XIA LLC

Instruments That Advance The Art

UltraLo-1800 Alpha Particle Counter

Site Requirements & Planning

Version: 0.4

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I. Site Preparation Tasks

A. Instrument Overview

The UltraLo-1800 is a state-of-the-art alpha particle counting system that uses a gas-filled ionization chamber and pulse shape analysis to achieve the lowest possible backgrounds and shortest possible counting times.

The instrument is to be used only by technologists trained both in laboratory techniques and procedures, and in the use of the instrument. The customer is responsible for validation of any results, and compliance with any requirements that pertain to their procedures and uses of the instrument.

B. Installation Overview

Before the system arrives at your location, please prepare your site for the installation process according to the instructions that follow. If an XIA LLC representative will be present to help install the instrument and associated devices, your site must be prepared prior to their arrival.

1. Site preparation process

1. Review this guide
2. Select the installation site
3. Meet requirements (gas, electrical, network)
4. Stock the site
5. Receive and inspect the system (shipment)
6. Move system to installation site

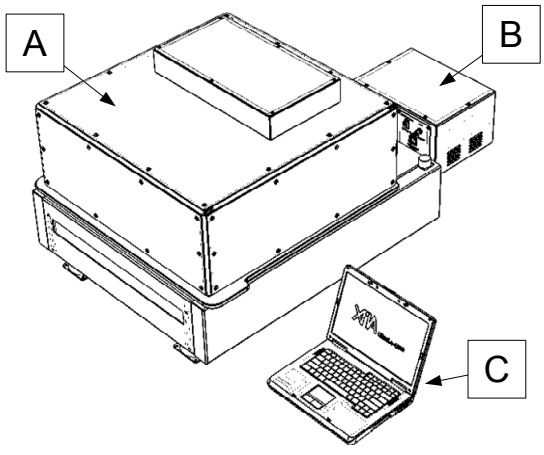
C. Select the site

1. Space requirements

a) System components

The shipment includes the following components:

A. Counter module
B. Support module
C. ThinkPad control laptop
D. Cables and Tubing (not shown)



b) Setup requirements

A typical setup is shown below in Figure 1.

