

# Nicolet iS5N FT-NIR Spectrometer - Quick Start Guide

This guide demonstrates how to install the Thermo Scientific™ Nicolet™ iS™5N Fourier transform near-infrared (FT-NIR) spectrometer and gives an overview of common tasks that can be performed with it.

**Note** Have all system utilities installed and tested before you proceed. For more information, refer to the *Site and Safety Information* guide that came with the spectrometer.

## Unpack the System

**WAIT 24 HOURS before you open the shipping bag!**

To prevent condensation, which can damage internal optics, leave the spectrometer in its plastic shipping bag for 24 hours after delivery to allow it to slowly adjust to room temperature. *Save the packing materials for storing or transporting the instrument.*

### ❖ To unpack the spectrometer

1. Open the shipping box and remove the top tray.
2. Lift the shipping sleeve straight up and then spread your hands apart to separate the foam blocks.



3. Remove the spectrometer from the sleeve (use two hands; spectrometer weighs 10 kg (22 lbs)).
4. When the spectrometer has been at room temperature for at least 24 hours, remove the spectrometer from its plastic shipping bag.
5. Open the iD1 accessory cover and remove and discard the desiccant packs.
6. Verify the order is complete (compare against packing list).

**NOTICE** Read the safety guide that came with this instrument before operating the instrument.

## Set Up the System

### ❖ To set up the system

1. Set up the computer and plug in the power cord.
2. Turn on the computer and log on as an administrator.
3. If necessary, install the software and device driver from the software media. Follow these steps to install software:

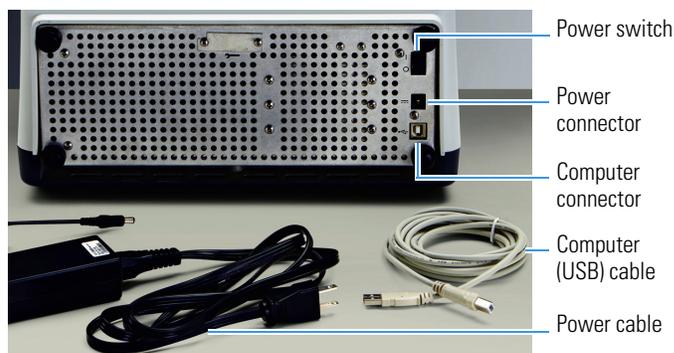


If the computer was purchased with the spectrometer, the software and driver are already installed

- a. Insert the OMNIC™ program disc into disc drive and run install program
  - b. Click **Install** and follow the prompts to install OMNIC software, along with the iS5N device driver and Help system
4. Set up the spectrometer and verify the device (follow these steps).



**CAUTION** Before you connect the power cord to the spectrometer, check the *Site and Safety Information* guide in the documentation set for electrical and other system requirements.



- a. Connect power supply to Power port on spectrometer back panel and to a properly grounded AC power source
- b. Press power switch on spectrometer back panel and wait until power indicator stops flashing (about 2 minutes)



- c. Connect provided USB cable to Computer port on spectrometer back panel and to USB 2.0 port on computer (typically on back panel)

If “Found device” or similar message appears, proceed to next step. (If computer does not recognize spectrometer, restart computer. If that doesn’t fix the problem, use the information at the back of this document to contact us.)

**WAIT 4 to 6 HOURS for the spectrometer to warm up!**

## Verify System Performance

The system automatically runs a performance verification (PV) test after installation to verify the spectrometer is operating properly. You will need the polystyrene reference card and C screen from the accessory kit that came your iS5N spectrometer. The PV test takes about 6 minutes to complete.

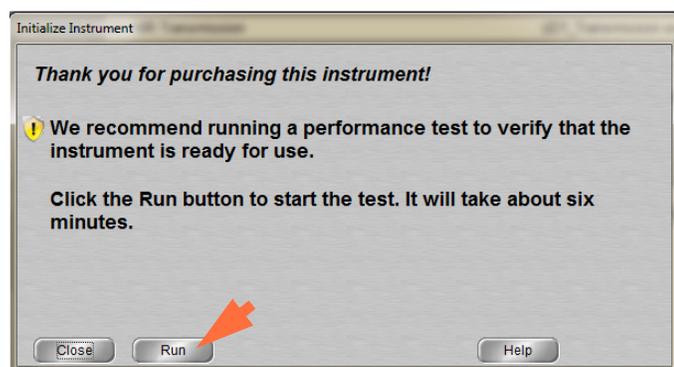
### ❖ To verify system performance

1. Start OMNIC software.



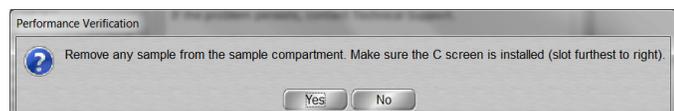
**Double-click** the OMNIC icon on the computer desktop

