

Keysight 34980A Multifunction Switch/ Measure Unit

Notices

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Safety Information

CAUTION

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.

WARNING

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.

NOTE















A NOTE calls the user's attention to an important point or special information in the text.

NOTE

This document contains references to Agilent. Please note that Agilent's Test and Measurement business has become Keysight Technologies. For more information, go to www.keysight.com.

Safety Symbols

The following symbols or markings that may be on or with the instrument and in the documentation indicate precautions which must be taken to maintain safe operation of the instrument.

	Alternating current (AC)		Caution, risk of electric shock
	Frame or chassis (ground) terminal		Caution, risk of danger (refer to this manual for specific Warning or Caution information)
	Standby supply. Unit is not completely disconnected from ac mains when switch is off		Direct current (DC)
	Off (mains supply)		On (mains supply)
	Three phase alternating current		Presence of a laser device
	Protective earth (ground) terminal		Equipment protected throughout by double insulation or reinforced insulation
	Caution, hot surface		Product is sensitive to electrostatic discharge

Additional Safety Notices

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

WARNING

Refer to the User Guides of the 34980A and relevant modules before using the equipment.

WARNING

The detachable power cord is the instrument disconnecting device. It disconnects the mains circuits from the mains supply before other parts of the instrument. The front panel switch is only a standby switch and is not a LINE switch (disconnecting device). The instrument power cord does not disconnect or de-energize external circuits connected to the analog bus, terminal blocks or modules.

WARNING

Safety of any system incorporating the equipment is the responsibility of the assembler of the system.

WARNING

Dangerous voltage levels capable of causing death, may be present on a channel. Use extreme caution when handling, testing and adjusting this instrument. Any voltages greater than 30 Vrms, 42.4 Vpeak and 60 Vdc are considered hazardous (IEC 61010-1).

WARNING

Keysight Customers utilizing the Open Platform Test Systems are classified as follows and require the user to have the appropriate skillset:

Operator: Interacts with the test system in a production environment, selection of test sequences, defining variables, running tests (test results, test statistics, control of marking devices)

Supervisor: Includes access to maintenance functions and utility sequences (control of hardline system functions, access to test area)

Developer: Full access

WARNING

Removal of the instrument's cover is to be conducted by qualified personnel only. Only qualified, trained personnel who are aware of the hazards involved should remove instrument covers. Prevent operators from accessing any external circuits, test fixtures, cables or wherever hazardous voltages may be present. Failure to recognize and observe normal safety precautions could result in personal injury or death.

WARNING

Under certain conditions, dangerous voltage levels capable of causing injury or death may remain even after external circuits have been disconnected. To avoid electrical shock, remove the main power cord from the 34980A and ensure all connections to the DUT, including field wiring to the instrument and the analog bus (if present) are deenergized and all circuits are discharged before coming in contact with the system. Ensure no hazardous voltages remain on any accessible before handling any part of the instrument and test setup, making connections to the system, removing covers or cleaning the instrument.

WARNING**GENERAL**

If this product is not used as specified in the operating instructions, the protection provided by the equipment could be impaired. This product must be used in a normal condition (in which all means for protection are intact) only. Any external connections must be made prior to applying power.

WARNING**GROUND THE INSTRUMENT**

This is a Safety Protection Class I product (provided with a protective earthing ground incorporated in the power cord). The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. Any interruption of the protective conductor inside or outside of the product is likely to make the product dangerous. Intentional interruption is prohibited. The mains wiring and connectors shall be compatible with the connector used in the premise electrical system. Inadequate earth grounding can damage the instrument or cause an electrical shock hazard. Always use the three prong AC power cord supplied with the instrument or one with equal or better ratings.

Connect to AC power cord as follows:

- Ensure the power cord is not damaged.
 - Install the signal generators so that one of the following items is readily identifiable and easily reached by the operator: AC power cord, alternative switch or circuit breaker.
 - Insert the mains plug into a socket outlet provided with a protective earth grounding.
-

WARNING**DO NOT REMOVE THE INSTRUMENT COVER**

No operator serviceable parts inside. Do not install substitute parts or perform any unauthorized modifications to the instrument. Return the instrument to Keysight for service and repair to ensure the safety features are maintained in operational condition. Instruments that appear damaged or defective should be made inoperative and secured against unintended operation until they can be repaired.

WARNING**IN CASE OF DAMAGE**

Do not use the instrument if it is damaged. Before use, inspect the instrument and all connections. Pay particular attention to the insulation surrounding the connectors and / or cable assembly insulation. NEVER use a cable showing any signs of damage. Faulty cables can cause electrical shock and /or fire hazards and could lead to personal injury or death.

WARNING

ENVIRONMENTAL HEALTH & SAFETY: When any channel is connected to a hazardous voltage source, the instrument and the device under test should be supervised, following local EHS practices to restrict access.

WARNING

The service instructions are for use by qualified personnel only. To avoid electrical shock, do not perform any servicing unless you are qualified to do so.

Environmental Conditions

Keysight 34980A is designed for indoor use in an installation category II and low condensation environment. Table below shows the general environmental conditions for this instrument. Refer to the product data sheet at <https://literature.cdn.keysight.com/litweb/pdf/5989-1437EN.pdf> for more information on the instrument general specifications.

General specifications	Requirement
Temperature	Operating condition: 0°C to 55°C Storage condition: -40°C to 70°C
Humidity	Maximum Relative Humidity (non-condensing): 80% RH up to 40°C, decreases linearly to 37% RH at 55°C
Altitude	Up to 2,000 m
Pollution degree	1 or 2




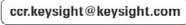
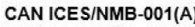

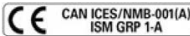
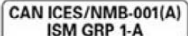


NOTE

Pollution Degree 1: No pollution or only dry, non-conductive pollution occurs. The pollution has no influence (on insulation) (IEC 61010-1).

NOTE

Pollution Degree 2: Normally only non-conductive pollution occurs. Occasionally, a temporary conductivity (leakage current between isolated conductors) caused by condensation can be expected (IEC 61010-1).

Regulatory Markings

	<p>The CE mark is a registered trademark of the European Community. This CE mark shows that the product complies with all the relevant European Legal Directives.</p>		<p>The CSA mark is a registered trademark of the Canadian Standards Association.</p>
	<p>The UK conformity mark is a UK government owned mark. Products showing this mark comply with all applicable UK regulations.</p>		<p>The Keysight email address is required by EU directives applicable to our product.</p>
	<p>This indicates that this ISM device complies with the Canadian ICES-001. Interference-Causing Equipment Standard for industrial, scientific and medical (ISM) equipment. Matériel industriel, scientifique et médical (ISM)</p>		<p>This is a symbol of an Industrial Scientific and Medical Group 1 Class A product. (CISPR 11, Clause 5)</p>
	<p>The CE mark is a registered trademark of the European Community. This CE mark shows that the product complies with all the relevant European Legal Directives. ICES/NMB-001 indicates that this ISM device complies with the Canadian ICES-001. Cet appareil ISM est conforme a la norme NMB-001 du Canada. ISM GRP:1 Class A indicates that this is an Industrial Scientific and Medical Group 1 Class A product.</p>		<p>This is a combined marking to indicate product compliance with the Industry Canadian Interference-Causing Equipment Standard (ICES/NMB-001). This is also a symbol of an Industrial Scientific and Medical Group 1 Class A product (CISPR 11, Clause 5).</p>
	<p>This symbol is a South Korean Class A EMC Declaration. This is a Class A instrument suitable for professional use and in electromagnetic environment outside of the home.</p>		<p>The RCM mark is a registered trademark of the Australian Communications and Media Authority.</p>



This symbol indicates the time period during which no hazardous or toxic substance elements are expected to leak or deteriorate during normal use. Forty years is the expected useful life of the product.



This instrument complies with the WEEE Directive (2002/96/EC) marking requirement. This affixed product label indicates that you must not discard this electrical or electronic product in domestic household waste.



Universal recycling symbol.

IP x y

This mark indicates product has been designed to meet the requirements of "IP x y", where "x" is the solid particle protection and "y" is the liquid ingress protection.

Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC

The crossed out wheeled bin symbol indicates that separate collection for waste electric and electronic equipment (WEEE) is required, as obligated by the EU DIRECTIVE and other National legislation.

Please refer to [keysight.com/go/takeback](https://www.keysight.com/go/takeback) to understand your Trade in options with Keysight in addition to product takeback instructions.



Sales and Technical Support

To contact Keysight for sales and technical support, refer to the support links on the following Keysight websites:

- www.keysight.com/find/34980a
(product-specific information and support, software and documentation updates)
- www.keysight.com/find/assist
(worldwide contact information for repair and service)

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Keysight 34980A Multifunction Switch/Measure Unit Getting Started Guide

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This guide provides an overview of the 34980A's controls, displays and connections; module assembly, wiring and installation instructions; and some basics of operation with examples. It is designed to allow you to gain quick familiarity with the instrument and start using it.

Contents of Your Shipment

The following items are shipped with your 34980A mainframe:

- Keysight 34980A User's Guide
- Keysight 34980A Getting Started Guide
- For more information on Keysight 34980A Product Reference, refer to www.keysight.com/support/34980a that contains:
 - Software and Drivers
 - Product Documentation
 - Product Data Sheet
 - Application Notes
 - Other product information
- LAN Crossover Cable for isolated (non-site) LAN connections
- Power cord for your country or geographical region
- Small flatblade screwdriver to connect field wiring to optional terminal blocks
- Keysight E2094 IO Libraries Suite

Any plug-in modules that you ordered will be shipped separately from the 34980A mainframe.

If you ordered optional terminal blocks or cables with your modules, they will be included in the shipment with your modules. You will find information about the modules in the 34980A User's Guide.

If you have questions about your shipment, or if you need information about warranty, service, or technical support, please contact Keysight Technologies:

In the United States: (800) 829-4444

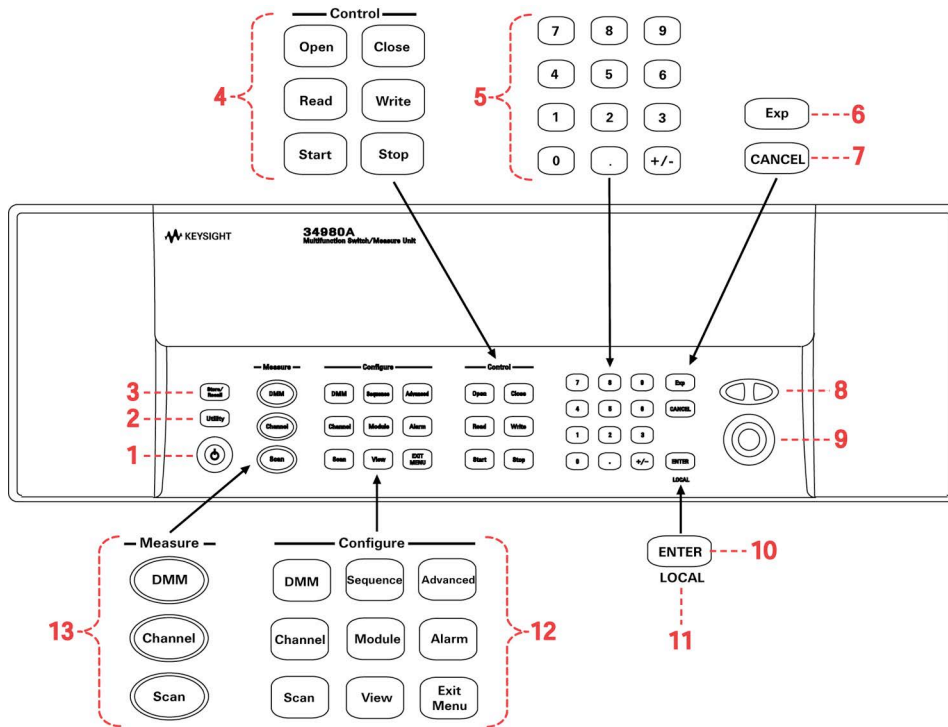
In Europe: 31 20 547 2111

In Japan: 0120-421-345

Or, go to www.keysight.com/find/assist for more information on contacting Keysight in your specific location.

