

# Startup Guide

## Keysight Modular Arbitrary Waveform Generator



# Notices

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P9336-90001

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### 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.

The following safety precautions should be observed before using this product and any associated instrumentation. This product is intended for use by qualified personnel who recognize shock hazards and are familiar with the safety precautions required to avoid possible injury. Read and follow all installation, operation, and maintenance information carefully before using the product.

### 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.

The types of product users are:

- Responsible body is the individual or group responsible for the use and maintenance of equipment, for ensuring that the equipment is operated within its

specifications and operating limits, and for ensuring operators are adequately trained.

- Operators use the product for its intended function. They must be trained in electrical safety procedures and proper use of the instrument. They must be protected from electric shock and contact with hazardous live circuits.
- Maintenance personnel perform routine procedures on the product to keep it operating properly (for example, setting the line voltage or replacing consumable materials). Maintenance procedures are described in the user documentation. The procedures explicitly state if the operator may perform them. Otherwise, they should be performed only by service personnel.
- Service personnel are trained to work on live circuits, perform safe installations, and repair products. Only properly trained service personnel may perform installation and service procedures.

### WARNING

Operator is responsible to maintain safe operating conditions. To ensure safe operating conditions, modules should not be operated beyond the full temperature range specified in the Environmental and physical specification. Exceeding safe operating conditions can result in shorter lifespans, improper module

performance and user safety issues. When the modules are in use and operation within the specified full temperature range is not maintained, module surface temperatures may exceed safe handling conditions which can

cause discomfort or burns if touched. In the event of a module exceeding the full temperature range, always allow the module to cool before touching or removing modules from chassis.

Keysight products are designed for use with electrical signals that are rated Measurement Category I and Measurement Category II, as described in the International Electro-technical Commission (IEC) Standard IEC 60664. Most measurement, control, and data I/O signals are Measurement Category I and must not be directly connected to mains voltage or to voltage sources with high transient over-voltages. Measurement Category II connections require protection for high transient over-voltages often associated with local AC mains connections. Assume all measurement, control, and data I/O connections are for connection to Category I sources unless otherwise marked or described in the user documentation.

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

Operators of this product must be protected from electric shock at all times. The responsible body must ensure that operators are prevented access and/or insulated from every connection point. In some cases, connections must be exposed to potential human contact. Product operators in these circumstances must be trained to

protect themselves from the risk of electric shock. If the circuit is capable of operating at or above 1000V,

no conductive part of the circuit may be exposed.

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

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

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

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

Do not touch any object that could provide a current path to the common side of the circuit under test or power line (earth) ground. Always make measurements with

dry hands while standing on a dry, insulated surface capable of withstanding the voltage being measured.

The instrument and accessories must be used in accordance with its specifications and operating instructions, or the safety of the equipment may be impaired.

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

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

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

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

Instrumentation and accessories shall not be connected to humans.

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

To maintain protection from electric shock and fire, replacement components in mains circuits - including the power transformer, test leads, and input jacks - must be purchased from Keysight. Standard fuses with applicable national safety approvals may be used if the rating and type are the same. Other components that are not safety related may be purchased from other suppliers as

long as they are equivalent to the original component (note that selected parts should be purchased only through Keysight to maintain accuracy and functionality of the product). If you are unsure about the applicability of a replacement component, call an Keysight office for information.

#### WARNING

No operator serviceable parts inside. Refer servicing to qualified personnel. To prevent electrical shock do not remove covers. For continued protection against fire hazard, replace fuse with same type and rating.

#### CAUTION

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."

#### PRODUCT MARKINGS:



This symbol marks the standby position of the power line switch.



The CE mark is a registered trademark of the European Community.



Australian Communication and Media Authority mark to indicate regulatory compliance as a registered supplier.



This symbol indicates product compliance with the Canadian Interference-Causing Equipment Standard (ICES-001). It also identifies the product is an Industrial Scientific and Medical Group 1 Class A product (CISPR 11, Clause 4).



South Korean Class A EMC Declaration

This equipment has been conformity assessed for use in business environments. In a residential environment, this equipment may cause radio interference.

\*This EMC statement applies to the equipment only for use in business environment.

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(업무용 방송통신기자재)

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This product complies with the WEEE Directive marketing requirement. The affixed product label (above) indicates that you must not discard this electrical/electronic product in domestic household waste. Product Category: With reference to the equipment types in the WEEE directive Annex 1, this product is classified as "Monitoring and Control instrumentation" product. Do not dispose in domestic household waste. To return

unwanted products, contact your local Keysight office, or for more information see <http://about.keysight.com/en/companyinfo/environment/takeback.shtml>.



This symbol is used to identify a terminal which is internally connected to the product frame or chassis.



This symbol indicates the instrument is sensitive to electrostatic discharge (ESD). ESD can damage the highly sensitive components in your instrument. ESD damage is most likely to occur as the module is being installed or when cables are connected or disconnected. Protect the circuits from ESD damage by wearing a grounding strap that provides a high resistance path to ground. Alternatively, ground yourself to discharge any buildup static charge by touching the outer shell of any grounded instrument chassis before touching the port connectors.



The instruction documentation symbol. The product is marked with this symbol when it is necessary for the user to refer to the instructions in the documentation.



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.

[ccr.keysight@keysight.com](mailto:ccr.keysight@keysight.com)

This is the Keysight email address required by EU directives applicable to our product.



ISO standard recycling symbol. This symbol satisfies the requirements for the China standard GB 18455-2001 as required by the China RoHS regulations for paper/fiberboard packaging.



USB connectors.



Kensington security Lock.

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## Introduction

The scope of this Startup Guide is to detail the steps required to follow to unpack, inspect, install (software and hardware), perform instrument connections, verify operability, and troubleshoot the M9336A/P9336A AWG. The P9336A AWG is a single slot USB module, shipped with USB-based chassis while as M9336A AWG is a single slot PXIe module shipped as a standalone product. However, the M9336A AWG, just like any other PXIe module, needs to be inserted in a PXIe chassis.

If you have any questions after reviewing this information, contact your local Keysight Technologies Inc. representative or contact us through our website at [www.keysight.com/find/usb-awg](http://www.keysight.com/find/usb-awg) (for P9336A AWG) and [www.keysight.com/find/M9336A](http://www.keysight.com/find/M9336A) (for M9336A AWG).

### Related Documentation

- To access documentation related to the AWG, use the following method:  
If the product software is installed on your PC, the related documents are also available in the software installation directory.

**Startup Guide** : Includes procedures to help you unpack, inspect, install (software and hardware), perform instrument connections, verify operability, and troubleshoot your product.

- **Default Location on 64-bit Windows system:** <YourDrive:>\Program Files (x86)\Keysight\MAwg\Help\MAwg\_Operation\_Guide.chm
- **Format:** CHM (Microsoft Help Format)

**User Guide:** Includes the system block diagram, a description of each subsystem, and information about programming of the AWG.

- **Default Location on 64-bit Windows system:** <YourDrive:>\Program Files (x86)\Keysight\MAwg\Help\MAwg\_Operation\_Guide.chm
- **Format:** CHM (Microsoft Help Format)

**SFP Help:** Provides detailed documentation of the options and menus available in the Soft Front Panel.

- **Default Location on 64-bit Windows system:** <YourDrive:>\Program Files (x86)\Keysight\MAwg\Help\MAwg\_Operation\_Guide.chm
- **Format:** CHM (Microsoft Help Format)

**Introduction to the KtMAwgIVI.NET/-C Driver** : Provides brief information about the

KtMAwg IVI.NET and IVI-C driver, and the hardware and software requirements of the AWG.

- **Default Location on 64-bit Windows system:** <YourDrive:>\Program Files (x86)\Keysight\MAwg\Help\Introduction\_to\_KtMAwg\_v<software version>.html
- **Format:** HTML

**IVI.NET Programming Guide** : Provides detailed documentation of the IVI.NET driver API functions. Also, includes information to help you get started with using the IVI drivers in your application development environment.

