KEITHLEY
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Software Release Notes and Installation Instructions

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Important information

The Clarius+ software application suite is the software for the Model 4200A-SCS Parametric Analyzer. Clarius+ software requires Microsoft® Windows® 10 to be installed on your Model 4200A-SCS Parametric Analyzer.

Introduction

This document provides supplemental information about the behavior of Clarius+ software. This information is grouped into the following categories:

Revision history   Lists the version of software, the document version, and the date of the software release.

New features and updates   Summary of each significant new feature and update included in Clarius+ software and the 4200A-SCS.

Problem fixes   Summary of each significant software or firmware bug fix in Clarius+ software and the 4200A-SCS.

Usage notes   Helpful information describing how to optimize the performance of Clarius+ software and the 4200A-SCS.

Installation instructions   Detailed instructions describing how to install all software components, firmware, and help files.

Version table   Lists the hardware and firmware versions for this release.

Revision history

This document is periodically updated and distributed with releases and service packs to provide the most up-to-date information. This revision history is included below.

Date	Software version	Document number	Version
6/2022	v1.11	077132616	16
3/2022	V1.10.1	077132615	15
10/2021	V1.10	077132614	14
3/2021	V1.9.1	077132613	13
12/2020	V1.9	077132612	12
6/10/2020	V1.8.1	077132611	11
4/23/2020	V1.8	077132610	10
10/14/2019	V1.7	077132609	09
5/3/2019	V1.6.1	077132608	08
2/28/2019	V1.6	077132607	07
6/8/2018	V1.5	077132606	06
2/23/2018	V1.4.1	077132605	05
11/30/2017	V1.4	077132604	04
5/8/2017	V1.3	077132603	03
3/24/2017	V1.2	077132602	02
10/31/2016	V1.1	077132601	01
9/1/2016	V1.0	077132600	00

New features and updates

Major new features in this release include updates to the Analyze Graph feature and support for the AFG31000.

Updates to the Analyze Graph feature (SCS-5170)

The Clarius Analyze Graph has been replaced with a modern, user-friendly graph that provides additional features and faster performance.

The graph is defined through a Graph Definition Menu that allows you to customize the axes, add text and legends, and add cursors. You can also add linear, exponential, log, tangent, or free linear line fits.

The x-axis and y-axis can be customized using fly-in controls from the edges of the graph.

Touchscreen interactivity of the graph has been improved. You can scale, pan, or autoscale the graph view.

For detailed information on the Graph feature, refer to the "Analyze data" section of the Learning Center and the *Model 4200A-SCS Clarius User's Manual*.

Support for the AFG31000 (SCS-6316)

This release adds support for use of the AFG31000 Arbitrary Function Generator with the 4200A-SCS.

A project and tests were added to the Clarius Library to demonstrate control of an AFG31000 from the 4200A-SCS through a USB port to simulate different devices with arbitrary waveforms. The project is `afg31000-config-output`. The new tests are `afg31000-config-1ch`, `afg31000-config-2ch`, `afg31000-segarb-1ch`, and `afg31000-segarb-2ch`.

A new user library was added. It uses the 4200A-SCS to communicate with an AFG31000 through a USB port to output arbitrary waveforms from an AFG31000. The new library is `AFG31000_examples_ulib`.

A new application note was also created. It provides detail on setting up and using the AFG31000 with the 4200A-SCS. The new application note is available from the Learning Center and tek.com. It is titled *USB Control of the AFG31000 Arbitrary Function Generator Using the 4200A-SCS Parameter Analyzer*, document number 1KW-73917-0.

Other features and updates

Issue number	**SCS-3375/AR60298**
Subsystem	Clarius – Analyze – Graph
Enhancement	When you select multiple runs for plotting, there is now a legend that uses color to correlate the curves with the run that produced the curve.
Issue number	**SCS-4093, SCS-6658**
Subsystem	Learning Center
Enhancement	Updated Self Test information, including the addition of detail on running Self Test on 4225-RPM modules.
Issue number	**SCS-5584**
Subsystem	Clarius (project export)
Enhancement	When exporting a project and the user does not have access to the destination directory, a warning is shown and the button is disabled.
Issue number	**SCS-6429/AR66779**
Subsystem	Clarius – Site and Subsite
Enhancement	Added support for copying a device stress configuration and pasting that configuration to other devices or sites.
Issue number	**SCS-6520**
Subsystem	Installer
Enhancement	The installer no longer offers to install NI-VISA 17.5 if a more recent release of NI-VISA is already installed.

