

**DXR RAMAN INSTRUMENTS**

**Preparing Your Site**

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# Introduction

The Thermo Fisher Scientific DXR Raman Microscope and DXR SmartRaman Spectrometer are designed to be extremely durable and reliable. They will work under adverse conditions for extended periods, but to help 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 work space. Three major areas are covered in this manual:

**Location** – Consult the dimensional information when planning the location of your instrument. If possible, leave extra space around the instrument for service access. See the “Location” chapter for details.

**Environmental considerations** – Avoid excessive static electricity, temperatures, vibration, intense magnetic fields, and humidity.

**Utility requirements** – Before the instrument arrives, it is important to install any necessary utilities in the planned work space. You will need electrical power, and you may also need a telephone line.

If you suspect that you cannot meet these optimal conditions, contact us. (See the “Questions or concerns” section for telephone numbers.)

## Conventions used in this manual

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

- Note** Notes contain helpful supplementary information. ▲
- Notice** Follow instructions labeled “Notice” to avoid damaging the system hardware or losing data. ▲
- ⚠ Caution** Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury. ▲
- ⚠ Warning** Indicates a hazardous situation which, if not avoided, could result in death or serious injury. ▲
- ⚠ Danger** Indicates a hazardous situation which, if not avoided, will result in death or serious injury. ▲

## 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, you can contact our sales or service representative in your area or use the information at the beginning of this document to contact us.

## Protective eyewear

If protective enclosures are removed during installation, exposure to Class IIIb visible and invisible laser radiation is possible. If you wish to observe such an installation, you will need to provide and wear the appropriate safety goggles to protect your eyes from possible exposure to laser radiation. The following table lists the specifications for protective eyewear for the excitation lasers that can be obtained for your instrument. If your laser is not listed, contact the laser manufacturer or consult ANSI Z136.1-1993.

For this laser...	Wear goggles rated for these specifications:	
	Laser wavelength	Optical density
NIR diode	780 nm	6
633 nm red	N/A	0
532 nm green	532 nm	6

**Note** If you are using the 633 nm red laser, the required optical density for laser safety eyewear is 0, so safety goggles are not necessary. ▲

**Warning** To prevent serious eye injury, always verify that your eyewear lists the wavelength of the laser you are using. ▲

## Packing material

If you have a microscope, you must keep the box and packing material the stage was shipped in. If you need to return the stage to the manufacturer, the original box and packing material must be used or the manufacturer's warranty is void.



# Location

Consider these points when planning the location of your instrument:

- If possible, choose a site easily accessible by our personnel and have a telephone near the instrument. This will save time if the instrument requires service or technical support.
- An electrical power source must be nearby.
- The floor (and table or counter used for a work surface) should be rigid to avoid vibration. Keep the instrument away from air conditioners, refrigeration units and other machinery that may vibrate the floor. While vibration will not damage the instrument, it can compromise spectral quality.
- The table top *must be strong enough to support the instrument*.
- Make sure the instrument will fit in the work space you choose. Compare the work space with the dimensions shown in the next section.
- Access covers must be able to open for maintenance and service.
- Choose a table height that allows you to work comfortably with the microscope. Keep in mind that the eyepieces will be approximately 55 cm (22 in) above the table top.

## Dimensions and weights

Use the following dimensions to plan your work space. A standard table depth of 76 cm (30 in) will accommodate the instrument. You will also need space for your computer and printer (if included).

The DXR Raman Microscope is approximately 94 cm (37 in) wide, 66 cm (26 in) deep, 59 cm (23 in) tall, and weighs about 57 kg (125 lb).

The DXR SmartRaman spectrometer is approximately 94 cm (37 in) wide, 64 cm (25 in) deep, 46 cm (18 in) tall, and weighs about 48 kg (105 lb).

If you purchased the optional motorized stage, you will need space for the two stage controller components: The joystick unit is 15 cm (6 in) wide, 23 cm (9 in) deep and 12 cm (5 in) tall. The electronics unit is 36 cm (14 in) wide, 30 cm (12 in) deep and 10 cm (4 in) tall. Together, these components weigh approximately 4 kg (9 lb).

**Important** Be sure to use a *heavy-duty* table that is strong enough to support the weight of the instrument and any other items that you plan to place on the table. The table must not visibly flex or otherwise deform when the instrument is placed on it. A flat and stable table top is essential to maintain proper alignment of components and the beam path. Maintaining proper alignment is necessary for instrument stability. ▲

# Environmental Considerations

This chapter includes information about environmental considerations such as temperature, vibration, magnetic fields, humidity, and static electricity. Some additional environmental considerations are that this instrument was designed to be:

- Used indoors.
- Operated at altitudes no higher than 2000 m (6561 ft).
- Located in an area where the pollution does not exceed pollution degree II.

