

Ion GeneStudio™ S5 System

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This guide contains the information that is needed to prepare your site for installation of an Ion GeneStudio™ S5 System, Ion GeneStudio™ S5 Plus System, or Ion GeneStudio™ S5 Prime System. An external Ion Torrent™ Server is required for use with the Ion GeneStudio™ S5 Prime Sequencer and is included in the Ion GeneStudio™ S5 Prime System.

Note: In this guide, Ion GeneStudio™ S5 Sequencer or System refers generically to the series of three Ion GeneStudio™ S5 Sequencers or Systems, unless otherwise specified.

The Ion S5™ System and the Ion S5™ XL System are no longer available for purchase and are replaced by the Ion GeneStudio™ S5 System and Ion GeneStudio™ S5 Prime System, respectively. Both of the Ion S5™ and Ion S5™ XL Sequencers continue to be supported by Thermo Fisher Scientific. See the *Ion S5™ and Ion S5™ XL System Site Preparation Guide* (Pub. No. MAN0010810) for site preparation information for these systems.

Site preparation workflow

A Thermo Fisher Scientific service representative will contact you to schedule the installation. When the installation date is scheduled, perform the following tasks.

Site preparation workflow	
Review this site preparation guide	
Complete the site preparation checklist (page 3) Complete, date, and initial all items in the checklist before the scheduled installation date.	
Receive and inspect the shipment (page 25) <ul style="list-style-type: none">• Verify items ordered were shipped.• Inspect the shipping containers and report any damage.• Unpack the installation kit and store as directed.	
Move the crated shipment to the installation site (page 26) <ul style="list-style-type: none">• Prepare the installation site.• Move the crated instrument to the site.	

Installation timeline and training

After your sequencer is uncrated, installation and testing of the Ion GeneStudio™ S5, Ion GeneStudio™ S5 Plus, or Ion GeneStudio™ S5 Prime Sequencer and Torrent Server (required for use with the Ion GeneStudio™ S5 Prime Sequencer) takes ~8 hrs.

The Ion Chef™ System or Ion OneTouch™ 2 System is purchased and installed separately. Installation requires an additional 4–6 hours.

During and/or after installation, the Thermo Fisher Scientific service representative reviews data and provides basic operator training. For additional training and reference information, see the user documents that are provided with the Ion GeneStudio™ S5 Sequencers.

Site preparation checklist

IMPORTANT! Complete, date, and initial all items in the following checklist before the scheduled installation date. If the site preparation checklist is not complete when the Thermo Fisher Scientific service representative arrives, the scheduled installation can be postponed.

✓	Date	Initials	Site preparation requirement	See page
<input type="checkbox"/>			Customer responsibilities have been reviewed and personnel have been assigned.	4 –5
<input type="checkbox"/>			The installation site is identified and meets requirements:	
			<input type="checkbox"/> Space and clearance	5
			<input type="checkbox"/> Environmental	16
			<input type="checkbox"/> Electrical	19
			<input type="checkbox"/> Network	22
			<input type="checkbox"/> Safety	24
<input type="checkbox"/>			All materials needed for installation and operation are available.	24
<input type="checkbox"/>			The instrument was received and inspected:	25
			<input type="checkbox"/> All items on the shipping list are the same items ordered at the time of purchase.	
			<input type="checkbox"/> Any damage to shipping containers was reported to the shipping company that delivered the instrument.	
			<input type="checkbox"/> Any damage or mishandling was recorded on the shipping documents.	
			<input type="checkbox"/> The reagents box was unpacked and stored as specified.	
<input type="checkbox"/>			The installation site is cleared and ready for instrument installation.	26
<input type="checkbox"/>			The crated instrument and other shipping containers are moved to the installation site.	

Customer responsibilities

Personnel	Responsibilities
Site preparation/ installation coordinator	<ul style="list-style-type: none"> • Reviews the site preparation guide for safety information and instrument requirements. • Coordinates personnel and tasks. • Chooses the site. • Reviews checklists with applicable personnel, then with the service representative to verify that the site is properly prepared. • Receives and inspects the Ion GeneStudio™ S5 Sequencer. • Stores the reagents box according to the specifications indicated in the product inserts. • Schedules the installation and informs personnel of the installation day. • Ensures that the site is clear of unnecessary material on the installation day. • Is available to assist the service representative throughout installation.
Laboratory safety representative	<ul style="list-style-type: none"> • Reviews the site preparation guide for safety information. • Ensures that the required safety practices and equipment are in place. • Is in the vicinity and available to the service representative at all times while the service representative is at the customer's facility.
Laboratory personnel/ primary users	<ul style="list-style-type: none"> • Review safety information. • Ensures that all customer-provided materials for installation are present at the site. • Ensures that primary users (responsible for training other users) are available during the installation, so that they can be trained on the instrument.
Facilities personnel	<ul style="list-style-type: none"> • Ensures that the installation requirements are met for: <ul style="list-style-type: none"> – Space at the installation site – Building clearances – Temperature and humidity – Waste collection – Electrical supply – Computer – Safety and installation materials • If possible, moves the crated Ion GeneStudio™ S5 Sequencer to the site before the installation date. • Is available to assist service representative and laboratory personnel throughout installation. • If applicable, ensures that at least two people are available to help the service representative move and position the instrument.

(continued)

Personnel	Responsibilities
Network or IT specialist (if the instrument will be connected to a network)	<ul style="list-style-type: none"> • Ensures that active, tested local area network (LAN) connections are in place before the scheduled installation date. • Ensures that network hardware is compatible with an RJ45-type connector. • If necessary, supplies additional cables. • Is available during installation to connect the Ion GeneStudio™ S5 Sequencer to the network. • If applicable, provides and installs a network or dedicated printer. <p>IMPORTANT! Do not attempt to connect the Ion GeneStudio™ S5 Sequencer components to the network before the service representative arrives.</p>

Site requirements

Dimensions and weights

To prepare for installation, provide space for receipt and configuration of the components listed in this section. This section provides dimensions and weights for the packages you will receive, and it describes the dimensions of the components after installation and configuration.

Crates and packages



WARNING! PHYSICAL INJURY HAZARD. Do not attempt to lift or move the crated instrument without professional assistance. The crated instrument is heavy. Any incorrect lifting or moving of the crated instrument can cause serious injury.

Ensure the building clearances allow for the passage of the instrument crates and packages.