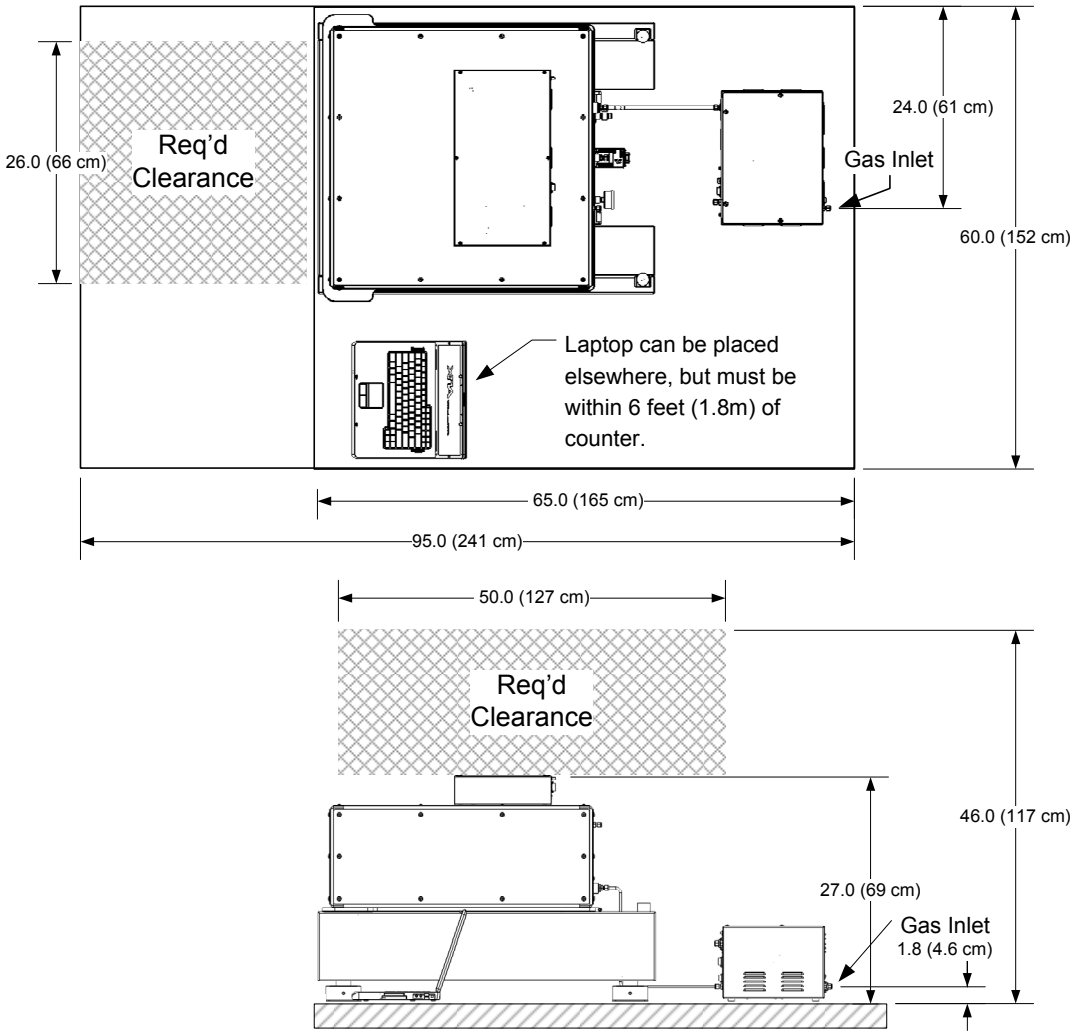


Figure 1: Space Requirements

For details on space requirements, see 'Dimensions and weights' on page 8. For additional information on necessary clearances, see 'Required clearances' on page 7. For details on the location of the gas inlet (and associated tolerance), see 'Gas Inlet Location' on page 5.

2. Gas requirements

The UltraLo-1800 requires a source of pure, dry Argon gas – ideally, the gas provided is boiloff from a tank of liquid Argon. All metal tubing (i.e. copper or stainless) should be used when running the gas from the source tank to the UltraLo-1800, and the plumbing system should be free from leaks. The gas pressure at the input to the UltraLo-1800 is required to be 21psi (150kPa) ± 5%.

The gas input fitting on the UltraLo-1800 is a Swagelok-type connector: P/N SS-400-61, and requires ¼" OD metal tubing. All necessary fitting hardware is supplied with the UltraLo-1800 system. The installation process for the gas tube and fitting is straightforward. If an XIA LLC representative is present during system installation, they will perform this installation step.

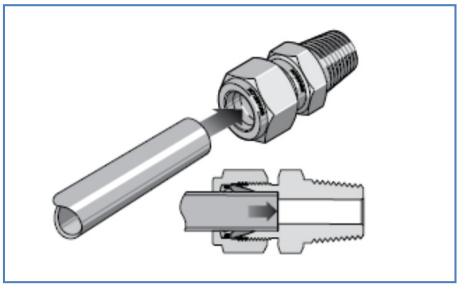


Figure 2: Gas Input Interface (Image from swagelok.com)

a) Gas Inlet Location

The location of the gas input fitting is called out in Figure 1. Prior to the scheduled date of installation, the gas tubing must be run from the gas source to the site of installation, and terminate at the specified gas inlet location. The termination of the ¼" metal tube (at the gas inlet location) shall be run in such a manner as to provide approximately 10" of play (in all directions) for final alignment during system installation.

b) Summary:

Requirement (at input to UltraLo)	Specification
Gas	Argon
Pressure	21psi (150kPa) ± 5%
Tubing	1/4" OD metal tube
Location	As called out in Figure 1, ± 10" all directions

c) Gas supply and consumption:

Our recommendation is to use a dewar of liquid Argon, and plumb the boiloff gas to the counter. In regards to gas consumption, the UltraLo-1800 has two defined flow rates; 'normal' (3.5 LPM) and 'purge' (15LPM). When you insert a new sample, the system runs at the purge rate for about 45 minutes, after which the flow is automatically throttled down to the normal rate for the measurement. Your gas consumption will depend on how many times you insert new samples. For reference, the counters at XIA run off of 230 liter liquid dewars. One counter running daily measurements (averaging at least 1 purge/day) will consume the dewar in a bit over two weeks.

