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S530 Parametric Test System

Administrative Guide

S530-924-01 Rev. A / January 2014

S530-924-01

A Greater Measure of Confidence

KEITHLEY
A Tektronix Company

S530 Parametric Test Systems

Administrative

Guide

Document number: S530-924-01 Rev. A / January 2014

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Safety precautions

The following safety precautions should be observed before using this product and any associated instrumentation. Although some instruments and accessories would normally be used with nonhazardous voltages, there are situations where hazardous conditions may be present.

This product is intended for use by qualified personnel who recognize shock hazards and are familiar with the safety precautions required to avoid possible injury. Read and follow all installation, operation, and maintenance information carefully before using the product. Refer to the user documentation for complete product specifications.

If the product is used in a manner not specified, the protection provided by the product warranty may be impaired.

The types of product users are:

Responsible body is the individual or group responsible for the use and maintenance of equipment, for ensuring that the equipment is operated within its specifications and operating limits, and for ensuring that operators are adequately trained.

Operators use the product for its intended function. They must be trained in electrical safety procedures and proper use of the instrument. They must be protected from electric shock and contact with hazardous live circuits.

Maintenance personnel perform routine procedures on the product to keep it operating properly, for example, setting the line voltage or replacing consumable materials. Maintenance procedures are described in the user documentation. The procedures explicitly state if the operator may perform them. Otherwise, they should be performed only by service personnel.

Service personnel are trained to work on live circuits, perform safe installations, and repair products. Only properly trained service personnel may perform installation and service procedures.

Keithley Instruments products are designed for use with electrical signals that are measurement, control, and data I/O connections, with low transient overvoltages, and must not be directly connected to mains voltage or to voltage sources with high transient overvoltages. Measurement Category II (as referenced in IEC 60664) connections require protection for high transient overvoltages often associated with local AC mains connections. Certain Keithley measuring instruments may be connected to mains. These instruments will be marked as category II or higher.

Unless explicitly allowed in the specifications, operating manual, and instrument labels, do not connect any instrument to mains.

Exercise extreme caution when a shock hazard is present. Lethal voltage may be present on cable connector jacks or test fixtures. The American National Standards Institute (ANSI) states that a shock hazard exists when voltage levels greater than 30 V RMS, 42.4 V peak, or 60 VDC are present. A good safety practice is to expect that hazardous voltage is present in any unknown circuit before measuring.

Operators of this product must be protected from electric shock at all times. The responsible body must ensure that operators are prevented access and/or insulated from every connection point. In some cases, connections must be exposed to potential human contact. Product operators in these circumstances must be trained to protect themselves from the risk of electric shock. If the circuit is capable of operating at or above 1000 V, no conductive part of the circuit may be exposed.

Do not connect switching cards directly to unlimited power circuits. They are intended to be used with impedance-limited sources. NEVER connect switching cards directly to AC mains. When connecting sources to switching cards, install protective devices to limit fault current and voltage to the card.

Before operating an instrument, ensure that the line cord is connected to a properly-grounded power receptacle. Inspect the connecting cables, test leads, and jumpers for possible wear, cracks, or breaks before each use.

When installing equipment where access to the main power cord is restricted, such as rack mounting, a separate main input power disconnect device must be provided in close proximity to the equipment and within easy reach of the operator.

For maximum safety, do not touch the product, test cables, or any other instruments while power is applied to the circuit under test. ALWAYS remove power from the entire test system and discharge any capacitors before: connecting or disconnecting cables or jumpers, installing or removing switching cards, or making internal changes, such as installing or removing jumpers.

Do not touch any object that could provide a current path to the common side of the circuit under test or power line (earth) ground. Always make measurements with dry hands while standing on a dry, insulated surface capable of withstanding the voltage being measured.

For safety, instruments and accessories must be used in accordance with the operating instructions. If the instruments or accessories are used in a manner not specified in the operating instructions, the protection provided by the equipment may be impaired.

Do not exceed the maximum signal levels of the instruments and accessories, as defined in the specifications and operating information, and as shown on the instrument or test fixture panels, or switching card.

When fuses are used in a product, replace with the same type and rating for continued protection against fire hazard.

Chassis connections must only be used as shield connections for measuring circuits, NOT as protective earth (safety ground) connections.

If you are using a test fixture, keep the lid closed while power is applied to the device under test. Safe operation requires the use of a lid interlock.

If a  screw is present, connect it to protective earth (safety ground) using the wire recommended in the user documentation.

The  symbol on an instrument means caution, risk of danger. The user must refer to the operating instructions located in the user documentation in all cases where the symbol is marked on the instrument.

The  symbol on an instrument means caution, risk of electric shock. Use standard safety precautions to avoid personal contact with these voltages.

The  symbol on an instrument shows that the surface may be hot. Avoid personal contact to prevent burns.

The  symbol indicates a connection terminal to the equipment frame.

If this  symbol is on a product, it indicates that mercury is present in the display lamp. Please note that the lamp must be properly disposed of according to federal, state, and local laws.

The **WARNING** heading in the user documentation explains dangers that might result in personal injury or death. Always read the associated information very carefully before performing the indicated procedure.

The **CAUTION** heading in the user documentation explains hazards that could damage the instrument. Such damage may invalidate the warranty.

Instrumentation and accessories shall not be connected to humans.

Before performing any maintenance, disconnect the line cord and all test cables.

To maintain protection from electric shock and fire, replacement components in mains circuits — including the power transformer, test leads, and input jacks — must be purchased from Keithley Instruments. Standard fuses with applicable national safety approvals may be used if the rating and type are the same. Other components that are not safety-related may be purchased from other suppliers as long as they are equivalent to the original component (note that selected parts should be purchased only through Keithley Instruments to maintain accuracy and functionality of the product). If you are unsure about the applicability of a replacement component, call a Keithley Instruments office for information.

To clean an instrument, use a damp cloth or mild, water-based cleaner. Clean the exterior of the instrument only. Do not apply cleaner directly to the instrument or allow liquids to enter or spill on the instrument. Products that consist of a circuit board with no case or chassis (e.g., a data acquisition board for installation into a computer) should never require cleaning if handled according to instructions. If the board becomes contaminated and operation is affected, the board should be returned to the factory for proper cleaning/servicing.

Safety precaution revision as of January 2013.

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Section 1

S530 System

In this section:

Introduction 1-1
System description 1-1

Introduction

If you have any questions after reviewing this information, contact your local Keithley Instruments representative or call one of our applications engineers at 1-888-KEITHLEY (1-888-534-8453) within the U.S. and Canada. You can also visit the Keithley Instruments website at www.keithley.com for updated worldwide contact information.

System description

The Keithley Instruments S530 Parametric Test System is a configurable, instrument-based system for semiconductor parametric characterization and testing. There are two different S530 systems available:

- S530 low-current parametric test system
- S530 high-voltage parametric test system

NOTE

The LO patch panel and the high-voltage safety interlocks are not visible from the front (see next figure).

The S530 systems have flexible hardware configurations that allow you to customize them to your specific needs. See the next table for a description of the main system configuration options, and see the next figure.

S530 system configuration options

DC source measure units (SMU)	• 2 to 8 maximum • Maximum number of units depends on other items in the system rack • Model 2410 high-voltage SMU
6-slot switching matrix	Model 707B with either: • Model 7072-HV switch card • Model 7072-HVD switch card • Model 7530 switch card
Optional capacitance/voltage (C-V)	• 1 channel of C-V • Based on Model 4200-SCS with CVU card
Optional instruments	• DMM • Up to 3 dual-channel pulse cards • Frequency measurement option
Each system contains:	• Computer inside cabinet • External 20-inch flat-panel monitor and keyboard mounted on exterior of cabinet • S530 system software – Keithley Test Environment (KTE) or Automated Characterization Suite (ACS) • Lo patch panel • Interlock system
Other options:	• Seismic bracing kit for additional resistance to seismic forces • Adjustable cable support arm

Figure 1: S530 parametric test system configuration example

Optional accessories

Optional items and accessories that may accompany the S530 system:

- Cables to connect to the test fixture or the probe card adapter
- Model 9139A-PCA (probe card adapter)
- Heavy duty seismic kit
- Adjustable cable support arm

Section 2

S530 Site preparation and installation

In this section:

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Site preparation checklist

The following table provides a site preparation checklist to help you prepare your site for the S530 system in your facility. If you find that an item listed is not valid for your site, then you can indicate it with "N/A."

S530 system preparation checklist

Site	Item
	Is it necessary to have lifting equipment?
	Is the flooring adequate and able to support the weight of the system while moving from receiving to the final destination (see the Floor plan (on page 2-21) specifications)?
	Are all of the corridors and hallways able to allow clearance for the system?
	Are stairways adequate for moving the system through?
	Are elevators needed to move equipment? Can they support the size and weight of the system?
	Are the doorways wide enough for the system?
	If you are using a Probe Card Adapter you must supply a vacuum connection (20 inch / 50.80 cm Hg).
Floor plan	**Item**
	Did you complete the system layout (see the Floor plan (on page 2-21) specifications)?
	Does your layout show all of the locations for all of the equipment?
	Does your system layout show the locations of all doors and aisles?
	Does you layout allow for the proper clearance of the system for the front, rear, and the keyboard/monitor arm?
	Is there enough space for personnel safety, comfort, and freedom of movement?
	Did you take future expansions into consideration?
	Is there sufficient space for any supplies or manuals?

Electrical power	Item
	Is adequate and proper electrical power available (see the Line power requirements (on page 2-16) specifications)?
	Is something connected to the same power source that generates noise?
	Is something that requires substantial amounts of current connected to the same power source?
	Did you prepare power outlets for service, or testing, or maintenance?

Unpacking the S530 system

The Keithley field service engineer (FSE) is responsible for unpacking the S530 system cabinet and the accessories (which is in a separate box). However, it is recommended that the customer moves the crate and the accessories box to the area where the system is going to be used. Here is a list of tools needed for unpacking:

- Standard screw driver
- Socket wrench
- Socket head: 19 millimeters (mm) (or 3/4 inch)

The following information will help you when you begin to unpack your system.The system is shipped in a wooden crate (see next figure).

Figure 2: S530 system cabinet in shipping crate

Unpacking system components

Inspect the shock sensor located on the outside of the shipping box (see next figure). If the shock sensor indicates a shock condition, conduct a very thorough inspection of all components contained in the system cabinet. Also, check the "TIP N TELL" indicator to ensure that the crate has not been tipped over (see the appropriate figure). Report any damage to the shipping agent immediately. Carefully remove all system components from the crate. While unpacking, make sure there is no component damage. Please reuse or recycle packaging materials in accordance with your local requirements.

Figure 3: S530 Crate shock sensor

Figure 4: S530 Crate tipping indicator

NOTE

You will need at least two people to unpack and move the S530 system cabinet.

1. Remove the climps from the crate using a standard screwdriver:

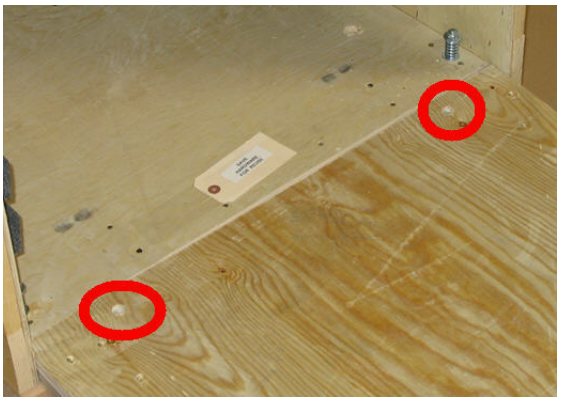
Figure 5: S530 remove the climps

2. Open the front of the crate. The front is identified by the wooden ramp support attached across the panel (see next figure).
3. Make sure the ramp support is pulled away from the crate. It is held in place with Velcro.

