Ion Personal Genome Machine™ (PGM™) System

Publication Number MAN0007516 **Revision** A.0

This guide contains the information needed to prepare your site for installation of the Ion PGM™ System (4462921).

Site preparation workflow

A service representative will contact you to schedule the installation. When the installation is scheduled:

1. Receive and inspect the shipment (see page 20).
2. Move the crated instrument to the installation site (see page 21).
3. Complete the site preparation activities (see page 2).
4. Ensure that the purchase order is complete.

Installation timeline and training

After the Ion PGM™ System is uncrated, installation and testing takes ~7 hrs:

During and/or after installation, the service representative reviews data and provides some basic operator training. For additional training and reference information, see the user documents provided with the Ion PGM™ System.

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 may be postponed.

✓	Date	Initials	Site preparation requirement	See page
☐			Customer responsibilities have been reviewed and personnel have been assigned.	3
☐			The installation site is identified and meets requirements:	
			☐ Space and clearance	5
			☐ Environmental	12
			☐ Electrical	16
			☐ Network	17
			☐ Safety	19
☐			All materials needed for installation and operation are available.	20
☐			The instrument was received and inspected:	20
			☐ All items on the shipping list are the same items ordered at the time of purchase.	
			☐ Any damage to shipping containers was reported to the shipping company that delivered the instrument.	
			☐ Any damage or mishandling was recorded on the shipping documents.	
			☐ The reagents box was unpacked and stored as specified.	
☐			The installation site is cleared and ready for instrument installation.	21
☐			The crated instrument and other shipping containers are moved to the installation site.	

Customer responsibilities

Personnel	Responsibilities
Site preparation/ installation coordinator	• 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 PGM™ System. • 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	• 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	• 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	• Ensures that the installation requirements are met for: – 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 PGM™ System 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.

Personnel	Responsibilities
Network or IT specialist (if the instrument will be connected to a network)	• 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 PGM™ System to the network. • If applicable, provides and installs a network or dedicated printer. ⚠ **CAUTION!** Do not attempt to connect the Ion PGM™ System components to the network before the service representative arrives.

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 crates and packages you will receive, and it describes the dimensions of the Ion PGM™ System after it has been installed and configured.

IMPORTANT! We do not install, service, or repair instruments in areas designated BioSafety Level 3 (BSL-3) or BioSafety Level 4 (BSL-4).

Crate dimensions and weights

Crate	Height	Length (depth)	Width	Weight
Ion PGM™ Sequencer	67.3 cm (26.5 in)	66.0 cm (26.0 in)	74.9 cm (29.5 in)	39.1 kg (95.0 lbs)
Torrent Server	71.9 cm (28.3 in)	70.6 cm (27.8 in)	34.3 cm (13.5 in)	29.9 kg (66.0 lbs)
Ion Chef™ Instrument	71.1 cm (28 in)	86.4 cm (34 in)	86.4 cm (34 in)	134.0 kg (295.0 lbs)
Ion OneTouch™ 2 Instrument	45.7 cm (18.0 in)	45.7 cm (18.0 in)	53.3 cm (21.0 in)	20.0 kg (44.0 lbs)
Ion OneTouch™ ES Instrument	36.8 cm (14.5 in)	36.8 cm (14.5 in)	44.4 cm (17.5 in)	5.9 kg (~13.0 lbs)
Ion Chip™ Minifuge	16.3 cm (6.4 in)	18.2 cm (7.2 in)	23.5 cm (9.2 in)	0.9 kg (2.0 lbs)

Instrument dimensions and weights

Component	Height	Length (depth)	Width	Weight
Ion PGM™ Sequencer	53.3 cm (21.0 in)	50.8 cm (20.0 in)	61.0 cm (24.0 in)	29.5 kg (65.0 lbs)
Torrent Server	56.6 cm (22.3 in)	53.8 cm (21.2 in)	21.6 cm (8.5 in)	24.9 kg (55.0 lbs)
Ion OneTouch™ 2 Instrument	30.5 cm (12.0 in)	40.6 cm (16.0 in)	35.6 cm (14.0 in)	17.0 kg (37.5 lbs)
Ion OneTouch™ ES Instrument	24.1 cm (9.5 in)	40.6 cm (16.0 in)	27.9 cm (11.0 in)	5.4 kg (12.0 lbs)
Ion Chip™ Minifuge	11.2 cm (4.4 in)	15.3 cm (6.0 in)	15.3 cm (6.0 in)	0.8 kg (1.8 lbs)

