

NICOLET™ iS10

Preparing Your Site

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Introduction

Your Thermo Scientific Nicolet™ iS™10 spectrometer is designed to be extremely durable and reliable. It will work under adverse conditions for extended periods, but to get repeatable, accurate results consistently, you should maintain a stable working environment. Before installation, please read this manual and follow its recommendations for your system work space.

Questions and concerns

In case of emergency, follow the procedures established by your facility. If you have questions or concerns about safety or need assistance with operation, repairs or replacement parts, you can contact our sales or service representative in your area or use the information at the beginning of this document to contact us.

Conventions used in this manual

This manual includes safety precautions and other important information presented in the following format:

Note Notes contain helpful supplementary information. ▲

Notice Follow instructions labeled “Notice” to avoid damaging the system hardware or losing data. ▲

▲ Caution Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury. ▲

▲ Warning Indicates a hazardous situation which, if not avoided, could result in death or serious injury. ▲

▲ Danger Indicates a hazardous situation which, if not avoided, will result in death or serious injury. ▲

When the instrument arrives

When the instrument arrives, check the exterior of the shipping box for signs of damage. If damage is apparent, contact us for instructions. Your instrument will be unpacked and installed by one of our service representatives, and that person will check for damage and verify that the shipment is complete. Move the shipping box to the installation location at least 24 hours before the installation, and make sure you read the following notices.

Notice While moving the instrument to the installation location, keep the shipping box upright. Damage due to improper moving techniques is not covered by warranty. ▲

Notice If it is necessary, you can unpack the shipping boxes before the installation, but do not do so unless it is absolutely necessary. If you open the shipping box before the system is installed by one of our service engineers, the warranty will not cover any missing or damaged parts. ▲

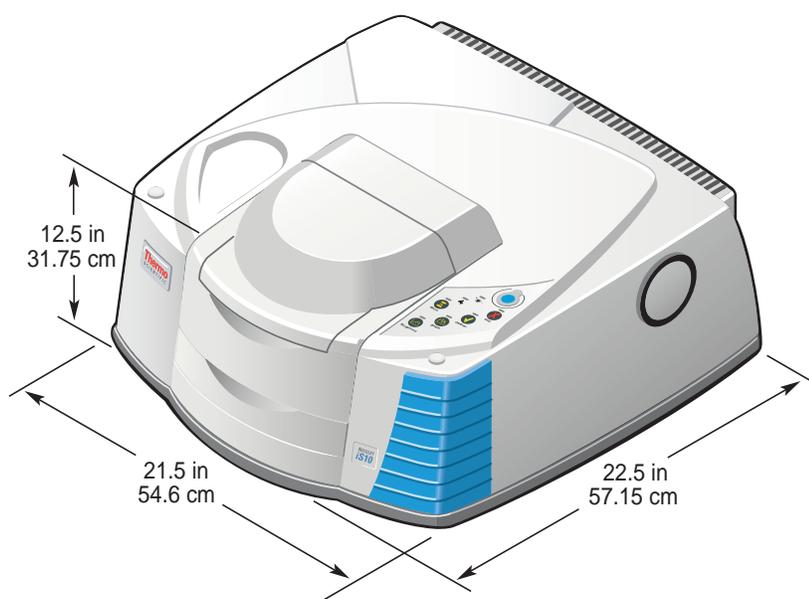
Notice Inside the shipping box, the instrument is sealed in a plastic bag to keep the optical components dry. If it is necessary to unpack the shipping boxes before the installation, you must allow 24 hours for the instrument to reach room temperature before opening the bag. If the bag is opened before the instrument reaches room temperature, moisture could condense on the optical components and cause permanent damage. Damage due to unpacking the instrument before it has come to room temperature is not covered by the warranty. ▲

Work Space Considerations

This chapter contains the information you should use when planning the work space for your system.