The OMNIC main window is displayed, along with a welcome screen:



2. Choose **Run** (see image above) to start the PV test.

Another message is displayed:

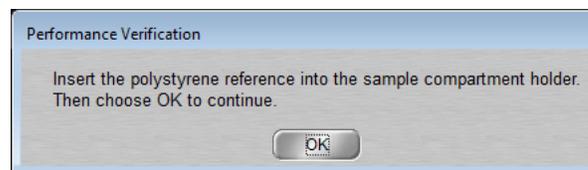


3. Open the iD1 accessory cover and insert the C screen from the iS5N accessory kit into the card slot furthest to the right.

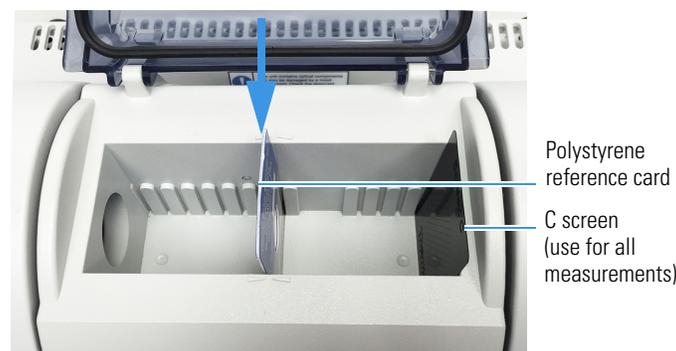


4. Close the cover and choose **Yes** to continue.

After several minutes, another message is displayed:



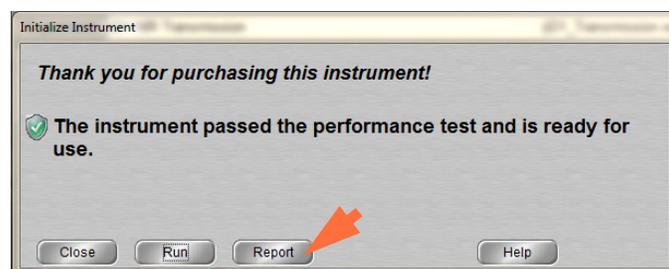
5. Open the iD1 accessory cover and insert the polystyrene reference card from the iS5N accessory kit into the center card slot (**leave C Screen installed**).



**Note** The iS5N accessory kit includes one polystyrene reference card and four attenuation screens labeled A through D. Use only the supplied polystyrene reference and C screen to verify system performance.

6. Close the iD1 accessory cover and choose **OK** to measure the polystyrene reference sample.

When all verification steps are completed, a message displays the PV test result:



The green check mark shown above indicates the spectrometer passed the PV test and is ready for use.

Detailed PV test results are saved automatically. To view or print them, choose **Report** (see the previous image).

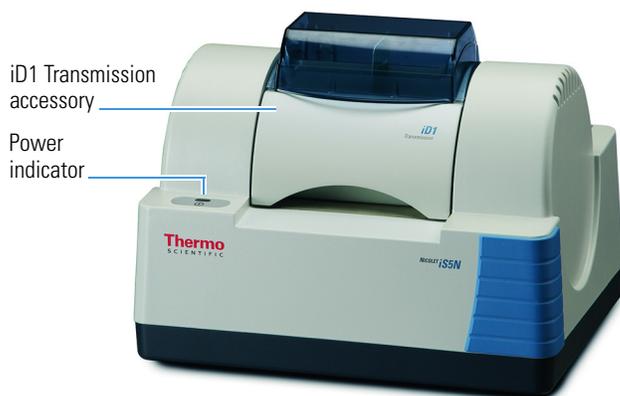
7. When you are finished viewing the results, choose **Close**.

**Note** If a red X appears instead of a green check mark, in OMNIC software choose **Help > Spectrometer Help Topics** and search for “PV Test Failed” in the Troubleshooting section, or use the information at the end of this document to contact us.

