

Series 3700A System Switch/Multimeter Quick Start Guide



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.

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

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. Maximum signal levels are defined in the specifications and operating information and shown on the instrument panels, test fixture panels, and switching cards.

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.

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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. The detachable mains power cord provided with the instrument may only be replaced with a similarly rated power cord. 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.

Unless otherwise noted in product-specific literature, Keithley instruments are designed to operate indoors only, in the following environment: Altitude at or below 2,000 m (6,562 ft); temperature 0 °C to 50 °C (32 °F to 122 °F) ; and pollution degree 1 or 2.

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 March 2016.



CAUTION

Carefully consider and configure the appropriate output-off state, and source and compliance levels before connecting the instrument to a device that can deliver energy. Failure to consider the output-off state, and source and compliance levels may result in damage to the instrument or to the device under test.

Introduction to the Series 3700A System Switch/Multimeter

The Series 3700A System Switch/Multimeter offers scalable, instrument-grade switching and multi-channel measurement solutions that are optimized for automated testing of electronic products and components. The Series 3700A instruments include four versions of the Model 3706A system switch mainframe along with a growing family of plug-in switch and control cards. When the Model 3706A instrument is ordered with the high-performance multimeter, you receive a tightly integrated switch and measurement system that can meet the demanding application requirements in a functional test system or provide the flexibility needed in stand-alone data acquisition and measurement applications.

The four versions of the Model 3706A include:

- 3706A six-slot system switch with high-performance DMM
- 3706A-NFP six-slot system switch high-performance DMM, without front-panel display and keypad
- 3706A-S six-slot system switch without DMM
- 3706A-SNFP six-slot system switch without DMM and without front-panel display and keypad

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Series 3700A documentation

Complete documentation for the Series 3700A System Switch/Multimeter instruments is available for download from the Keithley Downloads web page (<http://www.tek.com/downloads>). The following is a list of available documentation for the Series 3700A.

Document name	Document number
Quick Start Guide	3700AS-903-01
Shows you how to unpack and set up the instrument to determine that the instrument is functional.	
User's Manual	3700AS-900-01
Provides information about scanning, reading, writing, and controlling channels.	
Reference Manual	3700AS-901-01
Provides information about controlling the Series 3700A from a remote interface.	

Document name	Document number
Switch and Control Cards Reference Manual	3700AS-909-01
Contains card installation and operation instructions for the following models: 3720, 3721, 3722, 3723, 3724, 3730, 3731, 3732, 3740, 3750.	
Cables and Connector Kits Installation Instructions	PA-949
Provides information about the cables and connector kits that are used with the Series 3700A cards.	
Screw Terminal Assemblies Installation Instructions	PA-955
Contains handling and installation instructions for Series 3700A screw terminal assemblies.	

Unpack and inspect the instrument

To unpack and inspect the instrument:

1. Inspect the box for damage.
2. Open the top of the box.
3. Remove the packaging insert.



4. Remove the bag that contains the documentation and accessories.

Series 3700A documentation and accessories

Packaging insert



Series 3700A instrument

5. Carefully lift the instrument out of the box.

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6. Inspect the instrument for any obvious signs of physical damage.
Report any damage to the shipping agent immediately.

You have received one of the following Series 3700A System Switch/Multimeters.

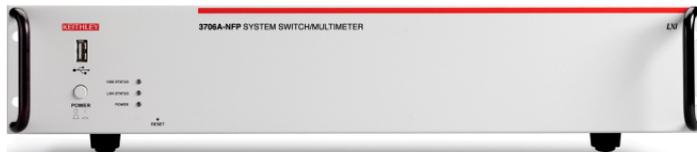
Model 3706A six-slot system switch with high-performance DMM



