

**Agilent TS-5410**  
**Compact Functional Test System**  
**Site Preparation and Installation Guide**



**Agilent Technologies**

# Notices

© Agilent Technologies, Inc. 2003, 2004

No part of this manual may be reproduced in any form or by any means (including electronic storage and retrieval or translation into a foreign language) without prior agreement and written consent from Agilent Technologies, Inc. as governed by United States and international copyright laws.

## Manual Part Number

E2230-90010

## Edition

Edition 2, June 2004

Printed in USA

Agilent Technologies, Inc.  
1601 California Street  
Palo Alto, CA 94304 USA

## Warranty

**The material contained in this document is provided “as is,” and is subject to being changed, without notice, in future editions. Further, to the maximum extent permitted by applicable law, Agilent disclaims all warranties, either express or implied, with regard to this manual and any information contained herein, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. Agilent shall not be liable for errors or for incidental or consequential damages in connection with the furnishing, use, or performance of this document or of any information contained herein. Should Agilent and the user have a separate written agreement with warranty terms covering the material in this document that conflict with these terms, the warranty terms in the separate agreement shall control.**

## Technology Licenses

The hardware and/or software described in this document are furnished under a license and may be used or copied only in accordance with the terms of such license.

## Restricted Rights Legend

If software is for use in the performance of a U.S. Government prime contract or sub-contract, Software is delivered and licensed as “Commercial computer software” as defined in DFAR 252.227-7014 (June 1995), or as a “commercial item” as defined in FAR 2.101(a) or as “Restricted

computer software” as defined in FAR 52.227-19 (June 1987) or any equivalent agency regulation or contract clause. Use, duplication or disclosure of Software is subject to Agilent Technologies’ standard commercial license terms, and non-DOD Departments and Agencies of the U.S. Government will receive no greater than Restricted Rights as defined in FAR 52.227-19(c)(1-2) (June 1987). U.S. Government users will receive no greater than Limited Rights as defined in FAR 52.227-14 (June 1987) or DFAR 252.227-7015 (b)(2) (November 1995), as applicable in any technical data.

## Safety Notices

---

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

---

---

A **WARNING** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a **WARNING** notice until the indicated conditions are fully understood and met.

---

# Safety Summary

The following general safety precautions must be observed during all phases of operation of this system. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the system. Agilent Technologies, Inc. assumes no liability for the customer's failure to comply with these requirements.

## General

This product is provided with a protective earth terminal. The protective features of this product may be impaired if it is used in a manner not specified in the operation instructions.

---

**WARNING: DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE**  
**Do not operate the system in the presence of flammable gases or flames.**

---

If the equipment in this system is used in a manner not specified by Agilent Technologies, the protection provided by the equipment may be impaired.

## Cleaning Instructions

Clean the system cabinet using a soft cloth dampened in water.

---

**WARNING: DO NOT REMOVE ANY SYSTEM COVER**

**Operating personnel must not remove system covers. Component replacement and internal adjustments must be made only by qualified service personnel. Equipment that appears damaged or defective should be made inoperative and secured against unintended operation until they can be repaired by qualified service personnel.**

---

## Environmental Conditions

Unless otherwise noted in the specifications, this system is intended for indoor use in an installation category II, pollution degree 2 environment. It is designed to operate at a maximum relative humidity of 80% and at altitudes of up to 2000 meters. Refer to the specifications tables for the ac mains voltage requirements and ambient operating temperature range.

## Before applying power

Verify that all safety precautions are taken. Note the external markings described in [“Safety Symbols and Regulatory Markings”](#) on page 4.

## Ground the System

To minimize shock hazard, the system chassis must have a hard-wired connection to an electrical protective earth ground. The system must also be connected to the ac power mains through a power cable that includes a protective earth conductor. The power cable ground wire must be connected to an electrical ground (safety ground) at the power outlet. Any interruption of the protective grounding will cause a potential shock hazard that could result in personal injury.

## Fuses

Use only fuses with the required rated current, voltage, and specified type (normal blow, time delay). Do not use repaired fuses or short-circuited fuse holders. To do so could cause a shock or fire hazard.

## Operator Safety Information

### MODULE CONNECTORS AND TEST SIGNAL CABLES CONNECTED TO THEM CANNOT BE OPERATOR ACCESSIBLE:

Cables and connectors are considered inaccessible if a tool (e.g., screwdriver, wrench, socket, etc.) or a key (equipment in a locked cabinet) is required to gain access to them.

Additionally, the operator cannot have access to a

conductive surface connected to any cable conductor (High, Low or Guard).

### ASSURE THE EQUIPMENT UNDER TEST HAS ADEQUATE INSULATION BETWEEN THE CABLE CONNECTIONS AND ANY OPERATOR-ACCESSIBLE PARTS (DOORS, COVERS, PANELS, SHIELDS, CASES, CABINETS, ETC.):














Verify there are multiple and sufficient protective means (rated for the voltages you are applying) to assure the operator will NOT come into contact with any energized conductor even if one of the protective means fails to work as intended. For example, the inner side of a case, cabinet, door, cover or panel can be covered with an insulating material as well as routing the test cables to the module's front panel connectors through non-conductive, flexible conduit such as that used in electrical power distribution.

