

Keysight Technologies

Modular Products

34980A Measurements Made Easy

Application note

Abstract

A significant and understandable concern with new test system setup is becoming familiar with and programming the instruments. Learning the steps needed to control an instrument can be time consuming if not difficult. Many hours can be spent reading through syntax manuals and performing trial and error tests. When a test system is updated only occasionally, it may be hard to remember the instrument commands and steps required to make changes.

This document includes examples with the few steps needed to make measurements using the 34980A's 1) front panel, 2) built-in web interface, and 3) Command Expert software. In a matter of minutes the 34980A will be making measurements, recording the commands sent to the 34980A and creating executable code for your choice of application software.

Overview

Introduction

Learn to make measurements using the Keysight Technologies, Inc. 34980A Switch Measure System (34980A) front panel—remotely from a web page or by programming. Also, see how easy the 34980A is to control using Keysight's Command Expert.

Controlling the 34980A can be done easily by three different methods: the front panel pushbuttons, the built-in web graphical user interface or by programming directly. Initial testing and configuration are achieved quickly by using the front panel or the web interface. Developing a software control that can be used in automated test or data acquisition applications is often based on the results of the initial test and configuration. This document will demonstrate the steps used to setup, test and program the 34980A.

Description

In this application note we will demonstrate how to easily make measurements and control the 34980A using three different methods:

- Front panel
- Web interface
- Command Expert—to easily validate measurements and create automated programs in less time.

You will see the 34980A Switch and Measure system presented with a selection of modules including matrix, multiplexer, general purpose, RF and microwave switching, and analog and digital control modules.

Uncompromising Benefits

- Quickly and easily configure the 34980A, begin measurements, and create automated programs.
- Learn to quickly configure and make measurements from the front panel.
- Learn how to utilize the built-in web interface to make measurements and create a command sequence.
- Use Keysight's Command Expert to generate a 34980A command sequence in your application of choice.

Applications

- Aerospace and defense
- Communications
- Electronic test
- Semiconductor testing

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34980A Setup Example

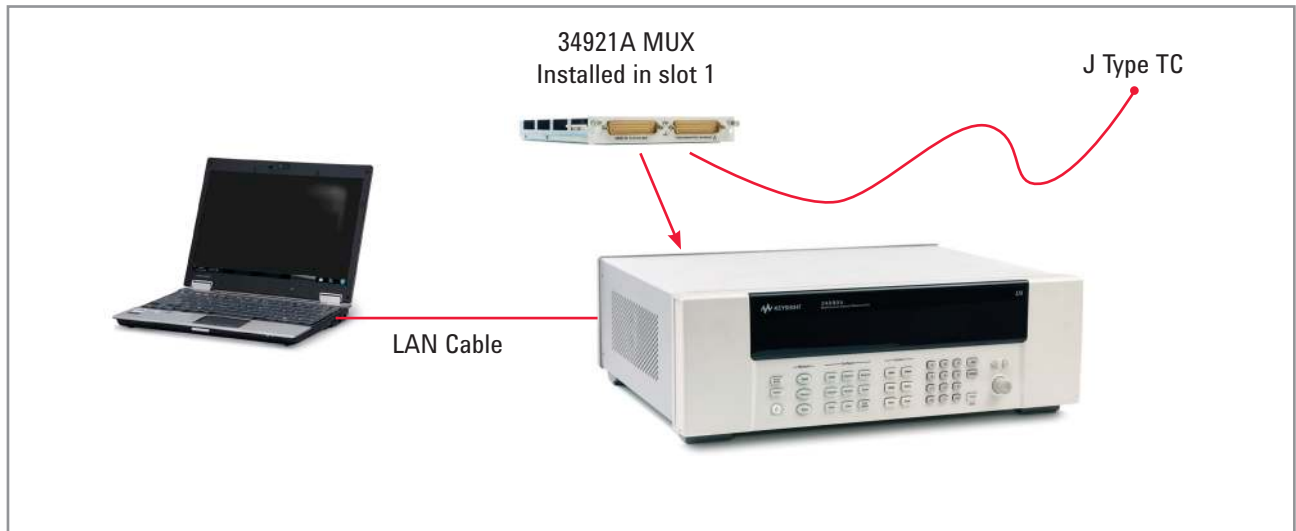


Figure 1. Example 34980A and M9121A multiplexer module set up

34980A set up example

Channel 2	J Type Thermocouple
Channel 4	3 V supply
Channel 15	15 Ω load (2-wire)

This document will denote examples using the 34980A's multiplexer module 34921A for the switch and measurement examples; however, any of the 34980A modules can be controlled using similar steps/commands.

The 34921A module and terminal example will be set for the following measurements:

Addressing module channels

To send a command to make a measurement on a specific channel, place the module slot number first and the channel number last, filling in spaces with zero for four digits. For example: addressing channel 4 of the multiplexer module installed in slot 1 uses the channel address of 1004. If the multiplexer were installed in slot 2 the address 2004 would be used.

Example Conventions:

RED []	Front panel hard buttons
BLUE < >	Web buttons/controls
GREEN	Front panel display menu items

34980A Measurements Using the Front Panel



Figure 2. Keysight 34980A with 34921A in slot one.

