



**Site Planning Guide for
SGI® Origin® 300 and
SGI® Onyx® 300 Rack Systems**

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Record of Revision

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About This Guide

What This Guide Contains

The *Site Planning Guide for the SGI Origin 300 and SGI Onyx 300 Rack Systems* contains the following chapters:

Chapter 1, “Overview”

Describes the information that helps management and site preparation personnel prepare for an SGI Origin 300 or SGI Onyx 300 rack system installation. It includes general site planning concepts as well as specific site specifications and requirements that you may use as a guide during the site planning and preparation process.

Chapter 2, “Site Preparation Concepts”

Describes the site planning process and provides a detailed discussion of the issues involved in any site preparation. For the SGI 300 rack-specific site planning information, refer to the subsequent sections of this guide.

Chapter 3, “SGI Origin 300 Rack Configurations and Components”

Describes the configuration classes for the Origin 300 rack system.

Chapter 4, “SGI Onyx 300 Rack Configurations and Components”

Describes the components and the configuration classes for the Onyx 300 rack system.

Chapter 5, “System Physical Specifications”

Describes the specifications for the SGI 300 rack system in detail.

Chapter 6, “Site Requirements”

Describes the information and guidelines that are necessary to plan your access route and to meet the environmental and power requirements for your system.

Chapter 7, “Securing the Cabinets”

Describes the four M12 threaded weld nut locations that are used to secure each 300 rack system to the computer room subfloor.

Chapter 8, “Site Planning Checklist”

Provides a site planning checklist that you can use as an organizational tool during the site planning and preparation process.

Chapter 9, “Summary”

Describes the methods available for contacting your SGI site planning representative.

Appendix A, “U.S. Customary Measure and Metric Measure Conversion”

Describes the conversions between U.S. customary and metric measures, Fahrenheit-to-Celsius temperature, and Celsius-to-Fahrenheit temperature.

Appendix B, “Regulatory Specifications”

Describes several national and international specifications to which the SGI 300 products conform.

Audience for This Guide

This guide is intended for people who are responsible for physical site planning and preparation.

By planning for your SGI Origin 300 or SGI Onyx 300 rack system installation, you have the opportunity to make adjustments to your site and order any additional facility equipment, thereby reducing the time required to install your system.

Obtaining Publications

To obtain SGI documentation, go to the SGI Technical Publications Library at <http://techpubs.sgi.com>.

Reader Comments

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We value your comments and will respond to them promptly.

Overview

This document provides information that helps management and site preparation personnel prepare for an SGI Origin 300 or SGI Onyx 300 rack system installation. It includes general site planning concepts as well as specific site requirements that you may use as a guide during the site planning and preparation process. Hereinafter, the term *SGI 300 rack* is used to indicate both SGI Origin 300 and SGI Onyx 300 rack systems.

SGI site planning representatives are available in the United States of America for site planning consultation; contact a site planning representative via one of the following methods:

- Telephone in the USA +1 888 744 8638, extension 676-2820; or +1 715 726 2820
- Fax +1 715 726 2969
- E-mail *site@sgi.com*

You will also want to discuss your site planning, preparation, and installation plans with your SGI account manager. Contact your account manager to obtain configuration information for any system.

Use the following steps as a planning guide for your system installation:

1. Identify the space, power, and environmental requirements for the system.
2. Select a location for the system and identify any necessary modifications.
3. Prepare the site according to the guidelines in this publication. You may use the site planning checklist in Chapter 8 of this document as a guide.

Site Preparation Concepts

This section of the *Site Planning Guide for the SGI Origin 300 and SGI Onyx 300 Rack Systems* provides a general overview of the site planning process and information about the issues that are involved in any site preparation. For the SGI 300 rack-specific site planning information, refer to the subsequent chapters of this document.

Not all of the items listed here apply to every installation. For example, if the system that you plan to install is a single small workstation, the delivery route probably does not present a problem. However, it is a good idea to briefly consider each question for any system installation.

Physical Location

This section addresses the issues that you need to consider when you select a physical location for a new system.

Selecting a Delivery Route

To ensure that the system can be delivered to the planned location, answer the following questions before you plan a delivery route for the new system:

- Will the shipping crate fit through doorways and hallways and on elevators?

In addition to measuring the width of the hallways along the planned delivery route, measure corners where the system might get stuck, the width and height of doorways and elevators, and other areas that may cause problems. Table 5-1 and Table 5-2 list the relevant system dimensions.

- If the shipping crate cannot be transported to the final destination, can you unpack the system somewhere else?

Often it is possible to unpack the system in a hallway or on a loading dock, and then roll the system to its final destination.

- Is the floor strong enough to support the weight of the system?

When the rack is loaded with modules, it can be very heavy. Determine the weight of each rack and verify that the floor that is along the delivery route can support the weight. Refer to Table 5-1 or Table 5-2 for the maximum weight per system rack.

- Is the elevator capable of lifting the system?

If the intended delivery route includes an elevator, check its weight capacity and size against the system specifications listed in Table 5-1 or Table 5-2. The use of freight blankets can reduce damage to the elevator or the system.

- Are there any steep angles, bumps, changes in level, or thick carpeting along the delivery route?

Large systems are typically equipped with casters. However, the casters are designed to roll easily only on relatively smooth, level surfaces. Ramps, sliding door channels, rough flooring, and even thick carpeting may present difficulty. If in doubt, arrange for additional assistance. The maximum access incline should not exceed 10 degrees (height:length = 1:6).

- Did you ensure that the leveling pads are fully retracted?

Some systems have screw-in leveling pads. If you move the system with these feet extended, severe damage to the chassis can occur. These feet sometimes unscrew during shipment. Before you unpack or move a system, ensure that the leveling pads are fully retracted. Refer to Chapter 7, “Securing the Cabinets” for more information about these leveling pads.

Selecting a Final Location

Consider the following issues when you select a final location for the system:

- Will the system fit in its intended location?

Carefully calculate the total system dimensions to ensure that it will fit in its intended final location.

- Does the intended system location provide adequate access space for maintenance?

Even if the system will fit in its intended final location, you must have room to maintain it. Ensure that you will have enough room to open the doors, remove boards, and accomplish other routine tasks. Table 5-1 and Table 5-2 list the relevant system dimensions and access requirements.

- Is the intended location subject to flooding, extremes of humidity or temperature, or any other factor that would make it inappropriate for sensitive electronic equipment?

The air temperature should not be too high and should not fluctuate dramatically, air should circulate freely and be relatively dust-free, and the system should not be exposed to any caustic or corrosive chemicals or vapors. Refer to the section titled “Environmental Requirements” for system-specific requirements.

- Will the system interfere with normal traffic through aisles, hallways, or entrance ways in the intended location?

- Will the intended location enable you to conveniently perform routine operations, such as loading and unloading tapes or other media, attaching cables, and so on?
- Is the floor of the intended final location strong enough to support the weight of the system and any future expansions?

Large systems should be installed in computer rooms with raised floors. Pay particular attention to floor loading and weight distribution in this case.

Floor-loading specifications are typically calculated by averaging the total chassis weight that is distributed over the entire footprint of the chassis. Because the chassis sits on four casters or four leveling pads, the load at each of these four points is greater.

- Have you considered the site preparation cost and ease of installation at this location?
- Does the intended location of the system allow for future expansion plans?

Electrical Requirements

Most SGI 300 rack systems require electrical resources beyond those that are normally provided in a typical office environment. The following sections describe those requirements in general. These sections, along with the data presented in subsequent sections, can help you determine the exact requirements for the new system. Table 2-1 lists the electrical service requirements.

Table 2-1 Electrical Service Requirements

| Electrical Service | Requirement |
|----------------------------------|---|
| Phase imbalance | 5% maximum (line-to-line, line-to-neutral) |
| Voltage harmonics | 5% maximum total, 3% largest |
| Voltage deviation from sine wave | +5% to -10% |
| Voltage modulation | 3% maximum |
| Transient voltage surges | +5% |
| Transient voltage sags | -5% |
| Frequency tolerance | 5% |
| Frequency rate of change | Less than 1.0 Hz during any 10-cycle period |

Voltage Requirements

SGI 300 rack systems are shipped with single-phase power. Refer to the section titled “System Power Requirements” in Chapter 6 for the voltage requirements of the chassis.

Ensure that the required voltage is available and is within a reasonable distance of the intended location. If it is not, the site must be wired for the required voltage.

Power Requirements

Even one SGI 300 rack can require more power than is routinely available in an office environment. A room full of racks will almost certainly require some specially installed electrical circuits. Refer to the section titled “System Power Requirements” in Chapter 6 for the power requirements of the rack in question.

Note: The wattages listed in this guide are the system maximums. While most systems never draw the maximum rated wattage, SGI recommends that you install wiring that is capable of supporting the maximum potential wattage. (Refer to Table 6-3 and Table 6-4.)

Power is measured in voltamperes (VA) and watts. Both measurements are important when you prepare to install wiring, power conditioning, and cooling.

A VA rating is a function of the voltage and amperage of a system. A watt rating is the VA rating multiplied by its power factor (refer to the section titled “Power Factor”). You can convert among amps, volts, VA, power factor, and watts by using the following formula:

Single Phase

$$\text{VA} = (\text{Amps} \cdot \text{Volts})$$

$$\text{VA} = \left(\frac{\text{Watts}}{\text{Power Factor}} \right)$$

$$\text{Watts} = (\text{VA} \cdot \text{Power Factor})$$

$$\text{Amps} = \left(\frac{\text{Watts}}{\text{Volts} \cdot \text{Power Factor}} \right)$$

Use this information and the information provided in Table 6-3 and Table 6-4 to determine the site power requirements.

If, after you add up the power requirements of all the devices in the room, you find that the total is close to the limit that the existing wiring can support, you should install additional power circuits to support the systems.

Grounding Requirements

- Ensure that the ground has sufficiently low impedance to limit the voltage to ground and to facilitate the operation of protective devices in the electrical circuit.
- Ensure that all grounds entering the room are interconnected somewhere within the building to provide a common ground potential. This includes any separate power sources, lighting, convenience outlets and other grounded objects such as building steel, plumbing, and ductwork. Refer to the "IEEE Emerald Book: IEEE Recommended Practices for Powering and Grounding Electronic Equipment" and the "National Electric Code (NEC)" for power, grounding, and life safety issues.

Power Factor

Power factor is a number between 0 and 1 that represents the ratio of the total power in watts to the total voltamperage input. A system with a power factor of one (sometimes called "unity") is fully using the energy that it draws. A system with a power factor of 0.75 is effectively using only three-quarters of the energy that it draws.

SGI 300 rack systems are power-factor corrected; therefore, they have a power factor very close to 1.

Caution: Ensure that you consider the power factor of the system when you select an uninterruptible power supply (UPS).

Inrush Current

Inrush current is the peak current that flows into a power supply as AC power is applied. The inrush current is usually much higher than the nominal current. This temporary increase is due to the charging of the input filter capacitors in the power supply and is limited only by the input impedance of the power supply and the wiring that supplies power to the system.

The inrush current often far exceeds the rating of the electrical outlet to which the system is connected. If the system is connected directly to "wall power" (that is, it is not on a UPS or a standby power system [SPS]), this is typically not a problem. The peak inrush current lasts for only a part of one AC cycle (less than 1/60 of a second). This is not long enough to damage wiring and, in most cases, will not trip a circuit breaker (depending on the delay curves of the circuit breaker).

