



The information in this publication is provided for reference only. All information contained in this publication is believed to be correct and complete. Thermo Electron Corporation shall not be liable for errors contained herein nor for incidental or consequential damages in connection with the furnishing, performance or use of this material. All product specifications, as well as the information contained in this publication, are subject to change without notice.

This publication may contain or reference information and products protected by copyrights or patents and does not convey any license under our patent rights, nor the rights of others. We do not assume any liability arising out of any infringements of patents or other rights of third parties.

We make no warranty of any kind with regard to this material, including but not limited to the implied warranties of merchantability and fitness for a particular purpose.

Copyright © 2004 by Thermo Electron Corporation, Madison, WI 53711. Printed in the United States of America. All world rights reserved. No part of this publication may be stored in a retrieval system, transmitted, or reproduced in any way, including but not limited to photocopy, photograph, magnetic, or other record, without the prior written permission of Thermo Electron Corporation.

For technical assistance, please contact:

Technical Support  
Thermo Electron Corporation  
5225 Verona Road  
Madison WI 53711-4495  
U.S.A.

Telephone: 1-800-642-6538 (U.S.A.) or +608-273-5015 (worldwide)  
Fax: +608-273-5045 (worldwide)  
E-mail: [techsupport.analyze@thermo.com](mailto:techsupport.analyze@thermo.com)

Nicolet, Antaris and RESULT are trademarks of Thermo Electron Scientific Instruments Corporation. Microsoft, Windows, and Windows NT are trademarks of Microsoft Corporation. Intel and Pentium are trademarks of Intel Corporation. Whatman and Balston are trademarks of Whatman International Ltd. Freon is a trademark of Du Pont. All other trademarks are property of their respective owners.

269-145400

# Contents

Introduction.....	1
What's in this manual? .....	2
When the system arrives .....	3
Regulatory and Safety Information .....	5
Questions or concerns.....	5
Conventions .....	6
General safety information .....	7
Fire safety, explosion and burn hazards .....	9
Using liquid nitrogen .....	12
Lifting or moving the analyzer .....	13
Rack enclosure hazards.....	14
Cleaning the analyzer .....	15
Servicing the analyzer.....	16
Desiccated systems .....	16
Hazardous materials and infectious agents.....	16
Electrical safety .....	17
Electrical service.....	18
Power cords .....	19
Fuses .....	19
Powering up.....	21
Circuit breakers.....	22
Power supplies .....	23
Analyzer.....	24
Optional IGS temperature controller .....	26
Laser safety .....	26
Protective housing .....	26
Laser emission indicator .....	27
Manufacturer's laser information .....	28
Status indicators.....	29

Corrosives and solvents .....	30
Caustic agents .....	30
Volatile solvents .....	30
Solvents containing halogenated hydrocarbons.....	31
Gases.....	32
Pressurized gases in general .....	33
Purge gas.....	34
Gas cells and supply cylinders.....	35
Overpressurizing.....	35
Analyzing oxygen .....	36
Maintaining the gas cell.....	37
Closed-cycle MCT-A detector.....	38
Ignition sources and heated components .....	40
Special fire fighting procedures.....	41
Operating pressure .....	41
Electrical service.....	42
Power supply.....	43
Circuit breaker .....	45
Fuses .....	45
Safety labels.....	50
Location .....	55
System dimensions and weight.....	56
Rackmount considerations.....	60
Tip hazard .....	61
Vibration isolation .....	62
Enclosure environment .....	62
Environmental Considerations.....	63
Vibration .....	63
Magnetic field and radio frequency immunity .....	63
Temperature .....	64
Storage .....	64

Humidity .....	65
Ventilation .....	66
Venting PT-14 and other flammable gas .....	67
Static electricity .....	68
Utility Requirements.....	69
Electrical requirements .....	69
Power line conditioning accessories.....	70
Electrical service specifications.....	70
Power consumption .....	71
Telephone .....	71
Purge gas.....	72
Selecting a purge gas .....	72
Installing purge gas fittings .....	73
Purge gas generators .....	75
Pure air dryer .....	78
Computer Requirements .....	81
Network requirements .....	81
Computer access .....	81
Hardware and software requirements .....	82
Site-Preparation Check List.....	85

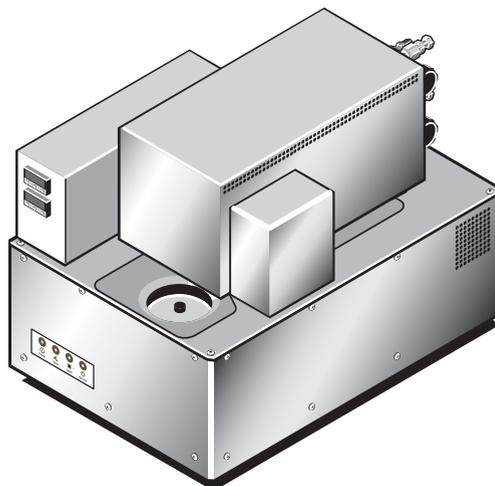


# Introduction

Thank you for choosing a Nicolet™ Antaris™ IGS analyzer. Nicolet Antaris IGS (integrated gas system) analyzers are designed to be extremely durable and reliable. They will work under adverse conditions for extended periods; however, to best ensure accurate results on a repeatable basis, you should maintain a stable working environment.

Before installation, please read this manual and consider its points for your system workspace. Have a competent engineer or other qualified professional prepare your sampling configuration and confirm the connections at the time of installation. By preparing your site before the system arrives, you can ensure that the qualified factory-trained service representative installs the analyzer and a Thermo Electron gas cell without complication.

**Important** If you plan to use a gas cell from another manufacturer, be sure to review the safety information provided by the gas cell manufacturer before you install the cell in a Nicolet Antaris IGS analyzer. ▲



## What's in this manual?

Five major areas are covered in this manual:

**Regulatory and safety information** — The Nicolet Antaris IGS analyzer conforms to all applicable safety and regulatory conventions outlined in the “General safety information” section of this manual. Each person who operates the system should read and become thoroughly familiar with the information in the “Regulatory and Safety Information” chapter.

**Location** — Consult the dimensional drawings of the analyzer and accessories when planning the location of your system. Leave extra space around the system for clearance and service access.

**Environmental considerations** — Avoid excessive static electricity, extreme temperatures, humidity, vibration, and intense magnetic fields. Be sure that your workspace is well ventilated.

**Utility requirements** — Before the system arrives, it is important to install any necessary utilities in the planned workspace. You will need electrical power. You may also need a telephone line and a source of dry air or nitrogen.

**Computer requirements** — Your system will have to meet certain minimum requirements for computer operation and networking, if desired.

If you suspect that you cannot meet these optimal conditions, or have other concerns, contact technical support for assistance. In the U.S.A., call 1-800-642-6538. Outside the U.S.A., contact your local Thermo Electron office. Telephone numbers for all Thermo Electron offices are provided on the card that came in this kit.

## When the system arrives

When your Nicolet Antaris IGS analyzer arrives, we recommend that you leave it in the shipping container until the Thermo Electron service engineer arrives to help you unpack and install it.

The service engineer has a checklist to ensure that all of the components of your system are in place and installed correctly.

### **Important**

Damage due to improper uncrating is not covered by warranty. If you need to unpack the system for inspection, allow 24 hours for the package to slowly warm to room temperature before opening it. Allow 48 hours if the system is equipped with a closed-cycle MCT-A detector and the compressor has been exposed to extreme cold during shipping. After inspection, replace all of the components in their original shipping containers before the service representative arrives. Thermo Electron Corporation cannot be responsible for missing components if the shipping container has been opened. ▲



# Regulatory and Safety Information

This chapter contains a summary of the safety precautions that must be followed when using your Nicolet Antaris IGS analyzer.

Each person who will be using the instrument should read the “Regulatory and Safety” chapter of this manual. Safety information is also included in your analyzer hardware, computer, and software manuals.

In many cases, safety information is displayed on the analyzer itself. The illustrations later in this chapter show the locations of the safety labels. Should any of these labels become loose or unreadable, Thermo Electron will supply new ones. The parts list that will arrive with your system contains information about obtaining replacement labels.

## Questions or 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, use the information below to contact Thermo Electron. Outside the U.S.A., contact your local Thermo Electron sales or service representative.

**Phone:** 1-800-642-6538 (U.S.A.) or  
+608-273-5015 (worldwide)

**Fax:** +608-273-5045 (worldwide)

**E-mail:** [techsupport.analyze@thermo.com](mailto:techsupport.analyze@thermo.com)

**World Wide Web:** <http://www.thermo.com/spectroscopy>

## Conventions

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

**Note** Notes contain helpful supplementary information. ▲

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

 **Caution** Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices. ▲

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

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



If you see this symbol on the analyzer or on an accessory, be sure to read this manual and the documentation that came with the instrument or accessory. The symbol indicates that there is additional safety information in the documentation and failure to heed the safety precautions could result in injury.

## General safety information

Each Nicolet Antaris IGS analyzer complies with domestic and international safety regulations and applicable product standards. The table that follows lists the third party testing laboratories, regulations and product standards.



---

### *Regulations and product standards for analyzer*

---

- UL 3101-1 (1993) Electrical equipment for laboratory use Part 1: general requirements
    - Installation category II
    - Pollution degree 2
  - CSA C22.2 No. 1010 (1992) Safety requirements for electrical equipment for measurement, control, and laboratory use
  - 73/23/EEC (1973) as amended by 92/31/EEC and 92/68/EEC Low voltage directive
  - EN 61010-1 (1993) Safety requirements for electrical equipment for measurement, control, and laboratory use
    - IEC 1010-1 (First Edition, 1990 with Amendment 1, 1992 and Amendment 2, 1995)
  - 89/336/EEC (1989) EMC Directive
  - IEC 61326-1 (1997) Electrical equipment for measurement, control and laboratory use – EMC requirements
    - EN 61000-4-2 (1995) Electrostatic discharge immunity
    - EN 61000-4-3 (1998) Electromagnetic field immunity
    - EN 61000-4-4 (1995) Electrical fast transient burst
    - EN 61000-4-5 (1995) Surge immunity
    - EN 61000-4-6 (1996) Immunity to conducted disturbances induced by radio frequency fields
    - EN 61000-4-11 (1994) Voltage dips short interruptions and voltage variation immunity
    - CISPR 11 (1997) Class A; Limits and methods of electromagnetic disturbance characteristics of industrial scientific and medical (ISM) radio frequency equipment
    - EN 61000-3-2 (1995) Voltage harmonics
    - EN 61000-3-3 (1995) Voltage fluctuation and flicker
  - EN 60825 (1994); Safety of laser products
  - U.S. 21CFR 1040.10; Safety of laser products
-

The regulatory compliance labels shown in the previous tables are located on the back of the analyzer and accessories. Check the Declaration of Conformity that came with your instrument for specific information about conformity with particular directives and standards. The regulatory organizations are described here.

**ETL (ETL SEMKO, a division of Intertek Testing Services)** — ETL SEMKO is an OSHA accredited Nationally Recognized Testing Laboratory (NRTL), a Standards Council of Canada (SCC) accredited Testing Organization and Certification Organization, an IECEE accredited National Certification Body, and a Notified Body for Europe that provides testing and certification services for the products. The ETL symbol indicates that the instrument has been inspected and approved by an independent testing laboratory.

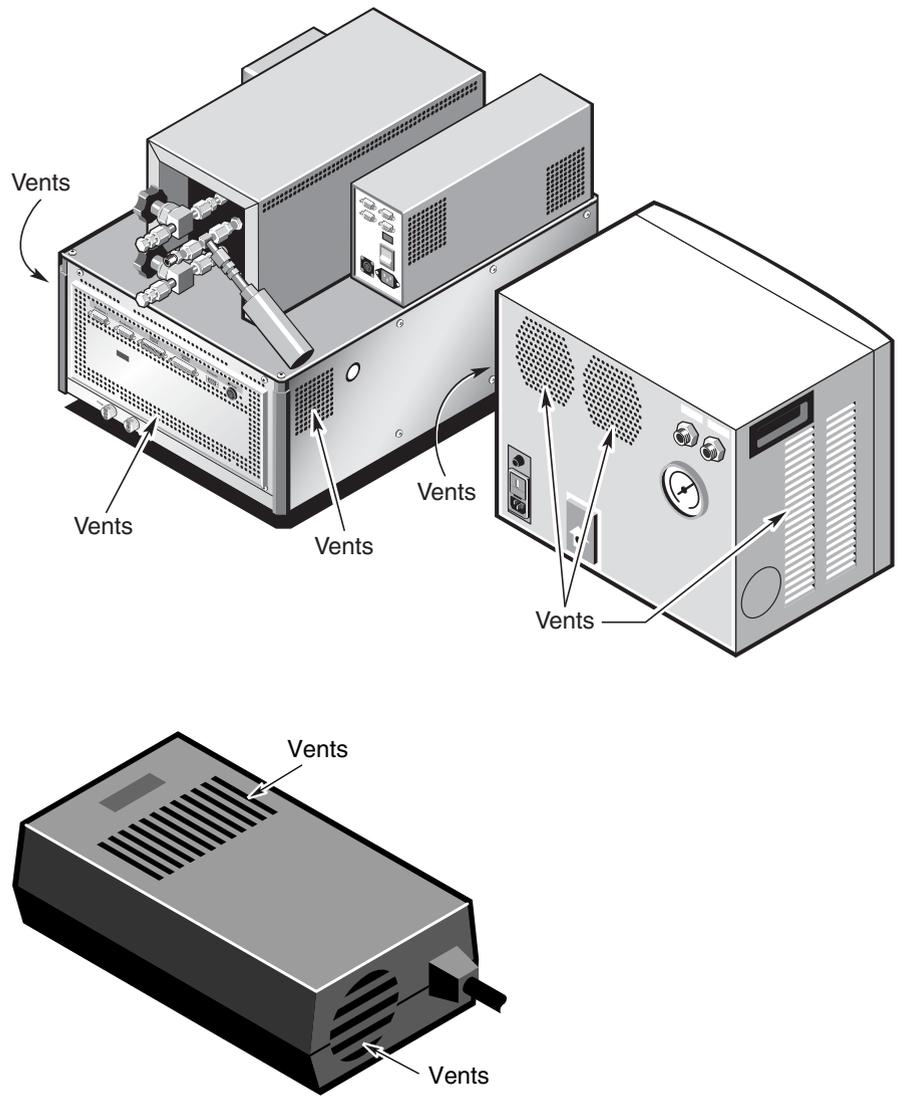
**CE (Conformité Européenne)** - The CE mark indicates compliance with the European Union's applicable New Approach Directives. The CE mark is a self declaration and self marking process. Once a manufacturer has proven that the particular equipment meets the requirements of the CE and has collected supporting data, that equipment may be marked with the CE.

