Using Your Nicolet iN10 FT-IR Microscope

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For Technical Support, please contact:
Thermo Fisher Scientific
5225 Verona Road
Madison, WI 53711-4495 U.S.A.
Telephone: 1 800 532 4752
E-mail: us.techsupport.analyze@thermofisher.com
World Wide Web: http://www.thermo.com/spectroscopy

For International Support, please contact:
Thermo Fisher Scientific
Telephone: +1 608 273 5017
E-mail: support.madison@thermofisher.com
World Wide Web: http://www.thermo.com/spectroscopy

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Table of Contents

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Introduction

Welcome

The Thermo Scientific Nicolet™ iN™10 microscope has integrated validation features, a powerful software suite, and many other features that make it easy for you to collect data. It was designed to allow you to perform several service and maintenance procedures yourself, and this help system, or printed documentation, contains detailed information about performing such procedures. If you cannot find the information you are looking for, please contact us for assistance.

If you are using the electronic help version of this document, you can access information by double-clicking the book in the Contents tab that interests you, and then double-clicking the topic you want to read. There is also an Index tab where you can search for topics by phrase or keyword, and there is a Find tab that allows you to search for specific words.

Note: If you have a Nicolet iZ™10 Module connected to your microscope, please refer to the Nicolet iZ10 help system for information about using the module.

Questions and concerns

In case of emergency, follow the procedures established by your facility. If you have questions or concerns about safety or need assistance with operation, repairs or replacement parts, you can contact our sales or service representative in your area or visit our web site at www.thermo.com/spectroscopy.

Conventions used in this help system

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

Note: Notes contain helpful supplementary information.

Notice: Follow instructions labeled "Notice" to avoid damaging the system hardware or losing data.

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

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

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

Warranty information

Thermo Fisher Scientific warrants that each product we sell you is free from defects in labor and materials and shall conform to its product specifications as defined in the product user documentation. If the product does not function as warranted during the warranty period, we will repair or replace it without charge. If in our judgment we are unable to do so, you may return it to us and we will refund your money.

This warranty replaces all other warranties, expressed or implied, including the implied warranties of merchantability and fitness for a particular purpose and any other obligations or liabilities on the part of Thermo Fisher Scientific whether in contract, warranty, negligence or otherwise. Thermo Fisher Scientific shall not be liable for and disclaims all consequential, incidental and contingent damages.

Warranty period

The system warranty period is 12 months in the U.S.A. and Canada. The warranty period begins on the date of installation or 30 days from the date of invoice, whichever is sooner.

The system warranty period for products sold outside the U.S.A. and Canada is 12 months from the date of installation or 14 months from the date of shipment, whichever is sooner.

Limit of warranty

Misuse, accident, modification, unsuitable physical or operating environment, improper maintenance, or damage caused by a product for which we are not responsible will void the warranty. Certain components may have separate warranty periods as stated in the product user documentation. Consumables are not covered under warranty.

Items not covered by warranty

We do not warrant uninterrupted or error-free operation of a product. We provide certain non-Thermo Fisher Scientific products on an "as is" basis. Non-Thermo Fisher Scientific manufacturers or suppliers may provide their own warranties to you. A separate software warranty is provided with the software user documentation.

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Purge/desiccation requirement

We recommend that you maintain seal and desiccation and/or purge your instrument at all times. Equipment damage due to failure to maintain seal and desiccation and/or purge is not covered under the warranty. If you have questions about this requirement, please contact us.

Finding PDF documents

PDF files of your instrument documentation are installed on the hard drive of the system computer when the software is installed. To access these PDFs:

1. Click the Start button on the Windows® taskbar.
2. Click All Programs.
3. Click the Thermo Scientific OMNIC™ folder.
4. Click the Documentation folder.
5. Choose the PDF file you want to open.

Ordering parts

To order parts, contact us.

Safety

Safety precautions

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 printed and electronic documentation may result in hazardous radiation exposure. Do not alter or attempt to remove the laser head from its protective housing or attempt to remove the shields that surround the laser head. Exposure to laser energy and high voltage may result.

Warning: Never stare directly into the laser beam or at its bright reflection. Avoid skin contact with the laser beam or its bright reflection. Never tamper with the laser head. Exposure to laser light or high voltage may result.

Warning: When operating your instrument, use only equipment (such as power supplies and lasers) supplied by us. Use of equipment (such as power supplies and lasers) not supplied by us can result in permanent damage to the instrument and may create a safety hazard.

Caution: The instrument may contain an automated stage that is controlled by the software. There are several places on and around the stage where a person or object could be pinched by moving parts. When operating the system, keep hands and fingers away from the stage area except to position the sample or change accessories. Remove your hands from the system when operating the software and when the stage is moving.

WEEE compliance

Many instruments are required to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2002/96/EC. If compliance is required, the instrument is marked with the following symbol:

We have contracted with one or more recycling/disposal companies in each EU Member State, and this product should be disposed of or recycled through them. Further information on our compliance with these directives, the recyclers in your country, and information on our products which may assist the detection of substances subject to the RoHS Directive are available at www.thermo.com/WEEERoHS.

Safety labels

The safety labels on your instrument are shown below. To order new labels, contact us.