Crate	Height	Length (depth)	Width	Weight
Ion GeneStudio™ S5 Sequencer	25.5 in (64.8 cm)	39 in (99 cm)	28 in (71.1 cm)	200 lbs (90.7 kg)
Ion GeneStudio™ S5 Plus Sequencer	25.5 in (64.8 cm)	39 in (99 cm)	28 in (71.1 cm)	200 lbs (90.7 kg)
Ion GeneStudio™ S5 Prime Sequencer	25.5 in (64.8 cm)	39 in (99 cm)	28 in (71.1 cm)	200 lbs (90.7 kg)
Ion Torrent™ Server ^[1]	28.3 in (71.9 cm)	27.8 in (70.6 cm)	13.5 in (34.3 cm)	116.9 lbs (53.0 kg)
Ion Chef™ Instrument	28 in (71.1 cm)	34 in (86.4 cm)	34 in (86.4 cm)	295 lbs (134.0 kg)
Ion OneTouch™ 2 Instrument	18 in (45.7 cm)	18 in (45.7 cm)	21 in (53.3 cm)	44 lbs (20.0 kg)
Ion OneTouch™ ES Instrument	14.5 in (36.8 cm)	14.5 in (36.8 cm)	17.5 in (44.5 cm)	~13 lbs (5.9 kg)

^[1] Required for use with the Ion GeneStudio™ S5 Prime Sequencer.

Components

Ensure that the installation site bench space is level and can accommodate the dimensions and support the weights.

Component	Height		Length (depth)	Width		Weight
	Open	Closed		Open	Closed	
Ion GeneStudio™ S5 Sequencer	—	20 in (50.9 cm)	31.75 in (80.6 cm)	34 in (86.4 cm)	21.4 in (54.2 cm)	140 lb (63.5 kg)
Ion GeneStudio™ S5 Plus Sequencer	—	20 in (50.9 cm)	31.75 in (80.6 cm)	34 in (86.4 cm)	21.4 in (54.2 cm)	140 lb (63.5 kg)
Ion GeneStudio™ S5 Prime Sequencer	—	20 in (50.9 cm)	31.75 in (80.6 cm)	34 in (86.4 cm)	21.4 in (54.2 cm)	140 lb (63.5 kg)
Ion Torrent™ Server ^[1]	—	17.5 in (44.4 cm)	27.5 in (69.8 cm)	—	12.1 in (30.8 cm)	101.4 lbs (46.0 kg)
Ion Chef™ Instrument	33 in (83.9 cm)	22.1 in (56.1 cm)	27.6 in (70.0 cm)	—	28.1 in (71.4 cm)	150 lbs (68.2 kg)
Ion OneTouch™ 2 Instrument	—	12 in (30.5 cm)	16 in (40.6 cm)	—	14 in (35.6 cm)	37.5 lbs (17.0 kg)
Ion OneTouch™ ES Instrument	—	9.5 in (24.1 cm)	12.5 in (31.8 cm)	—	11 in (27.9 cm)	12 lbs (5.4 kg)

^[1] Required for use with the Ion GeneStudio™ S5 Prime Sequencer.



WARNING! PHYSICAL INJURY HAZARD.

Do not attempt to lift or move the instrument without professional assistance. The instrument is heavy. Any incorrect lifting or moving of the instrument can cause serious injury.

Instrument clearances

During instrument setup and maintenance, it is necessary to access the back and sides of all of the instruments. If the back of an instrument component faces a wall, it is necessary to have enough space to allow rotation of the instrument on the bench for access.

IMPORTANT! For safety, the power outlet used for powering the instrument components must be accessible at all times.

Component	Top	Front	Left/Right	Back
Ion GeneStudio™ S5 Sequencer ^[1]	12.0 in (30.5 cm)	12.0 in (30.5 cm) ^[2]	4.0 in/12 in ^[3] (10.0 cm/30.5 cm)	12.0 in (30.5 cm)
Ion GeneStudio™ S5 Plus Sequencer ^[1]	12.0 in (30.5 cm)	12.0 in (30.5 cm) ^[2]	4.0 in/12 in (10.0 cm/30.5 cm) ^[3]	12.0 in (30.5 cm)
Ion GeneStudio™ S5 Prime Sequencer ^[1]	12.0 in (30.5 cm)	12.0 in (30.5 cm) ^[2]	4.0 in/12 in (10.0 cm/30.5 cm) ^[3]	12.0 in (30.5 cm)
Ion Torrent™ Server	2.0 in (5.0 cm)	12.0 in (30.5 cm)	2.0 in (5.0 cm)	24.0 in (61.0 cm)
Ion Chef™ Instrument	14 in (35.6 cm)	6.7 in (17.0 cm)	4.0 in (10.0 cm)	4.0 in (10.0 cm)
Ion OneTouch™ 2 Instrument	12.0 in (30.5 cm)	12.0 in (30.5 cm)	4.0 in (10.0 cm)	4.0 in (10.0 cm)
Ion OneTouch™ ES Instrument	12.0 in (30.5 cm)	12.0 in (30.5 cm)	12.0 in (30.5 cm)	4.0 in (10.0 cm)

^[1] Clearance requirements for all Ion GeneStudio™ S5 Sequencers are identical.

^[2] The instrument requires 36.0 in (90.0 cm) aisle in front of bench for operator access.

^[3] To allow sufficient clearance for the instrument door to open.

Placement of the instrument and server

If any of the instruments will be placed on a mobile bench, verify that the bench is level and meets the requirements in “Crates and packages” on page 5.

IMPORTANT! The Ion GeneStudio™ S5 Sequencer must be installed on a level surface.

Note: Thermo Fisher Scientific is not responsible for any damage caused by using a laboratory bench that does not meet the minimum weight capacity requirements mentioned above.

Laboratory layout of the Ion GeneStudio™ S5 Sequencers and Ion Torrent™ Server

The Ion GeneStudio™ S5 Sequencer contains a virtual Ion Torrent™ Server, and the Ion GeneStudio™ S5 Plus Sequencer is equipped with an internal Ion Torrent™ Server. These instruments are not connected to an external Ion Torrent™ Server and only require connection to a local area network (see Figure 1). For the Ion GeneStudio™ S5 Prime Sequencer, we support the layout in which the Ion Torrent™ Server is directly connected to the sequencer (see Figure 2), instead of through the local area network from a remote location such as a server room. Data are most robustly transferred from the Ion GeneStudio™ S5 Prime Sequencer to the Ion Torrent™ Server when they are directly connected by a category 6 Ethernet cable that is provided with the installation materials.