Figure 6: S530 open front of crate

4. Attach the ramp using the two bolts that are attached to the bottom front part of the crate:

Figure 7: S530 front of crate with ramp down



5. Remove the padding from the front of the S530 system cabinet:

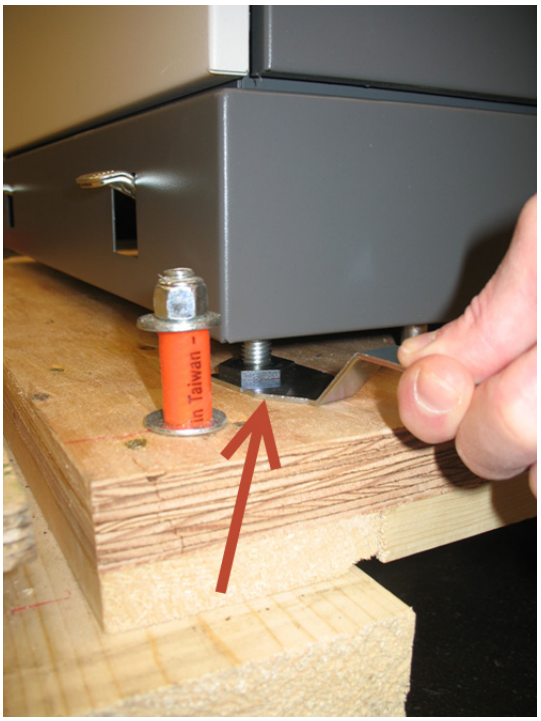
Figure 8: S530 remove padding

6. Remove climps and slide the outer box cover off of the crate:

Figure 9: S530 front of crate outer box off

7. Make sure that you retract the leveling feet on the bottom of the system (next to the casters), in order to put weight on the casters and prepare the system so that it can be rolled down the ramp:

Figure 10: S530 leveling feet



8. Remove the four bolts from the bottom of the crate that are attached to the bottom of the S530 system cabinet using a 19mm socket head on a socket wrench:

Figure 11: S530 system bolted to crate

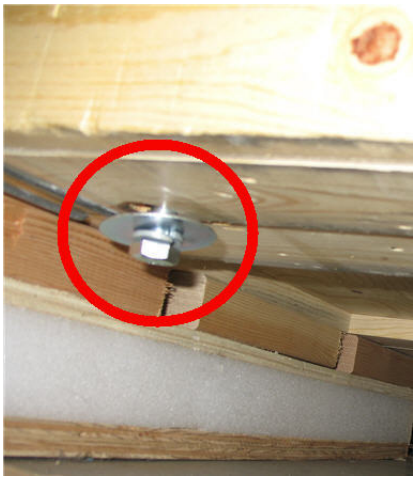


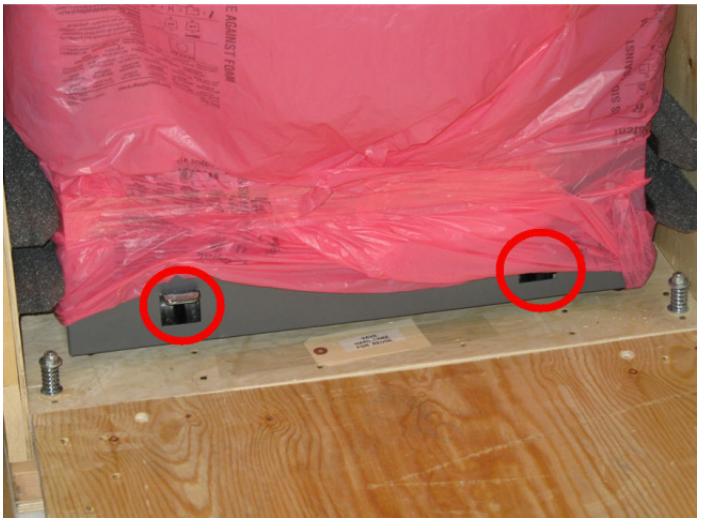
Figure 12: S530 remove bolts from crate

9. Save the hardware (the four bolts and washers) that you remove from the bottom of the crate:

Figure 13: S530 system crate hardware 1

10. Unlock the two wheels (casters) that are on the front of the S530 system cabinet by moving the locks up:

Figure 14: S530 system caster brakes 1



11. With two people, slide the S530 system cabinet down the ramp:

Figure 15: S530 slide system down ramp

12. Remove the tape from the packing material using scissors, taking care not to scratch the S530 system cabinet:

Figure 16: S530 cut the wrap off the system

13. Move the S530 system cabinet to its final destination.

The system cabinet is shipped from the factory with all of the instruments installed. Most equipment connections and wiring in the system's cabinet instruments were made at the factory. Note that the accessories that come with the system are in a separate container.

Unpacking the S530 system accessories

The accessories are shipped in a separate box (note there may be more than one depending on how many accessories are ordered)(see next figure).

Figure 17: S530 system accessories

The accessories box contains a computer monitor, keyboard, and mouse. It also includes required installation hardware, USB extension cables, connectors for the keyboard and mouse, and any other accessories that may have been ordered with the system, for example, cables to connect to the test fixture or probe card adapter, Model 9139A-PCA, heavy duty seismic kit, or the rear cable support arm. You will also find all of the necessary documentation that is shipped with your order. Please reuse or recycle packaging materials in accordance with your local requirements (see next figures).

Figure 18: Typical S530 system accessories

Figure 19: S530 monitor arm accessory

Figure 20: S530 keyboard tray and arm accessory

Keithley Field Service Engineer (FSE)

The Keithley FSE will perform the following tasks:

- Install the keyboard arm and monitor arm to the system.
- Install the keyboard and the mouse on the keyboard arm, and the monitor to the monitor arm.
- Install the probe card assembly (PCA)(if ordered), to the back of the system cabinet, and the 60190-PCA (probe card assembly) to the correct prober plate (customer supplied from prober company), which is attached to the prober.
- Plug in the system to the customer's power facilities (supplied by customer's facilities department at the final location for the S530 system cabinet) and power up the entire cabinet.
- Verify communications of all instruments and with the properly configured prober.
- Perform diagnostics and system verification tests of the entire S530 system, to include the 60190-PCA (if ordered).
- Record all of the information on the System Installation Form (see below for example).

Example S530 System Installation Form

Figure 21: Example S530 System Installation Form

EXAMPLE S530 System Installation Form

Company:		Sales order #:	
Address:		Date:	
		QMO #:	
Contact:		Phone #:	

System configuration:

System: ☐ Low-current ☐ High-voltage

Software: ☐ ACS version: _____ ☐ KTE version: _____

System options: ☐ CVU ☐ DMM

☐ Frequency measure ☐ Pulse generator

Matrix configuration: ☐ 2-wire ☐ Matrix model: _____

☐ Kelvin (4-wire)

9139A PCA: ☐ Yes ☐ No

# of pins wired: _____

Serial Numbers:

Low-current SMU (2636) #1/#2: _____

Low-current SMU (2636) #3/#4: _____

Low-current SMU (2636) #5/#6: _____

Low-current SMU (2636) #7/#8: _____

Computer: _____

4200-SCS: _____

2410 High-voltage SMU: _____

707B Switch system: _____

Figure 22: Example S530 System Installation Form page 2

Other system options or noteworthy details:

Installation complete?	☐ Yes	☐ No
System diagnostics passed?	☐ Yes	☐ No

Deficiencies	Resolution	Due date

Notes:

System cabinet size and weight

The size and weight specifications for the system cabinet are listed in the next table. See the Floor plan (on page 2-21) topic later in this document for details about designing a floor plan for the system cabinet.

System cabinet size and weight

Size (width x depth x height)	Weight	
	Minimum configuration	Maximum configuration
23.7 in. x 36.0 in. x 75.0 in (60.0 cm x 91.5 cm x 190.5 cm)	430 pounds (195.0 kg)	630 pounds (285.7 kg)

Power and operating conditions

Line power requirements

Nominal line power: 100 V, 115 V, 220 V, 240 V (50 Hz, 60 Hz)

Short-circuit current rating: 5 kA

Power consumption: Rated at 2.4 kVA for the 2 kW power distribution unit

Heat generation: Quiescent heat of 1720 BTU (1815 kJ) to maximum heat of 8191 BTU (8642 kJ).

⚠ WARNING

Severe personal injury or death due to electric shock or electrocution or equipment damage may occur if you do not have the correct circuit amperage.

For S530 systems that are configured to operate between 100 V and 120 V, a 20 A circuit must be used and systems that are configured to operate between 200 V and 240 V, a 15 A circuit must be used.

System power dissipation

The total power dissipated by the S530 depends on the type and number of instruments in the test system. The power distribution unit (PDU) limits the incoming power to these instruments. While the PDU ensures electrical safety and compliance to the required standards, it does not prevent the system from overheating.

When a Series 26XXB instrument detects an excessive heat condition, the unit turns the output off to minimize power dissipation. This safeguard prevents damage to individual Series 26XXB instruments, but may result in test instability. For instance, if you continuously source more than 1 A from all the SMUs for more than 100 seconds, it may trigger a temperature error in one or more of the Series 26XXB instruments. However, an average output of less than 1 A for an indefinite period of time will not cause a temperature error.

For additional information about the Keithley Instruments Series 26XXB SourceMeter instruments, refer to the supplied documentation that is located on the Keithley Instruments CD-ROM that was shipped with your purchase.

Operating environment conditions

The S530 will not perform within specifications if operated outside of the following environmental conditions:

Temperature: 23° C ±5° C (73.4° F ±9° F)

Operating humidity: 30% to 60% relative humidity, noncondensing, after a two hour warm up time.

Vibration: High ambient vibration levels may require isolation pads or the repositioning of equipment.

Air quality: The S530 system is compatible for use in a Class 10 clean room.

Audible system noise: dB level is 65.

Air flow: The S530 system is configured for top to bottom air flow.

Altitude: Less than 6,561 feet (2000 m) above sea level.

Noise interference: To prevent electrical noise from interfering with measurements, the ambient AC magnetic field must not exceed 2 x 10-3 Gauss (2 x 10-7 T).

- Avoid locating the S530 next to plasma etchers, large motors, magnets, RF transmitters, equipment with flash lamps, and other potential sources of interference
- Run power lines in a grounded conduit
- Position equipment to avoid routing signal and power cables near sources of electrical noise.

Triax connector handling and contamination

Keep source-measure triax cable connectors (if applicable) clean and free of any foreign contaminants. Do not touch the connector pins of the triax connectors. Contamination can cause current leakage in the source-measure signal paths to the DUT, which can significantly degrade the test results.

⚠ CAUTION

Do not touch any connector pins or the areas adjacent to the electrical contacts of the triax connectors; contamination will degrade the performance of the test system.

Cleaning: Clean contaminated connectors with methanol or isopropyl alcohol, and then blow-dry them with nitrogen gas. After blowing dry, wait several minutes before using.

Optional 9139A-PCA vacuum requirement

A 20 inch (50.80 cm) Hg (which is the same as 40.73 PSI), with a hose connection of 1/4 inch (.64 cm) outside diameter and 1/8 inch (.32) inside diameter.

Lockout/Tagout

For maximum safety, always perform a lockout and tagout procedure by removing power from the entire test system and discharge capacitors before connecting or disconnecting cables or any instrument, including the device under test, while power is applied. When you perform lockout and tagout procedures, make sure that you note all warning labels on the cabinet and instruments (see next figure).

Figure 23: Hazardous warning label

⚠ WARNING

Severe personal injury or death due to electric shock or electrocution may result if power is not removed before working inside the cabinet. Always disconnect the cabinet line cords from the AC line power receptacles before opening the system cabinet. Also, never turn on the system until all connections and safety grounds are installed.

When you perform removal and installation procedures, or maintenance on the system, lockout by placing a padlock through the bracket by the PDU breaker and tagout as appropriate.

Remove system power

1. You must shut down the software, and remove all power from the computer and the system (see Shut down using ACS (on page 3-2) or Shut down using KTE (on page 3-3)).

⚠ WARNING

Before proceeding, you must make sure the power indicator on the front door is NOT illuminated.

2. Place the power switch for the PDU to the OFF position. The location of the PDU is at the back of the cabinet below the rear door.
3. If you are working in the system cabinet, disconnect the system cabinet line cord from the AC line power receptacles.

⚠ WARNING

When you remove power, make sure that you disconnect all system cabinet line cords from AC line power receptacles.

4. Verify that all power has been removed and discharged from the system cabinet by switching the main power switch to the ON position (located on the front door of the cabinet) and verify that the green light does not illuminate. If the light does not come on, the power is off. Turn main power switch back to the OFF position.
5. Lockout and tagout the system source power connection in accordance with your company's lockout/tagout policy.

Installation and connections

⚠ WARNING

The following installation and connection procedures should be performed by trained site installers who are familiar with the associated physical and electrical hazards. Also, you should never turn on the system until all connections and safety grounds are installed.

Position the system cabinet

The system cabinet contains the controller and instrumentation for the test system. The cabinet is on casters, which allows you to easily roll on a hard floor surface. The two steering casters in the rear are swivel type, while the two casters at the front are in fixed positions.

To position the system cabinets:

1. Carefully roll the system cabinet to its desired location next to the prober. Allow approximately 23.5 inches (597 mm, nominal) of clearance between the cabinet and other instrumentation.
2. Lock the casters by pushing down on the caster-locking mechanisms located near the front-bottom of the cabinet.
3. Adjust the height of the four legs so that the weight of the cabinet is on the legs and not on the casters. Adjust the legs so that the cabinet is level and does not move (see the Seismic securement (on page 2-23) topic).

⚠ WARNING

Seismic securement is required for safety of the S530 system and for personnel. You must bolt the legs adjacent to the four casters to the floor. See the Seismic securement (on page 2-23) topic in this document for details.

Floor plan

NOTE

The following floor plan information is for the system cabinet only. Refer to the documentation for the prober or other test fixture equipment to determine its floor space requirements.

The system cabinet requires a floor space of approximately 4 ft x 7 ft (1.2 m x 2.1 m). The next figure shows a top view of the floor plan. The previous table lists the dimensions and weight of the system cabinet. Also, the proceeding figure shows the typical S530 system cabinet weight distribution and center of gravity.

NOTE

The following floor plan information is for the system cabinet only. Refer to the documentation for the prober or other test fixture equipment to determine its floor space requirements.