**The installation is complete.** The remaining information in this document is basic training for first-time users.

## What are the Features?

The iS5N spectrometer has these main features.



- **Source.** User replaceable white light source allows data collection in the near-infrared (NIR) light range (12,000–4,000  $\text{cm}^{-1}$ ).
- **Beamsplitter.** Calcium Fluoride ( $\text{CaF}_2$ ) beamsplitter for NIR measurements.
- **Detector.** Highly sensitive indium-gallium-arsenide (InGaAs) photodiode detector for NIR measurements.
- **Sample compartment windows.** Quartz windows protect the spectrometer's internal components from environmental humidity and other chemical vapors.
- **Humidity indicators.** The spectrometer is tightly sealed and its optical components are protected by desiccant that absorbs water vapor. When the spectrometer is powered on, an internal sensor monitors the humidity level inside the instrument and alerts you when the humidity is high. A paper humidity indicator lets you know when to change the desiccant when the instrument is powered off. The instrument can also be purged with dry air or nitrogen (no desiccant required for purged instrument).

**NOTICE** Maintain seal and desiccation and/or purge the spectrometer at all times. Optical damage caused by failure to maintain seal and desiccation or to purge the instrument is not covered under the warranty.

- **Integrated Accessories.**
  - **iD1 Transmission.** Required to run PV for the iS5N spectrometer. Can also be used to collect data from samples held in any of the typical transmission cells or holders including:
    - Film holders
    - Standard liquid cells
    - Pellet holders
    - Gas cells up to 10 cm
  - **iD1H Transmission.** Used for collecting data from liquids in cuvettes (40 °C heater included).

For more information about the iS5N spectrometer, see Spectrometer Help Topics in the Help menu in OMNIC software.

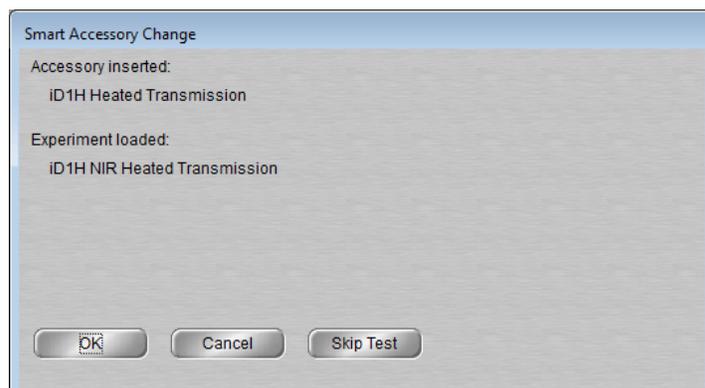
## Remove and Install an Accessory

To remove an integrated accessory (iD1 for example), grasp it by the top and bottom (not the sides) and lift it up. When not using an accessory, store it in a dust-free environment such as a cabinet or box.

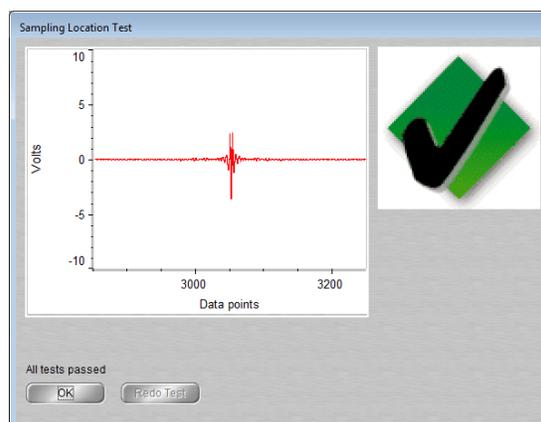


To install an accessory, such as the iD1H shown above, hold it by the top and bottom and lower it onto the spectrometer.

After you install an integrated accessory, the system responds with the message “Accessory inserted” along with the name of the accessory and its associated experiment file, which configure the spectrometer to run with that accessory.



