KEITHLEY
A Tektronix Company

Clarius+ Version 1.7

Keithley Instruments
28775 Aurora Road
Cleveland, Ohio 44139
1-800-935-5595
http://www.tek.com/keithley

Software Release Notes & Installation Instructions

Important information

The 4200A-SCS Clarius+ software application suite is a release of the software for the 4200A-SCS. Clarius+ software requires **Microsoft® Windows® 10** to be installed on your 4200A-SCS Parameter Analyzer.

Introduction

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

Revision history	Lists the version of software, the document version, and the date of the software release.
New features / enhancements	Summary of each significant new feature included in Clarius+ software and the 4200A-SCS.
Problem fixes	Summary of each significant software/firmware bug fix in Clarius+ software and the 4200A-SCS.
Known problems	Description of each significant known problem and ways to work around it.
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.

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
10/14/2019	V1.7	0771326	09
5/3/2019	V1.6.1	0771326	08
2/28/2019	V1.6	0771326	07
6/8/2018	V1.5	0771326	06
2/23/2018	V1.4.1	0771326	05
11/30/2017	V1.4	0771326	04
5/8/2017	V1.3	0771326	03
3/24/2017	V1.2	0771326	02
10/31/2016	V1.1	0771326	01
9/1/2016	V1.0	0771326	00

New features/enhancements

Issue number	SCS-3933
Subsystem	KXCI
Enhancement	Introduced KXCI RD command to request real time readings. See the Reference Manual for details on its usage.
Issue number	SCS-3951 / AR 61330
Subsystem	Manuals
Enhancement	Update Cascade/Microtech Prober documentation.
Issue number	SCS-4033
Subsystem	Clarius
Enhancement	Added support for the new 4201-SMU and 4211-SMU instruments with higher setup and drive capacitance drive capability. See the datasheet for details.
Issue number	SCS-4421
Subsystem	Clarius
Enhancement	Clarius Subsite Cycling/Stressing features video added to the Learning Center.
Issue number	SCS-4423
Subsystem	Learning Center
Enhancement	Making van der Pauw Resistivity and Hall Voltage Measurements Using the 4200A-SCS Parameter Analyzer" Application Note added to the Learning Center.
Issue number	SCS-4424
Subsystem	Learning Center
Enhancement	Making Stable Low Current Measurements with High Test Connection Capacitance Using the 4201-SMU and 4211-SMU" Application Note added to the Learning Center.
Issue number	SCS-4429
Subsystem	Learning Center
Enhancement	Video highlighting the upgraded sheet functionality added to the Learning Center.
Issue number	SCS-4432
Subsystem	Manuals
Enhancement	Added documentation for the KXCI commands "*IDN?" and "*RST" to the Reference Manual.

Issue number	SCS-4436
Subsystem	KCon
Enhancement	Added 4220-PGU uncertainties and Units to 4200A cal report based on ISO 17025 standard requirements.
Issue number	SCS-4553
Subsystem	Learning Center
Enhancement	4201-SMU and 4211-SMU Help Video added to Learning Center.
Issue number	SCS-4582
Subsystem	Learning Center
Enhancement	4201-SMU and 4211-SMU Help Video added to Learning Center.

Problem fixes

Issue number	SCS-2335
Subsystem	LPT
Symptom	setfreq and sweepf may not force same frequencies. dsweepf (dual frequency sweep) will force wrong frequencies if the start frequency is greater than stop frequency.
Resolution	This issue has been corrected.
Issue number	SCS-4303
Subsystem	Manuals
Symptom	The Reference Manual is missing documentation on the LPT command pulse_float() and the KXCI commands PC and VF.
Resolution	This issue has been corrected.
Issue number	SCS-4365
Subsystem	Clarius
Symptom	In the PMU_SegArb_ExampleFull user module in the PMU_examples_ulib, two of the input parameters of the "Enter Values" GUI of the SegArb Config do not save but revert back to the default values. In particular, both the values changed in the Waveform Sequence List and the removal of the Seq2 tab do not Save.
Resolution	This issue has been corrected.