Component	Height		Length (depth)	Width	Weight
	Open	Closed			
Ion Chef™ Instrument	83.9 cm (33.0 in)	56.1 cm (22.1 in)	70.0 cm (27.6 in)	71.4 cm (28.1 in)	68.2 kg (150 lbs)

Instrument clearances

During instrument setup and maintenance, it is necessary to access the back and sides of the instruments. If the back of an instrument faces a wall, it will be necessary to have enough space to rotate it 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 PGM™ Sequencer	30.5 cm (12.0 in)	30.5 cm (12.0 in) [1]	10.0 cm (4.0 in)	20.0 cm (8.0 in)	10.0 cm (4.0 in)
Torrent Server	5.0 cm (2.0 in)	30.5 cm (12.0 in)	5.0 cm (2.0 in)		61.0 cm (24.0 in)
Ion Chef™ System	35.6 cm (14 in)	17.0 cm (6.7 in)	10.0 cm (4.0 in)		10.0 cm (4.0 in)
Ion OneTouch™ 2 Instrument	30.5 cm (12.0 in)	30.5 cm (12.0 in)	10.0 cm (4.0 in)		10.0 cm (4.0 in)
Ion OneTouch™ ES Instrument	30.5 cm (12.0 in)	30.5 cm (12.0 in)	30.5 cm (12.0 in)		30.5 cm (12.0 in)
Ion Chip™ Minifuge	30.5 cm (12.0 in)	10.0 cm (4.0 in)	10.0 cm (4.0 in)		10.0 cm (4.0 in)

[1] The instrument requires: 30.5 cm (12.0 in) from front edge of bench to sequencer bezel, 20.3 cm (8.0 in) from front edge of bench to the conical tubes, and 90.0 cm (36.0 in) aisle in front of bench for operator access.

Placement of the instruments and server

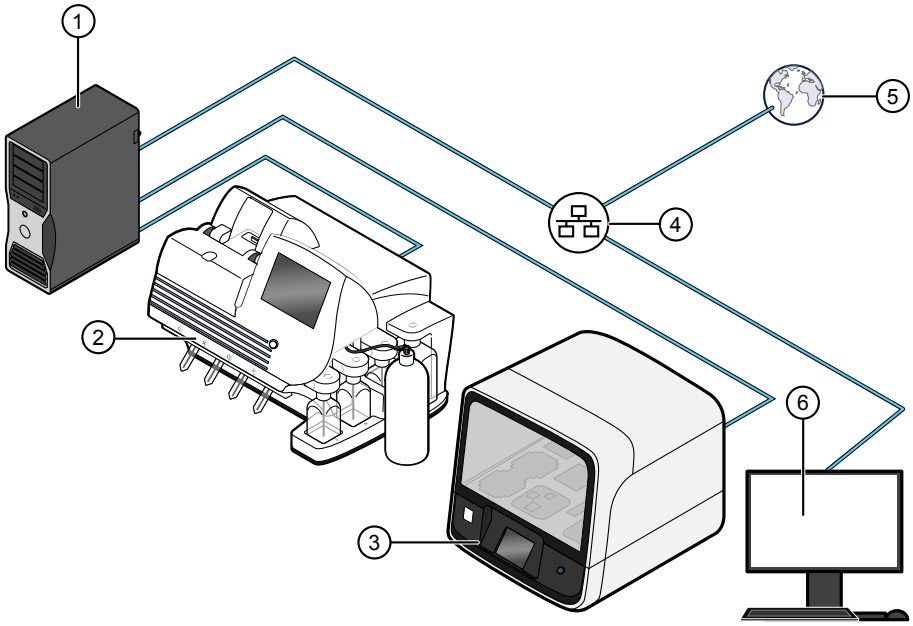
The installation room size must accommodate both the Ion PGM™ Sequencer and the Torrent Server. If the Ion PGM™ Sequencer, the Torrent Server, and the Ion Chef™ Instrument (or the Ion OneTouch™ 2 Instrument) are placed on a stationary or mobile bench, verify that the bench meets the requirements in "Dimensions and weights" on page 4.