Safety and electrical symbols

The following safety and electrical symbols may be used on this product:

Symbol	Description	Indication
	Black graphical symbol inside a yellow triangle with a black triangular band	This is a warning symbol. The graphic in this symbol is used to alert the user to potential hazards.
	Black graphical symbol inside a red circular band with a red diagonal bar	This is a prohibition symbol. The graphic in this symbol is used to alert the user to actions that shall not be taken or shall be stopped.
	White graphical symbol inside a blue circle	This is a mandatory action symbol. It is used to indicate that an action shall be taken to avoid a hazard.
	Black graphical symbol inside a yellow triangle with a black triangular band	This is the general warning sign. Failure to heed the safety precautions could result in personal injury.
	White graphical symbol inside a blue circle	This is the general data loss or property damage symbol and is not related to personal injury. Failure to heed these precautions can result in irreparable damage to property or permanent data loss.

Symbol	Indication
~	Alternating current
⏚	Earth terminal or ground
⏚	Protective conductor terminal
▭	Fuse
I	Power on
O	Power off

Dangerous contaminants

Biohazards or radioactive materials and infectious agents:

Instruments, accessories, components or other associated materials may not be returned to us or other accessory manufacturers if they are contaminated with biohazard or radioactive materials, infectious agents, or any other materials and/or conditions that could constitute a health or injury hazard to employees. Contact us if you have questions about decontamination requirements.

Using liquid nitrogen

Some detectors must be cooled with liquid nitrogen before use. The following symbols remind you to wear protective clothing when using liquid nitrogen.

Warning: Liquid nitrogen is extremely cold and therefore potentially hazardous. When filling the detector dewar, be careful not to contact the liquid nitrogen with your skin. Wear protective gloves and splash-proof goggles and follow standard laboratory safety practices.

Warning: To avoid hazardous equipment damage or contact with liquid nitrogen, make sure any dewar or container you use to hold liquid nitrogen can do so safely without breaking.

Using corrosives and solvents

Caustic or corrosive agents:

Instrument components may be degraded by exposure to caustic or corrosive agents or their vapors. Materials such as hydrochloric acid and hydrofluoric acid are particularly corrosive and may accelerate the degradation of the metallic components in your instrument. Damage can also occur if the concentration level of corrosive gasses in the air is excessively high due to improper sampling techniques.

To maintain the instrument in safe working condition, do not use caustic agents, such as acetone or chlorinated solvents, when cleaning or operating your instrument. Damage to the instrument caused by the use of caustic agents is not covered by the warranty.

Volatile solvents:

You can use your instrument to analyze samples dissolved in solvents, but you must follow the guidelines listed below. These measures will help prolong the life of your instrument and will eliminate the possibility of spectral interference caused by volatile solvent vapors.

- Use sealed sample holders.
- Do not leave exposed solvent in the sample compartment for longer than necessary.
- Do not leave the solvents near the instrument.
- Be sure that your work space is properly ventilated.

Solvents containing halogenated hydrocarbons:

The pyrolysis of chlorinated solvents, perfluorochlorinated solvents, and other solvents by an infrared source or by excessive heating caused by laser absorption may produce hydrochloric acid (HCl), hydrofluoric acid (HF), phosgene ($COCl_2$), or other hazardous compounds.

Warning: Materials such as hydrochloric acid, hydrofluoric acid and phosgene are highly toxic. If you regularly use solvents containing halogenated hydrocarbons, your work area must be properly ventilated, and your system must be purged while the solvents are in use. Damage to your system due to pyrolysis of halogenated hydrocarbons and/or exposure to other corrosive or caustic agents is not covered by the warranty.

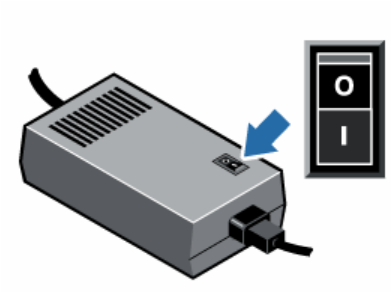
Checking the power supply

Danger: Your instrument is powered by an external power supply that accepts a variety of AC power sources and adjusts automatically to maintain a consistent VDC output. To avoid injury, only a qualified person using the appropriate measuring device should check the line voltage, current and frequency.

Operation

Turning the power on and off

To turn the system power on or off, press the power switch on the power supply.



Aligning your instrument

Your instrument can be aligned automatically using OMNIC Picta. For information about aligning your instrument, please refer to the software help for OMNIC Picta.

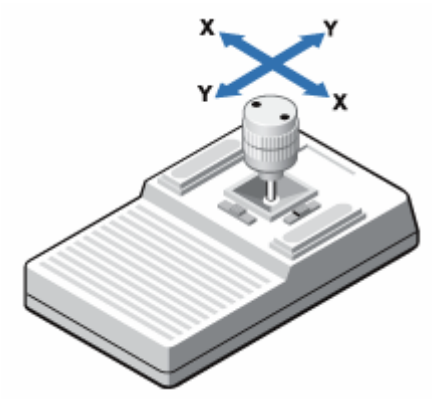
Positioning a manual stage

Note: Use the software to adjust the focus with a manual stage.

Positioning a motorized stage

Caution: The instrument may contain an automated stage that is controlled by the software. There are several places on and around the stage where a person or object could be pinched by moving parts. When operating the system, keep hands and fingers away from the stage area except to position the sample or change accessories. Remove your hands from the system when operating the software and when the stage is moving.

The joystick moves the motorized stage left and right along the X-axis or forward and back along the Y-axis.



Note: You must use OMNIC Picta to adjust the focus. OMNIC Picta also has a virtual joystick you can use to move the motorized stage along the X-axis and Y-axis. For more information about these features, see the OMNIC Picta software help, which you can open by clicking the Help button in OMNIC Picta.