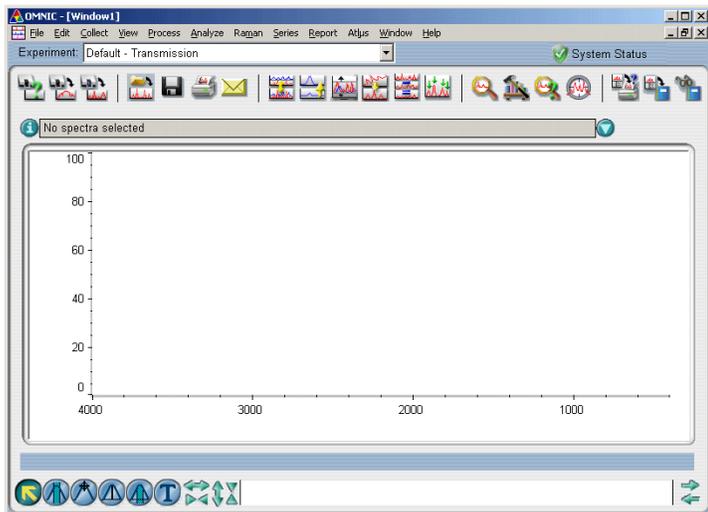
If multiple experiments are available, select an experiment and choose OK. Another message shows the energy throughput and the status.



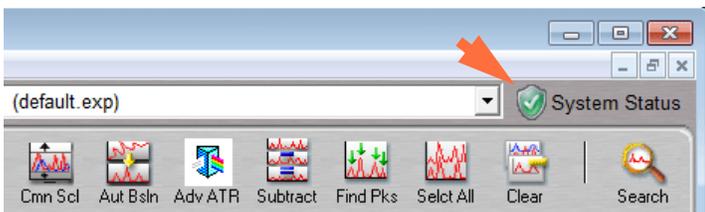
Choose OK to continue.

## About OMNIC Software

Use OMNIC software to operate the system. The main window provides everything you need to operate the spectrometer, measure samples and run diagnostics.

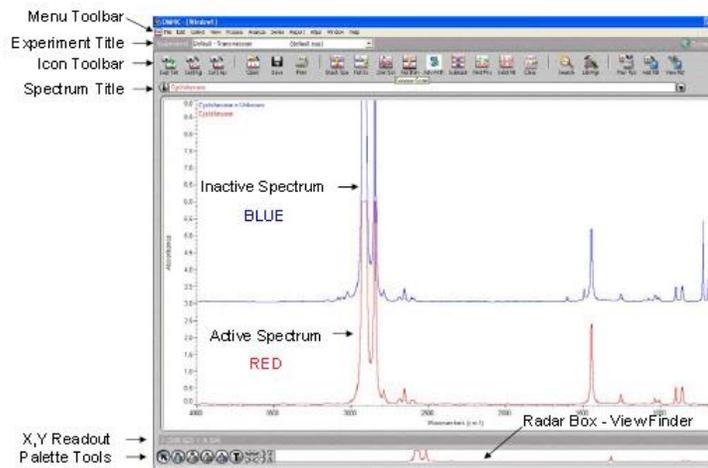


The **System Status icon** shows when the spectrometer is operating properly and ready for use. Click the icon for more information.



OMNIC software functions like many other Windows®-based applications. Tasks are grouped under drop down menus and task shortcuts are located on the icon bar. For a description of an icon's function, hover over it with the mouse cursor.

The selected spectrum is set to red by default. Other spectra are shown in other colors.



This spectrometer ships with OMNIC Light, which is a basic version of OMNIC. To access full OMNIC, choose **Edit > Options > OMNIC** and select Advanced OMNIC. For detailed information and tutorials for OMNIC software, check out its Help menu.

## Safety and Operating Precautions



**WARNING** Avoid fire and explosion. If using volatile solvents, provide an active venting system that is free of spark and other ignition sources and that prevents flammable vapors from collecting in the atmosphere surrounding the instrument.

To prolong the life of your spectrometer, follow these precautions:

- Do not use chlorinated solvents or materials that may produce HCl or HF vapors with or near the spectrometer
- Do not place containers of liquids on top of the spectrometer or near the power supply
- Do not block the air vents at the back of the spectrometer
- Do not place anything on the power supply
- Do not allow liquids to come into contact with sample compartment window
- If you are moving the spectrometer to a new location, protect it from extreme changes in temperature and humidity. Such changes may cause condensation, which can permanently damage the optical components.