## Safety Symbols and Regulatory Markings

Symbols and markings on the system, in manuals and on instruments alert you to potential risks, provide information about conditions, and comply with international regulations. [Table 1](#) defines the symbols and markings you may encounter.



**Table 1** Safety Symbols and Markings

Safety symbols	
	Warning: risk of electric shock.
	Caution: refer to accompanying documents.
	Alternating current.
	Both direct and alternating current.
	Earth (ground) terminal
	Protective earth (ground) terminal
	Frame or chassis terminal
	Terminal is at earth potential. Used for measurement and control circuits designed to be operated with one terminal at earth potential.
	Switch setting indicator. ○ = Off,   = On.
	Standby (supply); units with this symbol are not completely disconnected from ac mains when this switch is off. To completely disconnect the unit from ac mains, either disconnect the power cord, or have a qualified electrician install an external switch.
Regulatory Markings	
	The CE mark is a registered trademark of the European Community.
	The CSA mark is a registered trademark of the Canadian Standards Association.
 N10149	The C-tick mark is a registered trademark of the Spectrum Management Agency of Australia. This signifies compliance with the Australian EMC Framework regulations under the terms of the Radio Communications Act of 1992.
ISM 1-A	This text indicates that the product is an Industrial Scientific and Medical Group 1 Class A product (CISPR 11, Clause 4).

# Service and Support

Any adjustment, maintenance, or repair of this product must be performed by qualified personnel. Contact your customer engineer through your local Agilent Technologies Service Center.

## Agilent on the Web

You can find information about technical and professional services, product support, and equipment repair and service on the Web:

<http://www.agilent.com>

Click the link to **Test & Measurement**. Select your country from the drop-down menus. The Web page that appears next has contact information specific for your country.

## Agilent by Phone

If you do not have access to the Internet, call one of the numbers in [Table 2](#).

**Table 2** Agilent Call Centers and Regional Headquarters

<b>United States and Canada:</b>	Test and Measurement Call Center (800) 452 4844 (toll-free in US)
<b>Europe:</b>	(41 22) 780 8111
<b>Japan:</b>	Measurement Assistance Center (81) 0426 56 7832
<b>Latin America:</b>	305 269 7548
<b>Asia-Pacific:</b>	(85 22) 599 7777









## Chapter 1

<b>Site Preparation .....</b>	<b>11</b>
System Intended Use .....	11
Rack Layout.....	12
Ramp Requirements .....	13
Hallway and Door Width Requirements .....	13
If the system cannot be moved in the crate .....	13
System Requirements .....	14
Environmental Requirements .....	15
Corrosive Contaminants .....	15
Particulate Contaminants .....	15
Viscid Contaminants .....	15
Cooling Requirements .....	16
The Site Plan Drawing.....	17
AC Power Requirements .....	18
Important Information: .....	18
Alternate Disconnect Recommendation .....	19
Optional Emergency Disconnect Switch Recommendation .....	19

## Chapter 2

<b>Test System Installation .....</b>	<b>21</b>
Grounding and Connecting Power to the System.....	22
PC and Peripheral Connections .....	25
Power Strip Breakers .....	27
Fixture and UUT Connections.....	27
Getting Started .....	28
Making a Back Up System Image .....	28

<b>Index .....</b>	<b>29</b>
--------------------	-----------



# Chapter 1

## Site Preparation

---

This chapter describes how to prepare your site for installation of the Agilent E22xxA Automotive Functional Test System. Site preparation information includes:

- System Intended Use. . . . . page 11
- Rack Layout . . . . . page 12
- System Requirements . . . . . page 14
- Environmental Requirements . . . . . page 15
- The Site Plan Drawing . . . . . page 17
- AC Power Requirements. . . . . page 18
- Alternate Disconnect Recommendation . . . . . page 19

### System Intended Use

Agilent E22xxA systems are designed to fit under a manufacturing conveyor system, if necessary. The systems can handle 5 to 50 test points through the Test System Interface (Express Connect). Typical applications for E22xxA systems include testing of smart sensors and ECMs for remote keyless entry, climate control, sunroof and windows.

# Rack Layout

Figure 1-1 shows the system rack layout and rack dimensions.

