

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 the initial release of the software for the 4200A-SCS. Clarius+ software requires Microsoft Windows 7 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 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
9/1/2016	V1.0	0771326	00
10/31/2016	V1.1	0771326	01

Problem fixes

PR number	59982
Subsystem	Clarius
Symptom	While running certain tests, the graph axis may autoscale incorrectly.
Resolution	This issue has been corrected.
PR number	60036
Subsystem	Clarius
Symptom	When using Subsite Cycling, graphs for individual tests may not be visible due to incorrect graph settings.
Resolution	This issue has been corrected.
PR number	60041
Subsystem	Clarius
Symptom	<p>For the factory User Module "pram_pulse_ilimit" in the PMU_PCRAM_ulib User Library, as well as any newly created User Module that uses a data input array parameter, where the array size parameter value is specified, Clarius may wrongly interpret the array size parameter for such a User Module when creating a new test from that User Module. This results in the array size parameter being set to an incorrect value after creating a test within the User Module.</p> <p>For the factory User Module "pram_pulse_ilimit" in the PMU_PCRAM_ulib User Library, test parameters become jumbled and corrupted when re-selecting the test in Clarius after having viewed a different test.</p>
Resolution	This issue has been corrected.

PR number	60083
Subsystem	Clarius
Symptom	Opening several documents in the Help pane can cause a system crash.
Work-around for V1.0 only	<p>If you are using Clarius+ V1.0, this problem can be solved by enabling the Windows 7 Virtual Memory feature following the procedure below:</p> <ol style="list-style-type: none">1. Turn on the 4200A-SCS.2. Click Start.3. Right-click Computer on the right side of the Start menu and select Properties.4. Click Advanced system settings.5. In the System Properties Window, click the Advanced tab.6. In the Performance section, click Settings.7. In the Performance Options window, click the Advanced tab.8. Click Change.9. In the Virtual Memory window, select the checkbox labeled "Automatically manage paging file size for all drives."10. Click OK on all of the popup windows and close the Control Panel window.11. In the Microsoft Windows popup, click Restart Now.12. Repeat steps 2 through 7 (make sure that you do not click the Change button), to verify that the "Total paging file size for all drives" is no longer 0 MB. It should be around 3285 MB. Do not restart the 4200A-SCS this time.
Resolution	Note that this issue has been corrected since the work-around procedure is performed at the factory for all systems with Clarius+ V1.1, or later.
PR number	60109
Subsystem	Clarius
Symptom	The CVIV self-test may generate a false failure.
Resolution	This issue has been corrected.
PR number	60134
Subsystem	Clarius
Symptom	The CVU Confidence Check Short Test may generate a false failure.
Resolution	This issue has been corrected.

Known problems

PR Number	59184
Subsystem	4225-PMU
Symptom	In Segment Arb UTMs using multiple 4225-PMU cards, PMUs other than PMU1 may not output pulses in subsequent loop iterations.
Work-around	Call pg2_init() for all PMUs before each loop iteration.
PR Number	59560
Subsystem	Clarius
Symptom	In the Clarius subsite Stress Properties pane, in the Parameter Properties/Degradation Targets section, changes to the target checkboxes for the output values selected in tests will not cause a "Save" prompt to appear when navigating away from this screen.
Work-around	Save before navigating away from the screen.
PR number	59729
Subsystem	Clarius
Symptom	Touchscreen gestures are not supported on: <ol style="list-style-type: none">1. Subsite graph.2. Logarithmic axis of test graph.
Work-around	Use the mouse for these operations.
PR number	59736
Subsystem	Clarius
Symptom	Tool tips for UTM value entries are not available.
Work-around	Not available
PR number	59769
Subsystem	Clarius
Symptom	Occasionally, stopping a test that uses the <i>VLowFreqCV</i> user library, while the test is executing, may cause an error condition that requires a hardware reset.
Work-around	If this occurs, run "resethw" from the Windows command prompt to reset the system hardware and software.
PR number	60025
Subsystem	Clarius
Symptom	Stopping the test while executing may cause Clarius to remain in a running state.
Work-around	Click the Windows Start menu and type "resethw." Make sure all instruments are selected, as well as the "End of Clarius+ processes" option. Click Reset.

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 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. Include the action `cviv-configure` before a SMU or CVU test in the project tree to switch between I-V and C-V measurements. See Section 7 of the *4200A-SCS Reference Manual* and Section 6 of the *4200A-CVIV Multi-Switch User’s Manual* for details.