Figure 24: S530 System floor plan, top view

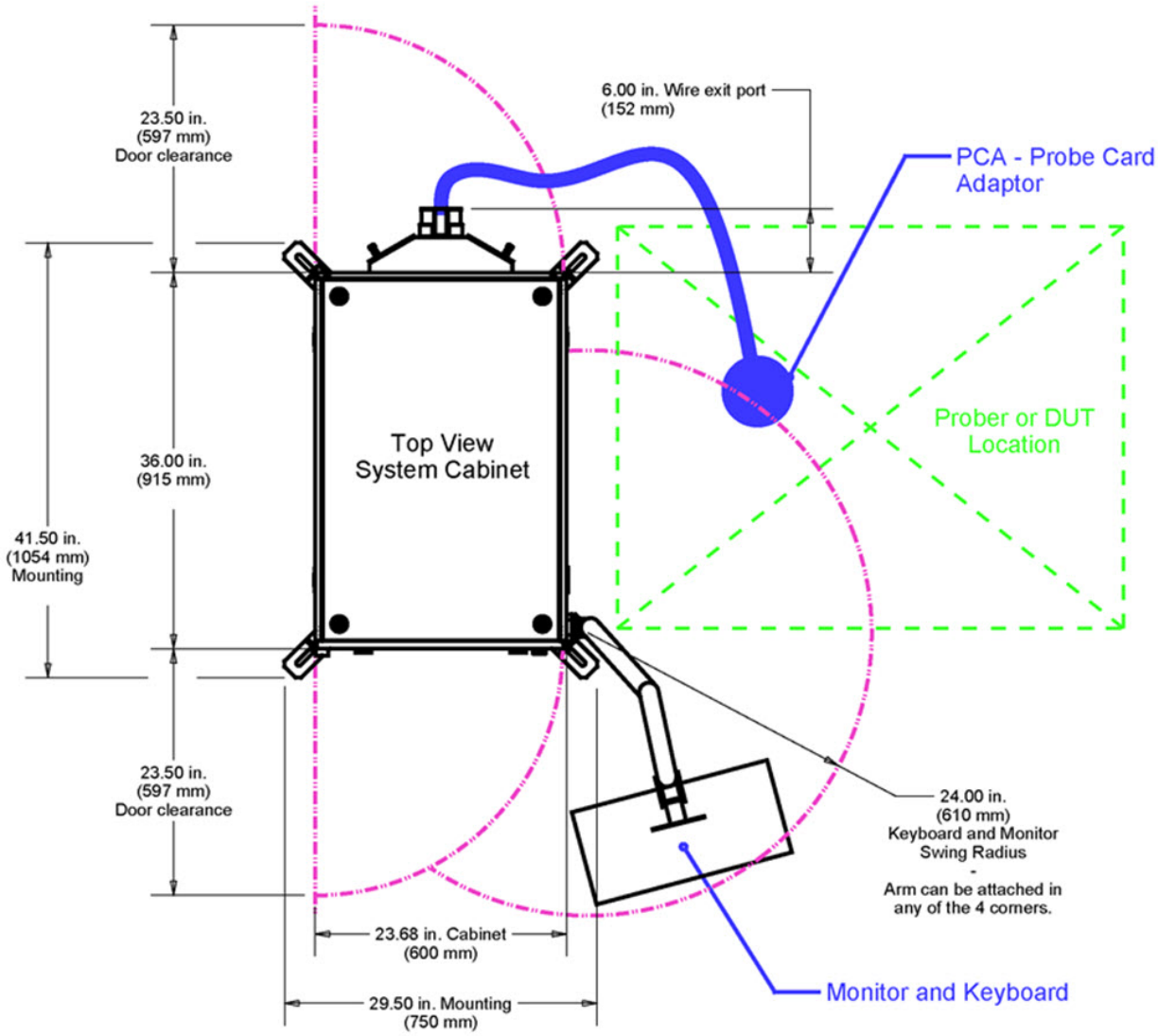
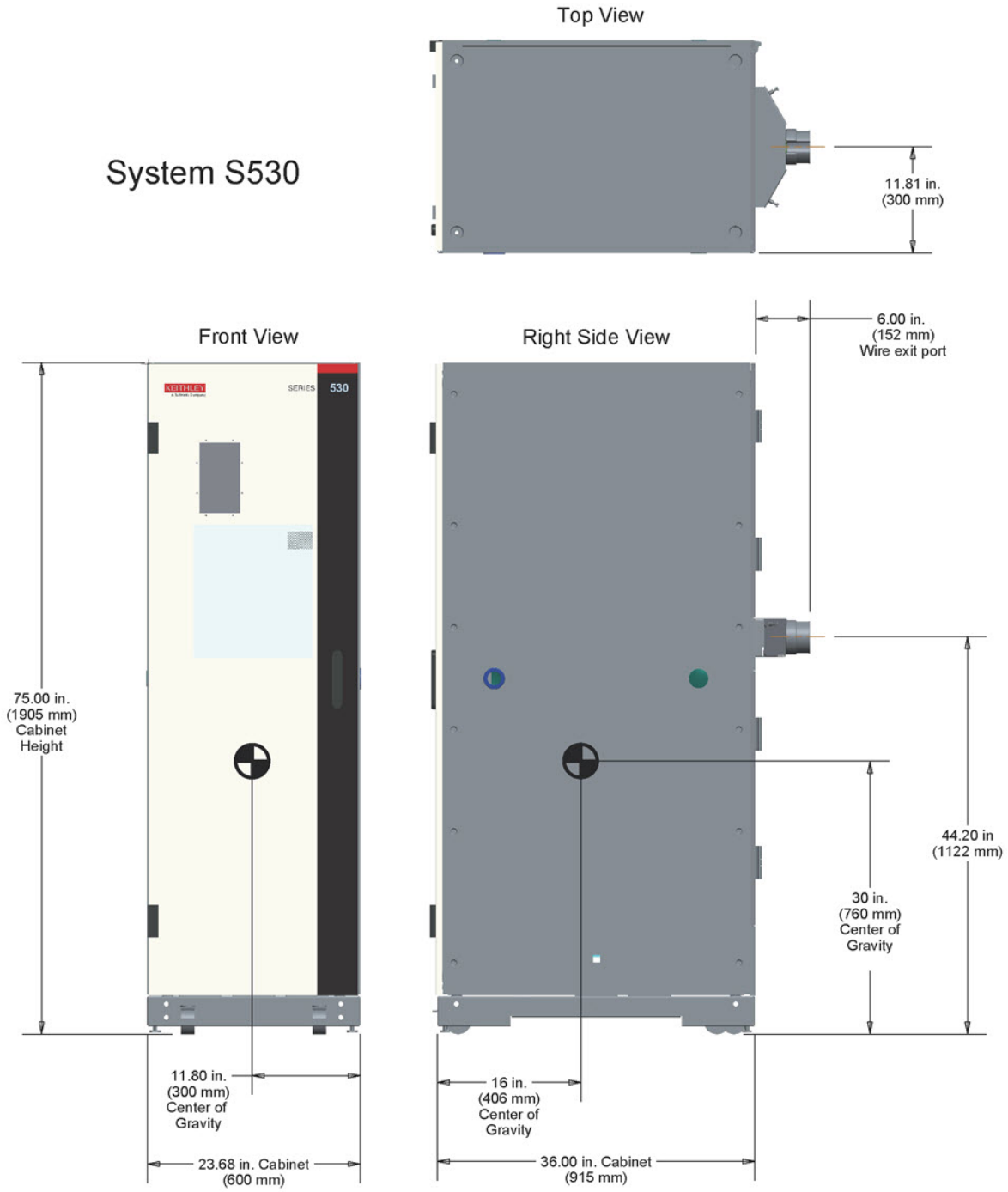


Figure 25: S530 weight distribution and center of gravity



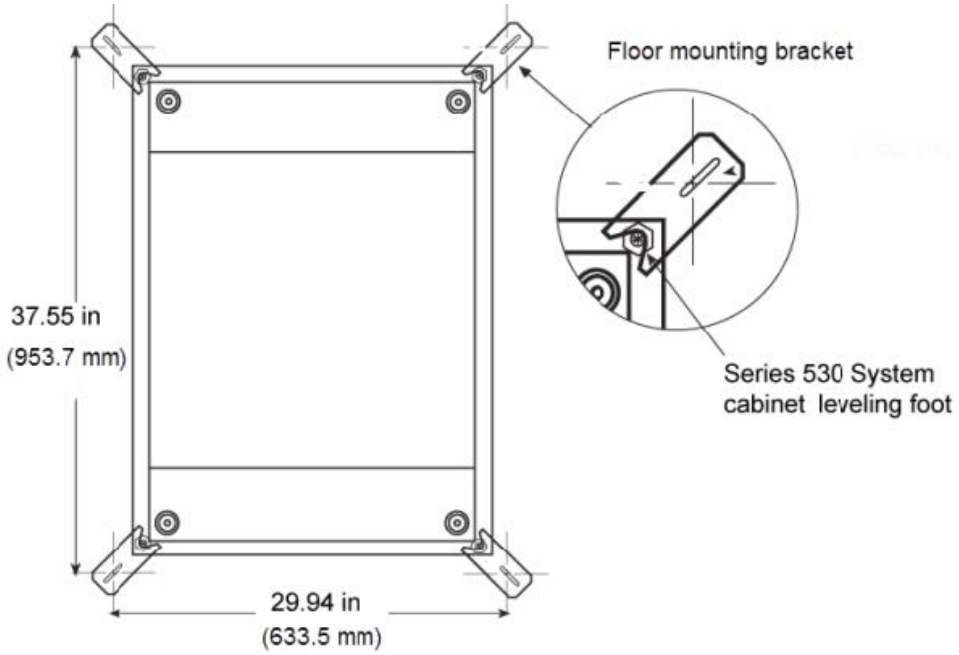
Seismic securement

Seismic securement is required for the S530 system cabinet. You must bolt down the system to the floor for safety purposes and to ensure the cabinet will not tip over. In the next figure, you will see a label that indicates a tip-over hazard located on the keyboard tray. The maximum weight capacity for the keyboard tray is 25 pounds (12 kilograms).

Figure 26: S530 system keyboard tray tip-over hazard

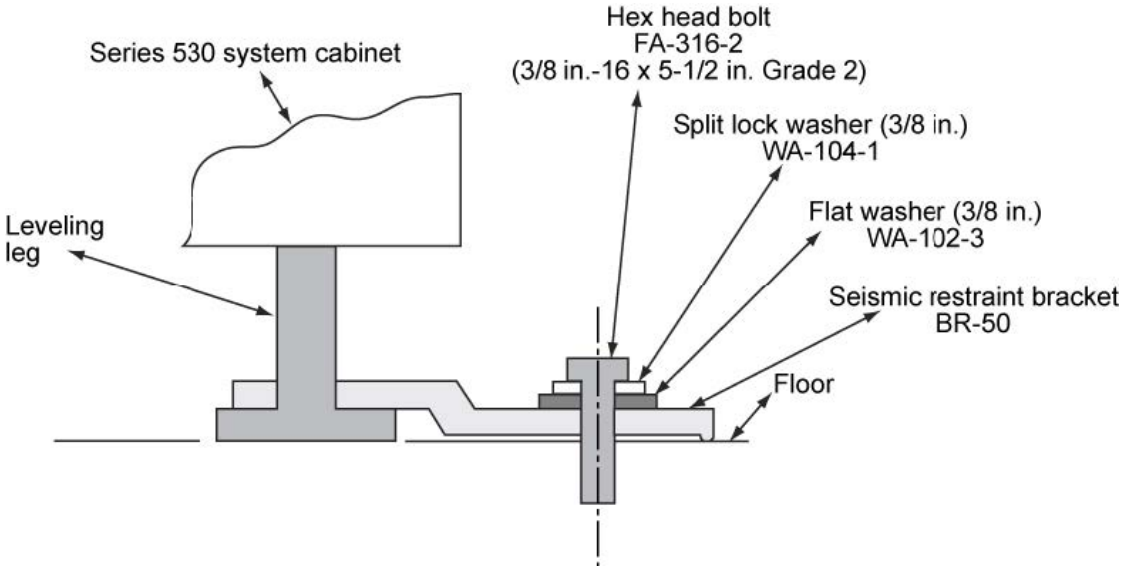
The next figure shows the restraint brackets and bolt installation dimensions for the system cabinet.

Figure 27: S530 system seismic securement dimensions



The next figure shows how a floor mounting bracket is installed. Keithley part numbers are included for the required hardware.

Figure 28: S530 system cabinet floor mount



Optional advanced seismic securement

If you ordered a system with the advanced seismic fastening, follow these mounting instructions.

1. Position the cabinet in the desired location on a smooth, level floor.
2. Place the floor mounting brackets at the corners and make sure you have enough room for proper placement.
3. To properly place the mounting brackets, the cabinet must be lifted by the leveling legs.

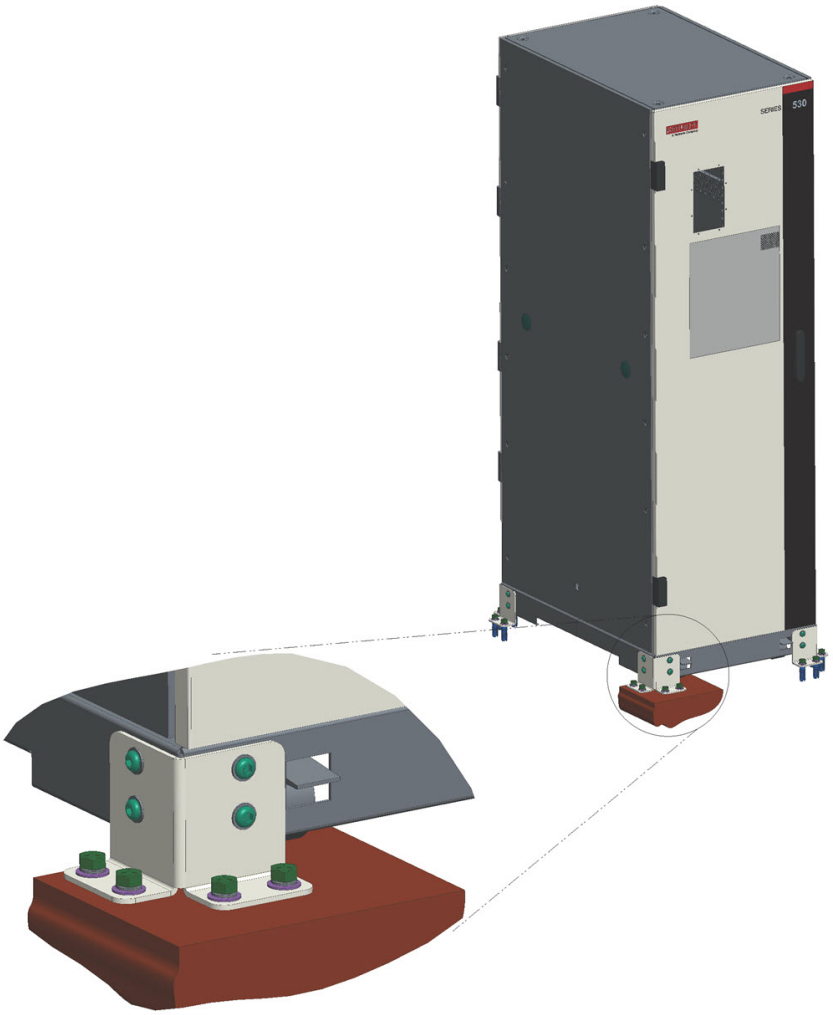
NOTE

Lifting the cabinet will allow the holes in the mounting brackets to line up with the holes in the plinth.