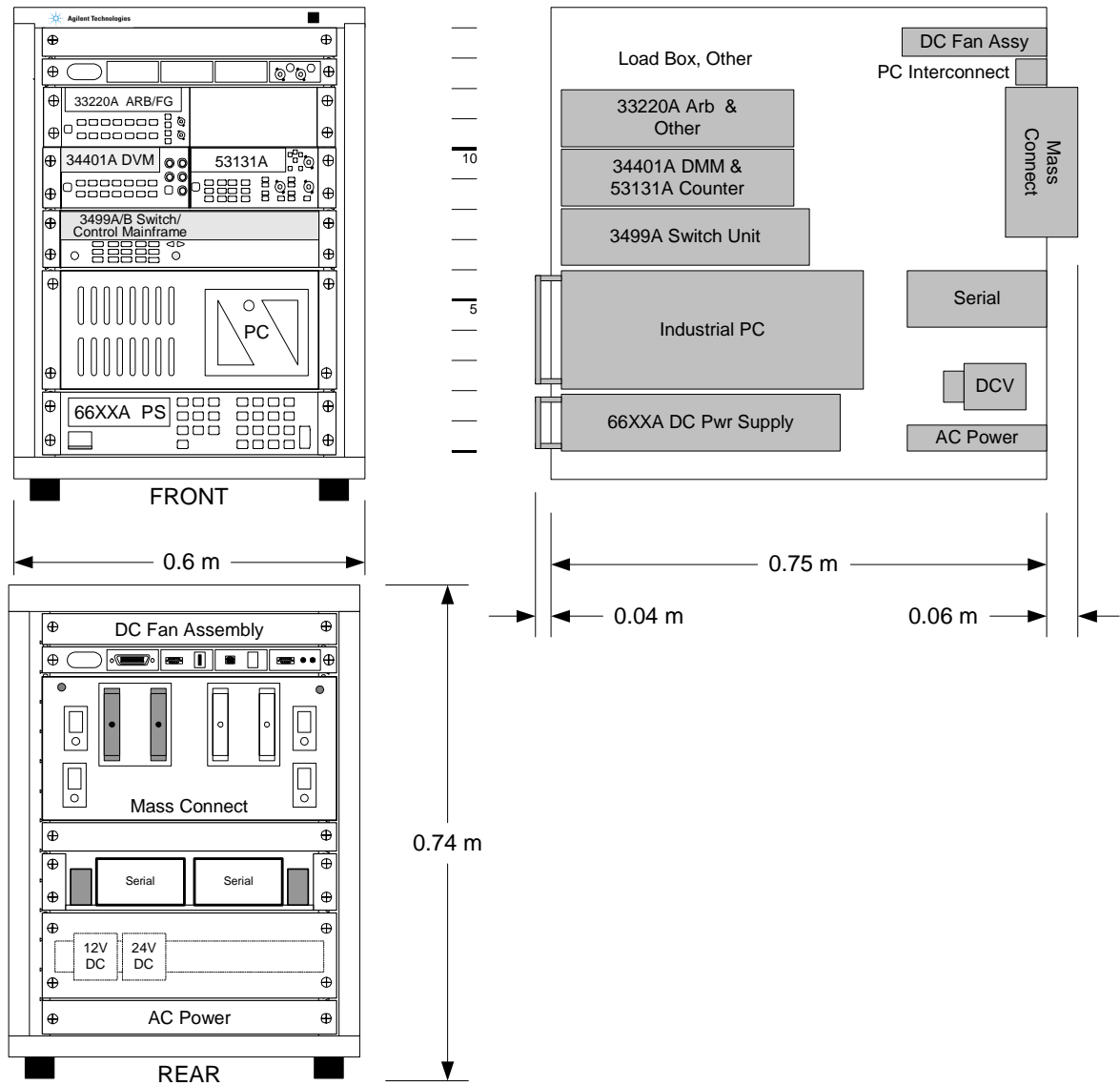


Figure 1-1. E22xxA Rack Layout

**Table 1-1. E22xxA Functional Test System Rack Specifications**

Size	Dimension	Height	Width	Depth	EIA
0.75m	Exterior	740mm (29.1in)	600mm (23.6in)	Outside of rack: 750mm (29.5in) Including Express Connect, PC and Power Supply overhangs: 850mm (33.46in)	15 RU

\*The approximate weight of a fully-loaded system is 112 kilograms (248 pounds) excluding the pallet and shipping crate. The pallet and shipping crate, together, weigh approximately 90 kilograms (200 pounds).

## **Moving Access Requirements**

The system is shipped from the factory on one pallet in a plywood shipping crate. The pallet may be too large to move directly to your system's destination.

## **Ramp Requirements**

The rack has casters and will negotiate ramps with inclines up to 8 percent before the leveling feet drag at the ramp transition.

## **Hallway and Door Width Requirements**

Make sure that all doors, elevators and passageways leading to the system's final location are large enough to allow passage of the crated system. The crated system requires the use of a floor jack or fork lift to engage the pallet and lift the crated system. The dimensions of the system crate including pallet are 41 inches W x 42.5 inches L x 53.25 inches H.

## **If the system cannot be moved in the crate**

Remove the system from the pallet in the receiving area and push it on the rack casters to the final destination if obstacles or lack of space restrict moving the crated system.

## **Note**

The rack casters can only transition very small floor level changes or gaps.

An uncrating document (Agilent part number E2230-90025) is attached to the outside of the crate and describes how to uncrate the system.

# System Requirements

This section provides additional specifications for installing the Agilent E22xxA Test System. This information will be useful for initial site preparation, as well as for later reference if it becomes necessary to move the system to a different location.

## Anti-Static Precautions

Static electricity is destructive to your production process and your Agilent E22xxA Test System. Careless handling and poor site planning can cause system reliability problems and reduce your product yield. The system may not be as easily damaged as the modules you will be testing, but good anti-static planning will help ensure high reliability.

---

**Caution** The system test rack is secured to the pallet of the shipping crate and wrapped with a plastic wrap. Do not move the crate or the test rack and pallet to a static sensitive area until you have removed the plastic wrap from the test rack.

---

While not an exhaustive list of anti-static precautions, here are some suggestions to consider as you plan your system area:

**Table 1-2. Suggested Anti-static Solutions for Site Planning.**

Precaution	Suggested Solution
Anti-static flooring	Plan to use an anti-static floor covering or mats.
Grounding straps	Plan for foot straps in conjunction with anti-static flooring and wrist straps for system operators.
Anti-static UUT storage	Plan for anti-static tote bins for your units-under-test and storage for anti-static bags.
Anti-static hardware	Consider the use of any devices that will help you maintain a static-free environment. Examples are wrist strap testers and ion generators.