For this example the 34921A is plugged into slot one, and you wish to measure dc voltage on channel four (address 1004).

1. Turn the front panel knob to select the module channel you wish to make a measurement on, "1004".
2. Press the [Channel] button in the configure button group to begin configuration of channel 4 for dc voltage measurements.
(Note: the Channel button in the configure group stays lit during configuration to make it quick and easy to navigate back as you select parameters using the knob and/or arrows.)
3. Turn the knob until DC VOLTS is displayed.
4. Press the [Channel] button to select dc volts and proceed to the next channel 4 parameter.
5. Turn the knob until the 10 V Range is displayed then press the lit [Channel] key a couple times until CHANNEL LABEL is displayed

6. If desired, you can use the knob and arrow keys to enter a channel label. Example label: CH4 VOLTS
7. Press the lit [Channel] button to save all the channel's configuration
8. Press the [Channel] button in the Measure button group to close relays and take a measurement.
(Note: the Channel button in the Measure group stays lit during measurements enabling easy navigation back to the button to start/stop measurements.)
9. Press the lit [Channel] button to stop measurements and open all the relays

The 34980A's front panel control is used to create basic measurements and makes test system setup and verification faster and easier.

34980A Measurements Using the Built-In Web Graphical User Interface (GUI)

The 34980A's web GUI does not require any additional software to communicate with a computer and offers access to the 34980A from anywhere around the globe with just a LAN connection. The 34980A's LAN connection is not only an easy-to-use interface for simple test, but also a great advantage for distributed test systems found in applications such as satellite and avionics tests.



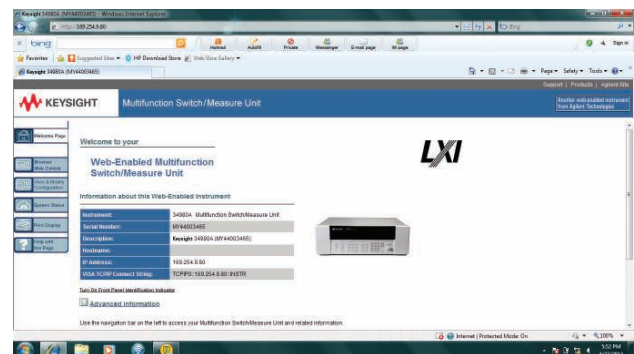
Figure 3. Keysight 34980A.

Connect the 34980A's web interface directly to a computer:

1. Use the 34980A's LAN port to connect to a computer and open a web browser (such as Internet Explorer, Firefox, Netscape, or google).
2. On the front panel of the 34980A, press the [Utility] button and turn the knob to select Remote I/O.
3. Press the [Utility] button again and turn the knob to select LAN.
4. Press the [Utility] button and turn the knob to select YES to Enable LAN.
5. Press the [Utility] button and turn the knob to select VIEW for LAN Settings.
6. Turn the knob to find the 34980A's LAN IP address. Example: 169.254.9.80.
7. Record the address.
8. Press [Exit Menu].

Note: since the 34980A is connected directly to the PC there is not a DHCP server (a networks' DHCP server will assign client computers a unique IP address). Keysight's LXI instruments such as the 34980A, have an "auto IP" function that will assign an IP address for using the web interface when directly connected to a computer rather than a network.

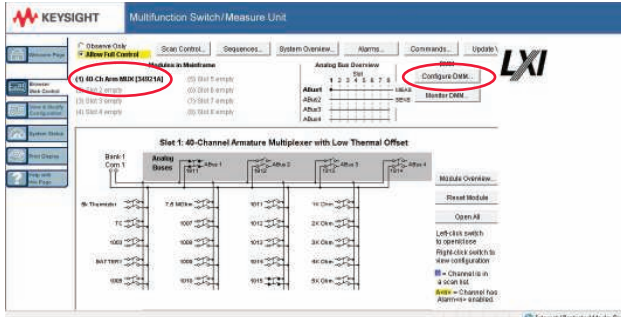
9. Open your preferred web-browser and enter the 34980A's IP address in the address bar and click Enter. Example: enter <http://169.254.9.80> and the 34980A's web home page will appear.



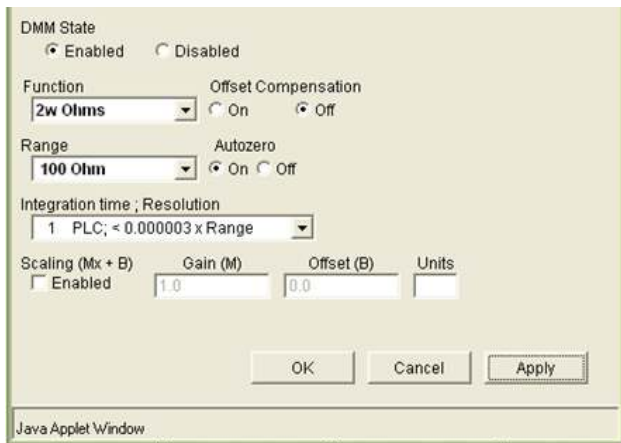
10. Click on the <Browser Web Control> button to go to the control page.
11. Once Java is done running, you should see a stylized schematic of the 34921A 40 channel MUX (or any module plugged into the 34980A mainframe).
12. Click on the <Allow Full Control> box (upper left of module window).