It is important that you take the inrush current of the system into account when you select a UPS or SPS. Unlike power-company lines, these power-treatment devices may not be able to supply the current that is required during power-on, even if they are sized appropriately for nominal current loads. For more information, refer to the following "Power-line Treatment" section.

It is possible for the inrush current that is drawn by a device to cause a slight drop in the line voltage. Although it is very brief, this drop can, in unusual situations, be enough to cause problems in other devices on the same line.

Inrush current is a characteristic of the power supplies in a system. The inrush current values apply whether the system is heavily or lightly loaded. Therefore, although a lightly loaded system may draw less power while it is running, it may still draw a very large inrush current.

SIG 300 rack systems typically have low inrush characteristics.

Power-line Treatment

Power-line treatment may be required if the site has unstable power with problems such as fluctuating voltage, transients, surges and spikes, and noise. Common causes of unreliable power are old wiring; load-switching equipment, such as welding and plating devices; and variable-speed motors or motors that start and stop frequently.

A variety of devices are available to improve the quality of a power line, including:

- Line conditioners
- Line regulators
- Isolation transformers
- UPSs

Total Harmonic Distortion

Table 6-3 and Table 6-4 list total harmonic distortion (THD). Total harmonic distortion is a measure of the extent to which a waveform is distorted by harmonic content. This rating indicates how much the power supply in the system affects the quality of power that is delivered to other systems that are supplied by the same transformer.

Note: While the term *total harmonic distortion* can be applied to either voltage or current, all of the numbers listed in this guide apply to current.

Thermal Requirements

It is important that SGI 300 rack systems be maintained within their rated thermal range.

Refer to the section titled “Environmental Requirements” in Chapter 6 for the temperature ranges for each rack, both operating and nonoperating as well as the recommended operating ambient temperature. Typically, the upper limit of the temperature range is more likely to become a problem than the lower limit.

Heat Output

All of the systems that this guide describes have a maximum rated operating temperature. Exceeding this temperature greatly increases the rate of hardware failure and, in many cases, causes the system to shut itself down.

All of the power that is consumed by a computer system must exist as some form of energy. For air-cooled systems, this energy exists in the form of heat in the surrounding air. Every watt that is drawn by a system is eventually dissipated as heat. This heat tends to raise the temperature of the air in the room that houses the system. Therefore, some method is needed to keep the temperature within the required range. The typical method is to install additional process cooling capacity.

The maximum heat dissipation-to-air per rack is listed in Table 5-1 and Table 5-2.

Air-conditioning Terminology

Air-conditioning capacity is generally measured in Btu/hr, tons, or kilocalories (kcal).

A Btu, or British thermal unit, is the amount of energy that is needed to raise the temperature of one pound of water by one degree Fahrenheit at a constant pressure of one atmosphere.

One ton of air conditioning removes 12,000 Btu of heat energy per hour.

The more systems that are installed in a given area, the larger the required air-conditioning capacity that is required. It is important to calculate the total thermal load of the systems that you will be installing and determine whether the existing air-conditioning system can handle the additional load. If not, you must provide additional cooling capacity.

Calculating Thermal Load

The thermal load can be determined as follows:

1. Add the wattages of all the items in the room.
2. Calculate Btu/hour by multiplying the total wattage by 3.41.
3. Calculate the kcal/hour by multiplying the total wattage by 3.23.
4. Calculate the tons of air-conditioning load by dividing Btu/hr by 12,000.
1 kBtu/hr = 1000 Btu/hr
12,000 Btu/hr = 1 ton of air-conditioning load

The calculations that are described here give results that represent the maximum thermal output of the equipment. These calculations, and the numbers given in Table 6-1, Table 5-1, and Table 5-2 are based on maximum rated wattage.

The thermal figures that are quoted in this guide are likely to be worst-case figures.

Some sources quote a “typical” thermal output for a system, which may be significantly less than the numbers that are listed in this guide. Selecting an air-conditioning capacity that accommodates the “worst-case” thermal output, however, helps to minimize system problems later.

When you calculate the air-conditioning capacity that is required, be sure to include the heat load from computer equipment that is already installed at the site, noncomputer equipment that is already installed at the site, and the computer equipment that is being added. Also remember to include noncomputer equipment that is already installed or will be installed, and other factors such as solar gain, outside ambient air temperatures, and the number of people who work in the room.

Thermal Gradient

Table 6-1 includes a maximum thermal gradient for each system. The thermal gradient is the rate at which the temperature changes, which is typically expressed in degrees per hour. Temperature changes that are more rapid than the given rate can damage some of the components in the systems.

Unless otherwise indicated, the thermal gradients listed apply whether or not the system is operating.

Cooling In Mission-critical Installations

In mission-critical installations, it is important to consider what would happen if an air conditioner failed. Complete consideration of this topic is beyond the scope of this guide; however, consider the following questions:

- Should the site have multiple air-conditioning units, each able to maintain a safe temperature?
- If an air conditioner fails, how long can the systems run before they get too warm and must be shut off?
- Can the air conditioner be repaired before the systems get too warm?

Environmental Requirements

Electromagnetic interference (EMI), electrostatic discharge (ESD), vibration, and humidity can cause problems for computer systems.

Electromagnetic Interference

Electromagnetic interference (EMI) is caused by malfunctioning, incorrectly manufactured, or incorrectly installed devices that radiate electrical signals. Common sources of EMI include electronic, telephone, and communications equipment. EMI transmissions can be conducted or emitted.

Use properly shielded connectors and cables throughout the site.

Caution: Failure to use shielded cables where appropriate may violate FCC regulations and void the manufacturer's warranty.

Electrostatic Discharge

SGI designs and tests its products to ensure that they resist the effects of electrostatic discharge (ESD). However, it is still possible for ESD to cause problems that range from data errors and lockups to permanent component damage. To protect the systems from ESD, follow these precautions:

- Minimize the use of carpeting at computer locations (or consider special static-reducing carpet).
- Ensure that all electronic devices are properly grounded.
- Keep chassis doors and access panels closed while the system is operating.
- Fasten all screws, thumbnail fasteners, and slide locks securely.
- Use a grounded static wrist strap whenever you work with the chassis or components.

- Use antistatic packing material for storage and transportation.
- Clear the site of all devices that create static electricity or provide possible sources of EMI.

Vibration

The SGI 300 product line is designed for typical office computing environments; it requires no special modifications or protection. If you plan to install a system at an industrial site, ensure that vibration does not exceed the limits that are listed in Table 5-1 and Table 5-2.

Humidity

Table 6-1 lists the maximum humidity levels for each rack, both operating and nonoperating; and Table 6-2 lists the recommended operating humidity. Exposure to humidity levels above the rated maximums or exposure to condensation can cause equipment damage.

Humidity Gradient

Table 6-1 lists the maximum humidity gradient for the system. The humidity gradient is the rate at which the humidity changes, which is typically expressed in percent relative humidity per hour. Humidity changes that are more rapid than the given rate can damage some of the components in the systems.

Unless otherwise indicated, the humidity gradients that are listed apply whether or not the system is operating.

Ergonomic Requirements

When you select a physical location, pay attention to ergonomic considerations. The location of a system often restricts the location of the devices that attach to it, such as monitors, keyboards, and so on. Decisions that are made during the installation process can affect workers later.

In addition to attached devices, consider other issues such as noise, temperature, air quality, and so on, some of which may be affected by the addition of the new system.

Acoustics

All of the acoustic measurements that are provided in this document are in dBa (decibels absolute) rather than dB (decibels). This is a measurement of weighted absolute noise power, and it includes frequency corrections.

The acoustic measurements that are listed in Table 5-1 and Table 5-2 are approximate. Acoustic values depend on many factors that are outside the control of the manufacturer. Room characteristics such as carpeting and wall coverings affect the noise levels at an installation.

If a site exceeds desirable noise levels, try these remedies:

- Reduce the quantity of flat reflective surfaces, such as glass, tile, or metal.
- Add sound-absorbing wall coverings, drapes, and ceiling tiles.
- Add sound baffles in critical locations (without blocking airflow).
- Modify the office space to separate the operators from the hardware.

Local Regulations

Before you install a system, become familiar with any applicable local regulations. Because these vary dramatically by country and state, it is impossible to provide a complete list of such regulations. These regulations, however, might involve:

- Power
- Emissions
- Safety issues
- Ergonomic and health issues
- Telecommunications

Planning for the Future

Even if the existing infrastructure can handle the immediate site needs, consider the future plans. It is much easier to provide enough space, power, air-conditioning capacity, and other resources in advance than it is to add them later.

SGI Origin 300 Rack Configurations and Components

The SGI Origin 300 rack systems can be configured with or without a NUMAlink module. Both systems support two rack types: a short rack and a tall rack. The racks are measured in standards units (U); one unit is equal to 1.75 in. (44.45 mm). The short rack is a 17U rack and the tall rack is a 39U rack. Refer to Figure 3-1 and Figure 3-2.

The SGI Origin 300 rack system without a NUMAlink module can be configured with 2 to 8 processors in 2-processor increments. A system maximum of 2 SGI Origin 300 servers is supported. Refer to Figure 3-1.

A single SGI Origin 300 short rack system without a NUMAlink module can contain:

- A maximum of 8 Origin 300 servers
- A maximum of 2 PCI expansion modules (optional)
- 1 or more Total Performance 900 (TP900) modules (optional)
- A maximum of 1 power bay (only required when PCI expansion modules are present)

A single SGI Origin 300 tall rack system without a NUMAlink module can contain:

- A maximum of 19 Origin 300 servers
- A maximum of 6 PCI expansion modules (optional)
- 1 or more TP900 modules (optional)
- A maximum of 1 power bay (only required when PCI expansion modules are present)

The SGI Origin 300 rack system with a NUMAlink module can be configured with 4 to 32 processors in 2-processor increments. A maximum of 8 Origin 300 servers are supported in an SSI system. Systems with 32 processors must have all 8 servers configured with 4 processors each. Each server that is configured with 2 processors reduces the maximum number of processors in the system by 2. Refer to Figure 3-2.

A single SGI Origin 300 short rack system with a NUMAlink module can contain:

- A maximum of 7 Origin 300 servers
- A maximum of 2 PCI expansion modules (optional)
- 1 or more TP900 modules (optional)
- 1 L2 controller module
- 1 power bay (only required when a DC-powered NUMAlink module or PCI expansion modules are present)

A single SGI Origin 300 tall rack system with a NUMAlink module can contain:

- A maximum of 8 Origin 300 servers
- A maximum of 4 PCI expansion modules (optional)
- 1 or more TP900 modules (optional)
- 1 L2 controller module
- 1 power bay (only required when a DC-powered NUMAlink module or PCI expansion modules are present)

Note: Adding PCI expansion modules reduces the maximum number of servers in a rack. For each PCI expansion module that is added to a system, the maximum number of servers is reduced by 1. For example, if 2 PCI expansion modules are added to an SGI Origin 300 tall rack system that has a NUMAlink module, the maximum number of servers is 6 instead of 8.

