Arbitrary Function Generator Module

AFG-125 / 225 / 125P / 225P

QUICK START GUIDE

GW INSTEK PART NO. 82DS-23045MB1

ISO-9001 CERTIFIED MANUFACTURER

GW INSTEK

The information in this manual was correct at the time of printing. However, Good Will continues to improve its products and therefore reserves the right to change the specifications, equipment, and maintenance procedures at any time without notice.

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OVERVIEW

The AFG-125/225/125P/225P are arbitrary function generator modules for use with the GDS-2000A series DSOs. The options require the DS2-FH1 module extension bay to secure the module to the DSO. This Quick Start Guide gives a quick overview to the features, installation and basic operation for the AFG-125/225/125P/225P. See the user manual for further details.

The AFG-125P & 225P also incorporate a power supply output with a selectable voltage output of 2.5, 3.3 or 5V.

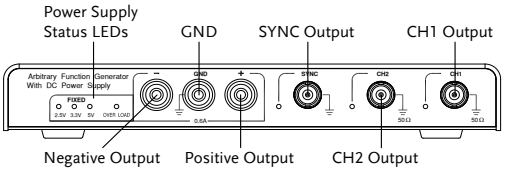
The AFG-125/225/125P/225P are only supported with GDS-2000A series DSOs with firmware version V1.19 or above installed.

Main Features

Waveforms	• Sine, Square, Ramp, Pulse, Noise, ARB waveforms
ARB Features	• 4k memory/waveform length • 10 bit amplitude resolution
Features	• 1uHz ~ 25MHz max. • AM, FM, PM, FSK, SUM modulation • Sweep function • Burst function • Channel tracking, coupling (AFG-225) • 50Ω and high load impedance • Internal / Manual trigger

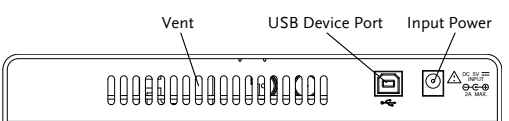
Front & Rear Panel

Front



Power Supply Status LEDs	Indicates the state of the power supply (AFG-125P/225P only).
Negative Output	Negative output port.
GND	Ground port
Positive Output	Positive output port
SYNC Ouput	Sync signal output. Outputs a Sync signal, Sweep marker, Burst marker,or Arbitrary waveform marker signal.
CH1 Output	Signal 1 output.
CH2 Output	Signal 2 output.

Front



Vent	Cooling vent.
USB Device Port	The USB Device port is used to supply power as well as communication from the GDS-2000A
Input Power	A 5V 2A power brick can be used to power the AFG-225.

Installation

AFG APP Installation

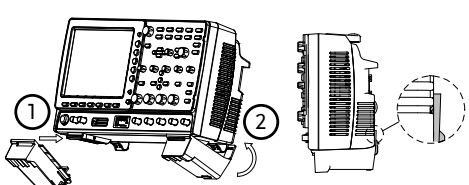
The AFG-125/225 modules require a separate APP installation.

1. Load the AFG.gz APP file onto a USB flash drive. Insert the USB flash drive into the USB slot on the front panel.
2. Press Utility > *File Utilities*. Select the AFG.gz file on the USB flash drive.
3. Press Select twice to install the AFG APP.
4. After the installation has completed, restart the oscilloscope.

Installing the DS2-FH1

The DS2-FH1 consists of 2 housings that are attached to the feet on the underside of the case.

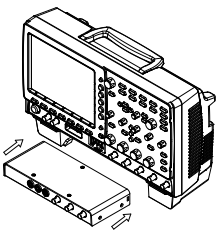
1. Slip the housing over the front of the feet on the GDS-2000A.
2. Make sure that the rear tab clips securely over the fan vent grid on the rear panel, as shown below.



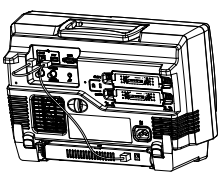
Installing the AFG-125/225 Module

The AFG-125/225 modules are installed into the area that is left between both of the DS2-FH1 housings.