You can also contact your Keysight Technologies representative.

Front Panel at a Glance



1 On/Standby switch.

WARNING

This switch provides standby only. To disconnect the mains from the instrument, be sure to remove the power cord.

- 2 Utility Menu. Configures the remote interface (LAN, GPIB, and USB), date and time, and other system-related parameters.
- 3 Store/Recall Menu. Allows you to store and recall instrument states in non-volatile memory.
- 4 Control Keys. Provide access to immediate execute actions such as closing and opening channels.
- 5 Number Keypad. Allows you to enter numeric values such as channel numbers.
- 6 Exponent Key. Allows you to enter exponential values (e.g., 10E3).

1 Getting Started

-
- 7 Cancel Key. Exits a menu without saving any changes.

 - 8 Arrow Keys. Move the cursor positions within a displayed menu item.

 - 9 Knob. Enters alphanumeric characters, selects slots, channels, and navigates menus.

 - 10 Enter Key. Steps you through a menu or stores a number entry.

 - 11 Local Key. Returns the instrument to the “local” mode and enables the front-panel keyboard.

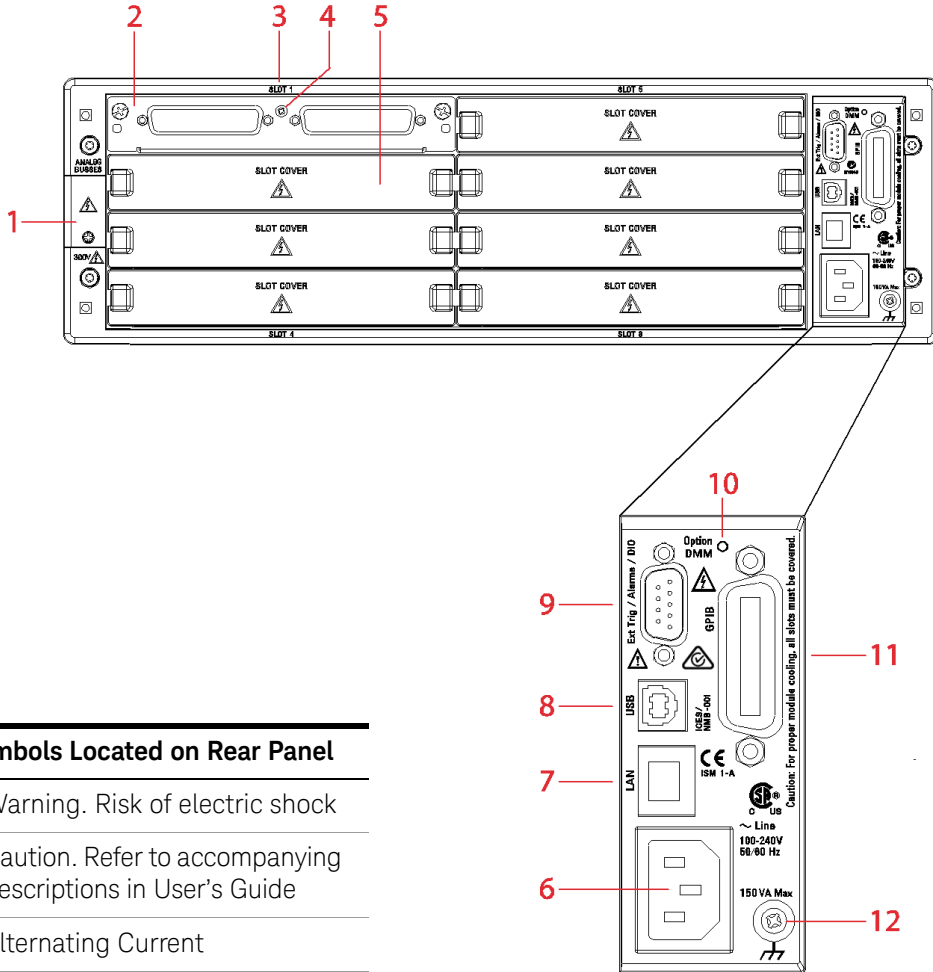
 - 12 Configure Key Group. Select functions and set various measurement parameters on the selected channel.

 - 13 Measure Key Group. Execute and monitor measurements. Depending on which measurement key you select, you can have complete/direct control over the switching and measurement operations, or you can let the 34980A automatically control the switching and measurement.
-

NOTE

For more information on using the front-panel menus, see the 34980A User's Guide.

Rear Panel at a Glance



Safety Symbols Located on Rear Panel

	Warning. Risk of electric shock
	Caution. Refer to accompanying descriptions in User's Guide
	Alternating Current
	Mainframe Chassis Ground

- 1 Access to Analog Buses (shown with removable cover installed). See 34980A User's Guide for connector pinout.
- 2 Module shown installed in Slot 1

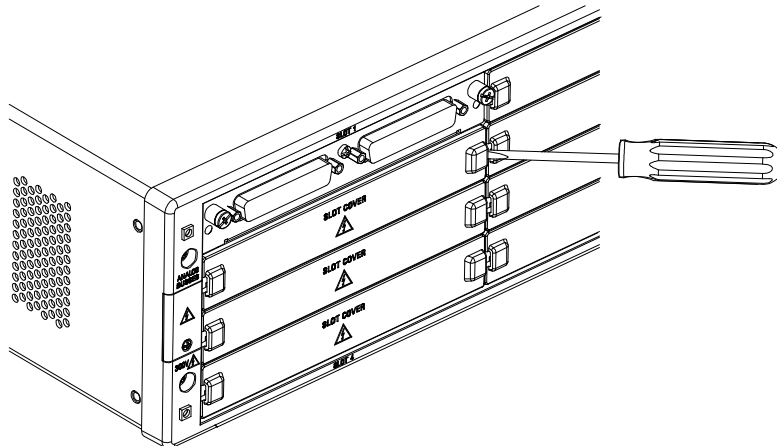
1 Getting Started

3	Slot Identifier (slots are numbered 1 through 8)
4	Module Chassis Ground Screw
5	Slot Cover
6	AC Power Connector
7	LAN Connector (10Base T/100Base Tx)
8	USB 2.0 Connector
9	External Trigger/Alarm/Digital I/O Connector. See 34980A User's Guide for connector pinout.
10	Internal DMM Option Marking. If you ordered the internal DMM option, this circle is marked black.
11	IEEE 488.2 GPIB Connector
12	Mainframe Chassis Ground Screw

Removing a Slot Cover

Your 34980A is shipped from the factory with one slot uncovered and the remaining seven slots covered. When performing tasks in this guide to become familiar with the instrument, you will install a plug-in module into Slot 1. When you are ready to install additional modules, follow the procedure below to remove a slot cover.

Using a flatblade screwdriver, pry each side of the slot cover until the cover releases from the slot. With the slot cover removed, you can now install a module in this slot.



WARNING

Under certain conditions, dangerous voltage levels capable of causing injury or death may remain even after external circuits have been disconnected. To avoid electrical shock, remove the main power cord from the 34980A and ensure all connections to the DUT, including field wiring to the instrument and the analog bus (if present) are deenergized and all circuits are discharged before coming in contact with the system. Ensure no hazardous voltages remain on any accessible before handling any part of the instrument and test setup, making connections to the system, removing covers or cleaning the instrument.

CAUTION

For proper module cooling, all unused slots must be covered.

CAUTION

Do not block air intake or exhaust vents at the sides of the instrument.

Installing a Module

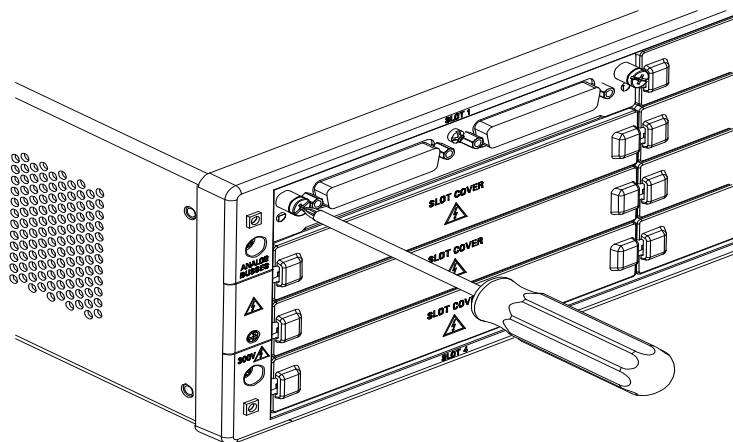
NOTE

The Safety Interlock feature prevents connections to the Analog Buses if no terminal block or properly-wired cable is connected to a module (available on the multiplexer and matrix modules only). If the proper connections are not present, the Analog Bus relays will be disabled on that module and the front panel “Safety Interlock” display annunciator will turn on. See the 34980A User’s Guide for additional information.

Installing a Module for Use with Cables

If you are planning to use cables for your external connections, follow the procedure below to install a plug-in module. If you are planning to use an optional terminal block to connect your external wiring, see the procedure on [page 24](#).

- 1 Install the module into a mainframe slot until it fully seats with the backplane connector.
- 2 Using a Pozidriv #1 screwdriver, tighten the two screws to secure the module in the mainframe. Installation is now complete.

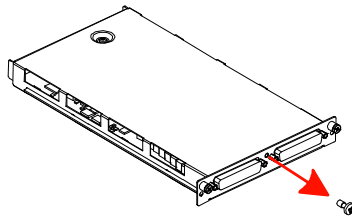


NEXT STEP: Go to “Operating the Front Panel Keyboard” on [page 34](#).

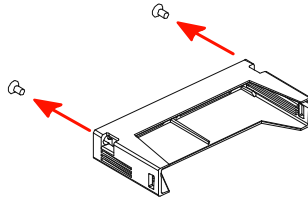
Installing a Module for Use with Terminal Blocks

All of the 34980A plug-in modules, except the RF and microwave modules, can be used with a compatible terminal blocks (optional accessories 349xxT). The optional terminal blocks provide screw terminals or solder cup connections for your external wiring. If you plan to use an optional terminal block, follow the procedure below.

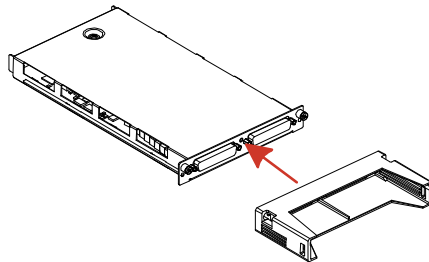
- 1 Using a Pozidriv #1 screwdriver, remove the panhead grounding screw located between the module connectors.



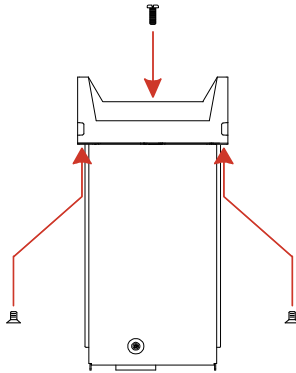
- 2 Remove the two flathead screws from the support sleeve.