# Environmental Requirements

The air quality, temperature and humidity requirements for the system are described below.

## Air Quality

As a rule, good air quality is as important for the reliability of your test system as it is for your production process. The presence of airborne contaminants at the site will contribute to system degradation, resulting in lower reliability and higher operating costs. Three types of airborne contaminants are discussed below.

## Corrosive Contaminants

Corrosion is a complex form of material deterioration or destruction by chemical or electrochemical reaction. The presence of corrosive contaminants (gases) in the atmosphere is very common in industrial environments. If ignored, corrosion can eventually degrade system performance by its effects on high-impedance circuits and low-impedance interfaces. It can also deteriorate most plastics including software storage media. The effects of corrosive contaminants are usually accelerated at high humidities or high temperatures.

Corrosives generally cannot be filtered out of the air by normal filtration methods, and the techniques that must be used for their removal are complex and costly. If the source of corrosive contaminants cannot be eliminated, the system should be installed in an enclosed environment with a fresh air supply at positive pressure.

## Particulate Contaminants

Particulate contaminants (hard particles) consist of smoke, dust, hair, lint, fibers and miscellaneous organic and inorganic materials. The presence of these contaminants in the air can cause system degradation, especially where disk drives, test fixtures, and low-impedance interfaces are concerned. Particulate contaminants can be filtered from the air, and appropriate filters should be included with any air conditioning installation. Also consider installing “No Smoking” signs in the area. Tobacco smoke is a well-known factor in fixture contact contamination. It causes false failures leading to unnecessary device under test/test system repairs, and higher production costs.

## Viscid Contaminants

Viscid contaminants are oily or sticky airborne substances that can be deposited on the system's electronic and mechanical parts. Besides contributing directly to system degradation, viscid contaminants collect and hold particulate contaminants and make cleaning very difficult. Viscid contaminants can be removed from the air by filtration, but it is preferred that the source of viscid contaminants be identified and the contaminants be eliminated at their source.

## Temperature Requirements

The Agilent E22xxA Test System is designed to operate in the range from 5° C to 40° C (41° F to 104° F).

## Cooling Requirements

As an option to the system, the system rack can be equipped with three extractor fans which draw air through the rack and exhaust it through the top rear of the rack. With the rack side panels and top installed, the fans must be operational to prevent excessive heat rise inside the rack.

---

### Caution

**As a convenience, the switch marked 'Fan Switch Only' can be switched off during maintenance when the rack side panels and top are removed. To prevent equipment damage from overheating, the fans should be turned on at all other times when the rack side panels and top are in place.**

---

## Humidity Requirements

The test system is designed to operate in the range from 5 percent to 80 percent relative humidity (non-condensing).

If the system is subjected to condensation, as when moved from a cold loading dock into a warm (and damper) environment, allow at least 24 hours for the system to dissipate the condensation before powering up.

## Pollution Degree

Degree 2 (IEC 664) (Indoor use only)

## Maximum Altitude

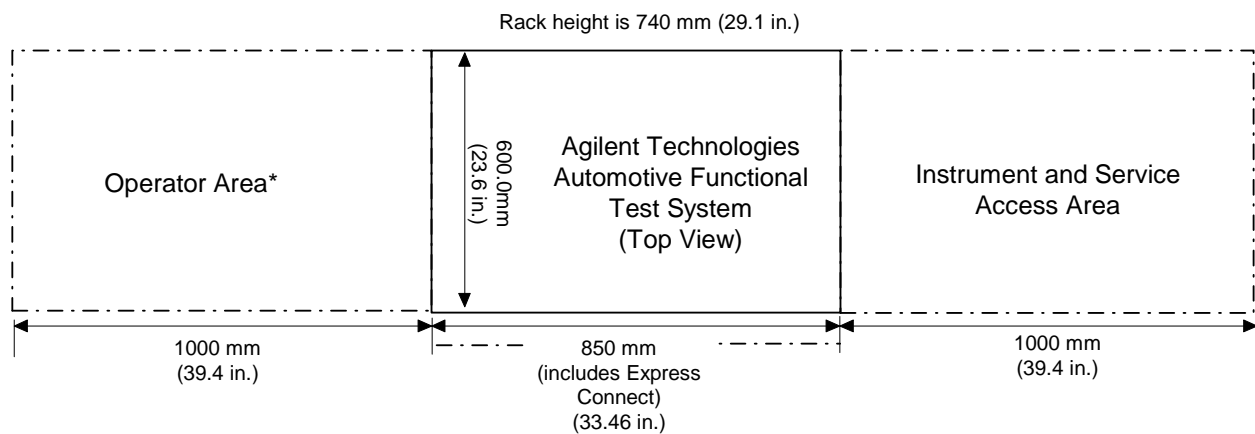
2000 meters



# The Site Plan Drawing

A system plan drawing should be used for all aspects of the site preparation. A complete drawing should detail power availability, LAN availability and system placement with respect to other equipment. It can also serve to verify physical access for operators and maintenance personnel.