Note: We are not responsible for any damage caused by using a laboratory bench that does not meet the minimum weight capacities requirements.

System layout

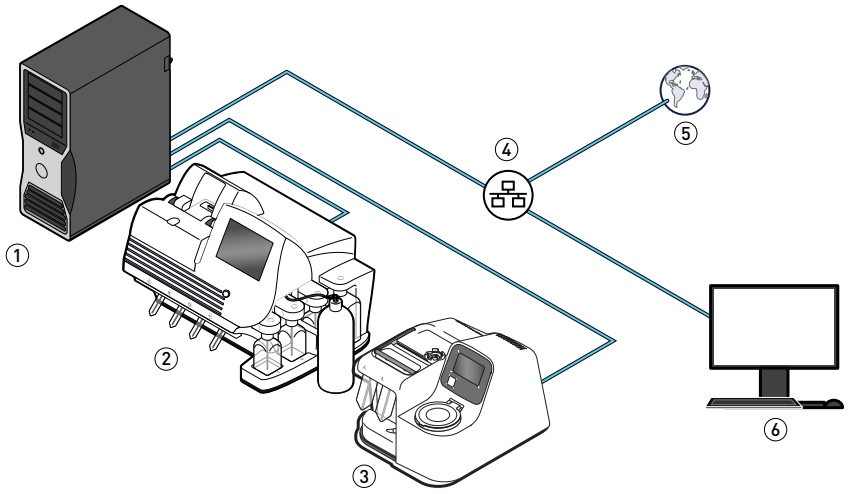
We support the layout in which the Torrent Server is directly connected to the Ion PGM™ Sequencer, instead of through the local area network from a remote location such as a server room. Data are most robustly transferred from the Ion PGM™ Sequencer to the Torrent Server when they are directly connected by a standard Category 6 Ethernet cable that is provided with the installation materials.

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



Ion PGM™ System with the Ion Chef™ System

1. Torrent Server
2. Ion PGM™ Sequencer
3. Ion Chef™ Instrument
4. Local area network
5. Internet
6. Torrent Suite™ Software



Ion PGM™ System with the Ion OneTouch™ 2 System

1. Torrent Server
2. Ion PGM™ Sequencer
3. Ion OneTouch™ 2 Instrument
4. Local area network
5. Internet
6. Torrent Suite™ Software

Connecting multiple Ion PGM™ Sequencers

The Torrent Server can physically connect to two Ion PGM™ Sequencers; however, depending on the use of each Ion PGM™ Sequencer and the type of chip used, a single Torrent Server might not be able to process the data flow from both units. Ion chips that have increased densities generate raw data in roughly the same time on the Ion PGM™ Sequencer, but the resulting data require longer processing times on the Torrent Server. Contact your Thermo Fisher Scientific representative for more information on finding the optimal balance of Ion PGM™ Sequencers to Torrent Servers based on the current processing times for specific Ion chips.

Internet connectivity

We highly recommend connecting the Torrent Server to a network with internet access. In providing outbound access to the Internet from the server, you enable the Thermo Fisher Scientific support team to provide inbound support. Both the Ion PGM™ System and the Torrent Server run a remote monitor agent that can provide service personnel with critical system information, such as installed software versions. With your permission, the agent also allows service personnel to remotely log in to the Ion PGM™ System and the Torrent Server, which is required for system support. Without remote access, service personnel cannot access, view, and troubleshoot issues regarding machine performance.

To enable full support, the Torrent Server must have outbound internet access (ports 22, 80, and 443) and be behind an appropriately configured firewall. While not recommended, you can enable access to the Torrent Suite™ Software (the web server running on the 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 the customer's server administrator and not of Thermo Fisher Scientific.