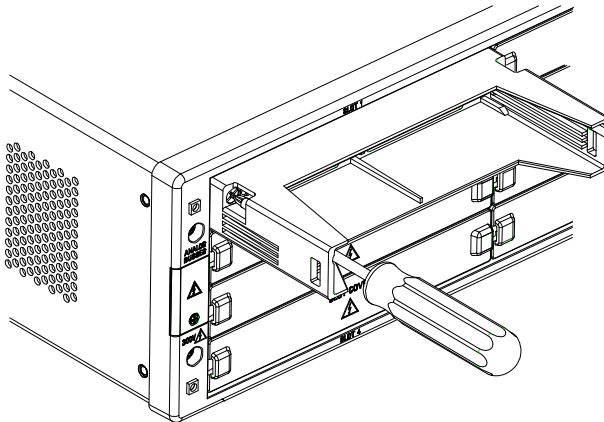
- 3 Fit the terminal block support sleeve against the module so the openings on the sleeve line up with the connectors and the center screw hole as shown.



- 4 Replace the panhead screw. Then replace and tighten the two flathead screws to secure the sleeve to the module.



- 5** Install the module into a mainframe slot until it fully seats with the backplane connector. Using a Pozidriv #1 screwdriver, tighten the two screws to secure the module in the mainframe. Installation is now complete.



NEXT STEP: Go to “Wiring and Installing a Terminal Block” on [page 26](#).

Wiring and Installing a Terminal Block

If you are planning to use an optional terminal block with your plug-in modules, refer to the instructions below to connect your external wiring and install a terminal block.

Wiring a Terminal Block

WARNING

Before you begin this task, make sure you have disconnected power from all external field wiring you will be connecting to the terminal block.

WARNING

Terminal block wiring: Failure to follow the instructions below could result in equipment damage and may result in hazardous conditions such as fire or shock and could lead to personal injury or death.

Wiring of the terminal block must be performed by qualified persons. A **MAXIMUM** of 5 mm of conductor insulation is to be removed. All wire strands must be appropriately inserted in the connector housing. The screw connections must be sufficiently secured to prevent accidental loosening.

Never operate the instrument without the terminal block covers securely installed. Use caution to prevent operators from accessing any external circuits, test fixtures, cables or whenever hazardous voltages may be present.

WARNING**External Wiring for Hazardous Voltages:**

To ensure minimum safety insulation when wiring with hazardous voltages, ensure all wiring (both internal and external to the instruments):

- follow (USA) NFPA 79 Table 12.5.1 Conductor Ampacity and 12.5.5(a) Ambient Temperature Correction Factors (or equivalent National Code requirements) when selecting the AWG required.
 - are rated for at least 2 x the maximum applied voltage of the external source or any interconnecting system modules or external connections.
 - flame rated minimum:
 - Wires and cables with overall cross-sectional area of the conductors exceeding 0.5mm^2 meet test of IEC 60332-1-2 (IEC); or
 - Wires and cables with overall cross-sectional area of the conductors of 0.5mm^2 or less, the test of IEC 60332-2-2 (IEC); or
 - FT-1 of CSA C22.2 No. 0.3 (Canada); or
 - VW-1 of UL 1581 (US).
 - temperature rated for the application.
 - classified and suitable to be used external to the enclosure:
 - AWM Class II B or A/B – external/interconnecting wires (single- or multiple-conductor constructions with a jacket) and potentially subject to mechanical abuse (Canada)
 - AWM Style Use – external interconnection of electronic equipment or appliances (US)
-

WARNING

Under certain conditions, dangerous voltage levels capable of causing injury or death may remain even after external circuits have been disconnected. To avoid electrical shock, remove the main power cord from the 34980A and ensure all connections to the DUT, including field wiring to the instrument and the analog bus (if present) are deenergized and all circuits are discharged before coming in contact with the system. Ensure no hazardous voltages remain on any accessible before handling any part of the instrument and test setup, making connections to the system, removing covers or cleaning the instrument.

WARNING

Module 34937A, Terminal Block 34937T:

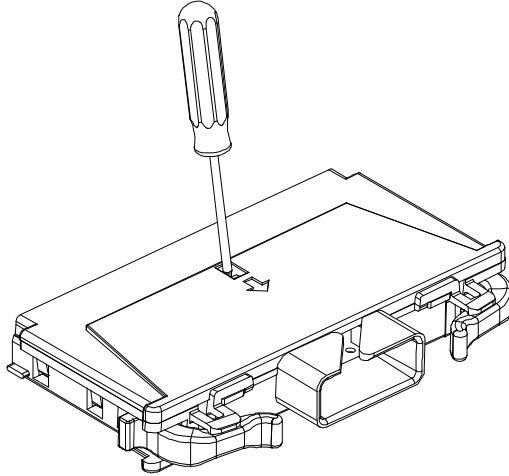
The maximum differential voltage between Form A and Form C is not to exceed 300 Vrms or Vdc in Pollution Degree I or 100 Vrms or Vdc for Pollution Degree 2. Exceeding these ratings may cause electrical shock and /or fire hazards and could lead to personal injury or death.

When wired to both Form A and Form C, and applying hazardous live signals (voltages above 30 Vac, 42.2 Vpeak or 60 Vdc), all circuits must also be considered hazardous, as a fault in the circuitry may lead to electrical shock hazards resulting in personal injury or death.

NOTE

For plug-in module pinout diagrams and additional information, refer to the 34980A User's Guide, which is shipped with your 34980A mainframe.

- 1 To remove the terminal block cover, insert a screwdriver through the hole in the cover as shown. Gently push the tab in the direction of the arrow.

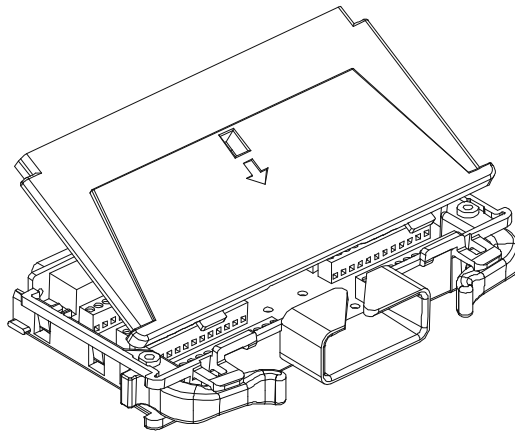


- 2 While pushing the tab (Step 1), lift the clear plastic cover from the edge near the D-sub connectors. Slide the cover from under the tab holders and remove the cover.

NOTE

If you are wiring to screw-type terminals, use the small flathead screwdriver included with your 34980A.

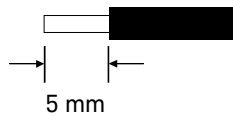
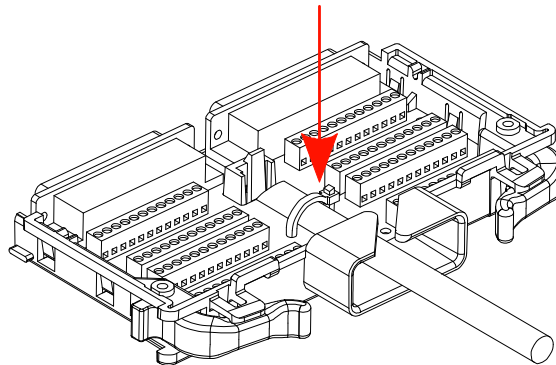
1 Getting Started



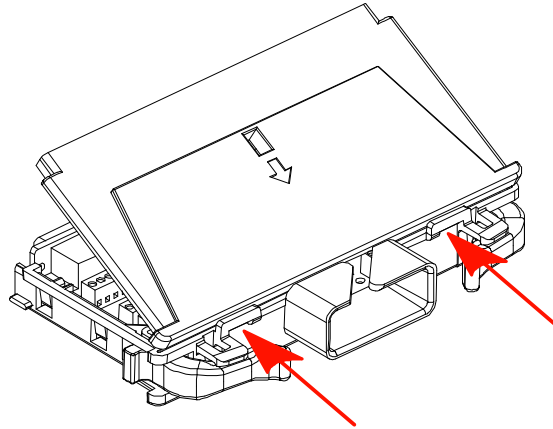
3 Use a 2.5 mm cable tie as shown for additional strain relief.

WARNING

Always include wiring strain relief to reduce strain on the connections. Failure to do so may result in hazardous conditions such as fire or shock and could lead to personal injury or death.



- 4 To replace the terminal block cover, slide the cover tabs into the tab holders on the terminal block as shown. Press down on the cover until it snaps securely into place.

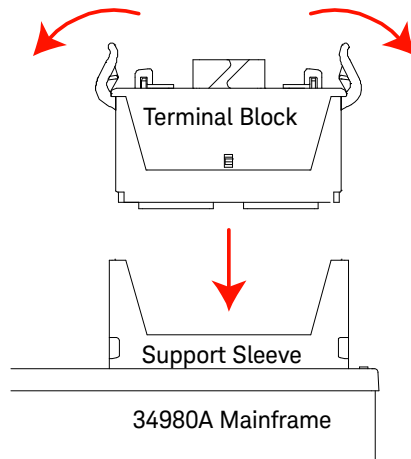


Installing a Terminal Block

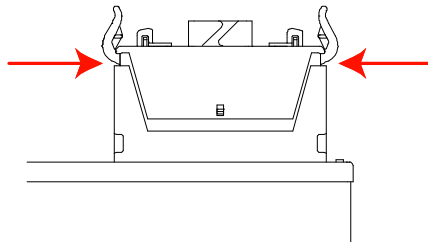
Use the following steps to install an optional terminal block to a plug-in module. See [page 26](#) to connect your external field wiring to the terminal block.

- 1 Push the levers on the terminal block to the fully-open position as shown below. Then slide the terminal block into the instrument-mounted support sleeve...

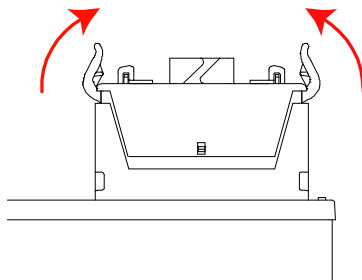
1 Getting Started



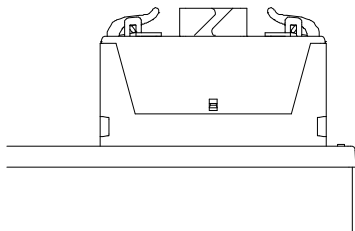
...until the terminal block stops at the two points indicated by the arrows below.



2 Carefully rotate the levers upward as shown...



...until both levers are locked in the closed position.



NEXT STEP: Go to “Operating the Front Panel Keyboard” on [page 34](#).

Operating the Front Panel Keyboard

This section gives an overview on operating the 34980A from the front panel keyboard. For additional information, see the 34980A User's Guide.