Issue number	SCS-6558
Subsystem	Clarius – Analyze
Enhancement	The "Save Test Data As" dialog was updated to simplify usage and provide better feedback on errors.

Issue number	SCS-6597
Subsystem	Clarius – Analyze (Project view)
Enhancement	Added a sub-paging mechanism in the project Analyze view to improve performance when navigating very large datasets.

Issue number	SCS-6655
Subsystem	Installer
Enhancement	NI-VISA Runtime 17.5 or higher is now required on 4200A systems. It will be installed if needed.

Issue number	SCS-6713
Subsystem	4200A-SCS
Enhancement	To adjust screen brightness, you can use the Front Panel Control, available from the Windows notification area. This screen brightness control only applies to 4200A-SCS platform versions prior to 4200A-300-3. For versions 4200A-300-4 and later, use the Microsoft® Windows® brightness controls. To check the platform version, see the 4200A-SCS Properties in KCon. For additional display controls, you can use the Intel® HD Graphics Control Panel.

Issue number	SCS-6791
Subsystem	Learning Center
Enhancement	The following documents are no longer available in the Learning Center. They can be accessed at tek.com: • *Series 3400 Pulse Pattern Generators User's Manual* (document number 3400S-900-01) • *Model 590 C V Analyzer Instruction Manual* (document number 590-901-01) • *Model 595 Quasistatic C V Meter Instruction Manual* (document number 595-901-01)

Issue number	SCS-6793
Subsystem	Learning Center
Enhancement	Videos and PDFs included with the Learning Center have been optimized to reduce the installer download size and disk usage.

Issue number	SCS-6809
Subsystem	Clarius – Subsite Configuration
Enhancement	Added buttons for selecting previous and next entries in the Device list for subsite configuration.

Problem fixes

Issue number	**SCS-4415/AR62736**
Subsystem	Clarius – Analyze – Graph
Symptom	Date and time settings do not always save on Clarius Graph.
Resolution	This issue has been corrected.
Issue number	**SCS-5223**
Subsystem	Clarius – Configure
Symptom	Opening a test originally created for the 4200-CVU or 4210-CVU when the system configuration contains the 4215-CVU could have incorrect values for frequency parameters after auto adjustment is performed.
Resolution	This issue has been corrected.
Issue number	**SCS-6217**
Subsystem	Clarius – Analyze – Run History
Symptom	In some limited situations, it is possible to give the same name to two different runs in the Run History, even though runs must have unique names.
Resolution	This issue has been corrected.
Issue number	**SCS-6362**
Subsystem	KULT – VSCode Extension
Symptom	When putting a string into the input field, proper C syntax is to surround the variable in double quotes. However, if the user attempted to do this, their input was cleared from the box, but input into the test file.
Resolution	This issue has been corrected. Any input is now valid in the field. However, it is advised that the user be careful to not input invalid C syntax into the field, as the module would fail compilation.
Issue number	**SCS-6559/AR67076**
Subsystem	KULT and KULT Extension
Enhancement	Some commands used in 4200 UTMs (GetKiteSite, GetKiteCycle, GetKiteDevice, GetKiteSubsite, and GetKiteTest) produced warnings when compiled on the 4200A.
Resolution	This issue has been corrected.

Issue number	**SCS-6566/AR67077**
Subsystem	KULT
Symptom	User modules that contain the `ssmeasi` and `ssmeasv` commands fail to compile and generate messages such as "warning: implicit declaration of function 'ssmeasi' [-Wimplicit-function-declaration]" and linker errors such as "undefined reference to `ssmeasi'".   In addition, the `ssmeasi` and `ssmeasv` functions cannot be found in lptproto.h.
Resolution	This issue has been corrected.
Issue number	**SCS-6599**
Subsystem	Clarius – Site and Subsite
Symptom	Changing the site in the project tree reset the selected device in the subsite stress configuration to the first device in the list rather than staying on the presently selected device.
Resolution	This issue has been corrected.
Issue number	**SCS-6895**
Subsystem	Clarius – Configure (4215-CVU)
Symptom	Configuring the 4215-CVU frequency sweep test parameters using a start frequency higher than the stop frequency (sweep down) could cause incorrect values for step size and number of points.
Resolution	This issue has been corrected.