Figure 1-2 shows a typical layout for a typical Agilent E22xxA Automotive Functional Test System. If the operator will be positioned in front of the system, allow 1 meter (3.3 feet) of space in front of the system. You should allow 1 meter (3.3 feet) of space behind the system for service. The 0.75 meter rack is designed to fit under many production lines.



*\*For example purposes only. The operator does not have to be positioned in front of the system.*

**Figure 1-2. Typical test system layout (overhead view)**

# AC Power Requirements

Agilent E22xxA Automotive Functional Test Systems are equipped with a Filtered Power Strip that distributes AC Mains power to the various system equipment. Figure 2-3 shows the location of the Filtered Power Strip. The standard system is configured for 230-240 VAC, single-phase, 50/60 Hz. The system can be configured for other single-phase voltages by contacting Agilent service personnel. Some instrumentation within the system must be reconfigured. The possible voltage ranges and currents are as follows:

- 100 VAC, 8 A,
- 110 - 120 VAC, 8 A,
- 200 - 220 VAC, 4 A,
- 230 - 240 VAC, 4 A.

## System Power Recommendations

The system is to be supplied from a dedicated 15/16 Amp single-phase service at the voltage for which the system is configured. The system is delivered with a mating power connector for the system appliance inlet.

A customer supplied power cord must meet the requirements of the country where the system is installed.

A supplemental Protective Earth ground wire is required for leakage current.

---

<b>Caution</b>	<b>Verify the AC source and that service conductors are sized correctly before connecting the system.</b>
----------------	---

---

### Important Information:

- Conventional 50/60-hertz current probes will not make accurate input current measurements of the system's power supplies due to the harmonics on the currents. A current measuring instrument needs a bandwidth that is above 10 kHz. Improper instruments may yield results that are 50 percent less than actual.

# Alternate Disconnect Recommendation

The ON/OFF switch on the front of the system DOES NOT remove power from the rack.

## Mains Disconnect

A mains disconnect for emergency purposes can be as simple as unplugging the power cord from the power source receptacle. The receptacle and power cord plug must be easily accessible to use this method for emergency power shut-down. Use the optional emergency disconnect switch described below if you require an emergency power off feature.

## Optional Emergency Disconnect Switch Recommendation

Emergency power off (EMO) capability is not provided with the Filtered Power Strip. An external mains disconnect switch or breaker should be installed adjacent to the equipment for easy access. Usual mounting is an approved enclosure on a floor-mounted pedestal. If an external emergency off (EMO) is required, it should be installed by a qualified electrician and comply with the following:

- Rated for the maximum system amperage (15/16 Amp).
- Approved for use in building installations in your locality.
- Marked "Emergency OFF" or the equivalent in your local language.
- "Off" position clearly marked.
- Capable of locking in the "Off" position, but not in the "On" position.
- Capable of opening all phases and neutral conductors, but not the safety grounding conductor.



## Chapter 2

# Test System Installation

---

This chapter describes how to ground the system, connect power to the system, make PC and peripheral connections and how to backup the system software. Chapter contents are:

- Grounding and Connecting Power to the System . . . . . page 22
- PC and Peripheral Connections. . . . . page 25
- Fixture and UUT Connections . . . . . page 27
- Getting Started . . . . . page 28
- Making a Back Up System Image. . . . . page 28

---

**Note** An uncrating document (Agilent part number E2230-90025) is attached to the outside of the crate and describes how to uncrate the system.

---

# Grounding and Connecting Power to the System

Agilent E22xxA Automotive Functional Test Systems are equipped with a Filtered Power Strip that distributes AC Mains power to the various system equipment. The system is delivered with a mating power connector for the system appliance inlet.

The system IS NOT supplied with a power cord or wall outlet connector. A customer supplied power cord must meet the requirements of the country where the system is installed. The power cord must be installed by a qualified electrician. A supplemental Protective Earth ground wire is required for leakage current.

## Procedure

The following procedure shows how to ground the system and connect the power plug and power cord to the system.

---

<b>WARNING</b>	<b>All steps are to be done by a qualified, licensed electrician with AC POWER SHUT OFF.</b>
----------------	--