NOTE

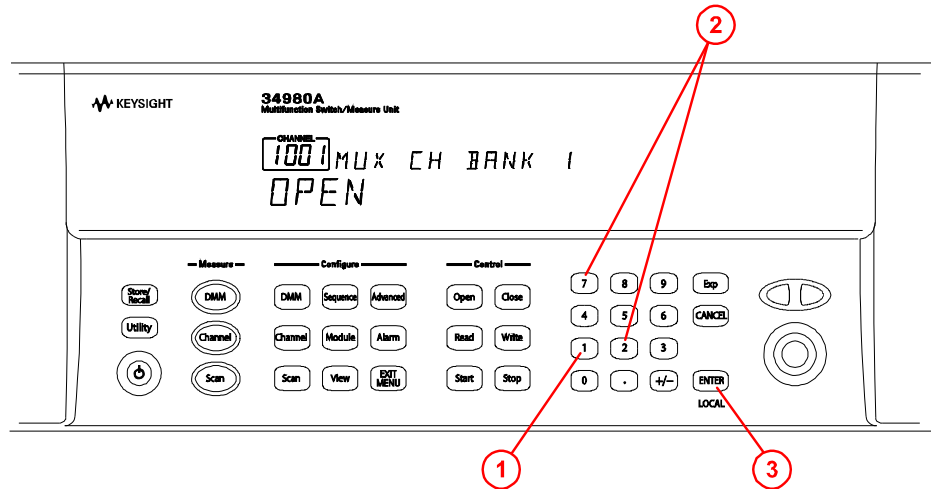
Before you can operate the front panel keyboard, connect the power cord to the 34980A and turn on the power. If the instrument does not power on properly, contact Keysight Technologies Technical Support.

At power on, all segments on the front panel are displayed and all lighted keys temporarily turn on. The front panel is ready for operation when the keys are no longer lit and the green channel field on the display shows the first slot in which a module is installed.

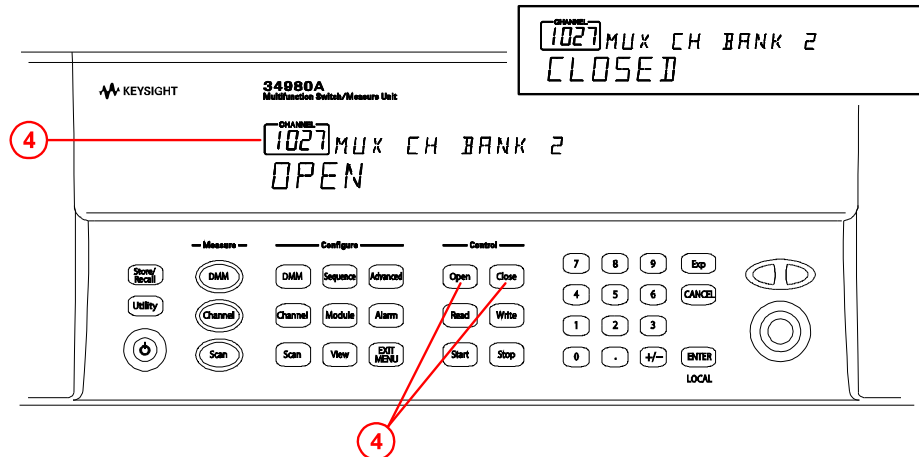
Menu Example: Selecting a Channel and Operating the Channel Relay

Use the following instructions for any of the multiplexer modules (34921A, 34922A, 34923A, 34924A, or 34925A). The example illustrations below show the 34921A module installed in slot 1.

- 1 Using the number keypad, press **1** to select the slot containing the multiplexer module.



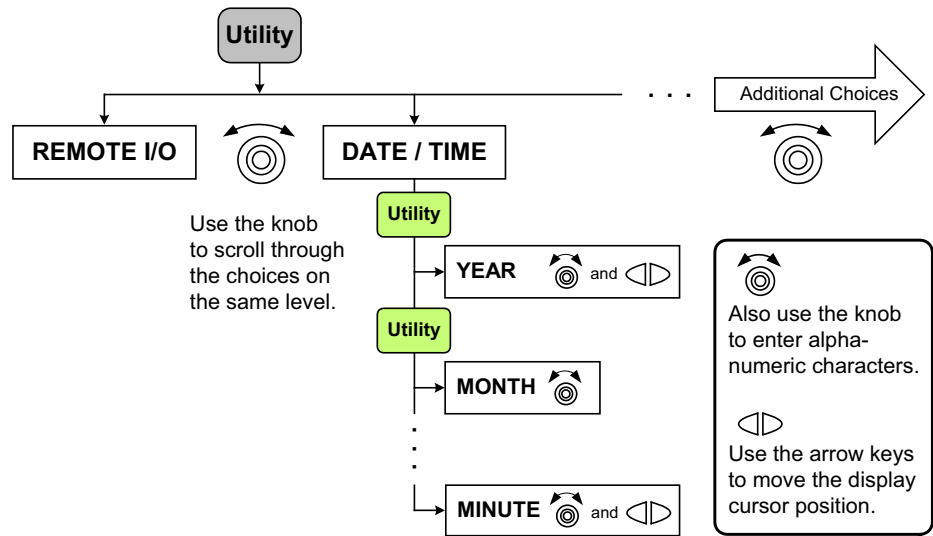
- 2 Select channel 27 on the module by pressing **2** and then **7**.
- 3 Press the lighted **ENTER** key to complete your channel selection.
- 4 With channel 1027 selected (shown in green channel field on display), toggle the **Close** and **Open** keys to close and open the selected channel. Note that the display shows **OPEN** or **CLOSED**, indicating the status of the channel.



Menu Example: Setting the Time and Date

In this example, you will learn the fundamentals of using the 34980A front-panel menus by setting the date and time. Begin by pressing the **Utility** menu key as shown in the diagram. Follow the menu prompts as they are displayed.

A list of menu hints is provided below. Use this information as you navigate through the menu structure. For an overview of the front panel keys, see [page 17](#).



Menu Hints:

- The navigation structure of the front panel menus is hierarchical, and the menus are self-guiding; as you use the front panel, you may be prompted to enter specific parameters.
- To make another choice at the same level within a menu, use the knob.
- To select a displayed parameter and move to the next parameter, press either the lighted menu key (e.g. **Utility** key) or the **ENTER** key.
- To save changes, keep other parameters at their same value, and immediately exit the menu, press the **EXIT MENU** key.
- To exit a menu without saving any changes, press the **CANCEL** key (located next to the number keypad).
- To select slots and channels so they appear in the green channel field, use the knob.
- To enter alphanumeric characters, use the knob. To enter numbers, use the number keypad or knob.
- To move the display cursor position, use the left and right arrow keys.
- When you have entered all required parameters, the lighting on the menu key will turn off.

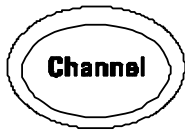
Using the Measure Keys

In the following examples, you will use keys in the front-panel Measure group. The three keys in the Measure group control the initiation of measurements (conversely, the menu keys in the Configure group allow you to set parameters for measurements). Depending on which measurement key you select, you can have complete/direct control over the switching and measurement operations, or you can allow the 34980A to automatically control the measurement to capture the desired data.

— Measure —



- **DMM** – When you press DMM, the internal DMM takes continuous measurements on whatever signal you have routed to the DMM (allows the most flexibility). In this mode, you must manually control the opening and closing of relays.



- **Channel** – When you press Channel, the 34980A controls the relays needed for the internal DMM to make continuous measurements on a single selected channel. The measurement configuration used for a particular channel (as specified in the Channel menu in the Configure group) is stored and recalled whenever you select that channel.



- **Scan** – When you press Scan, the 34980A controls all the relays required to make a series of sequential measurements, even across multiple channels with unlike measurement functions. Scan takes the measurements and stores the results in volatile memory.

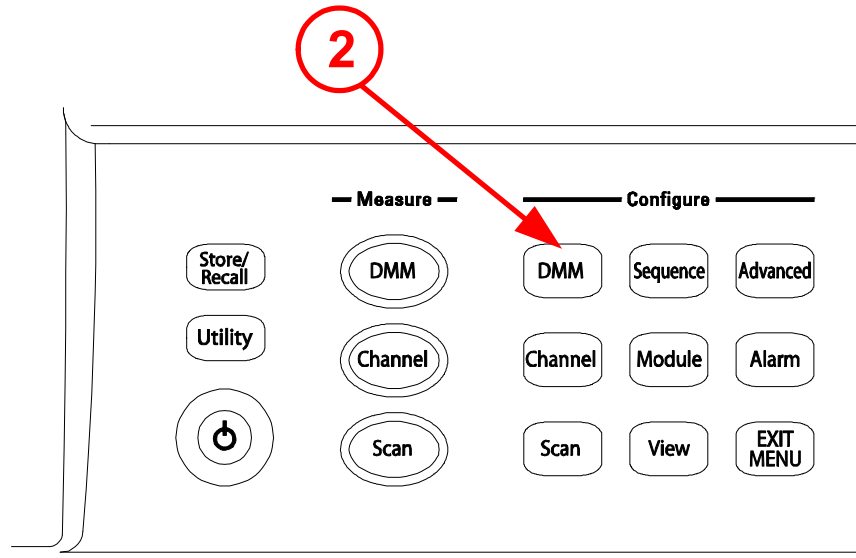
Menu Example: Configuring the Internal DMM for a Measurement

NOTE

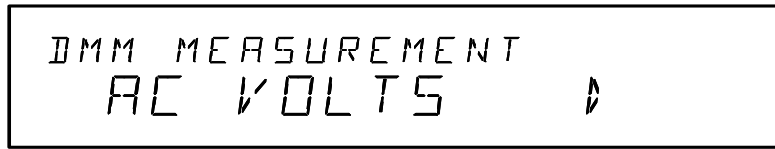
This example uses the internal DMM for a measurement. If you have disabled your internal DMM, or don't have one installed in your 34980A, skip this example.

Use the following instructions for any of the multiplexer modules (34921A, 34922A, 34923A, 34924A, or 34925A).

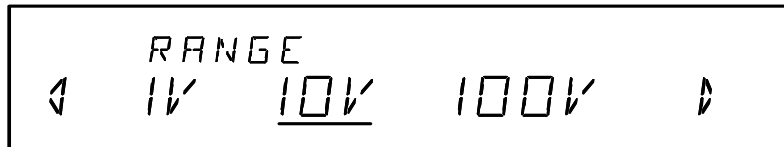
- 1 Make sure you have a multiplexer module installed in slot 1. Select any channel on this module (the channel number is shown in green channel field on display).
- 2 Within the Configure key group, press the **DMM** key to set the measurement parameters for the internal DMM. Note that the **DMM** key lights.



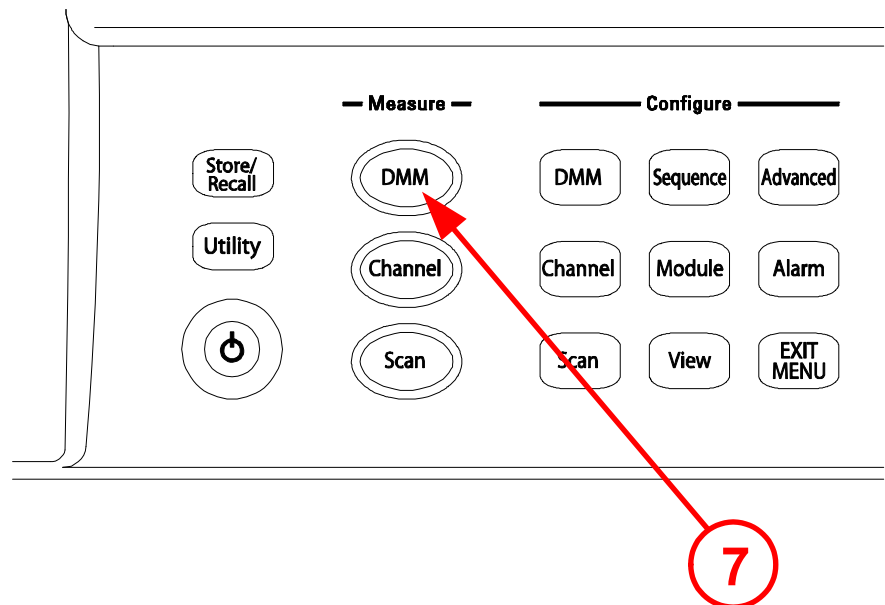
- 3 Using the knob to navigate through the menu choices, select the **AC VOLTS** function.