Issue number	SCS-4367
Subsystem	KULT
Symptom	The KULT C compiler may cause unexpected floating point comparison results compared to previous versions.
Resolution	This issue has been corrected.
Issue number	SCS-4373 / AR 62539
Subsystem	Clarius
Symptom	Cannot open projects with unusual Test/Device names (e.g. non-ASCII characters like ä, ö, ü, ß) cannot be opened.
Workaround	Only use ASCII characters in test/device names.
Resolution	This issue has been corrected.
Issue number	SCS-4379
Subsystem	KULT
Symptom	The vdpulib user library failed to rebuild using the rebuildkilibs.bat resulting in a linker error.
Resolution	This issue has been corrected.
Issue number	SCS-4384 / AR 59656
Subsystem	Clarius
Symptom	If you click on a test while subsite cycling test is running, the settings do not save for all runs. However, if you let the test finish running then click down to save, the settings do save.
Resolution	This issue has been corrected.
Issue number	SCS-4418
Subsystem	Clarius
Symptom	The reramSweep UTM was not using SMU current ranges below 100nA, even though they were being set. Also, help content for the reramSweep and reramEndurance UTMs was not complete and the delayTime parameter did not work with these UTMs when using SMUs.
Resolution	This issue has been corrected. Note, the SMU current ranges below 100nA are no longer available because RPMs should be attached when running the test.
Issue number	SCS-4419
Subsystem	Clarius
Symptom	When using a SMU with the reramSweep user module, the current is limited to 10mA when the compliance value is set to zero.
Workaround	Change the SMU Standby Range in KCon to the 100mA range.
Resolution	This issue has been corrected.

Issue number	SCS-4422
Subsystem	Manuals
Symptom	The table of " Large number reported readings and explanations" LPT values in Section 13 of the Reference Manual does not include information on the error reading 5.00E+22.
Resolution	This issue has been corrected.
Issue number	SCS-4458
Subsystem	KCon
Symptom	KCon System Scan will run excessively slow with specific SMU/PreAmp system configuration and will not find the SMU/PreAmp combo..
Resolution	This issue has been corrected.
Issue number	SCS-4460
Subsystem	Clarius
Symptom	PMU_SegARB_exampleB user module not saving Waveform setting.
Resolution	This issue has been corrected.
Issue number	SCS-4464
Subsystem	Clarius, LPT
Symptom	Clarius hangs after executing the LPT function kibdefdelete() in a UTM.
Resolution	This issue has been corrected.
Issue number	SCS-4469 / AR 63050
Subsystem	User Library
Symptom	After upgrading to Windows 10, the setTemp module in the LS336ulib user library was no longer working.
Resolution	This issue has been corrected.
Issue number	SCS-4484
Subsystem	Prober Driver, UTM.
Symptom	When running the PrSSMovNxt() user module with the the Cascade Microtech 12000 prober, the wrong site coordinates are shown in the Run Settings sheet.
Resolution	This issue has been corrected.
Issue number	SCS-4487
Subsystem	KULT
Symptom	KULT 1.6.1 may inject erroneous data for the default value or CHAR * argument types.
Resolution	This issue has been corrected.
Issue number	SCS-4494 / AR 62931
Subsystem	Clarius
Symptom	Clarius may crash while using Formulator.
Resolution	This issue has been corrected.

Issue number	SCS-4548
Subsystem	Manuals
Symptom	KXCI IT command settings documentation needs additional information.
Resolution	This issue has been corrected.
Issue number	SCS-4569
Subsystem	Clarius
Symptom	Clarius may crash when loading a subsite.
Resolution	This issue has been corrected.
Issue number	SCS-4573
Subsystem	Clarius
Symptom	Data disappears when you click away from analyze view on subsite projec.
Resolution	This issue has been corrected.
Issue number	SCS-4575
Subsystem	Clarius
Symptom	The provided hci-4-dut project has an empty Device field.
Resolution	This issue has been corrected.
Issue number	SCS-4634 / AR 63436
Subsystem	Clarius
Symptom	Clarius crashes when more than 40 devices are being used in a subsite.
Resolution	This issue has been corrected.

Known problems

Issue number	SCS-619
Subsystem	Clarius
Symptom	The Configure screen's All Parameter view does not include entries for the PMU's Load Line Effect Compensation and DUT Resistance options.
Workaround	Select Key Parameters pane on the Configure screen. In the right pane, select Terminal Settings, then select Advanced to open the PMU Advanced Terminal Settings dialog box, where you can enter PMU Load Line Effect Compensation and DUT Resistance values.
Issue number	SCS-3534
Subsystem	Clarius
Symptom	When copying a test from one subsite to another subsite, more rows of data may be copied than exist. The extra rows are copies of the last valid row.
Workaround	To keep this situation from occurring, set up the subsite and tests completely before collecting data. When creating a new collection of subsite tests copied from existing subsites, run from this new subsite or higher to generate a new, valid set of data.