- **Default Location on 64-bit Windows system:** <Your Drive:>\Program Files (x86)\IVI Foundation\IVI\Microsoft.NET\Framework32\v4.5.50709\Keysight.KtMAwg <software version>\Help\Keysight.KtMAwg.Fx45.chm
- **Format:** CHM (Microsoft Help Format)

**IVI-C Programming Guide** : Provides detailed documentation of the IVI-C driver API functions. Also, includes information to help you get started with using the IVI drivers in your application development environment.

- **Default Location on 64-bit Windows system:** <Your Drive:>\Program Files (x86)\IVI Foundation\IVI\Drivers\KtMAwg\KtMAwg.chm
- **Format:** CHM (Microsoft Help Format)

**LabVIEW Driver Reference** : Provides detailed documentation of the IVI-C driver API functions. Also, includes information to help you get started with using the IVI drivers in your application development environment.

- **Default Location on 64-bit Windows system:** <Your Drive:>\Program Files (x86)\Keysight\MAwg\Help\KtMAwg\_LabVIEW\_Help.chm
- **Format:** CHM (Microsoft Help Format)

**USB Chassis SFP Help** : Provides detailed documentation of the options and menus available in the USB Chassis Soft Front Panel.

- **Default Location on 64-bit Windows system:** <Your Drive:>\Program Files (x86)\Keysight\MAwg\Help\USB\_Chassis\_SFP\_Help.chm
- **Format:** CHM (Microsoft Help Format)

**Data Sheet** : Provides key features and specifications for the AWG.

- **Default Location on 64-bit Windows system:** Available only on the [Keysight website](#)
- **Format:** PDF

**Specification Guide** : Provides the specifications information for the AWG.

- **Default Location on 64-bit Windows system:** Available only on the [Keysight website](#)
- **Format:** PDF

**Security Guide** : Provides instructions for protecting and removing classified, proprietary information stored in the AWG.

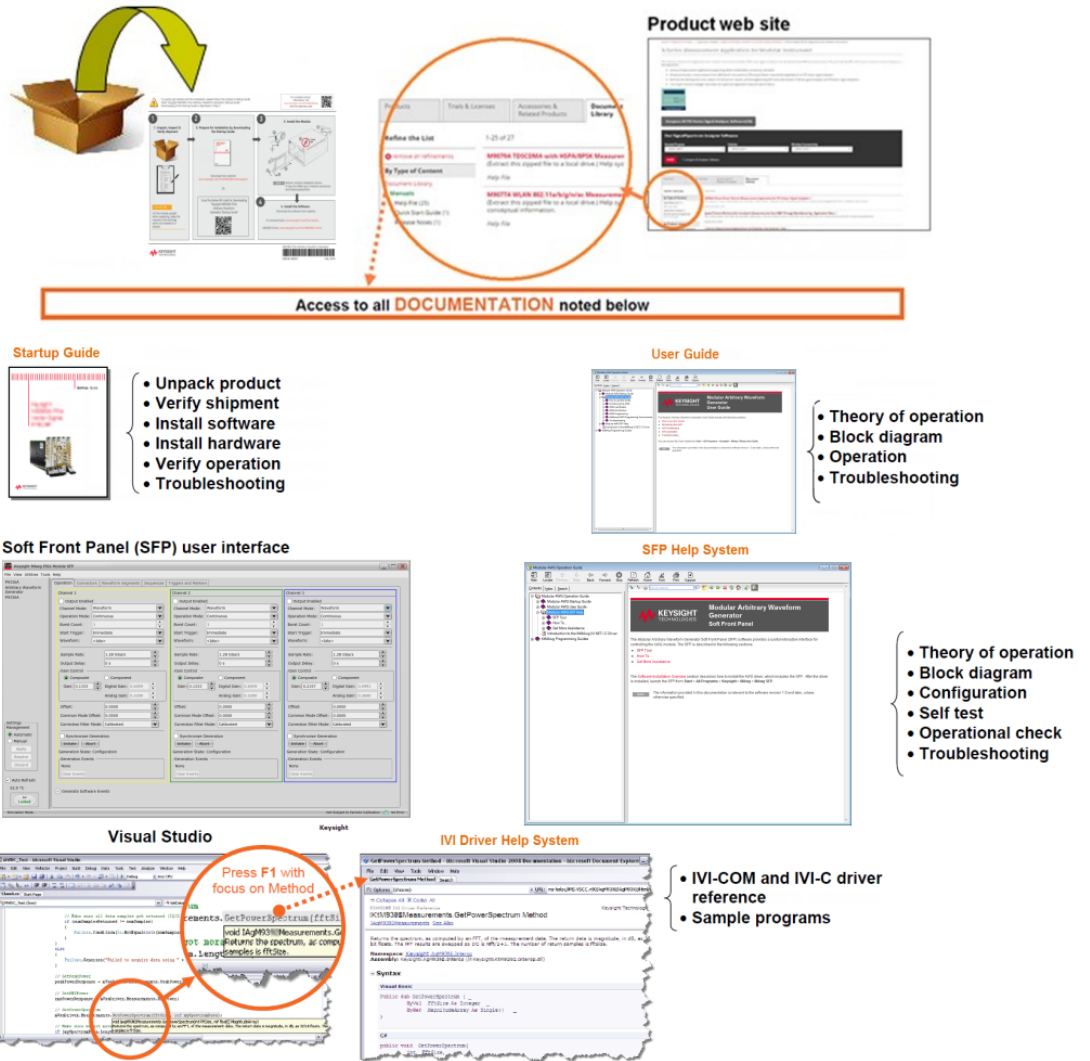
- **Default Location on 64-bit Windows system:** Available only on the [Keysight website](#)
- **Format:** PDF

**NOTE**

Alternatively, you can find these documents under **Start > All Programs > Keysight > MAwg**.

- To understand the available user documentation in context to your workflow, refer to the Documentation Map below.

## Documentation Map



## AWG At a Glance

The M9336A/P9336A AWG delivers exceptional performance for creation of complex wideband waveforms. Multiple, 540 MHz bandwidth channels with 16-bit resolution and up to a 1.28 GSa/s sampling rate are provided in a single-slot PXIe instrument (for M9336A AWG)/USB Chassis (for P9336A AWG). This enables the AWG to generate wide bandwidth signals with low Error Vector Magnitude (EVM), making it ideal for creating baseband waveforms for wireless communications, radar, and satellite. The AWG can also be combined with a wideband I/Q upconverter, resulting in modulation bandwidths of 1 GHz at RF frequencies for signal simulations employed in functional testing of chip sets designed for modern digital communications radios.

The AWG includes advanced sequencing and triggering modes which can be used to create complex waveforms and event-based signal simulations. Waveforms can be developed using a variety of software tools including Keysight Signal Studio and

MATLAB. The AWG's IVI driver set simplify integration into a variety of application development environments such as LabVIEW and VisualStudio.NET. A comprehensive Soft Front Panel (SFP) speeds test development and debug by enabling the user to interactively control the module.

## AWG Key Features

The P9336A/ M9336A AWG has the following features:

### Common Features

<b>P9336A/M9336A</b>
Offers three differential or single-ended signal channels with SMB connectors
Up to 4 GB of waveform sample and waveform sequencing memory
16-bit amplitude resolution
Up to 540 MHz BW per channel (1080 MHz I/Q modulation BW)
Sample Rate (rate at which waveform samples are fetched from Waveform Memory) ranges from 1 Sa/s to 1.28 GSa/s (on each channel)
Per channel control of channel skew, gain, and offset

### Model-Specific Features

<b>P9336A</b>	<b>M9336A</b>
A USB module shipped with USB chassis as a single unit.	Single slot PXIe module shipped as a standalone product. The PXIe chassis needs to be ordered separately.
Supports direct connection to PCH xHCI USB 3.0 hub only	Supports PXIe interface
Self test on the P9336A AWG includes a limited memory test. Full memory testing can be done using the SFP or the memory test specific API methods.	Self test on the M9336A AWG includes a full memory test.
Front panel and limited Backplane triggers and markers (Does not support PXI_STAR, PXIe_DSTARB and PXIe_DSTARC). Backplane triggers and markers are used by routing to the Trig 1 and Trig 2 connectors.	Front panel and Backplane triggers and markers.

