
N1000A DCA-X Series Wide-Bandwidth Oscilloscope



This document describes installation steps, environmental requirements, and safety.

Notices

Copyright Notice

© Keysight Technologies, Inc. 2019
- 2021

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

Manual Part Number

N1000-90009

Edition

Third Edition, August 2022

Designed in USA

Keysight Technologies, Inc.
1400 Fountaingrove Parkway
Santa Rosa, CA 95403

Warranty

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

Technology Licenses

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

Restricted Rights Legend

U.S. Government Rights. The Software is “commercial computer software,” as defined by Federal Acquisition Regulation (“FAR”) 2.101. Pursuant to FAR 12.212 and 27.405-3 and Department of Defense FAR Supplement (“DFARS”) 227.7202, the U.S. government acquires commercial computer software under the same terms by which the software is customarily provided to the public. Accordingly, Keysight provides the Software to U.S. government customers under its standard commercial license, which is embodied in its End User License Agreement (EULA), a copy of which can be found at <http://www.keysight.com/find/sweula>. The license set forth in the EULA represents the exclusive authority by which the U.S. government may use, modify, distribute, or disclose the Software. The EULA and the license set forth therein, does not require or permit, among other things, that Keysight: (1) Furnish technical information related to commercial computer software or commercial computer software documentation that is not customarily provided to the public; or (2) Relinquish to, or otherwise provide, the government rights in excess of these rights customarily provided to the public to use, modify, reproduce, release, perform, display, or disclose commercial computer software or commercial computer software documentation. No additional government requirements beyond those set forth in the EULA shall apply, except to the extent that those terms, rights, or licenses are

explicitly required from all providers of commercial computer software pursuant to the FAR and the DFARS and are set forth specifically in writing elsewhere in the EULA. Keysight shall be under no obligation to update, revise or otherwise modify the Software. With respect to any technical data as defined by FAR 2.101, pursuant to FAR 12.211 and 27.404.2 and DFARS 227.7102, the U.S. government acquires no greater than Limited Rights as defined in FAR 27.401 or DFAR 227.7103-5 (c), as applicable in any technical data.

Safety Notices

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** 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.

Contents

1	Introduction	5
	N1000A Includes a PC	6
	Front-Panel Features	7
	Rear-Panel Features	8
	Modules	9
	Connector Care	11
	Cleaning the N1000A	12
	Accessories	13
	Safety Information	15
2	Installing the N1000A	17
	Step 1. Inspect the Shipment	18
	Step 2. Work at a Static-Safe Workstation	20
	Step 3. Position the N1000A	23
	Step 4. Install the Modules	25
	Step 5. Connect the Keyboard and Mouse (optional)	26
	Step 6. Connect the Power	27
	Step 7. Turn On the Instrument	28
	Step 8. Configure a LAN Connection (Optional)	30
	Step 9. Install a Feature License (Optional)	31
	Step 10. Connect a Printer (Optional)	31
	Step 11. Connect an External Display (Optional)	32
	Step 12. Calibrate the Modules	33
	Step 13. Learn How to Use and Program the N1000A	35
3	Removable Hard Disk	36
	To Remove the Hard Disk	37
	To Declassify Instrument Memory	38
4	Instrument Markings and Regulatory Information	39
	Instrument Markings	40
	N1000A Regulatory Information	42
5	Contacting Keysight	44
	Returning the Instrument for Service	44
	Index	47

1 Introduction

N1000A Includes a PC	6
Front-Panel Features	7
Rear-Panel Features	8
Modules	9
Connector Care	11
Cleaning the N1000A	12
Accessories	13
Safety Information	15

This chapter introduces you to the N1000A and contains important safety information. To install your N1000A, refer to *Chapter 2, Installing the N1000A*. The following picture shows the N1000A with a module and filler panels installed. The module is not provided with the instrument.



Figure 1. N1000A with Installed Module

N1000A Includes a PC

The N1000A includes a built-in PC that is running Windows 10. The N1000A's FlexDCA Graphical User Interface (GUI) is the same Windows application as the N1010A FlexDCA Remote Access Software. The N1000A includes many of the standard PC connectors on the instrument's rear-panel as shown in the following figure.

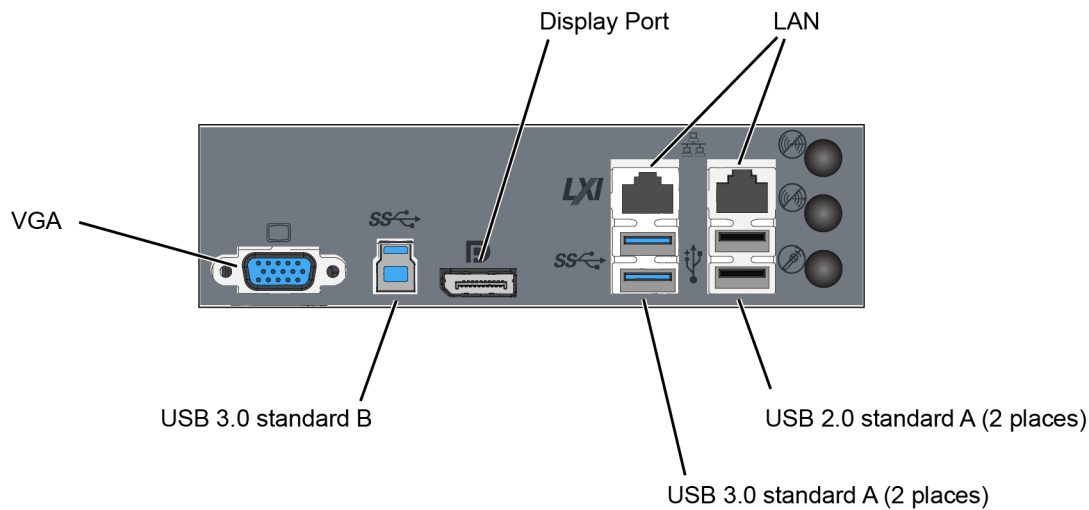


Figure 2. Rear-Panel Connectors

As with any computer, you should consider the following points to maintain security and protect your N1000A:

- Install Windows security updates as soon as they become available.
- Consider installing anti-virus software.
- When connected to the LAN, avoid visiting web sites or downloading material that are not completely secure and trusted.
- Never connect a pen drive or external memory device to the N1000A that has not been tested for viruses or malware.
- Follow the advice of you company's IT department.
- For N1000A firmware upgrades, go to https://www.keysight.com/find/flexdca_download.