## Sampling Tips

- **Attenuation screens.** When collecting NIR data for most sample types, an attenuation screen is needed to decrease the light from the source in order to prevent detector saturation. The kit that comes with the spectrometer contains four screens for this purpose. The C screen is recommended for most sample types. Use the same attenuation screen for background and sample measurements. For more information, open Spectrometer Help Topics from the OMNIC Help menu and find "Installing Attenuation Screens."
- **Background measurements.** A background measurement is needed before the first sample measurement. Measure the background with an attenuation screen (C screen is recommended) and no sample (you can leave your sample holder or accessory installed). The background spectrum shows the response of the system when no sample is present. A new background is recommended at user-defined intervals when the spectrometer is used continuously. The software can be configured to display a message when a new background is needed. We recommend that the time between background collections does not exceed 2 hours.
- **Sample measurements.** Collect the sample data using the same attenuation screen that was used for the background measurement. If you change to a different screen for the sample measurement, collect a new background with the new screen. The sample data is ratioed with the background data, which leaves only the spectral information from the sample.

- **Spectrometer status.** When you are finished running samples, leave the spectrometer powered on to maintain temperature equilibrium. To preserve the life of the source, you can turn it off manually in OMNIC software by choosing **Collect (menu) > Experiment Setup > Bench** and setting **Source** to **Off**.

Parameter	Value
Sample compartment	Main
Detector	InGaAs
Beamsplitter	CaF2
Source	Off

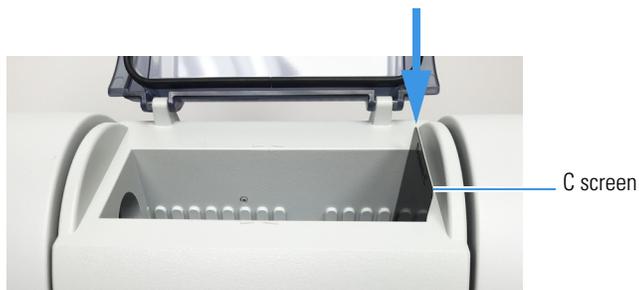
If you turn off the source, wait 5 minutes after you turn it back on before taking a sample measurement. (The Source setting resets to “White Light” automatically when you restart OMNIC.)

## Measure a Transmission Sample

This section explains how to run a basic transmission sample using the iD1 accessory and the polystyrene reference sample provided with the spectrometer.

### ❖ To measure a transmission sample

1. Install the iD1 transmission accessory if it is not already installed and select an experiment (see the previous section).
2. Open the iD1 cover and remove any sample.
3. Insert the C screen from the iS5N accessory kit into the card slot furthest to the right.

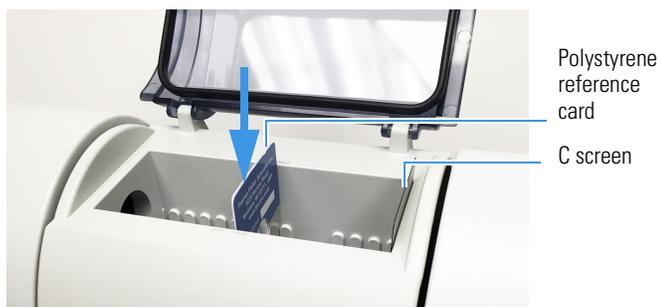


4. From the OMNIC main window, choose **Collect (menu) > Collect Background**.
5. Choose **OK** to start the background measurement.

When the background collection is completed, choose **Yes** to add the background spectrum to the OMNIC window.

6. Insert the polystyrene reference card from the iS5N accessory kit into the center card slot.

The slot is marked with arrows to indicate the location of the light beam's focus point.

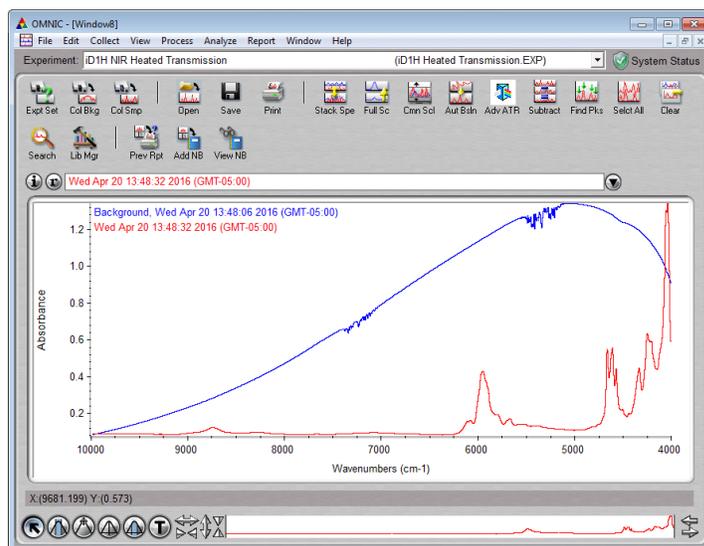


7. Close the cover.
8. From the OMNIC main window, choose **Collect (menu) > Collect Sample**.
9. Enter a title for the sample spectrum and choose **OK**.