## Fire safety, explosion and burn hazards

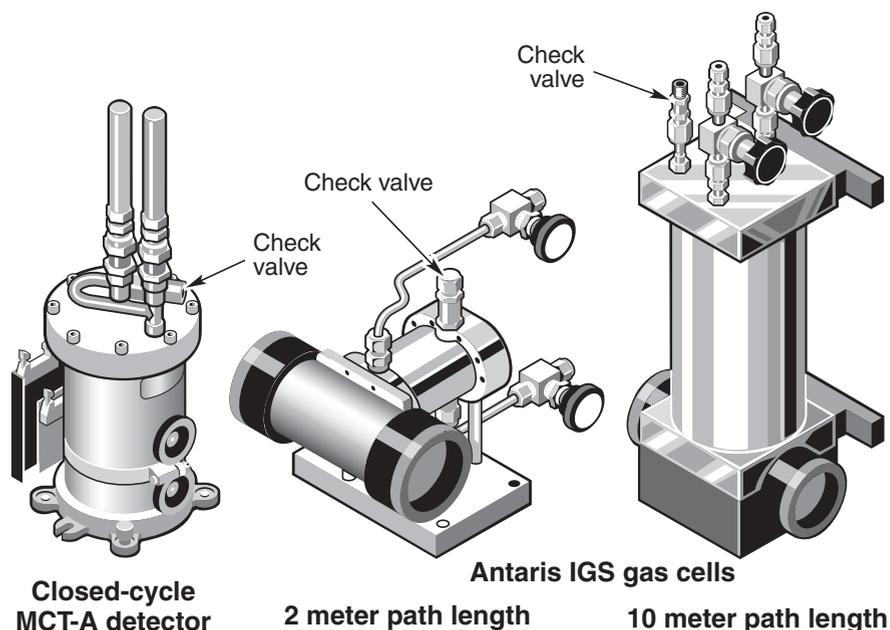
To avoid a burn injury and the risk of fire or explosion, follow these guidelines:

- Avoid testing flammable or explosive samples.
- If the analyzer is purged, use a clean, nonflammable purge gas.
- If the analyzer is desiccated, do not attempt to regenerate spent desiccant packs.
- Leak check closed-cycle MCT-A detector systems regularly with soapy water. Never use a flame. Ensure that the refrigerant gas lines are isolated from any heat sources.
- Ensure that the set point for any heating device used with the system is less than the vaporization/flash point of the sample or reference material
- Never block the vents on the analyzer, temperature controller, power supply or cabinet.
- Never block the check valve on a gas cell or supply cylinder.
- Do not touch surfaces located near either of the following symbols. They are hot and can cause burns.





*Vent locations for the Nicolet Antaris IGS*



### *Check valve locations for the Nicolet Antaris IGS*

The following Cautions and Warnings provide additional information about fire safety and preventing burn hazards.

**▲ Caution** The infrared source may be very hot. It stays hot for up to 15 minutes after you turn off your analyzer. To avoid being burned or starting a fire, handle the source assembly only by the ceramic base. Your *Nicolet Antaris IGS User's Guide* shows the location of the infrared source inside your analyzer. ▲

**▲ Danger** *Never* use a flammable gas to purge the analyzer. Heat from the source or internal electrical components could ignite a flammable gas. The purge gas must be free of moisture, oil and other reactive or infrared-absorbing materials. We recommend using dry air supplied by a purge gas generator or pure air generator (available from Thermo Electron), or dry nitrogen. Other gases, even inert gases such as argon (Ar), can damage the instrument. ▲

**▲ Danger** Prevent fire and explosion. The infrared source inside the analyzer is an ignition source. If your system is equipped with a closed-cycle MCT-A detector or if you plan to sample flammable gases, you must vent the check valves away from the analyzer. Provide a fume hood or other active venting system that is free of spark and other ignition sources and prevents flammable vapors from collecting in the atmosphere surrounding the analyzer. ▲

**▲ Danger** Prevent fire and explosion. Ensure that the operating temperatures of the analyzer gas cell, gas lines and heater jacket are lower than the vaporization/flash point of any volatile materials that may be present in the laboratory environment. ▲

**▲ Caution** The desiccant packs supplied with desiccated analyzers cannot be safely dried or regenerated. Avoid burn and fire hazard. Do not attempt to regenerate spent desiccant packs. ▲

## Using liquid nitrogen

Some detectors must be cooled with liquid nitrogen before use. Liquid nitrogen is extremely cold and therefore potentially hazardous. When filling a vacuum bottle or the detector dewar, be careful not to contact the liquid nitrogen with your skin. The symbols that follow remind you of this hazard and instruct you to wear protective gloves and goggles and follow standard laboratory safety practices.



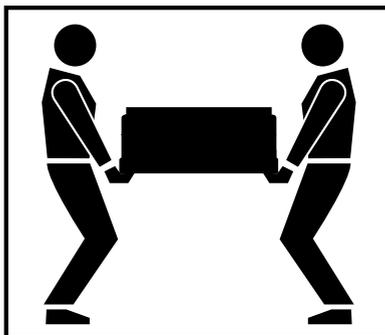
**⚠ Caution** Be careful not to contact the liquid nitrogen with your skin. It is extremely cold. Exposure may cause burns. Wear protective gloves and goggles and follow standard laboratory safety practices. When filling a vacuum bottle or the detector dewar, pour slowly. Pouring too quickly can cause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

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

**Important** 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. ▲

**Lifting or moving the analyzer** The Nicolet Antaris IGS weighs approximately 60 kg (131 lb). To avoid risk of injury, use proper lifting techniques when lifting or moving the analyzer or other system components.

**⚠ Warning** The Nicolet Antaris IGS cannot be lifted safely by a single person. When lifting or moving the analyzer, get a second person to help you.



Be sure to lift from each side of the analyzer, not the front and back. ▲

**▲ Danger** If the analyzer is equipped with an optional closed-cycle MCT-A detector, it must be partially disassembled by trained service personnel before it can be moved. *Never* loosen or disconnect the gas lines or compressor couplings yourself. Vapors can be ignited by pilot lights, other flames, smoking, sparks, heaters, electrical equipment, static discharge, or other ignition sources. Explosive atmospheres may linger. ▲

**Note** Moving the system may change its validation status. ▲

**Important** Whenever the analyzer has been stored or shipped, immediate exposure to room air can cause condensation damage. Allow 24 hours for the package to slowly warm to room temperature before opening it. ▲

## Rack enclosure hazards

The Nicolet Antaris IGS can be equipped for installation as roll-out components in a standard 30 in (76.2 cm) rack enclosure that meets the EIA Rs-310C, 19 in (48.26 cm) rackmount standard. Care must be taken to ensure a safe installation.

Maintain the operating environment inside the rack enclosure as described in the “Environmental Considerations” chapter of this manual. Cooling and desiccating devices must be available for the service engineer at the time of installation. Damage to the instrument from improper environmental controls is not covered under warranty.

Due to its weight, a Nicolet Antaris IGS can pose a rack enclosure tip hazard unless appropriate anti-tip extensions, feet, or anchors are in place. Use anti-tip devices that were designed by your rack enclosure manufacturer or by a qualified structural engineer.

We recommend that the analyzer be installed as low in the rack enclosure as possible. To prevent tipping, only items with weights that exceed the weight of the analyzer and all its components should be installed below it. See the section entitled “Tip hazard” later in this manual for specific information.

**▲ Warning** Be sure that the rack is stable and will support the analyzer and gas cell in the open position. To prevent the enclosure from falling forward, never open a rack unless appropriate anti-tip extensions, feet or anchors are in place and can support the additional weight. ▲

**Cleaning the analyzer** If the outside of the analyzer needs cleaning, turn off the power and disconnect the power cord from AC power. Then use a damp (not wet), soft cloth and a mild soap to clean the outside of the analyzer. Do not use harsh detergents, solvents, chemicals or abrasives; these can damage the finish. See *Powering Up* later in this document for information on the proper sequence and procedure for turning the analyzer and other system components on and off.

**▲ Warning** Avoid shock hazard. Always move the analyzer power switch to the off (○) position and disconnect the power cord from the wall outlet or power strip before cleaning the analyzer. Do not allow cleaning solutions or liquids to run into the analyzer or its power supply. ▲

**Important** Do not use harsh detergents, solvents, chemicals or abrasives to clean the analyzer and accessories; these can damage the finish. ▲

**Important** Do not attempt to clean or even touch the mirror surfaces inside the analyzer. These front-surfaced mirrors are easily scratched. Dust will not harm the mid-infrared signal, but fingerprints and scratches can degrade spectral performance or permanently damage the mirrors. ▲

## Servicing the analyzer

The Nicolet Antaris IGS is designed so that you can install optional hardware and replace many of the components yourself. The *Nicolet Antaris IGS User's Guide* contains step-by-step instructions.

### **Warning**

Avoid shock hazard. Always move the power switch to the off (O) position and disconnect the power supply from the wall outlet or power strip before you remove any access panel, laser, source, or other replaceable part. ▲

## Desiccated systems

If the analyzer is sealed and desiccated, you will occasionally have to check and change the desiccant packets. These packets keep the spectrometer free of excess moisture.

### **Warning**

The desiccant is harmful if swallowed. Keep the packets away from children and follow the manufacturer's instructions to dispose of them properly. ▲

### **Caution**

The desiccant packets supplied with the Nicolet Antaris IGS cannot be dried or regenerated safely. Avoid burn and fire hazard. Do not attempt to regenerate spent desiccant packets. ▲

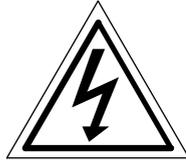
## Hazardous materials and infectious agents

Instruments, components, accessories and other associated materials may not be returned to Thermo Electron or other accessory manufacturers if they are contaminated with radioactive or other hazardous materials, infectious agents, or any other materials and/or conditions that could pose a health or injury hazard to employees.

Contact technical support if you have questions about decontamination requirements. If you live outside the U.S.A., contact your local Thermo Electron office.

## Electrical safety

Your system was designed with protective covers to prevent exposure to dangerous voltage and other electrical hazards. If you see either of the following symbols on your system, there is a risk of electric shock near the symbol.



### **Danger**

Only qualified factory-trained service representatives should attempt to service a component that carries either of these symbols. ▲

You may also see one or more symbols on or near switches and connectors on the analyzer. These symbols are often used to identify connectors or help you to locate user-replaceable fuses.

The table that follows shows the symbols and lists the meaning of each. Check the documentation that came with your analyzer if you find a symbol that is not included in the table.

<i>Symbol</i>	<i>Description</i>
	Alternating current
	Direct current
	Earth terminal or ground
	Protective conductor terminal
	Fuse
	Power on
	Power off

**⚠ Warning** If a protective cover on the analyzer or computer appears damaged, turn off the system and secure it against any unintended operation. Always examine the protective cover for transport stresses after shipping. ▲

**⚠ Warning** Before servicing the unit, turn off the power and disconnect the power cord from AC power. ▲

**⚠ Warning** Even after the analyzer has been disconnected from all voltage sources, capacitors may remain charged for up to 3 minutes. ▲

**Electrical service** Check the line voltage and frequency of the wall outlet that will be used for the analyzer *before* you connect the analyzer, temperature controller, or a closed-cycle MCT-A detector's compressor or turn on the power. Check the AC source before the system is installed and any time the system is plugged into a different wall outlet.

**⚠ Danger** To avoid injury, only a qualified person using the appropriate measuring device should check the line voltage, current and line frequency. ▲

<i>Power supply</i>	<i>Input voltages</i>	<i>Line frequencies</i>	<i>Current (max.)</i>
analyzer	100 vac to 240 vac	50 to 60 Hz	6 A
IGS temperature controller	100 vac to 240 vac	50 to 60 Hz	7 A 3.5 A
Closed-cycle MCT-A detector refrigerant compressor*	100 vac 120 vac 220 vac 240 vac	50 to 60 Hz 50 to 60 Hz 50 to 60 Hz 50 to 60 Hz	8 A 7 A 4 A 4 A

\* A change in input voltage requires a change to the compressor's voltage selection hardware.

## Power cords

You must be sure to use an appropriate power cord for your specific electrical service. The power cord supplied with the analyzer is a 3-wire, grounded power cord, appropriate for use in the country listed as the shipping destination for the system. If the power cord you received is not appropriate for the electrical system at your site, contact technical support or your local Thermo Electron office and order a new power cord. The illustrations on the next page show the power cord styles that are available from Thermo Electron.

If the power cord becomes damaged, replace it. Contact Technical Support or your local Thermo Electron office if you need additional information about replacement cord specifications.

### **Danger**

To prevent electrical hazards, do not remove or defeat the ground prong on the power cord. ▲

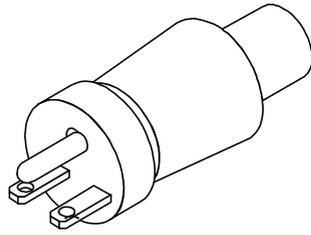
## Fuses

The analyzer is protected by two, 2A, time-lag (also known as T-type or slow-blow) fuses that are built into the external power supply. These fuses are not individually replaceable. If the fuses blow, you must replace the power supply.

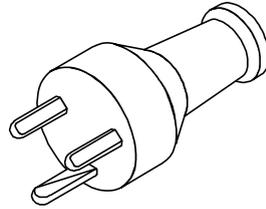
### **Danger**

Avoid shock hazard. *Never* remove the cover of the power supply. ▲

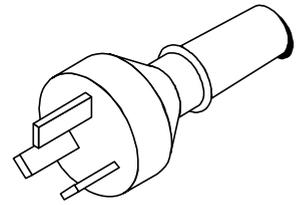
The refrigerant compressor used with an optional closed-cycle MCT-A detector is protected by three individually replaceable fuses. See the section entitled “Closed-cycle MCT-A detector” for information about replacing those fuses.



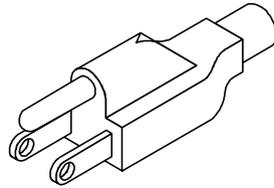
North American 220 Volt  
Plug Style: NEMA 6-15



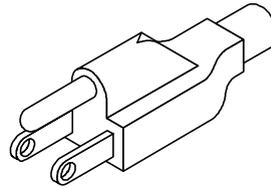
Danish style  
Plug Style: Afsnit 107-2-01



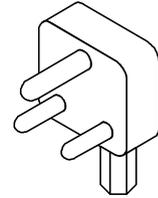
Australian style  
Plug Style: AS 3112



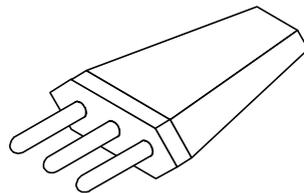
North American grounded plug  
Plug Style: NEMA 5-15



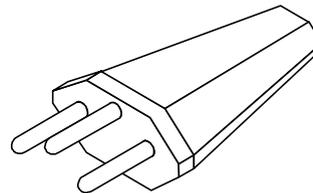
Japanese style  
Plug Style: JIS 8303



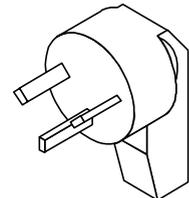
Indian, South African,  
old British style  
Plug Style: BS 546



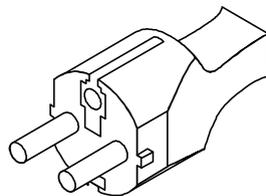
Italian style  
Plug Style: CEI 23-16/VII



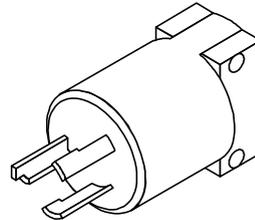
Swiss style  
Plug Style: SEV 1011



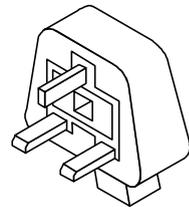
Israeli style  
Plug Style: SI 32



Continental Europe style  
or Schuko  
Plug Style: CEE7/7



North American  
220 Volt locking  
Plug Style: NEMA L6-15



British style or  
United Kingdom style  
Plug Style: BS 1363  
with a 13 amp fuse

## Powering up

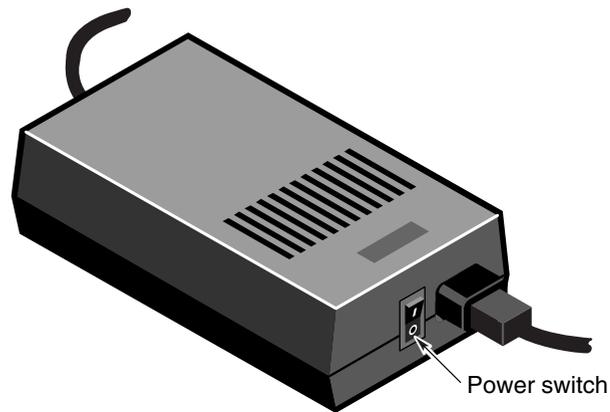
Follow these steps to turn on the system components:

### **⚠ Warning**

Do not operate the analyzer without following the safety precautions described in this manual and the documentation that came with your system. ▲

- 1. Turn on the analyzer by pressing the power switch on the external power supply.**

I = on  
O = off.