Front-Panel Features

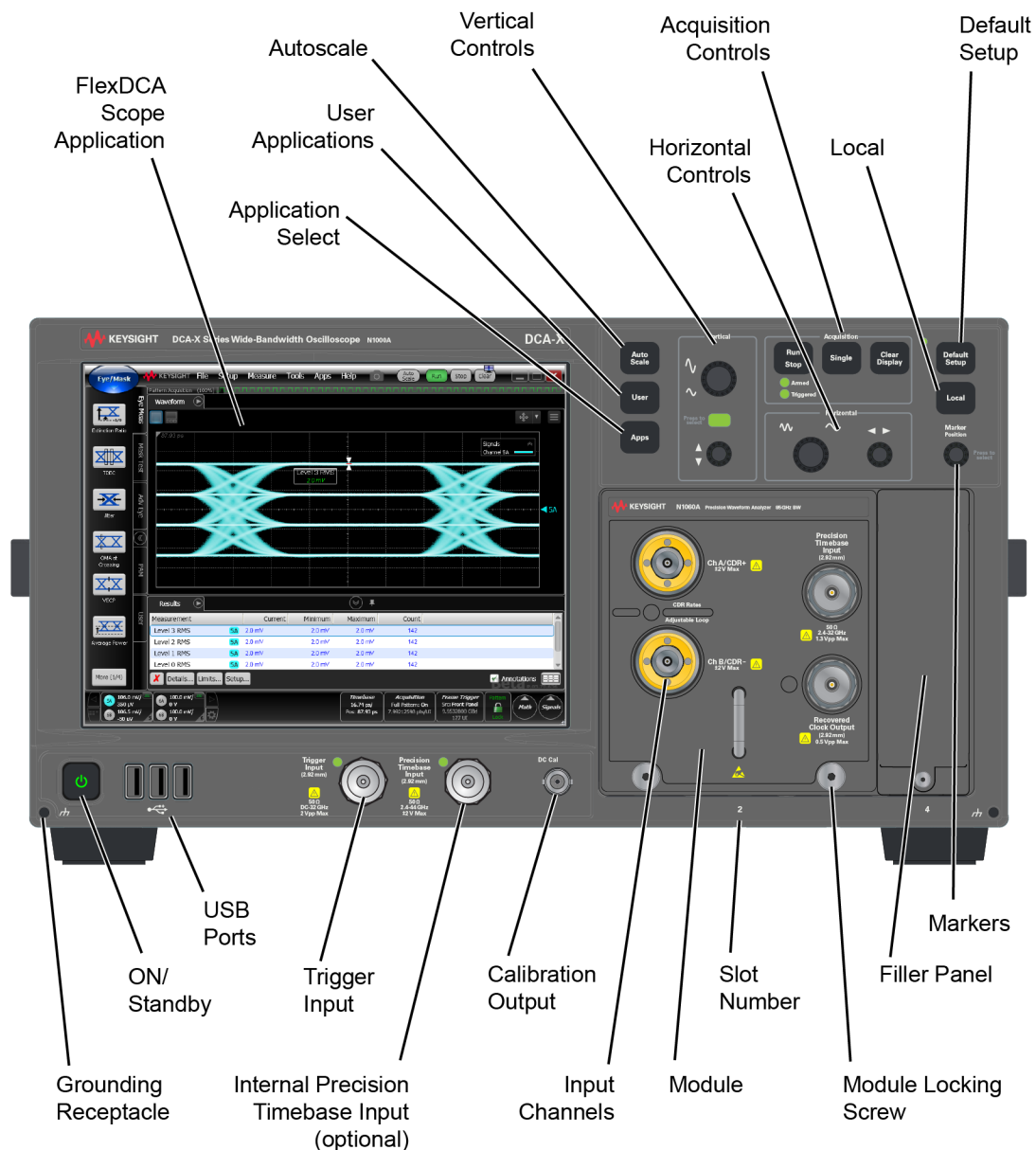


Figure 3. Front-Panel Features

Rear-Panel Features

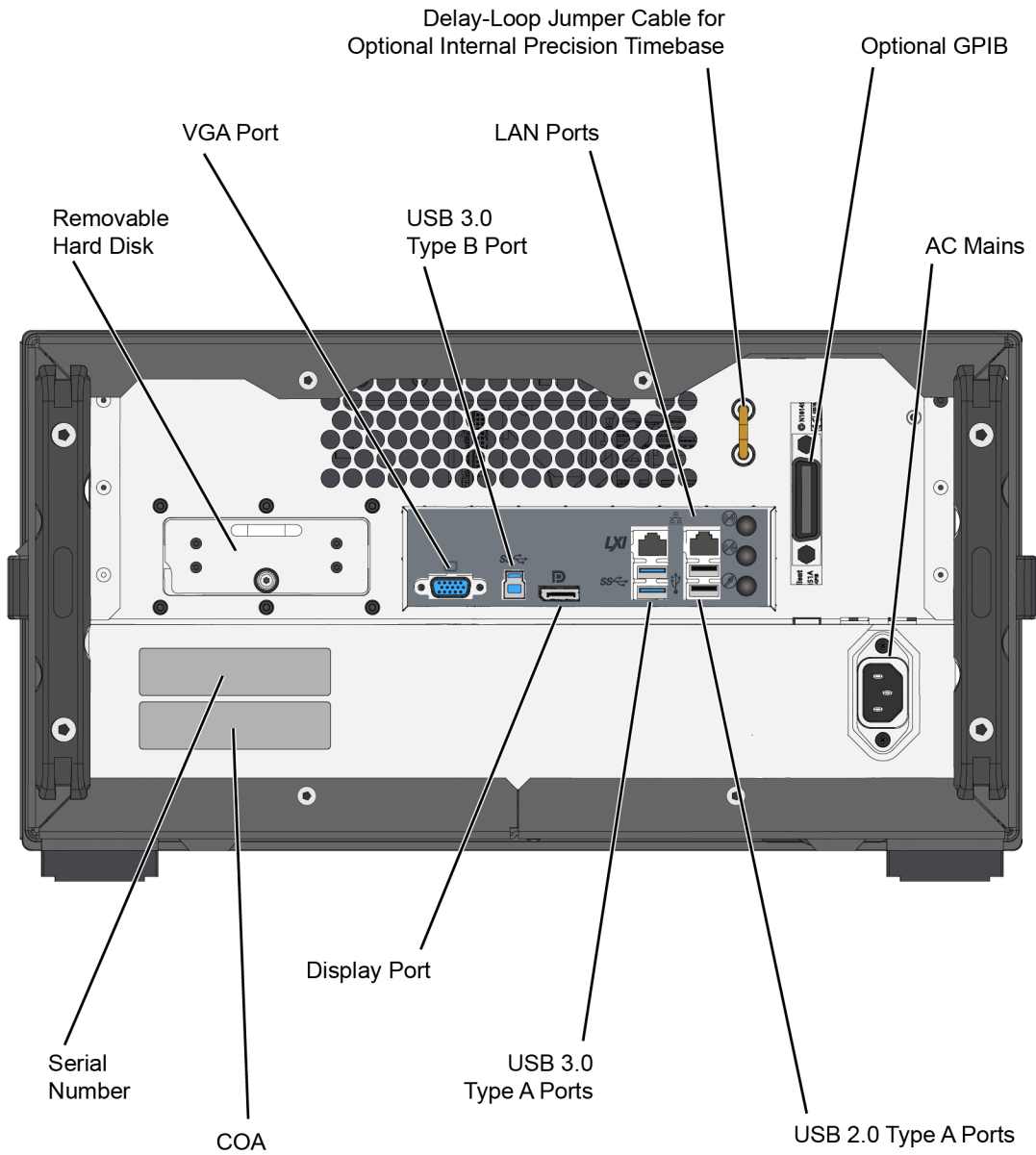


Figure 4. Rear-Panel Features

Modules

To complete the N1000A, an electrical or optical input module must be purchased and installed. [Figure 5](#) shows an installed module. The N1000A's module bay has four slots which can accommodate many combinations of modules that have different slot widths:

- One four-slot module. For example, an 86108B.
- One three-slot model (N1060A) and one one-slot module.
- Two two-slot modules.
- One standard module and two mini modules.
- Four one-slot mini-modules.

NOTE

Use the supplied filler panels to cover any unused module slots. Although the instrument is not damaged when running with uncovered module-bay slots, the altered air flow may affect measurement accuracy.

All documentation (including specifications) for plug-in modules is located in the N1000A's Help system. To access the Help system, complete the installation steps, turn on the N1000A, and click **Help** on FlexDCA's menu.

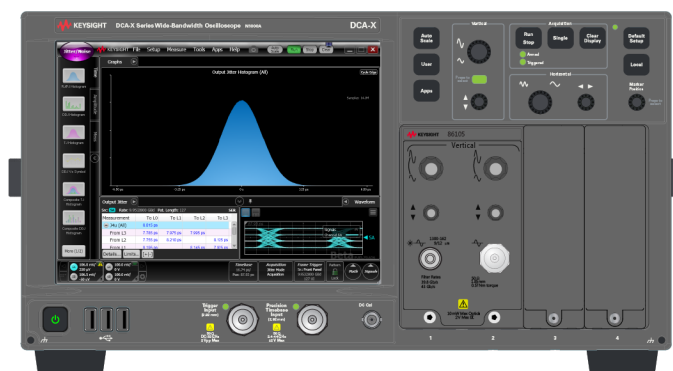


Figure 5. N1000A with a Module

Compatible Products

- All modules released in 2017 and later plus these older modules 86105C/D, 86107A, 86108A/B, 86112A, 86115D, 86116C, 86117A, 86118A, N1045A, and N1055A.
- DCA-M series "modules" do not install in the N1000A's module slot bay. Instead, these modules connect to the N1000A via USB. DCA-M modules

1 Introduction

include the N1090/2/4-series oscilloscopes and the N107x series clock recovery DCA-Ms.