Note: See the *Ion PGM™ System IT Checklist* (Pub. No. MAN0008316) for Torrent Server network access requirements and for information to prepare Ion PGM™ Sequencers and servers within the umbrella policies of your site. Contact Technical

Support to obtain the *Ion PGM™ System IT Checklist* (Pub. No. MAN0008316) (see "Customer and technical support" on page 22 for more information).

Planning the installation

In preparation for the Ion PGM™ System 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.

Laboratory layout

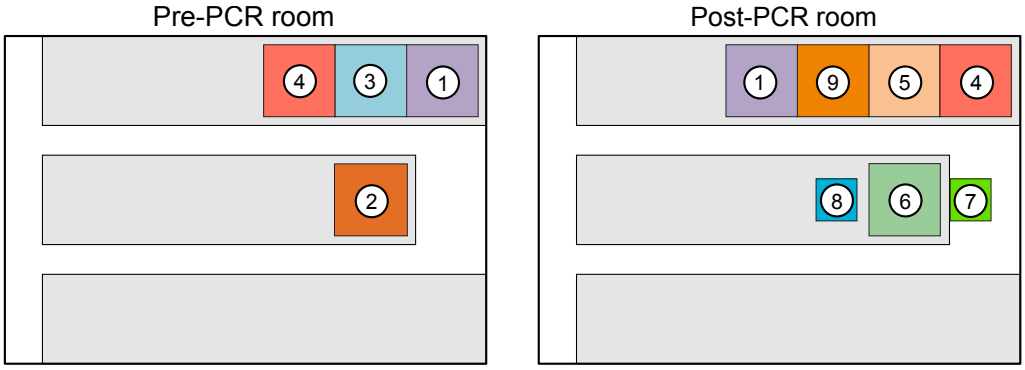
When designing your laboratory layout, follow good laboratory practices to ensure reliable and contamination-free PCR results. Pay particular attention to the need to separate the areas for pre- and post-PCR activities. Isolating the amplicon source, separating pre-PCR from post-PCR activities, and dedicating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

As shown in the illustrations below, the Ion PGM™ System can be deployed in both one- and two-room laboratory configurations. The two-room layout is highly recommenced due to the protection that it affords against contamination; however, the one-room layout produces acceptable results if proper precautions are observed.

If you choose to deploy the Ion PGM™ System in a one-room layout:

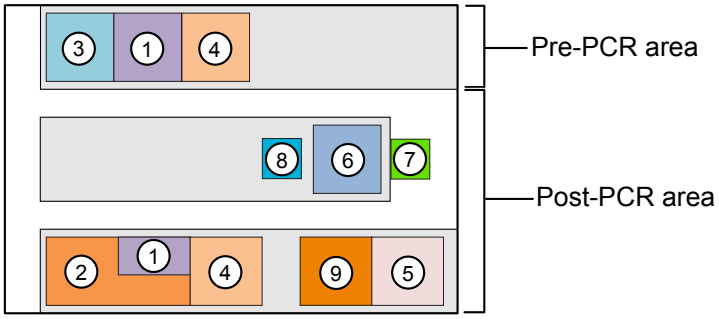
- Establish clearly-labeled, separate sets of pipettes for the library preparation, emulsion PCR (emPCR) setup, and emulsion breaking stations.
- Always move from "clean" to "dirty" (for example, from pre- to post-PCR). We do not recommend moving from "dirty" to "clean" (for example, do not handle post-amplification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

Note: The positions of the stations in the pre-and post- PCR rooms are not important. For example, several users have placed the Ion PGM™ Sequencer and Ion Chef™ Instrument (or Ion OneTouch™ 2 Instrument) on the same bench, often side by side.



Two-room layout

1. Centrifuge
2. Amplification mixture setup area
3. Library setup area
4. Pipettes
5. Ion Chef™ Instrument or Ion OneTouch™ 2 Instrument and Ion OneTouch™ ES Instrument
6. Ion PGM™ Sequencer and Ion PGM™ Torrent Server
7. Gas cylinder
8. Ion Chip™ Minifuge
9. Veriti™ Thermal Cycler



One-room layout

Laboratory workstations

The following table describes workstations associated with the generic laboratory layout for the Ion PGM™ System. The stations are categorized in terms of their involvement pre- and post-PCR activities.