---

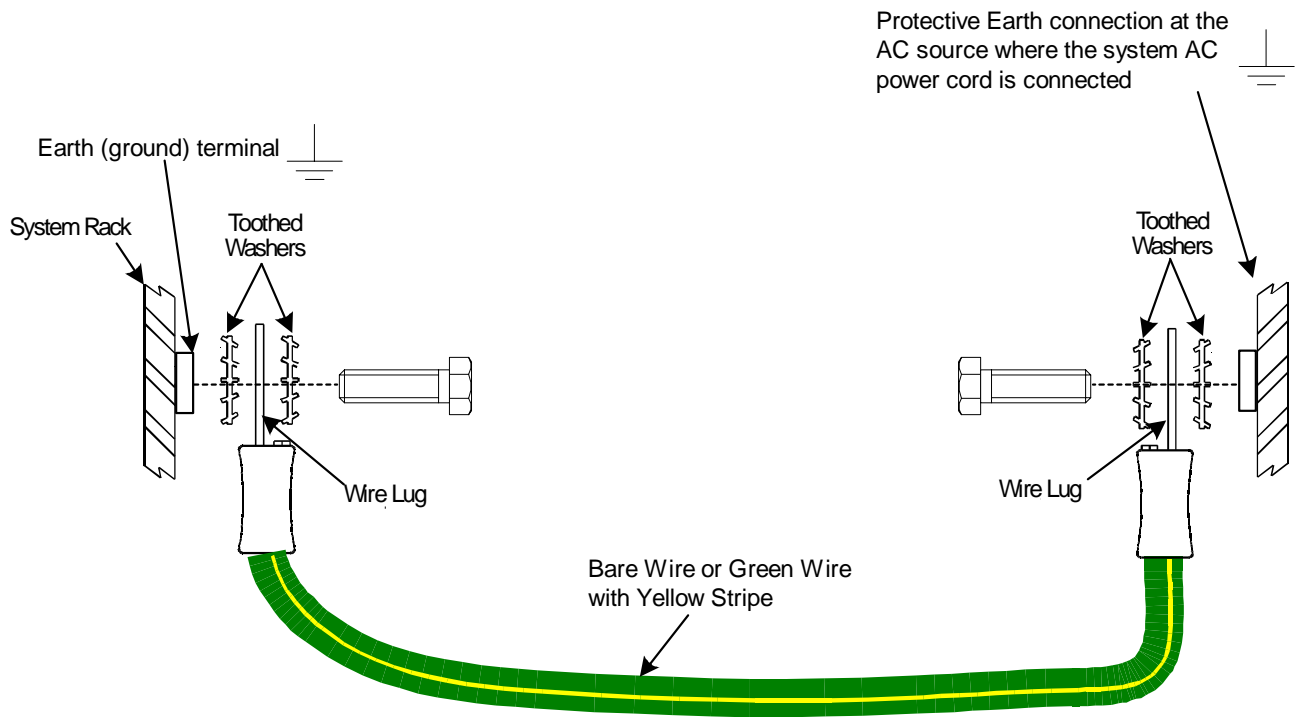
---

<b>WARNING</b>	<b>For protection from electrical shock, connect the system rack to permanent earth ground.</b>
----------------	---

---

1. Roll the test rack to its final position. Lower the test rack leveling feet to stabilize the rack and prevent it from rolling
2. Make a permanent connection from the system rack to protective earth ground. This connection will serve as a redundant Protective Earth Connection to the primary Protective Earth connection, which is part of the AC power cord. The "Earth (ground) terminal" found at the bottom of the system rack, see Figure 2-1, should be connected by a wire separate from the system AC power cord to the Protective Earth connection at the AC source where the system AC power cord is connected. The wire must be the same wire size as the protective conductor of the system AC power cord. The wire may be either a bare conductor or a green with yellow stripe insulated conductor.

The redundant Protective Earth connection wire shall have a correctly sized wire lug on both ends. The wire lugs shall also be sized to fit the "Earth (ground) terminal" stud or bolt as found on the system rack and for the Protective Earth connection at the source end of system AC power cord. In some cases, the Protective Earth connection at the source end of the system AC power cord will receive the conductor without a wire lug.



**Figure 2-1. Safety Ground Connections**

3. Locate the power strip's power connector (Figure 2-2). This is an IEC320/C19 connector.

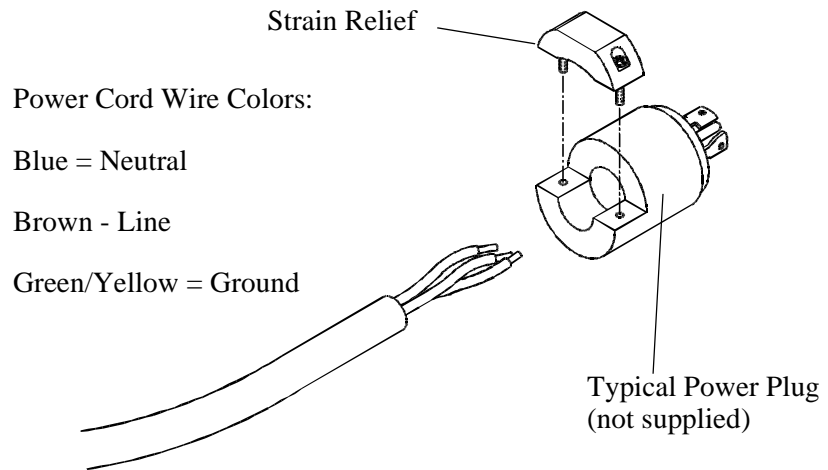


**Figure 2-2. Power Strip's Power Connector**

---

**Note** Some systems are shipped with an unterminated power cord. Wiring information for this cord is shown in Figure 2-3.