3. Layout requirements

The UltraLo-1800 is fairly sensitive to microphonics. As such, the counter should be located in a relatively quiet space with reduced foot traffic, and away from acoustically noisy machinery such as fans, pumps, etc.

Verify that the installation location:

- Is not adjacent to vibration sources, such as pumps, compressors, or fans. Excessive vibration will affect instrument performance.
- Is not adjacent to electrically noisy devices, such as ovens, stepper motors, refrigeration units, etc.
- Allows the laptop to be within 6 feet (2 meters) of the instrument.

4. Required clearances

During instrument setup and maintenance, it is necessary to access the back of the counter module and the support module. If the back of the instrument faces a wall, it will be necessary to have enough space to access the back of the counter and support module from the side.

When changing a sample for measurement, the sample tray opens and extends 26.0 inches (66 cm) forward, from the instrument's front face. See Figure 3 below for illustration. When loading or removing a sample, the user may wish to stand to either side of the extended tray, or alternatively, in front of the extended tray. For comfortable operation, add additional space for the user (~3 feet, 1m) as appropriate.

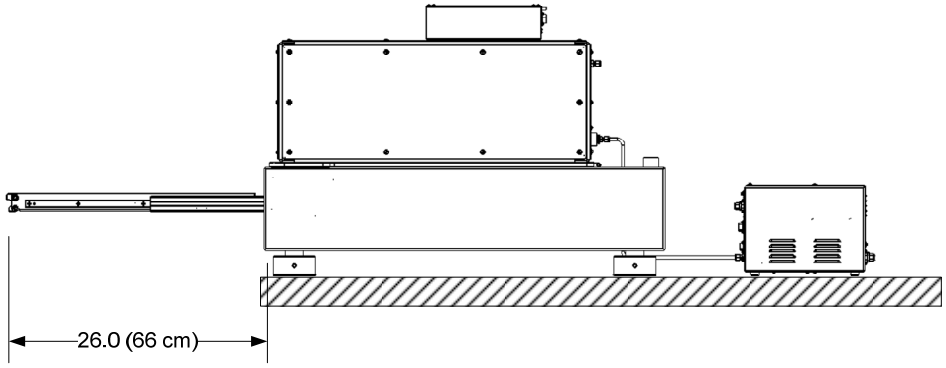


Figure 3: Counter with sample tray extended

During instrument maintenance, it may be necessary to open the counter module to access and service various internal components. See Figure 4 below for illustration. A total of 46 inches (117 cm) of vertical clearance is required for this operation.

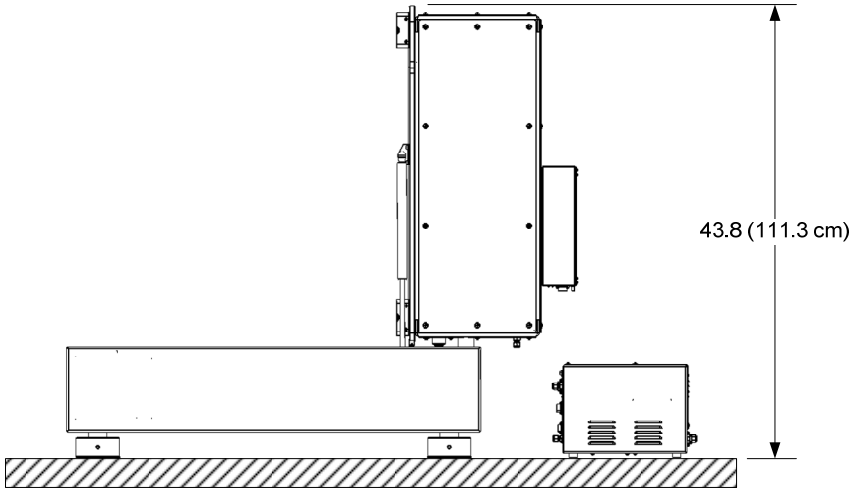


Figure 4: Counter opened for maintenance

5. Mounting hole locations

Should the user wish to secure the counter module to a table or bench – for earthquake safety or otherwise – the mounting hole pattern is provided below. The vibration-isolating feet are symmetrically located underneath the counter body. ¼”-20 size hardware would be appropriate. Mounting hardware is not supplied with the UltraLo-1800.