Known issues

Issue number	**SCS-6486**
Subsystem	Clarius
Symptom	It is difficult to move the line fit markers using the touchscreen.
Workaround	Use a mouse to move line fit markers.
Issue number	**SCS-6908**
Subsystem	4215-CVU
Symptom	Performing a frequency sweep with the start frequency higher than the stop frequency (sweep down) may calculate incorrect frequency points.
Workaround	None.
Issue number	**SCS-6936**
Subsystem	Clarius
Symptom	Monitoring of PMU multi-channel tests does not work.
Workaround	None.

Usage notes

Visual Studio Code Workspace Trust

As of May 2021, Visual Studio Code opens new file directories in Restricted Mode. Some Visual Studio Code features such as code execution and extensions are automatically disabled. Various features of the Clarius software (such as the KULT code extension) will not work unless you enable Workspace Trust for the applicable folders.

Please see the following link for more information on trusting workspaces, enabling code extensions, and other topics related to Restricted Mode:

https://code.visualstudio.com/docs/editor/workspace-trust

4200A-CVIV

Before using the Model 4200A-CVIV Multi-Switch, be sure to connect the SMUs using the 4200-PAs and 4200A-CVIV-SPT SMU Pass-Thru modules, and the CVU instrument cables to the 4200A-CVIV inputs. Make sure to close the Clarius application before opening KCon on the desktop. Then run the **Update Preamp, RPM, and CVIV Configuration** option in KCon. Include the action `cviv-configure` before a SMU or CVU test in the project tree to switch between I-V and C-V measurements.

4225-RPM

Before using the 4225-RPM Remote Amplifier Switch Module to switch between I-V, C-V, and Pulse ITMs, be sure to connect all instrument cables to the RPM inputs. Make sure to close the Clarius application before opening KCon on the desktop. Then run the **Update Preamp, RPM, and CVIV Configuration** option in KCon.

When using the 4225-RPM in UTMs, include the call in your user module to the LPT command `rpm_config()`. The `RPM_switch` user module in the `pmuulib` user library is deprecated. For more information, see the Help pane in Clarius.

4210-CVU or 4215-CVU

When choosing the Custom Cable Length in the CVU Connection Compensation dialog box of the Tools menu to perform open, short, and load simultaneously, you must run **Measure Custom Cable Length** first. Then enable **Open, Short, and Load CVU Compensation** within a test.

If you are performing Open, Short, and Load CVU Compensation when the CVU is connected to the CVIV, a best practice is to use the `cvu-cviv-comp-collect` action.

4200-SMU, 4201-SMU, 4210-SMU, or 4211-SMU

Under certain conditions, when running SMU current sweeps at very fast ramp rates, the SMU may report compliance unexpectedly. This may occur if the sweep ramps are too high or too fast.

The workarounds for this situation are:

- Use the `setmode` command when generating user modules to turn off the compliance indicator value. With this workaround, the reading is returned as 105% of the present range.
- Use smaller sweep and ramp rates (dv/dt or di/dt).
- Use fixed SMU ranges.

LPTLIB

If a voltage limit of greater than 20 V is needed from a SMU set to force zero current, a `measv` call should be used to set the SMU to autorange to a higher range or set a higher voltage range with `rangev`.

If a current limit of greater than 10 mA is needed from a SMU set to force zero volts, a `measi` call should be used to set the SMU to autorange to a higher range or set a higher current range with `rangei`.

KULT

If you make changes to or need to rebuild `ki82ulib`, please note that `ki82ulib` depends on `ki590ulib` and `winulib`. You must specify these dependencies in the Options > Library Dependencies menu in KULT before building `ki82ulib`. The Options > Build Library function will fail if the dependencies are not properly selected.

KXCI

In KXCI System Mode, in both KI4200A emulation and HP4145 emulation, the following default current measurement ranges exist:

- **Limited Auto – 1 nA:** The default current measurement range for 4200 SMUs with preamplifiers.
- **Limited Auto – 100 nA:** The default current measurement range for 4200 SMUs without preamplifiers.

If a different bottom range is needed, use the `RG` command to set the specified channel to a lower bottom range.