4. Temporarily attach the mounting brackets to each corner with the provided screws (see next figure).

The next figure shows the restraint brackets and bolt installation for the system cabinet.

Figure 29: S530 seismic restraints



5. Transfer the mounting hole locations to the floor with a marker.
6. Remove the mounting brackets and also mark the location of the cabinet leveling legs.
7. Lower the cabinet and move as needed for drilling and installing the customer supplied floor anchors.

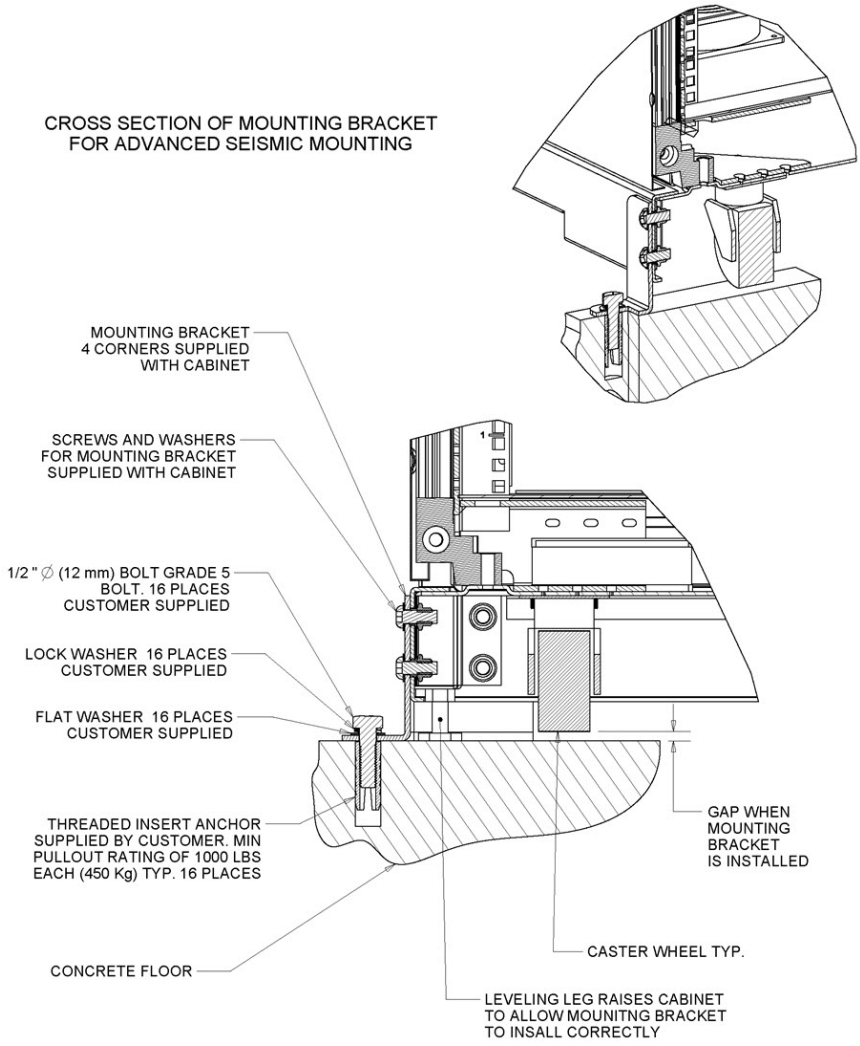
NOTE

Anchors should have a minimum pullout rating of 1000 pounds each (450 Kg). Install 16 anchors for maximum protection.

8. Return the cabinet to marked locations on the floor and lift the cabinet with leveling legs to the proper height.
9. Attach the mounting brackets to the corners with the mounting hardware provided (16 screws and washers).
10. Fasten brackets to the floor with the washers and at minimum grade five bolts (these are customer supplied)(see next figure).

The next figure shows how a floor mounting bracket is installed. Keithley part numbers are included for the required hardware.

Figure 30: S530 advanced cabinet floor mount



Section 3

Equipment startup

In this section:

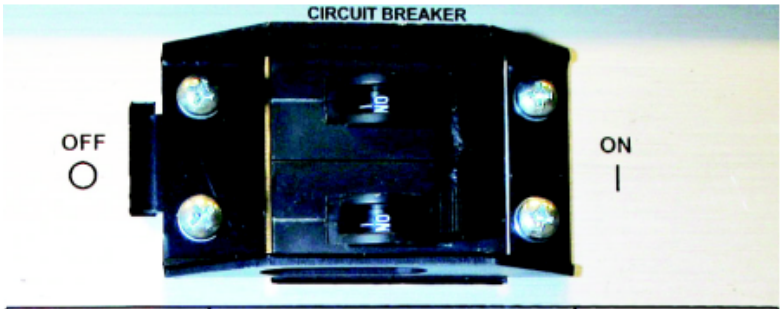
Introduction 3-1
Initial equipment startup 3-2
System startup 3-2
Start KTE software 3-2
Start ACS software 3-2
Shut down using ACS 3-2
Shut down using KTE 3-3
Emergency OFF (EMO) button 3-3
Safety interlocks 3-5
Network information 3-5
Before starting system software 3-6

Introduction

All of the instruments in the equipment rack are connected to one power distribution unit (PDU), which is located at the back of the cabinet.

- Check that all line cords for the system cabinet are connected to AC power line receptacles.
- Make sure the PDU circuit breaker on the back of the cabinet is in the ON position (see next figure). If the circuit breaker is tripped, turn it OFF and then turn it back ON.

Figure 31: S530 PDU circuit breaker



MODEL	LINE RATING			CIRCUIT BREAKER
42000-PDU	100-120 VAC	50/60 Hz	1.8k WATTS	15 AMP
42000-PDU/E	208-240 VAC	50/60 Hz	1.8k WATTS	7.5 AMP
42000-PDU-2K	100-120 VAC	50/60 Hz	2.4k WATTS	20 AMP
42000-PDU/E-2K	208-240 VAC	50/60 Hz	2.4k WATTS	10 AMP

On the front of the system, turn the POWER switch to the ON position. The POWER switch is located on the front door of the cabinet (see the next figure). Make sure the system computer and monitor are also turned on before attempting to use the S530 system and any software.

Initial equipment startup

1. Check that all line cords for the system cabinet are connected to AC power.
2. Make sure that the circuit breaker on the PDU is in the ON position.
3. Press the power/standby button on the computer and monitor.
4. Set the power button on the front door of the system to the ON position (see next figure).

System startup

1. Make sure that the power switch on the PDU is set to on.
2. Set the power button on the front door of the system to the ON position.
3. If the computer has not started to boot, then open the front cabinet door and press the Power/standby switch on the host computer.
4. Wait for all the instruments to power up.
5. Login to your computer and start the KTE or ACS software.

Start KTE software

To start the KTE software, first start the instrument controller (IC) process. To start the IC process, log into the computer and enter the following command:

$KIHOME/IC/bin/run_ic.pl

Start ACS software

To start the ACS sofware, log into the computer and double-click the ACS icon.

Shut down using ACS

NOTE

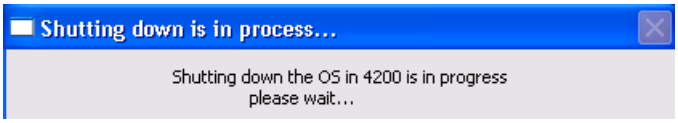
You must have administrator rights in ACS software in order to shut down the S530 system.

1. Double-click the Shutdown icon on the computer desktop. On the dialog box that opens, click Yes that you want to Shutdown the S530 Tester.

NOTE

The following message opens after you click Yes to Shutdown the S530 (see next figure). You must wait until the Model 4200-SCS and the system computer shut down before you press the power button on the system cabinet. It may take several minutes for the system to shut down.

Figure 32: S530 Shut down the S530



2. Once the ACS host computer has shut down, press the power button on the front door of the system cabinet (see next figure).

Shut down using KTE

1. Close all KTE programs.
2. In the LINUX® terminal, type the following command:
   $KIBIN/shutdown_s530.pl
3. Press Enter on the keyboard.
4. On the next command line, type the following:
   sudo $KIBIN/shutdown_s530.pl
5. Enter password for the 'root' account.
6. Wait for the system to stop (NOTE: the IC process will stop, the 4200 will shut down, and then the work station will shut down. The console screen will be blank when it has stopped).
7. Turn off power to the cabinet.

Emergency OFF (EMO) button

An Emergency OFF (EMO) button is located on the system cabinet door (see next figure). If you push the Emergency OFF button, it removes power to all of the system instruments. However, it will not remove power to the host computer.

The EMO TRIPPED indicator light (located on the cabinet door) turns on when the system has undergone an emergency shut down.

Emergency shut down procedure

Press the red Emergency OFF Button on the front of the system cabinet. The instruments will power down and a red Emergency OFF indicator will illuminate. Also, the red indicator will illuminate when the system recovers from as sudden power loss.

Recovering from an emergency shut down

1. Verify that the hazardous condition or emergency situation is no longer present.
2. Rotate the Emergency OFF button to release it.
3. Toggle the power switch from ON to OFF, and then back to ON again. All of the system instruments should power up.
4. Open the front cabinet door and press the Power/standby switch on the host computer.

Figure 33: S530 system cabinet front view

Safety interlocks

For operator safety, the S530 has interlocks on both the front and back cabinet doors and at the device under test (DUT). If you open a cabinet door or open the DUT interlock while instruments are sourcing, the interlock is activated causing the output from the source-measure instruments to output no voltage (0 volts; in a safe state).

Both the ACS and KTE software immediately notifies you (the operator) of the interlock activation. Once the interlock has been activated, you will need to clear the cause of the interlock activation:

Follow the instructions on the computer.

1. Make sure the front and rear doors are closed.
2. Make sure the DUT interlock is properly set for safe operation.
3. Close the DUT safety shield.
4. The software will then need recover before you can continue normal operation (you may need to re-run your tests).

⚠ WARNING

Failure to make sure that the safety interlock and safety shields / guards are properly installed and arranged as indicated will put personnel in severe danger. Severe personal injury or death due to electric shock or electrocution may result.

For the safety interlock to function properly, the DUT interlock sensor must be installed near the DUT connections and the interlock magnet must be installed on the safety shield. It must be set up so that when the magnet is near the switch (interlock closed) the operator cannot touch voltage-carrying conductors. If not properly installed, it will render the interlock inoperative and place personnel at severe risk.

Network information

- System controller network interface: Ethernet port (10, 100, or 1000 Base T capable using RJ-45.
- Supplied cables: one Ethernet crossover cable (connects the computer to the tester).
- One 10-Base T patch cable (connects to your network).
- IP address is determined by you (the customer).

Before starting system software

For more information about the ACS software setup procedures, refer to the Automated Characterization Suite (ACS) Reference Manual (document number ACS-901-01). For more information about the KTE software setup procedures, refer to the KTE S530 Release Notes (document number: PA-1036) that is located on the KTE Software for the S530 CD (CD part number: S530-850-01).

NOTE

The S530 system includes one of two system software options:

1. Automated Characterization Suite (ACS).
2. Keithley Test Environment (KTE).

- You must make sure that all of the instruments are connected with the appropriate interface cable and a TSP-Link™ connection between any Series 2600A System SourceMeter® instruments.
- Assign GPIB or TCP/IP addresses (as appropriate) and node numbers to the hardware and instruments.
- Make sure that all of the instruments are turned on and self-testing is finished.

NOTE

Make sure that all of the instruments are completely powered up before starting the system software.

⚠ CAUTION

ERROR POSSIBLE. To avoid errors to instruments, never start the system software until all of the instruments have finished self-testing.

Section 4

Maintenance

In this section:

Hardware replacement 4-1
Handling and cleaning precautions 4-2
Electrical hazard tasks 4-3
Heavy instrument removal/installation 4-3
Power distribution and emergency off 4-6
Patch panel 4-8
Interlock 4-8
Protection modules 4-8

Hardware replacement

⚠ WARNING

The information in this section is intended only for qualified service personnel. Some of these procedures may cause exposure to hazardous voltages that could result in personal injury or death. Do not attempt to perform these procedures unless you are qualified to do so.

This section contains information about removal and installation of system cabinet components, and instructions for replacing components determined to be faulty.

Handling and cleaning precautions

⚠ CAUTION

Always grasp cards by the side edges and shields to avoid contamination, which will degrade the performance of the components. Do not touch the connectors, the board surfaces, or components. On plugs and receptacles, do not touch areas adjacent to the electrical contacts.

Because of high impedance areas, take care when handling or servicing to prevent possible contamination, which could degrade performance. Take the following precautions when servicing any system component:

- Do not store or operate the system in an environment where dust could settle on the components.
- Use dry nitrogen gas to clean dust off the components, if necessary.
- Handle cards only by the side edges and shields.
- Do not touch any board surfaces, components, or connectors.
- Do not touch areas adjacent to electrical contacts.
- Wear clean cotton gloves when servicing any component.
- If necessary, make solder repairs on a circuit board using an OA-based (organically activated) flux. Remove the flux from the work areas when the repair is complete. Use pure water and clean cotton swabs or a clean, soft brush to remove the flux. Take care not to spread the flux to other areas of the components. Once the flux is removed, swab only the repaired area with methanol or isopropyl alcohol, then blow-dry the board with dry nitrogen gas.
- After cleaning, place the components in a 50° C low-humidity environment for several minutes before use.