Dimensions

If the optional sample compartment expansion kit is not installed, your instrument is approximately 54.6 cm (21.5 in) wide by 57.15 cm (22.5 in) deep by 31.75 cm (12.5 in) high. If the optional sample compartment expansion kit is installed, the depth is increased by approximately 5 cm (2 in).



Clearances

If possible, choose a location that is easy for service personnel to get to and leave at least 30 cm (12 in) of clearance behind the system for service access. This will make service calls faster and easier. There must be at least 64 cm (25 in) of clearance above the table top to allow access to internal parts during servicing and so that the optional sample compartment cover (if it is installed) can be fully opened.

Notice There are air vents on the back of the instrument and on the power supply. Do not block these vents. ▲

Weight

Your instrument weighs about 35 kg (77 lb). Make sure your work surface can support this much weight in addition to the weight of the system computer and any accessories you are using. (See the “Accessories” chapter for accessory weights.)

Table specifications

The table you use to support your system should be level and high enough to allow you to work comfortably. Keep in mind, however, that if you use a microscope accessory, the eyepiece (if it has one) will be 48 to 53 cm (19 to 21 in) above the table top. A depth of 92 cm (36 in) should accommodate the instrument and any combination of accessories, and a length of 125 cm (49 in) will accommodate the instrument and a computer. If you use an accessory, the length you will need should be increased by the width of the accessory plus an additional 13 cm (5 in) to account for the space between the accessory and the instrument. (See the “Accessories” chapter for accessory dimensions.)

Notice If you use more than one table to support the instrument and any accessory modules, the table tops must be the same height; otherwise, the external beam port will not align. ▲

Environmental factors

The following are the environmental factors you should consider when planning your work space. These factors include temperature, vibration, magnetic fields, excessive dust or particulates, humidity, and static electricity.

Temperature

Maintain the temperature in the work space between 16° and 27° C (60° and 80° F). For better long-term stability, keep the temperature between 20° and 22° C (68° and 72° F). Temperature changes may result in long-term drift in the system response.

Once the instrument has been installed, plan to leave it turned on. The internal temperature and stability of the instrument will change significantly if it is switched on and off daily. Long-term stability improves with the length of time the instrument has been on.

Avoid placing the system near air conditioning ducts or large windows. (Even if the windows have curtains, there is still significant heat loss through the glass at night.) Also keep sources of heat, such as hot plates and heating mantles, away from the instrument. Do not place it near heating or air conditioning vents.

Vibration

Floor vibration or acoustical noise from heavy manufacturing equipment or other sources will not damage the system, but it can affect performance and spectral quality. Keep the system away from machinery that may vibrate the floor, and minimize or eliminate acoustic noise and vibration wherever possible. If vibration is a problem, consider placing the instrument on a marble-top table or counter or obtaining a vibration isolation system.

Magnetic fields

Intense magnetic fields, such as those produced by superconducting magnets, can affect performance. The instrument should be at least 5.5 meters (18 feet) away from these fields. Minimize or eliminate exposure to magnetic fields wherever possible.

Dust and particulates

The instrument must be installed in a location where it will not be exposed to excessive dust or other airborne particulate matter. The instrument and its power supply have cooling vents through which excessive dust or particulate matter could enter, possibly causing damage to the system.

Humidity and moisture

Your instrument is sealed and desiccated to help prevent damage to the optics or other internal components due to humidity. If you are in an environment with high humidity, we recommend the following additional measures to protect your instrument:

- Purge the system with dry air or nitrogen. (Instructions about purge later in this manual.)
- Maintain the environmental humidity in the range of 20% to 80% noncondensing.
- Avoid rapid changes in temperature that may cause condensation.