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/load simultaneously, you must run custom cable length first, and 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 rare 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 work-arounds for this situation are:

- a) Use the `setmode` command when generating user modules to turn off the compliance indicator value.
With this work-around, 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 and 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.

reBuildKILib.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 2015 C++
- Microsoft Visual Studio 2013 C++

LPTLIB

1. If a voltage limit of greater than 20 V is needed from an 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 CVIV Switch in the configuration, **all** outputs will be turned off **if any signals are routed through the CVIV Switch**, regardless of the checkbox. 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, once again to prevent damaging relays.

Installation instructions

NOTE: These directions are provided as a reference in case you need to re-install Clarius+ software on your 4200A-SCS.

STEP 1. Archive your previous Default Project, Test, and Device Data (OPTIONAL)

CAUTION: Installing Clarius+ software will reinstall all sample and default Clarius projects, devices, tests, default user libraries, and prober drivers. If you have made changes to these components and do not want to lose these changes when this software is installed, copy these files to an alternate location before installation. To archive these components before installation, follow the steps listed after the tables below.

The following components will be upgraded when Clarius+ software is installed.

NOTE: Any tests, devices, projects, and user libraries not specified in the lists below will remain UNCHANGED by this installation process.

Default Clarius projects - Located in C:\S4200\kiuser\Projects

[xx] Indicates the number of tests in each project.

default [20]

Sample projects - Located in C:\S4200\sys\factory\library\projects

[xx] Indicates the number of tests in each project.

*Indicates New Project or updated with new version.

\demo

default [20]

\capacitor

cap-iv-cv-matrix [4]

cap measurements [2]

cvu-highv [5]

cvu-moscap [3]

ivcvswitch [10]

lifetime [7]

moscap-lifetime [3]

moscap-mobile-ion [7]

qbd [3]

r-c-circuit-vlf-cv [2]

simcv [7]

stvs [7]

vlf-cap-cv [4]

\diode

diode-project [6]

\material

four-pt-probe [2]

vdp-resistivity [4]

\memory

ferroelectric nvm examples [4]

flashdisturb-nand [6]

flashendurance-nand [6]

flash-nand [8]

floating-gate-nvm-examples [7]

phase-change-nvm-examples [8]

pmu-flash-nand [9]

resistive-nvm-examples [7]

\misc

ivswitch [17]

lake-shore-temp-controller [10]

lowcurrent [4]

probesites [15]

probesubsites [15]

\nano-tech

cntfet-characterization [5]

nanodevices [11]

\pulse

pmu-dut-examples [9]

\pvc

solarcell [13]

\reliability

en-const-i [3]

\transistor

bjt [3]

chargepumping [8]

chargetrapping-pmu [1]

cvu-bjt [3]

cvu-bjt-cviv [9]

hci-1-dut [8]

hci-1-dut [40]

hci-pulse [9]

jfet-iv-tests [2]

moscap-vlf-cv [3]

mosfet [11]

mosfet-cviv [8]

mosfet-vlf-cv [3]

nbt1-1-dut [6]

qscv [1]

ufsp [1]

vds-id-pulse-smu [3]

Sample device folders - Located in C:\S4200\sys\factory\library\devices

capacitor – all	generic – all	resistor – all
diode - all	nano-tech – all	transistor - all
echem- all	pv-cell – all	

Sample tests - Located in C:\S4200\sys\factory\library\tests

capacitor – all	memory – all	pulse – all	transistor – all
diode – all	misc – all	pv-cell - all	
materials – all	nano-tech – all	resistor– all	

Default User Libraries - Located in C:\S4200\kiuser\usrlib

[xx] Indicates the number of user modules in each user library.

*Indicates New Project or updated with new version.

Libraries marked no source code are reserved and cannot be modified.

AVMControl [1]	HP4294ulib [6]	parlib [11]
BeepLib [5]	HP8110ulib [3]	PMU_examples_ulib [8]
chargepumping [8]	ki82ulib [8]	PMU_PCRAM_ulib [3]
cvivulib [2]	KI590ulib [8]	pmuulib [1]
cvuCompulib [1]	KI595ulib [2]	QSCVulib [1]
DLCP [1]	ki340xulib [3]	RPM_llimit_Control [no source code]
flashulib [3]	KI42xxulib [1]	SystemUtil [no source code]
hivcvulib [2]	LS336ulib [4]	utilities_ulib [1]
Hotchuck_Temtronics3010B [1]	Matrixulib [1]	vlfcvulib [no source code]
Hotchuck_Triotek [1]	nvm [17]	VLowFreqCV [7]
HP4284ulib [2]	OVPControl [1]	Winulib [7]
		wlrlib [3]

Default Prober Drivers - Located in C:\S4200\kiuser\usrlib

[xx] Indicates the number of user modules in each user library.