Special handling of static-sensitive devices

⚠ CAUTION

System components can be damaged by electrostatic discharge (ESD). Wear a ground strap and attach the clip lead to the grounding bar in the test head or the system cabinet frame before working on the unit. Assume all parts are static sensitive.

High-impedance devices are subject to possible static discharge damage because of the high-impedance levels involved. When handling such devices, assume all parts are static sensitive:

- Static-sensitive components should be transported and handled only in containers specially designed to prevent or dissipate static buildup. Typically, these components are received in anti-static containers made of plastic or foam. Keep these parts in their original containers until ready for installation or use.
- Remove the components from their protective containers only at a properly grounded workstation. Also, ground yourself with an appropriate wrist strap while working with these components.
- Handle the connectors only by their bodies. Do not touch the boards, pins, or terminals.
- Any printed circuit board into which the device is to be inserted must first be grounded to the bench or table.
- Use only anti-static type de-soldering tools and grounded-tip soldering irons.

Electrical hazard tasks

This section contains a listing, by type, of energized, electrical "hot work" tasks for type 3 or higher electrical hazards task.

For additional information about diagnostics, troubleshooting, or maintenance of specific Keithley instruments, refer to that instrument's documentation for details before attempting to repair it. Also, refer to the supplied documentation that is located on the Keithley Instruments CD-ROM that was shipped with your purchase.

Type 4 or Type 5: Live circuit tests

Live circuit tests are classified as Type 4 or Type 5 energized electrical "hot work" dependent on the particular circuit tested.

Live circuit type	Description
4	Equipment is energized, live circuits are exposed and accidental contact is possible. Voltage potentials are greater than 30 volts RMS, 42.2 volts peak, 240 volt-amps, 20 joules or contains radio frequency (RF).
5	Equipment is energized and measurements and adjustments require physical entry into the equipment or equipment configuration will not allow the use of clamp-on probes.

Repair and replacement

Keithley Instruments, Inc. offers a fee-based service agreement with all S530 systems; a field service engineer will either repair or replace equipment. For more information about this service agreement, contact Keithley Instruments at 1-888-534-8453.

For additional information about specific parts, operations, and maintenance of Keithley instruments, refer to the instrument's documentation for details before attempting to replace or repair any equipment. Also, refer to the supplied documentation that is located on the Keithley Instruments CD-ROM that was shipped with your purchase.

Heavy instrument removal/installation

When installing or removing equipment heavier than 50 pounds, use a mechanical lifting device. If there is an instrument mounted below the heavy instrument, it must be removed to provide clearance for the lifting forks. Refer to the lifting device operating manual for proper usage.

Remove system power

⚠ WARNING

Severe personal injury or death due to electrical shock or electrocution may result if power is not removed before moving, removing, or installing equipment. Do not attempt to perform these procedures unless you are qualified to do so.

Make sure the system and instruments that are being installed, moved, or removed are turned off with all power source/cables unplugged.

To remove system power before performing maintenance or replacement of components:

⚠ CAUTION

Follow precautions for removing hazardous voltage from the probe or other types of test fixture before handling.

1. Close any software that is open on the computer.
2. Shut down the system computer per the instructions in either Shut down using ACS (on page 3-2) or Shut down using KTE (on page 3-3) in this guide.
3. Place the system cabinet power switch, on the front-panel door to the OFF position.
4. Place the main circuit breaker on the PDU (on the back of the cabinet) to the OFF position.
5. Disconnect the source power to the S530 system (power cord on back of PDU).
6. Place the lock and tag on the main circuit breaker of the PDU.
7. Wait five minutes before accessing any high-voltage units.

General replacement procedure

⚠ WARNING

Severe personal injury or death due to electric shock or electrocution may result if power is not removed before working inside the cabinet. Always disconnect the cabinet line cords from the AC line power receptacles before opening the system cabinet. Also, never turn on the system until all connections and safety grounds are installed.

1. Remove power and lockout/tagout the system (see the Lockout/Tagout (on page 2-18) topic).
2. Disconnect and tag cabling to the unit requiring removal. Do not change cable routing or securement.
3. Properly supporting unit, remove it from the system cabinet.

Calibration

Keithley Instruments recommends calibration of the individual system instruments on an annual basis and offers this as an on-site service. An FSE will calibrate instrumentation and perform system verification according to the warranted system specifications. For more information about calibration or other S530 services, contact your local Keithley office. Note that you can also perform system verification as described in the S530 Parametric Test System Diagnostics and System Verification manual. For information regarding instrument-level calibration, refer to documentation for each of the system instruments located on the Keithley Instruments Complete Reference CD-ROM that was shipped with your purchase.

Restore system power

Restore system power after properly performing the required maintenance or replacement of components; make sure that all connections are secure and connected correctly.

1. Remove the lock and tag placed on the main circuit breaker of the PDU.
2. Connect the source power to the S530 system (power cord on back of PDU).
3. Place the main circuit breaker on the PDU (on the back of the cabinet) in the ON position.
4. Close the rear cabinet door.
5. Make sure the system computer and all instrument power switches are in the ON position.
6. Close the front cabinet door.

NOTE

With the system cabinet POWER switch in the OFF position, the EMO light should be off. If the EMO light stays on, the power is not restored. To restore power, it may be necessary to push in and hold the Remote EMO Bypass switch until power has been restored to all units in the system. The Remote EMO Bypass switch is located on the PDU panel on the back of the system cabinet.

7. Place the system cabinet POWER switch (on the front-panel door) in the ON position.
8. Make sure the computer is turned on.
9. Start the computer and the system software.

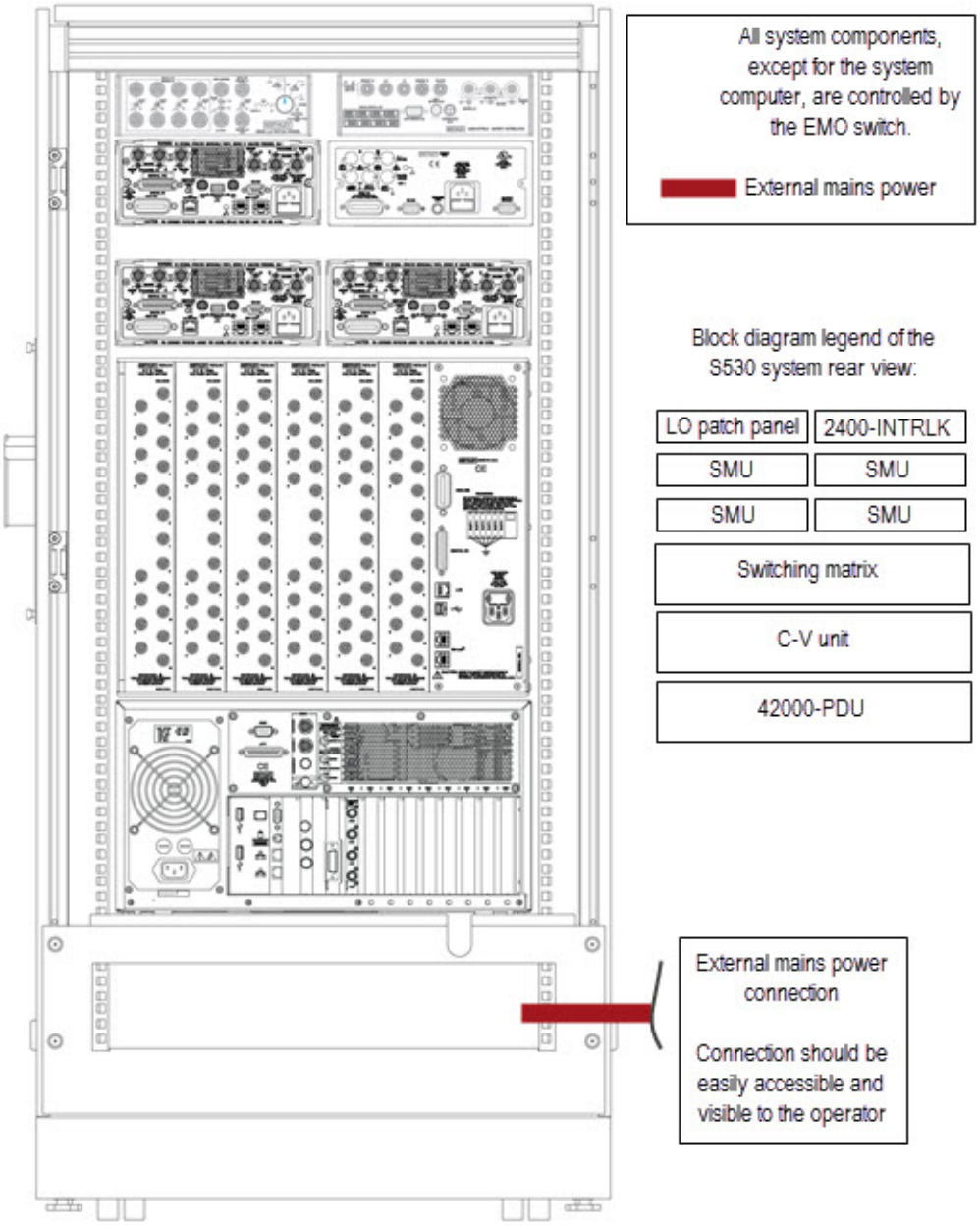
Fuses

Refer to the applicable instrument documentation that is included with the product for fuse replacement.

Power distribution and emergency off

The next figure contains simplified connection schematics for the various components of the S530 (the LO patch panel and the Interlock are shown for reference only; they are located behind the SMUs).

Figure 34: S530 system cabinet rear view



Power distribution unit connections and power distribution basics

The Model 42000-PDU consists of:

- 24 V DC output to Emergency OFF (EMO) circuits and cabinet fans with power
- 24 V DC output through banana jacks
- Two specially-switched power outlets (factory configuration: always on)
- Three switched four-outlet (off only with EMO condition)
- Control through a 25-pin D-sub connector

⚠ WARNING

Properly lockout/tagout the system before beginning installation or connection. Also, never turn on the system until all connections and safety grounds are installed. Make sure the main circuit breaker on the PDU is placed in the OFF position before making or breaking any connections.

The next table provides a detailed description of the available connections in the Model 42000-PDU. Information about the EMO circuit's connection and operation is also in the table.

For more detail regarding the different systems and the interconnect wiring for each, see the following figures.

Model 42000-PDU connection descriptions

Connection	Description
Specially switched outlets	Two power outlets located on the PDU rear panel.
	WARNING: Severe personal injury or death due to electric shock or electrocution may result if power is not removed before working inside the cabinet. Do not use power outlets for accessories (for example, a soldering iron, or drill). Use for instruments that do not have hazardous voltages and do not need to have power removed through the EMO circuit (for example, a computer). In the factory default configuration, these outlets have dedicated power and will remain live even if power is removed through the EMO circuit.
	The specific configuration is marked on the PDU rear panel[2].
To PDU box DB-25 cable connector	Connector providing control of the PDU box. Connect the PDU box to the EMO box with the supplied DB-25 male-to-female cable.
Switched outlets	Twelve power outlets located on the PDU rear panel. Do not use power outlets for accessories (for example, soldering iron, drill, etc.). Use for equipment with hazardous voltages that need to be removed with the EMO circuitry[2].
Ground connection (optional)	Connect to a quality ground within your facility with 18 AWG wire.
External fan connection	Connector providing 24 V DC to cabinet fans.
External EMO/shorting plug connection	DB-25 providing connection to external EMO devices. Make sure the shorting plug is installed if the system is not configured for external EMO.
To EMO box DB-25 cable connector	Connector providing control of the PDU box. Connect EMO box to the PDU box with the supplied DB-25 male-to-female cable.
24 VDC (-) banana plug	Banana plug providing 24VDC (-) power connection.
24 VDC (+) banana plug	Banana plug providing 24VDC (+) power connection.
[2]Outlet connector description: - Class 1 applications (42000-PDU (PDU/E)(PDU/E-2K) 15 A and 42000-PDU-2K 20 A. - Type: Push-in mount mates with IEC standard 320 C20 (20 A) or the IEC standard 320 C14 (15 A) power cords.	

Patch panel

The LO patch panel in the S530 system provides a common reference point for all the instrument low side connections. In 4-wire systems it also provides a common connection for the sense low terminals of the SMUs. In addition, the LO patch panel connects low to sense low using a 100k Ohm resistor to enable Auto-sensing. Finally, the LO patch panel provides several alternate ways to tie low to earth ground. See the Interlock (on page 4-8) topic for more details.

Interlock

The S530 must have a single, direct connection between instrument lows and safety (earth) ground. Keithley recommends that a high quality, low impedance connection between low and safety ground be made at the prober used with the S530. Because this is not always possible, the LO patch panel provides alternative connections as listed in the next table.

LO patch panel switch setting	Purpose
42 volt clamp with parallel 1k Ohm resistor. Normal Setting	Default setting to be used when connection between low and safety ground is made within the prober. This is the recommended configuration.
Direct connection to safety ground	Use when there is no connection between low and safety ground at the prober or elsewhere in the system.
42 volt clamp to safety ground with no parallel resistor	For temporary use only by qualified service personnel as a diagnostic aid. Switch should not be left in this position during normal operation.
Open (no connection between low and safety ground)	When this position is used, the system interlock must be intentionally tripped to ensure safety. It is for use only by qualified service personnel for certain rare diagnostic tests.