34980A Measurements Using the Built-In Web Graphical User Interface (GUI)

Make a 2-wire resistance measurement using the built-in DMM

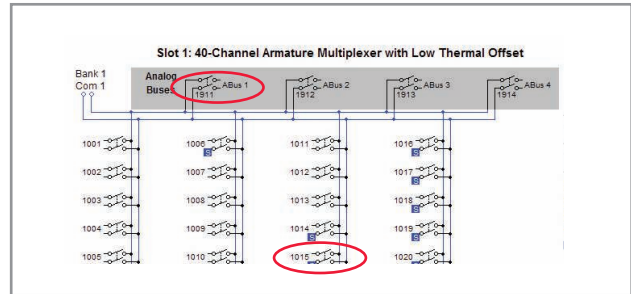


1. Click on the <Configure DMM> button (upper right in display). A menu display will open.

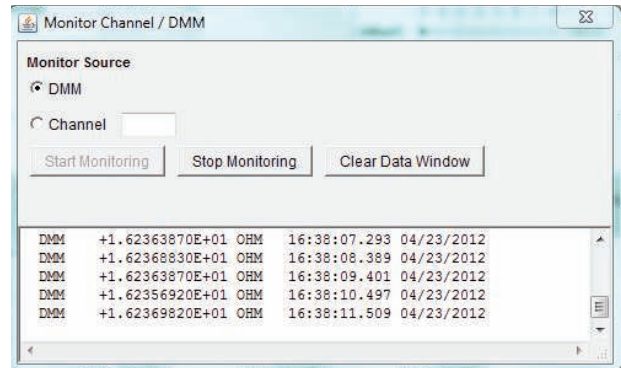


2. Configure the DMM for the following settings:
 - a. DMM State: Enabled
 - b. Function: 2w Ohms
 - c. Range: 100 Ohms
 - d. Integration time: 1 PLC <0.000003 x Range
3. Click on <OK> to save the configuration and close the dialog box.

Recall, our example setup has a 15 Ω resistance at channel 15 of the multiplexer module installed in slot 1 of the 34980A mainframe (for programming use channel “1015”). Closing relay 1015 on bank 1 connects channel 1015 to the 34980A analog bus and closing relay 1911 connects the analog bus to the input connectors of the DMM.



4. Create a measurement path (for ch 1015) by clicking on first, <1015>, and then, <1911> the analog bus relay that connects the multiplexer channel to the internal DMM.
5. Click <Monitor DMM> to open the DMM measurements display.
6. Click <Start Monitoring> to start time-stamped measurements.



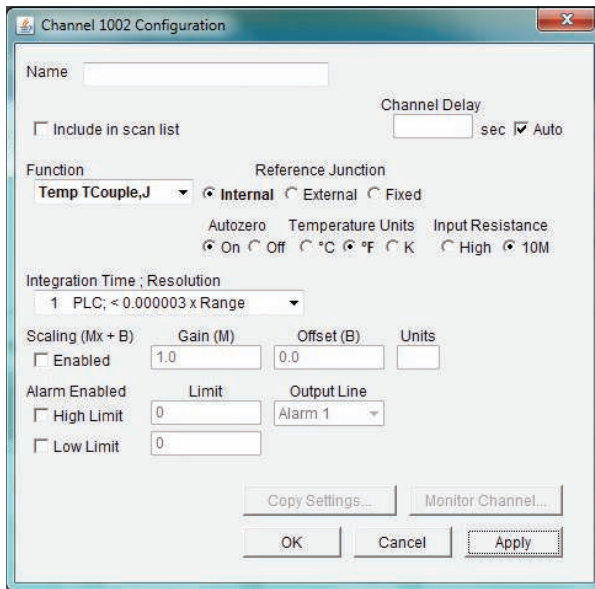
7. When finished, close the DMM and click on <Reset Module> on the 34921A web page if continuing with these examples.

34980A Measurements Using the Built-In Web Graphical User Interface (GUI)

Make a temperature measurement using the channel measurement function

This example is for a J-type thermocouple wired to channel 2 of the 34921A in slot 1 of the 34980A mainframe.

1. Right Click on channel <1002> to open a configuration box.



Channel 1002 Configuration

Name:

Include in scan list

Channel Delay: sec Auto

Function: **Temp TCouple, J** Reference Junction: Internal External Fixed

Autozero: On Off Temperature Units: °C °F K Input Resistance: High 10M

Integration Time ; Resolution: **1 PLC; < 0.000003 x Range**

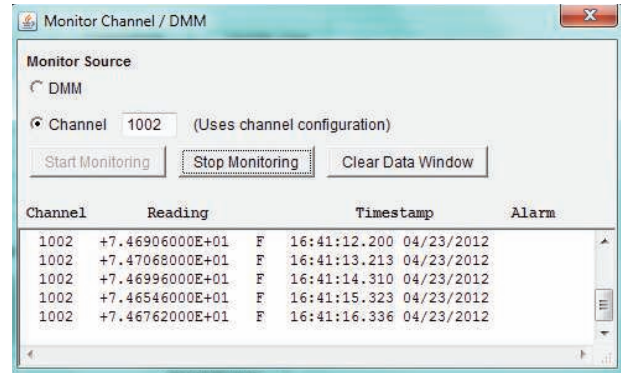
Scaling (Mx + B): Enabled Gain (M): 1.0 Offset (B): 0.0 Units:

Alarm Enabled: High Limit Limit: 0 Output Line: Alarm 1 Low Limit Limit: 0

Copy Settings... Monitor Channel...