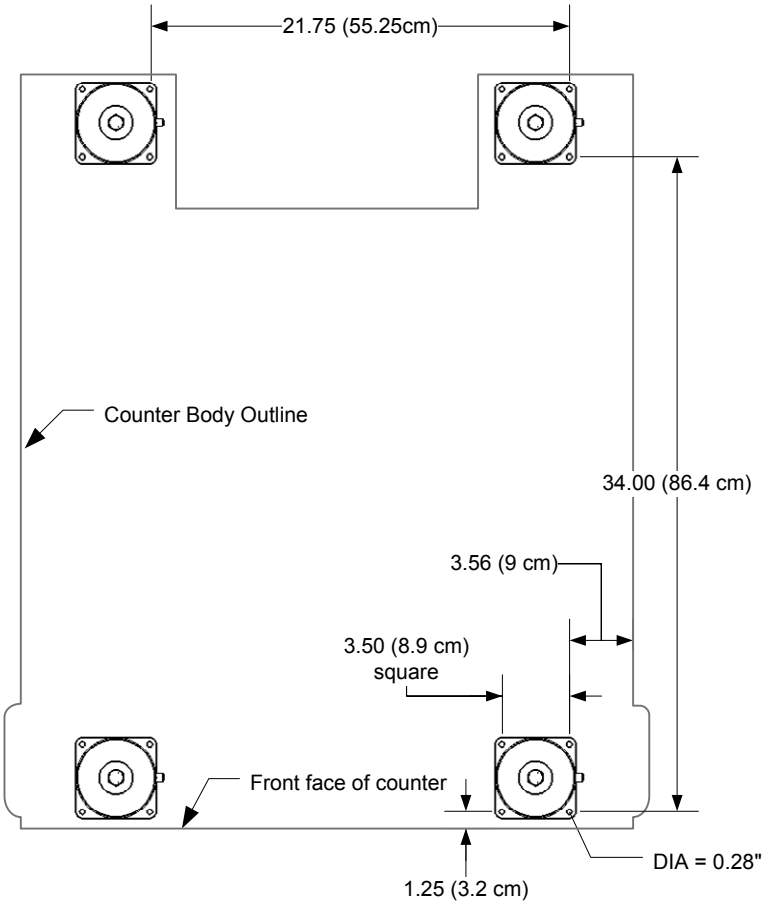


Figure 5: Mounting hole locations

6. Dimensions and weights

The table below indicates dimensions and weights of the instrument and associated components. Ensure that the installation site (table and/or bench space) can accommodate the dimensions and support the weights. In the table below, 'Width' is defined as the distance from the left side to the right side of the object, and 'Depth' is defined as the distance from the front to the back of the object.

Component	Width (in)	Depth (in)	Height (in)	Weight (lbs)
Counter Module (closed)	34.3 (87.1 cm)	40.0 (101.6 cm)	27.0 (68.6 cm)	330 (150 kg)
Counter Module (open)	34.3 (87.1 cm)	40.0 (101.6 cm)	45.3 (115.1 cm)	330 (150 kg)
Counter Module (tray ext)	34.3 (87.1 cm)	66.0 (167.6 cm)	27.0 (68.6 cm)	330 (150 kg)
Support Module	16.0 (40.6 cm)	12.0 (30.5 cm)	8.5 (21.6 cm)	30 (13.6 kg)
Laptop	13.5 (34.3 cm)	9.5 (24.1 cm)	10.5 (26.7 cm)	5 (2.2 kg)