Model 3706A-S six-slot system switch without DMM



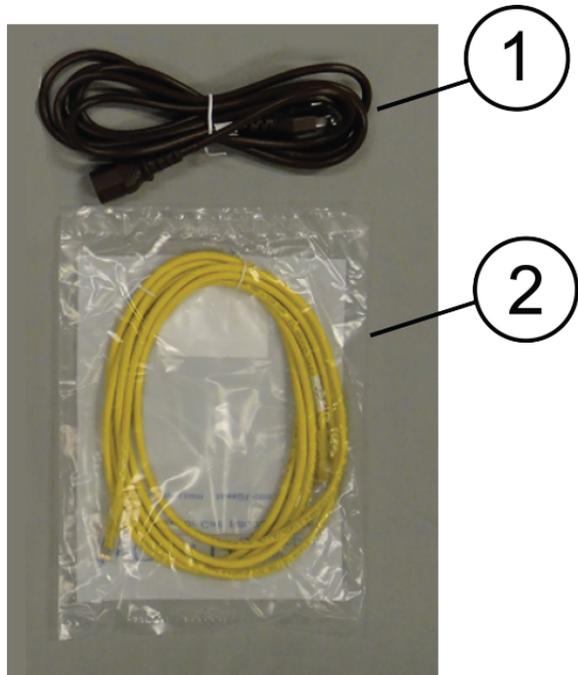
Model 3706A-NFP six-slot system switch with high-performance DMM, without front-panel display and keypad, and Model 3706A-SNFP six-slot system switch without DMM and front-panel display and keypad



In addition to the Series 3700A System Switch/Multimeter, you should have received:

- 1 Power line cord
- 2 RJ-45 LAN crossover cable
(item shipped may vary from model pictured here)
- 3 Series 3700A Quick Start Guide (not shown, this document)
- 4 Safety Precautions (not shown)

Refer to the packing list for additional items that might have shipped with your instrument.



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Connect the instrument

To keep users safe, always read and follow all safety warnings provided with each of the instruments in your system.

Install and connect a switching card

Unqualified personnel can install a switching card; however, external connections to the switching module must be performed by qualified service personnel.

The Series 3700A instruments support the following cards:

- Model 3720 Dual 1×30 Multiplexer Card (automatic CJC with 3720-ST accessory)
- Model 3721 Dual 1×20 Multiplexer Card (automatic CJC with 3721-ST accessory)

- Model 3722 Dual 1×48 High Density Multiplexer Card
- Model 3723 Dual 1×30 High Speed Reed Relay Multiplexer Card
- Model 3724 Dual 1×30 FET Multiplexer Card (60 differential channels, automatic CJC with 3724-ST accessory)
- Model 3730 6×16 High Density Matrix Card
- Model 3731 6×16 High Speed Reed Relay Matrix Card
- Model 3732 Quad 4×28 Ultra-High Density Reed Relay Matrix Card
- Model 3740 32-Channel Isolated Switch Card
- Model 3750 Multifunction Control Card (40 digital I/O bits, 2 analog output channels, and 4 counters)

For a complete list of cards that are available, see www.tek.com/keithley.

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Equipment needed:

- Series 3700A system switch/multimeter
- Switching card
- Flat-bladed screwdriver



WARNING

To prevent electric shock that could result in injury or death, NEVER handle a switching card that has power applied to it.

Before installing or removing a switching card, make sure the instrument is turned off and disconnected from line power. Even when the instrument is powered off, hazardous voltages may be present in signal cables attached to the switch cards. Always disconnect all cables before removing or installing a switch card.

If the switching card is already connected to a device under test (DUT), make sure power is removed from all external circuitry.

NOTE

For inexperienced users, disconnect DUT and external circuitry from switching cards. This allows you to exercise safe close/open operations without the dangers associated with live test circuits.



WARNING

Slot covers must be installed on unused slots to prevent personal contact with high-voltage circuits.

To install a switching card in a Series 3700A instrument:

1. Turn the instrument power off.
2. Position the instrument so that you are facing the rear panel.



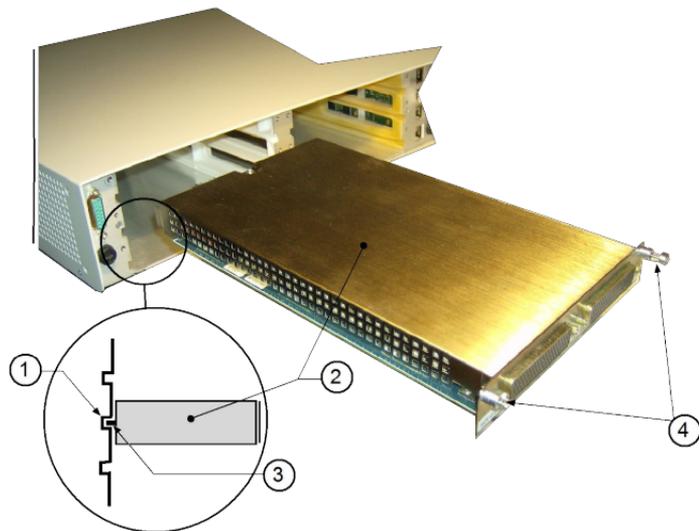
WARNING

As described in the International Electrotechnical Commission (IEC) Standard IEC 664, the Series 3700A switch cards are Installation Category I and must not be connected to mains.