---



**Figure 2-3. Unterminated Power Cord (not supplied with all systems)**

---

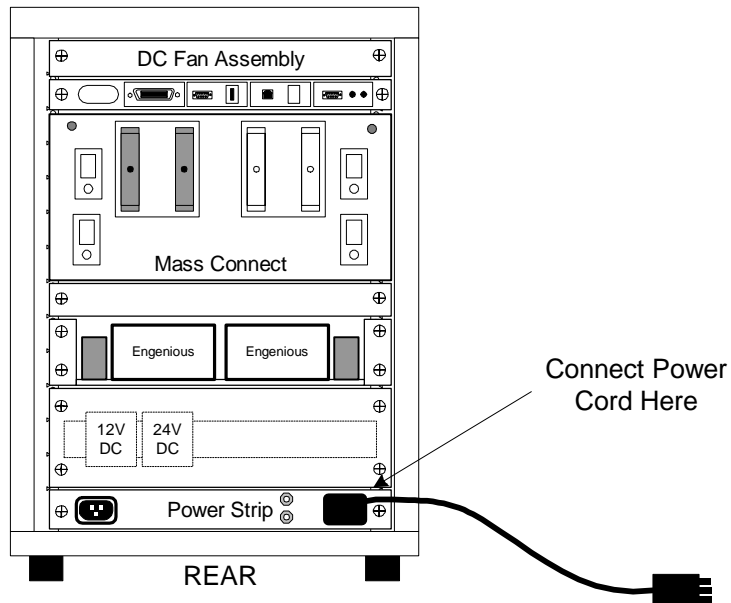
**Note** The power cord and wall outlet connector selected must conform to the requirements of the country where the system will be installed. All electrical connections must be done by a qualified electrician

---

4. Determine the power plug type needed and, if necessary, the power cord needed. Make the appropriate connections between the cord and wall outlet connector and the Power Connector.
5. Set the power switch on the top front of the rack to the off position. Connect the power cord to the Filtered Power Strip located in the



lower rear of the test stand.



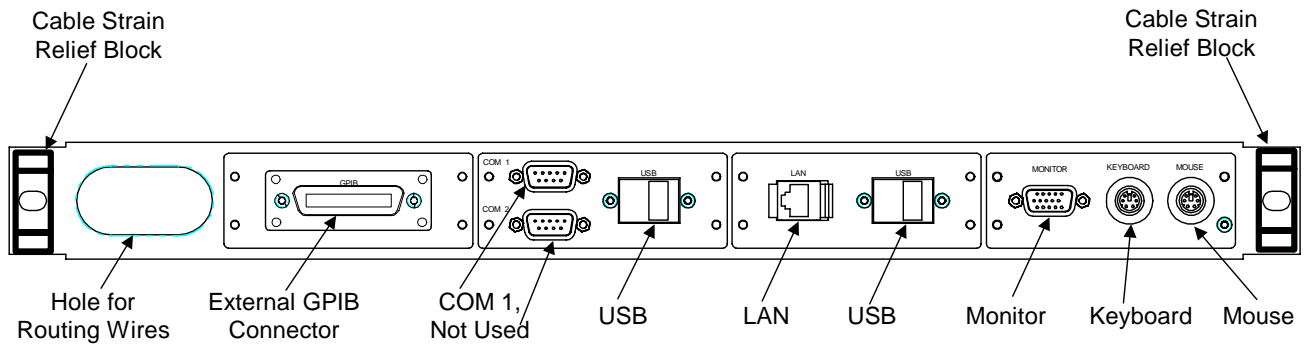
**Figure 2-4. Filtered Power Strip/Cord Location**

6. Plug-In the power cord to the power receptacle. Perform the following procedure “PC and Peripheral Connections” before turning on the system power switch.

## PC and Peripheral Connections

For your convenience, PC connections have been brought out to the rear of the system on the PC and GPIB Connector Panel (Figure 2-5).

1. Connect the monitor, keyboard, mouse, LAN and any USB or serial devices such as barcode readers and strip printers to this connector panel. .



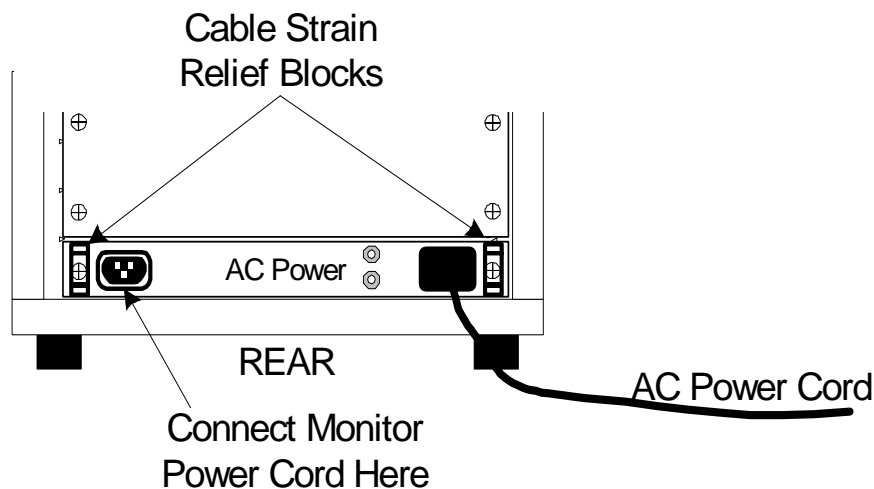
**Figure 2-5. PC and GPIB Connector Panel**

2. Connect the monitor's power cord to the receptacle on the Filtered Power Strip located in the bottom rear of the rack (Figure 2-6).

---

**Note** The monitor receptacle is rated for 2 Amp maximum current.

---



**Figure 2-6. Monitor Power Connector**

3. Use cable tie wraps to secure the cables to the Cable Strain Relief Blocks. After securing all cables, you can apply power to the system by setting the front panel on off switch to ON.