Connector Care

Damage to N1000A electrical and fiber-optic input connectors can cost thousands of dollars, not to mention lost time! To learn how to avoid damaging the connectors, read the Connector Care topics located in the Help.

1. Turn on the N1000A and click **Help** > **User's Guide** to open the help.
2. On the help's menu, click **Quick Start** > **Optical Connectors** or **Electrical Connectors**.

WARNING

If flammable fluids are used to clean connectors, the fluid shall not be placed on the instrument during use or when connected to mains voltage. Cleaning the connectors shall take place in ventilated area to allow fluid vapors to dissipate, and reduce the risk of fire.

WARNING

Cleaning connectors with alcohol shall only be done with the instruments power cord removed, and in a well-ventilated area. Allow all residual alcohol moisture to evaporate, and the fumes to dissipate prior to energizing the instrument.

Cleaning the N1000A

Clean the N1000A using a soft cloth slightly dampened with a mild soap and water solution.

WARNING

To prevent electrical shock, disconnect the Keysight Technologies Model N1000A from mains before cleaning. Use a dry cloth or one slightly dampened with water to clean the external case parts. Do not attempt to clean internally.

CAUTION

Do not use too much liquid in cleaning the oscilloscope. Water can enter the front panel, damaging sensitive electronic components.

Accessories

NOTE

Only Keysight approved accessories shall be used.

Optional Accessories

- 11667B Power splitter, dc to 26.5 GHz, APC 3.5 mm
- 11667C Power splitter, dc to 50 GHz, 2.4 mm
- 54006A 6 GHz Resistive divider probe kit
- 54008B 24 ns delay line
- N1020A 6 GHz TDR probe kit (passive)
- N1022A Active Probe Adapter
- N1024A TDR Calibration Kit
- N1025A 1 GHz Active Differential Probe

Optional Adapters for Electrical Channel Inputs

- SMA (f-f) adapter, Keysight part number 1250-1158
- APC 3.5 (f-f) adapter, Keysight part number 5061-5311






Optional Adapters for Optical Channel Inputs

Table 1 on page 14 shows the available fiber-optic adapters for optical channels. These adapters connect onto the front-panel optical channel connectors. FC/PC adapters come pre-installed on new optical modules. Changing fiber-optic adapters is easy. Simply hand turn an adapter counter-clockwise to remove it from a channel connector; to install a different adapter, hand turn the new adapter clockwise onto the connector.

For more information on options and licenses, including the transportable licenses, refer to the www.keysight.com. If anything is missing or defective, refer to *Chapter 5, Contacting Keysight*. If the shipment was damaged, contact the carrier, then contact the nearest Keysight Sales Office. Keep the shipping materials for the carrier's inspection. The Keysight Sales Office will arrange for repair or replacement at Keysight's option without waiting for claim settlement.

1 Introduction

Table 1. Front-Panel Fiber-Optic Adapters for Optical Channels

Fiber-Optic Adapters	Description	Keysight Part Number
	Diamond HMS-10	81000AI
	FC/PC	81000FI
	SC	81000KI
	DIN	81000SI
	ST	81000VI

Safety Information

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.

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.

NOTE

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

NOTE

This product has been designed and tested in accordance with accepted industry standards, and has been supplied in a safe condition. The documentation contains information and warnings that must be followed by the user to ensure safe operation and to maintain the product in a safe condition. Installation Category: Installation Categories (overvoltage categories) are determined by the transient overvoltage levels that may be expected. CAT I: Mains isolated. CAT II: Line voltage in appliance and to wall outlet. CAT III: Line voltage behind wall outlet to next level of distribution.

NOTE

Only Keysight approved accessories shall be used.

WARNING

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.

WARNING

If this product is not used as specified, 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.

WARNING

No operator serviceable parts inside. Refer servicing to qualified personnel. To prevent electrical shock do not remove covers.

WARNING

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

CAUTION

This product is designed for use in INSTALLATION CATEGORY II and POLLUTION DEGREE 2 environment.

CAUTION

CAUTION, VENTILATION REQUIREMENTS: When installing the instrument(s) into a cabinet consideration shall be given to the convection flow into and out of the cabinet. Consideration shall also be given to the individual instruments to avoid having the heated discharge of one instrument, now becoming the cooling intake air for another instrument.

Another area of concern is verification that the maximum ambient operating temperature of the instrument(s) is not exceeded by cabinet installation.

Keysight recommends forced air convection whenever an instrument(s) are installed in a cabinet and further recommends that the maximum operating temperature of the cabinet be reduced 10°C from the lowest, of the maximum operating temperature of a single instrument.

If there are any concerns or special requirements an Keysight Field Engineer should be consulted to assure instrument(s) temperature compliance and performance.

NOTE

The input terminals for this product are classified as Measurement Category None. Circuits are non-hazardous live. No transients.

NOTE

Install the instrument according to the enclosure protection provided. This instrument does not protect against the ingress of water. This instrument protects against finger access to hazardous parts within the enclosure.

NOTE

Is your product software up-to-date? Keysight periodically releases software updates to fix known defects and include product enhancements. To search for software updates for your product, go to www.keysight.com/find/TechSupport.

2 Installing the N1000A

Step 1. Inspect the Shipment	18
Step 2. Work at a Static-Safe Workstation	20
Step 3. Position the N1000A	23
Step 4. Install the Modules	25
Step 5. Connect the Keyboard and Mouse (optional)	26
Step 6. Connect the Power	27
Step 7. Turn On the Instrument	28
Step 8. Configure a LAN Connection (Optional)	30
Step 9. Install a Feature License (Optional)	31
Step 10. Connect a Printer (Optional)	31
Step 11. Connect an External Display (Optional)	32
Step 12. Calibrate the Modules	33
Step 13. Learn How to Use and Program the N1000A	35

Complete the steps in this chapter to install the N1000A. For important safety information, refer to [Safety Information on page 15](#).

CAUTION

Electrical channel input circuits and the trigger input circuit can be damaged by electrostatic discharge (ESD). Therefore, avoid applying static discharges to the front-panel input connectors. Prior to connecting any coaxial cable to the connectors, momentarily short the center and outer conductors of the cable together. Avoid touching the front-panel input connectors without first touching the frame of the instrument. Be sure that the instrument is properly earth-grounded to prevent buildup of static charge. Wear a wrist-strap or heel-strap.

CAUTION

Optical channel fiber-optic connectors on plug-in modules are easily damaged when connected to dirty or damaged cables and accessories. When you use improper cleaning and handling techniques, you risk expensive instrument repairs, damaged cables, and compromised measurements. Before you connect any fiber-optic cable to the N1000A, refer to [Connector Care on page 11](#).

Step 1. Inspect the Shipment

- Inspect the shipping container and instrument for damage. Keep the shipping container and cushioning material until you have inspected the contents of the shipment for completeness and have checked the instrument mechanically and electrically.
- Locate the shipping list. Verify that you received all the accessories and options that you ordered. The following list shows some of the items that may be on the shipping list. The information on your actual shipping list is more accurate and should supersede the information in this list.
- The N1000A and some modules may come with adapters or connector savers either pre-installed or in their own packaging.

Package Contents

- N1000A DCA-X Series Wide-Bandwidth Oscilloscope
- Keyboard, USB
- Mouse, USB
- Power cord
- Module bay filler panel (Qty. 2)
- ESD warning pamphlet
- ESD warning sticker sheet
- IO Libraries Media Suite CD

Instrument Options

An N1000A can have options STB or LOJ but cannot have both. Option GPI is automatically installed on every N1000A.

- N1000A-STB, Standard timebase.
- N1000A-LOJ, Low jitter timebase.
- N1000A-PLK, Pattern lock hardware. Requires option N1000A-LOJ.
- N1000A-PTB, Internal precision timebase.
- N1000A-GPI, GPIB Card Interface (installed on every N1000A)
- N1000A-AFP, Filler panel.