Example: `RG 1,1e-11`

This sets SMU1 (with preamplifier) to the Limited Auto – 10 pA range

Subsite Stress Mode

In Stress/Measure Mode, selecting the Leave Stress Conditions On checkbox maintains the stress voltage or current during the subsequent device testing. However, if the system configuration includes a matrix, then all outputs are turned off, regardless of the checkbox setting to prevent damaging matrix relays. Also, with a 4200A-CVIV Switch in the configuration, all outputs are turned off if any signals are routed through the 4200A-CVIV Switch, regardless of the checkbox setting. The stress signals can be left on if they are all directly connected outside of the CVIV Switch, but they are reset when a CVIV connection is made in the subsequent device testing to prevent damaging relays.

Microsoft® Windows® mapped network drive error

When installing Clarius⁺ on a personal computer, Microsoft policy settings can limit Clarius⁺ from accessing mapped network drives in its file windows.

Modifying the registry will fix this issue.

To modify the registry:

1. Run **regedit**.

2. Navigate to
   `HKEY_LOCAL_MACHINE/SOFTWARE/Microsoft/Windows/CurrentVersion/Policies/System`.

3. If one does not exist, create a new DWORD entry named `EnableLinkedConnections`.

4. Set the value to 1.

5. Restart the computer.

Computer installation, language packs

Clarius⁺ does not support additional languages in Microsoft Windows 10 other than the English (United States) base language. If you encounter errors with Clarius⁺ while a language pack is installed, follow Microsoft instructions for removing the language pack.

Installation instructions

These directions are provided as a reference if you need to reinstall Clarius⁺ software on your 4200A-SCS. All CVU Open, Short, and Load compensation constants must be re-acquired after the latest version is installed.

If you are installing Clarius⁺ and ACS on the same system, Clarius⁺ must be installed first.

STEP 1. Archive your user-modified user library data (optional)

Installing Clarius⁺ software reinstalls the `C:\4200\kiuser\usrlib`. If you made changes to the user library and do not want to lose these changes when this software is installed, copy these files to an alternate location before installation.

The easiest way to archive the user library is to copy the entire `C:\S4200\kiuser\usrlib` folder to a network drive or an archive area on the 4200A-SCS hard drive. Copy the files back after installation to restore them.

STEP 2. Install the 4200A-SCS Clarius⁺ Software Tools

You can download the Clarius⁺ software from the [tek.com](tek.com) website.

To download and install the Clarius⁺ software from the website:

1. Go to [tek.com](tek.com).

2. Select the **Support** link.

3. Select **Find Software, Manuals, FAQs by Model**.

4. In the Enter Model field, enter **4200A-SCS**.

5. Select **Go**.

6. Select **Software**.

7. Select the software version.

8. Select the software link that you want to download. Note that you will need to log in or register to continue.

9. Unzip the downloaded file.

10. Double-click the `setup.exe` file to install the software on your 4200A-SCS.

11. Follow the on-screen installation instructions. If a previous version of Clarius⁺ software is installed on your 4200A-SCS, you will be asked if you want to remove it. When asked, select **OK** to continue; selecting **No** will abort the installation. If a previous version of Clarius⁺ software is uninstalled, you must restart the system and then install the new Clarius⁺ software version.

12. After the installation is complete, select **Yes, I want to restart my computer now** to restart the 4200A-SCS before attempting to initialize or use the software tools.

STEP 3. Initialize each 4200A-SCS user account

Each user account on the 4200A-SCS must be properly initialized before attempting to run any of the Clarius⁺ software tools. Failure to initialize may cause unpredictable behavior.

From the Microsoft Windows login screen, type the user name and password of the account to be initialized. This must be done for each of the two default Keithley factory accounts, and for any additional accounts added by the system administrator. The two factory accounts are:

User name	Password
kiadmin	kiadmin1
kiuser	kiuser1

When Windows has completed startup, select **Start > Keithley Instruments > Initialize New User**. This initializes the current user.

Repeat steps one and two for both Keithley accounts and for any additional accounts added by the system administrator.

NOTE

The HTML5-based Learning Center is not supported in Internet Explorer. The installation will install Microsoft Edge Chromium, but you may need to change the default browser on user accounts that have the default set to Internet Explorer. You can use one of the following browsers: Microsoft Edge Chromium, Google Chrome, or Firefox.

STEP 4. Upgrade 42x0-SMU, 422x-PxU, 4225-RPM, 4225-RPM-LR, 4210-CVU and 4200A-CVIV firmware

Clarius software checks for compatible instrument firmware during startup and does not run if all instruments are not upgraded to compatible firmware versions.