Setting the purge gas controls

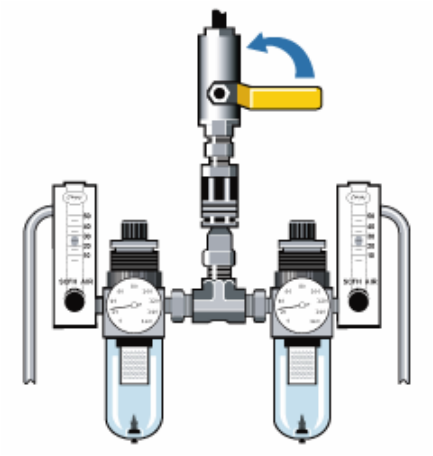
You must connect a source of purge gas (dry air or nitrogen) to purge your instrument of moisture and other environmental contaminants. For best results the purge gas should be dried to a dew point of -70 degrees C (-94 degrees F) or below. Use the following instructions to set the purge gas controls.

Note: Your instrument has two purge lines that will need to be set separately.

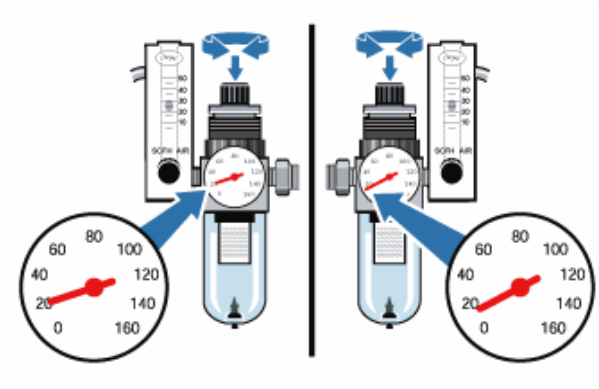
Notice: We recommend that you maintain the seal and desiccate and/or purge your modulator compartment at all times. Equipment damage due to failure to maintain seal and desiccation and/or purge is not covered under the warranty. If you have questions about this requirement, please contact us.

Warning: Never use a flammable gas to purge your instrument. The purge gas must be free of moisture, oil, carbon dioxide and other reactive or infrared-absorbing materials. To prevent laser damage, use only dried air or nitrogen to purge your instrument.

1. Open the shutoff valve.

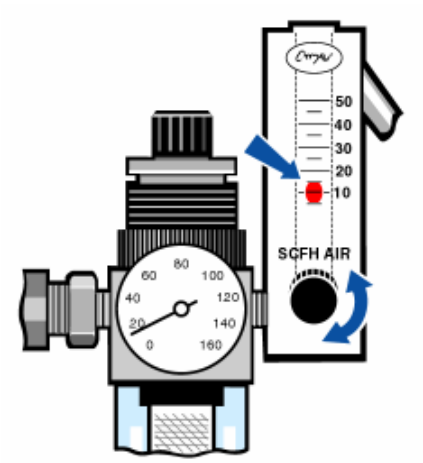


2. Adjust the pressure regulator for the interferometer purge line until the gauge indicates that the pressure is 20 psig. Adjust the pressure regulator for the instrument purge line until the gauge indicates that the pressure is 15 psig.



Notice: Flow rates greater than 10 scfh can cause vibration that can affect data quality. We recommend keeping the flow rates for both purge lines at approximately 10 scfh.

3. Set the flowmeters to 10 scfh.



Cooling a detector

Use this procedure if you have a detector that must be cooled with liquid nitrogen before you can collect data.

Time needed: 40 minutes or less

Tools needed: Protective clothing and eyewear

A small plastic laboratory funnel

A one-liter, metal vacuum bottle

Liquid nitrogen

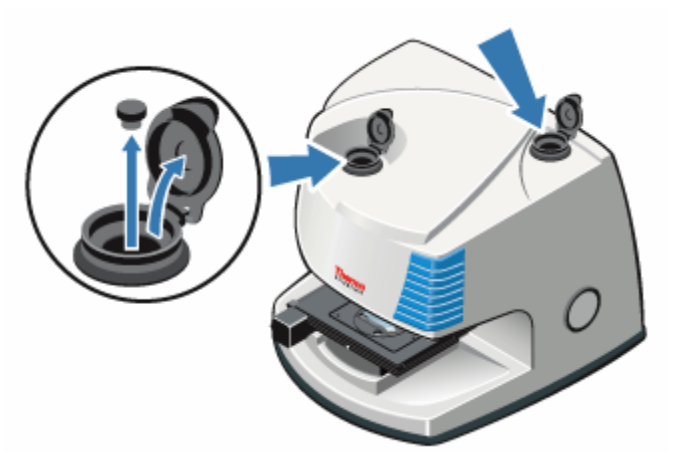
Note: Your instrument may have one or two detector dewars. The procedure below shows an instrument with two dewars.

Note: A detector dewar should maintain its insulating vacuum for several years. If the vacuum leaks, the insulation will lose effectiveness.

Note: Your detector, when cooled according to the following procedure, should remain cool for approximately 18 hours.

Warning: Liquid nitrogen is extremely cold and can be hazardous. When you use liquid nitrogen, always follow standard laboratory safety practices, and make sure your dewar is made to use with liquid nitrogen. Wear protective clothing and eyewear, and avoid letting liquid nitrogen come into contact with your skin.

1. Open the detector dewar cover and remove the plastic stopper from the dewar.



Warning: Make sure you pour the liquid nitrogen *slowly* when you fill the vacuum bottle or the detector dewar. Pouring too quickly can cause liquid nitrogen to spray out. Wear protective clothing and eyewear, and follow standard laboratory safety practices to prevent injury.

2. Fill the metal vacuum bottle with liquid nitrogen.

Notice: Do not spill liquid nitrogen on or near the detector window. If the window's O-ring seal is cooled very rapidly, the dewar may lose its vacuum and expose the detector element to damaging atmospheric pressure.