Protection modules

Depending on specific components used within each protection module, it can be used to provide functional protection from high voltage and (or) high current to various SMUs or CVUs. For example, the Series 26XXB instruments and the Model 4200.

Section 5

Instrument specifications and documentation

In this section:

Introduction 5-1
Matrix cards..... 5-2
Standard instrumentation 5-2
Optional instrumentation 5-7
S530 KTE communication diagram..... 5-7
S530 low-current using Model 2010 DMM 5-8
S530 high-voltage system using Model 2010 DMM 5-10
S530 low-current using Model 4220-PGU pulse generator card5-12
S530 high-voltage system using Model 4220-PGU pulse generator card
..... 5-14
S530 low-current using Model 4200-SCP2HR scope card..... 5-16
S530 high-voltage system using Model 4200-SCP2HR scope card 5-18
S530 KTE communications diagram..... 5-20
S530 ACS communication diagram 5-21

Introduction

For more information about instruments used in the S530 Parametric Test System, refer to the documentation for each specific Keithley Instruments model:

- Model 4200-SCS
- Model 4220-PGU pulse card
- Model 4200-SCP2HR scope card
- Model 707B switching matrix
- Model 2410 high-voltage SourceMeter
- Model 2010 DMM
- Series 26XXB system SourceMeter

Also, refer to the supplied documentation that is located on the Keithley Instruments CD-ROM that was shipped with your purchase. You can also visit the Keithley Instruments website at www.keithley.com to search for updated information by model number.

NOTE

Example wiring diagrams for the S530 test system are shown on the following pages.

Matrix cards

Model 7530 switch card

Low current systems use the Model 7530 8x12 matrix card to support up to 60-pin connections to the probe card adaptor (PCA).

Model 7072-HV high voltage switch card

High voltage systems use the Model 7072-HV matrix card to support up to 24-pin connections to the probe card adaptor (PCA).

Model 7072-HVD high voltage

High voltage systems may also use the Model 7072-HVD matrix card to support up to 24-pin connections to the probe card adaptor (PCA). Model 7072-HVD is identical to the model 7072-HV card except for the addition of additional circuitry designed to automatically discharge energy that may be accumulated in the system cables and PCA under certain test conditions.

Standard instrumentation

Typical matrix connections for standard instrumentation are shown in the next figure. The first two slots are used for instrument cards. The remaining four slots can be used for pin cards. This will provide Kelvin connections for 24 instrument terminals and 48 pin terminals.

S530 high-voltage four-wire diagram

See the next page for **Figure 35: S530 high-voltage four-wire diagram**

To
probe card assembly (PCA)
or
device under test (DUT)

Front
cabinet
door

Rear
cabinet
door

Triaxial
cables

7072-HV KELVIN
channels to
device under test (DUT)
24 sets of pins maximum

Instrument
Source
Card

Source
DUT
Card

Source
DUT
Card

Instrument
Sense
Card

Sense
DUT
Card

Sense
DUT
Card

Attention!
Ground Link must be disengaged

SMA
cables

SMA to BNC
adapters

BNC to triaxial
adapters

S530 standard 4-wire low-current on Model 7530-based system

See the next page for **Figure 36: S530 standard 4-wire low-current**

Interlock cable (CA-542-4)

To
probe card assembly (PCA)
or
device under test (DUT)

Front cabinet door

Rear cabinet door

Direct connect the (4) 25-pin D-SUBs on CA-542-4 into the 2636A/B instruments as shown

Triaxial cables

7530 Card channels
to
device under test (DUT)
48 pins maximum

SMA cables

SMA to BNC adapters

BNC to triaxial adapters

Instrument Card

Instrument Card

DUT Card

DUT Card

DUT Card

DUT Card

Direct connect triaxial adapters into Instrument Cards as shown

SMA cables

Triaxial to BNC adapters

BNC to SMA adapters

Attention!
Ground Link
must be disengaged

Optional instrumentation

KTE v5.4.0 supports several optional instruments:

- Model 2010 DMM (used as a sensitive DC-voltmeter only)
- Model 4220-PGU pulse card
- Model 4200-SCP2HR card (used for ring oscillator measurement)

The following diagrams show examples of how these instruments can be connected to the matrix. Please note the cards/columns of each instrument connection shown in the following diagrams may differ from your actual system. The flexibility of the S530 configuration allows for various numbers and combinations of instruments. Attempting to show examples of every possible scenario would be prohibitive.

You will see graphics of the following examples:

- S530 low-current using Model 2010 DMM
- S530 high-voltage system using Model 2010 DMM

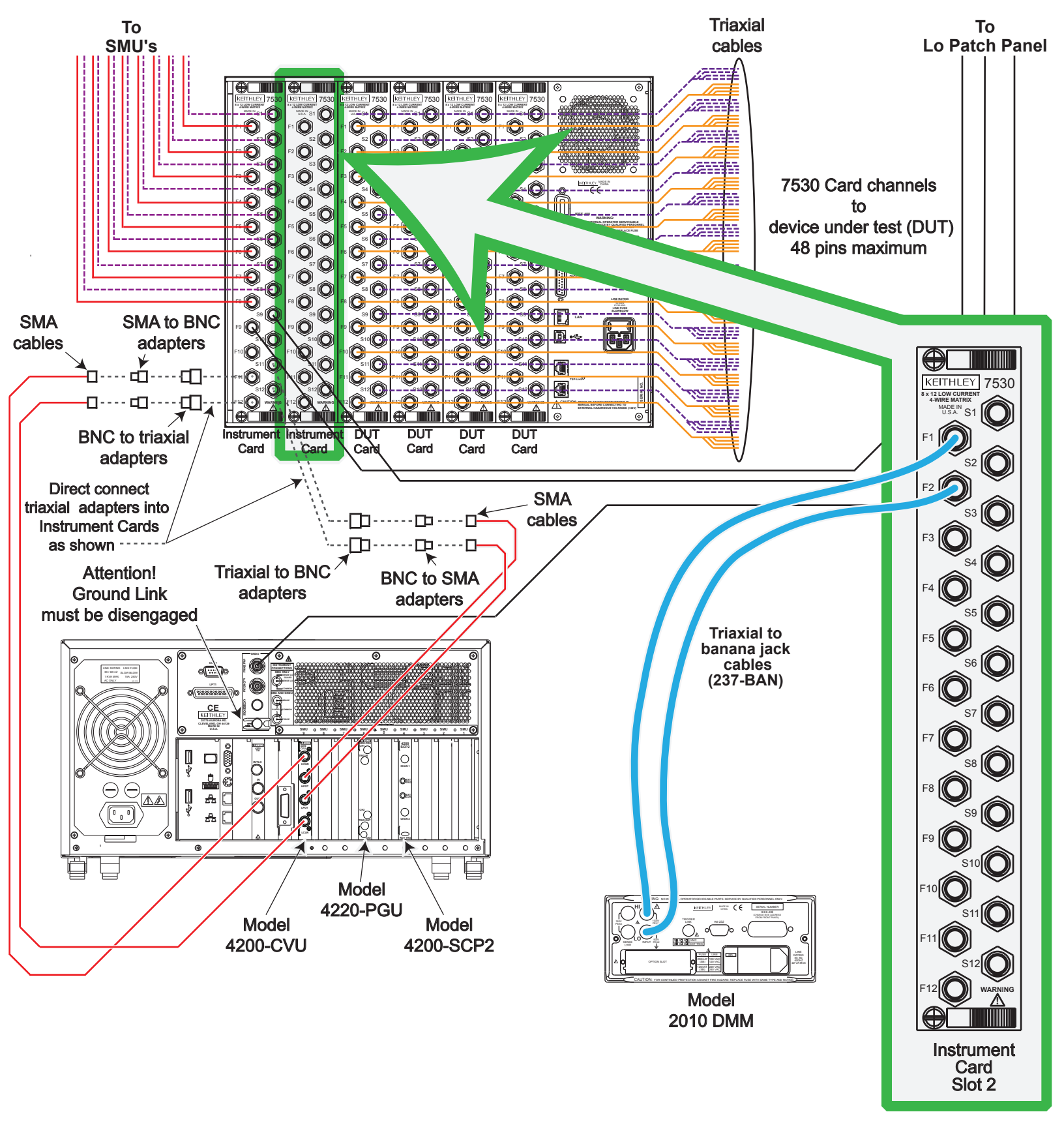
NOTE

The Model 2010 DMM is only connected to the "Force" side of the matrix, however, both the force and sense connections need to be configured in the icconfig_<QMO>.ini file.

- S530 low-current using Model 4220-PGU pulse generator card
- S530 high-voltage system using Model 4220-PGU pulse generator card
- S530 low-current using Model 4200-SCP2HR scope card
- S530 high-voltage system using Model 4220-SCP2HR scope card

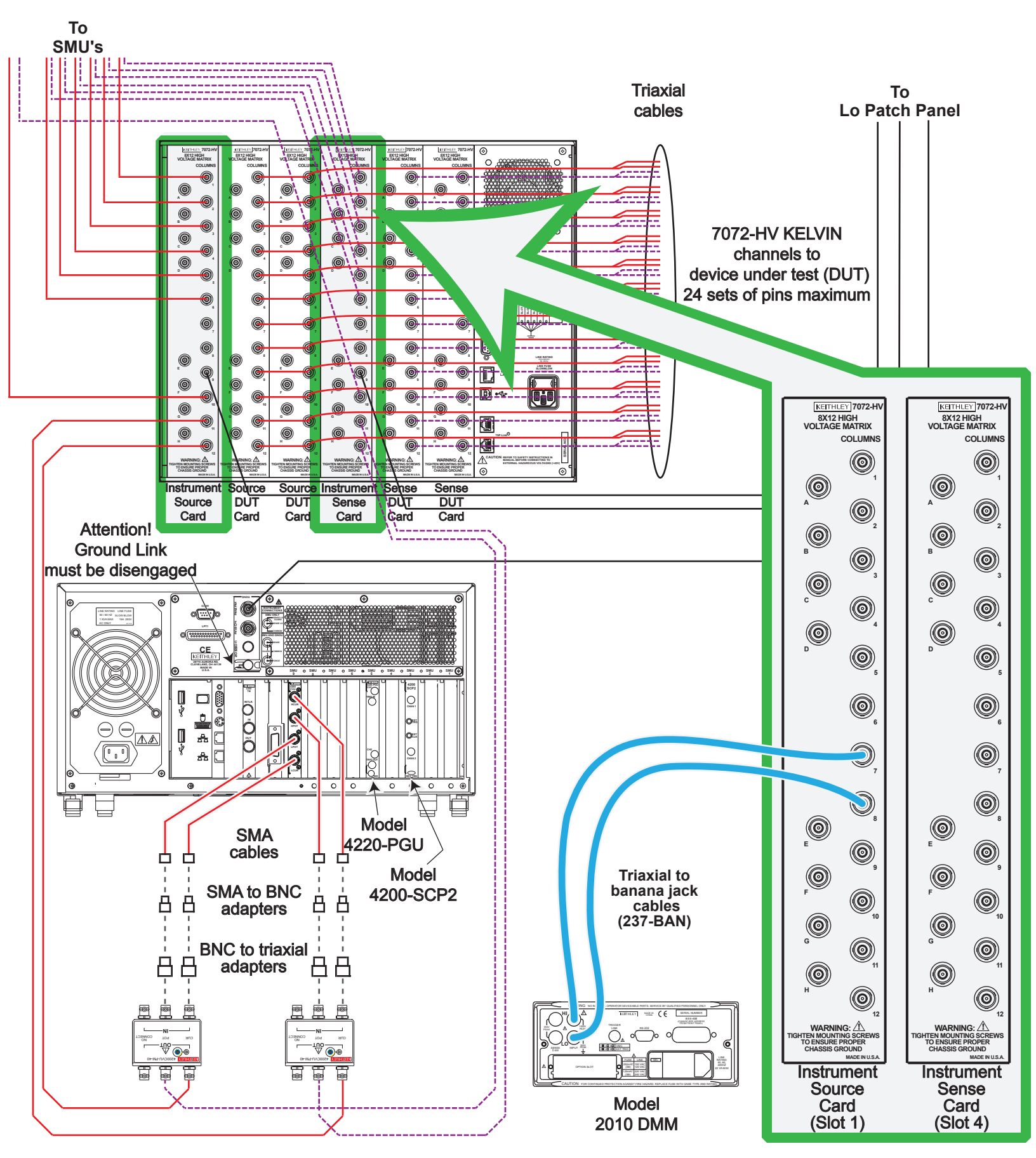
S530 low-current using Model 2010 DMM

See the next page for **Figure 37: S530 low-current using Model 2010 DMM**


To SMU's
Triaxial cables
To Lo Patch Panel
7530 Card channels to device under test (DUT) 48 pins maximum
SMA cables
SMA to BNC adapters
BNC to triaxial adapters
Instrument Card
Instrument Card
DUT Card
DUT Card
DUT Card
DUT Card
Direct connect triaxial adapters into Instrument Cards as shown
SMA cables
Triaxial to BNC adapters
BNC to SMA adapters
Attention! Ground Link must be disengaged
Triaxial to banana jack cables (237-BAN)
Model 4200-CVU
Model 4220-PGU
Model 4200-SCP2
Model 2010 DMM
Instrument Card Slot 2