IMPORTANT! The Ion GeneStudio™ S5 Prime Sequencer must be connected to the Ion Torrent™ Server by a category 6 Ethernet cable. We do not troubleshoot data transfer problems that are associated with an indirect connection between the Ion GeneStudio™ S5 Prime Sequencer and the Ion Torrent™ Server.

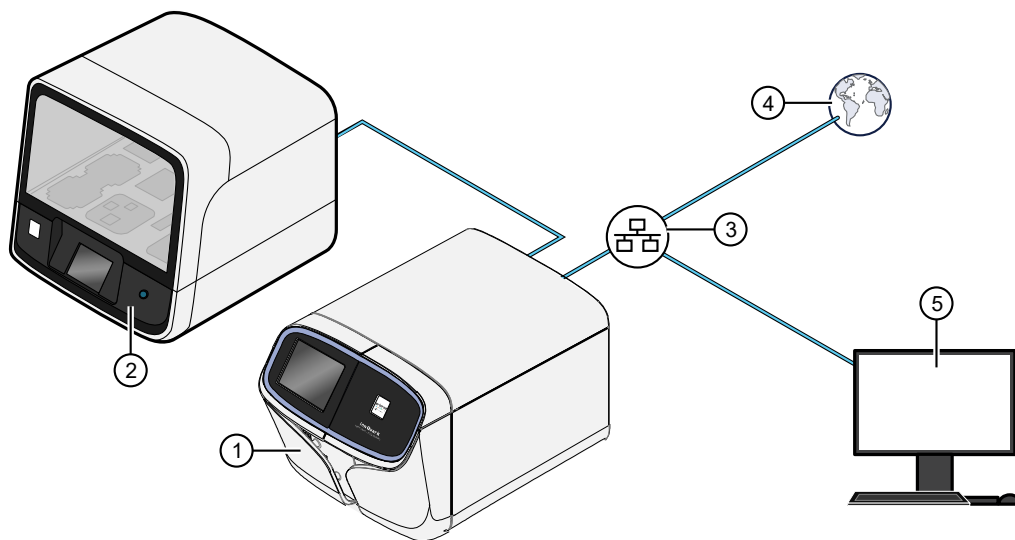


Figure 1 Ion GeneStudio™ S5 Sequencer and Ion GeneStudio™ S5 Plus Sequencer configuration

- ① Ion GeneStudio™ S5 Sequencer or Ion GeneStudio™ S5 Plus Sequencer
- ② Ion template preparation instrument (Ion Chef™ Instrument (shown) or Ion OneTouch™ 2 System)
- ③ Local area network
- ④ Internet
- ⑤ Client computer

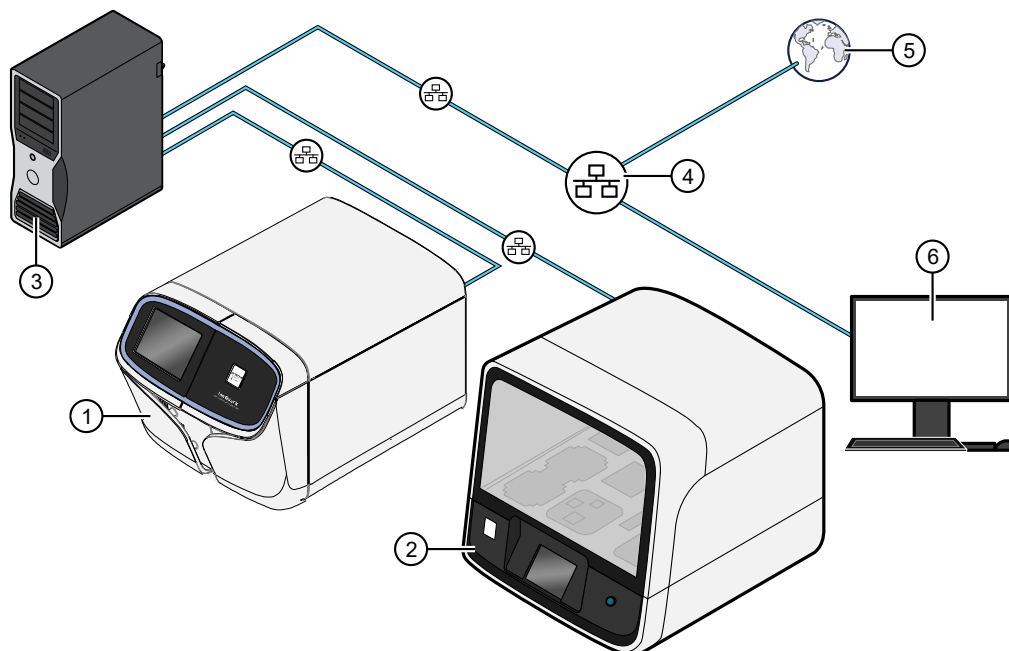


Figure 2 Ion GeneStudio™ S5 Prime Sequencer configuration

- ① Ion GeneStudio™ S5 Prime Sequencer
- ② Ion template preparation instrument (Ion Chef™ Instrument (shown) or Ion OneTouch™ 2 System)
- ③ Ion Torrent™ Server
- ④ Local area network
- ⑤ Internet
- ⑥ Client computer

Note: In either configuration, the Ion Chef™ Instrument must be connected to the Ion Torrent™ Server either directly using a category 6 Ethernet cable, or indirectly through a local area network that has been configured to allow HTTP-443, SSH-22, and FTP-20/21 traffic. Unlike the Ion GeneStudio™ S5 Prime Sequencer, the Ion Chef™ Instrument does not require a robust network connection to the Ion Torrent™ Server and can accommodate standard network connection speeds.

Internet connectivity

The Ion GeneStudio™ S5 Sequencer, the Ion GeneStudio™ S5 Plus Sequencer, or the Ion Torrent™ Server (in an Ion GeneStudio™ S5 Prime System) should be connected to a network with internet access. Connecting to the Internet allows you to update your software and access remote system support easily. Software updates through the network/internet are free. If you do not connect your instrument or server to a network, software updates must be manually installed via USB.

IMPORTANT! Thermo Fisher Scientific does not support the USB method for updating software.

Any problems (for example, file corruption, incomplete updates) resulting from update of the sequencer or server using a USB device that require correction of the faulty update is not covered by your Ion GeneStudio™ S5, Ion GeneStudio™ S5 Plus, or Ion GeneStudio™ S5 Prime Sequencer warranty or any service contract you may have bought. You are required to schedule an on-site Time and Materials visit by a field service engineer to correct the problem at your own expense.