3. Insert the funnel into the detector dewar, and pour the liquid nitrogen *slowly* into the funnel. (A small amount of liquid nitrogen typically spills out of the funnel. This will not harm your instrument.)

   Fill the funnel and then let it drain completely two or three times. Wait until the vapor plume disappears and then repeat until the dewar is filled.

4. Remove the funnel.

5. Wait until the vapor plume disappears, and then replace the plastic stopper and close the dewar cover.

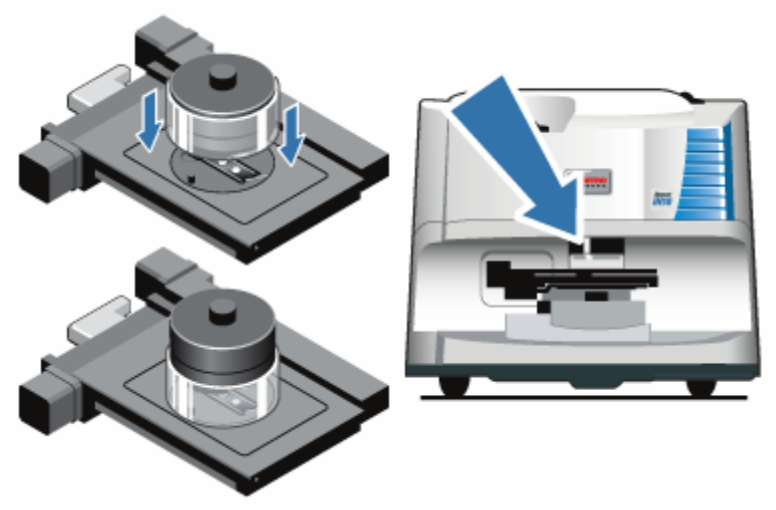
6. Wait 20 minutes, and then repeat the preceding steps to make sure the dewar is completely filled.

7. If your instrument has two dewars, you can repeat this procedure (if needed) for the second dewar.

Installing a slide-on ATR attachment

Note: For information about collecting data with a slide-on ATR attachment installed, please refer to the software help system.

Using the purge collar ring



Collecting data with the instrument

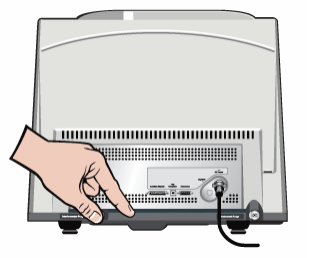
You must use OMNIC Picta to collect data. OMNIC Picta can be started by using the OMNIC Picta shortcut on your system desktop. For additional information, please see the OMNIC Picta help, which you can open with the Help button in OMNIC Picta.

Service

Static electricity precautions

Critical components in your instrument can be permanently damaged by static electricity. To help prevent such damage, follow these recommendations:

Notice: Before you disconnect the power supply, always discharge any static electricity you may have accumulated by touching the metal base of your instrument.



Notice: Do not touch any printed circuit board in your instrument (such as the circuit board on the detector).

Notice: Do not remove replacement components from their protective packaging until you are ready to install that component in your instrument.

Installing a purge kit

Purging your instrument protects the internal components from moisture and other environmental contaminants by maintaining an internal atmosphere of dry air or nitrogen. If your instrument is not already equipped to purge, you must install a purge kit. To install a purge kit, use the following procedure.

Notice: We recommend that you maintain the seal and desiccate and/or purge your modulator compartment at all times. Equipment damage due to failure to maintain seal and desiccation and/or purge is not covered under the warranty. If you have questions about this requirement, please contact us.

Time needed: 30 minutes or less

Tools needed: A 3/4 inch open-ended wrench

An 11/16 inch open-ended wrench

A shutoff valve (with a 1/4 inch male or 3/8 inch female fitting)

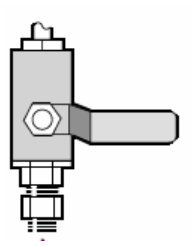
Pipe tape

Note: For best results the purge gas should be dried to a dew point of -70 degrees C (-94 degrees F) or below.

Note: There are two purge connectors on your instrument (one for the instrument and one for the interferometer), so you will have to install two purge lines, which are included with your instrument.

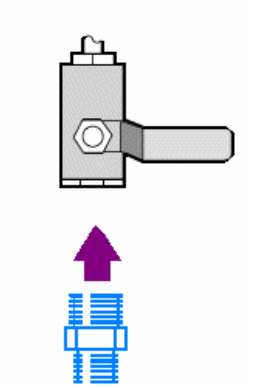
Warning: Never use a flammable gas to purge your instrument. The purge gas must be free of moisture, oil, carbon dioxide and other reactive or infrared-absorbing materials. To prevent laser damage, use only dried air or nitrogen to purge your instrument.

1. Install a shutoff valve and either a 1/4 inch male fitting or a 3/8 inch female fitting on the purge gas source. (Choose a shutoff valve and fittings that are appropriate for the purge gas source.)