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## Step 1 - Unpack, Inspect and Verify the shipment

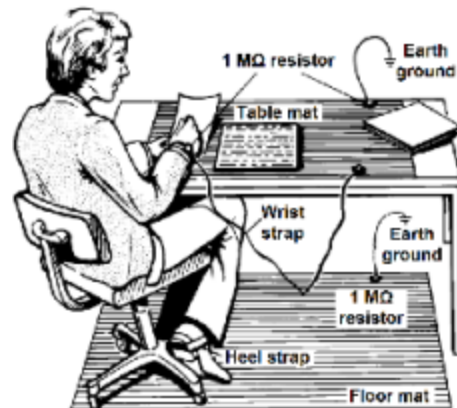
The module arrives packed in one small box. Before unpacking your module(s), inspect the packaging container for evidence of mishandling during transit. Inspect the carton carefully for damages or signs of rough handling.

Remove the AWG from the packaging container and ensure that all accessories are included. Inspect the AWG and accessories for damage. If the contents appear damaged, notify your local Keysight Technologies Inc. representative.

### CAUTION

The module is shipped in materials which prevent damage from electrostatic discharge. The module should only be removed from the packaging in a static-safe area ensuring that correct static-safe precautions are taken. Store the module in an anti-static envelope when not in use.

### ESD



Electrostatic discharge (ESD) can damage or destroy electronic components. Use a static-safe workstation to perform all work on electronic assemblies. The figure (left) shows a static-safe workstation using two types of ESD protection:

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

Both types, when used together, provide a significant level of ESD protection. Of the two, only the table-mat and wrist-strap combination provides adequate ESD protection when used alone. To ensure user safety, the static-safe accessories must provide at least 1 M $\Omega$  of isolation from ground.

### WARNING

DO NOT use these techniques for a static-safe workstation when working on circuitry with a voltage potential greater than 500 volts.

## Verify AWG Shipment

### P9336A Shipment Contents

The table below lists the items included in your P9336A AWG Shipment:



## Step 1 - Unpack, Inspect and Verify the shipment

Qty	Keysight Part Number	Description
1	P9336A	Keysight Streamline USB Arbitrary Waveform Generator
1	P9336-90002	Keysight P9336A USB Arbitrary Waveform Generator Quick Start Flyer
1	P9375-60010	Cable-Assembly USB 3.0 Type-A Plug to Type-C Plug 1m-LG PVC Black
1	0950-5886	Power Supply, External AC-DC Adapter, Switching 90W, 1-Output 15V 6A Level 6)
1	C13STDH-OC-PWRCRD	Country specific power cord

### M9336A Shipment Contents

The table below lists the items included in your M9336A AWG Shipment:

Qty	Keysight Part Number	Description
1	M9336A	Keysight M9336A PXIe I/Q Arbitrary Waveform Generator
1	M9336-90002	Keysight M9336A PXIe I/Q Arbitrary Waveform Generator Quick Start Flyer
1	1250-3854	Adaptor, coaxial, straight, SMB (f) to SMB (m)
1	8120-5091	Cable, coaxial, SMB-SMB (120 mm)
1	5002-3361	Cable removal tool, SMB/MMCX

### Inspect for Damage

After unpacking an instrument, inspect it for any shipping damage. Report any damage to the shipping agent immediately, as such damage is not covered by the warranty (Refer to the warranty information at beginning of this document).

#### CAUTION

To avoid damage when handling the AWG, do not touch exposed connector pins.

#### NOTE

Visit [www.keysight.com/find/tips](http://www.keysight.com/find/tips) for information on preventing damage to your Keysight equipment.

### Return the Instrument for Service

Should it become necessary to return the AWG for repair or service, follow the steps below:

**NOTE**

The AWG is factory tested, aligned, calibrated, and shipped as a single instrument/module.

1. Review the warranty information shipped with your AWG.
2. Contact Keysight to obtain a Return Material Authorization (RMA) and return address. For assistance in finding contact information, go to [www.keysight.com/find/assist](http://www.keysight.com/find/assist).
3. Write the following information on a tag and attach it to the malfunctioning equipment:
  - Name and address of the owner. A P.O. box is not acceptable as a return address.
  - Description of failure or service required.
4. Pack the instrument in its original packaging. Include all cables. If the original packaging material is not available, use anti-static bubble wrap or packing peanuts. Place the instrument in a sealed container and mark the container "FRAGILE".
5. On the shipping label, write ATTENTION REPAIR DEPARTMENT and the RMA number.

**NOTE**

In your correspondence, refer to the instrument by serial number written on the instrument label.

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## Step 2 - Download the Latest Documentation

Download the latest version of AWG Startup Guide and other documents from [www.keysight.com/find/usb-awg](http://www.keysight.com/find/usb-awg) or [www.keysight.com/find/M9336A](http://www.keysight.com/find/M9336A).

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## Step 3A - Prepare and Power up the P9336A Instrument

### NOTE

For installation of M9336A AWG in the PXIe chassis, skip this step and go to **Step 3B - Install the M9336A PXIe Module**.

Proceed through this section in the following order:

1. Review **Before Powering up the Instrument** to understand installation guidelines and precautions.
2. **Prepare the Instrument** for the installation process.
3. **Install the Software**.
4. **Power up the Instrument**.

### Before Powering up the Instrument

#### Precautions

#### Cooling Best Practices

The following are the recommended best practices to ensure proper and safe module operating conditions:

- Ensure that the ambient air temperature around the instrument does not exceed 50°C.
- Ensure that adequate clearance is provided around all instrument vents, both air intake vents, and air exhaust vents, of the chassis. Refer to your *USB SFP Help* for more information.
- Ensure that all the fan filters are clean and unobstructed.
- To the extent possible, install the instrument in a location with lower ambient temperatures. For example, avoid the situation where the exhaust air from another instrument feeds into the air intake for this instrument.

#### Instrument Air Flow



## Step 3A - Prepare and Power up the P9336A Instrument

The P9336A AWG has the right side of the instrument dedicated to air intake and the left side dedicated to air exhaust.

### Tools Required for the Installation Procedure

- Cable removal tool (part number 5002-3361) - not supplied.

### Cable and Connector Care

When you need to disconnect the push-on cables from the front panel connectors, use the below Keysight Cable Removal Tool (PN: 5002-3361).



#### NOTE

The Cable Removal Tool is not provided in your Keysight module's ship kit. You need to order it separately.

### Prepare the Instrument

1. Make sure that the line cord is plugged into a grounded outlet to establish earth ground.
2. Make sure that the instrument power switch is turned off.
3. Make sure that the instrument fans are operable and free of dust and other contaminants that may restrict airflow.

## Install the Software

### System Requirements

For up-to-date details on P9336A hardware, software and other requirements, refer to the **Supported Hardware and Software** section in the Introduction document.

### Software Installation Overview

This installation includes the following:

- Keysight IO Libraries Suite (IOLS), which includes the Keysight Connection Expert. This software is available at [www.keysight.com/find/iosuite](http://www.keysight.com/find/iosuite). This software must be installed first.

#### NOTE

Version 2018 Update 0.1 (or later) of the Keysight IO Libraries Suite is required.

