
Nicolet iS20 Site and Safety Guide

MANUAL CONVENTIONS

The following conventions are used in this manual to draw your attention to important information:

DANGER



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

WARNING



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

CAUTION



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

NOTICE

Follow instructions with this label to avoid damaging the system hardware or losing data.

Note Contains helpful supplementary information.

Tip Provides information that can make a task easier.

Site preparation

The following table lists some of the safety symbols and their indications that may appear in the user documentation.

Symbols	Indication
	This is a mandatory action symbol. It is used to indicate that an action shall be taken to avoid a hazard.
	This is a prohibition symbol. It is used to alert the user to actions that shall not be taken or shall be stopped.
	This is the general warning sign. Failure to heed the safety precautions could result in personal injury.
 	This is a sign to avoid shock hazard. If you see either of these symbols, there is a risk of electrical shock in the vicinity. Only qualified persons shall perform the related procedures.
	Avoid fire hazard. Do not test flammable or explosive samples. Read and follow the associated instructions carefully.

Symbols	Indication
	<p>Avoid toxic inhalation. Materials such as 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.</p>
 	<p>Avoid burn injury. These symbols alert you to hot surfaces. Read and follow the associated instructions carefully.</p>
	<p>Avoid explosion hazard. These symbols alert you to the risk of a possible explosion. Never use a flammable, combustible, or toxic gas to purge this instrument. Heat from the source, or from laser absorption, may ignite flammable gases or reactive materials in purge gas.</p>
 	<p>Avoid eye injury. If you see these symbols, there is a risk of exposure to laser radiation in the vicinity. Read and follow the associated instructions carefully.</p>
	<p>Avoid pinch hazard. If you see this symbol, there is a risk of pinch, crush, or impact hazards in the vicinity.</p>

Symbols	Indication
 	<p>Avoid risk of personal injury. If you see either of these symbols, use proper lifting techniques when moving the spectrometer or other system components.</p>
   	<p>Avoid freeze burns. If you see any of these symbols, there is a risk of skin burns or eye damage. Protective equipment required. Follow standard laboratory safety practices.</p>
	<p>Avoid chemical burns. This symbol alerts you to possible skin irritation. Wear gloves when handling toxic, carcinogenic, mutagenic, corrosive, or irritant chemicals. Use approved containers and proper procedures to dispose of waste.</p>

Table 1-1: Electrical symbols

Symbol	Description
~	Alternating current
⊥	Earth terminal or ground
---	Direct current
⊕	Protective conductor terminal

Symbol	Description
	Frame or chassis terminal
	Fuse
	Power on
	Power off

CAUTION



Avoid personal injury. If this equipment is used in a manner not specified in the accompanying documentation, the protection provided by the equipment may be impaired.

Avoid personal injury. Perform only those procedures described in the documentation. If there are other problems, contact us. Any other service must be performed by trained personnel.

Avoid personal injury. Do not remove the cover of the instrument. All service to the instrument must be performed by trained personnel.

WHEN THE INSTRUMENT ARRIVES

- Check the exterior of the shipping box for signs of damage. If damage is apparent, contact us or your local distributor for instructions.
- Move the shipping box to the installation location at least 24 hours before installation.
- Keep the instrument upright while moving it to the installation location.

NOTICE

The instrument is sealed in a plastic bag inside the shipping box to keep the unit dry. 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.

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

LIFTING OR MOVING THE INSTRUMENT

To avoid risk of injury, use proper lifting techniques when lifting or moving the instrument or other system components.

Lifting or moving this instrument requires two people. Be sure to grasp with both hands under the base on both sides of the instrument.

WORKSPACE CONSIDERATIONS

iS20 instrument weight: 70 lbs (32 kg)

Dimensions: 57.15 cm (L), 54.6 cm (W), 31.75 cm (H)

If the optional sample compartment expansion kit is installed, the length (L) is increased by approximately 5 cm

Computer: Plan for location of the computer, monitor and keyboard.

A standard USB A-B data cable is required to connect the instrument to the computer

NOTICE

Do not position the instrument so that it is difficult to reach the cable connections and power switch.

Use a heavy-duty table strong enough to support the weight of the instrument and any other items that you plan to place on the table.

The table must not visibly flex or otherwise deform when the instrument is placed on it. A flat and stable tabletop is essential to maintain proper alignment of components and the beam path. Maintaining proper alignment is necessary for instrument stability.

ELECTRICAL SERVICE SPECIFICATIONS

- **Input current:** 2.5 A (max)
- **Input voltage:** 100 to 240 VAC
- **Line frequency:** 50 to 60 Hz
- **Line disturbance:** 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 and less than 20 V (normal mode)

CAUTION



Avoid shock hazard. Each wall outlet used must be equipped with a ground. The ground must be a noncurrent-carrying wire connected to earth ground at the main distribution box.