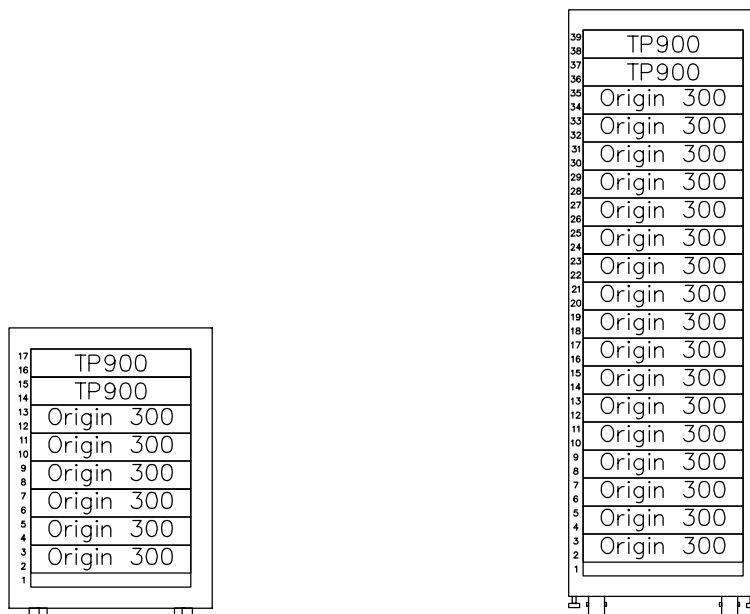


Figure 3-1 Examples of SGI Origin 300 Configurations without a NUMAlink Module

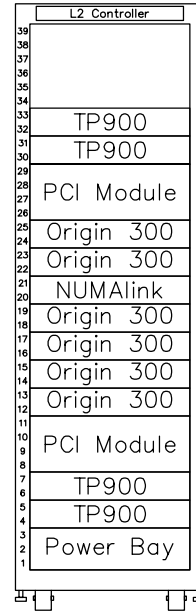
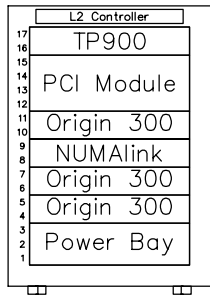


Figure 3-2 Examples of SGI Origin 300 Configurations with NUMAlink Module

SGI Onyx 300 Rack Configurations and Components

The SGI Onyx 300 rack system can be configured with or without a NUMALink module. For both configurations, one Onyx 300 compute module is required for each graphics pipe. The SGI Onyx 300 rack system is provided in a 39U rack only.

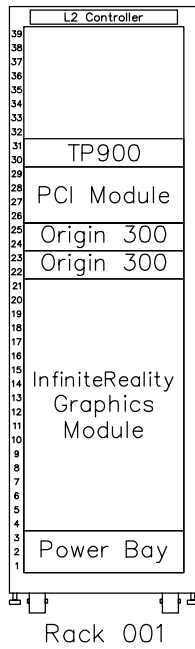
The Onyx 300 configuration without a NUMALink module is a single-rack or two-rack system that consists of the following components. Refer to Figure 4-1.

- 1 or 2 Onyx 300 compute modules (2, 4, 6, or 8 processors)
- 1 or 2 InfiniteReality graphics module with 1 or 2 graphics pipes
- 1 AC-powered L2 controller module
- 1 power bay module (only required when PCI expansion modules are present)
- 1 or more TP900 storage modules (optional)
- 1 PCI expansion module (optional)

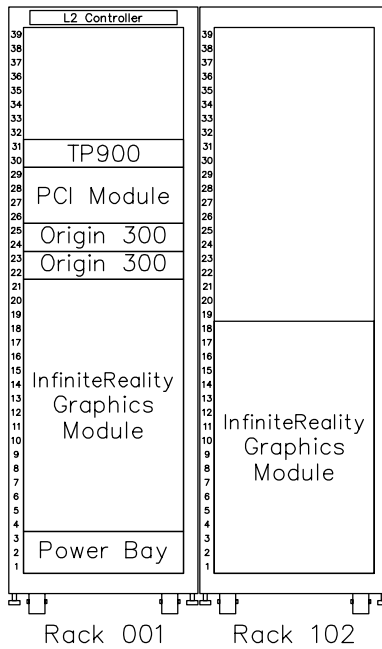
The Onyx 300 configuration with a NUMALink module is a single- or multiple-rack system that consists of the following components. Refer to Figure 4-2 and Figure 4-3.

- 2 to 8 Onyx 300 compute modules (4 to 32 processors)
- 1 to 8 InfiniteReality graphics modules (1 to 8 graphics pipes)
- 1 AC-powered NUMALink module
- 1 AC-powered L2 controller module
- 1 power bay (only required when PCI expansion modules are present)
- 1 or more TP900 storage modules (optional)
- 1 to 4 PCI expansion modules (optional)

Single-rack System



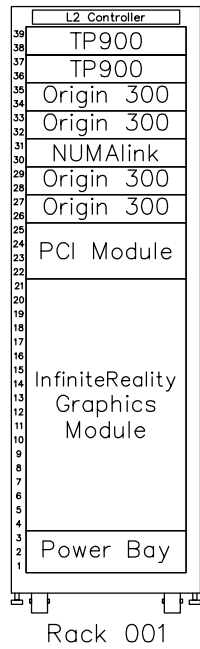
Two-rack System



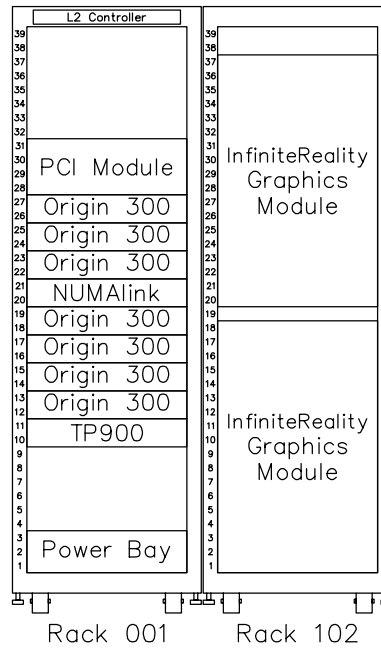
(NOTE: All racks are viewed from rear)

Figure 4-1 Typical Configurations of SGI Onyx 300 Systems without a NUMalink Module

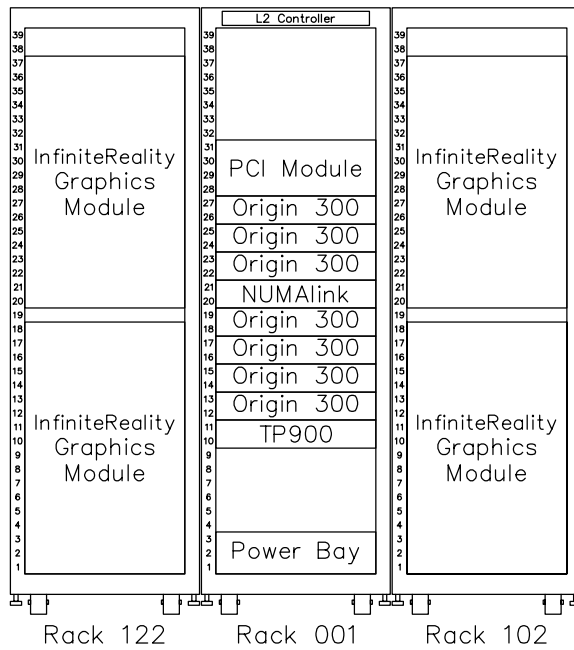
Single-rack System



Two-rack System



Three-rack System



(NOTE: All racks are viewed from rear)

Figure 4-2 Typical Configurations of SGI Onyx 300 Multiple-rack Systems (1 of 2)

4: SGI Onyx 300 Rack Configurations and Components

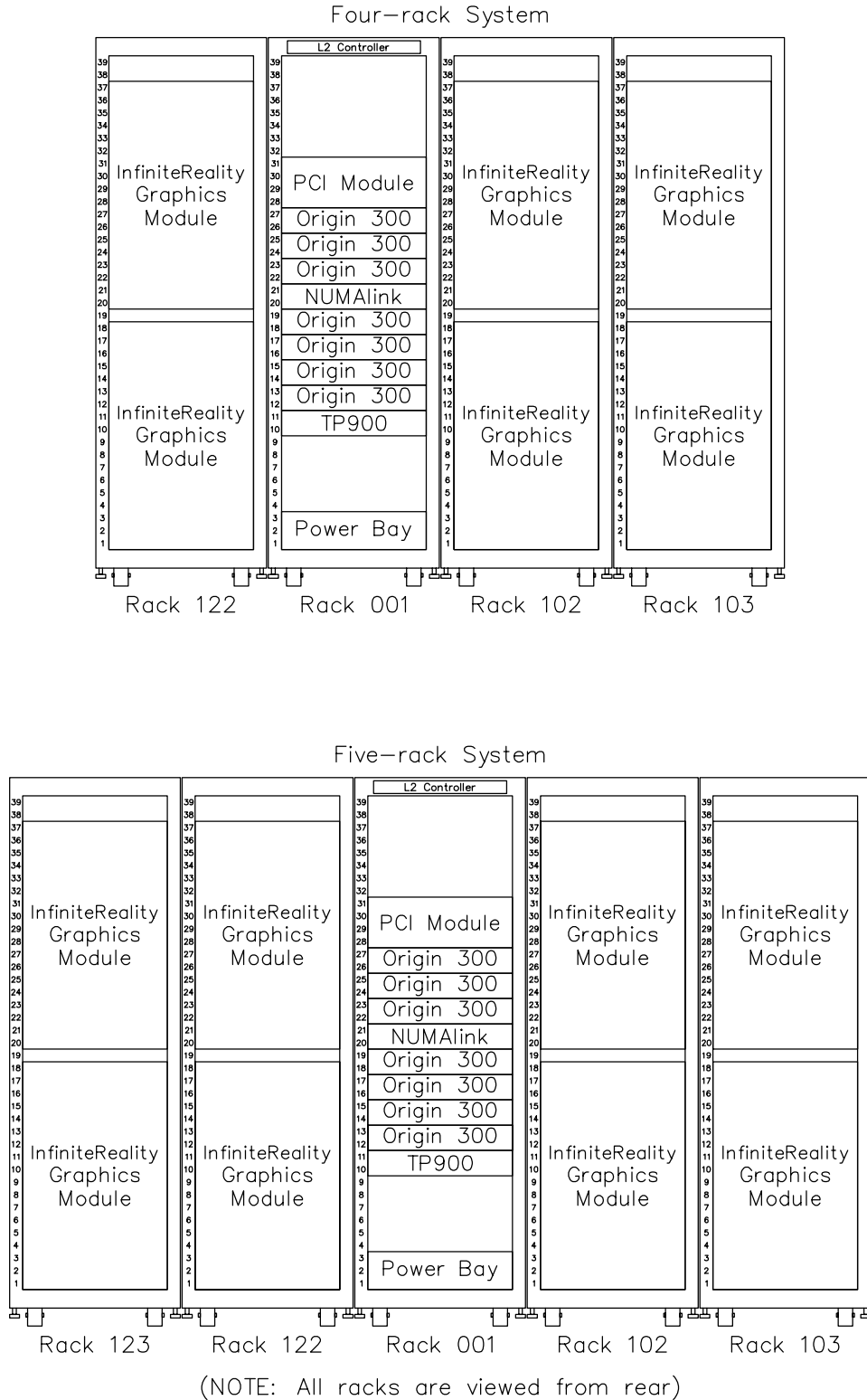


Figure 4-3 Typical Configurations of SGI Onyx 300 Multiple-rack Systems (2 of 2)

System Physical Specifications

The SGI 300 rack systems consist of a variety of standard and optional equipment. Each rack or peripheral device and each system configuration has unique physical characteristics.