- AWG software, which includes the soft front panel (SFP), device driver (IVI.NET, IVI-C and LabVIEW) and documentation for the AWG. This software is included with your shipment.

### Software Installation Procedure

The following are steps to install the Keysight IO Libraries Suite and AWG software:

1. Launch the IO Libraries Suite installer file to run the setup.  
Follow the guided tour to complete the installation.
2. Launch the AWG installer file to run the setup.
3. Choose the features to install.  
Follow the guided tour to complete the installation.

### Power up the Instrument

Power up the instrument before you power up the PC.



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## Step 3B - Install the M9336A PXIe Module

**NOTE**

For installation of P9336A AWG in the USB chassis, go to **Step 3A - Prepare and Power up the P9336A Instrument**.

Proceed through this section in the following order:

1. Review **Before Installing the Module** to understand installation guidelines and precautions.
2. **Prepare the PXIe Chassis** for the installation process.
3. **Install the Controller** (embedded or external).
4. **Install the PXIe Module**.
5. **Install slot blockers and filler panels** in the empty PXIe chassis slots.
6. **Install the Software**.

**NOTE**

For more information about the right configuration of your single chassis and multi-chassis systems, visit [www.keysight.com/find/pxie-multichassis](http://www.keysight.com/find/pxie-multichassis).

### Before Installing the Module

#### Precautions

**CAUTION**

PXIe hardware does not support "hot-swap" (changing modules while power is applied to the chassis) capabilities. Before installing or removing a module to/from the chassis, power down the chassis to prevent damage to the module.

#### Chassis and AWG Module Cooling Best Practices

The following are the recommended best practices to ensure proper and safe module operating conditions:

- Ensure that the ambient air temperature around the chassis does not exceed 50°C.
- To maintain proper airflow within the chassis, all empty chassis slots must be fitted with slot blockers (Keysight model **Y1212A**, 5 per kit) and EMC filler panels (Keysight model **Y1213A**, 5 per kit). This includes any empty slots to the left of slot 1.

- Ensure that adequate clearance is provided around all chassis vents, both air intake vents, and air exhaust vents, including any vents at the bottom of the chassis. Refer to your *chassis documentation* for more information.
- Ensure that all the fan filters are clean and unobstructed.
- To the extent possible, install the chassis in a location with lower ambient temperatures. For example, avoid the situation where the exhaust air from another chassis feeds into the air intake for this chassis.
- If you have multiple AWG modules and space is available in your chassis, leave an empty slot between modules to enhance airflow. Ensure that a slot blocker and a filler panel are installed in the empty slots. Be aware that leaving an empty slot between modules changes the length of inter-module cables, if any, and may also cause the modules to be on different chassis backplane PXI\_TRIG trigger bus segments.
- Set the fan speed switch on the rear panel of the chassis to **HIGH**. If this switch is set to **AUTO**, the module may not receive sufficient airflow to provide adequate cooling. This can result in a thermal shutdown of the AWG. Note that some chassis, when the fan speed switch is set to **AUTO**, ramp up the fan speed if excess heat is detected within the chassis. However, all chassis do not exhibit this behavior; so setting the fan speed switch to **HIGH** ensures maximum cooling with all chassis.

### Chassis Air Flow



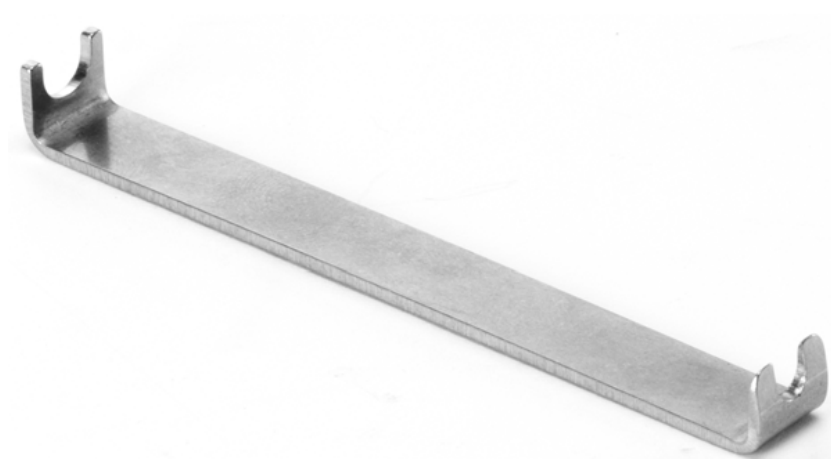
The Keysight Chassis has multiple air intakes. They are located at the lower sides, lower front and bottom of the chassis.

#### CAUTION

Position the AWG to provide ample space between the chassis fan intake and exhaust vents. Blockage by walls or obstructions affects the air flow needed for cooling.

### Cable and Connector Care

When you need to disconnect the push-on cables from the front panel connectors, use the below Keysight Cable Removal Tool (PN: 5002-3361).



#### NOTE

The Cable Removal Tool is not provided in your Keysight module's ship kit. You need to order it separately.

### Prepare the PXIe Chassis

1. Make sure that the line cord is plugged into a grounded outlet to establish earth ground.



2. Make sure that the chassis power switch is **Off**.
3. Before inserting a module into the chassis, back the mounting screws out to ensure that there is no interference between the screws and the mounting rails.
4. Make sure that the PXIe chassis fans are operable and free of dust and other contaminants that may restrict airflow.

### Install the Controller

Before installing the module, remove plastic thread protectors on the top and bottom of mounting screws. Use the appropriate instructions below for installing the embedded controller or the **remote controller**.

**NOTE**

For up-to-date details on hardware and software requirements, refer to the **Supported Hardware and Software** section in the **Introduction** document.

**CAUTION**


Do not power up the controller until instructed to do so later in this document.

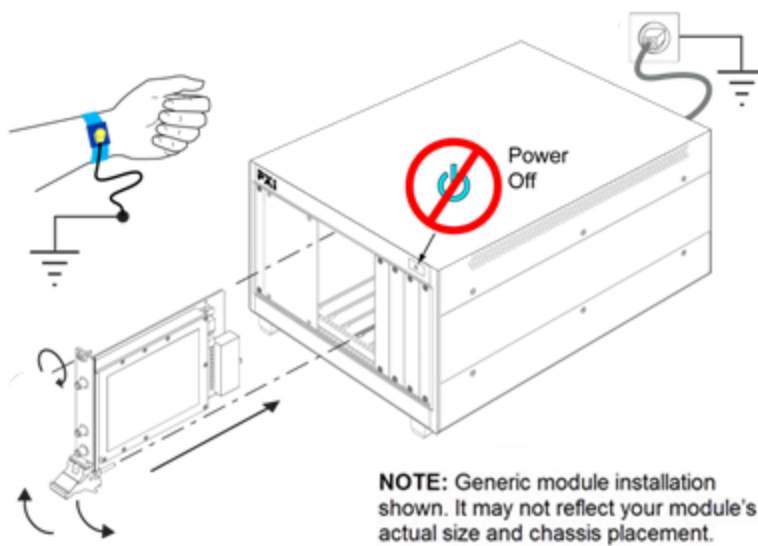
## Embedded Controller



If your configuration contains a Keysight Embedded Controller (for example, M9037A), follow the procedure below:

(For additional details, refer to the instructions in the [M9037A Startup Guide](#))

1. Remove the M9037A module from its ESD protective bag. Refer to [ESD precautions](#).
2. Install the embedded controller in Slot 1 (see  icon above the slot) in the chassis.



- a. While holding the module by the injector/ejector handle and making sure the injector/ejector handle is pushed down in the unlatched (downward) position, slide the controller module into chassis, using the slot guides (top and bottom).
  - b. Sliding the module into position, when you begin to feel resistance, pull up on the injector/ejector handle to fully inject the module into the chassis backplane connectors.
  - c. Tighten the module retaining screws (top and bottom) and torque them to 5 Lb-In (0.57 N-m).
3. Connect peripherals (mouse, keyboard, and monitor).