1. Slide the module into the slot that was created between the DS2-FH1 housings. The front of the module should be facing forwards.

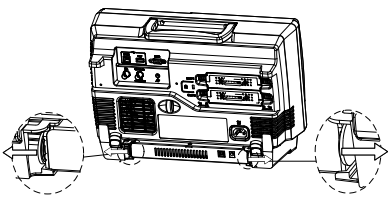


2. Make sure the module is secure. The module will click into place when it is inserted properly.
3. Make sure the GDS-2000A is turned off before proceeding.
4. Connect one end of the GTL-254 USB cable to the rear panel USB Device port and to the USB Host port. Connect the other end to the Device port on the AFG-125/225, as shown below.
5. Turn the power back on. The AFG-125/225 will now be accessible in the Option menu.



Removing an Installed Module

1. At the rear of the housings are two tabs. Pull both tabs outwards.
2. The module can now be slid out from the housing.



USB Configuration

The USB Device port needs to be configured to provide power for the AFG-125/225 if an external power supply is not used.

1. As shown previously in the "Installing the AFG-125/225 Module" section, connect the GTL-254 USB cable.
2. Press the Utility key and select *USB Device Port > USB Power*.

   The USB device port will now supply power to the AFG-125/225.

Caution	The USB Device Port should be reconfigured to "Computer" or "Printer" when the AFG-125/225 is not used. Failure to do so may damage the PC or printer when connected in the "USB Power" mode.

Accessing the Arbitrary Function Generator

Like all options, the AFG-125/225 options can be accessed with the Option key.

1. Press the Option key and select *AFG*.

   The AFG-125/225 is now ready to be used.

Basic Waveform Selection

The AFG-125/225 options have five selectable basic waveforms.

1. Select the output channel by pressing *Signal 1 Setup* or *Signal 2 Setup*.
2. Press *Waveform Mode* and select a waveform type from the side menu.

   Sine, Square, Pulse, Ramp, Noise
3. As appropriate, configure the frequency, amplitude, offset and duty cycle/symmetry from the side menu after a basic waveform is selected.
4. Press *Go Back* from the bottom menu to return to first level of the AFG menu.

ARB Waveform

The following will describe how to create and output an arbitrary waveform.

1. Select the output channel by pressing *Signal 1 Setup* or *Signal 2 Setup*.
2. Press *ARB* from the bottom menu. Press *ARB* on the side menu and toggle ARB *On*.
3. Press *Edit*.
4. Press *Edit Method* and select the method to edit the arbitrary waveform.
    - *Point/Line*: Creates pulses of a user-defined length and amplitude.
    - *Diagonal*: Creates a diagonal line between Addr1/Data1 and Addr2/Data2.
    - *Scale*: Scales the ARB waveform between 0.1X ~ 10X.
    - *Copy /Paste*: Copies a section of the ARB waveform and pastes it to a section of the ARB waveform.
5. Press *Action* to edit the ARB waveform using the method selected above.
6. Press *Output Confirm* from the side menu. Set the area of the ARB waveform to output. Press *Confirm* to confirm the area to output.
7. Press *more 1 of 2* and set the *Frequency, Amplitude, Offset* and *Rate* of the ARB waveform.

Modulation

The following will describe how to modulate a carrier waveform (shape) with the basic waveform shown previously.

1. Select a basic waveform as shown previously. This will be used as the modulating (baseband) signal.
2. Press *MOD* from the bottom menu. Press *MOD* on the side menu and toggle MOD *On*.
3. Select the type of modulation on the side menu: *AM, FM, FSK, PM, SUM.*
4. Set the parameters for the chosen modulation type from the side menu.

Sweep Modulation

The following will describe how to create a single sweep waveform.

1. Press *Sweep* from the bottom menu. Press *Sweep* on the side menu and toggle Sweep *On*.
2. Press *Type* and select *Linear* or *Log*.
3. Press *Start* to set the start frequency, press *Stop* to set the stop frequency.
4. Press *SWP Time* and set the sweep time.
5. Press *Span* to set the Span.
6. Press *Center* to set the sweep center frequency.
7. To set Markers, Press *Marker*, toggle *Marker On* and press *Frequency* to set the marker frequency.