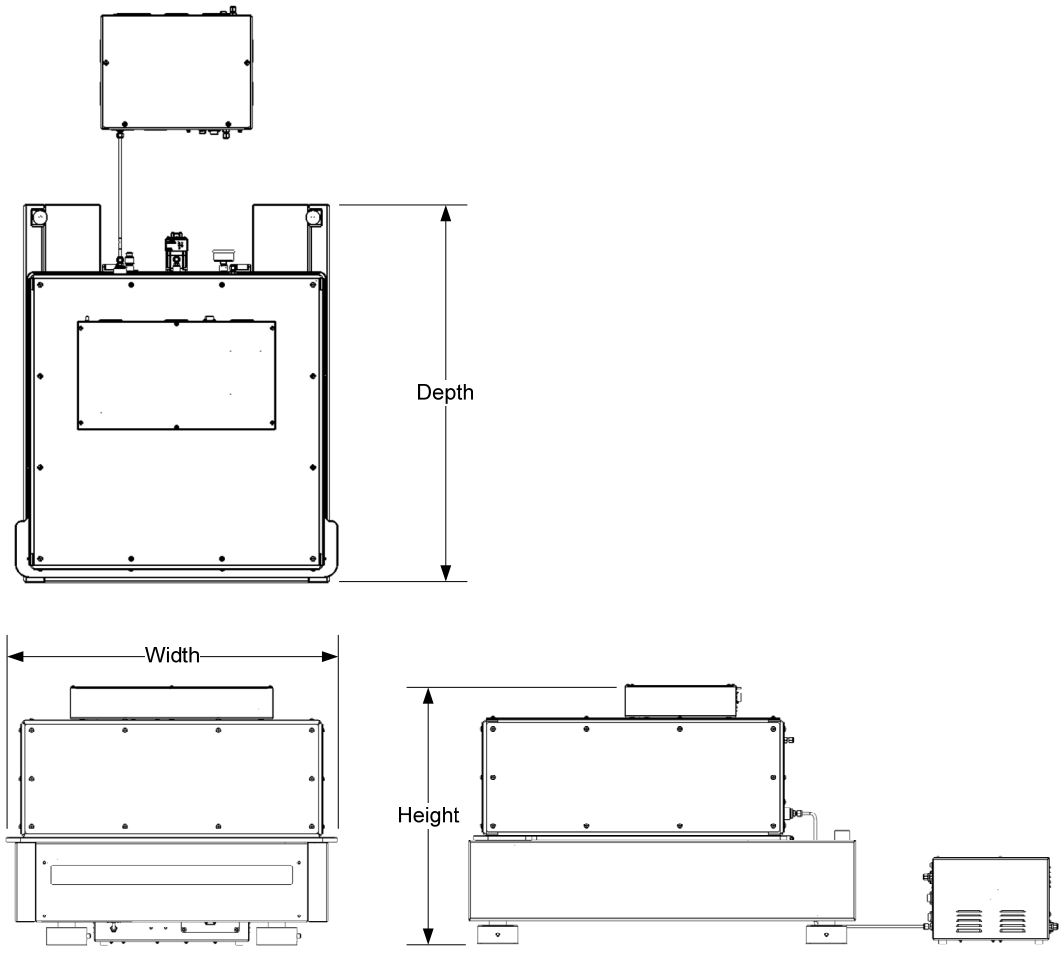


Figure 6: Views of the UltraLo-1800

7. Electrical requirements

a) System electrical requirements

The UltraLo-1800 has minimal power requirements, and can accept operating voltages between 100VAC and 240VAC with a fluctuation of +/- 10% of nominal at 50/60 Hz. The instrument will be pre-configured by XIA LLC for the appropriate line voltage based on the country where the installation site is located (or by the voltage specified by customer if specifically provided).

The maximum power consumption of the UltraLo-1800 is less than 0.100 kW at 110VAC. However, typical power consumption during active measurement, as well as during standby, is 0.05 kW (at 110VAC).

A single outlet with a good ground connection is required. Ideally, this outlet will be well isolated or separate from any circuits powering electrically 'noisy' systems or devices that can cause power surges, such as vacuum pumps, stepper motors, ovens, refrigeration units, etc.

If you wish to install and use an uninterruptible power supply (UPS), isolation transformer, or surge protector, you must still provide a single, solid ground connection between the instrument and the building's main electrical ground.

b) Summary:

Device	Rated Voltage (VAC)	Rated Freq (Hz)	Typ. Current (A)	Typ. Power (kW)	Max Power (kW)
Instrument	100-240 (± 10%)	50/60	0.4	0.05	0.100
Laptop	100-240 (± 10%)	50/60	0.3	0.03	N/A

c) Network (Computer) requirements

While not required for operation, the laptop should be connected to the internet in order to receive software and firmware updates from XIA LLC. Additionally, there are several support scenarios that significantly benefit by using an active internet connection. The laptop can connect to a local network either via a standard Ethernet cable (using the RJ45-type connector on the laptop) or by using a wireless connection.