In providing outbound access to the Internet from the server, you enable the support team to provide inbound support. The Ion GeneStudio™ S5 Sequencer, the Ion GeneStudio™ S5 Plus Sequencer, and the Ion Torrent™ Server run a remote monitor agent that can provide service personnel with critical system information, such as installed software versions and instrument alarms. With your permission, the agent also allows service personnel to access remotely the Ion GeneStudio™ S5 Sequencer, the Ion GeneStudio™ S5 Plus Sequencer, or the Ion Torrent™ Server, which is required for system support. Without remote access, service personnel cannot access, view, and troubleshoot problems regarding machine performance.

To enable full support, the Ion Torrent™ Server must have outbound internet access (ports 22, 80, and 443) and be behind an appropriately configured firewall. Although not recommended, you can enable access to the Torrent Browser (the web server running on the Ion Torrent™ Server from the Internet). If you provide such access, you must restrict access to the server using HTTP and AUTH firewall rules, or a combination of the two. Implementing and maintaining such restrictions is the responsibility of your server administrator and not of Thermo Fisher Scientific.

Planning the installation

In preparation for the Ion GeneStudio™ S5 Sequencer installation, you must plan the layout of your laboratory to accommodate library and template preparation activities, in addition to those related to chip preparation and sequencing. This section describes the stations involved in the sequencer workflow and the basic laboratory layouts.

Layout of instrument components and equipment

When designing your PCR laboratory layout, follow good laboratory practices to ensure reliable and contamination-free PCR results. Pay particular attention to the need to separate the areas for pre- and post-PCR activities. Isolating the amplicon source, separating pre-PCR from post-PCR activities, and dedicating laboratory supplies and/or equipment to each space can significantly reduce the potential for contamination.

You can deploy the Ion GeneStudio™ S5 Sequencer in both one- and two-room laboratory configurations. The two-room layout is highly recommended due to the protection that it affords against contamination; however, the sub-optimal one-room layout will produce acceptable results if proper precautions are observed.

If you choose to deploy the Ion GeneStudio™ S5 Sequencer in a one-room layout:

- Establish clearly-labeled, separate sets of pipettes for library preparation, emulsion PCR setup, and emulsion-breaking stations (if using the Ion OneTouch™ 2 System).
- Always move from "clean" to "dirty" (for example, from pre- to post-PCR). We do not recommend moving from "dirty" to "clean" (for example, do not handle post-amplification samples and then make libraries).

Note: The positions of the stations in the pre-and post- PCR rooms are not important.

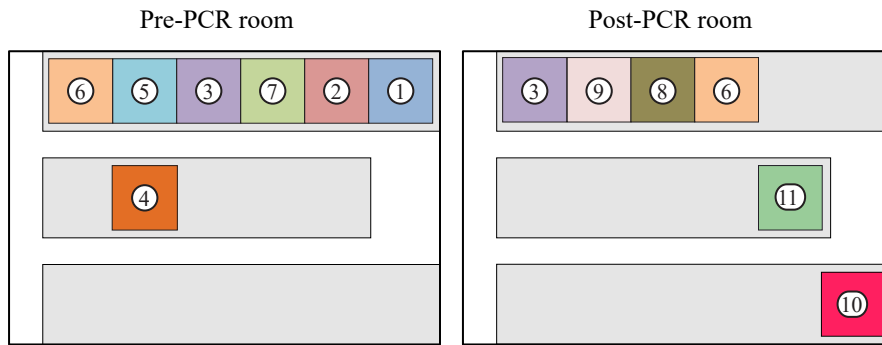


Figure 3 Two-room layout

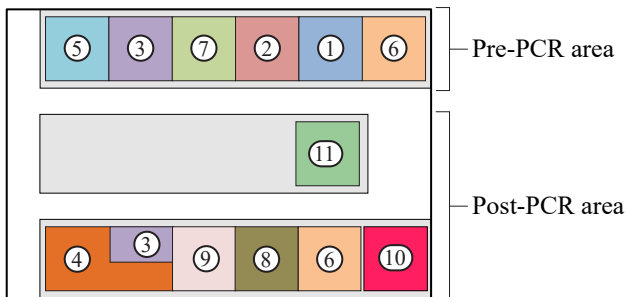


Figure 4 One-room layout

- ① Agilent™ 2100 Bioanalyzer™ instrument
- ② (Optional) Diagenode™ Bioruptor™ Pico sonication device system
- ③ Centrifuge
- ④ Amplification mixture setup hood
- ⑤ Library area setup hood
- ⑥ Pipettes
- ⑦ (Optional) Pippin Prep™ instrument
- ⑧ Qubit™ Fluorometer
- ⑨ Thermal cycler
- ⑩ Ion Chef™ or Ion OneTouch™ 2 Instrument
- ⑪ Ion GeneStudio™ S5 Sequencer, Ion GeneStudio™ S5 Plus Sequencer, or Ion GeneStudio™ S5 Prime Sequencer and Ion Torrent™ Server

Laboratory workstations

The following table describes workstations that are associated with the generic laboratory layout for the Ion GeneStudio™ S5 Sequencer. The stations are categorized in terms of their involvement pre- and post-PCR activities. Note that some stations (pipette and centrifuge) are present in both environments, but the equipment is not necessarily shared between the pre- and post-PCR stations.

#	Station	Location	Description/requirements
1	Agilent™ 2100 Bioanalyzer™ Instrument	Pre-PCR area	<p>Use the Agilent™ 2100 Bioanalyzer™ Instrument to perform library construction quality control, providing yield and size characterization. When planning the instrument placement, consider isolating the Agilent™ 2100 Bioanalyzer™ Instrument from the sequencer, preferably in a room dedicated for library preparation, to minimize contamination.</p> <p>Note: If needed, you can substitute a qPCR instrument for the Agilent™ 2100 Bioanalyzer™ Instrument. In general, qPCR does not yield size distribution but does provide more accurate counts.</p>
2	(Optional) Bioruptor™ System	Pre-PCR area	<p>If required, the Bioruptor™ Instrument performs acoustic shearing/fragmentation of DNA samples for library preparation. You can perform DNA shearing through the use of a Covaris™ Focused-Ultrasonicator or the Ion Express Library Kit, both of which are acceptable substitutes for the Bioruptor™ Instrument. Mechanical shearing is recommended (using Bioruptor™ or Covaris™ instruments), but enzymatic shearing is acceptable and can be less expensive.</p> <p>When planning Bioruptor™ or Covaris™ instrument placement:</p> <ul style="list-style-type: none"> • Consider placing the instrument in an isolated room to minimize the noise hazard. • Consider isolating the instrument from the sequencer, preferably in a dedicated room for library preparation, to minimize contamination.
3	Centrifuges	Pre- and post-PCR areas	<p>Use centrifuges during library preparation and chip loading, so access is required in both the pre- and post-PCR areas.</p> <p>When planning centrifuge placement:</p> <ul style="list-style-type: none"> • Consider dedicating separate centrifuges for the pre- and post-PCR operations to minimize contamination. • If only one centrifuge is available, place it in a central location, which is accessible from both areas. • To limit vibrational interference, do not place centrifuges on the same bench as the sequencer instrument. • Most importantly, place the centrifuges in convenient locations.