10. Choose **OK** again to start the sample measurement.

When the sample collection is completed, choose **Yes** to add the spectrum to the OMNIC window. The background spectrum (blue) and sample spectrum (red) should look similar to the following:



To save the spectrum, from the OMNIC main window, choose **File (menu) > Save As** and enter a file name. Save it in the default directory (OMNIC > Spectra) or select another directory for your archived data.

## Performance Verification (PV)

We recommend that the Performance Verification test is run once a month. Performance Verification (PV) aligns the spectrometer, verifies the laser frequency, checks the energy throughput and uses a polystyrene reference card to confirm wavenumber accuracy.

You will need the polystyrene reference card and C screen from the accessory kit that came with your iS5N spectrometer. The PV test takes about 6 minutes to complete.

**Before you begin**, make sure the spectrometer has been powered on for at least 15 minutes (one to six hours for best results).

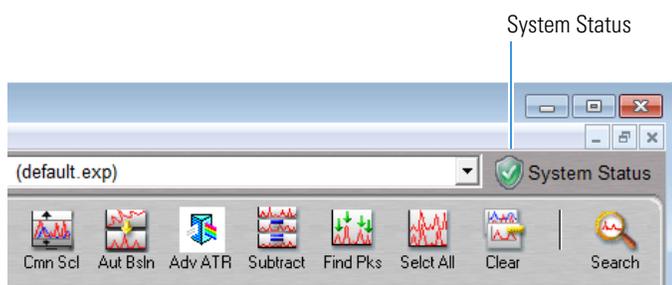
### ❖ To run the performance verification test

1. Make sure the iD1 transmission accessory is installed in the spectrometer sample compartment.
2. Insert the C screen from the iS5N accessory kit into the card slot furthest to the right inside the iD1 sample compartment.

(There should not be a sample in the iD1 sample compartment.)

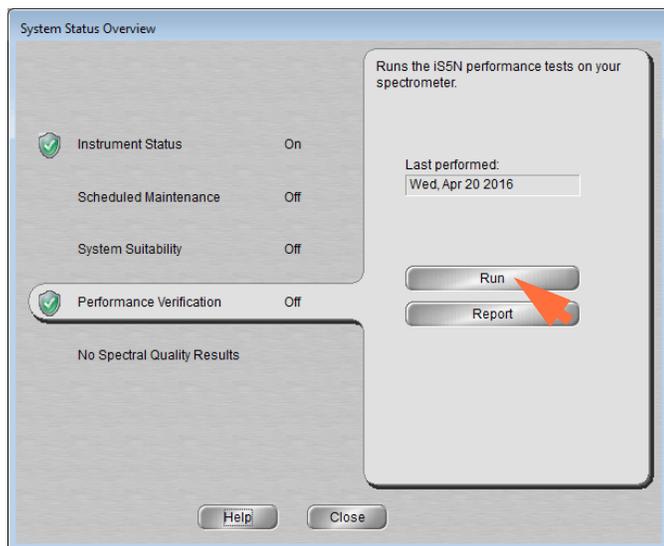


3. Click the System Status shield in the OMNIC main window.

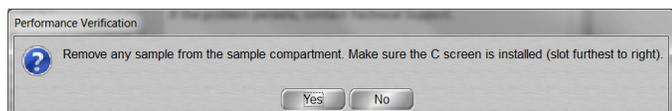


The System Status Overview window is displayed.