Software Options

N1010100A R&D Software Package. Provides the following features that, on the 86100D, were included in options:

- Advanced Eye Analysis
- Data Analytics Web Service Software
- Enhanced Jitter Analysis
- Equalizers (CTLE, DFE, LFE)
- FlexDCA Remote Access Software
- FlexEye Independent Eye Acquisition and Analysis
- InfiniiSim-DCA Waveform Transformation Toolset
- NRZ TDEC Measurement
- PAM-N Analysis Software
- Partial TDECQ Measurement and Equalizer
- TDECQ Measurement and Equalizer
- Unrestricted Data File Import
- User Defined Measurements and Operators
- Keysight Arbitrary Waveform Generator Control

N1010200A Manufacturing Software Package. Provides the following features that, on the 86100D, were included in options:

- Data Analytics Web Service Software
- Enhanced Impedance and S-Parameters
- FlexDCA Remote Access Software
- FlexEye Independent Eye Acquisition and Analysis
- NRZ TDEC Measurement
- PAM-N Analysis Software
- TDECQ Measurement and Equalizer

N1010300A Signal Integrity Software Package. Provides the following features that, on the 86100D, were included in options:

- Automatic Fixture Removal in TDR Mode
- Data Analytics Web Service Software
- Enhanced Impedance and S-Parameters
- FlexDCA Remote Access Software
- User Defined Measurements and Operators

Step 2. Work at a Static-Safe Workstation

Electrostatic discharge (ESD) can damage or destroy electronic components. All work on instruments and electronic components should be performed at a static-safe workstation as shown in [Figure 6](#). The static-safe workstation uses two types of ESD protection:

- Conductive table-mat and wrist-strap combination.
- Conductive floor-mat and heel-strap combination.

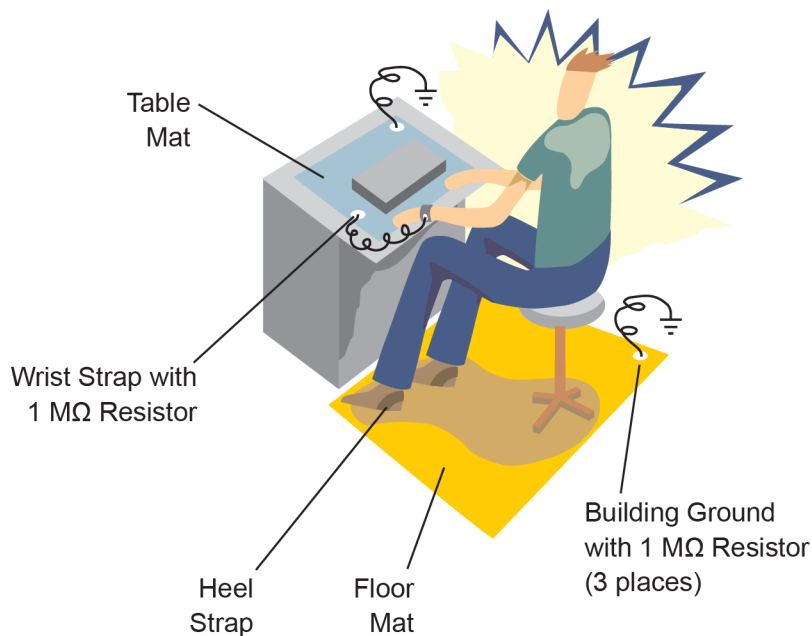


Figure 6. Example of Static-Safe Workstation

The following suggestions may reduce ESD damage that occurs during testing and servicing operations.

- Personnel should be grounded with a resistor-isolated wrist strap.
- Be sure all instruments are properly earth-grounded to prevent a buildup of static charge.

WARNING

These techniques for a static-safe workstation should not be used when working on circuitry with a voltage potential greater than 500 volts.

WARNING

Only the table-mat and wrist-strap combination provides adequate ESD protection when used alone. To ensure your safety, the static-safe accessories must provide at least 1 M Ω of isolation from ground. Purchase acceptable ESD accessories from your local supplier.

CAUTION

Electrical channel input circuits and the trigger input circuit can be damaged by electrostatic discharge (ESD). Therefore, avoid applying static discharges to the front-panel input connectors. Prior to connecting any coaxial cable to the connectors, momentarily short the center and outer conductors of the cable together. Avoid touching the front-panel input connectors without first touching the frame of the instrument. Be sure that the instrument is properly earth-grounded to prevent buildup of static charge. Wear a wrist-strap or heel-strap.

Grounding Receptacle

If the instrument has a grounding receptacle, you can plug the wrist strap into the grounding receptacle. For example, the DCA-X mainframe has a front-panel grounding receptacle that is shown in the following picture.

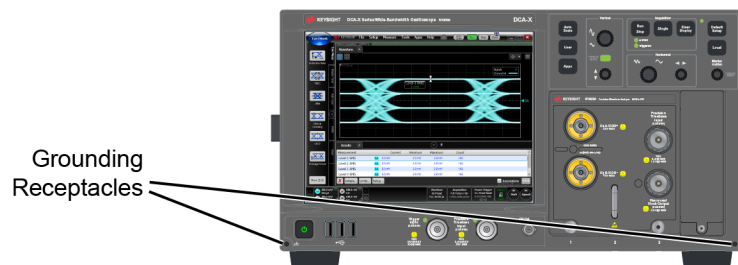


Figure 7. Grounding Receptacle on a DCA-X Instrument

Daily ESD Self Check

1. Visually check your work area to see that there are no static-generating materials, insulating work surfaces, or static-generating tools.
2. Clear your work area of static charge generators for a distance of at least 1 meter from ESD sensitive items.
3. Visually check that the ground wiring to the workstation has not been disconnected or damaged.
4. If applicable, make certain that your work station air ionizer is activated and correctly positioned.
5. Make sure that there are no static generators inside conductive containers with ESD sensitive items.

2 Installing the N1000A

6. Visually check that all ESD sensitive parts, assemblies, or products are completely inside closed conductive containers.
7. Make sure that all shielding containers have an approved static attention label on the outside.
8. Make sure that all cleaners, solvents, coatings, and sprays used at your workstation are types approved by your ESD Coordinator.
9. Put on wrist strap and conductive footwear, and any special garments which are required in your job.
10. Don't allow anyone who is not grounded closer than 1 meter to your static safe area.

Step 3. Position the N1000A

Position the N1000A so that it will have sufficient clearance for airflow around the top, back, and sides. Review [Table 2](#) to confirm that your operating or storage environment is suitable for the instrument.

WARNING

Use Keysight supplied power cord or one with same or better electrical rating.

WARNING

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

Table 2. N1000A Environmental Specifications

Item	Description
Use	indoor
Temperature	
Operating	10 °C to +40 °C (50 °F to +104 °F)
Non-operating	–40 °C to +70 °C (–40 °F to +158 °F)
Altitude (Operating)	Up to 4,600 meters (15,000 ft)
Humidity ¹	Type tested at 95%, +40 °C (non-condensing)
Weight	
Mainframe without modules (characteristic)	<i>20.5 kg (43 lb)</i>
Module (characteristic)	<i>1.2 kg (2.6 lb)</i>
Dimensions (excluding handle)	
Without front connectors and rear feet	221 mm H x 426 mm W x 530 mm D (8.7 inch x 16.76 inch x 20.9 inch)
With front connectors and rear feet	234 mm H x 426 mm W x 601 mm D (9.23 inch x 16.76 inch x 23.67 inch)
With front cover and rear feet	234 mm H x 426 mm W x 612 mm D (9.23 inch x 16.76 inch x 24.1 inch)

¹ Samples of this product have been type tested in accordance with the Keysight Environmental Test Manual and verified to be robust against the environmental stresses of Storage, Transportation and End-use; those stresses include but are not limited to temperature, humidity, shock, vibration, altitude and power line conditions. Test Methods are aligned with IEC 60068-2 and levels are similar to MIL-PRF-28800F Class 3.

2 Installing the N1000A

Table 3. N1000A LINE Power Specifications

Item	Description
Line Power	100/120 Vac, 50/60/400 Hz
	220/240 Vac, 50/60 Hz
Power in Watts	700 Watts Maximum
The products can operate with mains supply voltage fluctuations up to $\pm 10\%$ of the nominal voltage.	

NOTE

The official and complete specifications are located in the N1000A's help system. In FlexDCA, click **Help** > **Specifications....**

WARNING

Use Keysight supplied power cord or one with same or better electrical rating.

WARNING

To avoid injury, use a cart or similar device when transporting the instrument. When lifting the instrument, use safe lifting techniques. Lift with your legs, not with your back. Always employ at least two persons who have been trained in safe-lifting techniques.