- 2. Turn on the printer and then the computer.**

Turn on the printer and computer as explained in the documentation that came with those components.

*To turn off system components:*

- 1. Log off and then close any software applications that are open.**
- 2. Turn off the computer.**
- 3. Turn off the printer.**
- 4. Turn off the analyzer (leave the power supply connected).**

## Circuit breakers

Nicolet Antaris analyzers that will be installed in a rack are protected from over-voltage and over-current conditions by a 7 ampere, 240 vac. 10,000 AIC main circuit breaker.

Components within the Antaris IGS temperature controller and the refrigerant gas compressor for the optional closed-cycle MCT-A detector are also protected by circuit breakers. In the event of an over-voltage/over-current condition, any of the following breakers may be tripped.

<i>Component protected</i>	<i>Circuit breaker rating</i>
Analyzer	7 amperes; 10,000 AIC
Temperature controller	7 amperes; 10,000 AIC
Refrigerant compressor	10 amperes; 10,000 AIC

## Power supplies

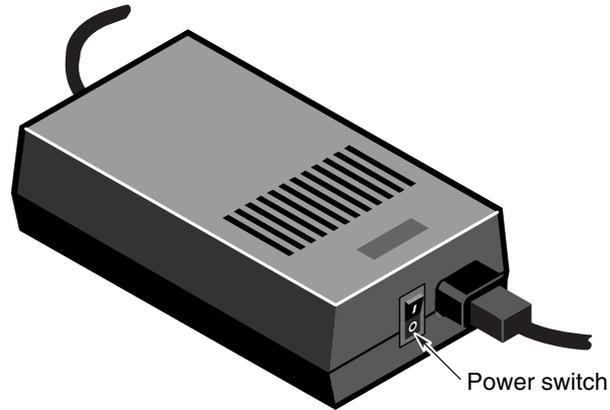
The analyzer receives power from an external power supply, which can adjust to a variety of AC voltages and line frequencies automatically. Your system may also include two other power supplies: one powers the optional Antaris IGS Temperature Controller; the other powers the refrigerant compressor for an optional closed-cycle MCT-A detector. Both of these supplies are internal to the accessory.

The table that follows provides input voltage, line frequency and full-load current information about each of the power supplies.

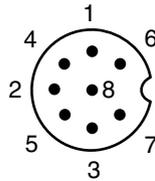
<i>Power supply</i>	<i>Input voltages</i>	<i>Line frequencies</i>	<i>Current (max.)</i>
Analyzer	100 <i>vac</i> to 240 <i>vac</i>	50 to 60 Hz	6 A
temperature controller	100 <i>vac</i> to 240 <i>vac</i>	50 to 60 Hz	7 A 3.5 A
Closed-cycle MCT-A detector	100 <i>vac</i> 120 <i>vac</i>	50 to 60 Hz 50 to 60 Hz	8 A 7 A
refrigerant compressor*	220 <i>vac</i> 240 <i>vac</i>	50 to 60 Hz 50 to 60 Hz	4 A 4 A

\* A change in input voltage requires a change to the compressor's voltage selection hardware.

Analyzer The analyzer is powered by an external power supply.



The following illustration shows the DC power cable connector from the analyzer's power supply and lists the manufacturer's maximum power output rating for each pin on the connector.



<i>Pin</i>	<i>Output</i>
1	DC common
2	- 12 VDC, 1.0 A
3	+ 5 VDC, 5 A
4	- 5 VDC, 1.0 A
5	+12 VDC, 5.0 A
6	DC common
7	+ 5 VDC, 5 A
8	Not connected

To connect the external power supply to the analyzer:

**Note** Moving the system may change its validation status. ▲

**⚠ Danger** Avoid shock hazard. *Never* remove the cover of the power supply. ▲

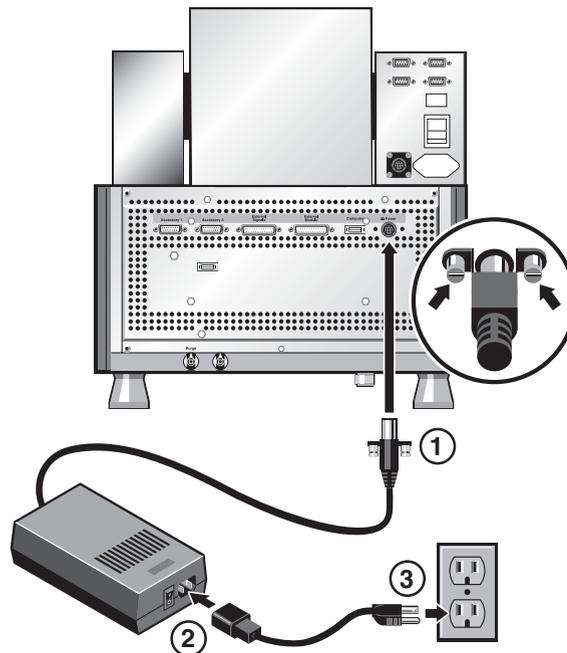
**⚠ Warning** Avoid shock hazard. Always move the power switch to the off (O) position before connecting or disconnecting the power supply. ▲

**1. Connect the DC power cable to the analyzer.**

Insert the power connector on the rear panel and tighten the screws to secure the connection.

**2. Connect the power cord to the external power supply.**

**3. Connect the power cord to the wall outlet or power strip.**



## Optional IGS temperature controller

If your analyzer is equipped with an optional Antaris IGS temperature controller (with or without a pressure readout), the controller is powered by an internal power supply. The supply is autoswitching and can accommodate input voltages ranging from 100 *vac* through 240 *vac*. There are no user-replaceable fuses.

## Laser safety

The analyzer is a Class I laser product. The accessible radiation levels are below Class I limits defined by the United States Department of Health and Human Services. The laser source in the analyzer is a helium/neon (HeNe) laser head.

### **Warning**

*Never* stare into the laser beam or at its bright reflection. *Never* tamper with the laser head on the main laser assembly, even if you are replacing a defective laser. Exposure to laser light or high voltage may result. ▲

The United States Department of Health and Human Services warns against improper laser use, as follows:

### **Warning**

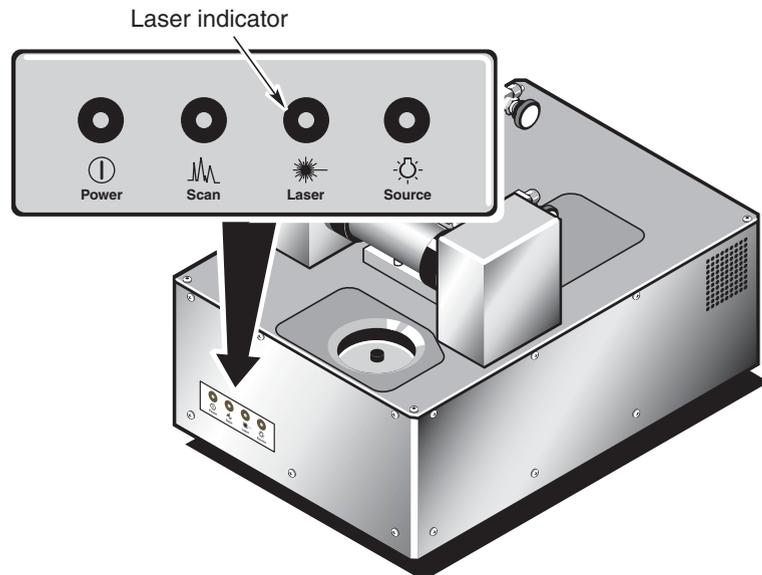
Use of controls or adjustments or performance of procedures other than those specified in your *Nicolet Antaris IGS User's Guide* may result in hazardous radiation exposure. ▲

## Protective housing

A protective housing covers each analyzer and module. More than 80% of the laser light is lost as it passes through the analyzer optics. During normal operation, there is no accessible laser radiation. Even while changing a gas cell, the accessible laser radiation is very low. Accessible laser radiation with the gas cell removed is approximately 3.7 nW of continuous power.

## Laser emission indicator

The laser indicator is on the main panel of Nicolet Antaris analyzers. The laser indicator lights whenever the HeNe laser is powered on; if laser power fails, the indicator light turns off.



### **▲ Warning**

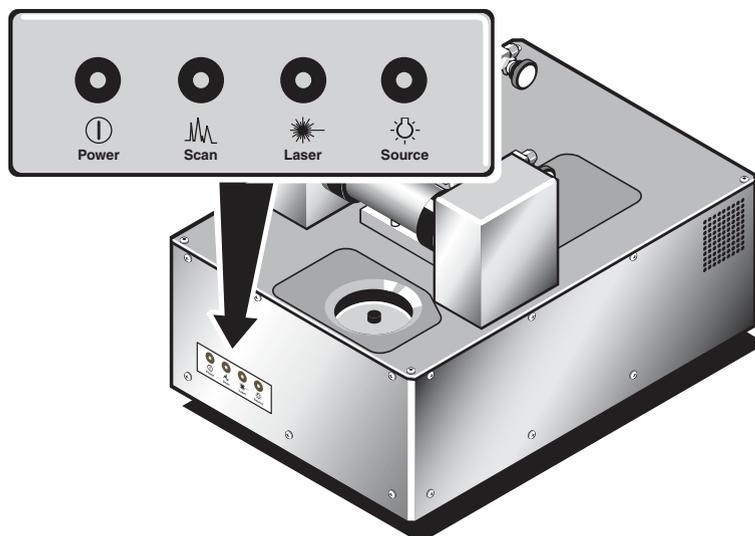
Never tamper with laser components, even if you are replacing a defective laser. Exposure to laser light or high voltage may result. ▲

## Manufacturer's laser information

In some jurisdictions you may be required to register the analyzer; check with your company's safety officer or your local government offices. The following is an excerpt from the laser manufacturer's manual regarding the information that might be needed for registration.

<i>Characteristic</i>	<i>Specification</i>
manufacturer	Melles Griot
type of laser	helium/neon (HeNe)
wavelength	632.8 nm
minimum power	0.9 mW (TEM <sub>00</sub> )
nominal power	1.0 mW
maximum power	1.6 mW
beam diameter	0.65 cm (1/e <sup>2</sup> )
beam divergence	3.0 mrad
spacing C/2L	1039 MHz
internal operating voltage	1700 ± 100 VDC
CDRH classification	IIIa

**Status indicators**    The status indicators show the current status of the analyzer.



### *Nicolet Antaris IGS status indicators*

Here is a brief description of the function of each of the controls and indicators.

**Power** — This indicator lights when the analyzer power is on and the power supply voltage is within specifications.

**Scan** — This indicator flashes with each scan of the interferometer.

**Laser** — This indicator lights when the correct voltage is supplied to the laser (this allows the laser to emit radiation).

**Source** — This indicator lights when the source is operating.

## Corrosives and solvents

Many standard methods are based on the use of solvents. Sample materials dissolved in solvents can be present in your laboratory, but special precautions must be taken when using or storing solvents near the analyzer.

## Caustic agents

Analyzer components may be degraded by exposure to caustic agents or their vapors. To maintain the analyzer in safe working condition, do not use or store open caustic agents near the analyzer. Damage to the analyzer caused by caustic agents is not covered by warranty.

## Volatile solvents

If you use volatile solvents regularly, follow these guidelines:

- Do not leave exposed solvents near the analyzer.
- If analyzing solvents near the analyzer, take care to use sealed sample cells.
- If possible, purge the analyzer.
- Ensure that the operating temperatures of the analyzer gas cell, gas lines and heating jacket are lower than the vaporization/flash point of any volatile materials that may be present in the laboratory environment.

These measures will help prolong the life of your analyzer and will eliminate the possibility of spectral interference caused by volatile solvent vapors.

## Solvents containing halogenated hydrocarbons

Chlorinated solvents, perfluorochlorinated solvents, and other materials containing halogenated hydrocarbons are often used as solvents. The pyrolysis of these solvents by the infrared source in your analyzer may produce hydrochloric acid (HCl), hydrofluoric acid (HF), or phosgene (COCl<sub>2</sub>).

Hydrochloric acid and hydrofluoric acid are highly corrosive and may cause accelerated corrosion of the metallic and optical components in the analyzer if the seal on the optical compartment is not properly maintained or the concentration level of corrosive gases in the air is excessively high due to improper sampling techniques.

### **Warning**

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

Solvents containing halogenated hydrocarbons should not be left near the analyzer longer than necessary.

## Gases

The Nicolet Antaris IGS uses gas to cool some optional infrared detectors and to eliminate water vapor, carbon dioxide and other airborne contaminants from the analyzer. Compressed gas cylinders and other pressurized gas lines are frequently the source of samples studied using the analyzer. These gases can pose a serious hazard if they are handled, stored, or vented improperly.

The following sections outline general gas safety requirements and precautions for persons using a Nicolet Antaris IGS.

### **Danger**

Sample gases may be hazardous, noxious, toxic, reactive, and/or asphyxiant. Be sure to read and follow the safety information found in the Material Safety Data Sheet or other documentation that accompanied the sample before you analyze it. Vent all hazardous toxic, reactive, and/or asphyxiant gases using sample transfer lines. Contact the agency that regulates environmental safety at your location if you need assistance. ▲

## Pressurized gases in general

The following are general guidelines for the safe use and storage of compressed gases. Check with your fire, public safety, and other regulatory authorities for specific requirements for your location.

- Wear eye protection when working with or near pressurized lines and cylinders.
- When handling toxic and hazardous gases, be sure the work area is properly ventilated through a non-sparking fume hood, glove box, or ventilated cabinet.
- Leave valve protective caps in place until the cylinder is connected to a regulator or manifold. Never lift a cylinder by the cap.
- Always provide a legible label or marking to identify the contents of a cylinder and any precautionary warnings.
- Inspect the cylinders regularly for corrosion, valve damage or leaks, and evidence of tampering. Never use a flame to detect flammable gas leaks.
- Wherever practical, keep the cylinder storage area dry, cool, well ventilated, and fire resistant. Never store cylinders in continuous dampness or near salt or other corrosive chemicals.
- Store cylinders in an upright position. Secure them against tipping or dropping.
- Protect cylinders from being struck, dented, scratched, cut or abraded.
- Store charged and empty cylinders separately. Never store gas cylinders near highly flammable or combustible substances, live wires, electrical third rails, or near ground wires leading to or from electrical equipment.
- Regulate the flow of gas from the canisters into the analyzer so that the pressure and flow rate never exceed the specifications for the gas cell and / or gas manifold.