Table 5-1 provides the specifications for the SGI Origin 300 short rack system.

Table 5-2 provides the specifications for an SGI Origin 300 tall rack system and an SGI Onyx 300 tall rack system.

All specifications in Table 5-1 are per rack unless otherwise noted.

Table 5-1 Physical Specifications for the SGI Origin 300 Short Rack System

| Characteristic | Specification |
|---|--|
| Cabinet Characteristics: | |
| Height | 36.06 in. (916 mm) |
| Width | 25.41 in. (645 mm) |
| Depth | 41.83 in. (1062 mm) |
| Maximum weight | 488 lbs (221 kg) |
| Shipping Size: | |
| Height | 48.75 in. (1238 mm) |
| Width | 29.25 in. (743 mm) |
| Depth | 42.75 in. (1086 mm) |
| Shipping weight | 563 lbs (255 mm) |
| Access Requirements: | |
| Front | 36.00 in. (914 mm) |
| Rear | 36.00 in. (914 mm) |
| Side | None |
| Acoustical noise level | Less than 65 dBA |
| Maximum heat dissipation to air (8 SGI Origin 300 servers) | 7.51 kBtu/hr (2.20 kW) |
| Maximum airflow (intake, front; exhaust, rear) | Less than 400 CFM (0.19 m ³ /s) |
| Vibration: | |
| Nonoperational (sine sweep) | 3-200-3 Hz, 0.5g @ 1 octave/min (vertical orientation) |
| Operational (sine sweep) | 5-500-5 Hz, 0.25g @ 1 octave/min (vertical orientation) |

All specifications in Table 5-2 are per rack unless otherwise noted.

Table 5-2 Physical Specifications for the SGI Origin 300 Tall Rack System and the SGI Onyx 300 Tall Rack System

| Characteristic | Specification |
|--|---|
| Cabinet Characteristics: | |
| Height | 75.82 in. (1926 mm) |
| Width | 23.62 in. (600 mm) |
| Depth | 41.25 in. (1048 mm) |
| Maximum weight | |
| Compute rack (19 SGI Origin 300 servers) | 1100 lbs (499 kg) |
| Graphics rack (2 InfiniteReality graphics modules) | 850 lbs (385 kg) |
| Shipping Size: | |
| Height | 81.50 in. (2070 mm) |
| Width | 40.00 in. (1016 mm) |
| Depth | 51.38 in. (1305 mm) |
| Shipping weight (maximum): | |
| Compute rack (19 SGI Origin 300 servers) | 1281 lbs (581 kg) |
| Graphics rack (2 InfiniteReality graphics modules) | 1031 lbs (468 kg) |
| Access Requirements: | |
| Front | 36.00 in. (914 mm) |
| Rear | 36.00 in. (914 mm) |
| Side | None |
| Acoustical noise level | Less than 65 dBA |
| Maximum heat dissipation to air: | |
| Compute rack (19 SGI Origin 300 servers) | 17.84 kBtu/hr (5.23 kW) |
| Graphics rack (2 InfiniteReality graphics modules) | 13.65 kBtu/hr (4.00 kW) |
| Maximum airflow (intake, front; exhaust, rear) | 950 CFM (0.45 m ³ /s) |
| Vibration: | |
| Nonoperational (sine sweep) | 3-200-3 Hz, 0.5g @ 1 octave/min (vertical orientation) |
| Operational (sine sweep) | 5-500-5 Hz, 0.25g @ 1 octave/min (vertical orientation) |

Note: Contact site@sgi.com for configuration-specific cooling requirements.

Figure 5-1 illustrates a single SGI Origin 300 short rack. Figure 5-2 illustrates a single SGI 300 tall rack. Figure 5-3 and Figure 5-4 illustrate the floor space and service clearance requirements for an SGI Onyx 300 multiple-rack system.

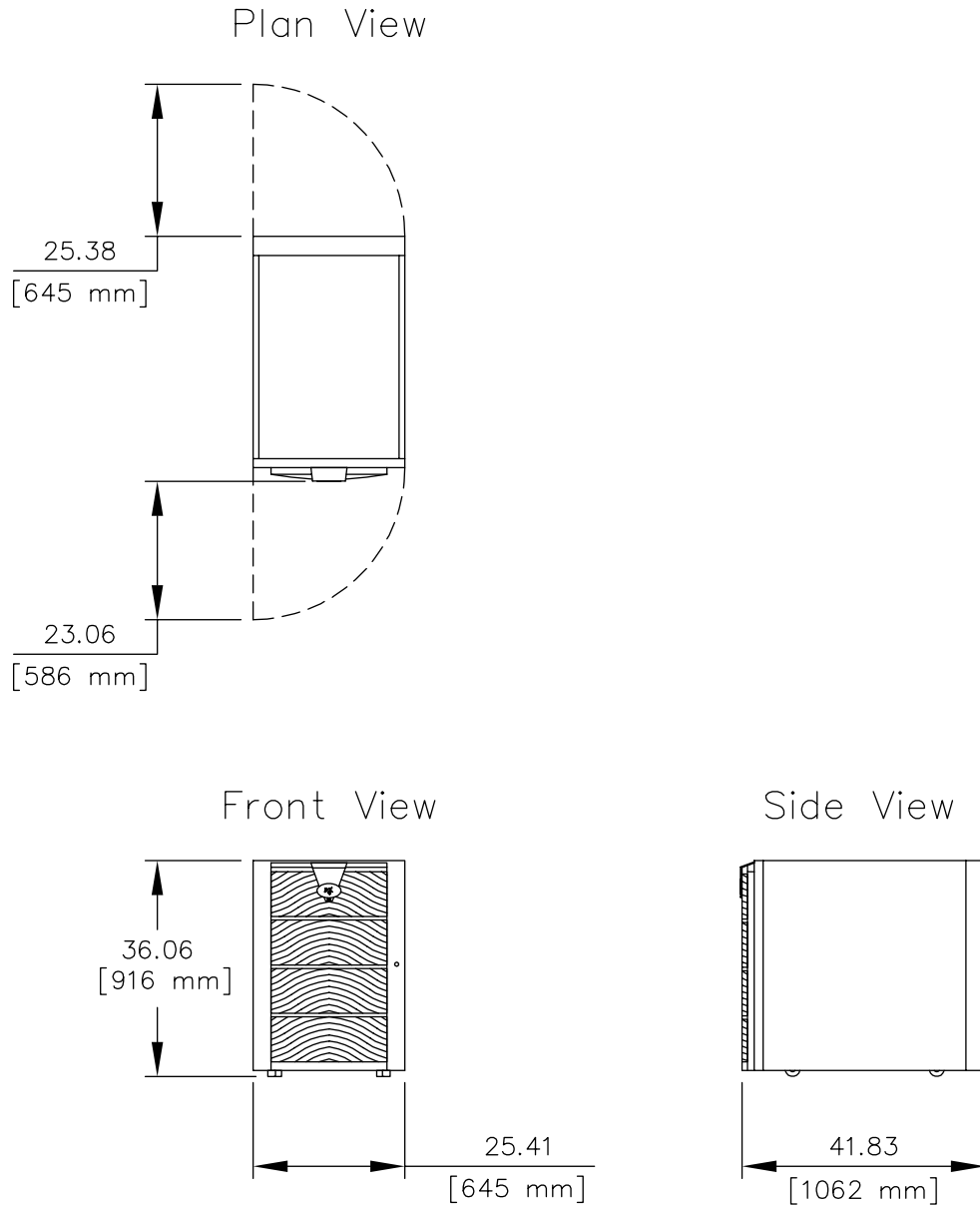
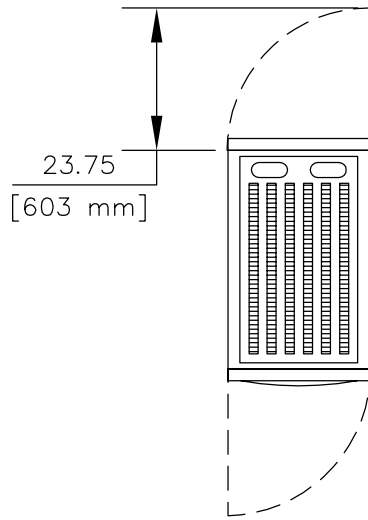
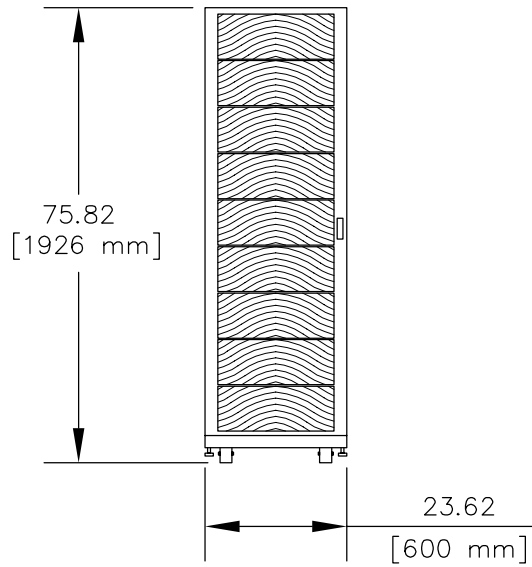


Figure 5-1 System Cabinet (Short Rack)

Plan View



Front View



Side View

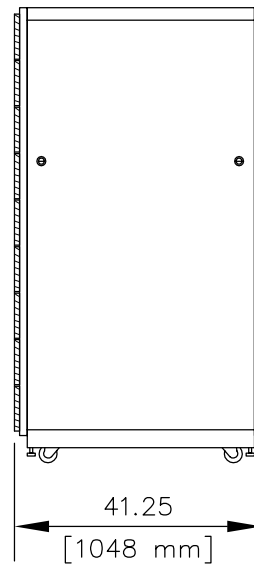


Figure 5-2 System Cabinet (Tall Rack)