WARNING

The Mains wiring and connectors shall be compatible with the connector used in the premise electrical system. Failure, to ensure adequate earth grounding by not using the correct components may cause product damage, and serious injury.

NOTE

Install the instrument so that the detachable power cord is readily identifiable and is easily reached by the operator. 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. Alternatively, an externally installed switch or circuit breaker (which is readily identifiable and is easily reached by the operator) may be used as a disconnecting device.

CAUTION

Windows registry: If the N1000A is mounted in a rack or cabinet, do not use the system power switch to disconnect power from the instrument. Instead, use the N1000A front-panel power switch. Using the system power switch may corrupt the Windows registry requiring you to perform the recovery procedure to restore normal operation to the N1000A.

NOTE

Should the Declaration of Conformity (DOC) be required, contact an Keysight Sales Representative or the closest Keysight Sales Office. Alternately, contact www.keysight.com.

Step 4. Install the Modules

1. Slide your modules into the front-panel module bay. Single-slot modules can be installed in any of the four slots. Two-slot modules can be installed in slots 1/2 or 3/4 but not 2/3. Three-slot modules can be installed in slots 1/2/3 only.
2. While gently pressing on the top inch of the module's front panel, finger tighten the knurled locking screws.

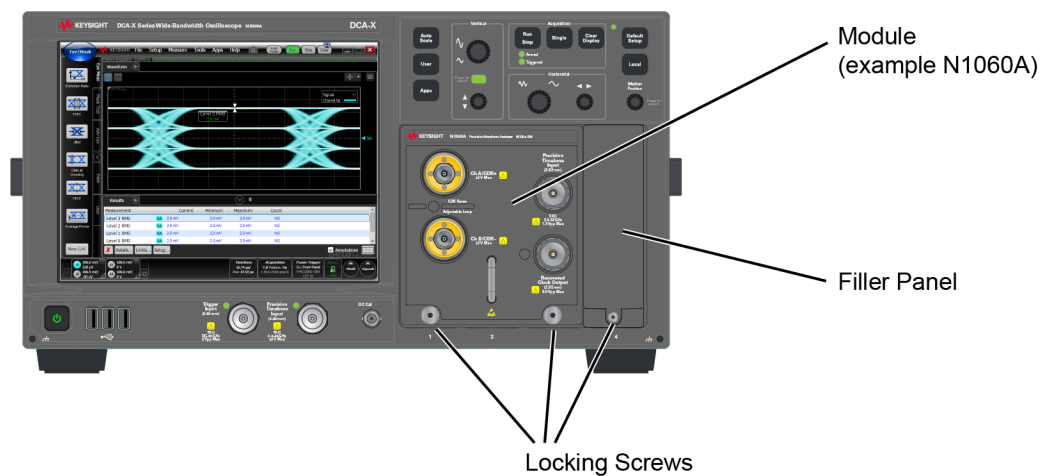


Figure 8. Installing a Module

Step 5. Connect the Keyboard and Mouse (optional)

If you want to use a mouse or keyboard, connect the supplied USB mouse and keyboard or provide your own. Since the N1000A has a touch screen, the use of these devices is optional.

When connecting or using a mouse or keyboard, always consider ergonomic principles. After completing the installation, click **Help > User's Guide...** to access the help. In the Help's menu, click **Hardware > Safety & Security > Working in Comfort**.

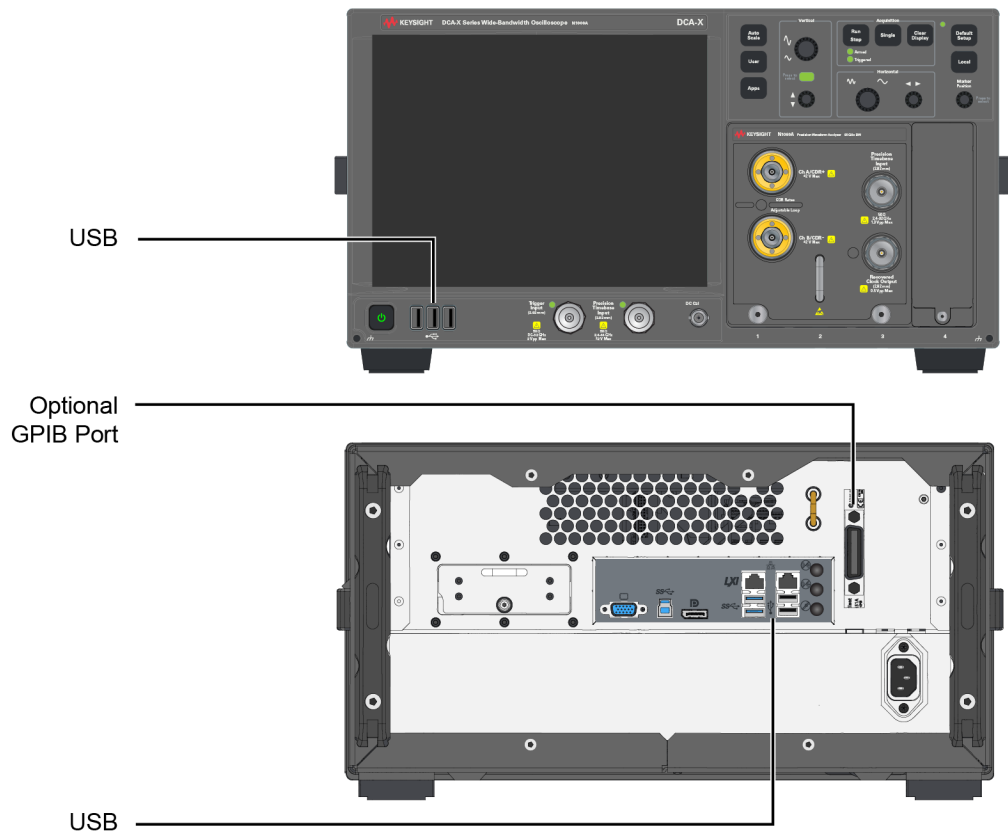


Figure 9. Accessory Connections

Step 6. Connect the Power

CAUTION

Always use the three-prong AC power cord supplied with this instrument. Failure to ensure adequate earth grounding by not using this cord may cause product damage.

CAUTION

Do not connect ac power until you have verified the line voltage is correct as described in [Table 3 on page 24](#). Damage to the equipment could result.

- Connect the line cord as shown in the figure below. The N1000A automatically adjusts for line input voltages. There is no voltage selection switch. The line cord provided is matched by Keysight to the country in which the order originates.

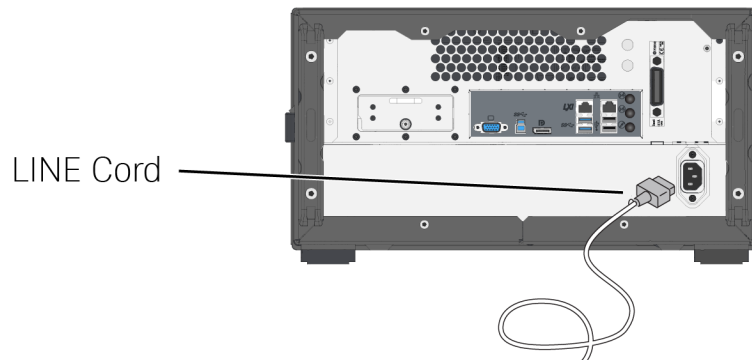


Figure 10. LINE Power Cord Connection to N1000A

CAUTION

This instrument has auto-ranging line voltage input; be sure the supply voltage is within the specified range and that voltage fluctuations do not to exceed 10 percent of the nominal supply voltage.

CAUTION

Windows registry: If the N1000A is mounted in a rack or cabinet, do not use the system power switch to disconnect power from the instrument. Instead, use the N1000A front-panel power switch. Using the system power switch may corrupt the Windows registry requiring you to perform the recovery procedure to restore normal operation to the N1000A.

NOTE

The main power cord can be used as the system disconnecting device. It disconnects the mains circuits from the mains supply.

NOTE

The products can operate with mains supply voltage fluctuations up to $\pm 10\%$ of the nominal voltage.

Step 7. Turn On the Instrument

CAUTION

Before switching on this instrument, make sure the supply voltage is in the specified range. Refer to [Table 3 on page 24](#).