### Remote Controller

If your configuration contains a Keysight Cable Interface module, follow the procedure below.

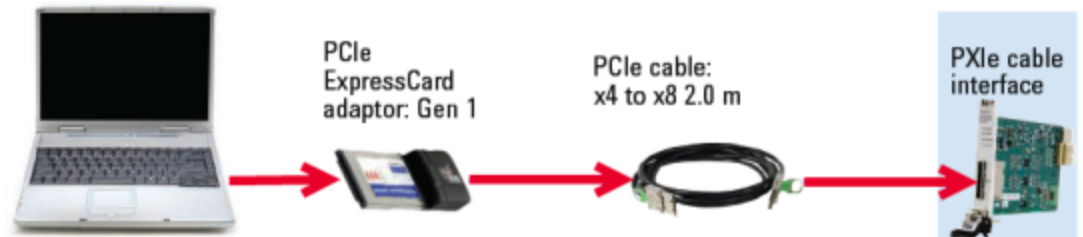
The following procedure addresses using a cabled PCIe interface between the chassis and an external host computer. However, if you intend to use a system module to control a subordinate downstream chassis or RAID configuration:

**NOTE**

- Install the module in an x8 hybrid slot in the PXIe chassis.
- Reverse the switch settings from those noted in this procedure: On the module, set both the S301 switches to "Host" and set the S201 rocker switch to the left-hand position. On the chassis backplane, set the controller slot power-supply switch to the left.

### Step 3B - Install the M9336A PXIe Module

1. Locate slot 1 in the chassis. It has the icon (▲) above it.
2. Set the chassis controller slot power supply switch to the right-hand position. This provides power to slot 1 for the benefit of the PCIe interface card.
3. Remove the interface module from its protect bag. Refer to [ESD precautions](#).
4. On the module, set both S301 switches to the Host (right-hand) position and set the S201 rocker switch to the left-hand position.
5. Install the Cable Interface module into the chassis:
  - a. While holding the module by the injector/ejector handle and making sure the injector/ejector handle is pushed down in the unlatched (downward) position, slide the module into chassis, using the slot guides (top and bottom).
  - b. Sliding the module into position, when you begin to feel resistance, pull up on the injector/ejector handle to fully inject the module into the chassis backplane connectors.
  - c. Tighten the module retaining screws (top and bottom) and torque them to 5 Lb-In (0.57 N-m).
6. Connect the Interface module to your laptop or desktop PC.
  - a. If you are using a **laptop** as a controller, connect to your module using the following components:



- b. If you are using a **desktop** PC as a controller, connect to the module using the following components:



## Install Slot Blockers and Filler Panels

To assure proper operating temperatures, install slot blockers (Keysight model Y1212A, 5 per kit) and EMC filler panels (Keysight model Y1213A, 5 per kit) in empty module slots.

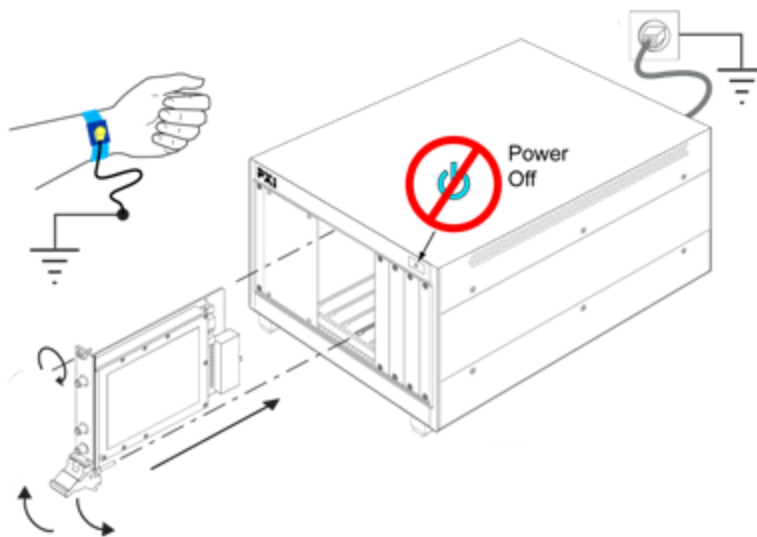
## Install the PXIe Module

### Procedure for Installing Module

Plan your module position. Before installing the module, remove plastic thread protectors on the top and bottom of mounting screws. Install the left-most module first and continue installing modules from left to right according to the image below:

When installing the M9336A AWG:

1. Hold the module by the injector/ejector handle and make sure that the injector/ejector handle is pushed down in the unlatched (downward) position. Slide the module into chassis, using the slot guides (top and bottom).
2. Slide the module into position. When you begin to feel resistance, pull up the injector/ejector handle to fully inject the module into the chassis backplane connectors.
3. Tighten the module retaining screws (top and bottom) and torque them to 5 Lb-In (0.57 N-m).



#### NOTE

Generic module installation is shown above. It may not reflect your module's actual size and chassis placement.



## Install the Software

### System Requirements

For up-to-date details on M9336A hardware, software and other requirements, refer to the **Supported Hardware and Software** section in the Introduction document.

### Software Installation Overview

This installation includes the following:

- Keysight IO Libraries Suite (IOLS), which includes the Keysight Connection Expert. This software is available at [www.keysight.com/find/iosuite](http://www.keysight.com/find/iosuite). This software must be installed first.

#### NOTE

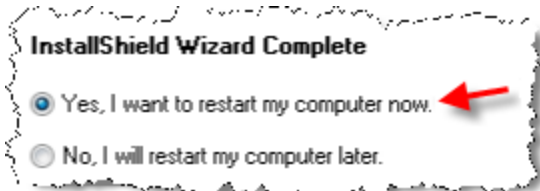
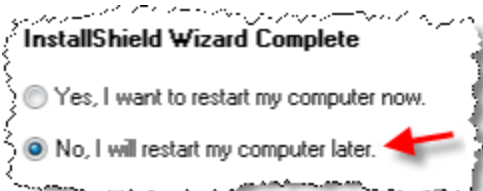
Version 2018 Update 0.1 (or later) of the Keysight IO Libraries Suite is required.  
The Keysight Instrument Control DVD, which includes the IO Libraries Suite software, is no longer shipped with Keysight instruments. If you require a Keysight Instrument Control DVD, it can be ordered by contacting your Keysight Customer Contact Center.

- AWG software, which includes the soft front panel (SFP), device driver (IVI.NET, IVI-C and LabVIEW) and documentation for the AWG. This software is included with your shipment.

### Software Installation Procedure

The following are steps to install the Keysight IO Libraries Suite and AWG software:

1. Launch the IO Libraries Suite installer file to run the setup.  
Follow the guided tour to complete the installation.
2. Launch the AWG installer file to run the setup.
3. Choose the features to install.  
Follow the guided tour to complete the installation.
4. After the installation completes, do one of the following for using a M9336A AWG with a Embedded/Remote Controller:

For Embedded Controller	For Remote Controller
<ol style="list-style-type: none"> <li>1. Select <b>Yes</b>, I want to restart my computer now. This is the default selection.</li> </ol>	<ol style="list-style-type: none"> <li>1. Select <b>No</b>, I will restart my computer later.</li> </ol>
	
<ol style="list-style-type: none"> <li>2. Click <b>Finish</b>.</li> <li>3. Wait for the system to restart.</li> </ol>	<ol style="list-style-type: none"> <li>2. Click <b>Finish</b>.</li> <li>3. Shut down the remote controller PC.</li> </ol>

---

Use **Start > Shut down**.

4. Power down the chassis.
  5. Power up the chassis.
  6. Power up the remote controller PC.
-

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## Step 4 - Verify Operation

In this step, the operation of the AWG is verified. Before running a Self Test assure that all required software is installed, the chassis is powered on, and all cabling is correct.

