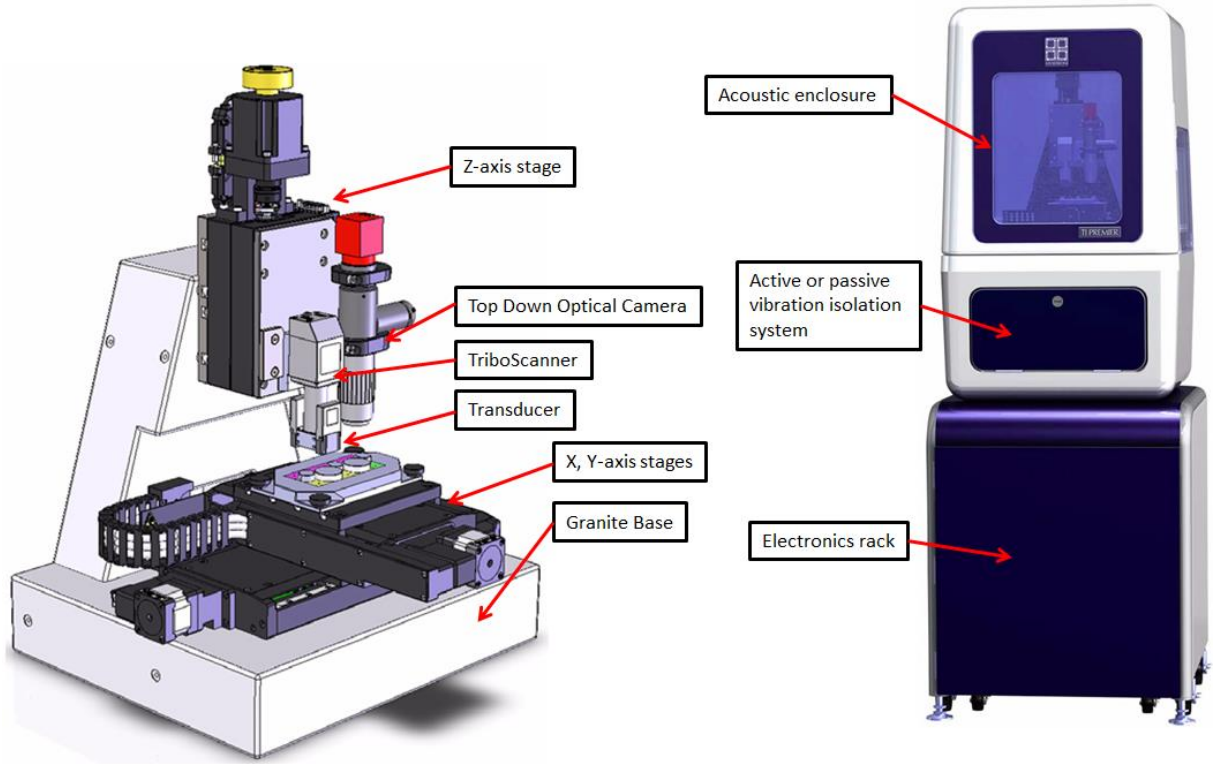
Bruker Hysitron TI Premier Site Guidelines

This document contains guidelines for the site at which the Bruker Hysitron TI Premier will be installed. The guidelines should be followed to ensure peak performance of the system. If the guidelines are not met, the noise floor, drift, and stability of the instrument can be adversely affected.

Space Requirements

The basic hardware components of the Bruker Hysitron TI Premier system are listed below:

- Granite base
- XYZ axes staging system
- Optical camera system
- TriboScanner piezo scanner
- Transducer assembly
- Vibration isolation system (active or passive system)
- Acoustic enclosure
- Electronics rack and peripherals
- Computer and data acquisition system



TI Premier components (computer not pictured)

The total weight of all components (excluding computer and monitor) is approximately 80 Kg. The total space required for the standard base and enclosure is 86 cm (34 in) wide × 80 cm (32 in) deep × 170 cm (67 in) tall. A separate desk at least 1 m (40 in) × 1 m (40 in) should be used for the computer station and auxiliary electronics.

Power Requirements

The system is designed for a specific voltage. Depending on the geographical location of the instrument the system will run either on 110 VAC (60 Hz) or 220 VAC (50 Hz). The maximum current required at any time will not exceed 15 A for the 110 VAC system and 8 A for the 220 VAC system. The instrument electronics rack does come equipped with its own surge protection/power strip, however, if numerous options have been ordered there may not be space on the supplied power strip for all options and additional wall outlet(s) will be required.

Bruker TI Premier System		
	110 VAC	220 VAC
Maximum power consumed	1540 VA @ 14 A	1540 VA @ 7 A
Rated input voltages	110 VAC ± 10%	220 VAC ± 10%
Rated input frequencies	50/60 Hz ± 5%	50/60 Hz ± 5%

If an xSol environmental control stage has been purchased for the system an additional 16 A at 110 VAC and 13.8 A at 220 VAC will be required.