1. Press the ON/Standby switch.



Figure 11. Location of ON/Standby Button

2. Wait while the instrument boots up. During the process, you will be asked to accept the Windows 10 End User License Agreement (EULA). Once accepted the N1000A will continue to configure itself.
3. After the instrument boots up, the FlexDCA oscilloscope application appears and looks similar to the following figure.

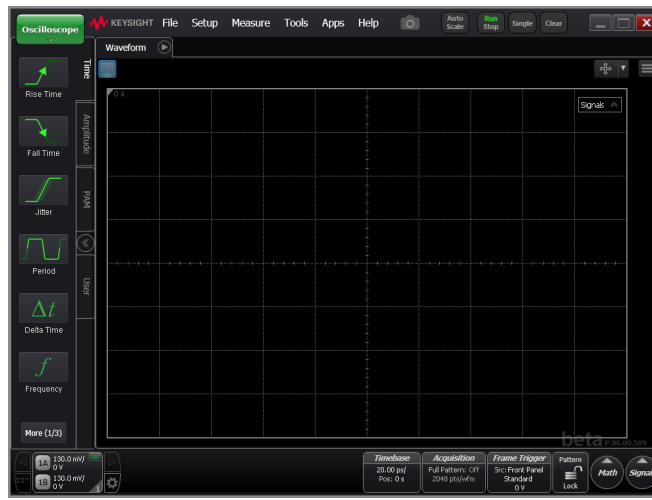


Figure 12. FlexDCA Application in Oscilloscope Mode

CAUTION

Avoid touching the screen with a sharp object, as this could result in damage to the display. Instead, use your finger.

CAUTION

To ensure proper operation of the N1000A, open the instrument's help system. Click under Safety, click Introduction and, in the displayed topic, click the Windows OS tab. This topic includes information on settings that you should avoid changing.

NOTE

The front-panel **ON/Standby** switch places the instrument in standby. The instrument is still energized.

NOTE

When you press the **ON/Standby** switch to place the instrument in standby mode, there is a small time delay before you'll see a change on the instrument. This is normal and does not indicate a problem.

User Accounts

Windows is configured with the following two user accounts: **dca-admin** and **dca-service**. The **dca-service** account is the only account that is password protected and is only provided for factor technicians. This account is not customer accessible.

Step 8. Configure a LAN Connection (Optional)

You can configure the N1000A on a local area network (LAN) for remote control, file sharing, and using network printers.

1. Connect your LAN cable to one of two rear-panel RJ-45 connectors.

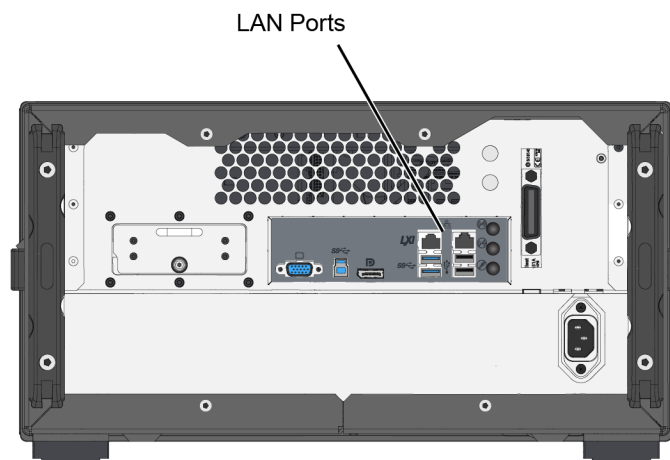


Figure 13. LAN Connector

2. Start the N1000A.
3. Click **File** > **Exit** to close the N1000A DCA application and view the Windows desktop.
4. Use Windows to setup your instrument with the appropriate client, protocol, and configuration for your LAN.

NOTE

If you do not know how to set up a network, contact your network administrator. If you plan on sharing the N1000A's hard disk drive with other computers on your LAN, the network administrator should enable file sharing as part of the network setup.

NOTE

You can share any folder on the USER (D:) drive.

Step 9. Install a Feature License (Optional)

If you ordered an optional license with your N1000A, it was probably installed at the factory. If you ordered it, but it wasn't installed, you received a Software Entitlement Certificate that you must use to install the license on your N1000A. Refer to the instrument's help system for information on installing licenses.

Step 10. Connect a Printer (Optional)

You can connect a printer to the N1000A's LAN or USB ports. Support for most printers will automatically be installed when the instrument is first turned on. For other printers, use Windows to add the printer.

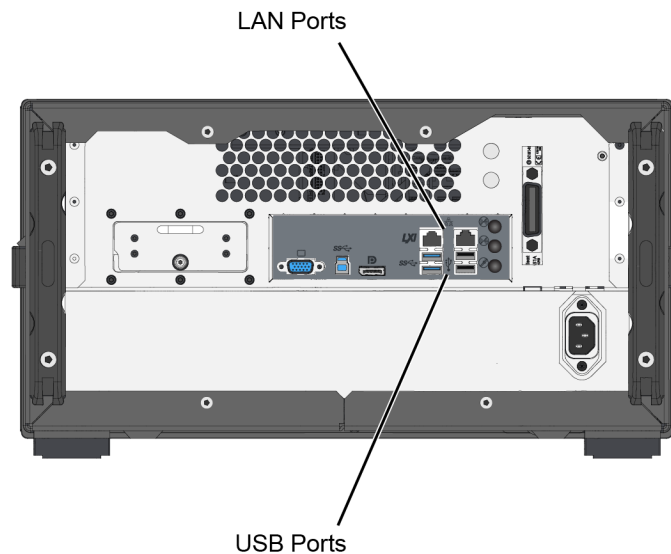


Figure 14. Location of Printer Ports

Step 11. Connect an External Display (Optional)

1. Connect your display to the rear-panel Display Port or VGA connector.
2. Refer to Windows Help for information on using a Windows second desktop feature.

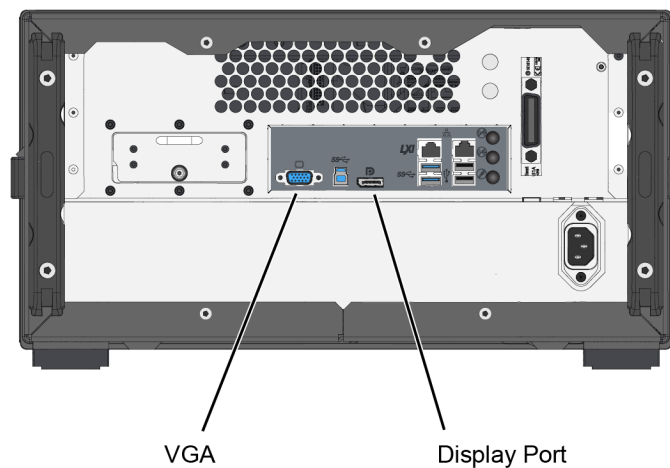


Figure 15. External Display Connections

Step 12. Calibrate the Modules

A module calibration establishes calibration factors that compensate for imperfections in the measurement system such as variations due to ambient temperature. Calibration is easy and quick to perform and will result in the best instrument precision. The module calibration is recommended whenever:

- Instrument power has been cycled.
- A module has been removed and then reinserted.
- A change in the temperature of the mainframe exceeds 5°C compared to the temperature of the last vertical (amplitude) calibration ($T > 5^{\circ}\text{C}$).
- The time since the last calibration has exceeded 10 hours.

To perform a module calibration

1. Turn on the N1000A.

NOTE

Allow the instrument, with modules installed, to warm up for a period of at least one hour before performing a vertical calibration. This ensures that the module reaches its equilibrium temperature.