TEMPERATURE AND HUMIDITY

- The instrument is designed for indoor use in normal operating environments (Pollution Degree 2).
- The instrument operates reliably at temperatures between 15 °C and 30 °C. For optimal performance, keep the temperature between 20 °C and 22 °C.
- Maintain humidity at 20% to 80%, non-condensing.
- Avoid damage to the optical components
 - Do not place system near sources of air conditioning ducts or large windows
 - Do not place system near sources of heat, such as heating ducts, hot plates, or heating mantles
- Purge the system with clean dry air or nitrogen.
- Avoid rapid changes in temperature that may cause condensation.

STORAGE

When stored in the original shipping container, the instrument can be exposed to temperatures from -20 °C to 60°C without damage to the instrument. Maximum humidity for storage is 85 %RH, non-condensing.

VIBRATION

- The instrument will perform better in a mechanically stable environment.
- Keep instrument away from machinery that may vibrate the floor.
- Minimize or eliminate acoustic noise and vibration wherever possible.
- Consider placing instrument on a marble top table or counter.

Floor vibration or acoustical noise from heavy manufacturing equipment, computer equipment, or other sources will not damage the system, but it can affect performance and spectral quality.

MAGNETIC AND ELECTRIC FIELDS

- Place instrument at least 5.5 m (18 ft) away from magnetic fields.
- Minimize or eliminate exposure to magnetic fields wherever possible.
- Some wireless devices may also affect instrument performance. If this type of interference is suspected, move all wireless devices at least 2.0 m (6.5 ft) away from the instrument.

Safety precautions

PURGE REQUIREMENTS

- The instrument contains precise optical components that may be damaged by a moist environment. It is recommended to install a source of clean dry air or nitrogen to purge the spectrometer. This is especially important if humidity levels are above 70% RH in the laboratory environment.
- 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 will better protect the components.
- 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.

SELECTING A PURGE GAS

WARNING



Avoid hazard. Never use a flammable, combustible, or toxic gas to purge this instrument. The purge gas must be free of oil and other reactive materials. Heat from the source or from laser absorption may ignite flammable gases or reactive materials in purge gas. Use only dried air or nitrogen to purge your instrument.

Dry air and nitrogen are equally effective in eliminating water vapor and volatile solvents, but nitrogen will remove carbon dioxide from your spectrum more effectively. 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 $-70\text{ }^{\circ}\text{C}$ ($-94\text{ }^{\circ}\text{F}$) or below for best performance.

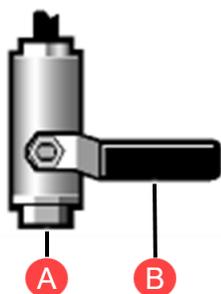
NOTICE

Do not argon as a purge gas. Argon is an insulator and prevents the system from cooling properly.

INSTALLING PURGE GAS FITTINGS

If you plan to purge the instrument, you must install the purge line and on/off valve before the instrument arrives. The source line pressure delivered to the pressure regulator must be at least 1.4 bar (138 kPa, or 20 psig) and must not exceed 7 bar (700 kPa, or 100 psig), with a minimum flow rate of 20 SCFH.

Figure 1-1: Purge valve



A Either 1/4 in male fitting or 3/8 in female fitting

B Main on/off valve (must be vertically aligned and easily accessible)

A pressure regulator is required at 20 psig. If the purge kit was purchased with the system, our service representative will install a pressure regulator and flowmeter. These components will maintain pressure and flow for optimal data collection. See the “Service” section of the user guide for more detailed information.

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.

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. It cleans and dries the air supplied by an air compressor so it can be used to purge the 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 using a purge gas generator:

- Position it as far from the instrument as practical to reduce noise and vibration.
- 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.
- 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.
- Before connecting a new air dryer to the instrument, it is vital to purge the dryer of water and particulates by running it for at least 12 hours at nominal air flow. Otherwise, there is risk of severe damage to the instrument when you connect the pure air dryer.

LIQUID NITROGEN

Some detectors must be cooled with liquid nitrogen before use. Follow your organization's Personal Protective Equipment (PPE) and handling guidelines when working with liquid nitrogen.

WARNING



Avoid freeze burns Liquid nitrogen is extremely cold and potentially hazardous. Wear protective equipment and follow standard laboratory safety practices.

To avoid hazardous contact with liquid nitrogen, make sure that any dewar or container used to hold liquid nitrogen can do so without breaking.

When fitting the dewar, be careful not to contact the liquid nitrogen with your skin. Fill the dewar slowly. Cooling the detector too quickly may cause the dewar to rapidly boil off liquid nitrogen.

HAZARDOUS MATERIALS INCLUDING CORROSIVES AND FLAMMABLES

Spectroscopic analysis may involve the use of solvents or samples which are volatile or corrosive.