OK Cancel Apply

2. Enter the following parameters (leave all others as default):
 - a. Function: **Temp TCouple, J**
 - b. Reference Junction: **Internal**
 - c. Temperature Units: select your choice of °C, °F, or K
 - d. Integration time: **1 PLC<000003 x Range**
3. Click <Apply> to send the configuration to the 34980A
4. Click on <Monitor Channel> to open the Monitor Dialog box



Monitor Channel / DMM

Monitor Source: **DMM**

Channel **1002** (Uses channel configuration)

Start Monitoring Stop Monitoring Clear Data Window

Channel	Reading		Timestamp	Alarm
1002	+7.46906000E+01	F	16:41:12.200 04/23/2012	
1002	+7.47068000E+01	F	16:41:13.213 04/23/2012	
1002	+7.46996000E+01	F	16:41:14.310 04/23/2012	
1002	+7.46546000E+01	F	16:41:15.323 04/23/2012	
1002	+7.46762000E+01	F	16:41:16.336 04/23/2012	

5. Click on <Start Monitoring> to display the readings. Temperature measurements are now made for the thermocouple installed on channel 2. The temperature calculations and conversion formulas are built into the 34980A so you get temperature results without having to do the math yourself. The temperature measurement will be displayed in the DMM monitor window as well as on the 34980A's instrument front panel.
6. When finished, click on <Stop Monitoring>, and close all the dialog boxes and the Web interface

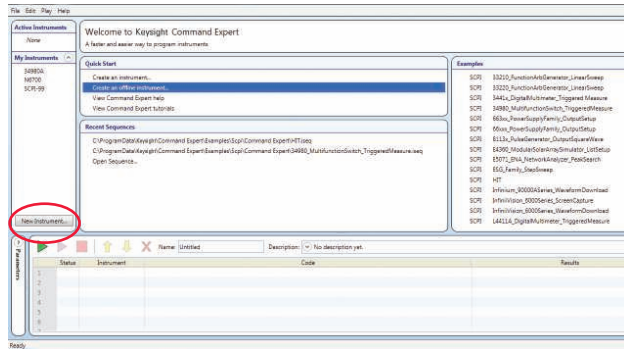
Make 34980A Measurements Using Keysight Command Expert

Keysight’s Command Expert is a free downloadable software application from Keysight. It is used to make instrument control (addressing & sending commands) in many PC environments faster and easier. It combines instrument commands, documentation, and syntax checking and command execution all in one simple interface. Command Expert works with instruments that use Standard Commands for Programmable Instrumentation (SCPI) or IVI-COM drivers. Once command sequences are built, they can be seamlessly integrated with MATLAB, Excel, VEE, SystemVue, Visual Studio and LabVIEW. The Command Expert software application can be downloaded to your computer from here: www.keysight.com/find/commandexpert

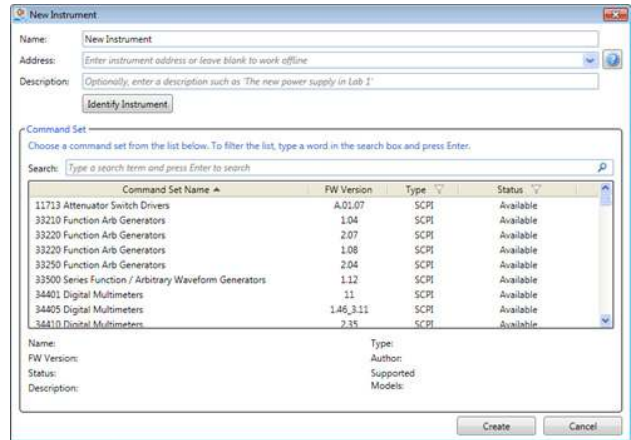
How to connect and make a dc voltage measurement

First create a connection to an instrument

1. Start Command Expert
2. Click the **<New Instrument>** button at the bottom of the instruments pane the application.



Command Expert displays a New Instrument dialog box as shown below.



3. In the Name field, enter a name for the instrument. (Use a short name that contains no special characters).
4. In the Address field, enter the device address of the instrument in one of the formats below.

Address Format	Example	Notes
VISA address	GPIB::0::INSTR	The address also specifies the communication protocol
VISA alias	USBInstrument1	The alias will be resolved using the VISA resource manager
IP address	130.27.94.12	Uses a raw TCP socket
Hostname	scope3.test.com	Uses a raw TCP socket

An example would be to enter the IP address **169.254.9.80**.

5. Click the **<Identify Instrument>** button, if you entered a device address in the Address field. Command Expert will connect to the 34980A at the specified address. If an instrument is not available, Command Expert will work offline.

Make 34980A Measurements Using Keysight Command Expert

Next identify the command set for the 34980A. The easiest way to find a command set is by searching.