2. Click **Tools > Calibrations**. The Calibrations dialog opens as shown in [Figure 16](#).

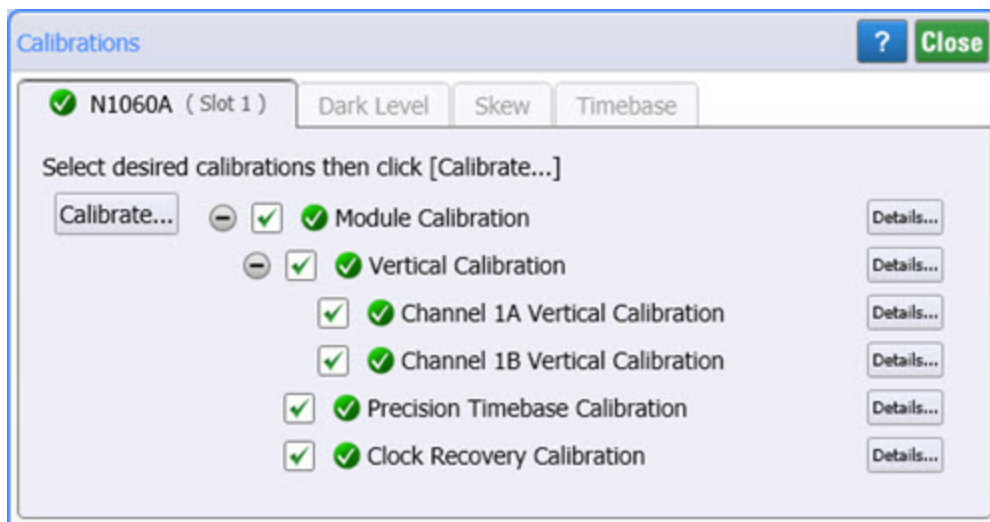


Figure 16. Calibrations Dialog

2 Installing the N1000A

3. Remove all external devices and signals from the module. The module calibration uses known signal levels in the instrument. Introducing an outside signal source interferes with the calibration factors and decreases calibration accuracy.
4. In the dialog box, select a tab that represents the module that you want to calibrate.
5. Calibrations with a green check mark are valid. Select any items without a green check mark or that show any other icon and click **Calibrate** to start the module calibration.
6. Follow any displayed instructions. After the calibration completes, the dialog will show the status of the calibration.

Step 13. Learn How to Use and Program the N1000A

Three help systems provide the N1000A's documentation. To access the help, turn on the N1000A and on FlexDCA's menu click:

- **Help > User's Guide...** to open learn how to use the instrument.
- **Help > Programmer's Guide...** to learn how to remote control the instrument via SCPI commands.
- **Help > Specifications...** to locate all product specifications for DCA-X main-frames, modules, and DCA-M modules.

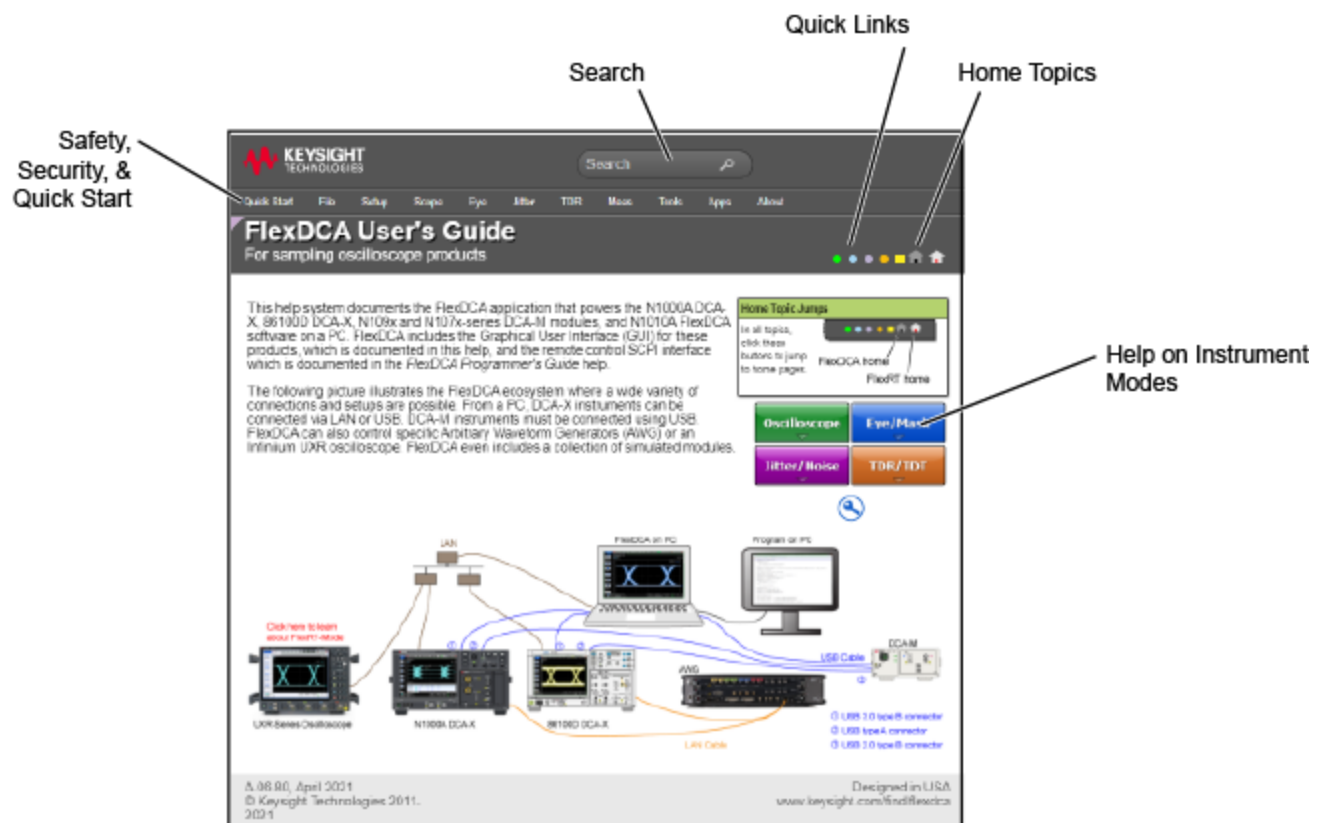


Figure 17. User's Guide Help

3 Removable Hard Disk

To Remove the Hard Disk 37
 To Declassify Instrument Memory 38

Every N1000A has a single removable hard disk. When it comes time to return the N1000A to Keysight for calibration, before returning the instrument remove the hard drive which is easily done. Because calibration data is stored on an internal EPROM and not on the hard disk, the hard disk with its sensitive data never has to leave your site. Keysight does not need your hard disk to perform the calibration.

The hard disk includes both drive C and drive D (USER). Drive C contains the following items:

- Operating system
- N1000A application
- Any factory or user installed applications
- Application licenses (automatically backed up to drive D)

Drive D contains the following items:

- Backup files
- User files including data files

CAUTION

Use standard anti-static precautions when handling the hard disk to avoid damaging the disk.

To Remove the Hard Disk

1. Press the **ON/Standby** switch to the standby position.
2. Remove the power cord.
3. Locate the hard disk on the N1000A's rear panel as shown in **Figure 18**.

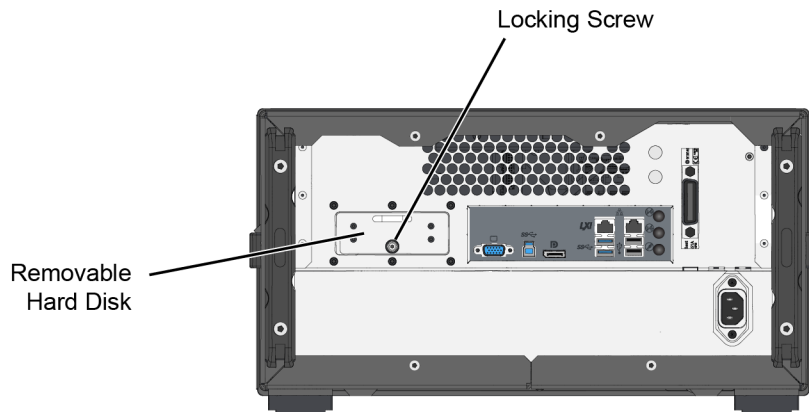


Figure 18. Removable Hard Disk

4. Turn the locking screw counter-clockwise to release the hard disk.
5. Pull out the hard disk.

To Declassify Instrument Memory

All sensitive instrument information is written to the instrument's hard disk. To declassify instrument memory:

1. Optional. Press the **Clear** button in the N1000A's Calibration dialog box to clear mainframe user timebase calibration data and optical dark level calibration data.
2. Turn off the instrument and remove the hard disk.