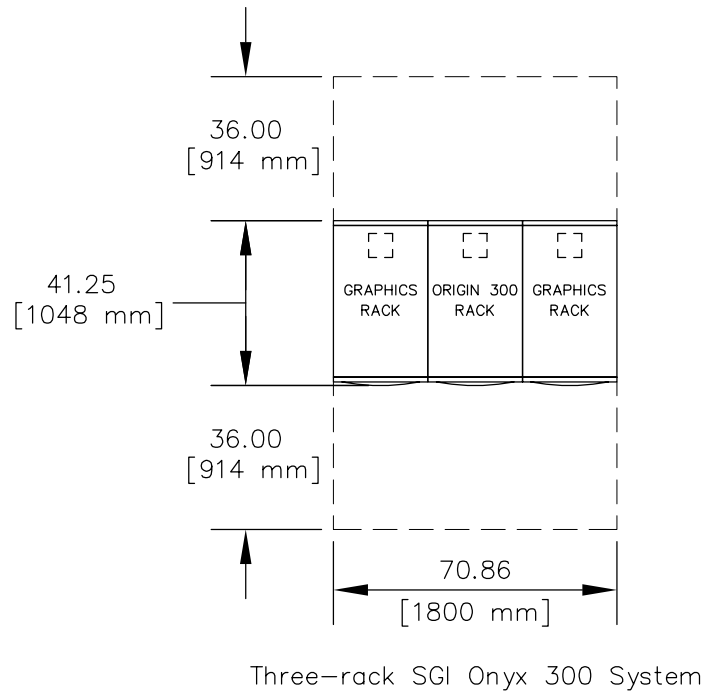
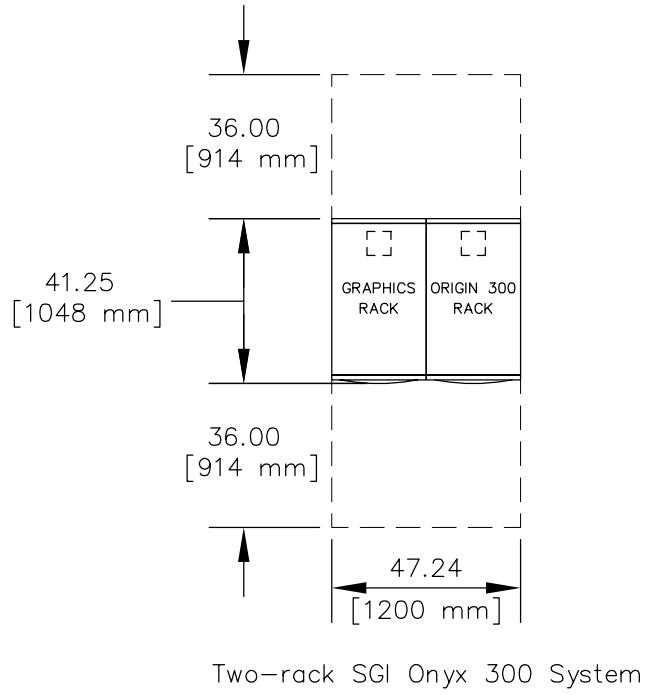
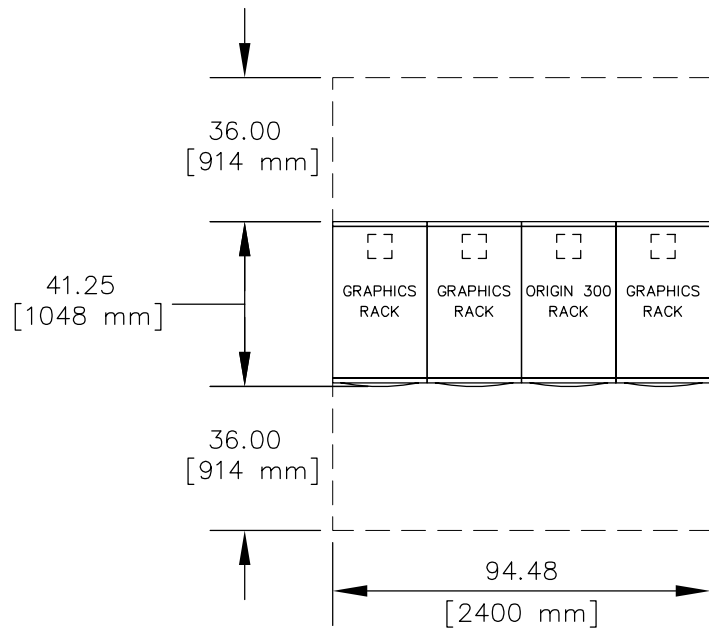
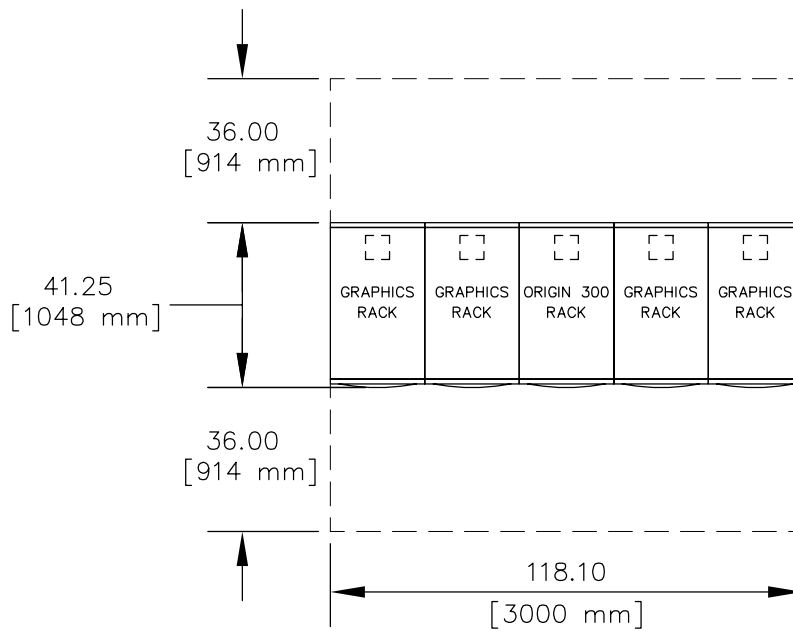


Figure 5-3 Service Clearance Requirements for SGI Onyx 300 Multiple-rack Systems (1 of 2)



Four-rack SGI Onyx 300 System



Five-rack SGI Onyx 300 System

Figure 5-4 Service Clearance Requirements for SGI Onyx 300 Multiple-rack Systems (2 of 2)

Site Requirements

Use the information and guidelines in this chapter to plan your access route and to meet the environmental and power requirements for your system.

Planning Your Access Route

The standard dock height for freight trailers in the USA is approximately 48.00 in. (1219 mm) from the ground. If your loading dock is standard height, you may use a pallet jack to unload the system in most cases. If the loading dock is not standard height, you must provide a forklift or other means to unload the system. The maximum access incline should not exceed 10 degrees (height:length = 1:6). If you have concerns about your site access route, contact a site planning representative by one of the following methods:

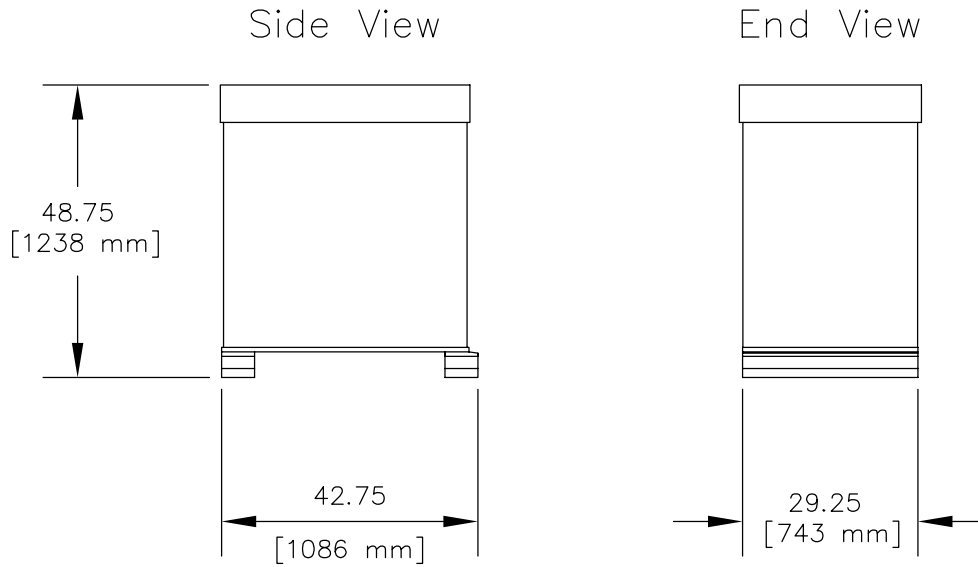
- Telephone +1 715 726 2820 or in the USA +1 888 744 8638, extension 676-2820
- Fax +1 715 726 2969
- E-mail site@sgi.com

Each SGI 300 rack system ships on a pallet in its own container, which includes an attached ramp for system removal. You must provide a pallet jack, preferably one with 48-inch (1219-mm) tines, to move each container to the approximate system location, where it can be removed from the pallet and moved to its final destination in the computer room.

SGI recommends that you leave each system cabinet in its shipping crate until it reaches its final destination. If the crate is too large for the planned access route, you may remove each cabinet from its container and wheel the cabinet on its casters through your facility to the computer room.

Figure 6-1 and Figure 6-2 illustrate the shipping configuration of an SGI 300 rack system.

6: Site Requirements



Note:

The shipping container consists of a wooden pallet and a corrugated paper cover. A ramp is enclosed in the shipping container to facilitate the removal of the short rack from the pallet.

Figure 6-1 System Cabinet Shipping Configuration (Short Rack)

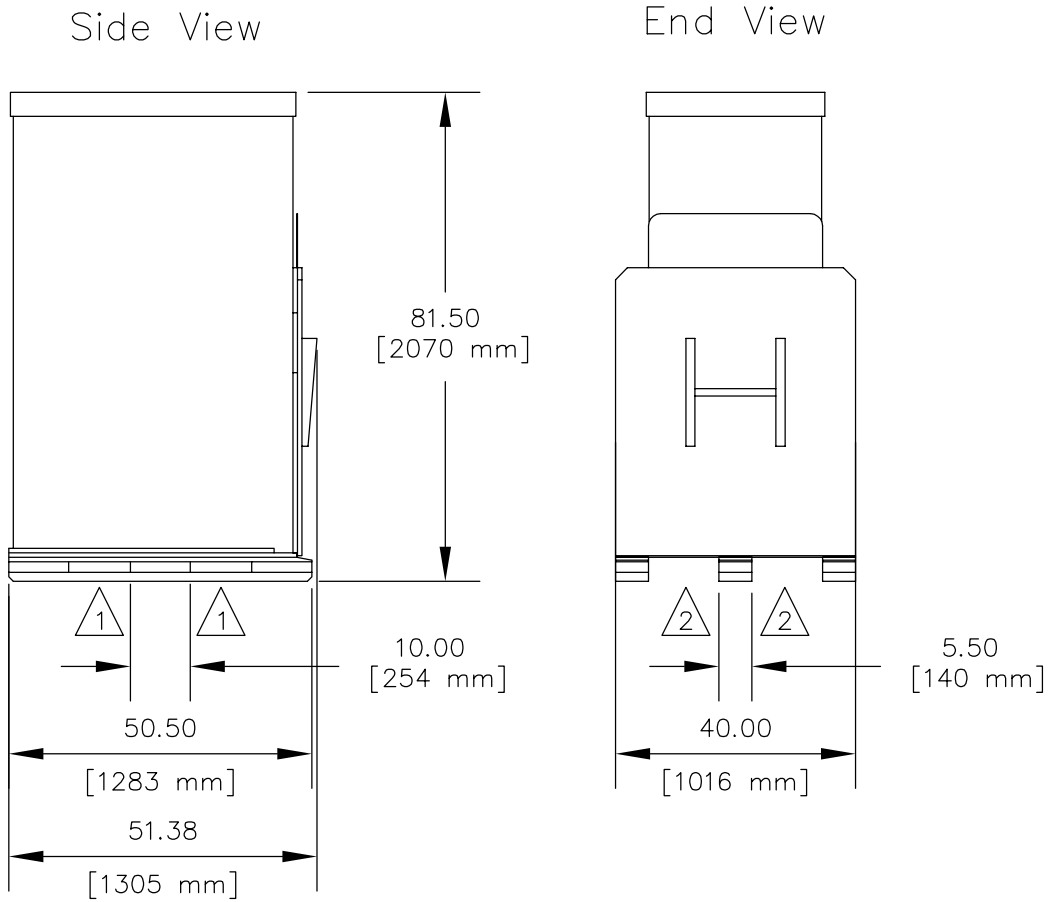


Figure 6-2 System Cabinet Shipping Configuration (Tall Rack)

Environmental Requirements

The SGI 300 rack systems operate in typical conditions for digital devices that are marketed for commercial and scientific environments. The air-conditioning system at your facility must ensure that the intake air to each SGI 300 rack system meets the requirements in Table 6-1. Table 6-1 lists the maximum requirements. Table 6-2 lists the optimum operating point and the recommended operating range. SGI strongly recommends that you adhere to the recommended operating ranges to minimize component failures.