## Temperature

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

The internal temperature and stability of the instrument may change significantly if the main power is switched on and off daily. Long-term stability improves with the length of time the instrument has been on. If your instrument will be used regularly, plan to leave it turned on.

Avoid placing the instrument near air conditioning ducts or large windows. Even if the windows have curtains, there is still significant heat loss through the glass at night.

Keep sources of heat, such as hot plates and heating mantles, away from the instrument. Do not place the instrument near heating vents.

## Magnetic fields

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

### **Warning**

To avoid defeating the safety interlocks and becoming exposed to laser radiation, keep magnetic materials and strong magnetic fields away from the safety interlock switches. ▲

## Vibration

Floor vibration or acoustical noise from heavy manufacturing equipment or other sources can affect the performance of your instrument. Minimize or eliminate noise and vibration wherever possible.

## Humidity

Some components of the instrument may corrode with exposure to moisture. Maintain the humidity in the range of 20% to 80% noncondensing. Avoid rapid changes in temperature that may cause condensation.

### **Important**

If a component has been stored or shipped, immediate exposure to room air can cause condensation damage. *Wait for the package to warm to room temperature before opening it.*

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

## Static electricity

Since static electricity can destroy electronic components, your instrument was specially designed to meet the international standard: IEC 1000-2-2; electrostatic discharge immunity requirements for industrial process, measurement and control equipment. If you have trouble with static electricity in your laboratory, you can further protect your instrument (especially when you are servicing or handling components inside the instrument) by following these guidelines:

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



# Utility Requirements

If at all possible, the power connections for the instrument and any accessories should be easily accessible for service purposes. You should also have direct control over the utilities for the instrument.

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

## Electrical requirements

Power supplied to the instrument 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 instrument will be installed in a heavy industrial environment, we recommend that a power quality audit be performed before installation. Contact us or your local electrical authority for more information.

### **Warning**

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

Your instrument was designed to meet the international standard: IEC 61326-1 Electromagnetic Compatibility (EMC) Requirements for Electrical equipment for measurement, control and laboratory use.

## Power line conditioning accessories

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

## Electrical service specifications

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

Requirement	Specification
Input current	1.7 A at 230 VAC
Input voltage	90-264 VAC
Line frequency	47-63 Hz
Line disturbances	Sags, surges, or other line disturbances must not exceed 10% of input voltage (even for a half cycle)
Noise	less than 2 V (common mode) less than 20 V (normal mode)

## Power consumption

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

Item	Power Consumption
DXR Raman Microscope	180 W
DXR SmartRaman spectrometer	180 W
optional motorized stage controller	200 W
additional external illuminator	100 W
standard computer and monitor*	460 W
standard printer*	200 W

\* These values are estimates. See the power specifications on the rear panels or undersides of the units.

## Telephone

If possible, install a telephone with an outside line near the instrument. If you require assistance from us, a telephone in the lab will save time.



# Setting Up a Laser Safety Area

Some accessories (such as the fiber optic accessory), as well as certain configurations of your instrument, are Class IIIb laser products. If you are going to use a class IIIb laser product, the instrument must be connected to an external remote interlock system that blocks the laser beam whenever a safety perimeter around the instrument is breached (when an unauthorized person opens the door, for example). Setting up a laser safety area with an external remote interlock takes about five minutes to complete and requires 2 BNC cables or the interlock defeat kit available from us.

## **Warning**

To avoid injury, the connectors and the laser safety interlock must be designed and built by someone who is properly trained. One of our representatives will help you install and test your connector. Please have the connector ready before the instrument arrives. ▲

## **Warning**

All persons using or in the vicinity of a Class IIIb instrument must wear appropriate laser safety goggles and must be aware of the safety precautions. (For more information, please refer to “Protective eyewear” in the “Introduction” chapter.) ▲

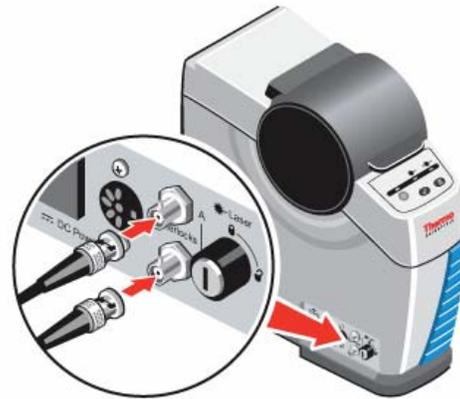
To set up a laser safety area with an external remote interlock:

1. **Install a switch across the pins of the connectors on each of the BNC cables.**

The switch must accommodate +5 VDC at 10 mA while it is closed. Opening the switch blocks the laser beam, and closing the switch unblocks the beam.



2. **Connect the BNC cables to the BNC connectors on the instrument power panel.**



3. **Connect the BNC cables to the laser safety circuit you have designed.**