**Purge gas** The Nicolet Antaris IGS is typically purged with dried air or nitrogen to eliminate water vapor, carbon dioxide and other airborne contaminants. This provides protection against environmental humidity and corrosive solvents, which can damage the optical components inside the analyzer.

If your analyzer environment is excessively humid (above 95% non-condensing) or contaminated with potentially corrosive solvents or other agents, we recommend that you purge the analyzer.

We provide instructions for selecting a purge gas and installing the purge source and connectors later in this manual. For best results, the purge gas should be dried to a dew point of  $-70^{\circ}\text{C}$  ( $-94^{\circ}\text{F}$ ) or below.

**▲ Danger** *Never* use a flammable gas to purge the analyzer. Heat from the source or internal electrical components could ignite a flammable gas. The purge gas must be free of moisture, oil and other reactive or infrared-absorbing materials. We recommend using dry air supplied by a purge gas generator or pure air generator (available from Thermo Electron), or dry nitrogen. Other gases, even inert gases such as argon (Ar), can damage the instrument. ▲

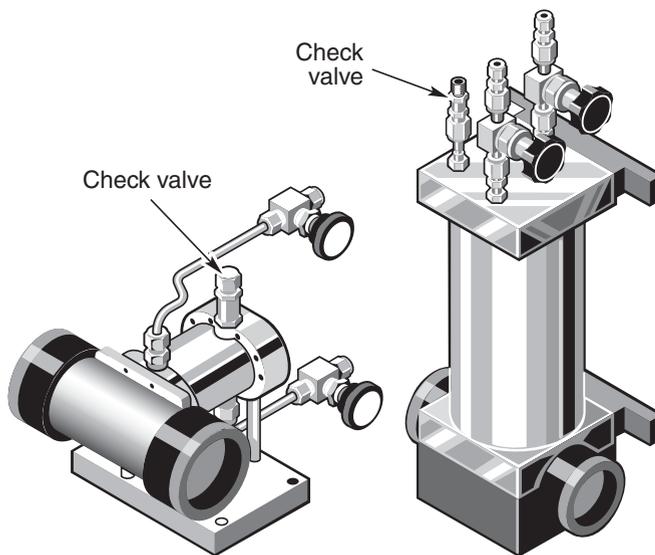
**Important** Do not install valves that can be closed in the line between the Purge Out port and the vent. If the purge line is not vented or the vent line is impinged, pressure from the purge gas can build up quickly inside the instrument, leading to instrument damage. ▲

## Gas cells and supply cylinders

This section is intended to provide basic safety information about the use and storage of gas cells and gas supply cylinders. Consult your local regulatory agencies and the material safety data sheets for detailed information about the particular gases analyzed at your site.

### Overpressurizing

Avoid overpressurizing the gas cell. Most gas cells include a check valve that prevents the cell from being overpressurized, which can cause it to explode. Check valve settings depend on gas cell size and the type of windows installed in the gas cell. When connecting sample lines to and from the gas cell, make sure the lines don't interfere with the check valve operation. See your gas cell user's manual for more information.



**Antaris IGS gas cells**

**2 meter path length**

**10 meter path length**

**▲ Danger** Explosion hazard; avoid overpressurizing the gas cell. Make sure the check valve is installed before using the gas cell. The cell can explode if it is overpressurized.

Never install a cap or valves that can be closed in the line between the vent and the check valve. The gas cell windows can explode if the gas cell is overpressurized and the check valve malfunctions.

Vent all hazardous, noxious, toxic, reactive, and/or asphyxiant gases using sample transfer lines. Contact the agency that regulates environmental safety at your location, if you need assistance. ▲

**▲ Danger** If you are using a gas cell that does not include a check valve, install a pressure gauge so you can closely monitor the gas cell pressure and never position a valve that can be closed between the pressure gauge and the gas cell. Also, protect the pressure gauge with a relief valve for pressures above 1.0 atm (760 torr, or 101 kPa). ▲

**▲ Danger** Avoid explosion hazard. Never exceed 1000 torr when filling a Antaris IGS 10 meter or 2 meter gas cell. ▲

Analyzing oxygen Do not use your instrument to analyze pure oxygen unless it is specifically designed and cleaned for that purpose. Antaris IGS gas cells have been specially designed and cleaned to allow safe analysis of pure oxygen. However, not all gas cells have been designed and cleaned for that purpose. Introducing pure oxygen to a gas cell that is not designed and cleaned for that use may cause the cell to explode.

**▲ Danger** Explosion hazard; use caution when sampling oxidizing, corrosive or toxic gases through the gas cell. Improper sampling techniques could result in injury or damage to the gas cell. ▲

## Maintaining the gas cell

Check gas cell windows regularly for damage. Any damage to the gas cell windows reduces the maximum pressure for safe operation of the cell. Check the windows regularly and before you attempt pressures close to the specified limit.

Your gas cell user's guide contains complete instructions for removing the windows from the gas cell. Examine the windows carefully for scratches, corrosion or degradation due to exposure to aqueous sample gases or uncontrolled humidity in your laboratory environment. Replace windows that have any sign of damage or degradation.

### **Caution**

Avoid gas cell failure. Before you attempt pressures close to the specified limit, examine your sample windows for scratches, corrosion or degradation from exposure to excessive moisture. Replace windows that have any sign of damage or degradation. ▲

### **Danger**

All systems used for the analysis of oxygen and other flammable or explosive gases must be returned to the factory for window replacement. Analyzing oxygen and other incendiary gases in a cell that has not been factory-cleaned following window replacement can result in fire and explosion. ▲

## Closed-cycle MCT-A detector

The optional closed-cycle MCT-A detector poses the following hazards:

- The gas lines connecting the detector and the refrigerant compressor are pressurized.
- The PT-14 gas used to cool the detector is a flammable asphyxiant.
- PT-14 gas has been known to form an explosive mixture with air and oxidizing agents.

If your Antaris IGS is equipped with an optional closed-cycle detector, be sure to read and follow all the precautions described in the Material Safety Data Sheet that accompanies your detector. The following is an overview of the precautions to take when working with a system that includes a closed-cycle MCT-A detector:

- Wear eye protection when working with or near pressurized lines and cylinders.
- Keep the work area well ventilated.
- Avoid crimping and repeatedly bending or repositioning the refrigerant gas lines.
- Never heat the refrigerant gas lines.
- Keep the work area free of ignition sources, including pilot lights and other flame sources, smoking, sparks, heaters, electrical equipment, and static discharge.
- Post work and storage areas with “No Smoking or Open Flames” signs.
- Never allow PT-14 gas to mix with oxygen, chlorine, bromine pentafluoride, nitrogen trifluoride, oxygen difluoride, chlorine dioxide, yellow mercuric oxide and other oxidizers.
- Leak check the analyzer, compressor and gas lines with soapy water. Never use a flame.

- ▲ Danger** Never loosen or disconnect the refrigerant gas lines or compressor couplings. These lines are filled with flammable PT-14 refrigerant gas. The gas is highly flammable and will react with any oxidizing agent. ▲
- ▲ Danger** Keep the work area well ventilated. The PT-14 gas used to cool the detector is a flammable asphyxiant. Before entering an area where a leak has occurred, especially a confined area, check with an appropriate device. ▲
- ▲ Danger** Do not analyze oxygen, chlorine, bromine pentafluoride, nitrogen trifluoride, oxygen difluoride, chlorine dioxide, yellow mercuric oxide and other oxidizers with a system equipped with an optional closed-cycle MCT-A detector. Mixtures of these materials and the PT-14 refrigerant gas used to cool the closed-cycle detector, particularly at high temperatures or low pressures, have been known to explode. ▲
- ▲ Danger** Provide separate storage areas and separate ventilation systems for PT-14 refrigerant gas cylinders and oxygen, chlorine, bromine pentafluoride, nitrogen trifluoride, oxygen difluoride, chlorine dioxide, yellow mercuric oxide and other oxidizers. The refrigerant gas is not compatible with these materials. Mixtures of these materials and PT-14 refrigerant gas, particularly at high temperatures or low pressures, have been known to explode. A physical separation of at least 6.1 meters (20 feet) or by using a noncombustible barricade with a fire rating of at least ½ hour is recommended for storage areas. ▲

## Ignition sources and heated components

Be sure that ventilation systems and check valves venting PT-14 and other flammable or explosive gases allow the gases to pass to the outside or a safe containment area without encountering ignition sources, such as fan motors that can spark.

### **Danger**

Never expose the refrigerant gas lines or compressor to temperatures above 52° C (125° F). Heat from the resulting fire can build pressure in the compressor and cause it to rupture.

Eliminate all ignition sources, including static electric sparks. Vapors can be ignited by pilot lights, other flames, smoking, sparks, heaters, electrical equipment, static discharge, or other ignition sources. Explosive atmospheres may linger

Avoid contact between heated components and gas lines used for PT-14 and other flammable or explosive gases. If the analyzer is installed in a rack enclosure, keep the refrigerant gas lines that are inside the enclosure as short as possible. ▲

### **Danger**

An analyzer equipped with an optional closed-cycle MCT-A detector must be partially disassembled by trained service personnel before it can be moved. Never loosen or disconnect the refrigerant gas lines or compressor couplings yourself. Vapors can be ignited by pilot lights or other flames, smoking, sparks, heaters, electrical equipment, static discharge, or other ignition sources. Explosive atmospheres may linger. ▲

## Special fire fighting procedures

Should a fire occur, evacuate all personnel from the danger area. Rescue workers may require self-contained breathing apparatus. Immediately cool cylinders, gas lines, and compressor with water spray from maximum distance, taking care not to extinguish flames. Then, if possible without risk, move them away from the fire area.

Acceptable extinguishing media for fires in the vicinity of PT-14 refrigerant gas include: CO<sub>2</sub>, dry chemicals, water spray or fog.

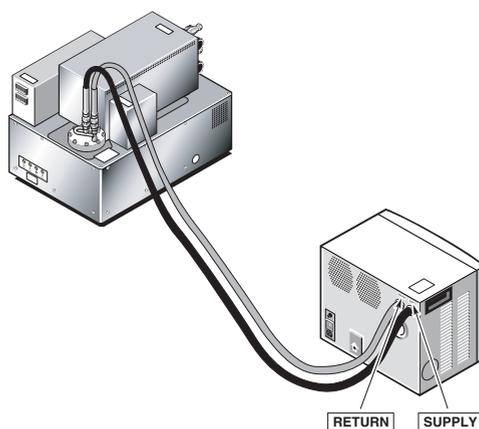
### **⚠ Danger**

If venting or leaking gas catches fire, do not extinguish the flames. Flammable vapors may spread from the leak creating an explosive reignition hazard. If possible without risk, stop the flow of gas or evacuate the area and allow the flames to burn out. ▲

## Operating pressure

The typical steady state operating pressure for the closed-cycle MCT-A detector refrigerant compressor is as follows:

<i>Gas line</i>	<i>Typical steady state operating pressure range</i>
Supply	1830 - 2170 kPa (250 – 300 psig)
Return	0 – 310 kPa (0 – 30 psig)



**⚠ Warning**

The refrigerant gas lines are pressurized. Typical operating pressure for the compressor supply line is 1830 – 2170 kPa (250 – 300 psig). Always wear eye protection when handling pressurized gas lines and other pressurized equipment. Avoid crimping and repeatedly bending or repositioning the gas lines. The resultant damage can cause dangerous leaks, fire, explosion, or injuries as the gas lines project the coupling with enough force to cause injuries. ▲

**Electrical service**

Check the line voltage and frequency of the wall outlet that will be used for the refrigerant compressor *before* you connect it or turn on the power. This should be done when the system is installed and any time the compressor is plugged into a different wall outlet.

**⚠ Danger**

To avoid injury, only a qualified person using the appropriate measuring device should check the line voltage, current and line frequency. ▲

<i>Input voltage*</i>	<i>Line frequencies</i>	<i>Current (max.)</i>
100 vac	50 to 60 Hz	8 A
120 vac	50 to 60 Hz	7 A
220 vac	50 to 60 Hz	4 A
240 vac	50 to 60 Hz	4 A

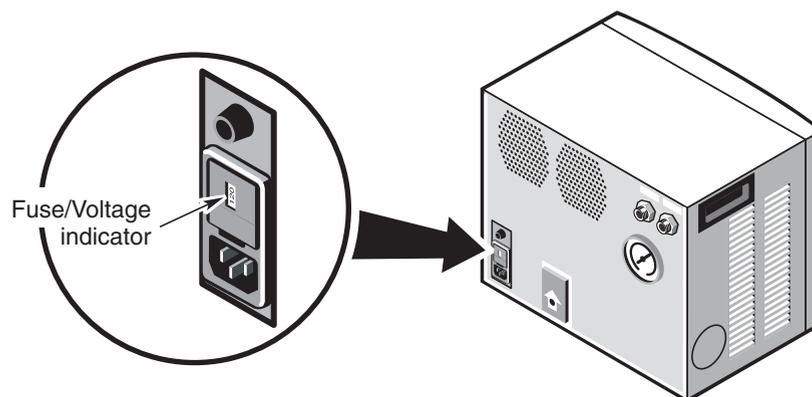
\* A change in input voltage requires a change to the compressor's voltage selection hardware.

**Power supply** The refrigerant compressor is powered by an internal power supply. As shipped from the factory, the compressor is set for an input voltage of 120 *vac* with a line frequency between 50 and 60 Hz.

*If your electrical supply does not match that specification, you must change the voltage selector block setting.*

**⚠ Danger** Avoid shock and fire hazard. Always verify that the voltage selector block setting matches the electrical supply voltage before connecting the compressor to a wall outlet or power strip. ▲

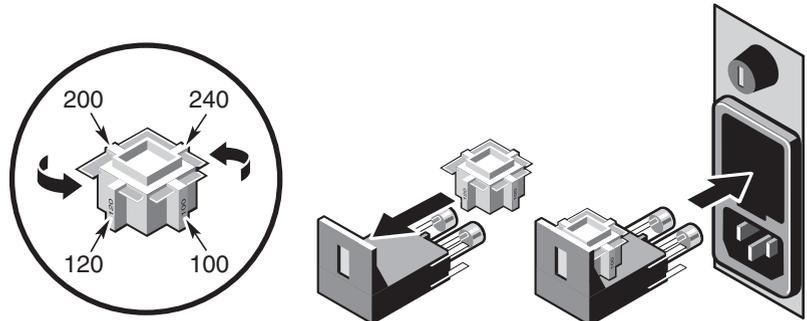
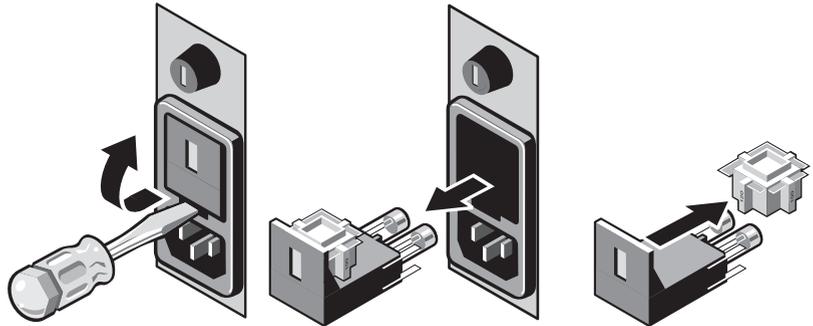
- 1. Check the voltage indicator on the rear panel of the compressor.**



*Voltage indicator*

- 2. If the voltage listed in the indicator does not match the electrical supply, use a 1/8-inch flat-blade screwdriver to lift and release the cover for the input power fuses and then slide the fuse holder out of the compressor.**

3. Grasp the voltage selector block with a small pliers and slide it out of the compartment.



4. Turn the block to the appropriate voltage and slide it back into the compartment.

You will hear a click as the block locks into place.