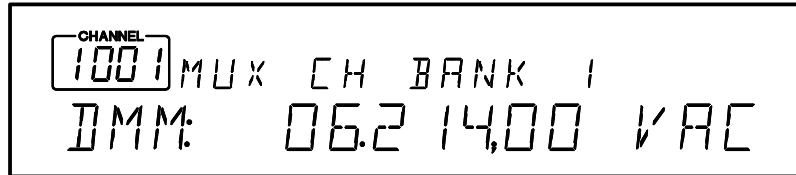
- 4 Press the lighted **DMM** menu key to accept the ac voltage function.
- 5 Using the knob, select **10V**, which indicates the range parameter for ac voltage.



- 6 Press the **EXIT MENU** key to save your selections (ac voltage, 10 volt range) and immediately exit the menu. All unmodified parameters within the menu remain unchanged.
- 7 Within the Measure key group, press the **DMM** key.



Note that the key lights and continuous ac voltage measurements are made using the internal DMM.



- 8 To stop the measurements, press the **DMM** key (in the Measure key group).

In This Example:

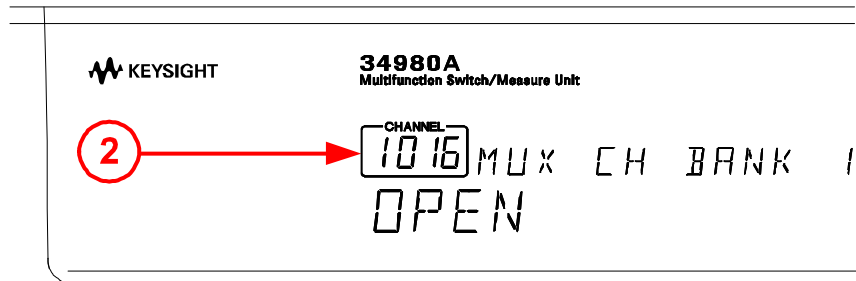
- You configured the internal DMM for ac voltage measurements,
- You started measurements, viewed continuous measurement results, and stopped the measurements.

Since you didn't open or close any channels, no module or Analog Bus relays were exercised in this example. The internal DMM acted as a stand-alone instrument and measured whatever ac voltages happened to be present on the Analog Buses. Pressing **DMM** key (in the Measure key group) also allowed you to continuously monitor measurements on the front panel.

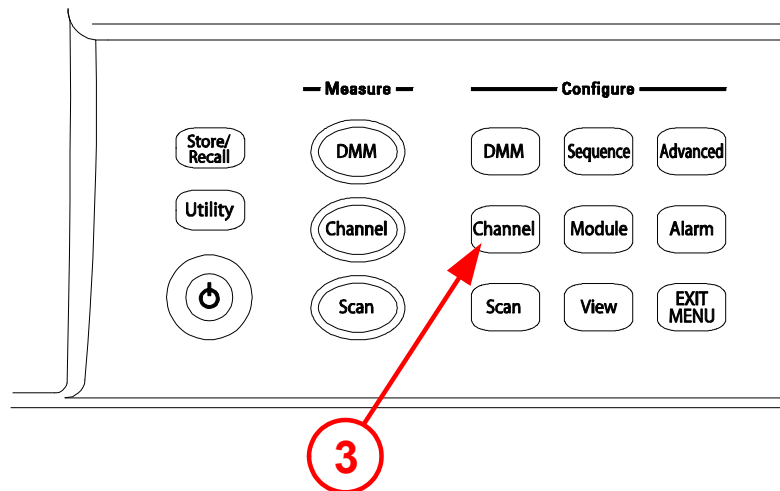
Menu Example: Configuring a Channel for a Measurement

Use the following instructions for any of the multiplexer modules (34921A, 34922A, 34923A, 34924A, or 34925A).

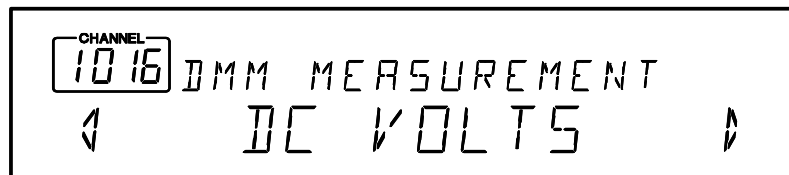
- 1 Make sure you have a multiplexer module installed in slot 1.
- 2 Using the knob to navigate or using the number keypad, select Channel **1016** (the green channel field displays 1016).



- 3 Press the **Channel** key (in the Configure key group) to access the configure menu for Channel 1016. Note that the Channel key lights while in the menu.

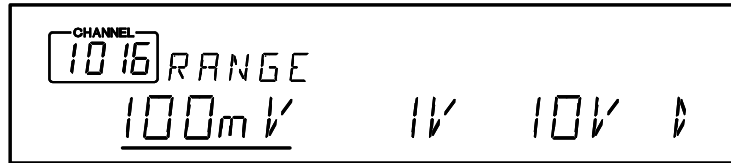


- 4 Using the knob to navigate through the menu choices, select the **DC VOLTS** function.

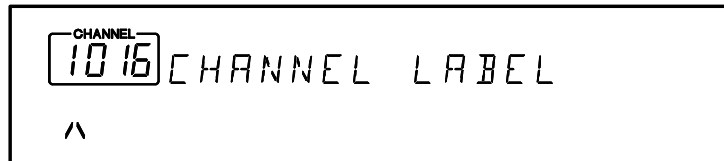


- 5 Press the lighted **Channel** key to select this function and proceed to the next parameter in the menu.

- 6 Use the knob to select the **100 mV** range for the dc voltage function.



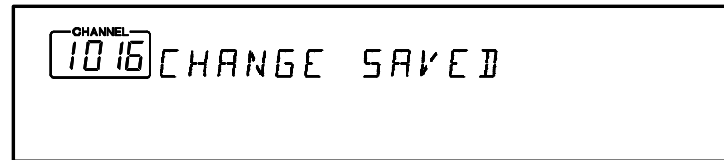
- 7 Continue pressing the lighted **Channel** key until **CHANNEL LABEL** is shown.



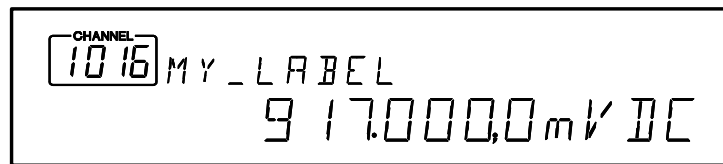
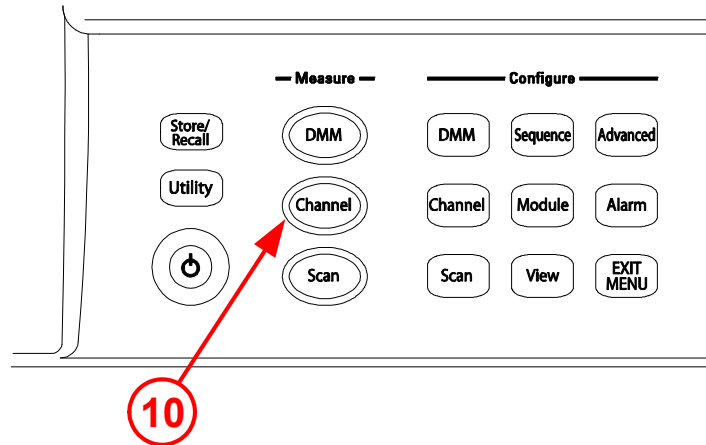
- 8 At the **CHANNEL LABEL** choice, use the knob (to select alphanumeric characters) and the arrow keys (to select the cursor position) to enter a custom channel label.



- 9 Press the lighted **Channel** key to save the assigned channel label and all other changes you made.



- 10 Press the **Channel** key in the Measure key group. Note that the Channel key lights, the required relays automatically close, and dc voltage measurements begin.



- 11 To stop the continuous measurements, press the **Channel** key again. Note that as you press the Channel key, you will hear the relays automatically opening.
- 12 Using steps 1 through 6 on the previous page, set the following configuration for Channel 1014. For this example, don't change any other measurement parameters.
 - Channel **1014**
 - **AC VOLTS** function
 - **1V** range
- 13 Press the **EXIT MENU** key to accept the new settings and retain all other parameters in this menu.
- 14 With Channel 1014 selected, press the **Channel** key in the Measure key group. The Channel key lights, the required relays automatically close, and measurements begin.



- 15** With the Channel key still lighted, turn the knob to display channel **1016**. You should see measurements start for DC VOLTS (your previously configured function for channel 16).
- 16** With the Channel key still active, turn the knob between channels **1016** and **1014** to monitor the measurement results for each channel. As you pass Channel 1015, which is not configured for a measurement, notice that the associated channel relay is open and measurement is off.



- 17** Press the **Channel** key so the light is off. Notice that **Monitoring** is now turned off, but you can continue to view the measurement parameters on channels 1014 and 1016.



In This Example:

- You configured channel 16 for dc voltage measurements.
- With the Channel key (in Measure key group), you started, viewed results, and stopped continuous dc voltage measurements on channel 16.
- You configured channel 14 for ac voltage measurements.
- With the Channel key (in Measure key group), you started, viewed results, and stopped continuous ac voltage measurements on channel 14.

- You monitored channels with the Channel key (in Measure key group) activated. Using the knob, you scrolled between channels 14 and 16 to alternatively start, view, and stop continuous measurements on the channels.

Connecting the 34980A to Your Computer

NOTE

To easily connect the 34980A to your PC, configure and verify your connection, you can use the Keysight IO Libraries Suite, the E2094M Keysight IO Libraries for Windows, or an equivalent.

- Keysight IO Libraries Suite for Windows 98/2000/ME/XP. For information and installation, refer to www.keysight.com/find/iolib.
- E2094M Keysight IO Libraries for Windows 98/NT/2000/ME/XP. You can find information and install this application via the Web at www.keysight.com/find/iolib.
- You can also access other information about Keysight IO Libraries at www.keysight.com/find/connectivity.

NOTE

The procedures in this section refer to the Keysight Technologies USB/LAN/GPIB Interfaces Connectivity Guide. If you have installed the IO Libraries Suite, you can access the Connectivity Guide via the Keysight IO Libraries Control icon. Or, you can access the Connectivity Guide via the Web at www.keysight.com/find/connectivity.

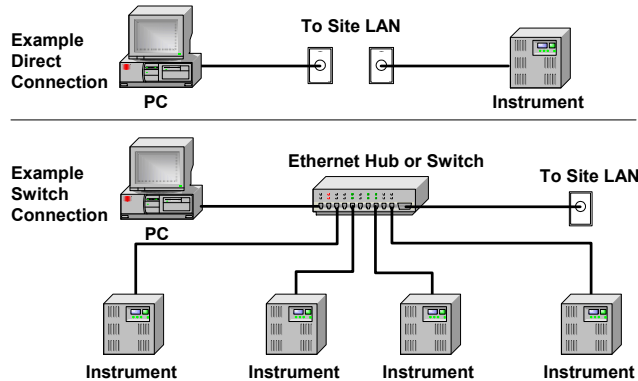
Connecting Over LAN

Selecting the LAN Network Type

You can connect and configure your 34980A for Site LAN or Isolated (non-site) LAN operation.