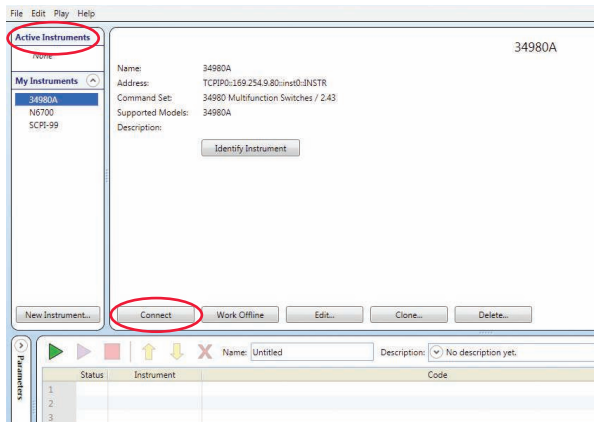
6. Enter “34980A” as the search term in the Command Set area and press Enter. Command Expert filters the list to display only command sets that contain “34980A”.
7. Click the row to highlight the 34980A command set.
8. Click the Create button.

Command Expert does the following:

- Downloads and installs the command set from the Command Expert Server if the command set is not already installed on your PC.
- Creates and saves the new instrument on your PC. Displays the new instrument’s name in the Instruments pane.
- Selects the new instrument and displays it in the Instrument Properties pane.

If you have connected to the 34980A in a previous session, Command Expert lists instruments added in the My Instruments column (left)

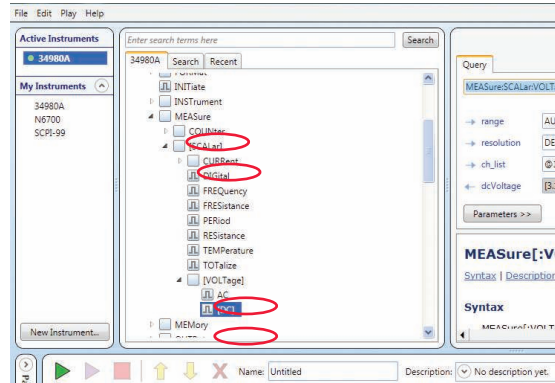
Click on the <34980A>, then click <Connect>.



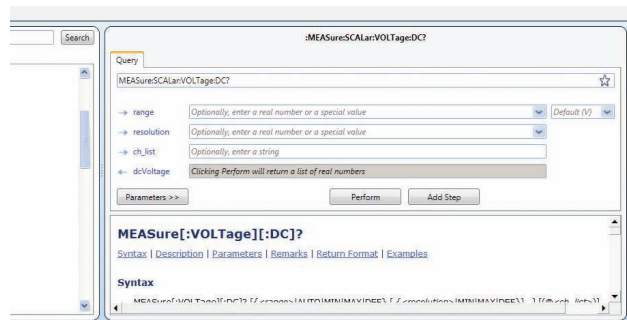
The 34980A is now displayed under the Active Instruments pane with a green dot indicating it is connected.

Next step, make a dc voltage measurement

This example uses the “Measure” command which configures the 34980A’s built-in digital volt meter, closes the necessary relays on the multiplexer module, and then makes the measurement. The Browse tab of the Search/Browse pane shows the command tree for the 34980A.



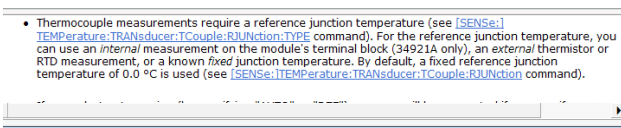
1. To develop a command, simply follow the outline and click on the desired commands. A “pulse” symbol (arrow to the left of each command) expands the command selection when clicked on.
2. In the Browse pane, Click on **MEASure:SCALar:VOLTag:DC**
The “Command pane” window is displayed .



Make 34980A Measurements Using Keysight Command Expert

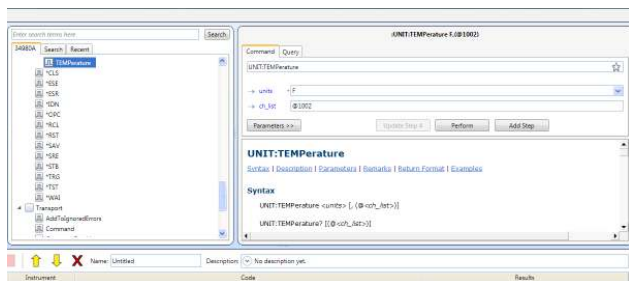
3. Use the drop down menus and/or enter the following parameters in the Command Pane
 - a. Range: **AUTO**
 - b. Resolution: **DEfault**
 - c. Chan_list: **@1004**
4. Click on **<Perform>** to make the measurement. The resulting dc voltage will be displayed at the bottom of the Command pane (dcVoltage),

How to make a temperature measurement
 The Command pane in Command Expert includes documentation and command syntax for the selected command. Here is an example of the details you will see for temperature measurements.



- The syntax guide tells us that an instrument temperature measurement requires three steps:
- 1) Set measurement units (UNIT command)
 - 2) Make reference junction temperature measurement (SENSe command)
 - 3) Make temperature measurement on selected channel (MEASure command).

Step 1. UNIT:TEMPerature Command
 Configures the units for the temperature measurement you would like to make.