Notice

The external power supply must be placed in a location where it will not be exposed to moisture or liquids of any kind. ▲

Notice

Whenever the spectrometer, a detector or an accessory has been stored or shipped, immediate exposure to room air can cause condensation damage. *Wait 24 hours for the package and its contents to warm or cool to room temperature before opening it.* ▲

Notice If you are moving the system between sampling sites, protect the instrument from extreme changes in temperature and humidity. Such changes may cause moisture condensation, which can permanently damage the optical components. ▲

Static electricity

Since static electricity can destroy electronic components, your instrument was specially designed to meet the international standard: IEC 61000-4-2; electrostatic discharge immunity test for measurement, control, and laboratory use. If you have trouble with static electricity in your laboratory, you can further protect your instrument by following these guidelines:

- Maintain the environmental humidity in the range of 20% to 80% noncondensing.
- Use conducting carpet in the work space.
- Place antistatic mats over conventional carpet.
- Avoid plastic chairs that may build up large static potentials.
- Wear natural fiber clothing.
- Use a grounding strap.

Ventilation

There are no special ventilation requirements for your instrument. The types of analysis you plan may require special ventilation (for example, if you will be analyzing highly toxic samples or dissolving your samples in solvents that interact with infrared sources, or sampling flammable gases). Chlorinated solvents, perfluorochlorinated solvents, and other solvents containing halogenated hydrocarbons are often used as FT-IR solvents. The pyrolysis of these solvents by an infrared source may produce hydrochloric acid (HCl), hydrofluoric acid (HF) or phosgene (COCl₂).

Hydrochloric acid and hydrofluoric acid are highly corrosive and may cause accelerated corrosion of the metallic and optical components in

the instrument if seals are not properly maintained or the concentration level of corrosive gasses in the air is excessively high due to improper sampling techniques.

 **Warning**

Hydrochloric acid, hydrofluoric acid and phosgene are highly toxic. If you plan to regularly use solvents containing halogenated hydrocarbons, be sure your work area is properly ventilated. ▲

Be sure to provide storage space for solvents containing halogenated hydrocarbons that is away from the instrument, and do not leave these types of solvents in the sample compartment for an extended time. If measurements require the sample compartment cover to be closed, the sample compartment must be purged while the solvents are used. An optional purge kit is available from us.

Utility Requirements

If at all possible, the power connections for the instrument and accessories should be easily accessible for service purposes. The line for dry air or nitrogen, which is used to purge the system, should also be accessible if service is required, and you should have direct control over the system utilities.

Note It is important to have all system utilities installed before the spectrometer arrives. Utility installations must comply with all local building and safety codes. ▲

Electrical requirements

An electrical power source must be within 2 m (7 ft) of the system. Power supplied to the system should be from dedicated, uninterrupted sources. Power must be free of voltage dropouts, transient spikes, frequency shifts and other line disturbances that impair reliable performance. Each wall outlet you use must be equipped with a 3-wire line: live, neutral and ground.

If you suspect power quality problems at your site, or if your system will be installed in a heavy industrial environment, we recommend a power quality audit before installation. Contact us or your local electrical authority for more information.

Warning

To assure a good ground connection and avoid shock hazard, do not use an outlet that is connected to a conduit ground. The ground must be a non-current-carrying wire connected to earth ground at the main distribution box. ▲

Note Some large accessories, such as microscopes, the Liquid Analysis System, and the thermogravimetric (TGA) interface require their own power connections. ▲

Note Your instrument was specially designed to meet the requirements of standard IEC 61000-4-4. ▲

Power line conditioning accessories

Uninterruptible power supplies (UPS) are available from us. A UPS reduces the probability of a system shutdown if power is lost elsewhere in the building. Power line conditioners (which ensure that your service is free from sags, surges or other line disturbances) also are available in the U.S.A. from us for 120-volt operation. Line conditioners for 220-volt operation can be purchased locally. Contact technical support for information about power conditioners and UPS.

Electrical service specifications

The following table lists the specifications for electrical service. Contact our service representative in your area if you have questions about the requirements. If you are not sure that your power lines meet these requirements, contact technical support for information about power audits.