WARNING



Avoid an explosion or fire hazard. This instrument or accessory is not designed for use in an explosive atmosphere.

CAUTION



Avoid personal injury. Do not leave solvents or flammable samples near the instrument. Be sure that the workspace is properly ventilated.

- Use appropriate personal protective equipment when handling these samples.
- Solvents and corrosives may damage the surfaces or structure of the instrument if spilled on it.
- When working with volatile materials, ensure proper workspace ventilation to minimize entry of vapors into the interior of the instrument.

FIRE SAFETY AND BURN HAZARDS

CAUTION



Avoid personal injury and risk of fire or explosion.

- Do not test flammable or explosive samples.
- Use only nitrogen or dried air to purge your instrument.
- Do not touch the infrared source housing; it may be very hot.
- Do not place anything on the electronics cover.
- After your turn off the instrument, wait 15 minutes before you replace components.
- Never block any of the vents on an instrument or its power supply.
- Use exact replacement for power supplies.

The infrared source in your instrument can be removed without removing the main cover. If you remove the source, be aware that the source housing may be very hot and stays hot for up to 15 minutes after you turn

off the instrument. To avoid being burned or starting a fire, do not touch the source with your body or any flammable object until it has cooled.

CORROSIVE SOLVENTS

WARNING



Avoid toxic inhalation hazard. Materials such as hydrochloric acid, hydrofluoric acid, and phosphene are highly toxic. If regular use of solvents containing halogenated hydrocarbons is desired, be sure the work area is properly ventilated.

Using solvents that may produce HCl or HF vapors in the sample compartment may severely damage the system. If using halogenated solvents, such as those listed below, purging the instrument with clean dry air or nitrogen is strongly recommended. Equipment damage due to failure to purge is not covered under the warranty. For questions about this, please contact us. The following is a list of commonly used halogenated solvents:

- Freon
- Methylene chloride
- Trichloroethylene
- Chloroform
- Carbon tetrachloride

BIOHAZARD OR RADIOACTIVE MATERIALS AND INFECTIOUS AGENTS

WARNING



Avoid hazard. Reduce the risk associated with potentially infectious samples. Do not spill samples on any of the instrument components. If a spill occurs, disinfect the external surfaces immediately following your laboratory protocols.

- Follow your organization's Biosafety Program protocols for working with and/or handling potentially infectious materials. Individuals should be trained according to applicable regulatory and organization requirements before working with potentially infectious materials.
- Do not return to us any instruments, accessories, components or other associated materials that have been contaminated with biohazard or radioactive materials, infectious agents, or any other materials and/or conditions that could constitute a health or injury hazard to employees.

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- Biological samples such as tissues, body fluids, infectious agents, and blood of humans and other animals have the potential to transmit infectious diseases.

Contact us if you have questions about decontamination requirements

ZINC SELENIDE

The Nicolet Apex spectrometer can be optionally purchased in a non-hygroscopic zinc selenide (ZnSe) configuration, as opposed to the more common potassium bromide (KBr) configuration. The ZnSe configuration replaces the instrument's KBr sample compartment windows, beamsplitter, and detector windows with ZnSe counterparts.

WARNING



Avoid toxic inhalation and ingestion. Zinc selenide is toxic. Refer to the manufacturer's Safety Data Sheet at www.specac.com for handling and exposure controls.

Wear protective gloves when replacing the ZnSe sample compartment windows.

Laser safety

This instrument is a laser product. The laser source is an 850 nm diode laser that emits radiation invisible to the human eye.

WARNING



Avoid personal injury. Never stare into the laser beam or at its reflection. Never tamper with the laser head, even if you are replacing a defective laser.

Protective housing

A protective housing covers this instrument. More than 80 percent of the laser light is lost as it passes through the instrument optics. The accessible laser radiation in the sample compartment is very low, with less than 200 μ W of continuous power.

Laser emissions

This instrument is classified as a Class I laser product (FDA-CDRH and IEC 60825-1:2014), which is inherently safe. Less than 200 μ W of reflective laser light is accessible during normal use and maintenance.

Manufacturer's laser information

In some jurisdictions, you may be required to register this instrument. Check with your company's safety officer or your local government offices. The following is information that might be needed for registration.

Characteristic	Specification
Type of laser	Diode
Wavelength	850 nm
Maximum power	0.4 mW
CDRH classification	Class 1

Cleaning your instrument

CAUTION



Avoid shock hazard. Turn off power before cleaning the instrument.

NOTICE

- Do not use harsh detergents, solvents, chemicals, or abrasives.
- Do not allow liquid to run onto optical surfaces.
- Do not attempt to clean or touch the mirror surfaces.

Clean the outside of the spectrometer with a damp (not wet) soft cloth and a mild soap.

CONTACT US:

www.thermofisher.com

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