4 Instrument Markings and Regulatory Information





Instrument Markings	40
N1000A Regulatory Information	42

Instrument Markings

The following table lists the definitions of markings that may be on the instrument.

Table 4. Instrument Markings

Marking	Description
	The instruction documentation symbol. The product is marked with this symbol when it is necessary for the user to refer to the instruction in the documentation
	The ON/STANDBY symbol. The ON, OFF and STANDBY symbols are used to mark the positions of the instrument power line switch.
	The AC symbol is used to indicate the required nature of the line module input power.
	The chassis ground symbol. The chassis ground symbol is used to indicate a chassis connection.
	The CE marking is a registered trademark of the European Community (if accompanied by a year, it is the year when the design was proven). It indicates that the product complies with all relevant directives.
	The CSA mark is a registered trademark of the CSA International.
	The RCM mark is a registered trademark of the Australian Communications and Media Authority.
ISM 1A	This is a symbol of an Industrial Scientific and Medical Group 1 Class A product (CISPR 11, Clause 5)
ICES/NMB-001	This is a marking to indicate product compliance with the Canadian Interference-Causing Equipment Standard. Cet appareil ISM est conforme a la norme NMB du Canada.
	China Restricted Substance Product Label. The EPUP (environmental protection use period) number in the center indicates the time period during which no hazardous or toxic substances or elements are expected to leak or deteriorate during normal use and generally reflects the expected useful life of the product.
	South Korean Certification (KC) mark; includes the marking's identifier code which follows this format: MSIP-REM-YYY-ZZZZ.

	<p>The crossed out wheeled bin symbol indicates that separate collection for waste electric and electronic equipment (WEEE) is required, as obligated by DIRECTIVE 2012/19/EU and other National legislation. Please refer to keysight.com/go/takeback to understand your Trade in options with Keysight in addition to product takeback instructions.</p>
	<p>Universal recycling symbol. This symbol indicates compliance with the China standard GB 18455-2001 as required by the China RoHS regulations for paper/fiberboard packaging.</p>
	<p>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>

N1000A Regulatory Information

To find a current Declaration of Conformity for a specific Keysight product, go to:

<http://www.keysight.com/go/conformity>

SAFETY: Complies with the essential requirements of the European Low Voltage Directive as well as current editions of the following standards (dates and editions are cited in the Declaration of Conformity):

- IEC/EN 61010-1
- Canada: CSA C22.2 No. 61010-1
- USA UL std no. 61010-1

COMPLIANCE WITH CANADIAN EMC REQUIREMENTS

This ISM device complies with Canadian ICES-001.

Cet appareil ISM est conforme a la norme NMB du Canada.

EMC

Complies with the essential requirements of the European EMC Directive as well as current editions of the following standards (dates and editions are cited in the Declaration of Conformity):

- IEC/EN 61326-1
- CISPR Pub 11 Group 1, Class A
- AS/NZS CISPR 11
- ICES/NMB-001

This ISM device complies with Canadian ICES-001.

Cet appareil ISM est conforme a la norme NMB-001 du Canada.

South Korean Class A EMC Declaration:

This equipment is Class A suitable for professional use and is for use in electromagnetic environments outside of the home.

A 급 기기 (업무용 방송통신기자재)

이 기기는 업무용 (A 급) 전자파적합기기로서
판매자 또는 사용자는 이 점을 주의하시기 바라
며, 가정외의 지역에서 사용하는 것을 목적으로
합니다.

Acoustic statement: (European Machinery Directive)

Acoustic noise emission

LpA < 70 dB

Operator position

Normal operation mode per ISO 7779

5 Contacting Keysight

To contact Keysight for sales and technical support, refer to support links on the following Keysight websites: <http://www.keysight.com/find> (product specific information and support, software and documentation updates) <http://www.keysight.com/find/assist> (worldwide contact information for repair and service).

For technical assistance with the, contact your local Keysight Call Center.

- In the Americas, call 1 (800) 829-4444
- In other regions, visit <http://www.keysight.com/find/assist>

Returning the Instrument for Service

The instructions in this section show you how to contact Keysight Technologies and how to properly package an instrument for return to a Keysight Technologies service office. Always contact the Keysight Technologies Instrument Contact Center to initiate service *before* returning the instrument to a service office. This ensures that the repair (or calibration) can be properly tracked and that your instrument will be returned to you as quickly as possible. For technical assistance, contact your local Keysight Call Center.

If the instrument is still under warranty or is covered by a maintenance contract, it will be repaired under the terms of the warranty or contract. If the instrument is no longer under warranty or is not covered by a maintenance plan, Keysight Technologies will notify you of the cost of the repair after examining the unit.

NOTE

Remember to always make backups of important files. Data stored on the instrument hard disk may be erased after a repair. You can restore the files from the backup.

1. Write a complete description of the failure and attach it to the instrument. Include any specific performance details related to the problem. The

following information should be returned with the instrument.

- Type of service required.
 - Date instrument was returned for repair.
 - Description of the problem:
 - Whether problem is constant or intermittent.
 - Whether instrument is temperature-sensitive.
 - Whether instrument is vibration-sensitive.
 - Instrument settings required to reproduce the problem.
 - Performance data.
 - Company name and return address.
 - Name and phone number of technical contact person.
 - Model number of returned instrument.
 - Full serial number of returned instrument.
 - List of any accessories returned with instrument.
 - The original cal data disks.
2. Cover all front or rear-panel connectors that were originally covered when you first received the instrument.

CAUTION

Cover electrical connectors to protect sensitive components from electrostatic damage. Cover optical connectors to protect them from damage due to physical contact or dust.

CAUTION

Instrument damage can result from using packaging materials other than the original materials. Never use styrene pellets as packaging material. They do not adequately cushion the instrument or prevent it from shifting in the carton. They may also cause instrument damage by generating static electricity.

3. Pack the instrument in the original shipping containers. Original materials are available through any Keysight Technologies office. Or, use the following guidelines:
- Wrap the instrument in anti-static plastic to reduce the possibility of damage caused by electrostatic discharge.
 - For instruments weighing less than 54 kg (120 lb), use a double-walled, corrugated cardboard carton of 159 kg (350 lb) test strength.

- The carton must be large enough to allow approximately 7 cm (3 inches) on all sides of the instrument for packing material, and strong enough to accommodate the weight of the instrument.
 - Surround the equipment with approximately 7 cm (3 inches) of packing material, to protect the instrument and prevent it from moving in the carton. If packing foam is not available, the best alternative is S.D-240 Air Cap from Sealed Air Corporation (Commerce, California 90001). Air Cap looks like a plastic sheet filled with air bubbles. Use the pink (anti-static) Air Cap to reduce static electricity. Wrapping the instrument several times in this material will protect the instrument and prevent it from moving in the carton.
4. Seal the carton with strong nylon adhesive tape.
 5. Mark the carton "FRAGILE, HANDLE WITH CARE".
 6. Retain copies of all shipping papers.

Index

A

adapters, electrical
 APC 3.5 (f-f) 13
 SMA (f-f) 13
 adapters, optic 13
 airflow 23

C

calibration
 modules 33
 certificate of authenticity 8
 cleaning
 fiber-optic connections 11
 instrument 12
 cleaning connections 12
 confirming shipment 18
 connecting
 accessories 26
 printer 31
 connectors, covering 44-45

D

declassify memory 38
 display, external 32

E

electrostatic discharge 17, 20
 environmental
 specifications 23
 ESD
 wrist strap 20

F

fiber optics
 adapters 13
 care of 17
 file sharing 30
 front panel features 7

G

grounding receptacle 21

H

hard disk, removable 36

I

instrument markings 40
 ISM1-A 40

K

keyboard 18, 26

L

LAN, connecting to 30
 licenses, installing 31
 line cord 27

M

markings, instrument 39
 memory, declassify 38
 modules
 calibration 33
 installing 25
 mouse 18, 26

O

ON/Standby switch 28
 options 18

P

positioning, instrument 23
 printer
 connecting 31
 network 30

R

rack mounting
 and standby switch 24
 rear panel features 8
 regulatory information 42

S

safety considerations 15
 safety information 15
 serial number label 8
 service 44
 shipment contents 18
 specifications 6, 9

V

ventilation clearance 23

W

wrist strap 20