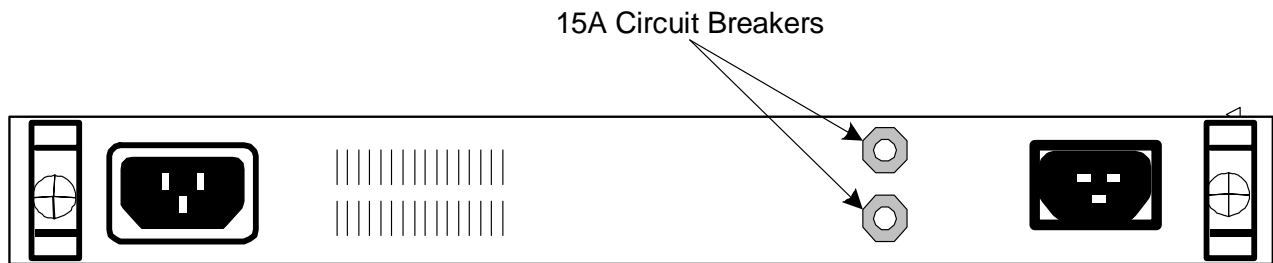
---

**Note** DO NOT secure the AC power cord to the cable strain relief bracket such that it would prevent the plug from being removed from the power strip in an emergency.

---

## Power Strip Breakers

The Filtered Power Strip contains two 15A breakers, one on Line, one on Neutral (Figure 2-7). When a breaker opens (trips), a red mark can be seen on the breaker switch. Press the breaker button to reset.



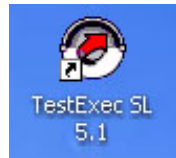
**Figure 2-7. Filtered Power Strip Circuit Breakers**

## Fixture and UUT Connections

The Test System Interface on the front of the system allows you to make connections between the test system and the UUT fixturing. Refer to the E22xxA Test System Interface Wiring Guide for more information.

# Getting Started

The Agilent TestExec SL software is pre-installed on your PC controller's hard drive. Agilent TestExec SL allows you to create testplans to control instruments and switching. Start TestExec SL from this icon in the PC desktop:



You can also run TestExec SL by clicking:

***Start / Programs / Agilent TestExec SL 5.1 / TestExec SL 5.1***

## Getting Started Examples

The TS-5400 Online Help contains getting started examples for E22xxA systems. To access the getting started examples, from TestExec SL, click:

***Tools / TS-5400 Online Help***

The help file opens up to a selection of getting started examples. Click the link that corresponds to your system.

## Wiring Information

An “E22xxA Wiring and Hardware Reference Guide” is included with your system. This guide shows you how to make connections to the system's Test System Interface. This manual is also available from Test Exec SL by clicking:

***Tools / TS-5400 Online Manuals***

This opens a directory of all online manuals. Click the appropriate link to access the wiring guide for your system.

# Making a Back Up System Image

Agilent STRONGLY recommends you use a tool such as Symantec Ghost (not supplied with the system) to make a back up image of your system software. You should make a back up now, immediately after installing the system, and periodically as time goes on to capture any development efforts and software changes. Having a back up image greatly simplifies the process of system recovery following such catastrophic events such as a hard disk crash. With Symantec Ghost you can make a complete duplicate image of the OS and software on your system. Back ups can be made to a network shared drive or to the system DVD writer.

## A

Access, for moving, 13  
Air Quality Requirements, 15  
Alternate Disconnect Recommendation, 19  
Altitude, 16  
Anti-Static precautions, 14

## B

Backing Up the System Image, 28

## C

Circuit breakers, Power Strip, 27  
COM1, COM2, 25  
Connecting ground, 22  
Connecting power, 22  
Cooling Requirements, 16  
Corrosive Contaminants, 15

## D

Dimensions, rack, 12  
Drawing, rack, 12

## E

Emergency power off, 19  
EMO, 19  
Environmental Requirements, 15

## F

Factory Layout, 17  
Filtered power strip, 25  
Front view, rack, 12

## G

GPIO connector, 25  
Grounding and connecting power to the system, 22

## H

Hallway and Door Width Requirements, 13  
Hole for routing wires, 25  
Humidity Requirements, 16

## I

IEC320/C19 connector, 23  
If the system cannot be moved in the crate, 13

## K

Keyboard, 25

## L

LAN, 25  
Layout of the System, 17

## M

Mains Disconnect, 19  
Monitor, 25  
Mouse, 25  
Moving Access Requirements, 13

## O

Optional Emergency Disconnect Switch, 19

## P

Particulate Contaminants, 15  
PC and GPIO Connector Panel, 26  
PC and peripheral connections, 25  
Peripheral connections, 25  
Plan, site, 17  
Plug, connections, 23  
Pollution Degree, 16  
Power Connector, 23  
Power cord location, 25  
Power plug connections, 23  
Power strip, 25  
Power Strip Circuit Breakers, 27  
Power strip/cord location, 25  
Power, connecting, 22

## R

Rack layout, 12  
Ramp Requirements, 13

## **S**

Safety Ground Structure, 23  
Side view, rack, 12  
Site plan, 17  
Static, precautions, 14  
System Power Options, 19  
System Weight, 13

## **T**

Temperature Requirements, 16  
Top view, rack, 12  
Typical Power Plug Connections, 23  
Typical test system layout (overhead view, 17

## **U**

USB, 25

## **V**

Viscid Contaminants, 15

## **W**

Weight, 13