The first step is to check the communications and LED Status of the AWG.

### Communications

You need Keysight Connection Expert (installed with IO Libraries Suite) to check the communications of the AWG.

To check if the AWG is visible in the Keysight Connection Expert,

- Start Keysight Connection Expert by clicking **Start > All Programs > Keysight Connection Expert > Keysight Connection Expert**.
- If the AWG is still not visible after the Keysight Connection Expert has been started, click **Rescan**.

If you are still unable to communicate with the AWG, verify that the following software and hardware has been correctly installed:

- Keysight IO Libraries Suite
- AWG SFP
- Module and chassis drivers
- System Interface Card, cable and PC PXIe card connections (in case of M9336A AWG), if you are using an external host PC

Keysight Connection Expert for P9336A AWG

The screenshot displays the 'Keysight Connection Expert 2018' interface. At the top, there is a title bar with the Keysight logo and the text 'Keysight Connection Expert 2018'. Below this, a tab labeled 'Instruments' is active, and the main title of the window is 'PXI/AXIe Chassis'. Underneath, there is a section titled 'My Instruments' with a '+ Add' button and several icons (refresh, list, search). The interface is organized into expandable sections: 'LAN (TCPIP0)', 'COM (ASRL3)', 'USB (USB0)', and 'PXI (PXI10)'. Each section contains a list of discovered instruments. The 'PXI (PXI10)' section is expanded, showing two instruments: 'P6001A, Keysight Technologies' with ID 'PXI10::1::BACKPLANE' and 'P9336A, Keysight Technologies' with ID 'Chassis: 1, Slot: 1'. Both instruments have a green checkmark icon to their left. The 'P9336A' instrument is highlighted with a blue border. At the bottom of the interface, there is a section for 'MMI (SOFTWARE0)' with the text 'Auto-Discovery Off' in red.

## Keysight Connection Expert for M9336A AWG

The screenshot shows the Keysight Connection Expert interface. At the top, there are tabs for 'Instruments', 'PXI/AXIe Chassis', 'Manual Configuration', and 'Settings'. Below the tabs, there is a 'Rescan' button and a 'Filter Instruments:' search box. The main area displays a list of discovered instruments. The first instrument, 'M9336A, Keysight Technologies', is highlighted with a red box. It has a yellow star icon and the text 'PXI0::8-0.0::INSTR (+2 additional)'. Below it are several 'M9505A, Agilent Technologies' entries, each with a star icon and a small image of the chassis. The last entry is 'N5182A, Agilent Technologies' with a star icon and a small image of the signal generator.

## LED Status Indicator

## LED Status for M9336A/P9336A AWG

LED State	Status
Solid Blue	Power okay, temperature okay, successful PCI enumeration.
Solid Green	The LED will go from blue to green when the IVI driver is initialized or the SFP is opened. It will go from green back to blue when the driver is closed (or SFP is closed).

Blinking Green	At least one channel is in the Output Generation state.
Solid Red	Error condition (power or over temperature, etc., not okay)
OFF	Power not applied or failure in the power supplies. Module hardware health can't be determined until the power supply failure is resolved.

P9336A AWG has an additional Power LED located next to the power switch. The table below lists the status description of the LED states for the additional Power LED.

LED State	Status
Green	Instrument is turned on.
Amber	Power supply is on but the instrument is turned off.
OFF	Power not applied

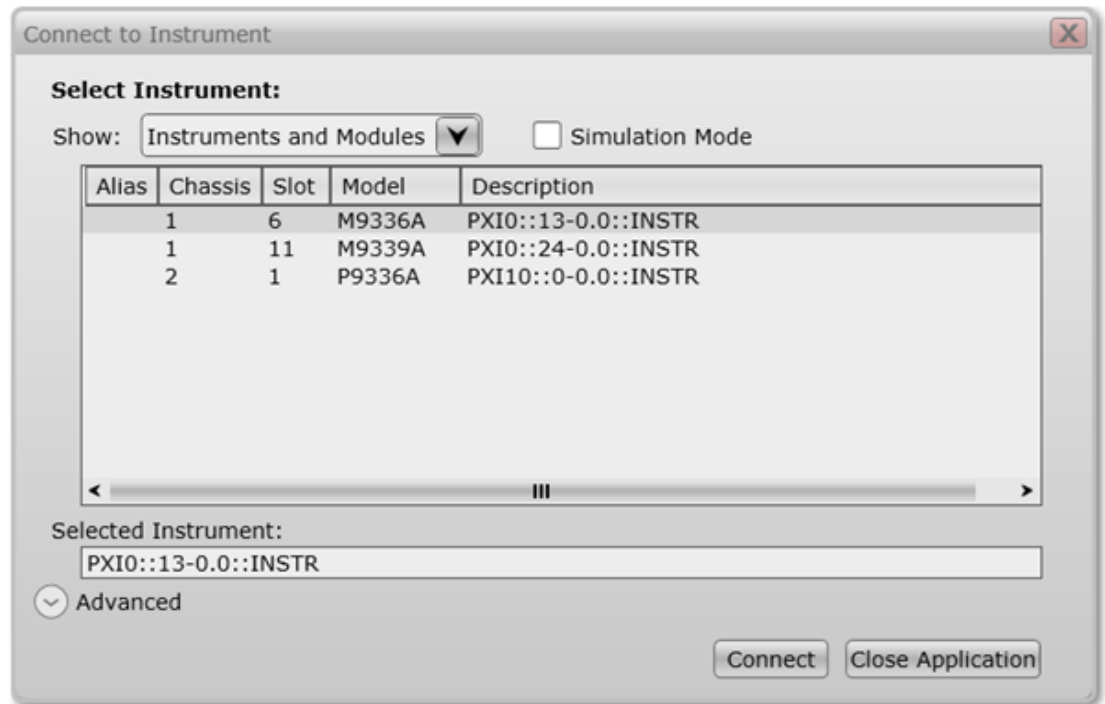
## Conduct Self Test

The second step in this process is to conduct a Self Test of the AWG.

1. Open the AWG SFP by selecting **Start > All Programs > Keysight > MAwg > MAwg SFP**.

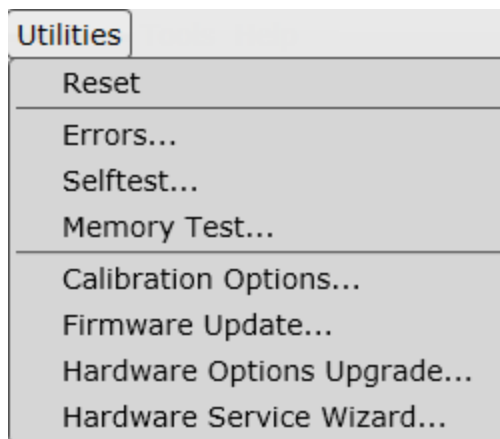
The **Connect to Instrument** dialog box is displayed.

2. Select **P9336A** or **M9336A** in the displayed list of Instruments (depending upon the instrument you wish to connect to) and click **Connect**.