<i>Requirement</i>	<i>Specification</i>
Input current	3.2 A
Input voltage	100-240 VAC
Line frequency	47-63 Hz
Line disturbances	Sags, surges or other line disturbances must not exceed 10% of input voltage (even for a half cycle).
Noise	less than 2 V (common mode) less than 20 V (normal mode)

Power consumption

Generally, 50% more power should be available than the entire system (including accessories) typically uses. Maximum power consumption and heat dissipation specifications for the spectrometer and accessories are shown below. The values are approximate.

<i>Item</i>	<i>Power Consumption</i>	<i>Max. Heat Dissipation</i>
Spectrometer	80 W	171 Btu/hr
Standard computer and monitor*	460 W	1,570 Btu/hr
Continuum™ microscope	250 W	852 Btu/hr
Centaurus™ microscope	65 W	222 Btu/hr
TGA interface	356 W	1,215 Btu/hr
Autosampler**	40 W	137 Btu/hr
PLUS™ 2 pump**	345 W	1178 Btu/hr
PLUS 2 power supply/valve module**	74 W	253 Btu/hr
Standard laser printer*	200 W	683 Btu/hr

* Values shown are estimates. See the power specifications on the rear panels or undersides of these units.
** Used with the Liquid Analysis System.

Telephone

If a cell phone will not be available, you should consider installing a telephone with an outside line near the spectrometer. This will save time if you require assistance from us.

Purge

Your instrument is sealed and desiccated. The spectrometer does, however, contain precise optical components that may be damaged by a moist environment. To protect those components, we recommend that you purge your spectrometer at all times, if you have difficulty controlling humidity in your laboratory environment.

Notice Optical damage caused by failure to maintain the desiccants or to purge the spectrometer is not covered under your warranty. ▲

You may also have a laboratory environment that contains solvents or other agents that can corrode spectrometer components. Purging the spectrometer (forcing dried air or nitrogen through the spectrometer to eliminate water vapor, carbon dioxide and other airborne contaminants) will better protect the components. Although your instrument is sealed and desiccated, we recommend that you install a source of dry air or nitrogen to purge the spectrometer of water vapor, carbon dioxide and volatile solvents.

Notice The interaction of chlorinated solvents, perfluorochlorinated solvents or other solvents containing halogenated hydrocarbons (for example, Freon®) with an IR source can corrode spectrometer components. Do not leave these solvents exposed around the spectrometer any longer than necessary. ▲

Purging the spectrometer can also ensure more accurate results. This is particularly true when you collect data for sample components that are also present in your laboratory environment.

Note If you ordered a microscope, you might need more than one purge line. Contact us for more information. ▲

Selecting a purge gas

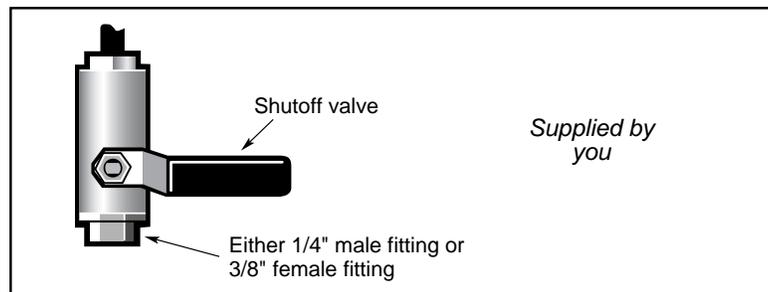
Dry air and nitrogen are equally effective in eliminating water vapor and volatile solvents, but nitrogen is more effective against carbon dioxide. The purge gas must be free of moisture, oil and other reactive materials. To remove particulate matter and oil, you may need to install a 10-micrometer filter. Dry air or nitrogen supplied for purge should be dried to a dew point of -70°C (-94°F) or below for best performance.