HVAC Requirements

The room must have suitable heating and cooling equipment to maintain a constant temperature of 23°C ± 5°C during normal operation.

Maximum environmental humidity is specified to be 45%.

Auxiliary Connections

The Bruker Hysitron TI Premier system does not require any additional connections. The system does have an air line connection to be used for a building vacuum line if the system is equipped with a vacuum sample stage or to supply an inert gas for testing purposes. A stand-alone vacuum pump may be supplied with the system (in addition to the vacuum sample stage) in place of connecting to a building vacuum line.

Noise and Vibration

Acoustic noise for the Bruker Hysitron TI Premier system environment should be no more than 75 dB.

Floor vibration that can disturb the system measurements can be classified as either steady state or transient vibration. Steady state vibration typically refers to motion caused by mechanical equipment such as pumps, fans and compressors that are operating continuously. Transient vibration is from sources such as people walking, doors slamming, vehicle traffic, etc. and involves the dynamic response of the supporting structure.

This specification is meant to assure that the minimum requirements are clearly communicated to the customer and vibration consultant. The criteria are based on the generic vibration criteria curves developed by Unger, et al. The vibration consultant may want to supplement these minimum requirements with other equipment, analysis and format and is encouraged to do so. The allowable vibration, minimum equipment and analysis requirements are given below.

Raised Floor Systems (suspended floors; floating floors; otherwise non-solid surfaces)

The Bruker Hysitron TI Premier is not intended for installation on raised floor systems (suspended floors; floating floors; otherwise non-solid surfaces). Raised floor systems are typically used with clean room environments and do not offer the stability required to meet system noise and vibration needs.

For raised floor environments Bruker recommends the installation of a dedicated, isolated, pedestal secured to the underlying solid floor surface that meets the noise and vibration requirements.

Allowable Vibration

1. The maximum allowable vibration periodic amplitude in the velocity spectrum is:
   - Below VC-C (with extended low frequency limit)
     - 100 µm/sec RMS at 1.0 Hz
     - 12.5 µm/sec RMS at 8.0 Hz
     - 12.5 µm/sec RMS at 100 Hz
2. The peak acceleration (maximum or minimum) in a time wave form to be less than .001 g.
3. The RMS acceleration of the time wave form for an entire 1 hour test to be less than 50 µg.

Optimal equipment and testing conditions for measuring vibration are given below:

Equipment Requirements for Measuring Floor Vibration

1. The vibration test equipment must be capable of making measurements below 3 µm/s RMS in the 0.5 Hz to 250 Hz frequency range. The test equipment should have adequate sensitivity and a sufficiently low noise floor to make these measurements. The transducer noise floor (broadband resolution) should be less than 10 ng RMS (1 Hz to 10 kHz). Seismic accelerometers with sensitivities of 1 V/g or 10 V/g in the 0.5 Hz to 300 Hz are typically used.
2. Steady state vibration evaluation requires Fast Fourier Transform (FFT) analysis. Transient vibration evaluation should make use of both FFT analysis and time waveform analysis.
3. The spectral criteria is in the 1/3rd octave band width. This may be done by parallel filtering or synthesis of the FFT narrowband spectra.
4. Vibration measurements should be made in three orthogonal directions simultaneously. When using a two channel signal analyzer, it is acceptable to make multiple measurements with the vertical direction as the reference.

Equipment Setup and Data Format for Measuring Floor Vibration

1. The signal analyzer should be configured as follows:
   - Frequency range: 0 Hz to 200 Hz.
   - Resolution: □f = 0.25 Hz. , i.e. 800 lines
   - Overlap: 90%
   - Windowing: Hanning
   - Averaging: 2 minute peak hold spectra (approximately 300 time blocks, each 4 seconds long).
   - Store each peak hold spectrum as a slice in a waterfall plot. Collect peak hold spectra over a minimum period of 1 hour during typical facility activity. Multiple measurement periods may be necessary to determine the worst case vibration.
   - Simultaneous with the spectral analysis, record the acceleration time data to disk.
2. The data should be presented as follows:
   - Waterfall spectra should be plotted with a linear frequency scale. The vertical amplitude scale should be linear and in units of µm/s RMS. Frequency and amplitude of periodics in the spectrum should be indicated.
   - Time data should be presented at acceleration in units of g's RMS vs. time(sec). The mean amplitude, maximum amplitude, minimum amplitude and RMS should be indicated.
   - Each plot should indicate the date, time, location, measurement direction, and analysis setup.
   - A log of events during the tests should be made. The log should have time for each event that caused vibration, such as someone walking past, an air handling unit turning on, a truck driving past the building, etc.