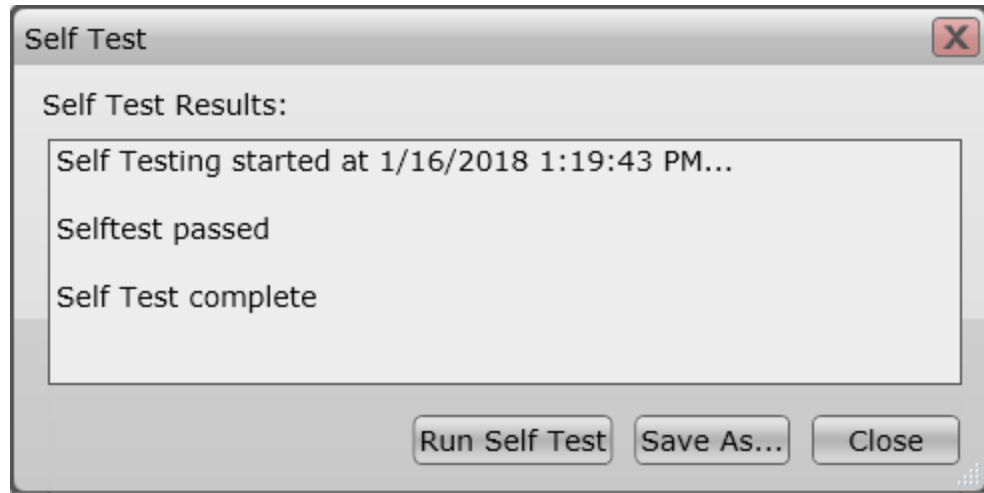
**NOTE**

If the M9336A AWG and its slot location is not visible in the **Connect to Instrument** dialog box, close the SFP and refer to **Communications**. After running Keysight Connection Expert, you may restart the SFP.

3. Check the front panel LEDs. Refer to **LED Status Indicator**.
4. Conduct a Self Test (**Utilities** > **Self Test...** > **Run Self Test**).







**NOTE**

If the Self Test fails, it indicates the module is likely to need service and you must return the modules and the cables. Refer to [Return the Instrument for Service](#).

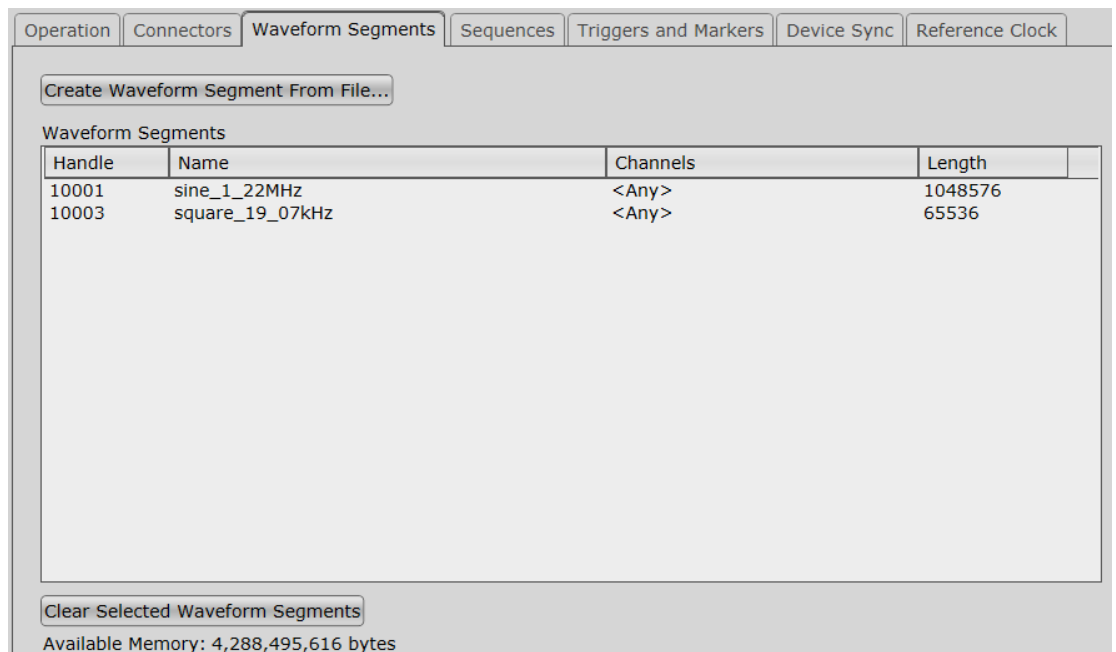
## Step 5 - Generate and View an Output Signal

After verifying the operation of the AWG in [Step 4](#), you are ready to generate an output signal and view it on an oscilloscope.

1. The first step in this process is to open the SFP of the AWG.
  - a. Open the MAwg SFP by selecting **Start > All Programs > Keysight > MAwg > MAwg SFP**.  
The **Connect to Instrument** dialog is displayed.
  - b. Select **P9336A/M9336A** in the displayed list of instruments (depending upon the instrument) and click **Connect**.
2. Connect a high-quality SMB (Female) to the BNC cable between the AWG Channel Source Output and the Input connector on the oscilloscope.
3. On the MAwg SFP, select the desired waveform using **Create Waveform Segment From File...** in the Waveform Segments tab.

### NOTE

For information on how to create a waveform, refer to [Create a Waveform Segment](#) in the Modular AWG SFP Help.



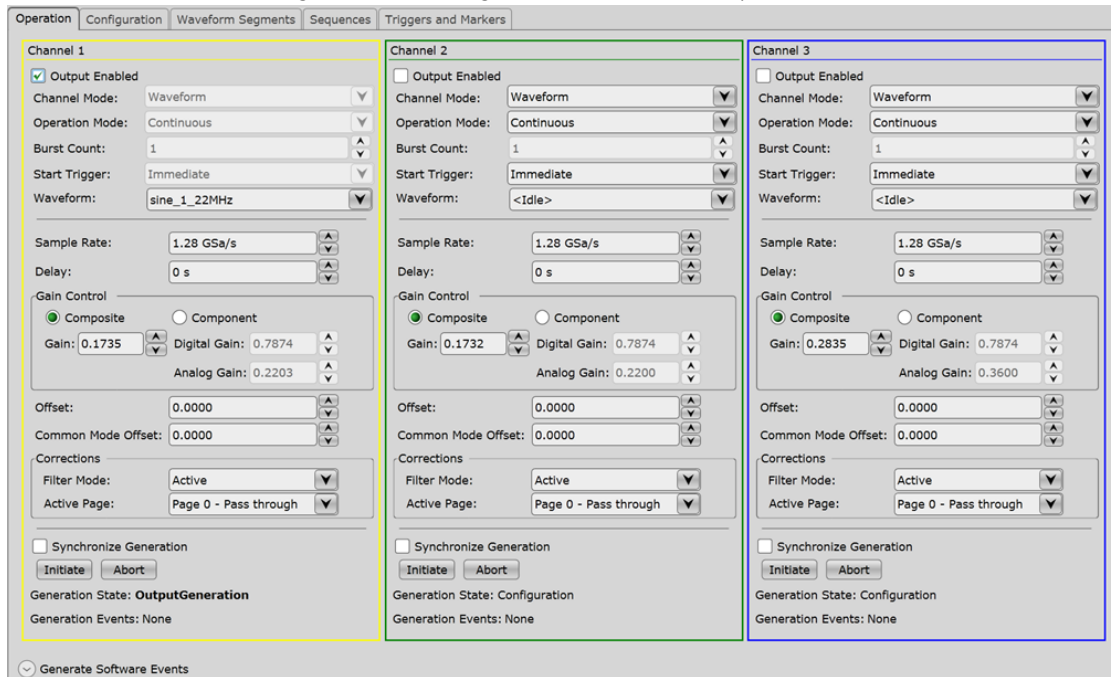
4. Now, select the **Operation** tab, and select the **Output Enabled** check box to enable the channel output.