Notice Do not use argon as a purge gas. Argon is a good insulator and prevents the laser from cooling properly. This significantly shortens the life of the laser and can also cause the source to overheat. ▲

Warning *Never* use a flammable, combustible or toxic gas to purge the spectrometer. The IR source is an ignition source. ▲

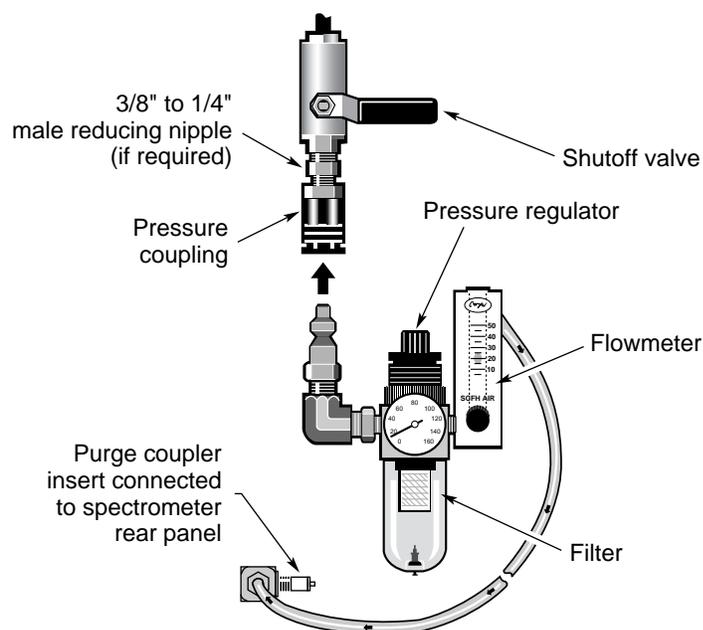
Installing purge gas fittings

If you plan to purge the instrument, install the purge line and the necessary fittings *before* the instrument arrives. (See the following illustration.) The source line pressure delivered to the pressure regulator must be at least 1.4 bar (140 kPa, or 20 psig) and must not exceed 7 bar (700 kPa, or 100 psig).



If we install your purge kit, our service representative will install a pressure regulator and flowmeter to maintain a line pressure of 0.7 to 1.4 bar (70 to 140 kPa, or 10 to 20 psig) at the flowmeter inlet and a flow rate of 15 scfh (about 0.4 m³/hr) for optimal data collection.

Install the air or nitrogen line vertically, as shown in the following illustration. This prevents the flowmeter and pressure gauge scale from tilting when the gauge and regulator assembly are attached. It also prevents moisture from accumulating in the system. If we install your purge kit, one of our service representatives will install the pressure coupling and the reducing nipple (if it is needed).



Once the line is installed, attach either a 1/4-inch male fitting or a 3/8-inch female fitting. If you purchased the option to have us install your purge kit, one of our service representatives will attach the pressure coupling to the 1/4-inch male fitting. If you used the 3/8-inch female fitting, the reducing nipple will be installed by our service representative before the pressure coupling is attached.

The pressure regulator, flowmeter and other related hardware will arrive preassembled with the spectrometer. (For more information, see the on-line help system for the instrument.)

Note If you are purging a system with a microscope or an experiment module, you will need to install a purge manifold. (For more information, see the on-line help system for the instrument.) ▲

Purge gas generators

If your facility does not have a source of clean, dry compressed air or nitrogen for system purge, we recommend using a purge gas generator. This device cleans and dries the air supplied by an air compressor so that it can be used to purge your instrument. If your facility does not have an air compressor, a complete dry-air generating system is available. Contact our sales or service representative in your area for more information.

Notice If you use a purge gas generator, position it as far from the spectrometer as practical to reduce noise and vibration. ▲

Notice Purge gas generators require a minimum pressure for proper operation. Failure to supply this pressure may allow moisture to enter the system, causing permanent damage. ▲

Notice Read the manufacturer's instructions before installing air-drying equipment or performing any maintenance. The installation and maintenance of air-drying equipment is your responsibility. Failure to perform routine maintenance as specified by the manufacturer may void your instrument warranty. ▲

Notice Before you connect a new air dryer to the instrument, it is vital that you purge the dryer of water and particulates by running it for at least 12 hours at nominal air flow. Otherwise, you risk severe damage to the instrument when you connect the pure air dryer. ▲

Liquid nitrogen

If you plan to use a spectrometer or accessory that has a cooled detector, you will need a supply of liquid nitrogen to cool the detector element.