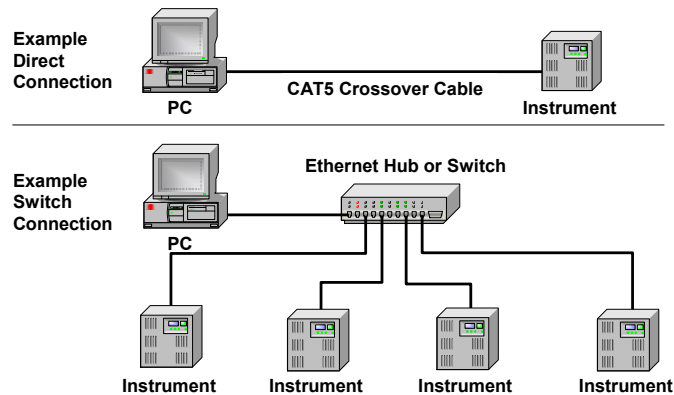
- A Site LAN network is defined as a local area network (LAN) in which computers and LAN-enabled instruments are connected to a site LAN (workgroup LAN, Intranet, or enterprise LAN) via optional routers, hubs, and/or switches.

Typical Site LAN Networks



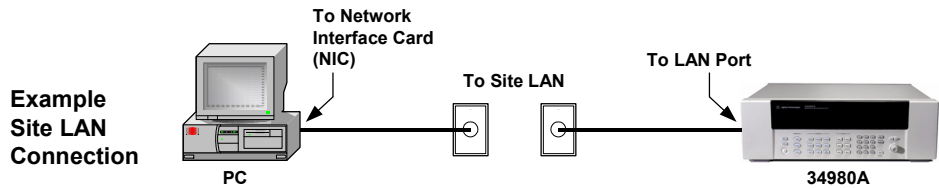
- An Isolated LAN network is defined as a local area network (LAN) in which computers and LAN-enabled instruments are **not** connected to a site LAN. Use the crossover cable provided with the 34980A to make a direct connection between the 34980A and your computer. Crossover cables are also supported by many newer LAN switches or routers.

Typical Isolated (Non-Site) LAN Networks



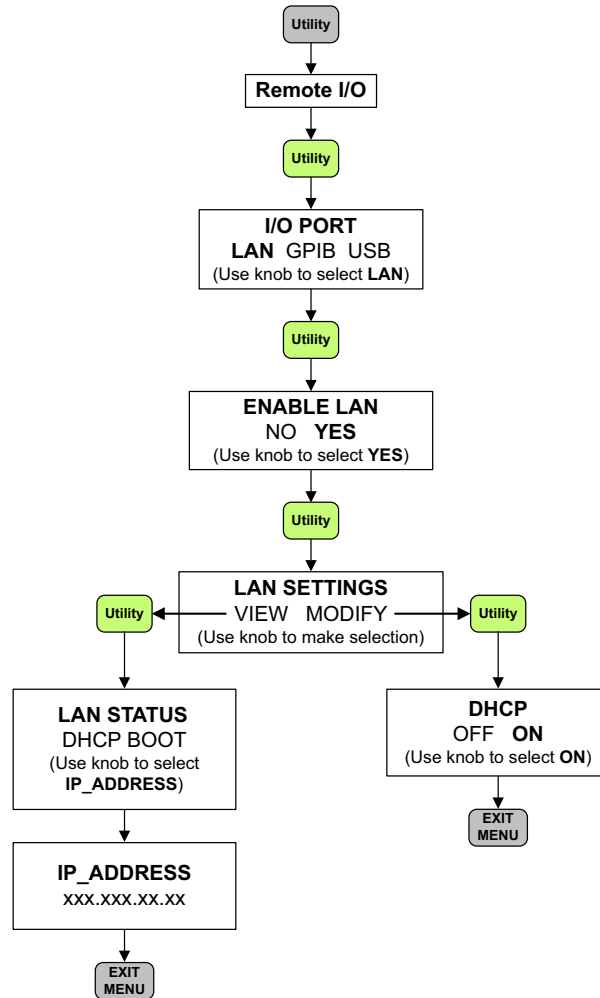
The diagrams above show examples of typical site LAN and isolated LAN networks. Select the LAN network type that you will use to connect the 34980A to your computer. Then follow the corresponding procedures shown on [page 48](#) or [page 50](#).

Connecting Via Site LAN



- 1 Using a standard LAN patch cable, connect your computer and the 34980A to LAN wall outlets.
- 2 Make sure power is applied to your computer and verify that the operating system is fully booted. Then apply power to the 34980A.
- 3 Using the flow diagram shown below, navigate through the 34980A front-panel **Utility** menu to verify that **DHCP** is **ON** (ON is the factory default state). Note that if your LAN does not support DHCP, refer to the Connectivity Guide.

Front-Panel Navigation



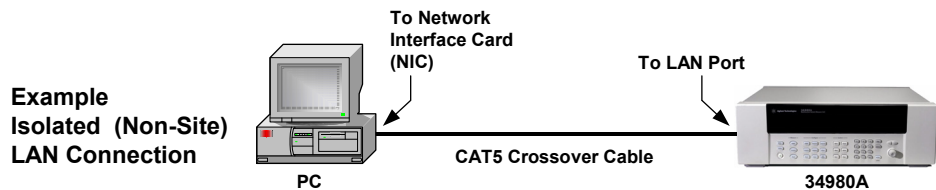
- 4 Press **EXIT MENU**, which saves any changes and defaults all other parameters in the Utility menu.
- 5 Wait for the DHCP server to assign a valid address (this operation can take between 30 seconds and one minute to complete).

- 6 From the **Utility** menu, navigate to the **LAN SETTINGS** choice and select **VIEW**. Using the flow diagram as a guide, view the instrument's IP address and other LAN settings. Write down the IP address in the space below:

34980A IP Address: _____

- 7 Press **EXIT MENU**.
- 8 Now you can use the 34980A Web Browser Interface to access and control the instrument. See [page 55](#) for more information on using the Web Interface.
- 9 If you plan to program the instrument over LAN or use such programs, make sure you have installed the required I/O software on your computer.
- 10 Use the Connection Expert utility of the Keysight IO Libraries Suite to add the 34980A and verify a connection. When identifying the instrument, it is easiest if you use the IP address noted in step 6 above. Note that if you have installed any other I/O software, refer to documentation included with that software.
- 11 Now you can use various programming environments to control the 34980A. For an overview on programming instruments via LAN, refer to the Connectivity Guide.

Connecting Via Isolated (Non-Site) LAN



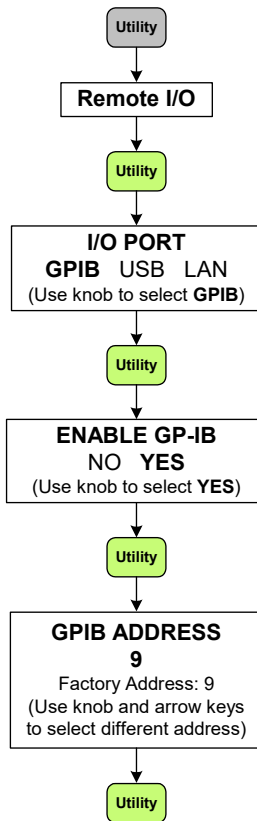
- 1 Using the CAT5 crossover cable provided with the 34980A, connect your computer to the 34980A.
- 2 Make sure power is applied to your computer and verify that the operating system is fully booted. Then apply power to the 34980A.
- 3 Using the flow diagram in [Connecting Via Site LAN](#), navigate through the 34980A front-panel **Utility** menu and set **DHCP** to **OFF**.
- 4 Press **EXIT MENU**, which saves any changes and defaults all other parameters in the Utility menu.

- 5 From the **Utility** menu, navigate to the **LAN SETTINGS** choice and select **VIEW**. Using the flow diagram above as a guide, view the instrument's IP address and other LAN settings. Write down the IP address in the space below:
34980A IP Address: _____
- 6 Press **EXIT MENU**.
- 7 Now you can use the 34980A Web Browser Interface to access and control the instrument. See [page 55](#) for more information on using the Web Interface.
- 8 If you plan to program the instrument over LAN or use such programs, make sure you have installed the required I/O software on your computer.
- 9 Use the Connection Expert utility of the Keysight IO Libraries Suite to add the 34980A and verify a connection. When identifying the instrument, it is easiest if you use the IP address noted in step 5 above. Note that if you have installed any other I/O software, refer to documentation included with that software.
- 10 Now you can use various programming environments to control the 34980A. For an overview on programming instruments via LAN, refer to the Connectivity Guide.

Connecting Over GPIB

- 1 Make sure you have installed the required I/O software on your computer.
- 2 Follow the instructions included with your GPIB interface card to install the GPIB hardware in your computer.
- 3 Connect a GPIB cable (not provided) between your computer and the 34980A.
- 4 Make sure power is applied to your computer and verify that the operating system is fully booted. Then apply power to the 34980A.
- 5 Configure your GPIB hardware as instructed by the documentation provided the hardware vendor.
- 6 Use the Connection Expert utility of the Keysight IO Libraries Suite to add the 34980A and verify a connection. Note that if you have installed any other I/O software, refer to documentation included with that software.
- 7 The 34980A is shipped from the factory with a default GPIB address of 9. To change the address, refer to the flow diagram shown below.

Front Panel Navigation



- 8 Now you can use various programming environments to control the 34980A. For an overview on programming instruments via GPIB, refer to the Connectivity Guide.

Connecting Over USB

NOTE

Before connecting the USB cable (not provided), make sure that I/O software is installed on your computer. See [page 46](#) for more information on installing the Keysight IO Libraries software.

- 1 After** installing the required I/O software on your computer, connect a standard USB cable between your computer and the 34980A.
- 2** Make sure power is applied to your computer and verify that the operating system is fully booted. Then apply power to the 34980A.
- 3** The Found New Hardware Wizard will automatically start and guide you through configuring the 34980A as a USB device. To install the software automatically, accept all defaults.
- 4** Use the Connection Expert utility of the Keysight IO Libraries Suite to verify that the 34980A is displayed under the USB interface. Note that if you have installed any other I/O software, refer to documentation included with that software.
- 5** Now you can use various programming environments to control the 34980A. For an overview on programming instruments via USB, refer to the Connectivity Guide.

Communicating with the 34980A

You can use either instrument drivers or SCPI commands (in any programming environment) to communicate with the 34980A. However, Keysight has designed drivers that work best in recommended environments, as shown in the table below. To install drivers and their associated Help files, refer to www.keysight.com/support/34980a.

Programming Environment	Driver
Microsoft® Visual C® version 6.0, Visual C++®, and ANSI C	IVI-C, IVI-COM
Microsoft® Visual Basic® version 6.0	IVI-C, IVI-COM
Microsoft® Visual Studio®.NET for C#, C, and Visual Basic	IVI-COM
Keysight VEE	IVI-C
National Instrument's LabVIEW®	LabVIEW® Plug and Play (native mode), IVI-C
National Instrument's LabWindows/CVI®	IVI-C

Exploring the 34980A Web Interface Over LAN

You can use the 34980A's Web Browser Interface for remote access and control of the instrument via a Java™-enabled Web browser, such as Microsoft® Internet Explorer. Using the Web Interface, you can configure, troubleshoot, and monitor your system remotely.

This section provides an overview of the 34980A Web Interface. The Web Interface works with the 34980A mainframe and all installed plug-in modules. For the examples provided in this section, the 34921A multiplexer module is used for illustration purposes.

