



DS INSTRUMENTS
WWW.DSINSTRUMENTS.COM



DSI SG PRO SERIES Microwave Signal Generator User Manual



DS Instruments' various signal generator models are all designed to be as intuitive as possible, either being controlled by the front panel, or from the USB/Ethernet interface. **Buttons and front panel modes are similar across all models.**

Stand-Alone Use Quick Setup:

- Connect your device to a blue USB 3.0 port or 5 Volt power source using the included USB cable. A desktop, laptop computer, or smart-phone charger can work. The best source is a 12v powered USB 3.0 hub. Avoid using **unpowered** USB hubs or **long** USB cables. Many older USB ports will not be able to supply enough power.
- Connect an external 10MHz reference source to the rear reference **MCX** connector *if desired*. If no external source is detected, the unit will use its own internal source. Searching for an external frequency only occurs at boot-up, do not connect an external reference **after** the unit is already powered up.
- Note that the screen will display the model number and firmware version. The unit will beep indicating boot-up and the green power LED should light up if no errors were detected during self-tests.
- The unit is now ready to accept front panel changes or a data connection from the control software.
- To cycle between front control modes, **hold** the MODE button down until there is a beep (~0.5 seconds). The default mode is integer frequency, followed by fractional frequency, power output level, power vernier, RF output on-off, and save system state.
- The **RFO** led indicates that the device is successfully locked to the reference and providing the desired frequency on the rear RF output port.
- Some devices are equipped with an "oven" LED indicator. This is to signal to the user that the oven-controlled reference source is still cold and needs a few minutes to warm up. RF output will not be reliable while this led is active.

Control Software (GUI) Screenshot

The screenshot displays the Signal Generator Control Pro software interface. At the top, a window title bar reads "Signal Generator Control Pro - DS Instruments". The main interface is divided into several sections:

- Device Configuration:** Includes a search field for "COM7", a "Connect" button, a "Save Name" button, a "Set Reference" button, a "Send Command" button, and a "Save Defaults" button. A "Temperature Calibration" checkbox is checked.
- Device Information:** Shows "SG40000PRO - Rev 1 - SER:112 - V6.54", "4.76 VDC", and "23 °C". Buttons for "Get Messages" and "Get Errors" are present.
- SMA: Low Band 0.1-26.5GHz:** Features a frequency control with a value of "9000.000000", an RF Power control set to "0.00", and an RF Power Vernier control set to "0". A "Step (MHz)" control is set to "1.0".
- Bottom Panel:** Contains a USB icon, a red "RF OFF" button, a "Low Band" label, an "RF ON" button, and a "Help! V5.62" button.

Red numbers 1 through 12 are overlaid on the screenshot to indicate specific features and controls.

Control Software Feature Descriptions

1. COM / Ethernet search and connect – Lists any COM ports or DSI IP addresses found
2. Custom Name – Lets the user save a TAG ID, Name, or inventory number to non-volatile memory
3. Reference frequency source – Sets internal, external or auto detect for the 10MHz reference input
4. Custom Command – Type or select a custom SCPI serial command to send to the connected device
5. Power output level temperature compensation can be disabled if needed
6. Save all current settings and configuration as the boot-up defaults
7. Signal generator device information panel, here you can also request any debug messages or errors
8. Frequency – Step up or down in frequency, or enter a new frequency to generate in MHz
9. RF Output Power – Adjust the output power in calibrated steps
10. Fine Power Tune – Adjust output power in high resolution between the 0.5dB calibrated steps
11. Cold oven indicator – indicates if the 10MHz oven needs time to warm up before reference is stable
12. RF Enabled – Set the RF output port to ON or OFF

USB/Ethernet Computer Control Quick Setup:

- Connect your device to a blue USB 3.0 port using the included USB cable. The best source is a 12v powered USB 3.0 hub. Avoid using **unpowered** USB hubs or **long** USB cables. Many older USB 2.0 ports will not be able to supply enough power. For Ethernet control a smart-phone charger can be used as the USB power source.
- Connect an external 10MHz reference source to the rear MCX connector if desired. If no external source is detected, the unit will use its own internal source. Reference auto-detection can be overridden in the GUI if desired.
- Windows should now install the standard virtual COM port driver. Wait for this to complete.
- Download and open the DS Instruments Signal Generator Control GUI from the website. Install any .NET framework updates from Microsoft if needed.
- Clicking the **search** button will find all COM ports and IP addresses that are accessible. Select a COM port or IP from the top select list and press CONNECT to try to control the device. If the select box turns green, then a connection has been established.
- The model number and firmware versions will appear in the green info box. If this box is turns red, the wrong COM port was selected or an error has occurred.
- At this point a user can enter a frequency and change other device settings
- The blue RFO led on the front of the SG unit indicates that it is successfully locked and outputting the desired frequency on the output port
- The physical front control buttons will be **disabled** when a USB or network connection is established to prevent any accidental bumping of the buttons when under computer/automated control.
- Some devices are equipped with an oven-controlled reference source that will need a few minutes to warm up. The control software will display a “Cold” warning, and RF output will not be reliable while this warning is active.

Control Software Notes

- If reference auto-detection is misbehaving with your input signal, it can be forced to external or internal using the select box and “Change Ref” button. Make sure to re-apply your desired frequency after changing the reference source.
- “Send Command” allows a user to send a raw SCPI command to the Signal Generator, in USB mode the GUI will also display any response from the device in the message bar at the bottom.
- The Vernier setting allows fine power output level setting between the 0.5dB steps. Highest power output results when the slider is farthest to the right.
- If the USB voltage box goes into the red, performance will be unpredictable or an error will be indicated by the device. Try finding a better USB power source or cable.

Hardware

- The MCX **10MHz reference** input will accept sine or square wave input between -10 and +10dBm.
- Some models feature a **sweep trigger** MCX input that is pulled high to +3.3V internally, when pulled low the saved sweep will be initiated. Sweep parameters must be loaded from the GUI for this trigger to be activated. This input is **5-volt tolerant**. Bringing the input back high will not stop the sweep or have any other effect.
- Network enabled devices ship with DHCP enabled as default. There is a separate PDF app note on how to change these network settings if needed.

Frequency Sweeping Support

- See our sweeping application note PDF for using the separate dedicated sweeping functionality and control software.

Notes

- A complete SCPI command list is located on the website (<https://www.ds instruments.com/downloads/>)
- Tech support email can be reached at support@dsinstruments.com