Note: 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	Centrifuges	Pre- and post-PCR areas	Centrifuges are used during library preparation and chip loading, so access is required in both the pre- and post-PCR areas. When planning centrifuge placement: • 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. • Most importantly, place the centrifuges in convenient locations.
2	Amplification mixture setup area	Pre-PCR area	Whenever possible, amplification mixture preparation should be performed within a dedicated hood. When selecting a location for amplification mixture preparation: • The amplification mixture setup station requires a set of dedicated pipettes. • If only one hood is available within the pre-PCR area, dedicate the hood for amplification mixture preparation and perform library preparation elsewhere. • If a hood is unavailable within the pre-PCR area, select a bench that is sterilized regularly and preferably isolated from the neighboring stations. **IMPORTANT!** Separation of the amplification mixture preparation area from the other stations is critical to preventing contamination. **IMPORTANT!** If possible, physically separate the library and amplification mixture setup areas.
3	Library setup area	Pre-PCR area	The use of a dedicated hood allows for UV treatment of the library preparation area and minimizes contamination from post-PCR material containing adaptors. When selecting a location for library preparation: • In a one-room laboratory layout, the use of a dedicated hood for library preparation is highly recommended, 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.

#	Station	Location	Description/requirements
4	Pipettes	Pre- and Post-PCR areas	Both the pre- and post-PCR areas require a complete set of dedicated pipettes. If necessary, the pipettes can be shared between neighboring stations, except for the amplification mixture and library setup stations, both of which require dedicated sets of pipettes.
5	Ion Chef™ Instrument, or Ion OneTouch™ 2 Instrument	Post-PCR area	When planning the placement of the instruments, confirm that the location meets all clearance and environmental requirements described in this document. **Note:** If possible, install the Torrent Server and Ion Chef™ Instrument to a dedicated power outlet.
6	Ion PGM™ Sequencer and Torrent Server	Post-PCR area	When planning the placement of the Ion PGM™ Sequencer and Torrent Server, confirm that the location meets all clearance and environmental requirements described in this document. **IMPORTANT!** The Ion PGM™ Sequencer is sensitive to both electrical noise and temperature changes. **Note:** Because the Torrent Server requires a direct connection to the Ion PGM™ Sequencer via a standard Category 6 Ethernet cable, the server is typically installed to the bench directly beneath the instrument.
7	Gas cylinder	Post-PCR area	The Ion PGM™ Sequencer requires a constant supply of nitrogen gas, typically provided by a gas cylinder located within 3m (10ft) of the instrument. **IMPORTANT!** The gas cylinder must be chained to a wall or bench.
8	Ion Chip™ Minifuge	Post-PCR area	The Ion Chip™ Minifuge is designed for loading chips, and should be located near the Ion PGM™ Sequencer. It comes in two configurations, depending on your power supply: 120 VAC and 220–240 VAC. ⚠ **CAUTION!** Never plug a 120 VAC minifuge into an 220–240 VAC outlet, or vice versa. Operating the minifuge with a supply voltage outside the range specified on the label may cause a fire or electric shock.
9	Primer-Annealing Thermal Cycler	Post-PCR area	When planning the placement of the instruments, confirm that the location meets all clearance and environmental requirements described in this document.

Environmental requirements

Ensure that the room where the instruments have been installed is maintained under the correct environmental conditions. Avoid placing the instruments next to heaters, cooling ducts, or in direct sunlight. Place the sequencer at least a meter away from major sources of electronic noise, such as refrigerators or microwaves.

CAUTION! Use of the instruments in an unspecified manner may result in the protection provided by the instruments to be impaired.

Note: For environmental requirements for the Ion Chef™ Instrument, see the *Ion Chef™ System Site Preparation Guide* (Pub. No. MAN0007956).