D. Prepare for installation

1. Safety and materials

a) Safety notes:

The UltraLo-1800 is a heavy instrument (see 'Dimensions and weights' on pg 9), and is to be moved and positioned with caution and care. If you decide to lift or move the instrument after it has been installed, 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 injury. Moving or lifting the instrument may require three or more persons.

Please exercise caution when running the gas supply lines to the installation site. Pressurized gas poses a safety hazard if appropriate precautions are not followed. The customer is responsible for compliance with any safety requirements that pertain to the installation of the gas supply lines.

b) Materials for installation/maintenance

The following tools are necessary for installation and maintenance:

- Box wrenches (for use with gas fittings): 1/2", 9/16", 5/8"
- Hex keys (for use with latches/panels): 5/16", 1/8", 3/32"
- Screwdrivers (for use with electronics): Size 0-1 or 1-2 Phillips

c) Materials for routine operation

No tools are required for routine operation, but from time to time you may wish to clean the sample tray to prevent contamination from building up. XIA LLC recommends the following materials for cleaning:

- Radiacwash – available from Biodex Medical Systems
- Distilled/Deionized water
- Methanol or Isopropyl alcohol
- Powder-free gloves

The user manual will provide additional details on recommended cleaning supplies and methods.

E. Receiving and inspecting the system

1. Shipped Contents

All shipments include the following:

- UltraLo-1800 Counting Module
- UltraLo-1800 Support Module
- Cable assembly/Gas tubing kit
- Laptop control computer
- PCB kit

2. Inspect shipping containers for damage

Carefully inspect the shipping containers and report any damage to an XIA service representative. Specifically, check the condition of all ShockWatch© stickers present on the outside of the shipping container. Should an indicator be red, carefully follow instructions listed on sticker. Record any damage or mishandling on the shipping documents.

3. Shipping container dimensions

All items will arrive in one large shipping container (crate). The dimensions for the crate are listed in the table below.

Crate Dimension	Minimum building clearance
Width	43in (109cm)
Depth	43in (109cm)
Height	62.5in (159cm)
Weight	500lbs (225kg)

The main instrument body (UltraLo-1800 Counting Module) is shipped on a dolly to facilitate transportation of the (relatively heavy) unit from shipping and receiving to your installation site. When the counter is on the dolly, the external dimensions of the combined unit are listed in the table below. Please verify that there are sufficient building clearances between shipping and receiving and your installation site for the passage of the dolly.

Dolly & Unit Dimension	Minimum building clearance
Width	35in (89cm)
Depth	40in (102cm)
Height	32in (82cm)
Weight	325lbs (150kg)

II. Checklists

Use the checklists below to ensure that you have made all preparations for installing the UltraLo-1800 counting system. If you have requested installation and training, an XIA LLC representative will contact you to verify that all checklists are complete before setting up the installation date.

A. Space and Layout checklist

Date verified	Requirements
	Location is away from: ▪ Vibration from other instruments or devices ▪ Electrically noisy devices
	Location accommodates the dimensions and weights specified in "Dimensions and weights" on pg 9
	Location meets the requirements specified in "Space requirements" on pg 3

B. Gas checklist

Date verified	Requirements
	Source of Argon gas is available on site
	All metal plumbing is installed between Argon gas source and installation site
	Gas pressure at installation site is 21psi (150kPa)
	Metal tubing at installation site is 1/4" OD, and terminates at the appropriate location with necessary tolerance

C. Electrical checklist

Date verified	Requirements
	Appropriate grounded power receptacles are available at installation site (See "Electrical requirements", pg 10)
	An active, tested, LAN/internet connection is available

D. System receipt and inspection

Date verified	Action
	The measured building clearances can accommodate the dolly and main instrument body dimensions (See “Shipping container dimensions”, pg 12).
	Received the system and inspected the shipping containers for mishandling or damage.
	Reported to the XIA service representative any signs of mishandling or damage to the shipping container.