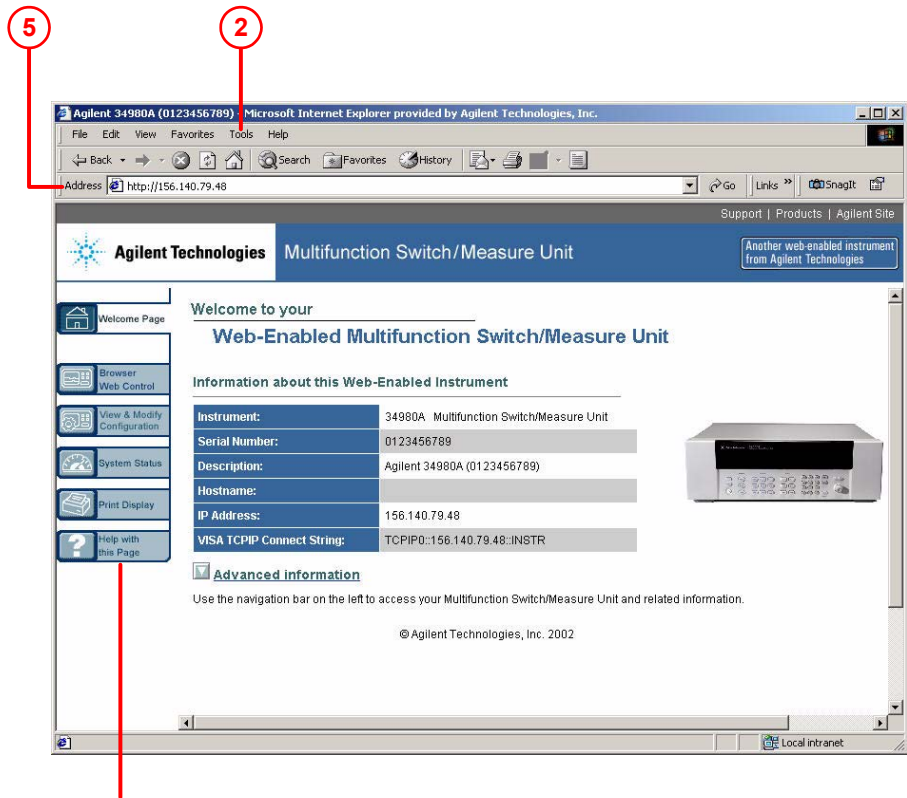
NOTE

The following tasks assume you have configured the 34980A for LAN communication and have verified connection to a LAN network. See [page 48](#) and [page 50](#) for more information.

Launching the Web Interface

- 1 Open your Internet browser from your computer.
- 2 From the **Tools>Internet Options** menu, navigate to **Connections** (exact navigation depends on your browser), and then select **LAN Settings**.

1 Getting Started



Click here for Help

- 3 From the LAN Settings dialog, select/activate bypass proxy server for local addresses (exact terminology depends on your browser).
- 4 Exit the Options window.
- 5 Enter the IP address of the 34980A in the **Address** field and press return. Either refer to the IP address you wrote on [page 50](#) or [page 51](#), or use the 34980A's front panel **Utility** menu to read the IP address.
- 6 After entering the appropriate IP address, the 34980A Web Interface's Welcome Window should appear.

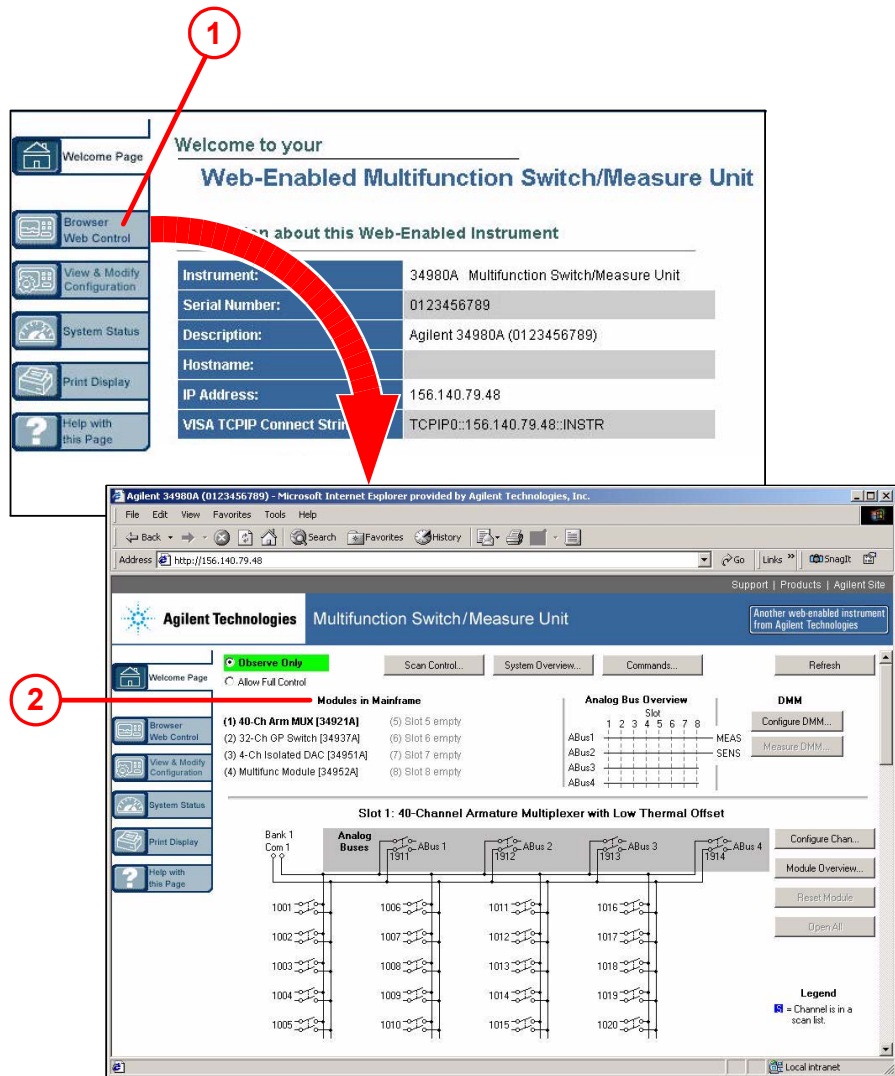
NOTE

The procedures in this section will help you understand tasks commonly performed using the 34980A's Web Interface. For additional help on using the interface, click the **?Help with the Page** tab on the lower-left corner of the Web Interface window.

Displaying the Browser Web Control Page

- 1 From the Welcome Window, click the **Browser Web Control** tab on the left side of the window to display the Browser Web Control page.

1 Getting Started



2 From this page, you can view and modify the configuration of the modules currently installed in the 34980A.

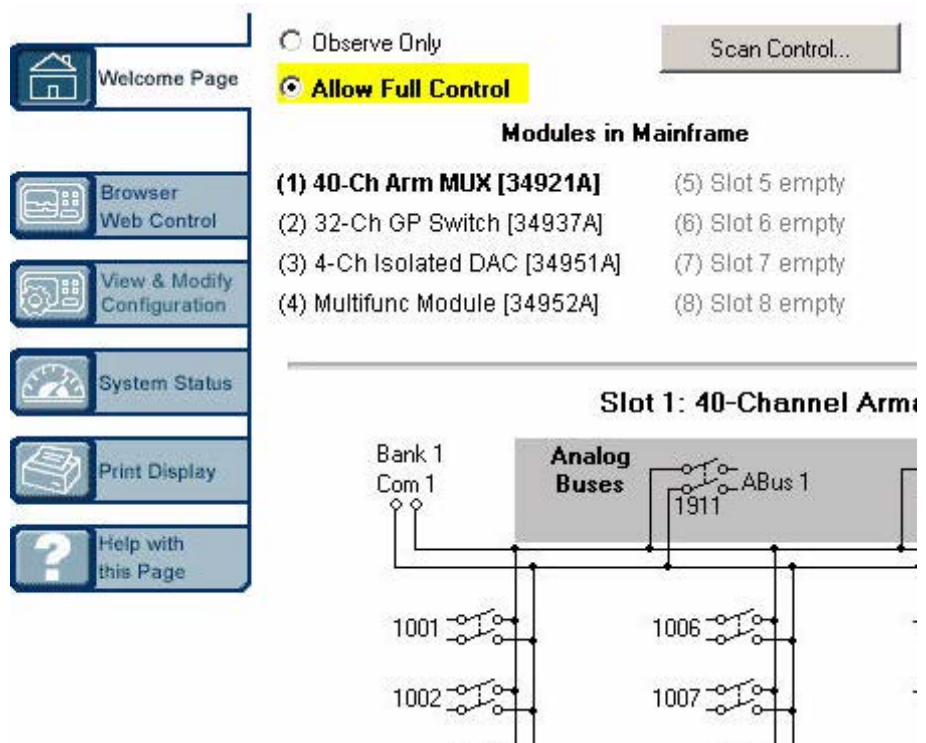
When you first launch this page, the configuration of the module in the lowest numbered slot is shown (shown in bold text). To view the configuration of a

different module, click on the desired module name from the list (slots are numbered 1 through 8).

Selecting the “Allow Full Control” Mode

Select the **Allow Full Control** radio button as shown. Once enabled, this mode allows you to open and close channel relays and modify the state of the installed modules.

If desired, you can use the 34980’s front panel Utility menu to assign a password for use with the 34980A Web Interface. Once specified, the password must be provided to transition from the Observe Only mode to the Allow Full Control mode.



Closing and Opening Channel Relays

WARNING

When working with dangerous voltage levels, intentional closing of multiple bus and channel relays could cause a potential shock hazard on external connections. Use extreme caution when handling, testing and adjusting this instrument. Do not perform these procedures unless qualified to do so. Failure to recognize and observe normal safety precautions could result in personal injury or death.

NOTE

You must be in the Allow Full Control mode to close and open channels.

- 1 To close a channel, left-click directly on the graphic of the desired relay. To open a closed channel, click again on the relay graphic.

The screenshot displays the Agilent 34980A web interface. At the top, the browser title is "Agilent 34980A (0123456789) - Microsoft Internet Explorer provided by Agilent Technologies, Inc.". The address bar shows "http://156.140.79.48". The page header includes "Agilent Technologies Multifunction Switch/Measure Unit" and "Another web-enabled instrument from Agilent Technologies".

The main interface features a sidebar on the left with options like "Welcome Page", "Browser Web Control", "View & Modify Configuration", "System Status", "Print Display", and "Help with this Page". The main content area has a "Control" section with "Observe Only" and "Allow Full Control" (selected) radio buttons, and buttons for "Scan Control...", "System Overview...", "Commands...", and "Refresh".

Below the control section is the "Modules in Mainframe" list:

(1) 40-Ch Arm MUX [34921A]	(5) Slot 5 empty
(2) 32-Ch GP Switch [34937A]	(6) Slot 6 empty
(3) 4-Ch Isolated DAC [34951A]	(7) Slot 7 empty
(4) Multifunc. Module [34952A]	(8) Slot 8 empty

To the right is the "Analog Bus Overview" table:

ABus	Slot	MEAS	SENS
ABus1	1 2 3 4 5 6 7 8		
ABus2			
ABus3			
ABus4			

The main schematic is titled "Slot 1-40-Channel Armature Multiplexer with Low Thermal Offset". It shows "Bank 1 Com 1" connected to "Analog Buses" (1911-1914) which are further connected to "ABus 1" through "ABus 4". Each bus has 10 channels (1001-1010). A red circle labeled '1' highlights the first three channels (1001, 1002, 1003) of ABus 1. A red circle labeled '2' points to the "Analog Bus Overview" table.

At the bottom right, there is a "Legend" indicating that a blue square represents a "Channel is in a scan list".