When the racks arrive, if they are significantly colder (a difference of 40 °F [22 °C] or more) than the environment in which you will install them, leave the racks in their shipping containers (at the final destination) for 24 hours to prevent thermal shock and condensation.

Each system cabinet receives intake air through the front of the cabinet and exhausts heated air through the back of the cabinet. When you install the system, ensure that heated air from other equipment does not discharge toward the air intakes of any system cabinets. The equipment can overheat if heated air enters the front or top intake of any system.

Refer to Table 6-1 for the environmental requirements for the SGI 300 rack systems.

Table 6-1 System Environmental Requirements (Maximum)

| Characteristic | Specification |
|--|--------------------------------|
| Ambient Temperatures: | |
| Operating 0 to 5,000 ft (0 to 1524 m) ^a | 41 to 95 °F (5 to 35 °C) |
| Operating 5,000 to 10,000 ft (1524 to 3048 m) ^a | 41 to 86 °F (5 to 30 °C) |
| Nonoperating | -40 to 140 °F (-40 to 60 °C) |
| Maximum Thermal Gradient | 18 °F (10 °C) per hour |
| Relative Humidity: | |
| Operating ^a | 10% to 95% noncondensing |
| Nonoperating | 10% to 95% noncondensing |
| Maximum Humidity Gradient | 10% relative humidity per hour |
| Altitude: | |
| Operating | 0 to 10,000 ft (0 to 3048 m) |
| Nonoperating | 0 to 40,000 ft (0 to 12192 m) |

^a Temperature sensors in each 300 rack system automatically power down the system when the intake temperature reaches 104 °F (40 °C) or if internal electronics reach an unsafe operating temperature.

Table 6-2 System Environmental Requirements (Optimum)

| Characteristic | Specification |
|------------------------------|------------------------------|
| Ambient Temperatures: | |
| Optimum Operating | 72 °F (22 °C) |
| Recommended Operating | 68 °F to 74 °F (20 to 23 °C) |
| Humidity: | |
| Optimum Operating | 45% (noncondensing) |
| Recommended Operating | 40% to 50% (noncondensing) |

System Power Requirements

Table 6-3 lists the electrical specifications for a single SGI Origin 300 short rack system.

Table 6-4 lists the electrical specifications for a single SGI Origin 300 tall rack system and a single SGI Onyx 300 tall rack system.

Note: Table 6-3 and Table 6-4 list the maximum numbers; other configurations might require significantly less power.

The calculated power consumption for specific SGI 300 rack configurations is available from your SGI site planning representative. Refer to Chapter 9, “Summary” for contact information.

Note: To maintain a ground potential of less than 250 millivolts between interconnected SGI 300 rack systems, SGI requires that all power circuits that supply power to an SGI 300 rack system originate from the same distribution panel if possible. If not, they must originate from the same source (transformer). Electrical work and installations must comply with all applicable local, state, and national electrical codes.

SGI makes every effort to minimize the effects of power failures and interruptions to the system hardware. Studies indicate that computer systems that are subjected to repeated power interruptions and fluctuations experience higher component failure rates than systems with stable power sources.

SGI encourages you to install a stable power source, such as an uninterruptible power system (UPS), to minimize component failures.

Each SGI 300 rack system and each piece of support equipment requires its own customer-supplied receptacle. If you have difficulty obtaining the correct receptacles as listed in Table 6-3 and Table 6-4, please contact your account manager.

Table 6-3 Electrical Specifications for the SGI Origin 300 Short Rack System

| Electrical Service | Specifications |
|--|--|
| Input voltage | 180 - 264 Vac, single phase |
| Frequency | 47 to 63 Hz |
| Maximum power consumption ^a | 2.24 kVA (2.20 kW) |
| Hold-up time | 16 milliseconds |
| Total harmonic distortion (THD) | Less than 10% THD-Rms |
| Power cable: (1 supplied) | 8-ft (2.4-m) pluggable drop cord |
| Power receptacle (1 required) | NEMA L6-30R (North America/Japan) or 32 amp, IEC60309 (International) |

^a The maximum power consumption is based on eight SGI Origin 300 servers installed in a rack.

Table 6-4 Electrical Specifications for Single SGI Origin 300 Tall Rack and Single SGI Onyx 300 Tall Rack Systems

| Electrical Service | Specifications |
|--|--|
| Input Voltage | 180 to 264 Vac, single-phase |
| Frequency | 47 to 63 Hz |
| Maximum Power Consumption: | |
| Compute rack (19 SGI Origin 300 servers) | 5.34 kVA (5.23 kW) |
| Graphics rack (2 InfiniteReality graphics modules) | 4.08 kVA (4.00 kW) |
| Hold-up time | 16 milliseconds |
| Total harmonic distortion (THD) | Less than 10% THD-Rms |
| Power Cable (Maximum of 2 supplied per rack) | 8-ft (2.4-m) pluggable drop cords |
| Power Receptacle ^a (Maximum 2 required per rack) | NEMA L6-30R (North America/Japan) or 32 Amp, IEC60309 (International) |

^a The quantity of power receptacles that are required is configuration dependent. Power is distributed within a compute rack via a power distribution unit (PDU). One receptacle is required per PDU. For the graphics rack, one receptacle is required per InfiniteReality graphics module. Contact your SGI account representative for the quantity of PDUs and InfiniteReality graphics module per rack.

For the power and cooling requirements for a particular configuration, contact SGI Site Planning representative. Refer to Chapter 9 for contact information.

In addition to the equipment that Table 6-3 and Table 6-4 list, your system configuration might also include optional equipment such as modems, printers, and additional displays. Please plan your facility electrical and air-conditioning requirements accordingly.

Remote Support

SGI offers a remote support package that enables an off-site support specialist to maintain your SGI 300 rack system.

The connection for this remote support is provided from SGI call centers through a dedicated, restricted access communication hub to a service processor that connects to your SGI system. This high-speed, secure link is constantly monitored and controlled to ensure security for you and your system users.

Remote support is implemented only with your consent.

To use remote support, you need to install a dedicated, integrated services digital network (ISDN) line. SGI supplies a router that provides connection to an ISDN U interface in the USA and to an S/T interface in Europe. This router is housed in one of the I/O racks. Data telephone lines should be separate from outside telephone lines. Some PBX systems can degrade the effective bandwidth of these lines.

Contact your local SGI customer service representative or account manager for additional information about remote support.

Embedded Support Partner (ESP) is a new tool that is available for your use. ESP integrates monitoring, notifying, and reporting operations. It enables users to monitor one or more systems at a site from a local or remote connection. ESP detects system conditions that indicate potential problems and then notifies the appropriate personnel. This enables SGI customers and support personnel to proactively support systems and resolve issues before they develop into actual failures.

Network Connections

If you plan to add any optional network interfaces such as Ethernet to your SGI 300 rack system, you must ensure that you provide the proper cables and transceivers to match your network protocol. Contact your account manager to plan any optional network connections.

Raised-floor Installations

The SGI 300 rack system does not require a raised-floor system. However, SGI recommends a raised-floor system because it provides convenient routes for underfloor air circulation and for power and communication cabling.

SGI recommends a minimum raised-floor height of 12.00 in. (305 mm).

Each rack that you install on a raised floor requires a floor cutout for cabling. When you design your raised-floor system, place perforated floor panels or floor grilles near the front base of the system racks, not directly under them.

SGI supplies full-scale templates for the location of system floor cutouts on request. Contact SGI Site Planning personnel at site@sgi.com.

The computer room floor must support the weight of all of the system racks in your configuration. Each component, except the short rack, rests on four leveling pads that concentrate the weight of the cabinet on a small surface area.

Additional floor support pedestals increase the floor-loading strength of the raised floor. If your computer site lies in an earthquake zone, you can secure the computer system components to the computer room subfloor for added stability. Refer to Chapter 7, “Securing the Cabinets”, or contact your site planning representative for additional details.

If you have any questions about the structural capabilities of any floor, please contact a qualified structural engineer. If you do not install your system on a raised floor, SGI recommends that you install flat cable covers to protect cables from damage and to protect computer room personnel from injury.

Figure 6-3 illustrates the floor cutout for a single SGI Origin 300 short rack system.

Figure 6-4 illustrates the floor cutout for a single Origin 300 or SGI Onyx 300 tall rack system.

Figure 6-5 illustrates caster locations for the SGI Origin 300 short rack.

Figure 6-6 illustrates the caster and leveler locations for the SGI Origin 300 or SGI Onyx 300 tall rack system.

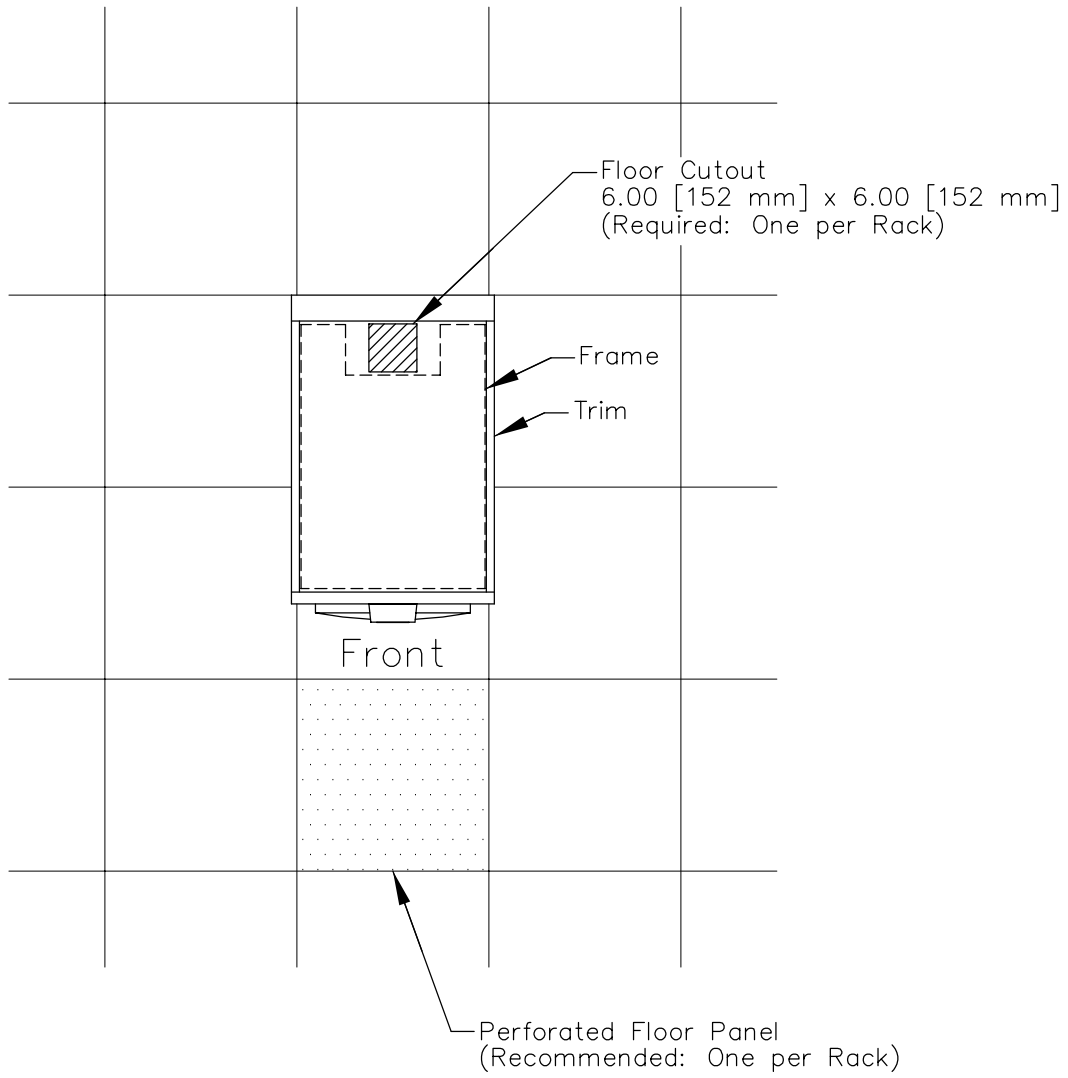


Figure 6-3 System Floor Cutout (Short Rack)