4. Choose **Performance Verification** and then choose **Run**.



A message is displayed:

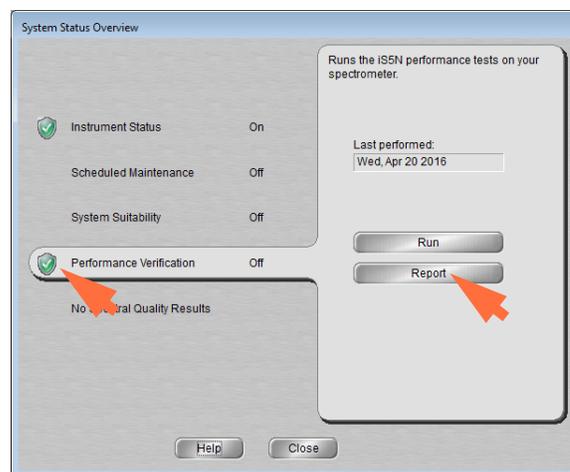


5. Choose **OK** to continue.

The software performs an alignment to maximize the laser signal and then verifies the laser frequency.

6. When those are completed, follow the prompt to insert the polystyrene reference card into the center card slot, close the cover and choose **OK** to continue.

After the polystyrene measurement is completed, the overall PV test result is displayed in the System Status Overview window.



The possible overall PV test results are explained below:



**Green Shield** indicates that all subsystems are operating within specification and all performance tests passed.



**Yellow Shield** indicates that the system identified a minor problem, which should be viewed to determine the possible effects on the quality of the data collected.



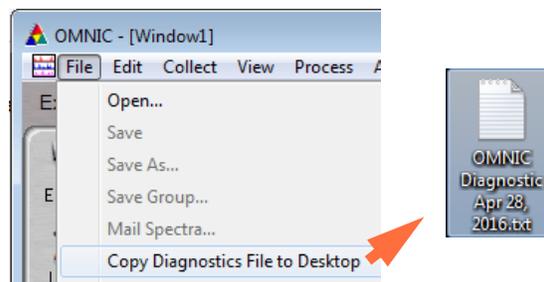
**Red Shield** warns that the system is out of specification or a sub-system failed. It can also indicate that the last performance test did not meet specifications.

Detailed PV test results are saved automatically. To view or print them, choose **Report** (see the previous image). When you are finished viewing the results, choose **Close**.

**Note** If the yellow shield or red X appears instead of a green check mark, in OMNIC software choose **Help > Spectrometer Help Topics** and search for “PV Test Failed” in the Troubleshooting section, or use the information at the end of this document to contact us.

## Diagnostics Log File

OMNIC software continuously monitors and records critical system parameters over time to a log file. To save a copy of your log file to your computer desktop, from the OMNIC main window, choose **File (menu) > Copy Diagnostics File to Desktop**.



You will see an icon similar to the one shown above. This file can be e-mailed as an attachment.

## Advanced Diagnostics

To see the advanced diagnostics options, from the OMNIC main window, choose **Collect** (menu) > **Advanced Diagnostics**.

Advanced Diagnostics are useful for troubleshooting problems with the spectrometer. For more information, see Advanced Diagnostics in OMNIC Help Topics (available from the OMNIC Help menu) or search for Troubleshooting in Spectrometer Help Topics.

## Before You Call for Technical Support

To help determine the problem, from the OMNIC main window, choose **Help** (menu) > **Spectrometer Help Topics** and open the Troubleshooting group from the contents tab. The following subtopics are available:

### Hardware Problems

- PV Test Failed
- Spectral Peaks Appear Shifted in Wavenumber Axis
- Fails Laser Frequency Verification
- Power Indicator Does Not Light After Power Up
- Power Indicator Blinks Continuously
- System Scans Normally but Signal Intensity Is Low
- Spectra Have Noise Spikes
- Spectral Baseline Is Not Stable
- Alignment Fails
- Data Cannot Be Collected (or Other Software Problems)

### Error Messages

- Computer Cannot Communicate With Instrument
- Instrument Temperature Is Out of Specification
- OMNIC Cannot Communicate With the Detector
- Instrument Is Not Scanning
- Laser Voltage Is Out of Specification
- Source Voltage Is Out of Specification
- Power Supply Voltages Are Out of Tolerance
- Humidity is Too High
- Laser Temperature is Out of Specification
- Interferometer Temperature is Out of Specification
- Laser Frequency is Out of Specification

## Contact Us

For U.S. Technical Support, please contact:

Unity Lab Services, Part of 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](mailto:us.techsupport.analyze@thermofisher.com)

For International Support, please contact:

Thermo Fisher Scientific  
Telephone: +1 608 273 5017  
E-mail: [support.madison@thermofisher.com](mailto:support.madison@thermofisher.com)

Please have the following information ready to communicate or send via e-mail:

- Instrument serial number
- Diagnostics log file

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