1. In the Browse pane, click **UNIT:TEMPerature**.
2. Enter the following parameters in the Command pane:
 - a. Units: you can choose **F**, **K** or **C**
 - b. Chan_list: **@1002**
3. Click on **<Perform>**

Notice that each command sent is recorded in the bottom "Sequence" pane.

Step 2. SENSe:TEMPerature command
 Performs a reference temperature measurement to compensate for the local ambient temperature



The sense command for the 34980A does not need to be repeated every time a measurement is made. It should be sent periodically or whenever the ambient temperature changes.

1. In the Browse pane, click **SENSe:TEMPerature:Transducer:TCouple:RJUNction:TYPE**
2. Enter the following parameters in the Command pane:
 - a. Source: **INternal**
 - b. Ch_list: **@1002**
3. Click on **<Perform>**

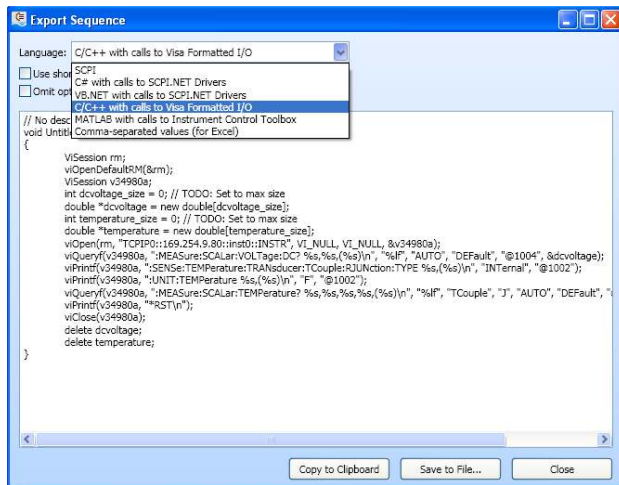
Step 3. MEASure command

1. In the 34980A Browse pane, click **MEAS:SCALure:TEMPerature**
2. Enter the following parameters in the Command pane:
 - a. Probe_type: **Tcouple**
 - b. Type: **J**
 - c. Range: **AUTO**
 - d. Resolution: **DEfault**
 - e. Ch_list: **@1002**
3. Click on **<Perform>** and see the temperature measurement appear in the Sequence pane
4. If you wish to repeat the measurement, click on the green play button in the Sequence pane.

Make 34980A Measurements Using Keysight Command Expert

Save and/or export command sequences in Command Expert

You can save the command sequence and recall it later or export the command sequence to your programming environment. This saves time by not reentering and verifying your 34980A configuration and measurement commands. To export the command string to your application pro-



gram, Select File, then Export Sequence from the drop down menu.

Next, either save the sequence of commands to a file or copy them to the clipboard.

Software Tip

Command Expert add-ins are available for these applications:

- C# with calls to SCPI.NET drivers
- VB.NET with calls to SCPI.NET drivers
- C/C++ with calls to Vi-sa Formatted I/O
- MATLAB with calls to Instrument control Toolbox
- Comma-separated values (Excel)

Set a 34980A IP Web Address



Figure 3. Keysight 34980A.

Set or VIEW a 34980A IP Web Address from the 34980A's front panel:

1. Press the [Utility] button and turn the knob to Remote I/O
2. Press the [Utility] button and turn the knob to LAN
3. Press the [Utility] button and turn the knob to YES to Enable LAN
4. Press the [Utility] button and turn the knob to MODIFY for LAN Settings (or VIEW to see currently set IP address and not change)
5. Press the [Utility] button and turn the knob to NO for Reset LAN
6. Press the [Utility] button and turn the knob to OFF for DHCP* since the 34980A is connected directly to your computer and not a server
7. Press [Exit Menu]
8. Cycle the power
9. Wait for about 1 minute to let the LAN assign an IP address
10. Using the [Utility] button and knob in the same manner as steps 1 thru 3, go to Remote I/O>LAN>YES>VIEW
11. Turn the knob to find the IP address.
Example: 169.254.9.80
12. Record the address
Press [Exit Menu]

There is not a DHCP server since a computer is connected directly to the 34980A rather than through a network. Keysight's LXI instruments have an "auto IP" function that will assign the IP address. Note that the last few digits in the product's model number are used in the IP address. This is the general case for Keysight instruments.

In the Stand-Alone DMM Mode, the internal DMM makes measurements of the signals present on the analog buses. In this mode, you have full control of what channel relays are closed and connected to the appropriate analog bus for the measurement. You can route your signals directly to the internal DMM using the 34980A multiplexer and matrix modules.

For 4-wire resistance measurements, the instrument automatically pairs channel n in 34980A Bank 1 with channel $n+20$ in Bank 2 (for switch modules: 34921A, 34923A, 34925A) or $n+35$ (for switch modules: 34922A, 34924A) to provide the source and sense connections. For example, make the source connections to the HI and LO terminals on channel 2 in Bank 1 and the sense connections to the HI and LO terminals on channel 22 (or 37) in Bank 2.