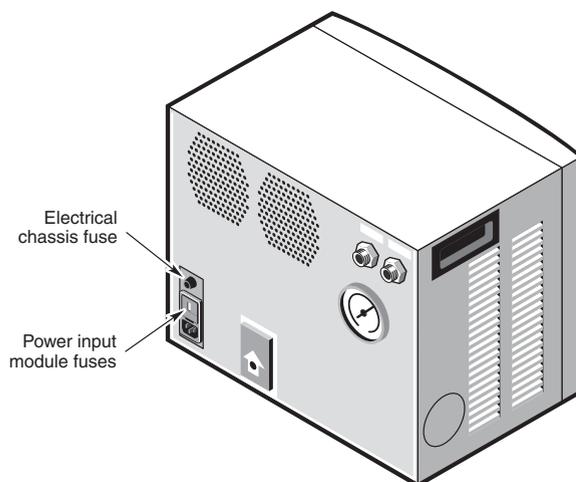
5. Reinstall the power input fuses.
6. Verify that the appropriate voltage indicator is visible in the window.

## Circuit breaker

Components within the refrigerant gas compressor for the optional closed-cycle MCT-A detector are protected by a 10 ampere; 10,000 AIC circuit breaker. In the event of an over-voltage or over-current condition, the breaker may be tripped.

## Fuses

If your analyzer is equipped with an optional closed-cycle MCT-A detector, the refrigerant compressor is protected with three, individually replaceable fuses.



**⚠ Warning** Avoid shock hazard. Always use an exact replacement for the fuses.

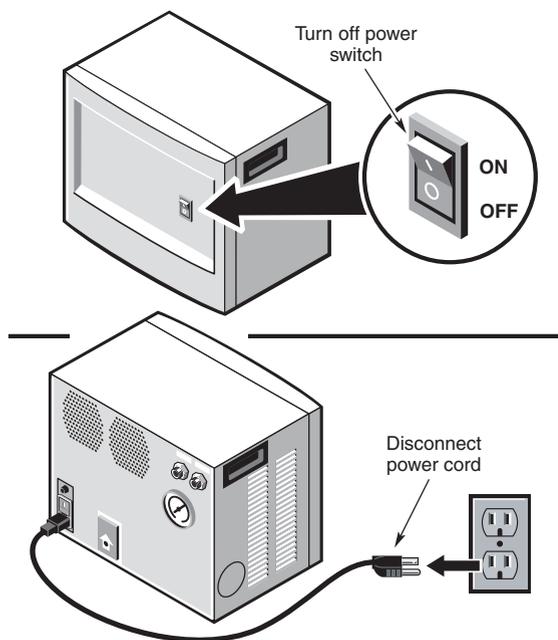
*For the power input module, always use two 1 A, 250 V, 5 x 20 mm, F-type (fast-blow) fuses.*

*For the electrical chassis, always use one 12.5 A, 250 V, 5 x 22 mm, T-type (slow blow) fuses. ▲*

**⚠ Warning** To avoid the risk of electrical shock, do not attempt to change the fuses with the power cord plugged in. ▲

*To replace the refrigerant compressor fuses:*

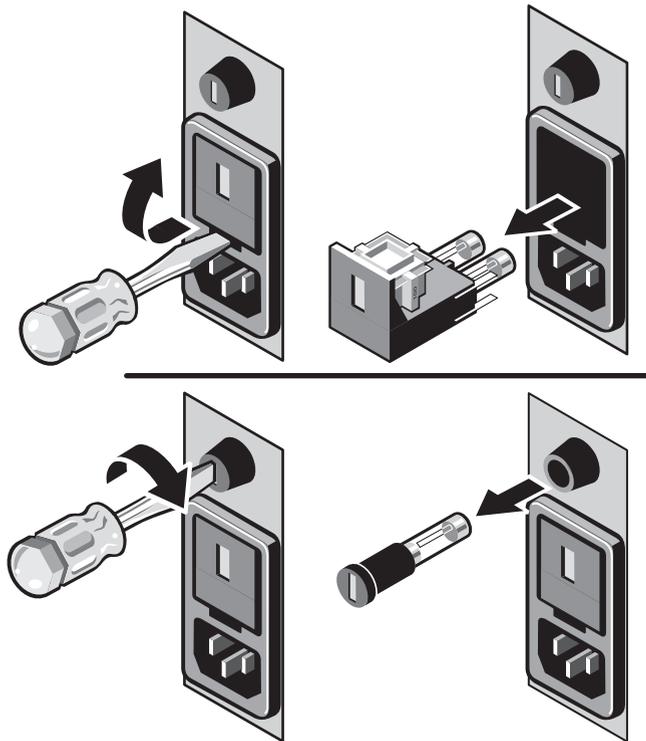
1. Power off the compressor.
2. Disconnect the compressor power cord from the wall outlet or power strip.



### 3. Open the fuse holders.

*For the power input module:* Use a 1/8-inch flat-blade screwdriver to lift and release the cover for the input power fuses and then slide the fuse holder out of the compressor.

*For the electrical chassis:* Use a 1/8-inch flat-blade screwdriver to turn the fuse holder and release it from the electrical chassis.



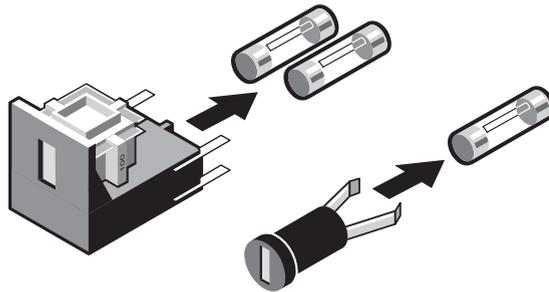
**4. Slide the fuse holders out of the compressor.**



**Warning**

Avoid shock hazard. Always use an exact replacement for the fuses. ▲

**5. Slide the fuses out of the holder, check them, and replace them, if necessary.**

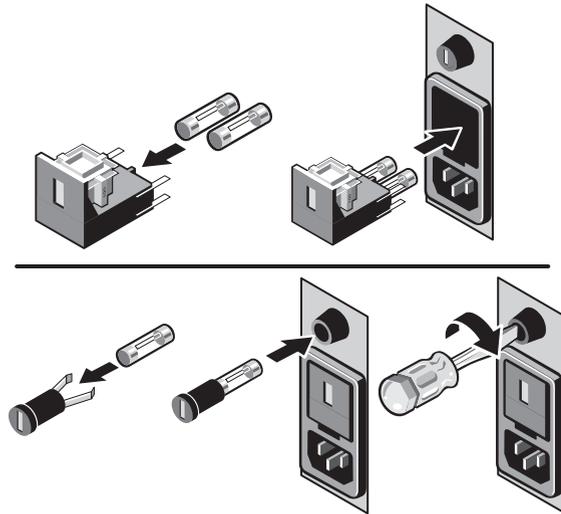


**6. Slide the fuses into the fuse holder.**

**7. Slide the fuse holder back into the compressor.**

*For the power input supply module:* Be sure to slide the holder all the way in. You should hear the latch click into place.

*For the electrical chassis:* Slide the holder all the way in. Use a 1/8-inch flat-blade screwdriver to secure the holder.

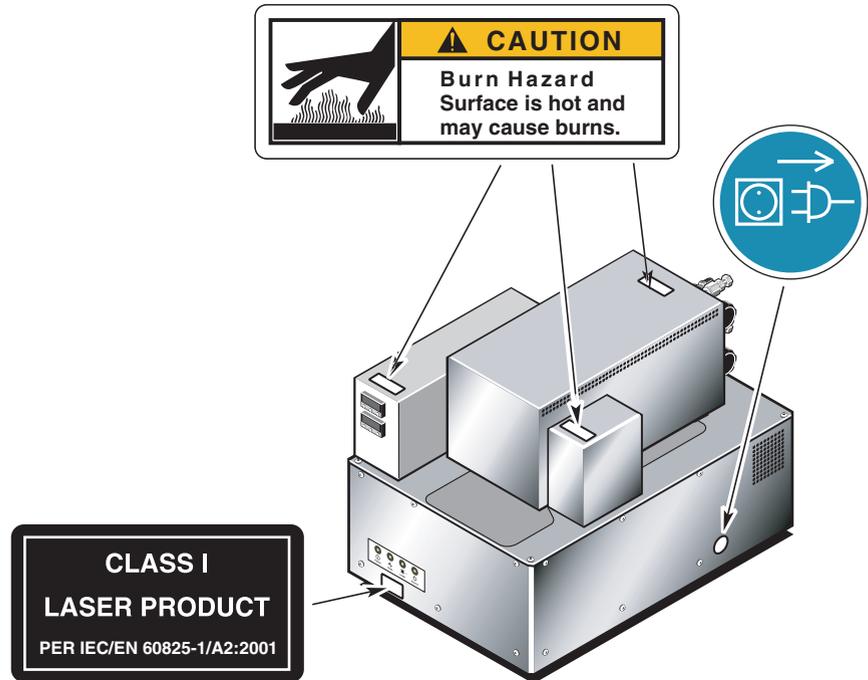


**8. Reconnect the power cord.**

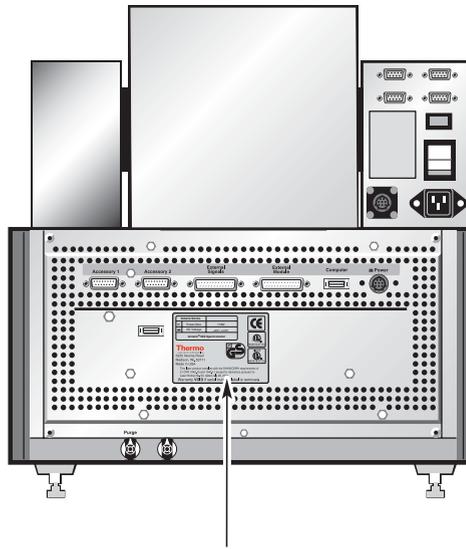
**9. Power on the refrigerant compressor.**

## Safety labels

The illustrations in this section show the locations of the safety labels attached to the analyzer. Should any labels come loose or become unreadable, Thermo Electron will supply new ones. The parts list that came with your system contains information about obtaining replacement labels.



*Safety labels for systems equipped with  
TE-cooled DTGS detectors*



Antaris Series		
W	Power Max	110W
---	DC Voltage	±5V / ±12V

**Antaris® IGS Spectrometer**

**Thermo**  
ELECTRON CORPORATION  
5225 Verona Road  
Madison, Wi. 53711  
Made in USA



**CE**

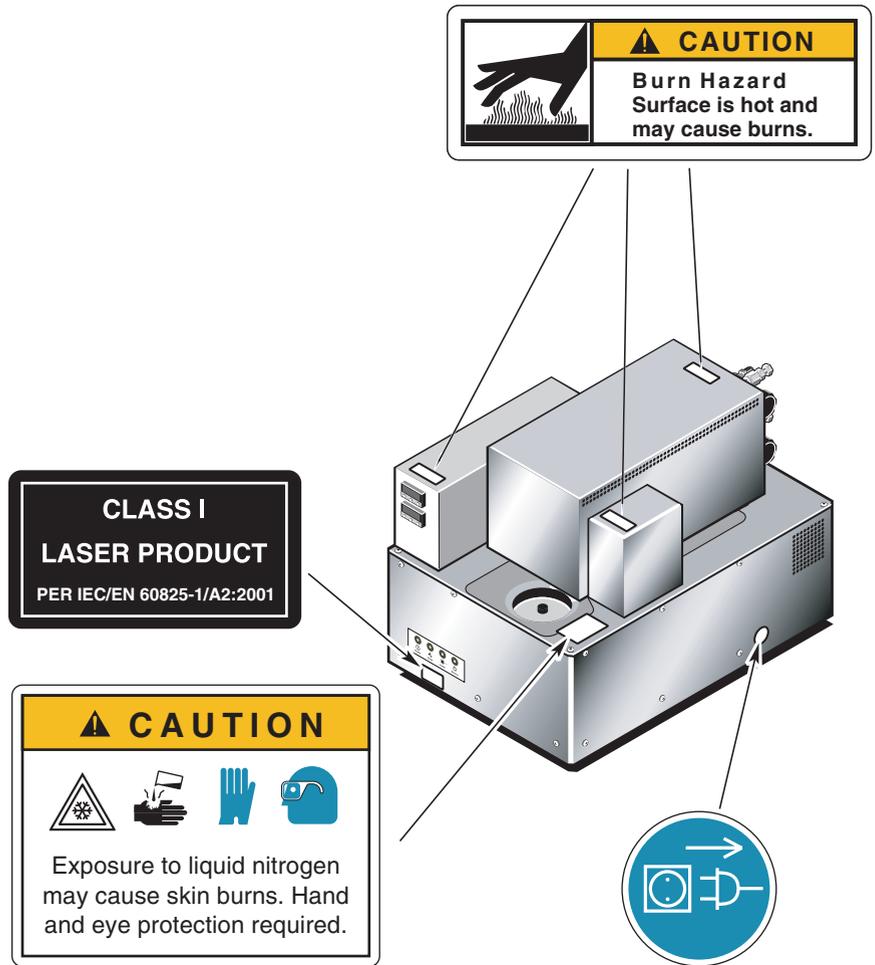
**ETL**  
C-Listed®  
N0291537110

**LISTED**

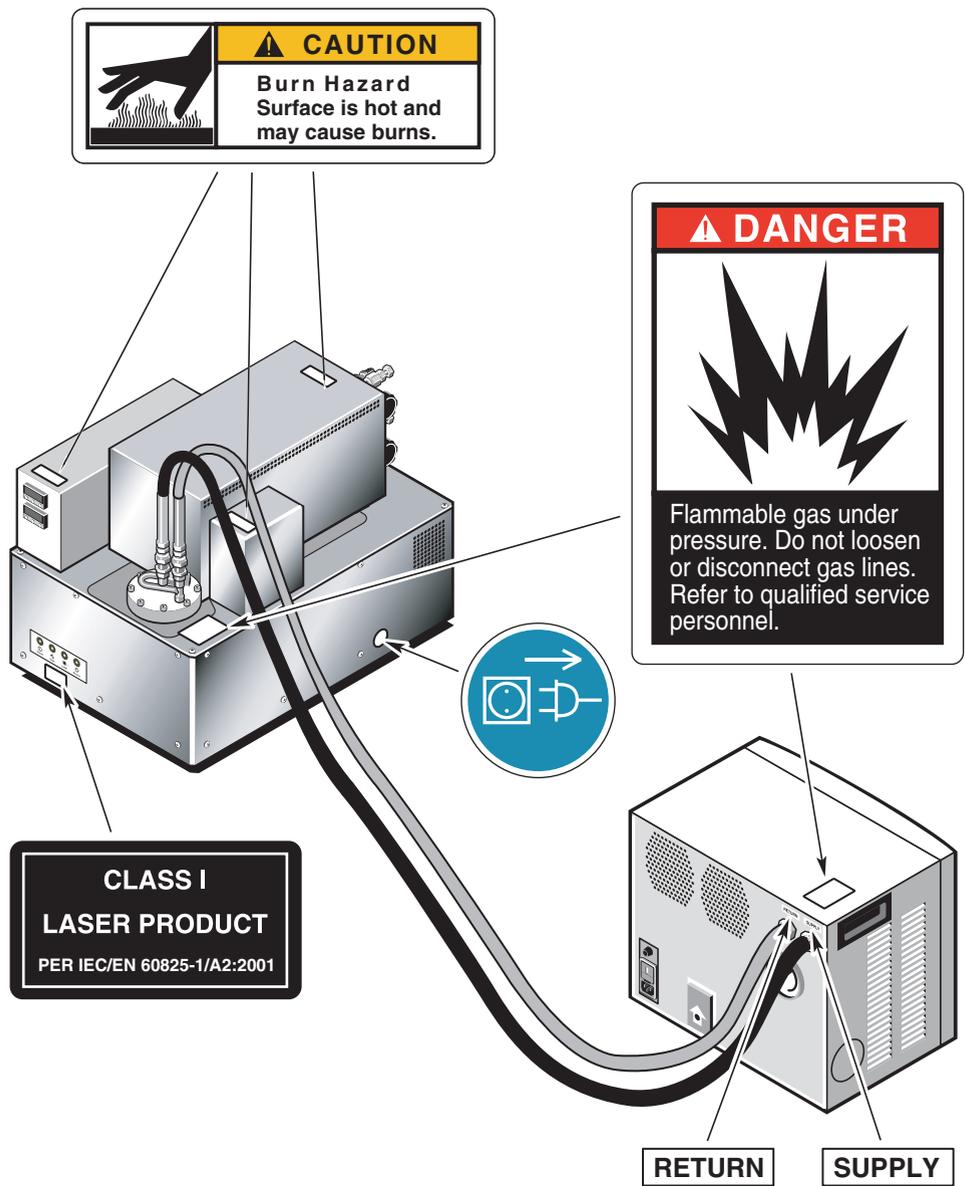
**ETL**  
N0291537110

This laser product complies with the DHHS/CDRH requirements of 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated July 26, 2001.  
Warranty **VOID** if serial number label is removed.