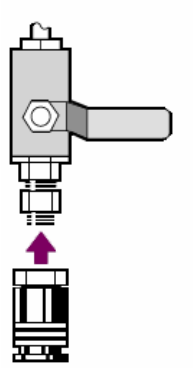


2. If you used a 1/4 inch male fitting, proceed to the next step.

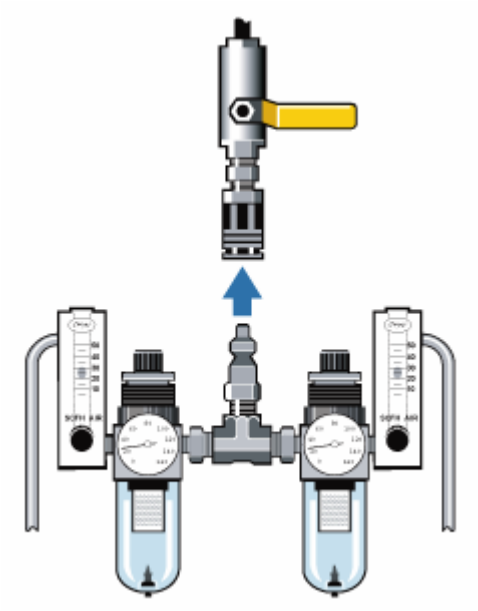
   If you used a 3/8 inch female fitting on the purge gas source, install the 3/8 inch to 1/4 inch reducing nipple that was included with your purge kit. Wrap the reducing nipple with Teflon pipe tape before you install it, and use an 11/16 inch open-ended wrench to tighten the connection.



3. Wrap the reducing nipple or the 1/4 inch male fitting with Teflon pipe tape, and then install the pressure coupling. Use a 3/4 inch open-ended wrench to tighten the connection.

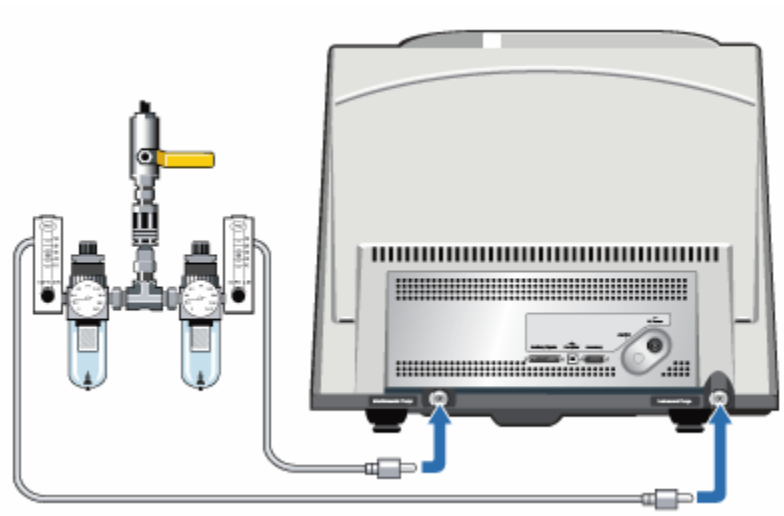


4. Assemble the two purge filters, pressure regulators, and flowmeters, and then snap the assembly into the pressure coupling.



Note: Make sure you set the purge gas controls appropriately for the Interferometer purge line and the Instrument purge line.

5. Connect one purge line to the Interferometer purge connector and the other line to Instrument purge connector, and then set the purge gas controls.



Replacing the power supply

Time needed: 5 minutes or less

Tools needed: None

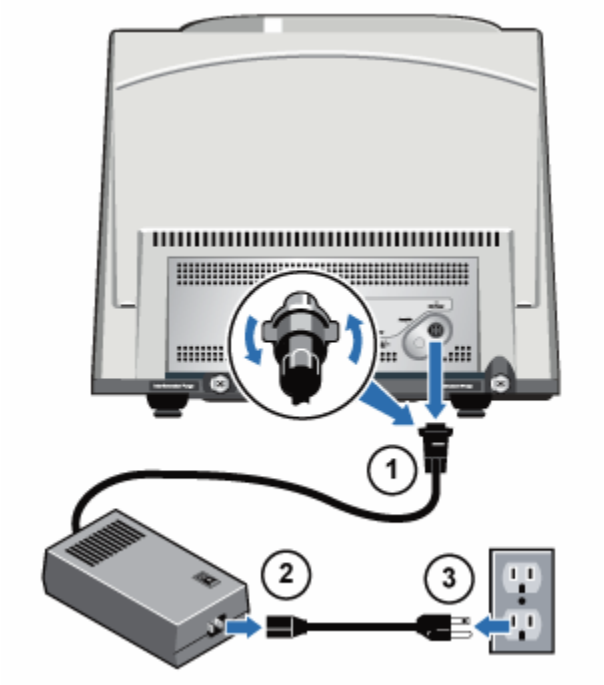
Note: To order parts, contact us.

Warning: To avoid a shock hazard, do not attempt to remove the cover of the power supply.

Warning: Before you replace the power supply, always make sure you have turned off your instrument and disconnected the power supply from the wall outlet or power strip.

1. Turn off your instrument.

2. Disconnect the old power supply.



Note: Turn the locking ring on the power supply connector until you feel it snap into place.

3. Connect the new power supply.

   Simply reverse the order that you disconnected the power cords in the previous step.

4. Turn on your instrument.

   The Power indicator on the main cover should light and your instrument should function normally when you turn on the power. If your instrument does not function normally, turn off the power and check the cable connections between the power supply, the instrument, and the wall outlet or power strip. If the connectors are seated properly and your instrument still does not function normally, contact us for assistance.

Cleaning your instrument

If the outside of your instrument needs cleaning, turn your instrument off and disconnect the power supply. When this is done, you can use a soft cloth that is damp (not wet) and a mild soap to clean the outside of your instrument.

Warning: To avoid a shock hazard, do not allow liquid to run into the power supply or the back of the instrument.

Notice: Do not use harsh detergents, solvents, chemicals or abrasives; these can damage the finish. Do not allow liquid to contact any windows, such as those that may be in the sample compartment.