(continued)

#	Station	Location	Description/requirements
4	Amplification mixture setup hood (if using the Ion OneTouch™ 2 System)	Pre-PCR area	<p>Whenever possible, perform amplification mixture preparation in a dedicated hood.</p> <p>When selecting a location for amplification mixture preparation:</p> <ul style="list-style-type: none"> • The amplification mixture setup station requires a set of dedicated pipettes. • If only one hood is available in the pre-PCR area, dedicate the hood for amplification mixture preparation and perform library preparation elsewhere. • If a hood is unavailable in the pre-PCR area, select a bench that is sterilized regularly and preferably isolated from the neighboring stations. <p>IMPORTANT! Separation of the amplification mixture preparation area from the other stations is critical to preventing contamination.</p> <p>IMPORTANT! If possible, physically separate the library and amplification mixture setup areas.</p>
5	Library area setup hood	Pre-PCR area	<p>Whenever possible, perform library preparation in a dedicated hood. The use of a dedicated hood allows for UV treatment of the library preparation area and minimizes contamination from post-PCR material containing adaptors.</p> <p>When selecting a location for library preparation:</p> <ul style="list-style-type: none"> • In a one-room laboratory layout, we highly recommend the use of a dedicated hood for library preparation, but not required. • The library area setup station requires a set of dedicated pipettes. • If a dedicated hood is unavailable, select a bench that is preferably isolated from the neighboring stations.
6	Pipettes	Pre- and post-PCR areas	Both the pre- and post-PCR areas require a complete set of dedicated pipettes. If needed, you can share the pipettes between neighboring stations, except for the amplification mixture and library setup stations, both of which require dedicated sets of pipettes.
7	(Optional) Pippin Prep™ Instrument	Pre-PCR area	<p>If required, use the Pippin Prep™ Instrument to perform automated size selection before template preparation. Use of the Pippin Prep™ Instrument is necessary only if you require size selection for your sample type.</p> <p>Note: You can also do size selection through the use of the E-Gel™ Imager Gel Documentation System, an acceptable substitute for the Pippin Prep™ Instrument.</p>
8	Qubit™ System	Post-PCR area	You can use the Qubit™ 2.0, Qubit™ 3.0, or Qubit™ 4 Fluorometer to perform library quantification or quality control following PCR or just before library preparation. When selecting a location for the instrument, place the Qubit™ System close to the Ion OneTouch™ 2 System.

(continued)

#	Station	Location	Description/requirements
9	Primer-Annealing Thermal Cycler	Post-PCR area	<p>Use a 96-well thermal cycler to perform the primer-annealing step during template preparation. When selecting a location for the thermal cycler, ensure that the location meets all clearance and environmental requirements for the instrument.</p> <p>Note: If you are using Ion AmpliSeq™ Primers, a pre-PCR thermal cycler is required in the pre-PCR room.</p> <p>Note: Primer-annealing thermal cycler is not required if using the Ion Chef™ System for template preparation.</p>
10	Ion Chef™ or Ion OneTouch™ 2 System	Post-PCR area	<p>When planning the placement of the Ion Chef™ Instrument or Ion OneTouch™ 2 System, ensure that the location meets all clearance and environmental requirements described in this document.</p> <p>Note: If possible, install the Ion GeneStudio™ S5 Sequencer and Ion Chef™ Instrument to a dedicated power outlet.</p>
11	Ion GeneStudio™ S5 Sequencer, Ion GeneStudio™ S5 Plus Sequencer, or Ion GeneStudio™ S5 Prime Sequencer and Ion Torrent™ Server	Post-PCR area	<p>When planning the placement of the Ion GeneStudio™ S5 Prime Sequencer and Ion Torrent™ Server, ensure that the location meets all clearance and environmental requirements described in this document.</p> <p>IMPORTANT! The Ion GeneStudio™ S5 Sequencers are sensitive to electrical noise, vibration, and temperature changes.</p> <p>Note: Because the Ion Torrent™ Server requires a direct connection to the Ion GeneStudio™ S5 Prime Sequencer via a standard Category 6 Ethernet cable, the server is typically installed to the bench directly beneath the instrument.</p>

Environmental requirements

Ensure that the installation room is maintained under correct environmental conditions. Avoid placing the sequencer or server next to heaters, cooling ducts, or in direct sunlight. Place the sequencer at least 1 meter away from major sources of electronic noise such as refrigerators or microwaves. Fluctuations between day and night temperatures can cause system instability.

Component	Acceptable range
Altitude	Located between sea level and 6500 ft (2000 m) above sea level
Humidity	<p>Ion GeneStudio™ S5, Ion GeneStudio™ S5 Plus, or Ion GeneStudio™ S5 Prime Sequencer : 40-60%, non-condensing</p> <p>Ion Torrent™ Server: 20-80%, non-condensing</p> <p>Ion Chef™ Instrument: 40-60%, non-condensing</p> <p>Ion OneTouch™ 2 Instrument/Ion OneTouch™ ES Instrument: Relative humidity 80% for temperatures up to 31°C, decreasing linearly to 50% relative humidity at 40°C</p>
Operating Temperature	<p>Ion GeneStudio™ S5, Ion GeneStudio™ S5 Plus, or Ion GeneStudio™ S5 Prime Sequencer: 20°C to 30°C (68°F to 86°F)</p> <p>Note: The room temperature must not fluctuate more than 2°C over a 2-hour period.</p> <p>Ion Torrent™ Server: 10°C to 35°C (50°F to 95°F)</p> <p>Ion Chef™ Instrument: 20°C to 25°C (68°F to 77°F)</p> <p>Ion OneTouch™ 2 Instrument/Ion OneTouch™ ES Instrument: 20°C to 25°C (68°F to 77°F)</p>
Vibration	<p>Install the instrument(s) on benches that have no contact with equipment that causes vibration (freezers, pumps, and similar equipment). Significant vibration during sequencing can add noise and reduce the quality of the sequencing measurements.</p> <p>Note: Where possible we recommend placing the Ion Chef™ Instrument on a separate bench from the Ion GeneStudio™ S5, Ion GeneStudio™ S5 Plus, or Ion GeneStudio™ S5 Prime Sequencer as the Ion Chef™ Instrument can itself cause vibration.</p>
Pollution	The Ion GeneStudio™ S5 Sequencers, the Ion Chef™ Instrument, Ion OneTouch™ 2 Instrument, and the Ion OneTouch™ ES Instrument are for use in Office or Laboratory controlled environments.
Overvoltage category	The Ion GeneStudio™ S5 Sequencers, Ion Chef™ Instrument, Ion OneTouch™ 2 Instrument, and the Ion OneTouch™ ES Instrument have installation (overvoltage) categories of II (2), and are classified as portable equipment.
Other conditions	For indoor use only. Install the Ion GeneStudio™ S5 Sequencers on a level surface. The installation location must be away from any vents that could expel particulate material on the system components.