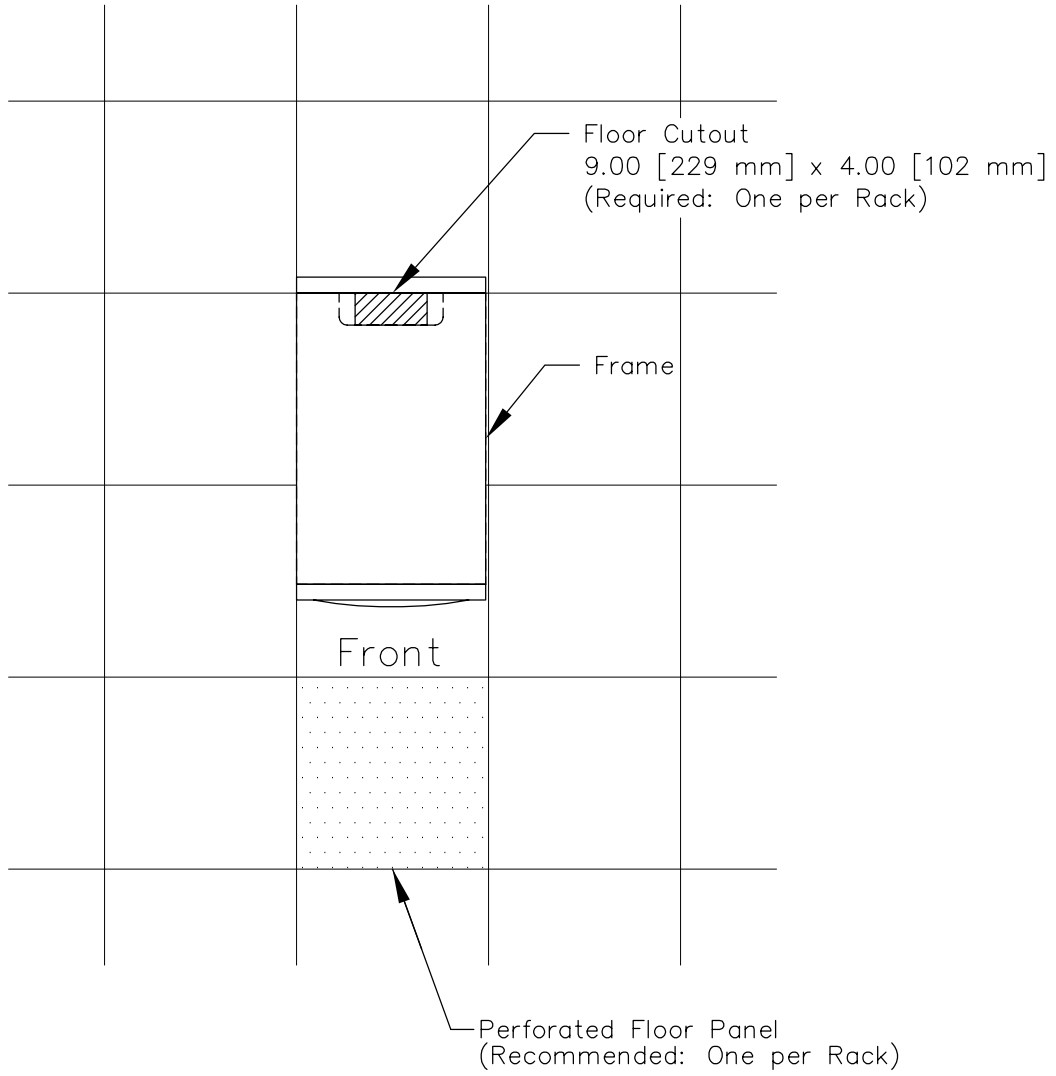


Figure 6-4 System Floor Cutout (Tall Rack)

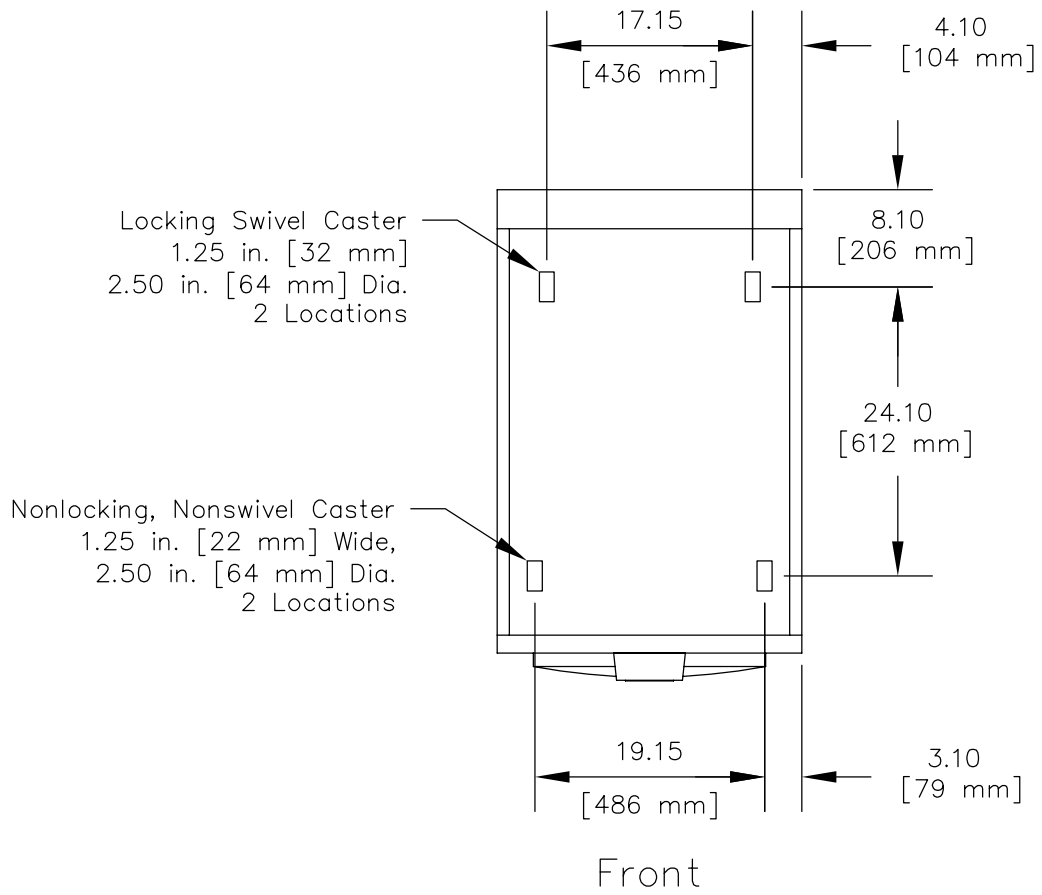


Figure 6-5 Caster Locations (Short Rack)

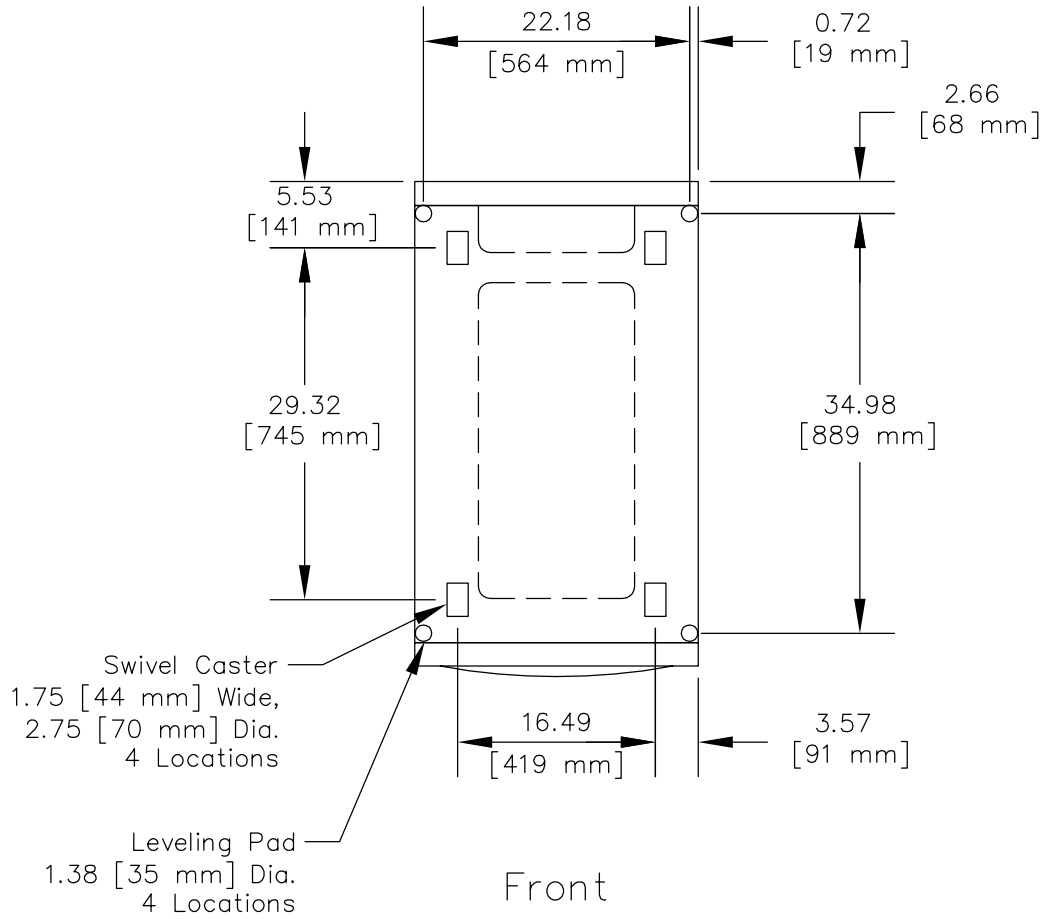


Figure 6-6 Caster and Leveler Locations (Tall Rack)

Securing the Cabinets

In areas that are prone to earthquakes, you should secure each SGI 300 rack system to the computer room subfloor. Four M12 threaded weld nuts are located on the underside of each cabinet frame for attachment to customer-supplied hold-down devices. The attachment points are shown in Figure 7-1 and Figure 7-2.