*Indicates New Project or updated with new version.

Libraries marked no source code are reserved and cannot be modified.

prbcc12k [no source code]	prbmanl [no source code]
prbcom [no source code]	prbmm40 [no source code]
prbfake [no source code]	prbpa200 [no source code]
PRBGEN [4]	prbcm500 [no source code]

Archive your previous Default Project, Test, and Device Data (OPTIONAL)

The easiest way to archive these components is to copy the entire C:\S4200\kiuser folder to a network drive or archive area on the 4200A-SCS hard drive.

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 in order 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 Clarius+ software from www.tek.com, follow these instructions:

1. Go to www.tek.com
2. Click the **DOWNLOADS** link.
3. On the DOWNLOAD TYPE drop-down 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, if desired).
7. Unzip the downloaded file.
8. Double-click the **setup.exe** file in order 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.

1. 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	no password required; password field left blank

2. When Windows has completed startup, select **Start > Keithley Instruments > Initialize New User**. This will initialize the user who is currently logged on.
3. Repeat steps 1 and 2 for both Keithley accounts and for any additional accounts added by the system administrator.

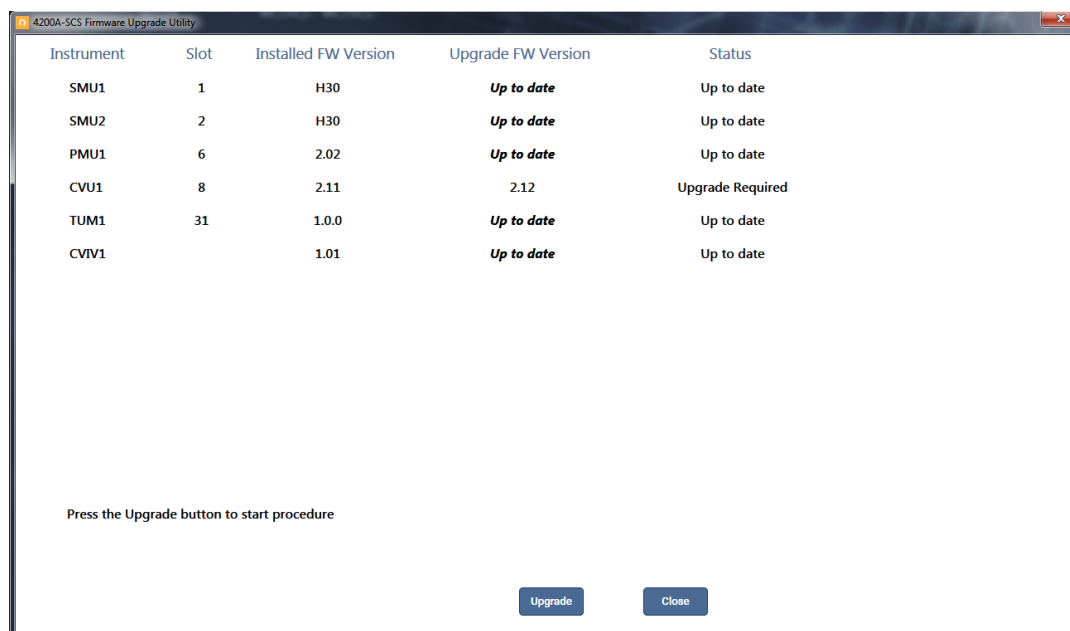
STEP 4. Upgrade 42x0-SMU, 422x-PxU, 4225-RPM, 4225-RPM-LR, 4210-CVU and 4200A-CVIV Firmware

- **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 on a particular instrument as shown below:
5. Select **Upgrade**.



Version Table

4200A-SCS instrument family	Hardware version from KCon	Firmware version
4200-SMU/4210-SMU ¹	05,XXXXXXXX or 5,XXXXXXXX	4H30
	06,XXXXXXXX or 6,XXXXXXXX	M30
4200-PA	<this product cannot be flash upgraded in the field>	<n/a>
4210-CVU	ALL (3.0, 3.1, 4.0 and later)	2.12
4220-PGU/4225-PMU ²	1.0 and later	2.03
4225-RPM/4225-RPM-LR	1.0 and later	2.00
4200A-CVIV ³	1.0	1.02
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.

Installation and firmware upgrade are now complete.