To find the current hardware and firmware versions of your 4200A-SCS cards, use the KCon utility and select each card.

The firmware upgrade program automatically indicates the hardware that needs to be upgraded to the approved or latest firmware version.

The 4200A-SCS cards are organized by families of related models, as shown below.

***To upgrade the firmware of your 4200A-SCS cards:***

It is strongly recommended that you connect the 4200A-SCS to an uninterruptible power supply during the firmware upgrade process. If power is lost during the firmware upgrade, the instruments may no longer be functional and will require factory servicing.

1. Exit all Clarius⁺ software programs and any other Microsoft Windows programs.

2. From the Windows taskbar, select **Start**.

3. In the Keithley Instruments folder, select the **Firmware Upgrade** tool.

4. If your instrument needs to be upgraded, the upgrade button becomes visible and there is an indication in Status that an upgrade is required for an instrument, as shown below.

5. Select **Upgrade**.

The Firmware Upgrade Utility window below shows that the upgrade is not complete. The CVU1 requires upgrading.

The Firmware Upgrade Utility window
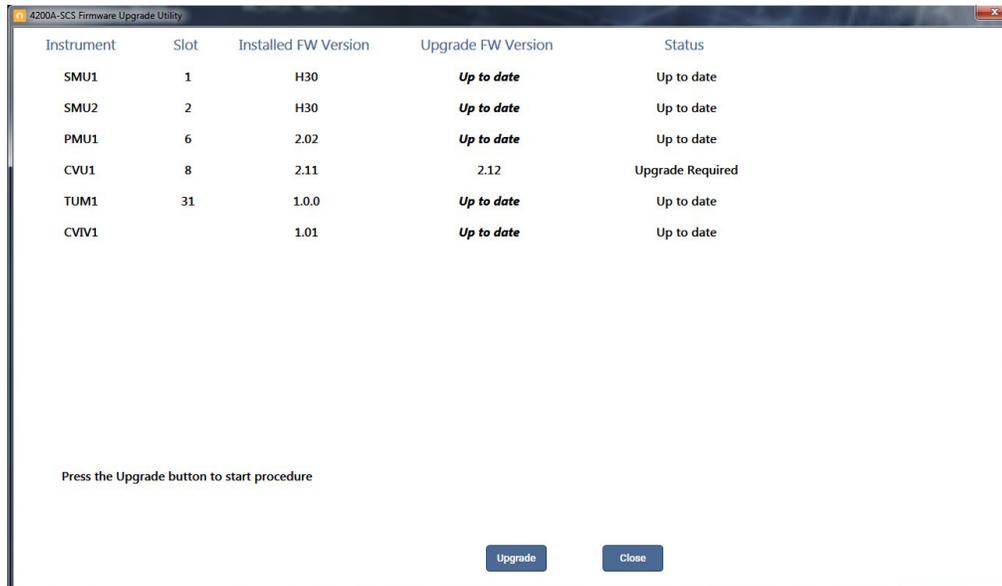
Version table

4200A-SCS instrument family	Hardware version from KCon	Firmware version
4201-SMU, 4211-SMU, 4200-SMU, 4210-SMU[1]	05,XXXXXXXX or 5,XXXXXXXX	H31
	06,XXXXXXXX or 6,XXXXXXXX	M31
	07,XXXXXXXX or 7,XXXXXXXX	R33
4200-PA	This product cannot be flash upgraded in the field	—
4210-CVU	ALL (3.0, 3.1, 4.0, and later)	2.15
4215-CVU	1.0 and later	2.16
4220-PGU, 4225-PMU[2]	1.0 and later	2.08
4225-RPM, 4225-RPM-LR	1.0 and later	2.00
4200A-CVIV[3]	1.0	1.04
4200A-TUM	1.0	1.00
	1.3	1.1.30

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[1] There are several different models of SMUs available in the 4200A-SCS: 4201-SMU or 4211-SMU (medium power) and 4210-SMU or 4211-SMU (high power); all use the same firmware file.

[2] The 4225-PMU and 4220-PGU share the same pulse and source board. The 4225-PMU adds measure capability through an additional hardware board but uses the same firmware file.

[3] The 4200A-CVIV firmware contains two files to upgrade. The firmware utility uses both files in the version folder.