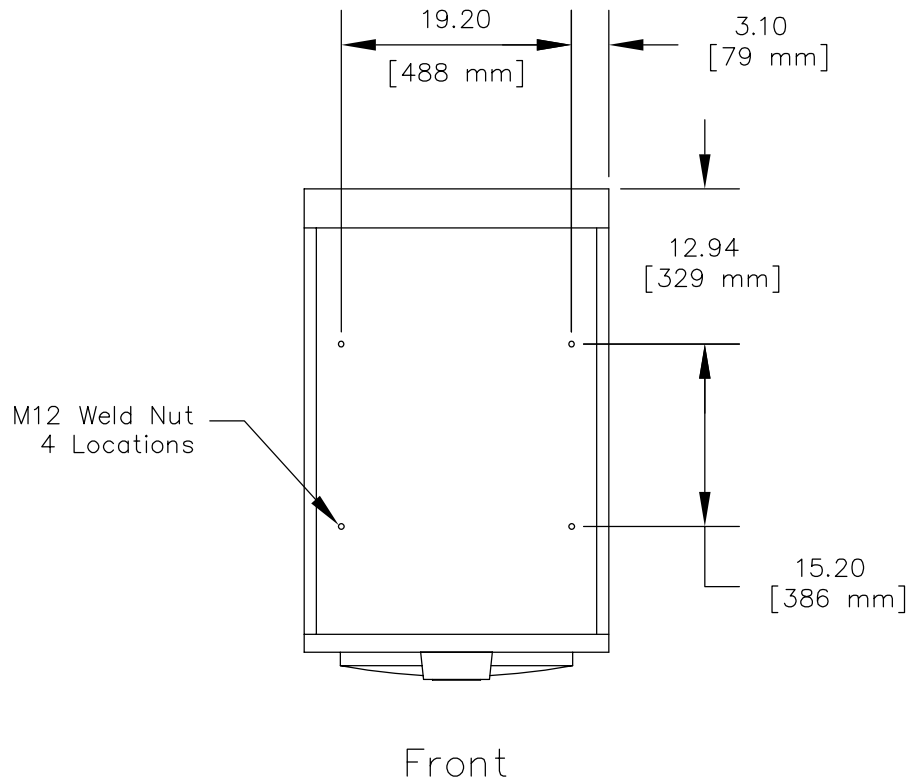


Figure 7-1 System Weld Nut Locations (Short Rack)

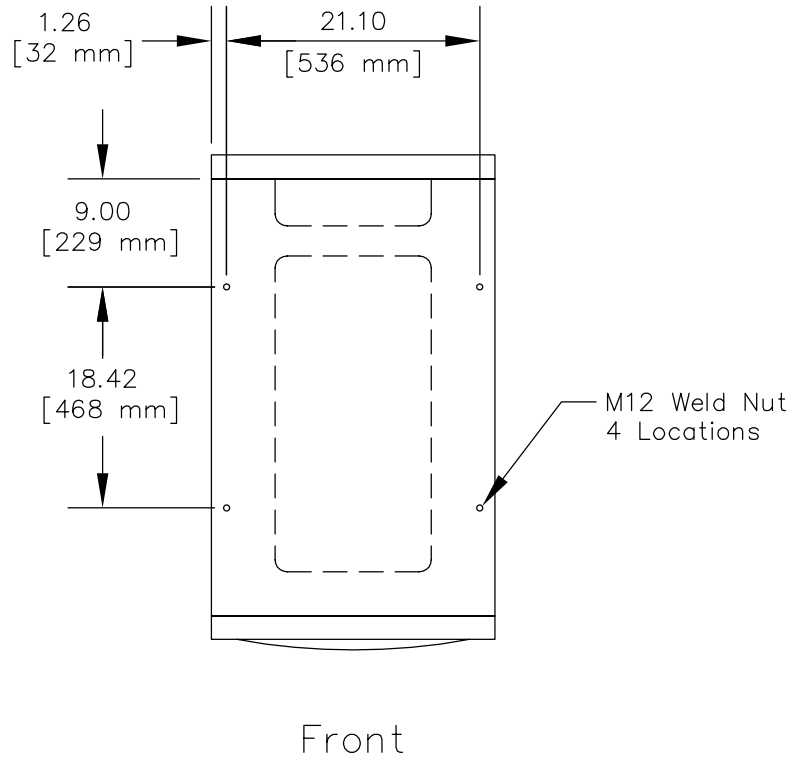


Figure 7-2 System Weld Nut Locations (Tall Rack)

Site Planning Checklist

Table 8-1 provides a site planning checklist that you can use as an organizational tool during the site planning and preparation process. During the planning process, you might discover additional preparation issues at your site that this checklist does not address. To discuss your site plans and to resolve any issues, contact an SGI site planning representative by one of the methods listed in the summary of this document.

Table 8-1 Site Planning Checklist

| Yes | No | Planning Issue | Comments |
|-----|----|--|----------|
| | | Have you determined the system configuration? Configuration: _____ | |
| | | Have you determined the installation date? Date: _____ | |
| | | What is the total number of system cabinets? | |
| | | Have you established the system location? | |
| | | Does the equipment floor layout meet the equipment maintenance access requirements? | |
| | | Is the equipment positioned so that the exhaust air of one heat-ejecting device does not enter the air inlet of another? | |
| | | Have you identified an access route to the final system location? | |
| | | Does the access route meet the access requirements for the system? | |
| | | Does the access route meet the floor-loading requirements for the system? | |
| | | Have you made provisions to cover irregular or engraved floor patterns along the access route to reduce vibration of the system while you move it? | |
| | | Will customer assistance be available to help unload, unpack, and move the system during delivery? | |

Table 8-1 Site Planning Checklist **(continued)**

| Yes | No | Planning Issue | Comments |
|-----|----|--|----------|
| | | Does your loading dock meet standard freight-carrier truck requirements? If not, have you allocated a forklift for delivery? Contact your site planning representative if you have concerns about your loading dock. | |
| | | Is a pallet jack available on-site to move the system in its shipping container to the final system location? | |
| | | Do the pallet-jack fork dimensions meet the requirements for the shipping container? | |
| | | Are the elevator and elevator door dimensions adequate? | |
| | | Is the elevator weight capacity adequate? | |
| | | Does each ramp in the access route have an incline that is less than 10 degrees? | |
| | | Did you order the power receptacles for your system? | |
| | | Are the circuit breakers for all cabinets properly installed and labeled? | |
| | | Are all power receptacles properly installed and labeled? | |
| | | Are the floor cutouts properly positioned and free of sharp edges? | |
| | | Are the recommended perforated floor panels properly positioned? | |
| | | Is the computer room floor strong enough to support the weight of the system? | |
| | | Can the computer room environment be properly maintained within the specifications listed in Table 6-1? | |
| | | Are telephone lines installed if you plan to implement remote support for your system? | |
| | | Have you trained system administrators or enrolled operators in the necessary training courses? | |

Summary

Now that you understand the basic configurations and requirements of the SGI 300 rack, you can make appropriate plans for your site. SGI site planning representatives are available for consultation regarding site planning and preparation. You may contact an SGI site planning representative by any of the following methods:

- Phone +1 715 726 2820, or in the USA: +1 888-744-8638, extension 676-2820
- Fax +1 715 726 2969
- E-mail site@sgi.com

SGI sales representatives and employees may access the following internal Site Planning website:

- <http://site.americas.sgi.com>

Appendix A

U.S. Customary Measure and Metric Measure Conversion

Table A-1 lists some useful conversions between U.S. customary measure and metric measure.

Table A-1 U.S. Customary to Metric Conversions

| U.S. Customary | Metric |
|----------------------------------|---------------------------|
| 1 inch | 2.54 cm |
| 1 foot | 30.48 cm |
| 1 square foot (ft ²) | 0.093 m ² |
| 1 pound (lb) | 0.4536 kg |
| 1 lb/ft ² | 4.88 kg/m ² |
| 1 cubic feet per minute (cfm) | 0.00047 m ³ /s |
| 1 British thermal unit (Btu) | 1055 joules |
| 0.3937 in. | 1 cm |
| 39.37 in. | 1 m |
| 10.76 ft ² | 1 m ² |
| 2.205 lbs | 1 kg |
| 0.205 lb/ft ² | 1 kg/m ² |
| 2127.66 cfm | 1 m ³ /s |
| 0.00095 Btu | 1 joule |

Fahrenheit-to-Celsius Conversion

$$\frac{(F - 32) \cdot 5}{9} = C$$

Start with the temperature in Fahrenheit, subtract 32 degrees, multiply by 5, and divide by 9. The result is the temperature in Celsius.

Celsius-to-Fahrenheit Conversion

$$\left(\frac{C \cdot 9}{5}\right) + 32 = F$$

Start with the temperature in Celsius, multiply by 9, divide by 5, and add 32 degrees. The result is the temperature in Fahrenheit.

Regulatory Specifications

The following sections present information that may be important to the operation of your SGI system.

Manufacturer's Regulatory Declarations

The SGI 300 family of products conforms to several national and international specifications and European Directives listed on the "Manufacturer's Declaration of Conformity." The CE insignia displayed on each device is an indication of conformity to the European requirements.

Caution: Each SGI system has several governmental and third-party approvals, licenses, and permits. Do not modify this product in any way that is not expressly approved by SGI. If you do, you may lose these approvals and your governmental agency authority to operate this device.

System Model Number

The CMN (model) number for each system is shown on the system label on the unit.

CE Notice and Manufacturer's Declaration of Conformity

Marking by the "CE" symbol indicates compliance of the device to directives of the European Community. A "Declaration of Conformity" in accordance with the standards has been made and is available from SGI upon request; please contact your local SGI account representative to obtain a copy.

Electromagnetic Emissions

FCC Notice (USA Only)

This equipment complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at the user's own expense.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by using one or more of the following methods:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Caution: Users should note that changes or modifications to the equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Industry Canada Notice (Canada Only)

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique n'émet pas de perturbations radioélectriques dépassant les normes applicables aux appareils numériques de Classe A prescrites dans le Règlement sur les interférences radioélectriques établi par le Ministère des Communications du Canada.

VCCI Notice (Japan Only)

この装置は、情報処理装置等電波障害自主規制協議会 (VCCI) の基準に基づくクラスA 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

Chinese Class A Regulatory Notice

警告使用者：

這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

Korean Class A Regulatory Notice

이 기기는 업무용으로 전자파적합등록을 한 기기이오니 판매자 또는 사용자는 이 점을 주의하시기 바라며 만약 잘못 판매 또는 구입하였을 때에는 가점용으로 교환하시기 바랍니다.

Shielded Cables

The SGI 300 family of products is FCC-compliant under test conditions that include the use of shielded cables between the system and its peripherals. Your system and any peripherals that you purchase from SGI have shielded cables. Shielded cables reduce the possibility of interference with radio, television, and other devices. If you use any cables that are not from SGI, ensure that they are shielded. Telephone cables do not need to be shielded.

Optional monitor cables supplied with your system use additional filtering that is molded into the cable jacket to reduce radio frequency interference.

Always use the cable that is supplied with your system. If your monitor cable becomes damaged, obtain a replacement cable from SGI.