Notice: Mirror surfaces and windows can be scratched and ruined very easily. Do not touch or attempt to clean them. Dust will not affect the signal, but fingerprints can degrade the performance of your instrument and permanently damage mirrors or windows. If you wish to remove dust from a mirror or window, blow it off with a gentle stream of clean, dry air or nitrogen. *Never* allow any liquid to come into contact with a window or optical component in the instrument.

Maintaining detector dewars

If your instrument has a cooled detector, it will include a detector dewar. With proper care, a detector dewar should maintain its insulating vacuum for several years. If the vacuum leaks, the insulation will lose effectiveness and the following symptoms may occur:

- Liquid nitrogen boils off much faster than usual.
- Water and atmospheric contaminants condensing on the detector window show up in spectra as unwanted peaks.

Notice: If your instrument shows any of these symptoms, the detector dewar may have a vacuum leak. Contact us immediately for assistance. Leaving internal detector elements exposed to atmospheric pressure can permanently damage them.

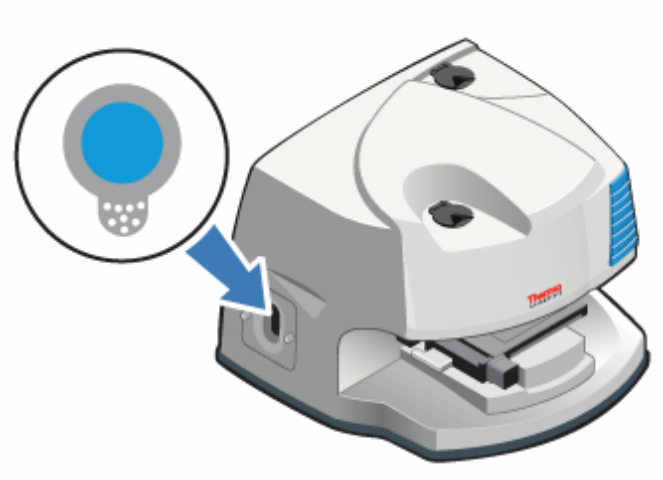
Note: You can restore the vacuum in a detector dewar if you have the proper equipment. The vacuum must be pumped to approximately .000001 torr. A special evacuation valve for pumping out dewars is available from us. To order a dewar evacuation valve, contact us.

Checking the humidity indicator

The optical components of your instrument are protected by a desiccant canister that absorbs moisture. As long as the humidity indicator on the side of your instrument's main cover is blue, the desiccant canister is not saturated and does not need to be replaced. When the desiccant canister becomes saturated, the humidity indicator turns pink or white. This means you must replace the desiccant cartridge, and you may need to replace the humidity indicator as well.

Notice: You should check the humidity indicator every time you use your instrument. If you don't use your instrument frequently, make sure you check the indicator at least once a month.

Notice: We recommend that you maintain desiccation and/or purge your modulator compartment at all times. Equipment damage due to failure to maintain desiccation and/or purge is not covered under the warranty. If you have questions about this requirement, please contact us.



Replacing the humidity indicator

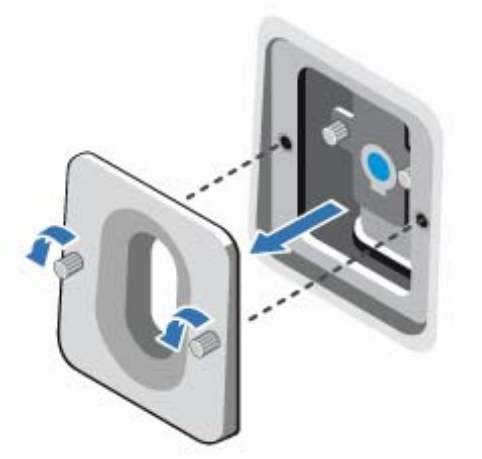
The humidity indicator must be replaced when it turns white or does not return to blue after the desiccant has been replaced.

Time needed: Less than 1 minute

Tools needed: Gloves, finger cots, or laboratory tissue

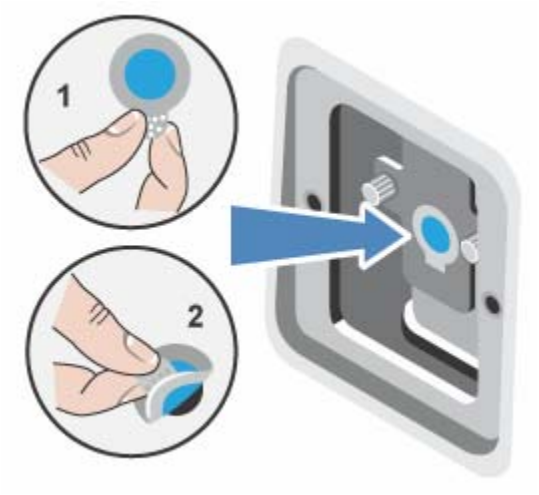
Note: To order parts, contact us.

1. Loosen the thumbscrews on the cover of the iN10 desiccant compartment, and then remove the cover.



2. Remove the old humidity indicator.

   Save the old indicator for reference when you install the new indicator.