Thermal specifications for the instrument and server

During operation, the thermal outputs based on the typical current draw of the components are:

Component	Typical draw (W)	Thermal output (BTU/h)
Ion GeneStudio™ S5 Sequencer	520 ^[1]	1774
Ion GeneStudio™ S5 Plus Sequencer	700 ^[1]	2388
Ion GeneStudio™ S5 Prime Sequencer	700 ^[1]	2388
Ion Torrent™ Server ^[2]	1100	3753
Ion Chef™ Instrument	990	3378
Ion OneTouch™ 2 Instrument	550	1877
Ion OneTouch™ ES Instrument	410	1399

^[1] Maximum draw: 1350W

^[2] Minimum Efficiency: 65% (Energy Star Qualified); 85% Efficient Power Supply.

Ventilation requirements

Allow at least 4 inches (10 cm) of clearance around the Ion GeneStudio™ S5 System for ventilation. Do not block air inlets or outlets to allow proper ventilation.

Cleaning or decontamination

See the user documentation for your Ion GeneStudio™ S5 Sequencer for information on how to clean or decontaminate the instrument.

Wear appropriate protection, including gloves, laboratory goggles, and coat whenever you work with the fluids that are used on this instrument, or parts that may come into contact with these fluids.

Use only the cleaning agents as described in the user documentation for your Ion GeneStudio™ S5 Sequencer. Use of cleaning agents that are not described in user documentation can impair the instrument. Contact Technical Support if you have questions.

Wipe off any liquid on or near the instrument using a lint-free tissue.

Disposing of waste



WARNING! CHEMICAL HAZARD. Refer to Safety Data Sheets (SDSs) and local regulations for handling and disposing of plastic consumables. Follow local municipal waste ordinances for proper disposal provisions to reduce the environmental impact of plastic consumables.



WARNING! DANGER CHIMIQUE. Consulter les fiches de données de sécurité (FDS) et les réglementations locales en matière de manipulation et d'élimination des consommables en plastique. Se conformer à la réglementation locale relative à l'élimination des déchets usuels pour réduire l'impact environnemental des consommables en plastique.



WARNING! CHEMICAL HAZARD. Before handling chemicals, refer to the Safety Data Sheet (SDS) provided by the manufacturer, and observe all relevant precautions.



WARNING! DANGER CHIMIQUE. Avant de manipuler des produits chimiques, se référer à la fiche de données de sécurité (FDS) fournie par le fabricant et respecter toutes les précautions d'usage.



WARNING! CHEMICAL HAZARD. All chemicals in the instrument, including liquid in the lines, are potentially hazardous. Always determine what chemicals have been used in the instrument before changing reagents or instrument components. Wear appropriate eyewear, protective clothing, and gloves when working on the instrument.



WARNING! DANGER CHIMIQUE. Tous les produits chimiques contenus dans l'instrument, notamment le liquide dans les lignes, sont potentiellement dangereux. Toujours déterminer les produits chimiques utilisés dans l'instrument avant le remplacement de réactifs ou de composants de l'instrument. Porter des gants, des vêtements de protection et des protections oculaires appropriés lors de toute intervention sur l'instrument.



WARNING! CHEMICAL HAZARD. Waste produced by instruments can be hazardous and can cause injury or illness.



WARNING! DANGER CHIMIQUE Les déchets produits par les instruments peuvent être dangereux et entraîner des blessures ou des maladies.

Electrical requirements



WARNING! For safety, the power outlet used for powering the instrument must be accessible at all times. See “Instrument clearances” on page 7 for information about the space needed between the wall and the instrument. In case of emergency, you must be able to immediately disconnect the main power supply to all the equipment. Allow adequate space between the wall and the equipment so that the power cords can be disconnected in case of emergency.



WARNING! Par souci de sécurité, la prise de courant alimentant l’instrument doit être accessible à tout moment. En cas d’urgence, il doit être possible de débrancher immédiatement l’alimentation principale de l’ensemble des équipements. Laisser suffisamment d’espace entre le mur et les équipements afin de pouvoir débrancher les câbles d’alimentation sans encombre, en cas d’urgence.

- Electric receptacle required: 2-prong with ground pin
- Mains AC line voltage tolerances must be up to $\pm 10\%$ percent of nominal voltage

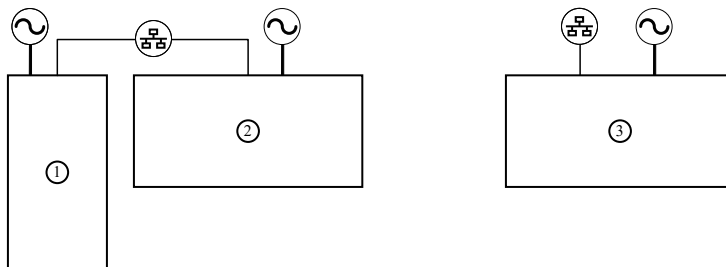
Component	Input voltage (VAC)	Frequency (Hz)	Rated Current (A) ^[1]
Ion GeneStudio™ S5 Sequencer	100-240	50/60	14.0
Ion GeneStudio™ S5 Plus Sequencer	100-240	50/60	14.0
Ion GeneStudio™ S5 Prime Sequencer	100-240	50/60	14.0
Ion Torrent™ Server ^[2]	90-265	50/60	12
Ion Chef™ Instrument	100-240	50/60	12
Ion OneTouch™ 2 Instrument	100-240	50/60	5.5
Ion OneTouch™ ES Instrument	99-132/198-264	50/60	0.5

^[1] Based on rated current at minimum input voltage.