## Step 5 - Generate and View an Output Signal

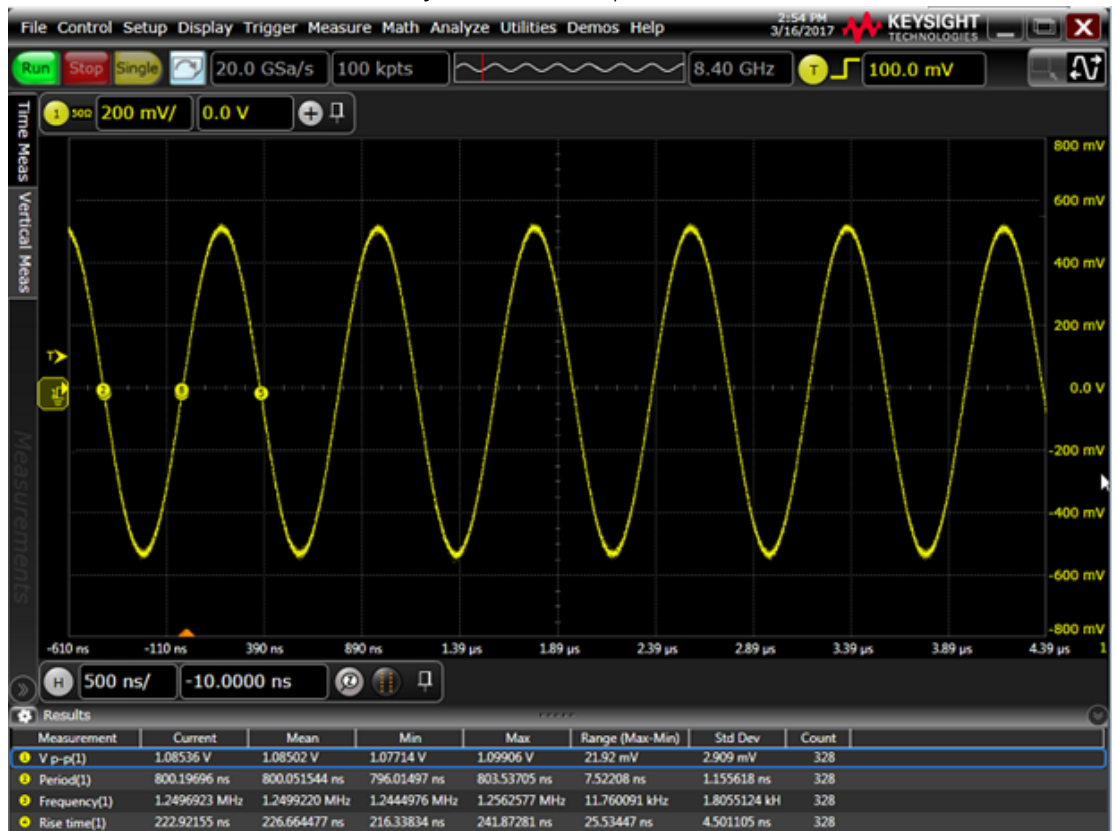
5. From the **Waveform** drop-down, select a waveform that you wish to play.

6. Click **Initiate**.

When you click the Initiate button, waveform generation starts. The Generation State status then changes from Configuration state to OutputGeneration state.



You should see the waveform on your oscilloscope.



**NOTE**

The waveform generated by the above steps is very basic. You can apply other settings (for example: Delay, offset voltage, and more) on the waveform as needed.

7. Proceed to [Step 6 - Installation is Complete.](#)

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## Step 6 - Installation is Complete

Proceed to program your product by means of the applications programming interface (API) for the supplied drivers.

### Application Programming Interface (API) Overview

When you have completed installation, you can use the AWG Soft Front Panel (SFP) or program the instrument using the applications programming interface (API) for the supplied drivers.

#### IVI Drivers

Keysight IVI drivers simplify the creation and maintenance of instrument control applications in a variety of development environments; they allow programmatic control of instrumentation while providing a greater degree of instrument interchangeability and code reuse. The IVI.NET driver supports compiling application programs for 64-bit platforms.

When you install the product software, the IVI driver files are installed in the standard IVI Foundation directories (for example, <YourDrive:>\Program Files (x86)\IVI Foundation\IVI\Microsoft.NET\Framework32\v4.5.50709\Keysight.KtMAwg <software version>\Help). The reference material for the driver functions (a Microsoft HTML Help .chm file) is installed with the IVI driver and is available for Microsoft Visual Studio's IntelliSense context linking. In addition, you can directly access the .chm file (Keysight.KtMAwg.Fx45.chm) from this Start menu location: **Start > All Programs > Keysight Instrument Drivers > IVI.NET Drivers > KtMAwg <software version>.NET.**

#### LabVIEW Driver

In addition to the IVI drivers, Keysight provides a LabVIEW driver that includes all the functionality of the IVI-C driver. When you install the product software, the LabVIEW driver is installed to each LabVIEW instr.lib directory for each version of LabVIEW you have on your computer (for example, C:\Program Files (x86)\National Instruments\<LabVIEW version>\instr.lib\<Keysight product model>). If you install LabVIEW drivers before you install LabVIEW itself, the drivers will be installed in the Keysight directory instead of the National Instruments directory (for example, C:\Program Files (x86)\Keysight\<Keysight product model>\LabVIEW Driver\<LabVIEW version>\...). Example programs are provided to demonstrate most driver functionality. The reference information for the driver (a Microsoft HTML Help .chm file) is also installed with the driver and the content is available from LabVIEW's Context Help window. In addition, you can directly access the chm file (KtMAwg LabVIEW Help) from the Keysight directory: C:\Program Files (x86)\Keysight\MAwg\LabVIEW Driver Help.

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## Safety Information

### IMPORTANT

The safety of any system incorporating the equipment is the responsibility of the assembler of the system.

## Maintenance

To remove dirt or dust from the external case of the AWG, clean the case using a dry or slightly-dampened cloth only.

### WARNING

To prevent electrical shock, disconnect the AC/DC adapter from the 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.

## General Safety Considerations

### Before Applying Power

### 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.

### CAUTION

The measuring terminals on this instrument are designed to be used with external signals described in Measurement Category I, but NOT with external signals described in Categories II, III, and IV. The input of this instrument cannot be connected to the mains.

### CAUTION

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.

## Servicing

### WARNING

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



## Operating Conditions

### WARNING

Operator is responsible for maintaining safe operating conditions. To ensure safe operating conditions, P9336As should not be operated beyond the full temperature range documented in the P9336A Data Sheet. Not maintaining safe operating conditions can result in shorter A lifespans, improper P9336A performance, and user safety issues. If P9336As are allowed to exceed the specified full temperature range, P9336A surface temperatures can cause discomfort or burns if touched. If a P9336A exceeds the full temperature range, always allow it to cool before touching it or removing it from the chassis.

### CAUTION

This product is designed for use in Installation Category II and Pollution Degree 2 environment.

## For the AC/DC Adapter

### WARNING

For safety reasons, only equipment Keysight approved accessories should be used with the instrument.

### WARNING

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

### WARNING

Use only the designated AC/DC adapter supplied with the instrument.

### WARNING

Use a Keysight supplied power cord that has the same or better electrical rating.

### WARNING

To prevent electrical shock, disconnect the AC to DC adapter from the 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.

**WARNING**

When the is connected to the AC/DC adapter, position the adapter so the power cord is readily accessible. The power cord is the disconnecting device. It removes main power to the AC/DC adapter. The front panel switch is only for the DC power within the instrument, and not for the AC/DC adapter. Alternately, an AC switch or circuit breaker (which is readily identifiable and is easily reached by the operator) may be installed and used as a disconnecting device to remove mains power from the AC/DC adapter.

**CAUTION**

The AC/DC adapter has an auto-ranging line voltage input - be sure the supply voltage is within the specified range and the voltage fluctuations do not exceed 10 percent of the nominal supply voltage.

**CAUTION**

The AC/DC adapter is for indoor use only.

**CAUTION**

Never use a modified or damaged charger. Use the original AC-DC adapter ONLY.

**CAUTION**

The AC/DC adapter is designed for use in Installation Category II and Pollution Degree 2 per IEC 61010-1.

**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.

**NOTE**

Position equipment to ensure easy access to disconnecting device.



This information is subject to change  
without notice.

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