Ordering Information

Ordering instructions

Mainframe - holds up to 8 plug-in modules

34980A	Multifunction switch/measure mainframe	Comes standard with "DMM" option, BenchLink Data Logger Software, User Guide on CD-ROM, Power cord and quickstart package.
34832A	BenchLink Data Logger Pro Software	Optional software package that adds limit checking and decision making for more complex applications.
	Description	Module connectors Optional terminal blocks, cables, connector kits

Multiplexer modules

34921A	40-channel armature multiplexer w/low thermal offset with screw connectors (order 34921T for temp reference)		2 - 50-pin Dsub, Male 3492xT Terminal block
34923A	40/80-channel reed multiplexer		Y1135A - 1.5 m 50-pin M/F Dsub cable
34925A	40/80-channel optically isolated FET multiplexer		Y1136A - 3 m 50-pin M/F Dsub cable Y1139A - 50-pin female solder cup connector kit
34922A	70-channel armature multiplexer	2 - 78-pin Dsub, Male	3492xT Terminal block, option 001 for solder connections, option 002 for screw connectors
34924A	70-channel reed multiplexer		Y1137A - 1.5 m 78-pin M/F Dsub cable Y1138A - 3 m 78-pin M/F Dsub cable Y1140A - 78-pin female solder cup connector kit

Matrix modules

34931A	Dual 4x8 armature matrix	2 - 50-pin Dsub, Male	3493xT Terminal block with screw connectors
34932A	Dual 4x16 armature matrix		Y1135A - 1.5 m 50-pin M/F Dsub cable
34933A	Dual/quad 4x8 reed matrix		Y1136A - 3 m 50-pin M/F Dsub cable Y1139A - 50-pin female solder cup connector kit
34934A	Quad 4x32 reed matrix	2-78-pin Dsub, Male	34934T Terminal block with screw connectors OR 34934C Configuration block Y1134A - Row expansion cables for 34934C and 34934T Y1137A - 1.5 m 78-pin M/F Dsub cable Y1138A - 3 m 78-pin M/F Dsub cable Y1140A - 78-pin female solder cup connector kit

General purpose/actuator modules

34937A	32-channel Form C/Form A general-purpose switch	2 - 50-pin Dsub, Male	3493xT Terminal block with screw connectors
34938A	20-channel 5-amp Form A switch		Y1135A - 1.5 m 50-pin M/F Dsub cable Y1136A - 3 m 50-pin M/F Dsub cable Y1139A - 50-pin female solder cup connector kit
34939A	64-channel Form A Switch	2 - 78-pin Dsub, Male	34939T Terminal block with screw connectors Y1137A - 1.5 m 78-pin M/F Dsub cable Y1138A - 3 m 78-pin M/F Dsub cable Y1140A - 78-pin female solder cup connector kit

Ordering Information

Ordering instructions continued

RF and microwave modules			
34941A	Quad 1x4 50-ohm 3-GHz RF multiplexer connectors	20 – SMA 8710-2576 SMA Extender	Requires standard 50 ohm SMA RF cables, and optional wrench for connecting SMA
34942A	Quad 1x4 75-ohm 1.5 GHz RF multiplexer	20 – Mini SMB	Requires mini 75 ohm SMB RF cables, adapters
34945A	Microwave switch/attenuator driver	N/A	Requires 34945EXT and optional Y1150A-Y1155A distribution boards (one 34945EXT is automatically included in each 34945A order)
34946A	Dual 1x2 SPDT terminated microwave switch Option 001: No switches installed Option 004: 4 GHz switches installed Option 020: 20 GHz switches installed Option 026: 26.5 GHz switches installed	6 SMA	Requires standard 50 ohm SMA cables and adapters 8710-2576 SMA Extender for connecting SMA connectors Option 001 supports qty 2 of any of the following switches: N1810UL unterminated SPDT N1810TL terminated SPDT N1811TL terminated 4 port transfer N1812UL unterminated 5 port transfer
34947A	Triple 1x2 ww unterminated microwave switch Option 001: No switches installed Option 004: 4 GHz switches installed Option 020: 20 GHz switches installed Option 026: 26.5 GHz switches installed	9 SMA	Requires standard 50 ohm SMA cables and adapters 8710-2576 SMA Extender for connecting SMA connectors Option 001 supports qty 3 N1810UL unterminated SPDT switches
System measurement and control modules			
34950A	64-bit digital I/O with memory and counter	2 – 78-pin Dsub, Female	3495xT Terminal block with screw connectors Y1137A – 1.5 m 78-pin M/F Dsub cable Y1138A – 3 m 78-pin M/F Dsub cable Y1142A – 78-pin male solder cup connector kit
34951A	4-channel isolated D/A converter with waveform memory (DMM option required for calibration)	1 – 50-pin Dsub, Female	3495xT Terminal block with screw connectors Y1135A – 1.5 m 50-pin M/F Dsub cable Y1136A – 3 m 50-pin M/F Dsub cable Y1141A – 50-pin male solder cup connector kit
34952A	Multifunction module with 32-bit DIO, 2-ch D/A and totalizer		
34959A	Breadboard module	26- & 40-pin internal ribbon cable connectors	Any terminal block can be used assuming 50- or 78-pin Dsub is used