▲ Warning The gas boiling off liquid nitrogen can create an oxygen deficient environment in an insufficiently ventilated room. ▲

⚠ Caution Be careful not to contact the liquid nitrogen with your skin. It is extremely cold. Exposure may cause burns. Wear protective gloves and goggles and follow standard laboratory safety practices. When filling a vacuum bottle or the detector dewar, pour slowly. Pouring too quickly can cause the bottle or dewar to expel liquid nitrogen. ▲

Notice Do not spill liquid nitrogen onto or near the detector window. Rapid cooling of the window's O-ring seal can cause the dewar to lose vacuum. Prolonged exposure to atmospheric pressure can damage the detector element. ▲

Accessories

This chapter provides preinstallation considerations and dimensional information for accessories. If you ordered an accessory with your instrument, use this information to help plan your spectrometer work space. One of our service representatives will install all infrared microscopes and Liquid Analysis Systems.

Dimensions and weights

The following table lists the dimensions and weights of some of the more common accessories for your instrument. (See the “Work Space Considerations” chapter for more information.)

<i>Accessory</i>	<i>Height</i>	<i>Width</i>	<i>Depth</i>	<i>Weight</i>
Continuum microscope	54 cm (21.5 in)	44 cm (18 in)	76 cm (30 in)	80 kg (176 lb)
Centaurus microscope	53 cm (21 in)	35 cm (14 in)	55 cm (22 in)	30 kg (66 lb)
iZ10 accessory	26 cm (10 in)	54 cm (21 in)	59 cm (23 in)	35 kg (77 lb)
Liquid Analysis System Autosampler	26 cm (11 in)	52 cm (20.5 in)	46 cm (19 in)	11 kg (24 lb)
Liquid Analysis System liquid uptake system	25 cm (10 in)	13 cm (6 in)	18 cm (7 in)	3 kg (7 lb)
Liquid Analysis System PLUS 2 power supply/valve and pump	25 cm (10 in)	25 cm (10 in)	35 cm (14 in)	9 kg (20 lb)

Microscopes

The Continuum and Centaurus microscopes attach to the right side of the instrument using an interface bracket. When the interface bracket is installed on a Continuum microscope, 7.6 cm (3 in) is added to the width of the microscope. In addition, if the optional eyepiece is installed, 11.5 cm (4.5 in) is added to the height. When the interface bracket is installed on a Centaurus microscope, 8 cm (3 in) is added to the width of the microscope. In addition, if the optional eyepiece is installed, 12 cm (5 in) is added to the height.

TGA interface

This interface fits in the sample compartment of the spectrometer (or an iZ10 Module) and connects to a TGA furnace. (See the documentation that came with your furnace for information about dimensions and weight.)

Liquid Analysis System

Our Liquid Analysis System can include a PLUS 2 (programmable liquid uptake system) and an autosampler. The overall width of this configuration is approximately 155 cm (61 in). Follow these recommendations to prepare your site for the Liquid Analysis System.

- We recommend using dry-air purge. (See “Purge” in the “Utility Requirements” chapter for more information.)
- The configured system requires about 2 meters (6 feet) of space. The autosampler must be on the right side of the instrument.
- A reservoir containing the appropriate solvent must be behind the autosampler. This reservoir is not included with the system.
- The waste reservoir (provided) must be located below the system for gravity-fed waste containment.
- Be sure to have 2 to 8 liters (0.5 to 2 gallons) of a sample material that is appropriate for calibrating the sample cell.
- Be prepared to supply some representative samples for verifying that the system is working properly at the time of installation.