*Safety labels (back)*



*Safety labels for systems equipped with liquid nitrogen-cooled MCT-A detectors*



*Safety labels for systems equipped with  
closed-cycle MCT-A detectors*

**⚠ WARNING**



**Shock Hazard**

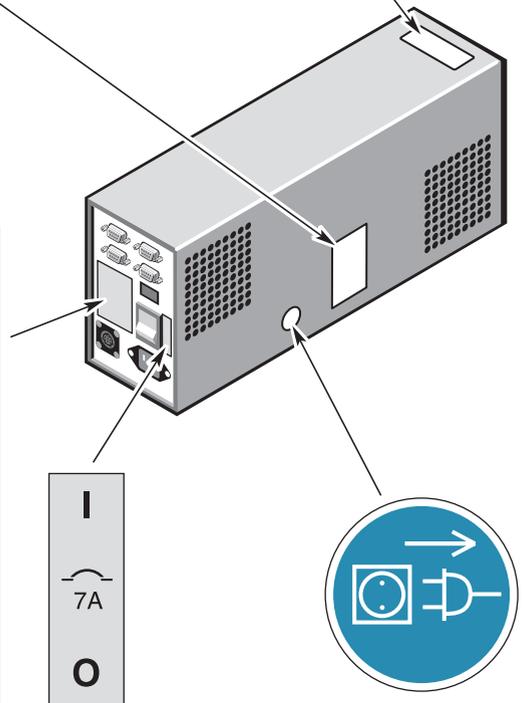
To prevent electrical shock, **DO NOT** remove cover. Refer to qualified service personnel. Service personnel must remove **ALL** power connections before servicing unit.

**⚠ CAUTION**



**Burn Hazard**  
Surface is hot and may cause burns.

W	Power Max	1100 W
Hz	Frequency Range	50-60 Hz
~	AC Voltage	110V-240V
A	Current Max	7.0A-3.5A
==	DC Volt	+5V/±12V
Model: Antaris IGS Temperature Control		
  		
<b>Thermo</b> ELECTRON CORPORATION		
5225 Verona Rd. Madison, WI. 53711		
Warranty VOID if serial number label is removed		



*Antaris IGS Temperature controller labels (back)*

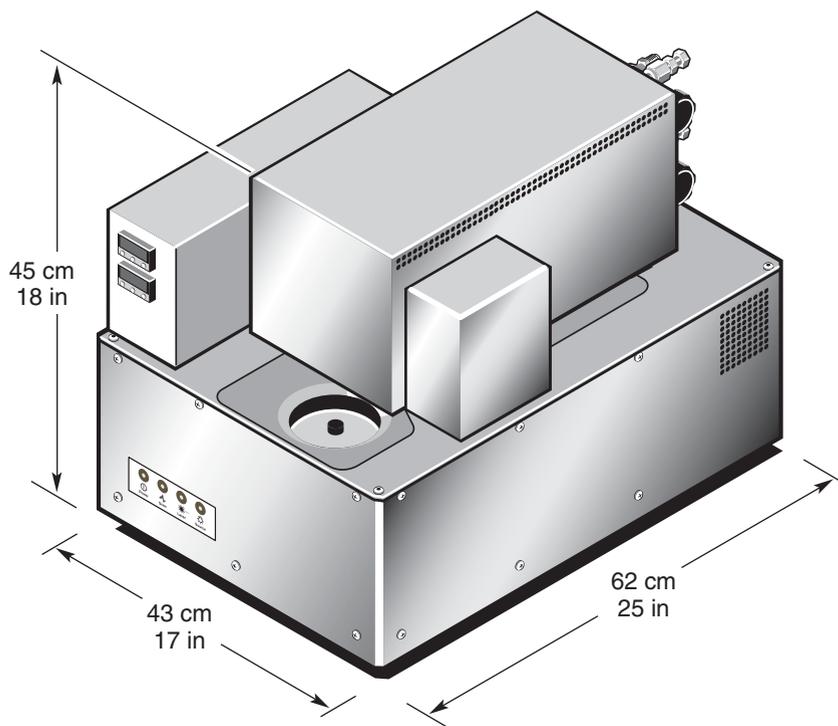
## Location

Consider these points when planning the location of your system:

- If possible, choose a site easily accessible by Thermo Electron personnel and have a telephone near the system. Should the system require technical support or service, these measures will save time.
- An electrical power source must be nearby. The analyzer has a 2.5 m (8 feet) long power cord.
- The floor (and table or counter used for a work surface) should be rigid to avoid excessive vibration, level to within 10° of horizontal, and sturdy enough to support the analyzer. If the system is equipped with an optional closed-cycle MCT-A detector, place it on the floor or provide a separate table or counter for the refrigerant compressor wherever possible. While vibration will not damage the analyzer, excessive vibration may compromise spectral quality and measurements.
- If the system is equipped with an optional closed-cycle MCT-A detector, the floor (and table or counter) used for the compressor must be level to within 10° of horizontal.
- Make sure the system will fit in the workspace you choose. Compare the workspace with the dimensions shown in the next section and in the “Utility Requirements” chapter.
  - Ventilation must be provided for the system and access covers must be able to open for maintenance and service. Leave at least 20.5 cm (8 in) of clearance on each side of the analyzer to allow the compartment covers to be opened fully.
  - If possible, leave at least 20.5 cm (8 in) of clearance behind the system to allow service access.
  - If you use more than one table to support the analyzer, the tabletops must be the same height.
  - Place the system at a height that allows you to work comfortably.

## System dimensions and weight

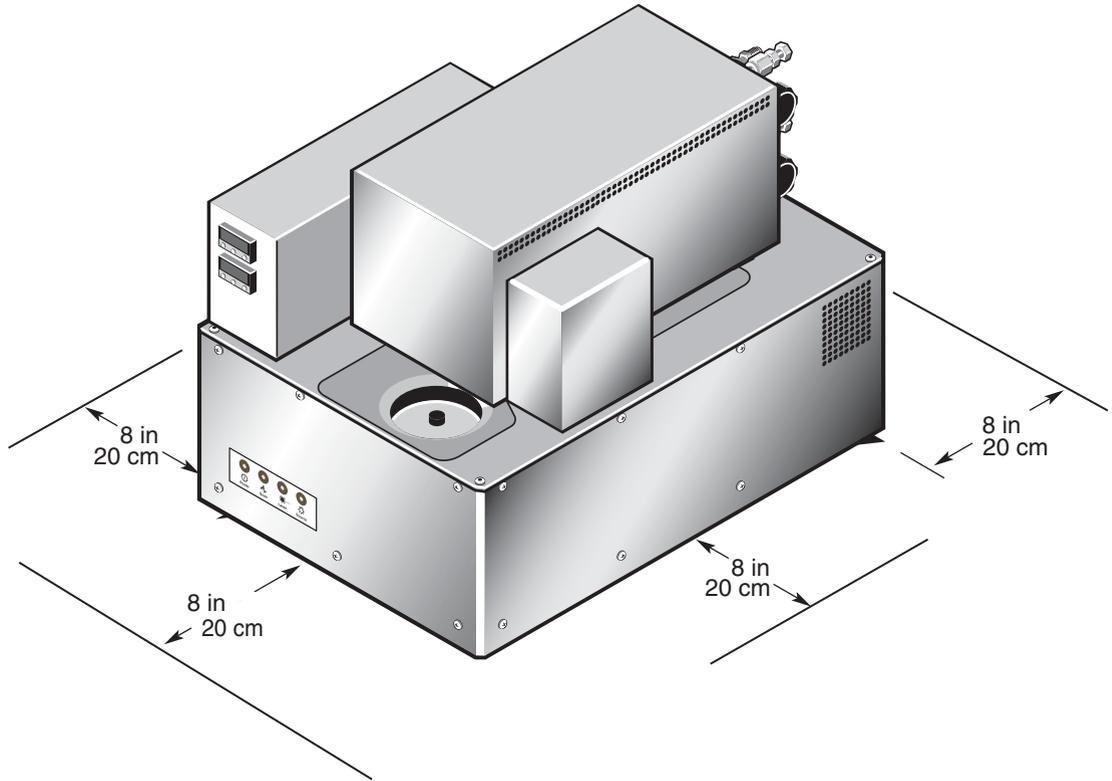
A Nicolet Antaris IGS, equipped with a 10 m gas cell and an optional temperature/pressure controller, weighs about 60 kg (131 lb). They are approximately 43 cm (17 in) wide by 62 cm (25 in) long by 45 cm (17.5 in) high.



### *Analyzer dimensions*

**Note** Your analyzer may look somewhat different, depending upon the configuration. ▲

To ensure proper operation and allow service access, unobstructed space is required on all sides of the analyzer, as shown in the illustration that follows.



### *Clearance needed around analyzer*

In addition to the space required for the analyzer itself, workspace is needed for a computer, a video monitor, a mouse and a keyboard. The computer will be connected to the analyzer by a data cable. Both 3 m (10 ft) and 18 m (60 ft) data cables are available from Thermo Electron. A 3 m (10 ft) cable is standard.

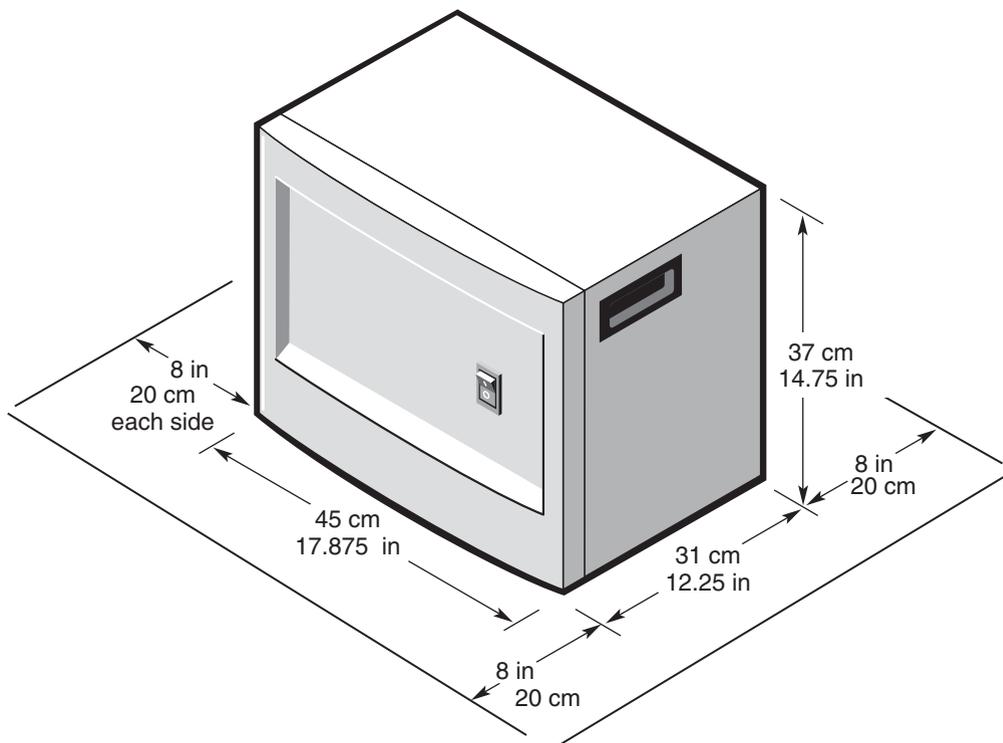
**Important** To avoid data loss, use only Thermo Electron data cables to connect the computer to the Antaris IGS. ▲

Typical computer component dimensions are shown in this table.

<i>Component</i>	<i>Height</i>	<i>Width</i>	<i>Depth</i>
Computer	48 cm (19 in)	22 cm (8.5 in)	47 cm (18.5 in)
Monitor	46 cm (18 in)	41 cm (16 in)	47 cm (18.5 in)
Keyboard	6 cm (2.5 in)	48 cm (19 in)	19 cm (7.5 in)

***Dimensions for typical computer***

If the analyzer is equipped with an optional closed-cycle MCT-A detector, a level space is required for the compressor.



Standard 7.6 m (25 ft) superflex, stainless steel gas lines with 4F couplings connect the compressor to the analyzer. This allows the compressor to be placed in a location that isolates the low vibrations produced by the compressor from the analyzer. Plan the location of the compressor such that there is no stress or strain on the connections. You will need a flat surface for the compressor that is level to within 10 degrees of horizontal.

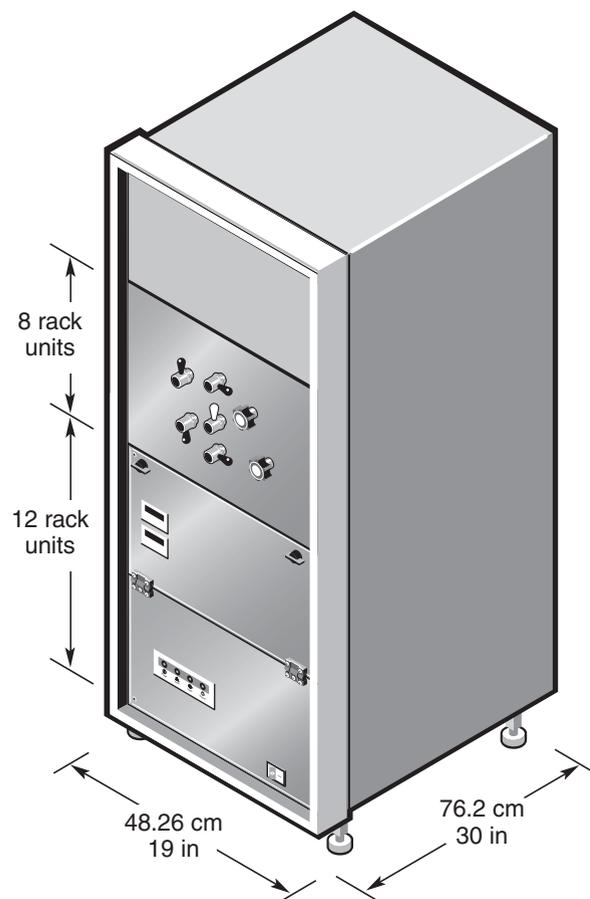
The table that follows provides weight information for the various components in an optional closed-cycle MCT-A detector system.