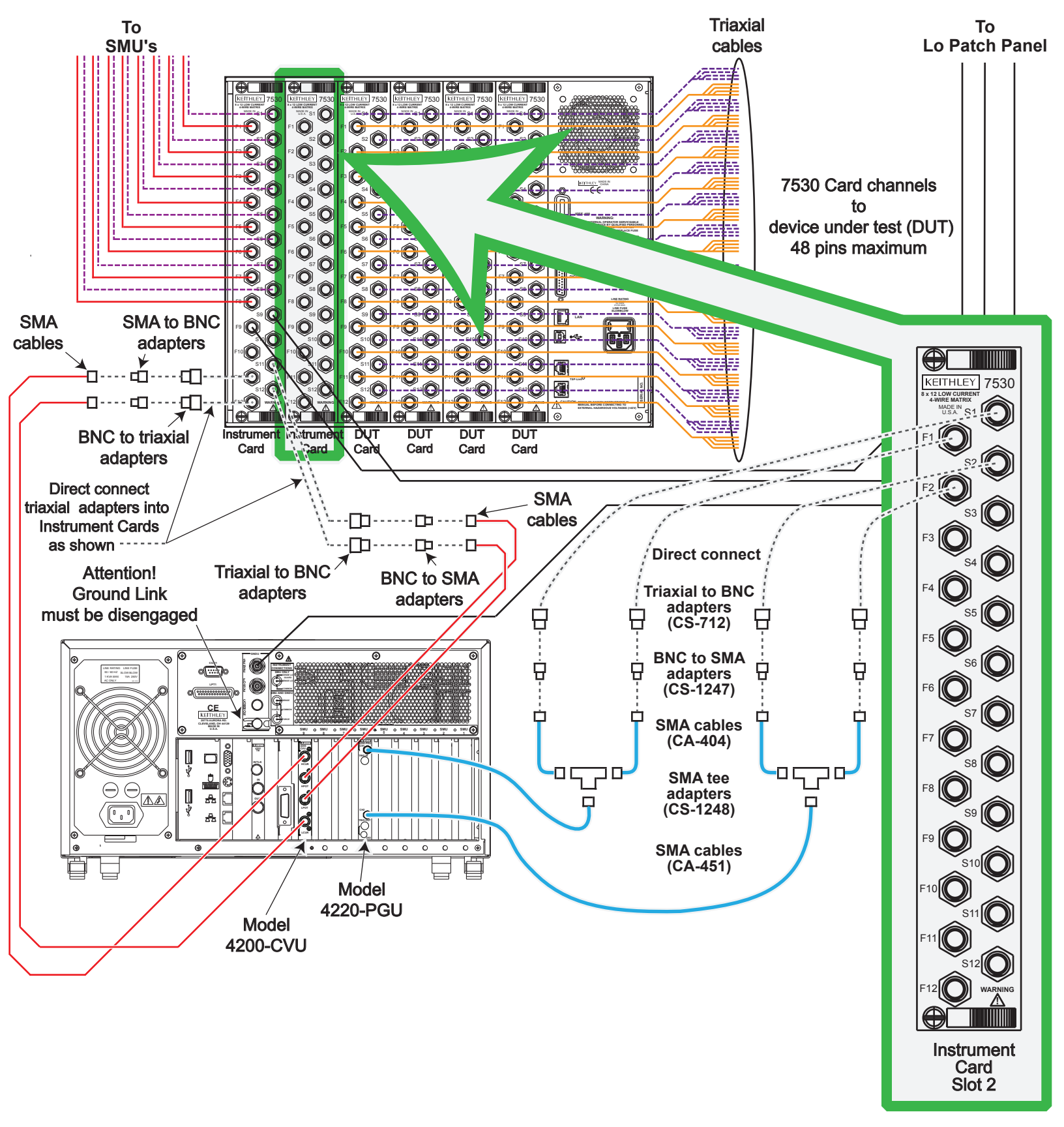
S530 high-voltage system using Model 2010 DMM

See the next page for **Figure 38: S530 high-voltage system using Model 2010 DMM**


To
SMU's
Triaxial
cables
To
Lo Patch Panel
7072-HV KELVIN
channels to
device under test (DUT)
24 sets of pins maximum
Instrument
Source
Card
Source
DUT
Card
Source
DUT
Card
Instrument
Sense
Card
Sense
DUT
Card
Sense
DUT
Card
Attention!
Ground Link
must be disengaged
SMA
cables
SMA to BNC
adapters
BNC to triaxial
adapters
Model
4220-PGU
Model
4200-SCP2
Triaxial to
banana jack
cables
(237-BAN)
Model
2010 DMM
Instrument
Source
Card
(Slot 1)
Instrument
Sense
Card
(Slot 4)

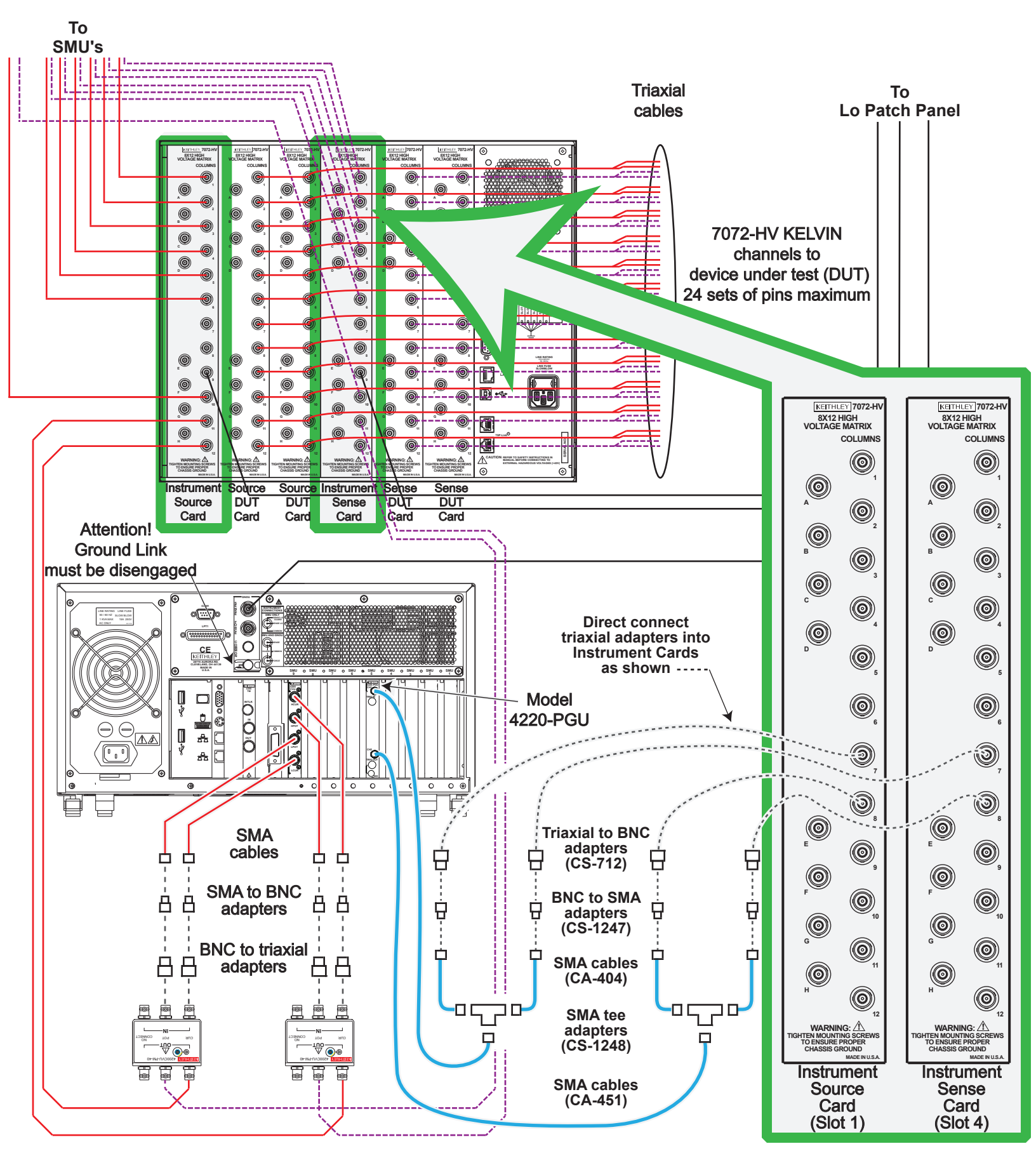
S530 low-current using Model 4220-PGU pulse generator card

See the next page for **Figure 39: S530 low-current using Model 4220-PGU pulse generator card**


To SMU's
Triaxial cables
To Lo Patch Panel
7530 Card channels to device under test (DUT) 48 pins maximum
SMA cables
SMA to BNC adapters
BNC to triaxial adapters
Direct connect triaxial adapters into Instrument Cards as shown
Instrument Card
Instrument Card
DUT Card
DUT Card
DUT Card
DUT Card
SMA cables
Triaxial to BNC adapters
BNC to SMA adapters
Attention! Ground Link must be disengaged
Direct connect
Triaxial to BNC adapters (CS-712)
BNC to SMA adapters (CS-1247)
SMA cables (CA-404)
SMA tee adapters (CS-1248)
SMA cables (CA-451)
Model 4220-PGU
Model 4200-CVU
KEITHLEY 7530
Instrument Card Slot 2

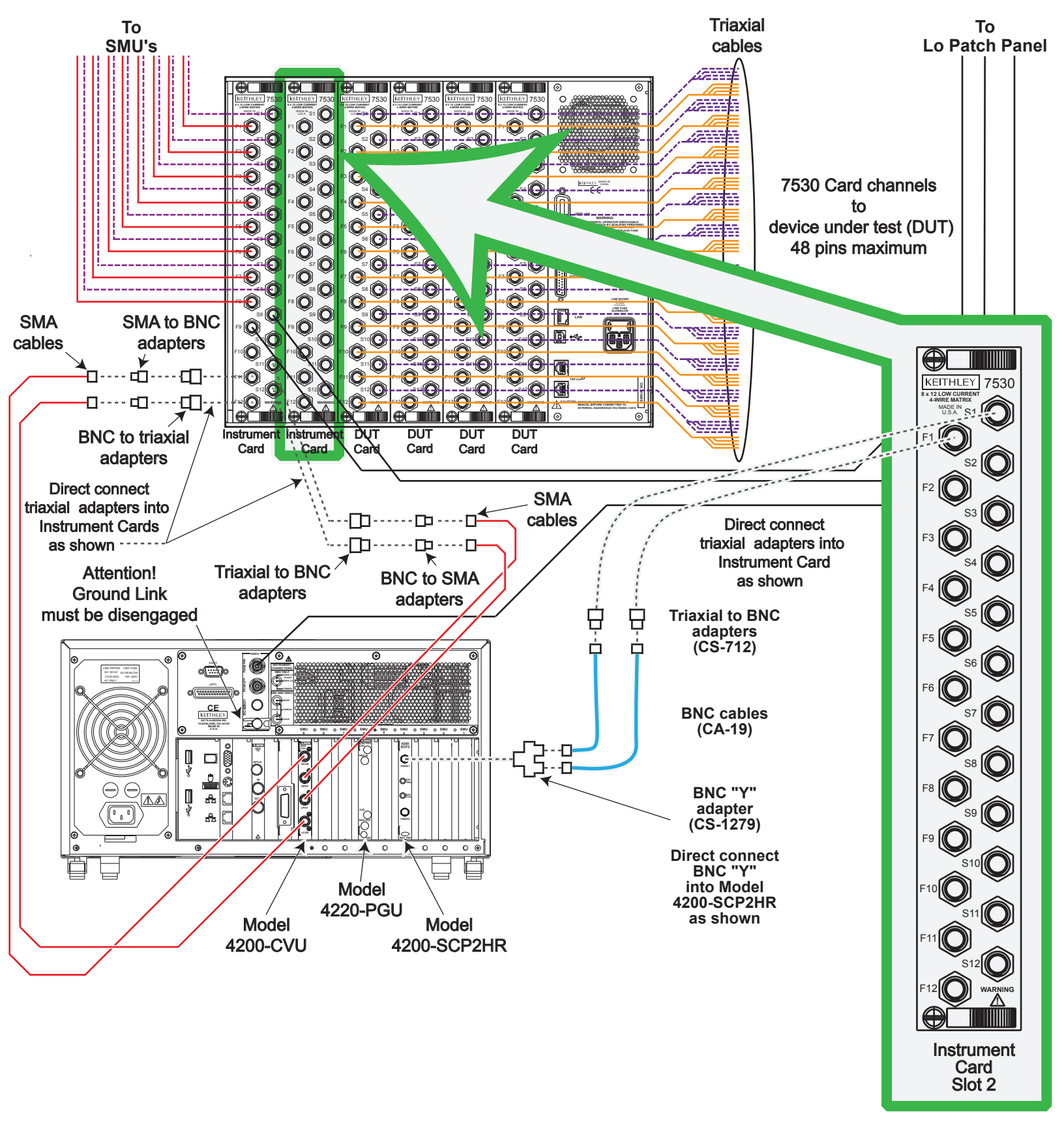
S530 high-voltage system using Model 4220-PGU pulse generator card

See the next page for **Figure 40: S530 high-voltage system using Model 4220-PGU pulse generator card**


To SMU's
Triaxial cables
To Lo Patch Panel
7072-HV KELVIN channels to device under test (DUT) 24 sets of pins maximum
Instrument Source Card
Source DUT Card
Source DUT Card
Instrument Sense Card
Sense DUT Card
Sense DUT Card
Attention! Ground Link must be disengaged
Direct connect triaxial adapters into Instrument Cards as shown
Model 4220-PGU
SMA cables
SMA to BNC adapters
BNC to triaxial adapters
Triaxial to BNC adapters (CS-712)
BNC to SMA adapters (CS-1247)
SMA cables (CA-404)
SMA tee adapters (CS-1248)
SMA cables (CA-451)
KEITHLEY 7072-HV
8X12 HIGH VOLTAGE MATRIX
COLUMNS
WARNING: TIGHTEN MOUNTING SCREWS TO ENSURE PROPER CHASSIS GROUND
MADE IN U.S.A.
Instrument Source Card (Slot 1)
Instrument Sense Card (Slot 4)