Issue number	SCS-3574
Subsystem	Clarius+ applications, including Clarius, KCon, KXCI, KPulse, Message Console, Firmware Upgrade, and InitializeNewUser
Symptom	By default, User Account Control (UAC) notifications are disabled on the 4200A-SCS. This allows Clarius and the other Clarius+ applications noted above to make required system changes without prompting for increased privileges each time they are launched. It also allows third-party applications, including applications potentially categorized as malware, to make system changes without such prompts. You may wish to enable UAC notifications to provide an additional layer of protection when running third-party applications on the 4200A-SCS.
Workaround	You can enable UAC notifications from the User Account Control Settings in Windows. To access these settings, type `uac` in the Windows Search Bar and select **ENTER**. Raise the slider from the "Never notify" position to enable notifications. Note that the notifications will appear as prompts asking, "Do you want to allow this app to make changes to your device?" each time you launch the Clarius+ applications noted above.
Issue number	SCS-3959
Subsystem	System
Symptom	When installing Clarius+, if software dependencies are required they will be installed and may require a reboot. When prompted for a reboot, if No is chosen and the install is attempted again without a reboot, the installation will fail.
Workaround	Uninstall Clarius+, if necessary, and re-install, allowing reboots when requested.
Issue number	SCS-4321
Subsystem	Subsite cycling
Symptom	The number of devices that can be configured for stressing and cycling is limited to 40 due to memory limitations during execution. This is planned to be addressed in a future version of Clarius. For now, only the first 40 devices from the subsite project tree will be loaded into the subsite config pane. There is no limit on the number of devices that a single subsite can have otherwise.
Workaround	Create another subsite within the project with the overloaded subsite. Click and drag your devices to the new subsite.

Usage notes

4200A-CVIV

Before using the 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. Then run the “Update Preamp, RPM, and CVIV Configuration” option in KCon. Make sure to close the Clarius application before opening KCon on the desktop. 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, and run the “Update Preamp, RPM, and CVIV Configuration” option in KCon. Make sure to close the Clarius application before opening KCon on the desktop.

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

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, it is recommended that you use the `cvu-cviv-comp-collect` action.

42x0 SMUs

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:

a. Use the `setmode` command when generating user modules to turn off the compliance indicator value.

   With this workaround, the reading will be returned as 105% of the present range.

b. Use smaller sweep and ramp rates (dv/dt or di/dt).

c. Use fixed SMU ranges.

Keithley Default User Libraries

The User Libraries in Clarius+ software were compiled with Visual Studio C++. If your 4200A-SCS has a different version of Visual Studio installed (see version list below) and you wish to change or debug (using the debug task feature described in Section 8 of the *4200A-SCS Reference Manual*) any of the user libraries listed below (see Default User Libraries table), you will need to recompile all modules in that user library. You will then rebuild the user library. If you do not recompile all user modules, you will receive the error "LINK: fatal error LNK1207: incompatible PDB format in <`your usrlib`>; delete and rebuild." Follow this message or use the provided batch file, `reBuildKILibs.bat`, for this purpose. `reBuildKILibs.bat` will compile all modules and build all user libraries listed in the Default User Libraries section below. `reBuildKILibs.bat` is in `C:\S4200\sys\bin`. Earlier versions of Visual Studio may install and operate properly but are not supported.

Versions of Visual Studio supported by Clarius+ software:

- Microsoft Visual Studio 2017 C++
- Microsoft Visual Studio 2015 C++
- Microsoft Visual Studio 2013 C++

LPTLIB

1. 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 auto range to a higher range or set a higher voltage range with `rangev`.
2. 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 auto range 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 – 1nA" is the default current measurement range for 4200 SMUs with preamplifiers.

"Limited Auto – 100nA" is the default current measurement range for 4200 SMUs without preamplifiers.

NOTE: 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 will set SMU1 (with preamplifier) to the "Limited Auto - 10pA" range.

Subsite Stress Mode

In "Stress/Measure Mode," the "Leave Stress Conditions On" checkbox will maintain the stress voltage or current during the subsequent device testing. However, if the system configuration includes a matrix, then all outputs will be turned off, regardless of the checkbox, to prevent damaging matrix relays. Likewise, with a 4200A-CVIV Switch in the configuration, all outputs will be 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 will be reset when a CVIV connection is made in the subsequent device testing to prevent damaging relays.

Windows® mapped network drive error

When installing Clarius+ on a PC, 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 PC.

PC Installation, Help Pane PDF Link errors

When installing Clarius+ on a PC, PDF links may not open in Clarius from the help pane if you have Acrobat Reader installed and protected mode enabled.

Modifying Internet Explorer settings will fix this issue.

To modify the Internet Explorer settings:

1. Open Internet explorer.
2. Select Internet Settings.
3. On the general tab, find the Startup section, and change "Start with tabs from the last session" to "Start with home page."

PC Installation, language packs

Clarius does not support additional languages in Windows® 10 besides 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 re-install Clarius+ software on your 4200A-SCS.

NOTE: All CVU Open, Short, and Load compensation constants must be re-acquired after V1.2 is installed.