<i>Component</i>	<i>Weight</i>	
	<i>Metric</i>	<i>English</i>
Closed-cycle MCT-A detector	2.3 kg	5.0 lb
refrigerant compressor	21.8 kg	48 lb
7.6 m (25 ft) superflex, stainless steel gas lines with 4F couplings	3.2 kg	7.0 lb

***Weight for typical closed-cycle MCT-A detector components***

## Rackmount considerations

The Nicolet Antaris IGS, can be equipped for installation as roll-out components in a standard 30 in (76.2 cm) rack enclosure that meets the EIA Rs-310C, (19 in (48.26 cm)) rackmount standard. An optional rack-mounted gas manifold is also available. For a complete system including optional manifold, 20 standard rack units are required.



## Tip hazard

Due to its weight, a Nicolet Antaris IGS can pose a rack enclosure tip hazard unless appropriate anti-tip extensions, feet, or anchors are in place. Use the information that follows to have them designed by your rack enclosure manufacturer or a qualified structural engineer prior to the installation of the Nicolet Antaris IGS. The structural engineer who designs your restraints will need the weight information for the analyzer components and any other items installed in the rack enclosure.

The table that follows lists the weights of Nicolet Antaris IGS rackmount components.

<i>Component</i>	<i>Weight</i>	
	<i>(kg)</i>	<i>(lb)</i>
Analyzer with temperature controller pressure readout, and 10m gas cell with heating jacket	60 kg	131 lb
Rack drawer (includes rails and fasteners)	15 kg	32 lb
Rack manifold	4 kg	8.5 lbs

We recommend that the analyzer be installed as low in the rack enclosure as possible. To prevent tipping, only items with weights that exceed the analyzer component weights should be installed below them.

**Vibration isolation** The rollout drawer is designed to isolate the analyzer from minor vibrations caused by power supplies and small moving parts. Do not install vacuum pumps, compressors, clean air or purge gas generators/driers or other motor-driven devices in the same rack enclosure as the analyzer system. Motor-driven devices should be installed in a separate enclosure or on a solid, level floor near the analyzer enclosure. Vibrations from the motors, compressors, and pumps can distort your spectral data.

**Enclosure environment** To prevent damage to the analyzer, you must provide cooling and desiccating devices that will maintain ambient temperature and humidity inside the rack enclosure as follows

**Temperature** — 15° and 35° C (59° and 95° F)

**Humidity** — 20% to 80% noncondensing

Cooling and desiccating devices must be available for the service engineer at the time of installation. Damage to the instrument from improper environmental controls is not covered under warranty.

# Environmental Considerations

This chapter provides information about the environmental specifications for a Nicolet Antaris IGS workspace, including: temperature, humidity, vibration, magnetic fields, and static electricity.

## Vibration

Extreme floor vibration or acoustical noise from heavy manufacturing equipment or other sources can affect the performance of your analyzer. Minimize or eliminate excessive noise and vibration wherever possible.

If your analyzer is equipped with an optional closed-cycle MCT-A detector, provide a separate work surface for the compressor. While the compressor emits only low-level vibrations, isolating the analyzer from the compressor precludes spectral interference.

## Magnetic field and radio frequency immunity

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

The Nicolet Antaris IGS complies with the radiated emissions testing required by IEC 1000-4-3:1995. The electromagnetic compatibility test standard outlines testing and measurement techniques for the radiated radio-frequency electromagnetic field immunity test.

## Temperature

The Nicolet Antaris IGS analyzer itself safely operates in ambient temperatures between 15° and 35° C (59° and 95° F). The actual safe environmental operating temperatures the gas analysis system at your location may be further restricted by the safe operating parameters for the gas cell(s) used with your analyzer.

---

### *Antaris IGS*

#### *gas cell*

#### *Safe operating temperature range*

---

10-meter

25° to 185° C (77° to 365° F)

2-meter

20° to 185° C (68° to 365° F)

Other cells

See the documentation that came with the gas cell

---

Frequent fluctuations in temperature may result in long-term drift in the system response. (For optimal long-term stability, keep the temperature constant between 20° and 22° C (68° and 72° F).) Long-term stability improves with the length of time the analyzer has been on.

Avoid placing the analyzer near heating or air conditioning ducts, or areas where the workspace temperature may exceed recommended limits. Keep sources of heat, such as hot plates and heating mantles, away from the analyzer.

## Storage

If your analyzer is not operating, and is stored in the original shipping container, it can be exposed to temperatures from -20° to 50° C (-4° to 122° F).

## Humidity

Excessive exposure to moisture, outside the range of 5% to 95% noncondensing, may degrade components inside the Antaris IGS analyzer, affecting the performance. Exposure to moisture, outside the range of 20% to 80% noncondensing, will degrade Antaris IGS gas cells and affect the performance.

Antaris IGS analyzers are typically purged with clean, dried air or nitrogen. This provides a protection against environmental humidity. We recommend that you:

- Purge the analyzer with dry air or nitrogen. (We provide instructions for purge later in this manual.)
- Maintain the humidity in the range of 20% to 80% non-condensing.
- Avoid rapid changes in temperature that may cause condensation.
- Save the protective packaging used to ship the analyzer and gas cells. Reseal the analyzer and/or gas cell in the protective packaging before you store or move them. Extreme changes in temperature and humidity may cause moisture condensation, which can permanently affect the optical components.

### Important

Whenever the analyzer has been stored or shipped, immediate exposure to room air can cause condensation damage. *Allow 24 hours for the package to slowly warm to room temperature before opening it.* ▲

## Ventilation

If the analyzer is equipped with an optional closed-cycle MCT-A detector or you are sampling flammable gases, it may require special ventilation. For example, if you will be analyzing highly toxic samples, flammable gases, or use solvents that interact with infrared sources, ventilation must be provided to prevent the build-up of explosive and/or toxic vapors in the vicinity of the analyzer. Chlorinated solvents, perfluorochlorinated solvents, and other solvents containing halogenated hydrocarbons are often used as solvents. The pyrolysis of these solvents by an infrared source may produce hydrochloric acid (HCl), hydrofluoric acid (HF), or phosgene ( $\text{COCl}_2$ ).

Hydrochloric acid and hydrofluoric acid are highly corrosive and may cause accelerated corrosion of analyzer and gas cell components, seals, and gaskets if the concentration level of corrosive gases in the air is excessively high due to improper sampling techniques.

### **Warning**

Hydrochloric acid, hydrofluoric acid and phosgene are highly toxic and reactive. If you regularly use solvents containing halogenated hydrocarbons, be sure your work area is properly ventilated and maintain appropriate safety practices. ▲

Be sure to provide storage space for solvents containing halogenated hydrocarbons that is away from the analyzer; they should not be left on or near the analyzer for an extended time, and the analyzer must be purged while the solvents are used. An optional purge kit is available from Thermo Electron. ▲

## Venting PT-14 and other flammable gas

The infrared source inside the analyzer is an ignition source. The PT-14 refrigerant gas used to cool the optional closed-cycle MCT-A detector is a flammable gas under pressure. Check valves are provided to prevent over pressurization of the detector cooling chamber, gas lines, and compressor. Check valves are also provided for each gas cell. In the event of over pressurization of a system sampling flammable gases and/or sampling and PT-14 cooling system leaks, flammable vapors can build in the atmosphere surrounding the analyzer, presenting a fire or explosion hazard.

If your system is equipped with a closed-cycle MCT-A detector or if you plan to sample flammable gases, you must provide an active venting system that is free of spark and other ignition sources and prevents flammable vapors from collecting in the atmosphere surrounding the analyzer.

We recommend using sample transfer lines to vent the check valves in systems that will be used to analyze hazardous, noxious, toxic, reactive, and/or asphyxiant gases. Sample transfer line venting should also be used for the check valves in systems that are equipped with an optional closed-cycle MCT-A detector. The PT-14 refrigerant gas used to cool the detector has been known to explode when mixed with oxygen, chlorine, bromine pentafluoride, nitrogen trifluoride, oxygen difluoride, chlorine dioxide, yellow mercuric oxide and other oxidizers.

The table that follows lists the components that are protected by check valves and the connections required to vent them using sample transfer lines.

<i>Component</i>	<i>connector type</i>	<i>Check valve customer supplies</i>
Antaris IGS 10 meter gas cell	0.25" male VCR	0.25" female stainless VCR
Antaris IGS 2 meter gas cell	0.25" swagelok	0.25" stainless tubing
Closed-cycle MCT-A detector	0.25" female NPT	0.25" male brass or stainless steel NPT

## Static electricity

Since static electricity can destroy electronic components, your system was designed to meet the international standard: IEC 1000-4-2; electrostatic discharge immunity requirements for industrial process, measurement and control equipment.

If you have trouble with static electricity in your facility, protect your system (especially when you are servicing or handling components inside the analyzer) by following your company's established guidelines for reducing electrostatic discharges.

## Utility Requirements

If possible, the power connections for the system should be easily accessible for service purposes. You should have direct control over the electrical and purge gas supply to the analyzer.

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

You must also ensure that your computer and computer network are properly configured. See *Computer Requirements* in this manual for more information.

### Electrical requirements

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 that a power quality audit be performed before installation. Contact Thermo Electron Technical Support or your local electrical authority for more information.

 **Danger**

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. ▲

Your analyzer was designed to meet the international standard: IEC 1000-4-4; electrical fast transient burst immunity requirements for industrial process, measurement and control equipment.

## Power line conditioning accessories

Un-interruptible power supplies (UPS) are available from Thermo Electron. A UPS reduces the odds 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 Thermo Electron for 120-volt operation. Line conditioners for 100- or 230-volt operation can be purchased locally. Contact Technical Support for information about power conditioners and uninterruptible power supplies.

## Electrical service specifications

The following table lists the specifications for electrical service. Contact your local Thermo Electron service representative 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>Analyzer Specification</i>
Nominal operating AC input & current	3.5 A @ 110 V 1.8 A @ 220 V
Maximum startup AC input & current	15 A @ 110 V 7.5 A @ 220 V
line frequency	50 – 60 Hz; printers may require special 50-Hz versions.
line disturbances	Sags, surges or other line disturbances must not exceed 10% of input voltage (even for a half cycle).
noise	less than 2 volts (common mode) less than 20 volts (normal mode)

System components such as the computer, printer and monitor may modify these specifications.

## 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 analyzer and accessories are shown below. The values are approximate.

---

<i>Component</i>	<i>Power Consumption</i>	
	<i>(watts)</i>	<i>(British thermal units per hour)</i>
analyzer	110 W	375 btu/hr
IGS Temperature controller and pressure readout	10 W	34 btu/hr
Refrigerant gas compressor for closed-cycle MCT-A detector	750 W	2559 btu/hr
Heating jacket for 10 M gas cell	600 W	2047 btu/hr
Heating jacket for 2 M gas cell	200 W	682 btu/hr
Standard computer and monitor*	460 W	1570 btu/hr
Whatman purge gas generator	10 W	34 btu/hr
Whatman pure air dryer	1,000 W	3412 btu/hr
Standard printer*	200 W	682 btu/hr

---

\* Values shown are estimates. See the power specifications on the rear panels or undersides of these units.

---

## Telephone

If possible, install a telephone with an outside line near the analyzer. Should you require assistance from Thermo Electron, being able to use the phone while operating the analyzer will save time.

## Purge gas

Nicolet Antaris IGS analyzers are typically purged with clean, dried air or nitrogen to prevent damage to optical components from environmental humidity and corrosive solvents. Purging (forcing dried air or nitrogen through the analyzer to eliminate water vapor and other airborne contaminants) protects the system's internal components.

### **Caution**

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

## Selecting a purge gas

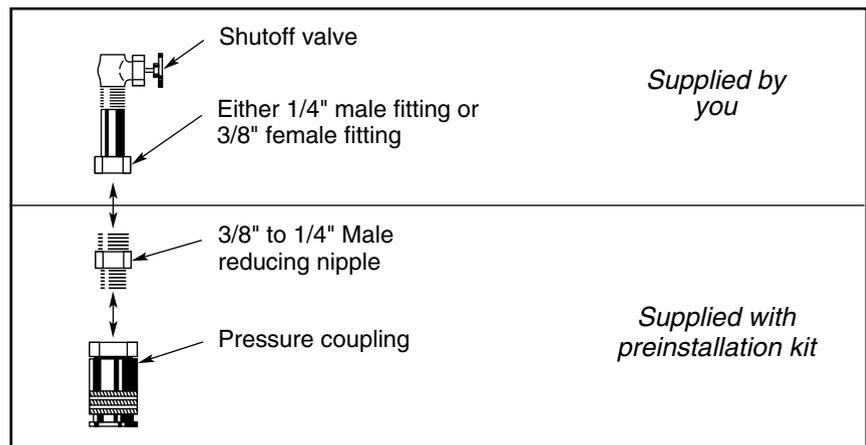
Dry air and nitrogen are equally effective in eliminating water vapor and volatile solvents from the analyzer environment. If you decide to purge your analyzer, the purge gas must be free of moisture, oil and other reactive materials. To remove particulate matter and oil, you may need to install a 10-micron filter. Dry air or nitrogen supplied for purge should be dried to a dew point of  $-70^{\circ}\text{C}$  ( $-94^{\circ}\text{F}$ ) or below for best performance.

### **Danger**

*Never* use a flammable gas to purge the analyzer. Heat from the source or from laser absorption could ignite the gas. Use only nitrogen or clean, dried air to purge the analyzer. Other gases, even inert gases such as argon (Ar), can damage the analyzer or cause the infrared source to overheat. ▲

## Installing purge gas fittings

If you ordered an optional single- or two-zone purge kit for the Antaris IGS, install the purge line and the necessary fittings *before* the system arrives. The source line pressure should be at least 20 psig (1.4 atm) and must not exceed 150 psig (10.2 atm). The kits include pressure regulators and flow meters (appropriate to your particular configuration) that will be shipped with the analyzer. Use them to maintain the line pressures of 10 to 20 psig at the flow meter inlet and a flow rates of 15 to 20 scfh for optimal data collection. Specific instructions for setting the pressure and flow rate for each purge zone will be included with your analyzer.