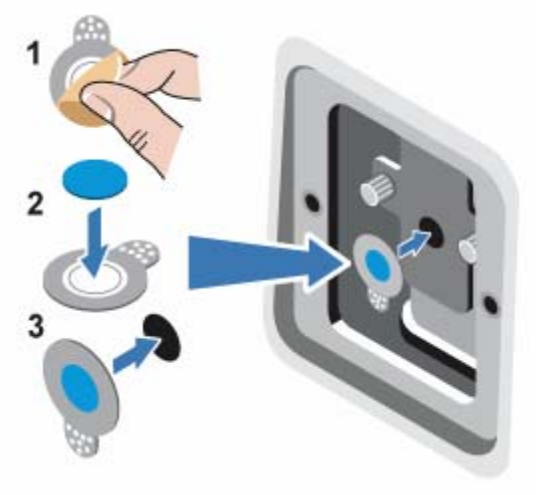


Notice: Always wear lab gloves or finger cots, or use laboratory tissue, when handling the humidity indicator. Oil or moisture from skin can discolor the indicator.

Notice: Make sure that the indicator is centered in the holder and that there are no gaps.

3. Peel the backing off of the indicator holder, and then, as shown below, press the round, blue indicator onto the adhesive on the holder.

   Place the new indicator and holder over the indicator opening, and press down gently to make sure it is sealed.



4. Replace the desiccant compartment cover you removed in step 1.

Replacing the desiccant

The optical components of your instrument are protected by a desiccant canister that absorbs moisture. As long as the humidity indicator on your instrument's main cover is blue, the desiccant canister is not saturated and does not need to be replaced. When the desiccant canister becomes saturated, the humidity indicator turns pink or white. This means you must replace the desiccant cartridge.

Notice: We recommend that you maintain the seal and desiccate and/or purge your modulator compartment at all times. Equipment damage due to failure to maintain seal and desiccation and/or purge is not covered under the warranty. If you have questions about this requirement, please contact us.

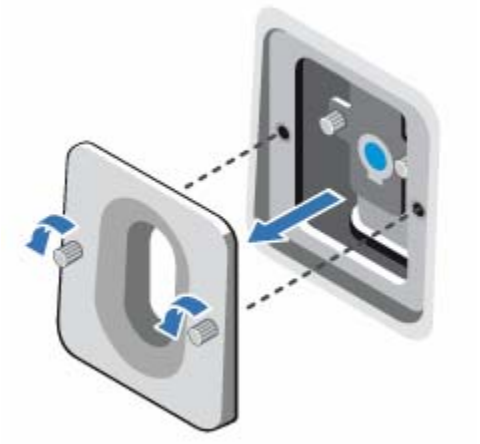
Time needed: 3 minutes or less

Tools needed: None

Note: To order parts, contact us.

Notice: Make sure nothing falls into the instrument while the desiccant cover is removed.

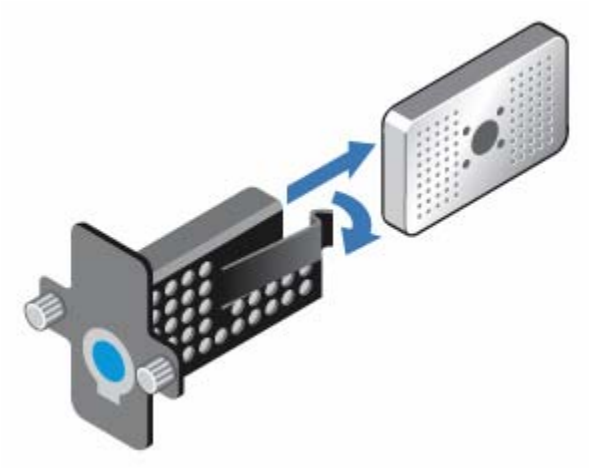
1. Loosen the thumbscrews on the cover of the iN10 desiccant compartment, and then remove the cover.



2. Loosen the thumbscrews on the desiccant holder, and then slide the holder out of the desiccant compartment.

Caution: The contents of the desiccant canister could be harmful if ingested. If you discard the saturated desiccant canister, make sure it is properly disposed of.

3. Take the saturated desiccant canister out of the holder and install the new desiccant canister.



4. Slide the desiccant holder back into the desiccant compartment, and then tighten the thumbscrews.

5. Replace the desiccant compartment cover you removed in step 1.

Notice: If the humidity indicator has turned white or does not return to blue after the desiccant has been replaced, you must replace the humidity indicator.

Regenerating the desiccant

When the desiccant canister must be replaced, you can contact us to order a new desiccant canister, or you can dry and reuse the saturated canister according to the following instructions.

Time needed: 3 hours

Tools needed: Vented oven

Insulated cloth or hot pad

Note: If you need to replace the humidity indicator, you must order a new desiccant canister. A new humidity indicator is included with the new desiccant canister.

Notice: If you are going to dry and reuse the saturated desiccant canister, make sure you have a fresh desiccant canister you can place in your instrument while the saturated canister dries.

Notice: Do not leave the canister in the oven for more than three hours and do not exceed a temperature of 150 ºC (about 300 ºF).

Notice: Make sure the insulated cloth or hot pad you use to handle the regenerated desiccant canister is not contaminated with substances that could be absorbed by the desiccant and subsequently released into your instrument.

1. Place the saturated desiccant canister in a vented oven at 150 ºC (about 300 ºF) for three hours.

Caution: To avoid a burn hazard, use an insulated cloth or hot pad to handle the heated desiccant canister, and always wait until the canister has cooled to room temperature before you reinstall it in your instrument.

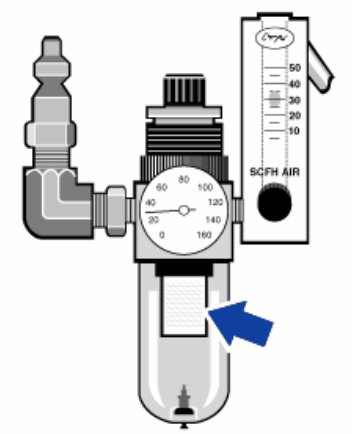
2. Use an insulated cloth or hot pad to remove the desiccant canister from the oven.

