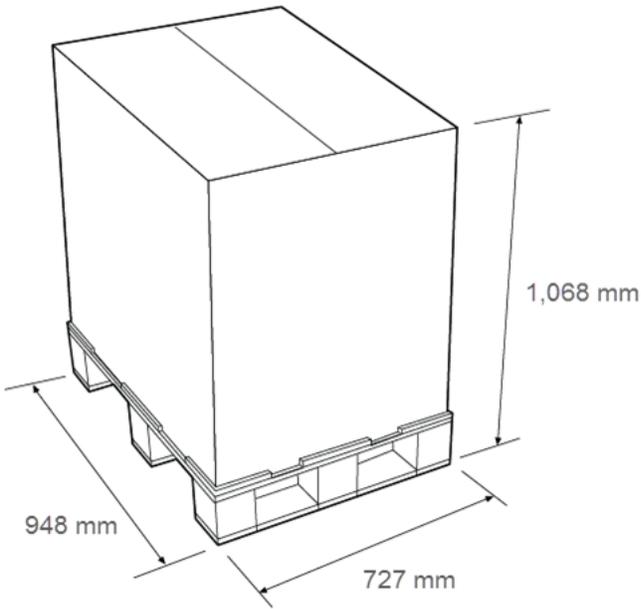
- Check the packing list against the original order.
- Check all boxes and crates for damage.
- Note any damage and report it to the Fluidigm service representative.
- Locate the Reagent kit (if ordered) and unpack it immediately.
- Store each component at the appropriate temperature according to the instructions.

### Polaris System Size and Weight Specifications



**WARNING** PHYSICAL INJURY HAZARD. Do not attempt to lift or move any boxed or crated items unless you use proper lifting techniques. The crated Polaris weighs ~136 lb (~300 kg).

## Step 6: Place the System at the Site



The crated measurements for the Polaris system are:

Length	Width	Height	Weight
948 mm (37.3 in)	727 mm (28.6 in)	1,068 mm (42.0 in)	136 kg (300 lb)

### Path Clearances

**IMPORTANT** A clear path from the loading dock to the laboratory bench must be established. The path must accommodate the dimensions of the crate.

Be sure the path to the installation site has the following minimum clearances:

	Minimum Clearance
Height	1,143 mm (45 in)
Width	762 mm (30 in)

## Step 6: Place the System at the Site

Remove all unnecessary materials from the proposed installation site prior to the arrival of the Fluidigm field service engineer.

Have the crated Polaris system at its permanent location prior to the arrival of a field service engineer. Wait for the engineer to arrive before unpacking the crate.

## System Weight



**WARNING** PHYSICAL INJURY HAZARD. Do not attempt to lift or move any boxed or crated items unless you use proper lifting techniques. The weight of the boxed or crated instrument is 136 kg (300 lb). 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.

## Installation

Before the installation date, be certain that you have done the following:

- Removed all unnecessary materials from the proposed final installation site
- Received the Polaris system and performed a visual check of the crate and containers
- Moved the crated and boxed equipment from the receiving location to the installation area
- Installed and secured the blood gas cylinder

Contact your Fluidigm representative if you require assistance with any of these steps.

## Appendix A: Related Documentation

Document Title	Part Number
Polaris User Guide	100-9580

## Appendix B: Safety

### 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](http://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 weight of the boxed or crated instrument is 136 kg (300 lb). 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.

## 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.

**For technical support visit [techsupport.fluidigm.com](https://techsupport.fluidigm.com). For general support visit [fluidigm.com/support](https://fluidigm.com/support).**

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