^[2] Minimum Efficiency: 65% (Energy Star Qualified); 85% Efficient Power Supply.

Electrical requirements for the Ion GeneStudio™ S5 System and Ion Torrent™ Server

Use an approved UL Listed detachable power supply cord to connect the sequencer to the wall. Route power cords away from the workspace to avoid accidental disconnection.



- ① Ion Torrent™ Server
- ② Ion GeneStudio™ S5 Sequencer
- ③ Ion GeneStudio™ S5/Ion GeneStudio™ S5 Plus Sequencer

Power cords are provided with the instrument. If not suitable for installation in your region, ensure that any power cord you do use is:



- Maximum 10 ft (3 m) in length
- Grounding type
- Compatible with the power supply receptacles used to connect to main power
- Suitable for the rating of the instrument and mains power supply
- Compliant with local safety requirements (for example, UL Listed for North America, JIS approved for Japan, HAR or agency certified for Europe)

Electrical requirements for the Ion OneTouch™ Instrument

- Use the external power supply provided with the instrument.
- Facility to supply via building code compliant 15A circuit.
- Use an approved UL Listed detachable power supply cord, as supplied, to connect the system to the wall.

Electrical protective devices

We recommend several protective devices to protect the system in environments with large voltage and power fluctuations.

Device	Description
Power line regulator	<p>We recommend the use of a 1.5-kVA power line regulator in areas where the supplied power fluctuates in excess of $\pm 10\%$ of the normal voltage. Power fluctuations can adversely affect the function of the instrument and computer.</p> <p>Note: A power line regulator monitors the input current and adjusts the power supplied to the instrument or computer. It does not protect against a power surge or failure.</p>
Uninterruptible power supply (UPS)	<p>We recommend the use of a 1.5-kVA uninterruptible power supply (UPS), especially in areas prone to power failure. Power failures and other events that abruptly terminate the function of the instrument and computer can corrupt data and possibly damage the system.</p> <p> WARNING! PHYSICAL INJURY HAZARD. Do not attempt to lift the UPS unit without assistance of at least two people. Improper lifting can cause painful and permanent back injury. Refer to the UPS manufacturer user guide for more information.</p> <p> WARNING! RISQUE DE BLESSURES CORPORELLES. Ne pas essayer de soulever l'onduleur sans l'aide d'au moins deux personnes. En soulevant incorrectement l'appareil, l'opérateur risque de se blesser au dos de façon permanente. Voir le guide de l'utilisateur du fabricant de l'onduleur pour plus d'informations.</p> <p>IMPORTANT! UPSs provide power for a limited time. They are meant to delay the effects of a power outage, not to serve as replacement power sources. In the event of a power loss, power off the instrument and computer unless you expect to regain power within the battery life of the UPS.</p>
Surge protector	<p>We recommend the use of a 10-kVA surge protector (line conditioner) in areas with frequent electrical storms or near devices that are electrically noisy, such as refrigerators, air conditioners, or centrifuges. Short-duration, high-voltage power fluctuations can abruptly terminate the function of, and thereby damage the components of, the computer and the instrument.</p> <p>Note: A dedicated line and ground between the instrument, computer, and the building's main electrical service can also prevent problems caused by power fluctuations.</p>

Network requirements

The Ion Torrent™ Server is factory-configured for the TCP/IP protocol. The product includes a fast Ethernet adapter (10/100 Mbps) with an RJ45-type connector and one 3-m (9.8-ft) crossover Ethernet cable that connects the computer and the instrument.

For the instrument to be connected to a LAN, an active, tested LAN connection must be in place before the scheduled installation date.

You must supply a standard Category 6 Ethernet cable of the required length to connect the computer to your LAN.

Network configuration

The following requirements must be met before installation of the Ion Torrent™ Server. Discuss any discrepancies in the checklist with your field service representative prior to the visit.

- An information technologies resource must be available to assist with the network connection on the date that the Ion Torrent™ Server will be installed.
- A static (or dynamic) IP address must be reserved for the Ion GeneStudio™ S5 Plus Sequencer or Ion Torrent™ Server.

Note: If necessary, field service can provide the Ion GeneStudio™ S5 Plus Sequencer or Ion Torrent™ Server's MAC address prior to the installation.

- The room where the Ion Torrent™ Server will be deployed must contain at least one active network jack.
- The site DNS Server must be configured for the Ion Torrent™ Server so that users can access the server URL from their workstations.
- The Ion GeneStudio™ S5 Plus Sequencer and/or the Ion Torrent™ Server must be protected behind an appropriately configured network firewall and have outbound internet access as described below.

Note: While not recommended, you can enable access to the Ion Torrent™ Server from the internet (via the web server running on the Ion Torrent™ Server). If you provide such access, you must restrict access to the server using HTTP and AUTH firewall rules, or a combination of the two. Implementing and maintaining such restrictions is the responsibility of the server administrator and not of Thermo Fisher Scientific.

- The Ion GeneStudio™ S5 Plus Sequencer and Ion Torrent™ Server require outbound Internet access through HTTP/port-80 to <http://ionupdates.com> and <http://us.archive.ubuntu.com> to retrieve software updates.

Note: The Ion GeneStudio™ S5 Sequencer and Ion Torrent™ Server require an efficient Internet connection to download software updates. If they are isolated from the Internet, you must download and install updates manually to the server.

IMPORTANT! Manually installing server updates is not supported by Thermo Fisher Scientific. If you choose to download the updates to a USB and manually update the Ion Torrent™ Server you do so at your own risk. Any issues updating the server in this manner requiring Thermo Fisher Scientific intervention are not covered by the warranty or any service contract you may have purchased. You will need to schedule an on-site visit by your field service engineer at your own expense.

- The Ion GeneStudio™ S5 Sequencer and Ion Torrent™ Server require outbound Internet access through HTTPS/port-443 and SSH/port-22 to allow us to provide remote support via the Axeda Remote System Monitoring (RSM) Agent. The server includes the Axeda Agent to assist you in maintaining your Ion GeneStudio™ S5 System and to provide timely technical support (for more information, see <http://www.axeda.com/community/customers/applied-biosystems>).

At minimum, whitelist the following outbound addresses for the server:

- drm.appliedbiosystems.com on HTTPS (443)
 - rssh.iontorrent.net on SSH (22)
-

IMPORTANT! Without access through HTTPS/port-443 and SSH/port-22, we cannot support your site in a timely fashion and we may forego remote support for your site altogether at our discretion.