Component	Acceptable range
Altitude	Between sea level and 2,000 meters (6,500 feet) above sea level
Humidity: operating	10–90% relative humidity
Humidity: transportation and storage	20–80% relative humidity
Temperature: operating	15–30°C (59–86°F) At or above 1,800 meters (5,906 feet), the system must not be used if the temperature is above 29.5°C.
Temperature: transportation and storage	–30°C to 60°C (–22°F to 140°F)
Vibration	Ensure that benches where instruments are to be installed are free of vibration and have no contact with equipment that causes vibration (freezers, pumps, and similar equipment). Vibration can reduce the quality of sequencing measurements.
Pollution	The system has a Pollution Degree rating of II (2). The system may only be installed in an environment that has nonconductive pollutants, such as dust particles or wood chips. Typical environments with a Pollution Degree II (2) rating are laboratories, sales, and commercial areas.
Overvoltage category	The instruments have an installation (overvoltage) category of II (2).
Other conditions	For indoor use only. Keep away from any vents that could expel particulate material on the system components.

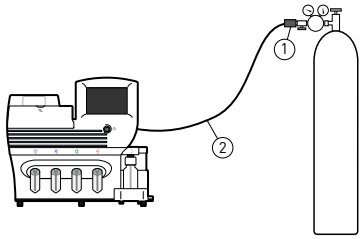
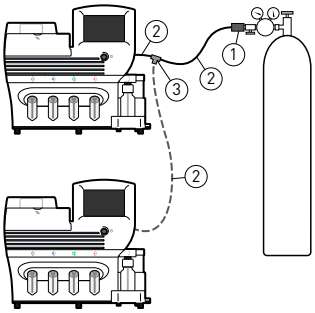
Gas requirements

CAUTION! Thermo Fisher Scientific recommends the use of nitrogen gas with the Ion PGM™ System. The use of alternative gasses is currently not supported and may adversely affect system performance.

An nitrogen gas cylinder must be:

- Connected to the Ion PGM™ Sequencer. See the figure below for a schematic and list of tubing and fittings.
- Able to supply 30 psi for up to three sets of installations of the Ion PGM™ Sequencer.

Note: In the following figure, dashed lines indicate an optional configuration for multipoint tie-in.

Installation	Example (see the following table for annotated parts)
• Single instrument • Single Room	
• Multiple instruments • Single or Multiple Room	

Items in the following table ship with the Ion PGM™ System:

	Description
1	Nylon and Nickel- Plated Brass Tube Fitting Adapter for 1/4-in Tube OD × 1/4-in NPT Female Pipe
2	Clear Tygothane® C-210-A Polyurethane Tubing 1/8-in ID, 1/4 in OD
3	*(Optional)* Nylon Tee for 1/4-in Tube OD
	Regulator, relieving-type, 7.25-58 psi, 28 scfm, no gauge, 1/4-in NPT
	(Not shown) Syringe, 10CC, Female Luer-Lok™ fitting
	(Not shown) Cleaning Tray

Note: If the gas cylinders will be placed more than 10 ft from the Ion PGM™ Sequencer, use the same type of low-permeability tubing supplied with the Ion PGM™ System (Tygothane® C-210-A).

Gas cylinders

You must supply the required nitrogen gas cylinder and accessories for the installation. This instrument requires a pressurized house line or one size 1-A nitrogen gas cylinder that holds approximately 7.2 m^3 (257 ft^3) of gas when full. Use only prepurified nitrogen of 99.998% (grade 4.8) or greater purity.

CAUTION! Damage to the instrument and its products can result from using impure gas, gases other than nitrogen, or an inadequate amount of gas.

WARNING! EXPLOSION HAZARD. Pressurized gas cylinders are potentially explosive. Always cap the gas cylinder when it is not in use, and attach it firmly to the wall or gas cylinder cart with approved brackets or chains.

WARNING! Gas cylinders are heavy and may topple over, potentially causing personal injury and tank damage. Cylinders should be firmly secured to a wall or work surface. Please contact your Environmental Health and Safety Coordinator for guidance on the proper installation of a gas cylinder.