3. Disconnect the power line cord and any other cables connected to the rear panel.
4. Remove the slot cover plate from the desired slot. Retain the plate and screws for future use.
5. With the top cover of the switching card facing up, align the card edge into the card guide of the slot.

Item	Description
1	Card guide (part of Series 3700A instrument)
2	Card
3	Card edge (part of card)
4	Mounting screw (part of card)

6. Slide in the card. For approximately the last ¼ inch, press in firmly to mate the module connector to the mainframe connector.
7. On each side of the module, there is a mounting screw. Use the flat-bladed screwdriver to tighten these two screws to secure the module to the mainframe. Do not overtighten.



8. Reconnect the power line cable and any other cables to the rear panel.

Note that all signal wiring to devices and instruments is done through the switch cards. Please refer to the switch card documentation for additional information.

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Install the instrument

A Series 3700A instrument can be used on a bench or in a rack. Please see the instructions that came with your rack-mount kit if you are installing a Series 3700A instrument in a rack.

Note that the air intakes for the fan are located on the side panel of the Series 3700A instrument. The space around these areas should be free from obstruction to ensure proper fan operation.

Connect line power

Series 3700A instruments operate from a line voltage of 100 V to 240 V at a frequency of 50 Hz or 60 Hz. Line voltage is automatically sensed (there are no switches to set). Make sure the operating voltage in your area is compatible.



WARNING

The power cord supplied with the Series 3700A instrument contains a separate ground wire for use with grounded outlets. When proper connections are made, the instrument chassis is connected to power line ground through the ground wire in the power cord. Failure to use a grounded outlet may result in personal injury or death due to electric shock.



CAUTION

Operating the instrument on an incorrect line voltage may cause damage to the instrument, possibly voiding the warranty.

To connect line power:

1. Make sure the front-panel power switch is in the off (O) position.
2. Connect the socket of the supplied power cord to the power connection on the rear panel.



Connect power cord

3. Connect the plug of the power cord to a grounded AC outlet.

Turn on the instrument

Turn on the instrument by pressing the front-panel **POWER** switch to the on (I) position.

The Series 3700A instrument must be turned on and allowed to warm up for at least two hours to achieve rated accuracies.



Power switch

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Power-up sequence

For instruments with a front panel, when the instrument is turned on, you should see:

- Three dots
- All segments of the display light
- A brief display showing “KEITHLEY Series 3700A”
- Line frequency detection and other startup checks

When initialization is complete, you will see the default display screen, as shown below.



For instruments without a front panel, you should see the Power indicator illuminate, then all three indicator lights illuminate briefly.

Test the instrument

For instruments with a front panel (the Models 3706A and 3706A-S), you can view system information to check operation.

To view the system information:

1. Press the **MENU** key.
2. Turn the navigation wheel  to select **UNIT-INFO**.
3. Press the navigation wheel  to see the system information menu.
4. Turn the navigation wheel  to select **SERIAL#**.
5. Press the navigation wheel  to view the serial number.
6. Press **EXIT** several times to return to the main display.

These steps confirm basic functionality of your Series 3700A. Please turn instrument power OFF now.

The examples in the Series 3700A User's Manual demonstrate increasing levels of Series 3700A functionality. We strongly recommend first-time users complete the examples in the manual.

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FAQs

What should I do if I see an error message when I turn the instrument on?

If an error message is displayed, press the **EXIT (LOCAL)** key. The Series 3700A instrument will return to the default display screen. For detailed information about error messages, see “Errors and status messages” in the Series 3700A Reference Manual.

When I connect a Model 3706A-NFP or 3706A-SNFP to my computer, how can I find the IP address?

Run the Keithley LXI Discovery Utility. For information on using this utility, see the “Communication Interfaces” section in “General Operation” in the Series 3700A User’s Manual.

Next steps

Refer to the Series 3700A User’s Manual

This manual provides application-based examples that will help familiarize you with the instrument.

Refer to the Series 3700A Reference Manual

It contains detailed information about all features of the instrument.

Refer to the Series 3700A Switching and Control Cards Reference Manual

This manual provides information on all switch cards that are compatible with Series 3700A instruments.

Keithley Instruments website

See www.tek.com/keithley for support and additional information about the instrument.

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