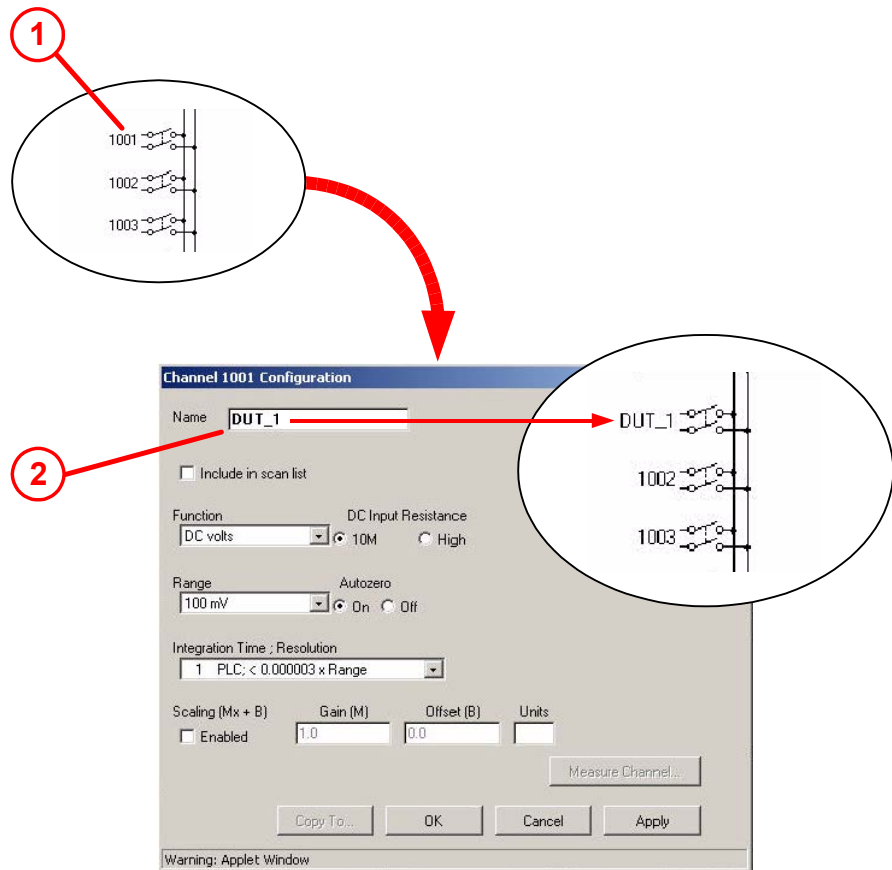
- 2 You can also open and close the four Analog Bus relays by left-clicking the graphics of these relays. The **Analog Bus Overview** display located near the top of the window shows the slot-by-slot status of the four Analog Buses.

Modifying the Channel Configuration

NOTE

You must be in the Allow Full Control mode to modify the channel configuration.

- 1 To modify the measurement configuration of individual channels (e.g., add channel labels, select function and range, etc.), right-click directly on the graphic of the desired relay. The Channel Configuration dialog box for that channel is displayed.



- 2 As an example, change the label on Channel 1001 to **DUT_1**. Click **OK**.

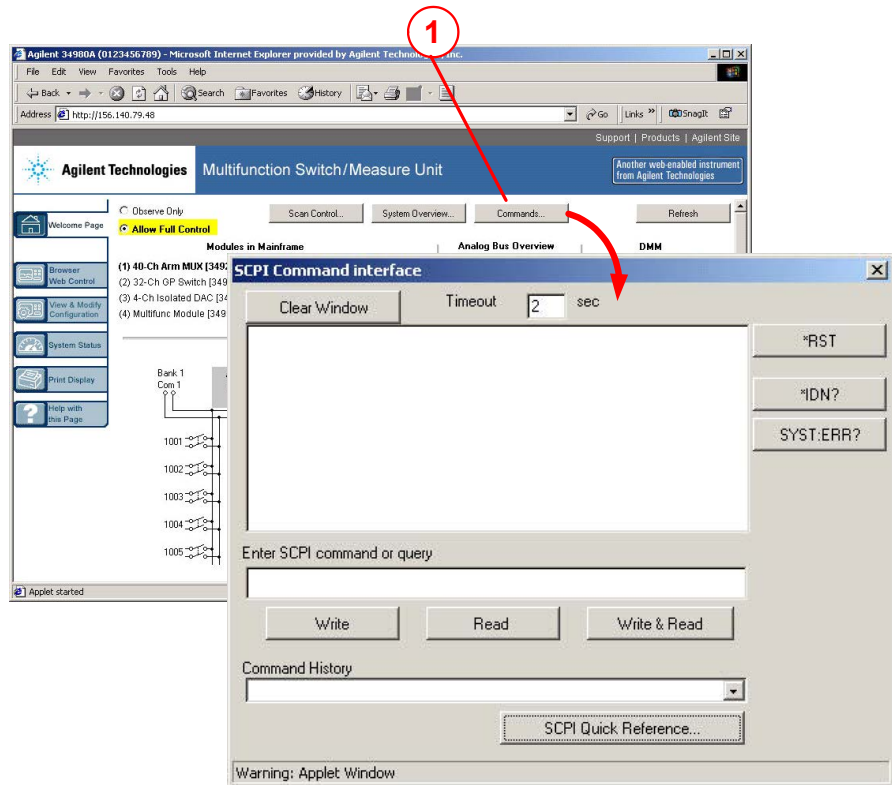
Sending SCPI Commands Via the Web Interface

NOTE

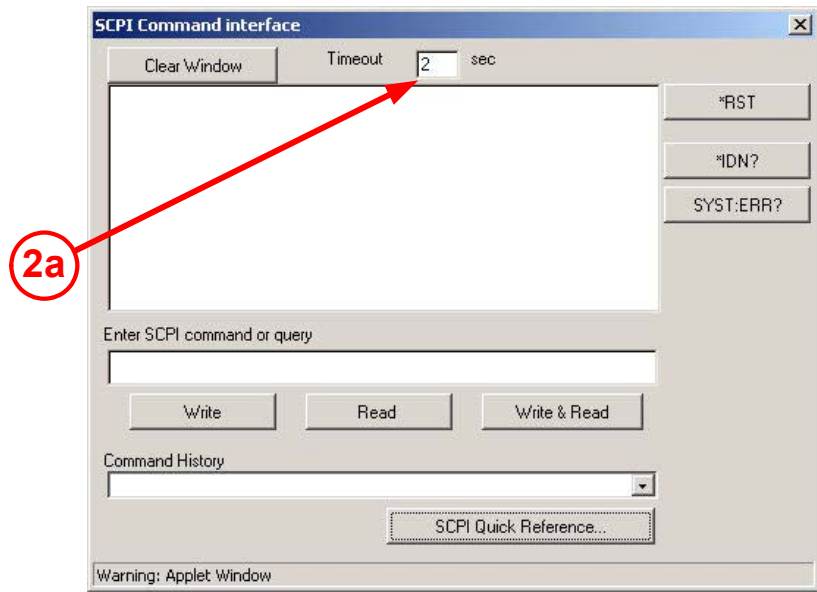
You must be in the Allow Full Control mode to send instrument commands to the 34980A.

The Web Interface provides a utility to send SCPI commands to the 34980A via the SCPI Command Interface window. The procedure below shows how to access this window and send commands.

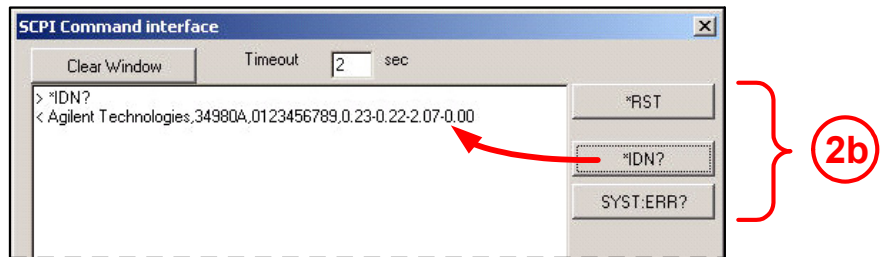
- 1 Press the **Commands** button at the top of the Web Browser Control page to launch the SCPI Command Interface window.



- 2 The SCPI Command Interface window allows you to:
 - a Set the time to wait for a command response from the instrument.

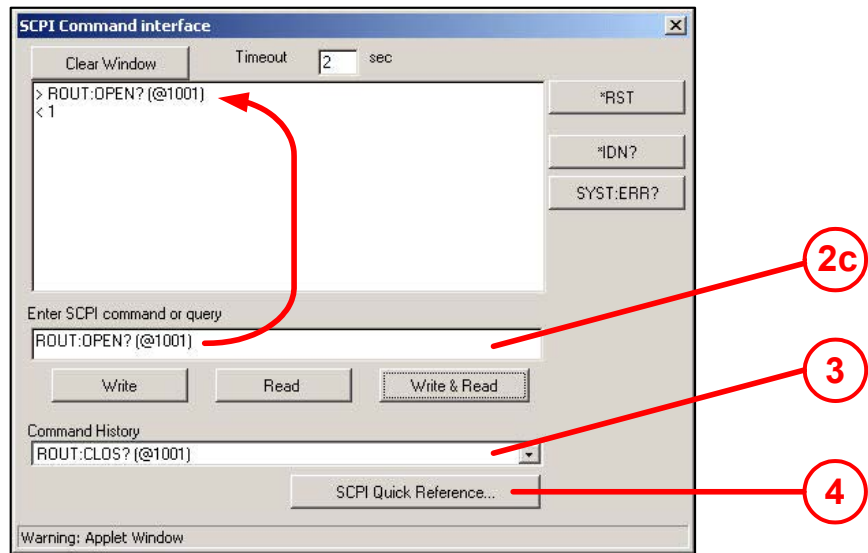


b Select commonly used commands to send to the instrument.



c Enter SCPI commands to send to the instrument.

- Use **Write** to send the command to the instrument.
- Use **Read** to read the response back from the instrument.
- Use **Write & Read** to send a query to the instrument and read back the response.



- 3 In the **Command History** field, you can view the last 20 commands sent to the instrument.
- 4 You can use the **SCPI Quick Reference** button to access a syntax summary of all SCPI commands for the 34980A.

34980A Documentation Map

If you want to...	Go here...	Additional Comments
Install Keysight IO Libraries Suite	Refer to Additional comments for the website.	You can find installation instructions and additional information at: www.keysight.com/find/iolib .
Install 34980A instrument drivers	Refer to Additional comments for the website.	Download the 34980A drivers from the Keysight Web site at: www.keysight.com/find/drivers .
Read the Keysight Connectivity Guide	Refer to Additional comments for the website.	Download the Connectivity Guide from the Keysight Web site at: www.keysight.com/find/connectivity .
Learn more about the 34980A Web Browser Interface	Web Interface On-Line Help system	Click on the ?Help with this Page tab on the Web Interface window.
Learn about the 34980A front-panel menu content and operation	34980A User's Guide	Download the User's Guide from the Keysight Web site at: www.keysight.com/find/34980A .
Learn more about the 34980A mainframe and the available plug-in modules	34980A User's Guide	Download the User's Guide from the Keysight Web site at: www.keysight.com/find/34980A .
Learn about the SCPI programming commands used with the 34980A	34980A Programmer's Reference On-Line Help Quick Reference Guide	Download the information from the Keysight Web site at: www.keysight.com/find/34980A .
Update 34980A instrument firmware	Refer to Additional comments for the website.	Download firmware at www.keysight.com/firmware/34980A .

This information is subject to change without notice. Always refer to the Keysight website for the latest revision.

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