Pressure regulator

You must supply a two-gauge regulator with a Compressed Gas Association (CGA) 580-cylinder adapter on the inlet side and a Swagelok® (or equivalent) end-fitting that accepts 6.35-mm (0.25-in.) outer diameter tubing. The primary gauge (0-3000 psi; 0-25,000 kPa recommended) measures tank pressure, and the secondary gauge (0-50 psi; 0-350 kPa recommended) measures regulated pressure. The secondary gauge must allow regulation between 25 and 45 psi via a Compressed Gas Association (CGA) 580-cylinder adapter with a needle-type shutoff valve on the exit side. The needle valves should have Swagelok® (or equivalent) end-fittings ready for connection to 6.35-mm (0.25-in.) outer diameter tubing.

Attaching the cylinder

Attach the pressurized gas cylinder firmly to a wall or gas cylinder cart by means of approved straps or chains.

Ventilation and waste collection requirements

WARNING! The instrumentation must be installed and operated in a well-ventilated environment as defined as having a minimum airflow of 6–10 air changes per hour. Contact your environmental health and safety coordinator to confirm that all instruments are installed and operated in an environment with sufficient ventilation.

Ventilation requirements

Allow at least 50 cm (20 in.) of clearance around the Ion OneTouch™ 2 Instrument for ventilation.

Allow at least 10 cm (4 in.) of clearance around the Ion PGM™ Sequencer for ventilation.

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

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

Cleaning or decontamination

Refer to the user documentation for your Ion PGM™ System 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 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 PGM™ System. Use of cleaning agents not described in this manual can impair the instrument. Contact Technical Support if you have questions.

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

Electrical requirements

CAUTION! Do not unpack or plug in any components until a field service representative has configured them for the proper operating voltage.

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

- Electric receptacle required: 2-prong with ground pin
- Main AC line voltage tolerances must be at most ±10% percent of nominal voltage.
- Power cords are provided with the instruments. If not suitable for installation in your region, ensure any power cord you do use is:
  - Maximum 10 feet (3 meters) in length
  - Grounding type
  - Compatible with the power supply receptacles used to connect to main power
  - Suitable for the rating of the instrument and main power supply
  - Compliant with local safety requirements (for example, UL Listed for North America, JIS approved for Japan, HAR or agency certified for Europe)
- (Ion OneTouch™ 2 Instrument only) Fuse Rating: 6 A, 250 VAC, Type M. Replace only with the same fuse type and rating.

WARNING! FIRE HAZARD. For continued protection against the risk of fire, replace fuses only with fuses of the type and rating specified for the instrument.

Device	Rated voltage [1,2]	Rated frequency	Rated current [3]
Ion PGM™ Sequencer	110/120VAC 220/240VAC	50/60 Hz	9 A
Torrent Server [4]	110/120VAC 220/240VAC	50/60 Hz	11 A
Ion Chef™ Instrument	100–240 VAC	50/60 Hz	14 A
Ion OneTouch™ 2 Instrument with power supply	110/120VAC 220/240VAC	50/60 Hz	5.5 A

Device	Rated voltage [1,2]	Rated frequency	Rated current [3]
Ion OneTouch™ ES Instrument	110/120VAC 220/240VAC	50/60 Hz	375 mA 160 mA
Ion Chip™ Minifuge	120 VAC 220–240 VAC	50/60 Hz	130 mA 65 mA

[1] In Japan, rated voltages of 100 VAC and 200 VAC are acceptable.

[2] If the supplied power fluctuates beyond the rated voltage, a power line regulator may be required. High or low voltages can adversely affect the electronic components of the instrument.

[3] Based on rated current at minimum input voltage.

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

Electrical requirements for the Ion PGM™ Sequencer and 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.

Power cords are provided with the instrument. If not suitable for installation in your region, ensure 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)

Network requirements

The Ion PGM™ Sequencer, Torrent Server, and Ion OneTouch™ 2 Instrument are factory-configured for the TCP/IP protocol and include fast Ethernet adapters (10/100Mbps) for use with RJ45-type connectors. The product includes one 3-m (9.8-ft) 1GB Ethernet cable used to connect the Torrent Server to the Ion PGM™ Sequencer, and one 3-m (9.8-ft) 10/100Mbps Ethernet cable used to connect the Torrent Server to the Ion OneTouch™ 2 Instrument. You must supply a standard Category 6 Ethernet cable of the required length to connect the Torrent Server to your LAN.