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

CAUTION: Installing Clarius+ software will reinstall 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

If you are installing Clarius+ software using the supplied USB drive, follow these instructions:

1. Insert the **4200A-SCS Clarius+ software** USB flash drive into a 4200A-SCS USB port.
2. Double-click the **setup.exe** file on the USB drive to install the software on your 4200A-SCS.
3. 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.
4. After the installation is complete, remove the USB flash drive and select **Yes, I want to restart my computer now** to restart the 4200A-SCS before attempting to initialize or use the software tools.

If you are downloading and installing the Clarius+ software from www.tek.com, follow these instructions:

1. Go to www.tek.com
2. Click the **DOWNLOADS** link.
3. From the DOWNLOAD TYPE list, choose **Software**.
4. For MODEL OR KEYWORD, type **4200A**, and click **SEARCH**.
5. Click the software link that you want to download (note that you will need to log in or register to continue).
6. Once you are logged in, click the **Download File** button and choose where to download your file (rename the file as needed).
7. Unzip the downloaded file.
8. Double-click the **setup.exe** file to install the software on your 4200A-SCS.
9. 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.
10. 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

NOTE: 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 Windows® login screen, type the user name and password of the account to be initialized. This will need to 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 will initialize the user who is currently logged in.

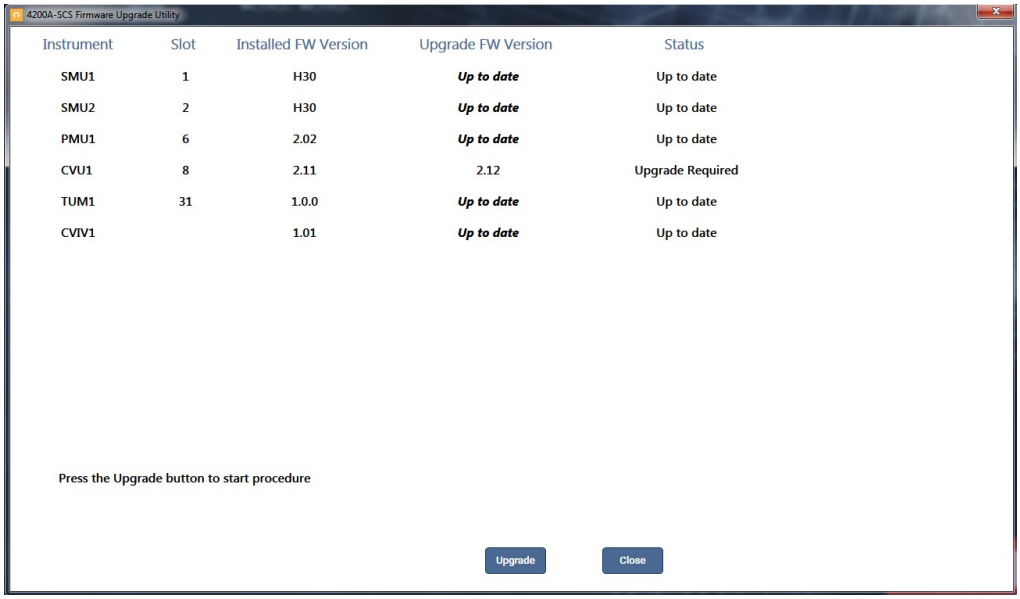
Repeat steps 1 and 2 for both Keithley accounts and for any additional accounts added by the system administrator.

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

- **NOTE:** Clarius software checks for compatible instrument firmware during startup and will not run if all instruments have not been upgraded to compatible firmware versions.
- **NOTE:** To find the current hardware and firmware versions of your 4200A-SCS cards, use the KCon utility and select each card.
- **NOTE:** The firmware upgrade program will automatically indicate the hardware that needs upgraded to the approved or latest firmware version.
- **NOTE:** 4200A-SCS cards are organized by families of related models as shown in the table below. To upgrade the firmware of your 4200A-SCS cards:

CAUTION: 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 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 a instrument as shown below.
5. Select **Upgrade**.
6. The upgrade is not complete, and CVU1 requires upgrading.



The Firmware Upgrade Utility window

Version Table

4200A-SCS instrument family	Hardware version from KCon	Firmware version
4200-SMU/4210-SMU[1]	05,XXXXXXXX or 5,XXXXXXXX	H31
	06,XXXXXXXX or 6,XXXXXXXX	M31
4200-PA	<this product cannot be flash upgraded in the field>	–
4210-CVU	ALL (3.0, 3.1, 4.0 and later)	2.14
4220-PGU/4225-PMU[2]	1.0 and later	2.05
4225-RPM/4225-RPM-LR	1.0 and later	2.00
4200A-CVIV[3]	1.0	1.04
4200A-TUM	1.0	1.0.0

[1] There are two different models of SMUs available in the 4200A-SCS, 4200-SMU (medium power) and 4210-SMU (high power); both models 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 will use both files in the version folder.