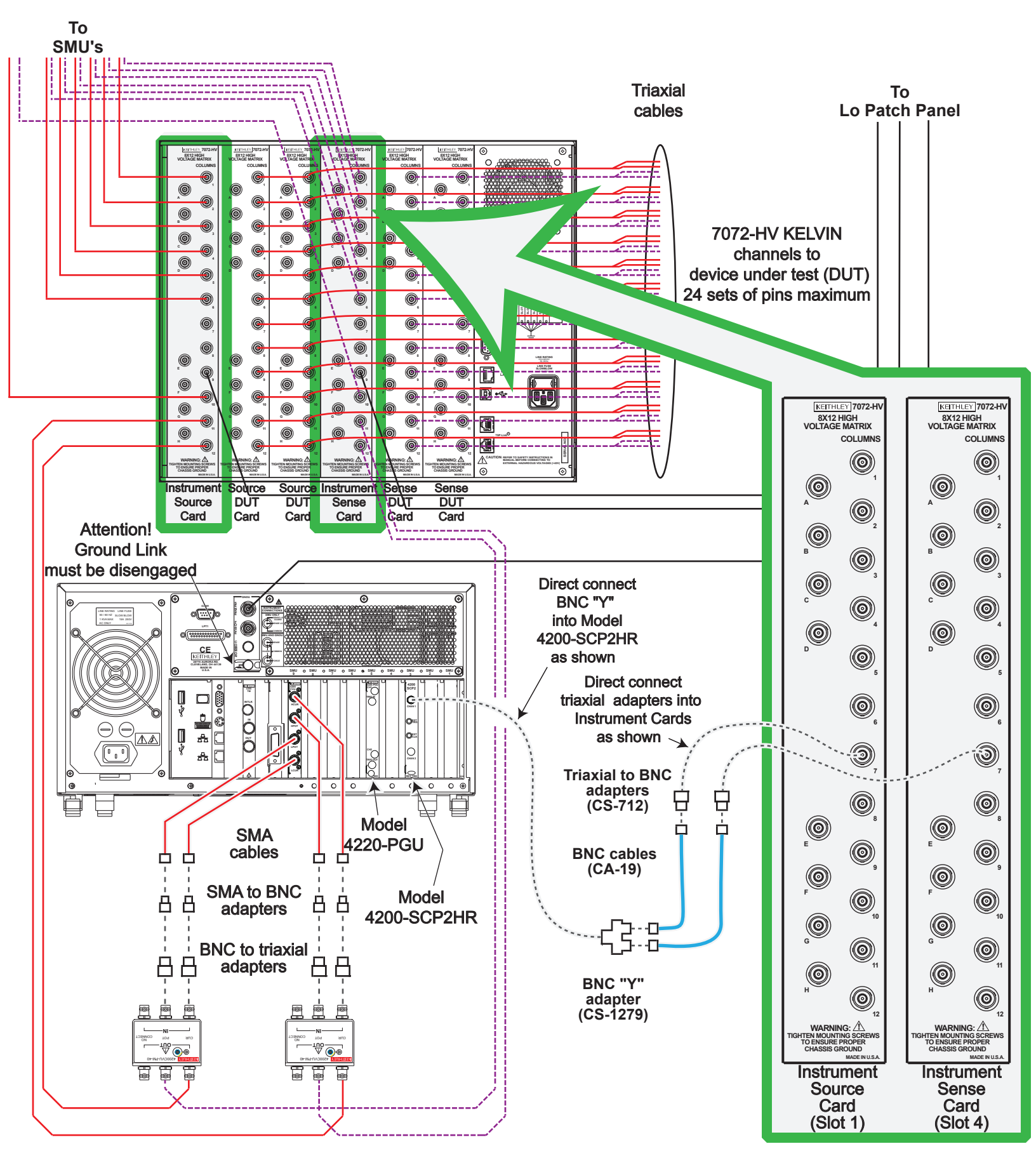
S530 low-current using Model 4200-SCP2HR scope card

See the next page for **Figure 41: S530 low-current using Model 4200-SCP2HR scope card**


To SMU's
Triaxial cables
To Lo Patch Panel
7530 Card channels to device under test (DUT) 48 pins maximum
SMA cables
SMA to BNC adapters
BNC to triaxial adapters
Instrument Card
Instrument Card
DUT Card
DUT Card
DUT Card
DUT Card
Direct connect triaxial adapters into Instrument Cards as shown
SMA cables
Triaxial to BNC adapters
BNC to SMA adapters
Attention! Ground Link must be disengaged
Direct connect triaxial adapters into Instrument Card as shown
Triaxial to BNC adapters (CS-712)
BNC cables (CA-19)
BNC "Y" adapter (CS-1279)
Direct connect BNC "Y" into Model 4200-SCP2HR as shown
Model 4200-CVU
Model 4220-PGU
Model 4200-SCP2HR
KEITHLEY 7530
8 x 12 LOW CURRENT 4-WIRE MATRIX
MADE IN U.S.A.
Instrument Card Slot 2

S530 high-voltage system using Model 4200-SCP2HR scope card

See the next page for **Figure 42: S530 high-voltage system using model 4200-SCP2HR scope card**

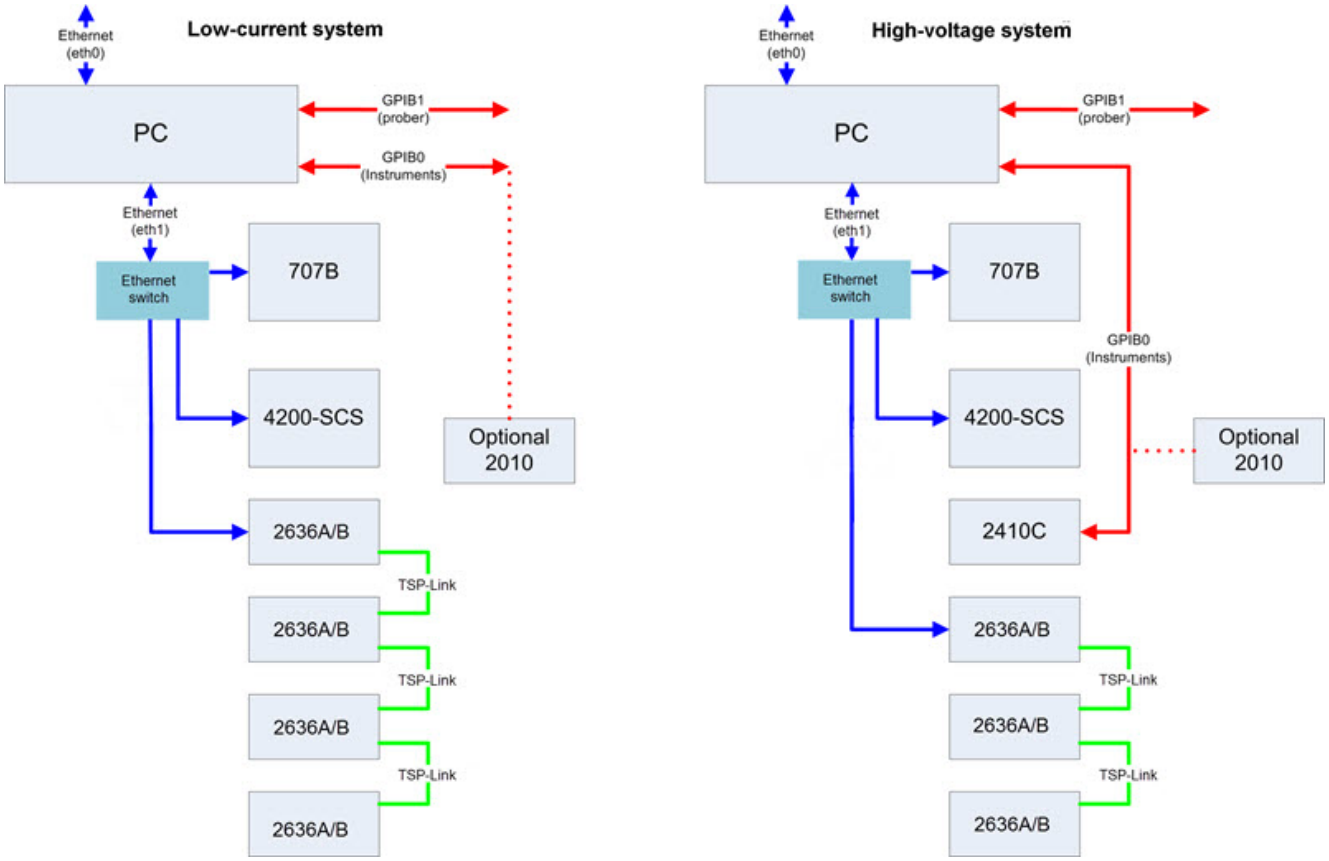

To SMU's
Triaxial cables
To Lo Patch Panel
7072-HV KELVIN channels to device under test (DUT) 24 sets of pins maximum
Instrument Source Card
Source DUT Card
Source DUT Card
Instrument Sense Card
Sense DUT Card
Sense DUT Card
Attention! Ground Link must be disengaged
Direct connect BNC "Y" into Model 4200-SCP2HR as shown
Direct connect triaxial adapters into Instrument Cards as shown
Triaxial to BNC adapters (CS-712)
BNC cables (CA-19)
BNC "Y" adapter (CS-1279)
SMA cables
SMA to BNC adapters
BNC to triaxial adapters
Model 4220-PGU
Model 4200-SCP2HR
KEITHLEY 7072-HV
8X12 HIGH VOLTAGE MATRIX
COLUMNS
WARNING: TIGHTEN MOUNTING SCREWS TO ENSURE PROPER CHASSIS GROUND
MADE IN U.S.A.
Instrument Source Card (Slot 1)
Instrument Sense Card (Slot 4)

S530 KTE communication diagram

The S530 KTE System uses both Ethernet and GPIB to communicate with and control the instruments. The diagrams shown in the next figure show how the instruments are connected to each other and what type of communications are used.

Note that the next figure shows three and four Model 2636A/B source measure units. However, the system only requires one Model 2636A/B and you do have the option to include more with a total of four.

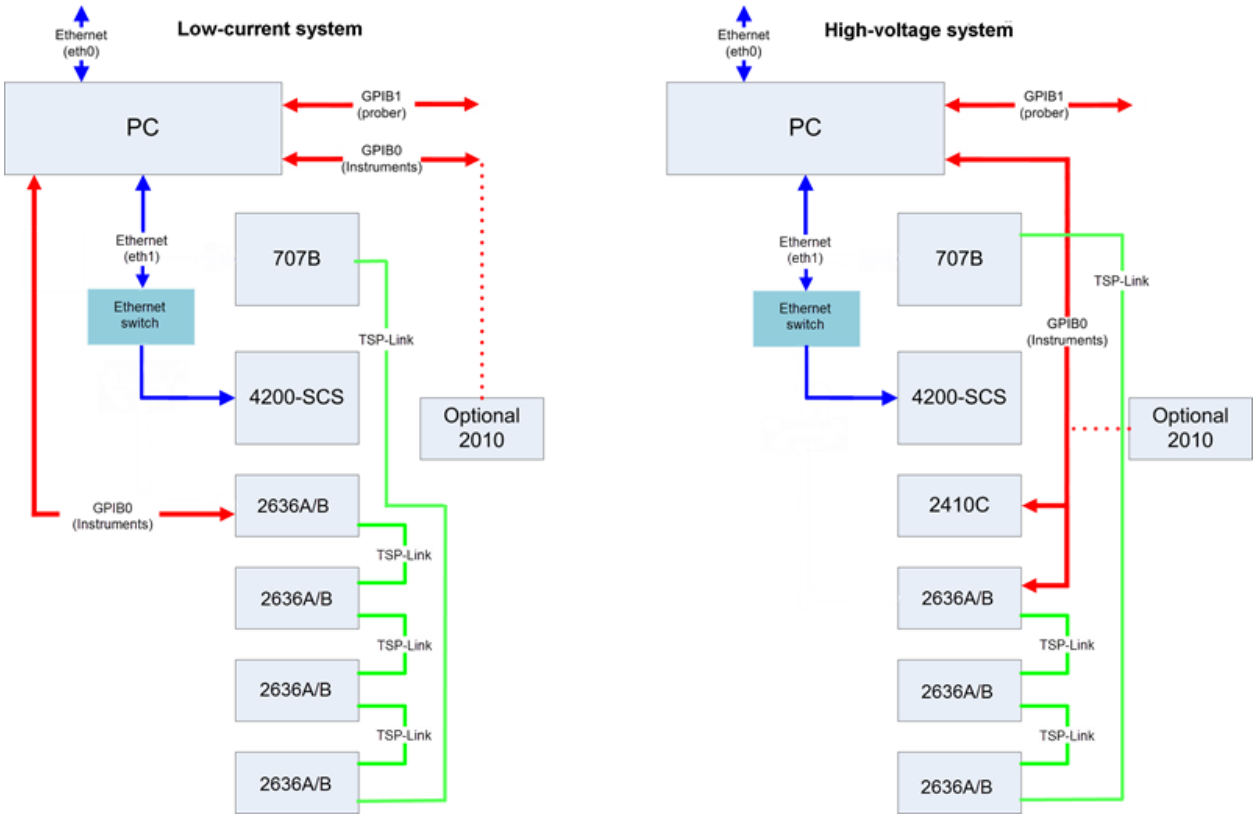
Figure 43: S530 KTE communication diagram



S530 ACS communication diagram

Note that the next figure shows three and four Model 2636A/B source measure units. However, the system only requires one Model 2636A/B and you do have the option to include more with a total of four.

Figure 44: S530 ACS communication diagram



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