Note: The Axeda Agent is already in use with the Ion PGM™ and Ion Proton™ Sequencers to perform instrument diagnostics, preventive maintenance, failure prediction, and proactive notification. The agent does not collect any sequencing reports, results, or data. For more information on the Axeda Agent, see: <http://lifetech-it.hosted.jivesoftware.com/message/1546#1546>

- If the Ion GeneStudio™ S5 System will be installed without a connection to a local area network, then you must provide a router to access data generated by the Ion GeneStudio™ S5 Sequencer. Connection and configuration of the router is not the responsibility of the field service engineer.
 - If the Ion Torrent™ Server will be more than 10 feet from the Ion GeneStudio™ S5 Prime Sequencer, you must provide a standard Category 6 Ethernet Cable of sufficient length at the time of installation.
-

Note: The supported configuration of the Ion GeneStudio™ S5 Prime Sequencer is a direct connection between the instrument and the server.

- Use a shielded Ethernet cable when connecting the Ion Torrent™ Server to the Ion OneTouch™.

Safety requirements

Safety practices

A safety representative from your facility must ensure that:

- Personnel establish and follow all applicable safety practices and policies to protect laboratory personnel from potential hazards.
- All applicable safety devices and equipment are available at all times.

Required safety equipment

Your laboratory has specific safety practices and policies designed to protect laboratory personnel from potential hazards that are present. Follow all applicable safety-related procedures at all times.

The following safety equipment and protection from hazards must be available at the installation site:

- Protection from any sources of hazardous chemicals, radiation (for example, lasers, radioisotopes, radioactive wastes, and contaminated equipment), and potentially infectious biological material that may be present in the area where the service representative will work.
- Eyewash
- Safety shower
- Eye and hand protection
- Adequate ventilation, including vent line/fume hood, if applicable
- Biohazard waste container, if applicable
- First-aid equipment
- Spill cleanup equipment
- Applicable Safety Data Sheets (SDSs)

Materials for installation and operation

Installation checklist

See the *Ion GeneStudio™ S5 Systems Pre-Installation Checklist* (Pub No. MAN0013777) for the materials required for instrument installation. The checklist specifies the materials that must be present onsite before installation and subsequent training can take place.

Installation kit

The Ion S5™ Installation Kit (Cat. No. A27215) is available to first-time owners of an Ion GeneStudio™ S5 System and is shipped with the instrument. The kit contains the core reagents and controls that are used during the installation, training, and operation of the instruments.

Ion S5™ Installation Kit (Part No. A27215; Not available for separate purchase.)

Contents	Part No.	Quantity	Storage
Ion 540™ Chip Kit	A27765	4 pack	15°C to 30°C
Ion S5™ Sequencing Solutions	A27767	1	
Ion S5™ Sequencing Reagents	A27768	1	-30°C to -10°C
Ion S5™ Cartridge Tool	A28308	1	15°C to 30°C

Operation materials

Additional supplies and consumables are necessary for routine operation. Contact a sales representative to order these additional supplies. Use only supplies as specified by Thermo Fisher Scientific.

Materials for template and library preparation

For more information about Ion Torrent™ sequencing applications and materials and equipment required for library and template preparation, see the documentation at thermofisher.com.

Receive and inspect the shipment

1. Verify that the items shown on the shipping list are the items that were ordered at the time of purchase.
2. Carefully inspect the shipping containers. Take photographs of any damage, then report the damage to the shipping company and to your service representative. Record any damage or mishandling on the shipping documents.
3. Immediately unpack the reagents or installation kit box (boxed separately from the instrument components). Store the reagents at the temperatures specified on the product packaging or labels. Storage temperatures are also listed in .

IMPORTANT! Other than reagents or plates that require storage at specific conditions, do not unpack the instrument shipping containers at this time. To protect yourself from liability for damage that occurred during shipping, inspect the shipping containers and report damage as described above.

IMPORTANT! Do not unpack the instrument shipping containers at this time. To protect yourself from liability for damage that occurred during shipping, inspect the shipping containers and report damage as described above.

Move the crated instrument to the installation site

1. Clear the installation site of all unnecessary materials.
2. If possible, move the crated instrument and other shipping containers to the installation site. Do not uncrate.



CAUTION! PHYSICAL INJURY HAZARD. Do not attempt to lift or move the instrument without the assistance of others, the use of appropriate moving equipment, and proper lifting techniques. Improper lifting can cause painful and permanent back injury. Depending on the weight, moving or lifting an instrument may require two or more people.

IMPORTANT! Do not tip the crated instrument on end. Tipping may damage the instrument hardware and electronics.

Note: After installation, retain the crate and instrument packaging in case you need to relocate the instrument.

Related documentation and support

Related documentation

Document	Pub. No.	Description
<i>Ion GeneStudio™ S5 Instrument User Guide</i>	MAN0017528	Describes the Ion GeneStudio™ S5 System hardware and software, and provides information on preparing, maintaining, and troubleshooting the system.
<i>Ion GeneStudio™ S5 Systems Pre-Installation Checklist</i>	MAN0013777	Describes the tasks that you should complete before installation, and lists the materials needed for a successful Ion GeneStudio™ S5 System installation and training.

Customer and technical support

Visit thermofisher.com/support for the latest service and support information.

- Worldwide contact telephone numbers
- Product support information
 - Product FAQs
 - Software, patches, and updates
 - Training for many applications and instruments
- Order and web support
- Product documentation
 - User guides, manuals, and protocols
 - Certificates of Analysis
 - Safety Data Sheets (SDSs; also known as MSDSs)

Note: For SDSs for reagents and chemicals from other manufacturers, contact the manufacturer.

Limited product warranty

Life Technologies Corporation and/or its affiliate(s) warrant their products as set forth in the Life Technologies' General Terms and Conditions of Sale at www.thermofisher.com/us/en/home/global/terms-and-conditions.html. If you have any questions, please contact Life Technologies at www.thermofisher.com/support.



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Revision history: Pub. No. MAN0017529

Revision	Date	Description
C.0	1 February 2023	Removed the following skus from the Ion S5™ Installation Kit contents table. <ul style="list-style-type: none">• A28195• A27897• A29022
	21 February 2022	Update the quantity of the Ion S5™ Cartridge Tool in the Ion S5™ Installation Kit. Update site preparation workflow to current format.
A.0	5 January 2018	New site preparation guide for Ion GeneStudio™ S5 Series sequencers.

The information in this guide is subject to change without notice.

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1 February 2023

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