Burst Modulation

The following will describe how to create a burst waveform.

1. Press *Burst* from the bottom menu. Press *Burst* on the side menu and toggle Burst *On*.
2. Press *N Cycle* set the burst parameters.
3. Choose *Infinite* for an infinite number of burst cycles or press Cycle to set the number of burst cycles for each period.
4. Press *Phase* to set the phase of the burst.
5. Press *Period* to set the period of each burst cycle in seconds (not for infinite).
6. Press *TRIG Set* to set the trigger settings: *INT*, *Manual Trigger* and *Delay*.

Turn the Output Signal On

The following will describe how to turn the output signal on and how to set some basic output parameters.

1. Press *Go Back* on the bottom menu to return to first level of the AFG menu.
2. Press *Output Setup*.
3. Press *Select* and choose the output signal channel.
4. Press *Output* and toggle the selected output *On*.
    - The signal will now be output.

5. To toggle the load impedance between 50Ω and High Z, press *Load*.

6. For basic waveforms, press *Phase* to set the output phase.

7. On dual channel models, both output channels can be phase-synchronized by pressing the *S_Phase* soft-key.

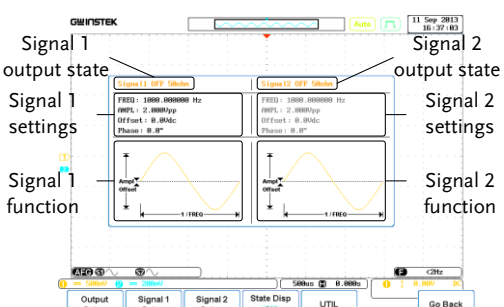
State Display

The State Display function gives an overview of the arbitrary function generator settings for both channels.

1. Press *State Disp* to toggle the State Display on.

   The State Display screen will appear in the center of the display.

State Display Screen Overview



Dual Channel (AFG-225/225P only)

The following will describe the basic 2 channel functions. Ensure both channels have already been turned on in the *Signal 1 Setup/ Signal 2 Setup* menus.

1. Press *UTIL* > *Dual Chan* from the first level of the AFG menu level.
2. From the side menu choose the relevant tracking functions:
    - *Freq Cpl* turns frequency coupling on and sets the type of frequency coupling: Offset, Ratio
    - *Ampl Cpl* turns amplitude coupling on or off.
    - *Tracking* turns tracking on or off or turns tracking on and inverts the output.
    - *S_Phase* synchronizes the phase of both channels.

Preset (default settings)

1. Press *UTIL* > *Preset* from the first level of the AFG menu level.
2. The factory default settings will be loaded automatically.

Sync Signal Setup

The sync output signal is output from the SYNC port on the front panel. The sync output signal is based on either the channel 1 or channel 2 output signals. Each periodic type of waveform output function has an associated sync output signal.

1. Press *UTIL* > *Sync Setup* from the first level of the AFG menu level.
2. Press *Sync* and toggle *Sync* on.
3. Press *Source* and choose *Signal 1* or *Signal 2* as the source signal to follow.
4. Press *Mode* and select the SYNC signal mode:
    - *Marker* forces the marker signal to be the basis of the SYNC signal.
    - *Carrier* forces the carrier waveform to be the basis of the SYNC signal.
5. Press *Polarity* and select the SYNC signal polarity.
    - *Normal* for normal polarity.
    - *Inverted* for inverted polarity.

Power Supply (AFG-125P/225P only)

The AFG-125P and AFG-225P have an additional power supply function. The power supply has three fixed output levels: 2.5V, 3.3V, 5V.

1. Press *Power Supply* from the first level of the AFG menu level.
2. From the side menu press *Power* and turn the power supply function on.
3. Press voltage and choose which fixed voltage output to use: 2.5V, 3.3V, 5V
    - The status led will indicate which voltage is selected.