If the Ion OneTouch™ 2 Instrument will be connected to a local area network (LAN), an active, tested LAN connection must be in place before the scheduled installation date. Due to differences in network connections, the service representative cannot configure the system to access a specific network.

See the *Ion Chef™ System Site Preparation Guide* (Part. No. MAN0007956) for network requirements for the Ion Chef™ Instrument.

Network configuration

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

- A static (or dynamic) IP address must be reserved for the Torrent Server.

  Note: If necessary, field service can provide the server's MAC address prior to the installation.

- The room where the Torrent Server will be deployed must contain at least one active network jack.
- The site DNS Server must be configured for the Torrent Server so that users can access the server URL from their workstations.
- If connected to the internet, the 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 Torrent Server from the internet (via the web server running on the 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 Torrent Server requires outbound Internet access through HTTP/port-80 to **http://ionupdates.com** and **http://us.archive.ubuntu.com** to retrieve software updates.

  Note: The Ion PGM™ System and 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.

- The Torrent Server requires 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 PGM™ Sequencer 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**

- An information technologies resource must be available to assist with the network connection on the date that the Torrent Server will be installed.

- If the Ion PGM™ Sequencer will be installed without a connection to a local area network, then you must provide a router to access data generated by the Ion PGM™ System and to enable data storage by the Torrent Server.
- If the Torrent Server will be more than 10 feet from the Ion PGM™ System , you must provide a standard Category 6 Ethernet Cable of sufficient length at the time of installation.

  Note: The supported configuration is a direct connection between the instrument and the server.
- Use a shielded Ethernet cable when connecting to the Ion OneTouch™ 2 Instrument.

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.
- Appropriate fire extinguisher:
  - You are responsible for providing an appropriate fire extinguisher for use on or near the equipment.
  - The types and sizes of fire extinguishers shall be suitable for use on electrical and chemical fires as specified in current codes, regulations, and/or standards, and with approval of the Fire Marshall or other authority having jurisdiction.
  - The installation of appropriate fire extinguishers shall be in addition to other fire-protection systems and not as a substitute or alternative to them.
- 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

Reagents

You need to purchase templating and sequencing kits for the Ion PGM™ System. Contact your sales representative for purchase information.

18-MΩ water purification system

The Ion PGM™ Sequencer requires an 18-MΩ water purification system to prepare water for solutions used on the instrument. Such a system is essential to remove ions and organic carbons from the water that might interfere with the chip surface or sequencing enzyme. Water purchased from vendors or stored for any length of time is not acceptable.

Template and library preparation

For a complete list of materials and equipment required for template and library preparation, see the associated documentation in the following table.

For information on...	Refer to the...
Ion Fragment Library preparation	*Ion Xpress™ Plus gDNA Library Preparation User Guide* (Pub. No. 4471989)
Library quantitation	*Ion Library Quantitation Kit User Guide* (Pub. No. 4468986)

Note: The documents listed in the table above and similar resources are available for download from the Thermo Fisher Scientific website (thermofisher.com).

Installation checklist

Refer to the *Ion PGM™ Sequencer Pre-Installation Checklist* 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.

Receive and inspect the shipment

1. Verify that the items shown on the shipping list are the same items that you ordered at the time of purchase.
2. Carefully inspect the shipping containers and report any damage to the shipping company and 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) and store as specified.

IMPORTANT! Do not unpack shipping containers, except for the reagents or installation kit box, to protect yourself from liability if any damage occurred during shipping.

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.

CAUTION! 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.

Customer and technical support

Visit **thermofisher.com/support** for the latest in services and support, including:

- Worldwide contact telephone numbers
- Product support, including:
  - Product FAQs
  - Software, patches, and updates
  - Training for many applications and instruments
- Order and web support
- Product documentation, including:
  - 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 found on Life Technologies' website 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**.

Manufacturer: Life Technologies Corporation | 5781 Van Allen Way | Carlsbad, CA 92008

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

Revision history: Pub. No. MAN0007516

Revision	Date	Description
A.0	22 June 2017	• Added support for Ion Chef™ • Updated environmental requirements
3.0	13 September 2013	Removed materials lists
2.0	1 March 2013	New Product