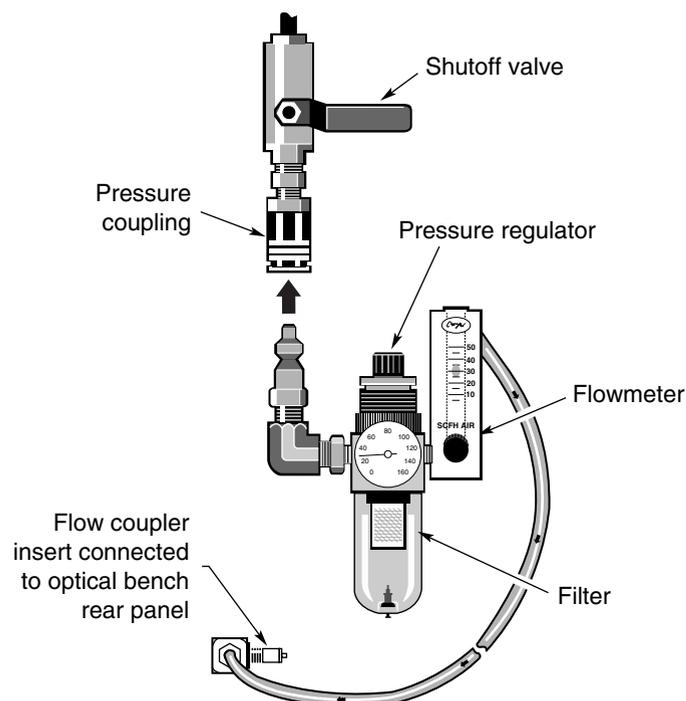


Install the source line within 3 meters (10 feet) of the proposed location for your analyzer. The purge gas line must be installed vertically to ensure that the pressure gauge scale does not tilt when the gauge and regulator assembly are attached later. This prevents moisture from accumulating in the system.

Once the line is installed, attach a shutoff valve and either a 1/4-inch male fitting or a 3/8-inch female fitting. When your analyzer arrives, you can attach the pressure coupling directly to the 1/4-inch male fitting. If you used the 3/8-inch female fitting, install the reducing

nipple before attaching the pressure coupling. Use an 11/16-inch open-end wrench to tighten the reducing nipple and a 3/4-inch open-end wrench to tighten the pressure coupling. Use pipe tape to prevent leaks at the fittings.

The rest of the purge equipment (including the reducing nipple, pressure coupling, pressure regulator, and flow meter) will arrive with the analyzer. The illustration below shows how the equipment will be connected between the pressure coupling and the analyzer.



**Important** Do not install valves that can be closed in the line between the Purge Out port and the vent. If the purge line is not vented or the vent line is impinged, pressure from the purge gas can build up quickly inside the instrument, leading to instrument damage. ▲

## Purge gas generators

If you need to purge your analyzer and your facility does not have a source of clean, dry compressed air or nitrogen, we recommend that you consider using a purge gas generator. The generator cleans and dries the air supplied by your air compressor and provides it to the analyzer. (For facilities without an air compressor, a complete dry-air generating system is available; see the next section.)

The analyzer works well with the Whatman® (Balston®) purge gas generator models shown at the top of the following table, which lists part numbers and specifications. The generator supply voltage and frequency are not adjustable, so be sure to order the correct items for your local utility service. The power consumption of the generators is listed in the section called “Power consumption.”

**Note** Position the purge gas generator away from the analyzer to reduce noise and vibration. ▲

**Important** 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. The table that follows includes the minimum pressure values. ▲

<i>Whatman Model Numbers</i>	<i>75-45</i>	<i>75-45EU</i>	<i>75-52</i>	<i>75-52EU</i>
part number	869-050300	869-050400	869-050500	869-050600
nominal input line voltage	120 vac	240 vac	120 vac	240 vac
dew point	-73° C (-100° F)			
maximum dry (outlet) air flow rate for specified dew points* by inlet pressures:				
8.50 atm (125 psig)	17 liters/min (36 scfh)	17 liters/min (36 scfh)	34 liters/min (72 scfh)	34 liters/min (72 scfh)
4.08 atm (60 psig)	9 liters/min (18 scfh)	9 liters/min (18 scfh)	17 liters/min (36 scfh)	17 liters/min (36 scfh)
air consumption for regeneration**	14 liters/min (30 scfh)	14 liters/min (30 scfh)	28 liters/min (60 scfh)	28 liters/min (60 scfh)
minimum inlet air pressure	4.08 atm (60 psig)	4.08 atm (60 psig)	4.08 atm (60 psig)	4.08 atm (60 psig)
CO <sub>2</sub> concentration	< 1 ppm	< 1 ppm	< 1 ppm	< 1 ppm
maximum inlet air temp.***	25° C (78° F)			
inlet/outlet port size	1/4-inch NPT (female)	1/4-inch NPT (female)	1/4-inch NPT (female)	1/4-inch NPT (female)
shipping weight	11 kg (25 lb)	11 kg (25 lb)	18 kg (40 lb)	18 kg (40 lb)

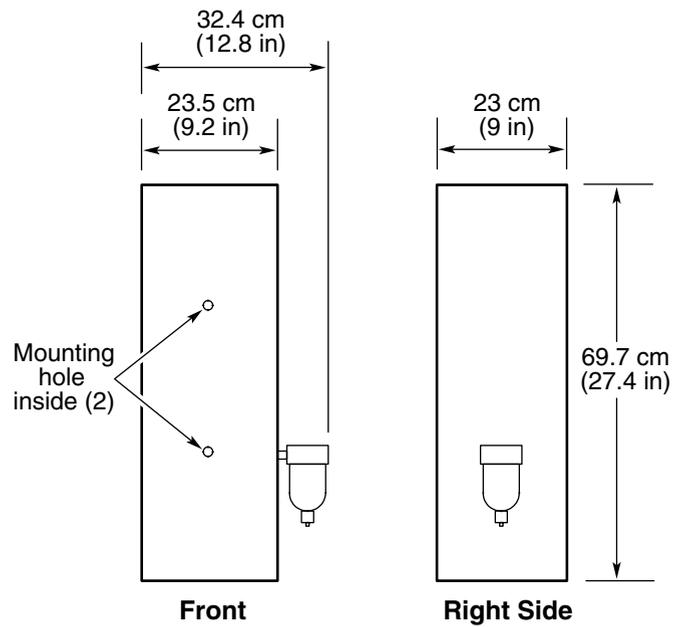
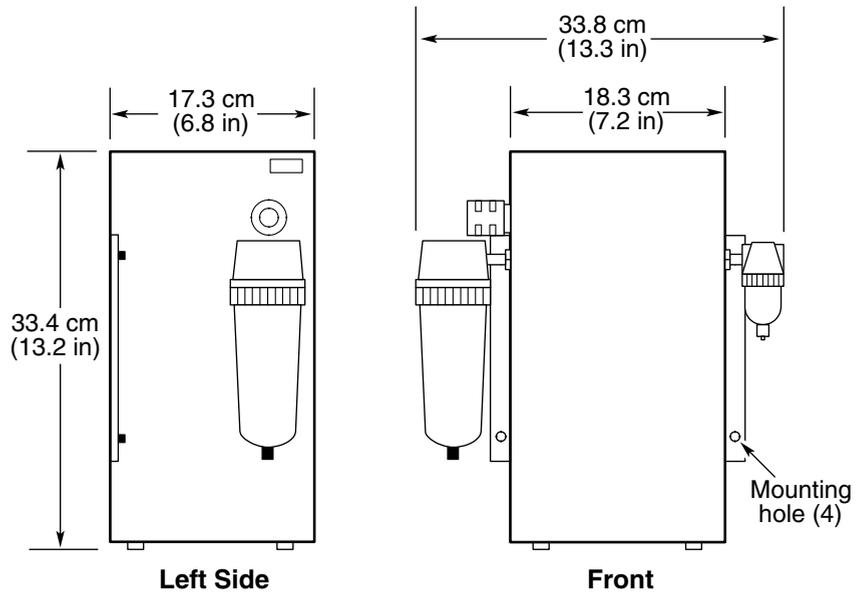
\* Dew point will be lower than specified at lower airflow.

\*\* Total air required = air loss + process demand (up to maximum dry air flow rate).

\*\*\* Outlet dew point will increase at higher inlet compressed air temperatures.

### ***Purge gas generator specifications by part number***

The following illustrations show the dimensions of the purge gas generators and the locations of holes that can be used for mounting the generators on a wall. Models 75-45 and 75-45EU fit easily on top of a bench or table. When not wall-mounted, Models 75-52 and 75-52EU should be placed on the floor.



***Model 75--45 (and 75-45EU)  
Model 75-52 (and 75-52EU)***

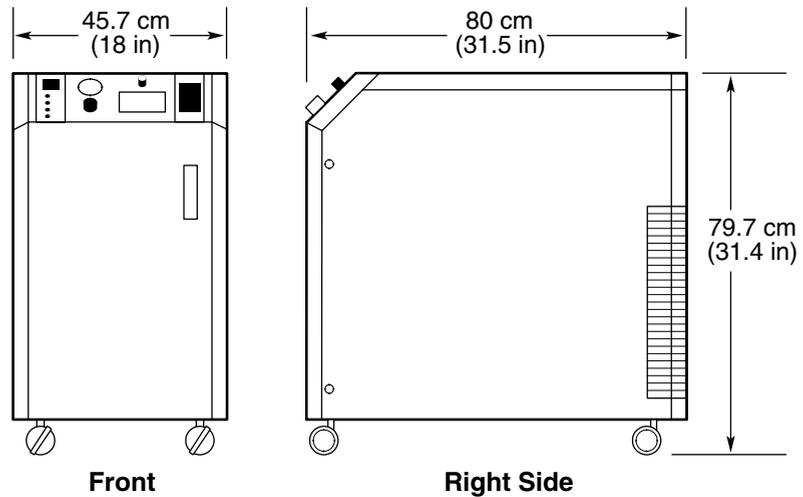
## Pure air dryer

Thermo Electron also offers a complete dry-air generating system for providing analyzer purge. Since this system contains an air compressor, it can be used in facilities that do not have a source of compressed air.

The pure air dryer system includes an air compressor, a dryer, pre-filters, a final filter/moisture indicator and flow controls. The following table gives the Thermo Electron part numbers and specifications for the two available generator models.

	<i>74-5041</i>	<i>74-5041EU</i>
part number	869-065500	869-065600
nominal input line voltage, frequency	110 vac, 60 Hz	220 vac, 50 Hz
dew point	-73° C (-100° F)	-73° C (-100° F)
max. air flow rate at 80 psig	28 L/min (60 scfh)	28 L/min (60 scfh)
CO <sub>2</sub> concentration	< 1 ppm	< 1 ppm
outlet port size	1/4-inch NPT (female)	1/4-inch NPT (female)
shipping weight	114 kg (250 lb)	114 kg (250 lb)

### *Pure air dryer specifications by part number*



***74-5041 and 74-5041EU  
Pure air dryers***

**Note** Read the manufacturer's instructions before installing air-drying equipment or performing any maintenance, such as changing the filters. The installation and maintenance of air-drying equipment is *your* responsibility. Failure to change the filters at least once a year and perform other routine maintenance can void the warranty. ▲

**Important** *Before* you connect a pure air dryer to the analyzer, it is *vital* that you purge the dryer of water and particulates by running it for at least 12 hours at nominal air flow. If the dryer has not been purged, you risk severe damage to the optical components in the analyzer when you connect the pure air dryer. ▲



# Computer Requirements

## Network requirements

The Nicolet Antaris IGS analyzer is designed to run with Thermo Electron's RESULT spectroscopy software for industrial applications. RESULT works with several versions of the Microsoft Windows operating system, including Windows XP Professional, Windows 2000 Professional and Windows NT version 4, service pack 4 or greater. Thermo Electron-provided computers feature an on-board Ethernet interface. Ethernet drivers are included. If desired, the onboard Ethernet interface can be disabled to allow the use of custom Ethernet cards.

### **Important**

You can also run RESULT software on a workstation that has no network connection. However, the RESULT file naming convention, which uses globally unique identifiers (GUIDs), requires an Ethernet interface and Windows network services for proper operation. ▲

## Computer access

Thermo Electron service engineers must be allowed access to the computer controlling the Nicolet Antaris IGS during installation. System administrators have three options for providing access:

- Set up a Windows logon account with administrative rights to the computer, allowing the service representative to run RESULT software.
- Set up a local logon account with administrative rights to the computer, so that the service representative can only log on to that computer with no network access.
- For customers who are obliged by FDA or other regulations to limit logons to the system, the network administrator or other designated person may log on personally and remain present while the service representative performs the maintenance or service functions.

## Hardware and software requirements

The computer used to run RESULT software should meet the following minimum requirements for hardware and software. For applications that require faster collection rates or higher resolutions, use the recommended specifications rather than the minimum.

- Intel® Pentium® processor with 400 MHz clock speed (3.0 GHz clock speed is recommended).
- 96 megabytes of random access memory (RAM) (1.0 gigabyte of RAM is recommended).
- 4 megabytes of video RAM (32 megabytes of video RAM is recommended).
- Hard disk size of 10 gigabytes (80 gigabytes of hard disk space is recommended).
- 8x speed CD-ROM drive for installing Result software.
- 1.44-megabyte floppy disk drive for 3.5-inch floppy disks for installing individual software files, when needed, and firmware upgrades.
- 15-inch SVGA monitor with at least 800 by 600 resolution.
- Compatible sound card and speakers or headphones if you want to have audio feedback.
- A keyboard and mouse, or an equivalent input device.
- One open PCI slot for installing the analyzer interface card.
- Ethernet port if you want to take advantage of the automatic file naming features of Result software, including globally unique identifiers (GUIDs).
- Two serial ports for running the Antaris IGS temperature controller. (The second serial port is required only if the temperature controller includes the optional pressure sensor.)

- One compatible port for connecting to a local printer. Depending on the printer, the port may need to accept a parallel, serial, USB, or other type of connector. (Not needed for connecting to a network printer.)
- One of the following Microsoft® Windows® operating systems:
  - Windows XP Professional
  - Windows 2000 Professional
  - Windows NT® Workstation version 4, service pack 4 or greater(We recommend Windows XP or Windows 2000.)
- Microsoft Internet Explorer version 4, version 5, or version 6 (version 6 is recommended).

If your version of RESULT includes the sequence module and you want to collect data continuously using very high speeds or very high resolutions, the computer should meet the following additional requirements:

- Intel® Pentium® processor with 3.0 GHz or greater clock speed.
- At least 1.0 gigabyte of random access memory (RAM).
- At least 128 megabytes of video RAM.
- Hard disk size of at least 80 gigabytes.



# Site-Preparation Check List

Use this checklist to ensure that all site-preparation steps have been performed. You will then be ready to schedule the installation.

## General

- Affected administrators, such as MIS, shipping, maintenance, metrology, users, and regulatory employees, have been informed that the system is on order and when it will be installed.
- The system remains packed until the Thermo Electron service engineer arrives.
- The system administrator is scheduled to be present during the installation to complete the following tasks:
  - Set up users in the Windows operating
  - Set up Windows security features
  - Change settings for the RESULT Operation audit log, if necessary
  - Set up another RESULT administrator account, if necessary.

## Environmental considerations

- The temperature stays relatively constant between 15° and 35°C (59° and 95°F), between 20° and 22°C (68° and 72°F) for best performance.
- The humidity (non-condensing) is between 5% and 95%.

### **Location**

- The location is easily accessible to a Thermo Electron service engineer.
- The system fits through the necessary doorways and elevators.
- There are no excessive floor vibrations.
- There are no intense magnetic fields.
- The floor, and table or cart, are strong enough to support the system.
- The work height is convenient for use of the analyzer.
- There is adequate clearance around and above the system.

### **Utility service**

- A dedicated power line is available.
- There is sufficient power to run the analyzer and all accessories.
- There is a definite earth ground (*not* neutral) for power outlets.
- Adherence to local building and safety codes is verified.
- A source of dry air or nitrogen is installed, if you plan to purge the analyzer.

### **Computer requirements**

- Customer-supplied computer meets minimum standards (if applicable).
- Network services are configured properly.