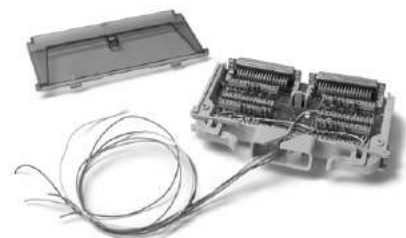
Accessories

Y1130A	Rackmount kit for 34980A, forward or reverse mount (must order either E3663AC rail kit for forward rack mounting or E3664AC rail kit for reverse rack mounting)
Y1131A	Verification and diagnostic tools for 34980A mainframe and modules (select option for specific module support)
Y1132A	Module extender for 34980A. Extends cable to locate module outside of mainframe
8710-2576	SMA Extender for connecting SMA connectors.
Terminal blocks	used for discrete wiring. Supports 20 AWG wire for <100 connections and 24 AWG for >100 connections.
3492xT	Multiplexer terminal blocks
3493xT	Matrix and GP terminal blocks
3495xT	Measurement and control terminal blocks
Cables^[1]	used for direct cable connection to module. some modules require 2 cables
Y1134A	Row expansion cables for 34934C and 34934T
Y1135A	1.5 m 50-pin Dsub, M/F twisted pair with outer shield cable – 300 V
Y1136A	3 m 50-pin Dsub, M/F twisted pair with outer shield cable – 300 V
Y1137A	1.5 m 78-pin Dsub, M/F twisted pair with outer shield cable – 300 V
Y1138A	3 m 78-pin Dsub, M/F twisted pair with outer shield cable – 300 V

Rack kit



Screw terminal block



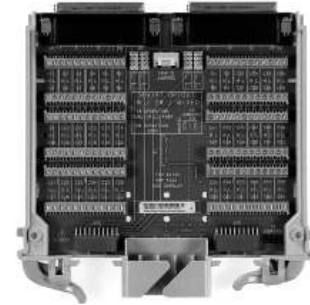
Ordering Information

Cables ^[1]	used for direct cable connection to module. some modules require 2 cables
Y1135A	1.5 m 50-pin Dsub, M/F twisted pair with outer shield cable - 300 V
Y1136A	3 m 50-pin Dsub, M/F twisted pair with outer shield cable - 300 V
Y1137A	1.5 m 78-pin Dsub, M/F twisted pair with outer shield cable - 300 V
Y1138A	3 m 78-pin Dsub, M/F twisted pair with outer shield cable - 300 V
Connector kits ^[1]	used to build custom cables
Y1139A	Solder cup connector kit for 34921/23/25/31/32/33/37/38 - 50-pin Dsub female - 125 V
Y1140A	Solder cup connector kit for 34922, 34924 - 78-pin Dsub female - 60 V
Y1141A	Solder cup connector kit for 34951, 34952 - 50-pin Dsub male - 125 V
Y1142A	Solder cup connector kit for the 34950A - 78-pin Dsub male - 60 V
34945A accessories -	distribution boards required for control of external switches. One 34945EXT is required for each 64 coils (included, add more 34945EXTs for additional coils).
34945EXT	External driver for 34945A, one required for each 64 coils - holds 4 distribution boards. Order Y1157A-Y1159A cable kits to connect from distribution boards to switches and attenuators.
Y1150A	34945EXT distribution board for 8 N181x SPDT switches
Y1151A	34945EXT distribution board for two 87104x/106x L7x0xx multiport or 87406B matrix switches
Y1152A	34945EXT distribution board for one 87204x/206x or 87606B switch and two N181x switches
Y1153A	34945EXT distribution board for two 84904/5/6/7/8 or 8494/5/6 step attenuators
Y1154A	34945EXT distribution board for two 87222, L7222C transfer switches and six N181x SPDT switches
Y1155A	34945EXT distribution board w/ generic screw terminals for driving 16 switch coils
Y1157A	9-to-10 pin cable kit for Y1150A, Y1152A, Y1154A - supplies to build 4 cables
Y1158A	10-to-10/10-to-14 pin cable kit for Y1153A, Y1154A - supplies to build 2 cables
Y1159A	16-to-16 pin cable kit for Y1150A/51A/52A/53A/54A/55A - supplies to build 2 cables
Thermocouples/thermistors	
34307A	10 pack of J type thermocouples
34308A	5 pack of 10 k thermistors

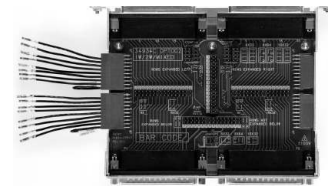
For additional information please visit: <http://www.keysight.com/find/34980a>

[1] Module specifications include terminal block; performance may be degraded when using cables or connector kits

High-density screw terminal block



34934A High-density configuration block



Standard Dsub cable



Connector kit



Related Information

Want to know more?

For more information about the 34980A:

- 34980A on K.com: www.keysight.com/find/34980A
- 34980A on KeysightTube: <http://www.youtube.com/playlist?list=PL54201150017FE90D&feature=plcp>
- Technical Support, drivers, firmware and software (Benchlink DataLogger software, LabVIEW drivers, IVI drivers and examples, C++, .net examples, VBA examples and more) www.keysight.com/find/techsupport

For more information about Command Expert:

- Command Expert on A.com: www.keysight.com/find/commandexpert
- Command Expert on YouTube: http://www.youtube.com/watch?v=v0_yJ4lUF2s&feature=plcp



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