   Allow the canister to cool on the hot pad or cloth, and do not attempt to handle or install it until it has cooled to room temperature. As soon as the canister reaches room temperature, however, you must either install it in your instrument or seal it in an airtight container or bag. Otherwise, it will absorb moisture from the air in the room and quickly become saturated again.

Checking and changing the purge gas filter

Note: Your instrument uses two purge lines, so there are two purge assemblies with filters for your instrument. The following procedure shows only one purge assembly, but there is no difference in the way you check and change the purge filter when there are two assemblies.

You should check the purge filters occasionally to make sure they are clean and dry. (The drawing below shows where the purge filter is located.)



If the filter is green, it does not need to be replaced. If it is yellow, or otherwise discolored, replace it according to the following procedure.

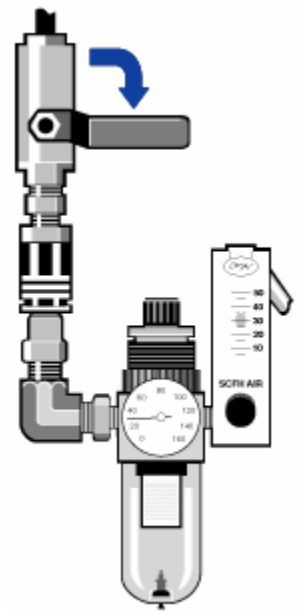
Notice: We recommend that you maintain seal and desiccation and/or purge your instrument at all times. Equipment damage due to failure to maintain seal and desiccation and/or purge is not covered under the warranty. If you have questions about this requirement, please contact us.

Time needed: 5 minutes or less

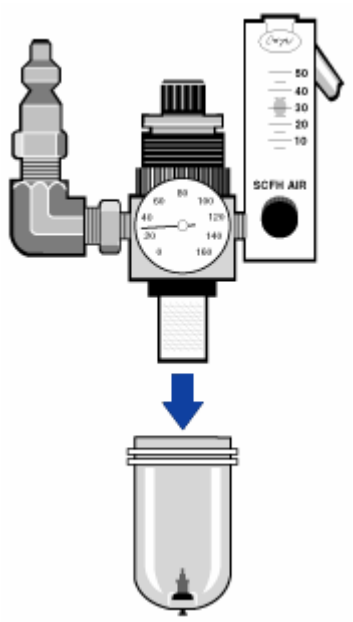
Tools needed: None

Note: To order parts, contact us.

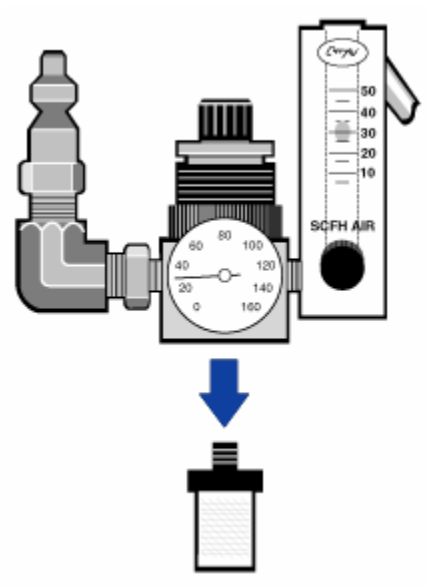
1. Turn off the purge gas at the main valve. Do not turn down the flowmeter or the pressure regulator.



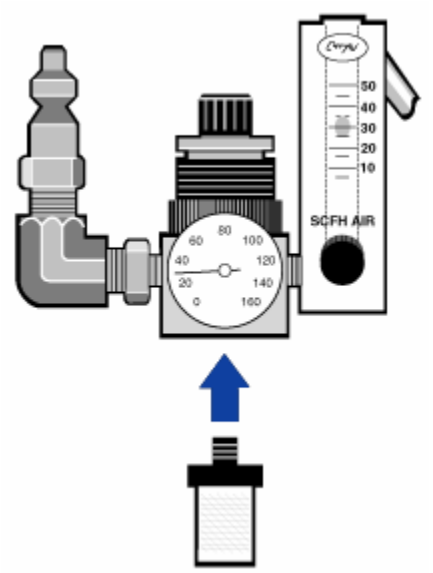
2. Remove the plastic bowl that houses the filter. (You can unscrew the bowl by hand.)



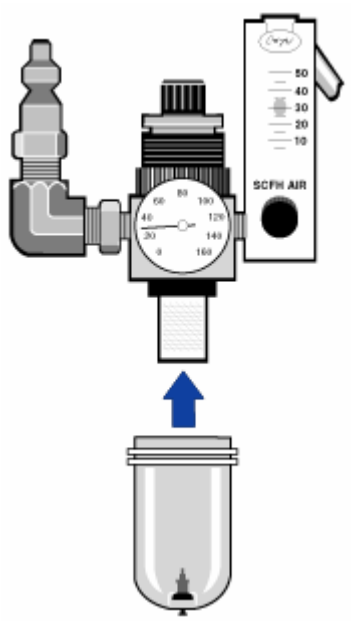
3. Remove the filter. (You can unscrew the filter by hand.)



4. Install the new filter.



5. Reinstall the plastic bowl.



6. Turn on the purge flow to your instrument.

Note: You may notice increased levels of water and carbon dioxide in spectra collected immediately after you have had the purge gas turned off. If this interferes with your data, wait 15 to 60 minutes until purge is completely re-established.

Index