Clarius+ Version 1.3

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Software Release Notes & Installation Instructions

Important information

The 4200A-SCS Clarius+ software application suite is a release of the software for the 4200A-SCS.

Introduction

This document provides supplemental information regarding the behavior of Clarius+ software. This information includes:

4200A-SCS installation	Information on installing all software components, firmware, and help files on the 4200A-SCS.
PC installation	Information on installing software components and help files on a personal computer.
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 the latest version of the Clarius+ software and the 4200A-SCS.
Problem fixes	Summary of each significant software or firmware bug fix in the latest version of the 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.

4200A-SCS installation

You can upgrade or re-install Clarius+ on your 4200A-SCS.

NOTE: If you are installing Clarius+ on a personal computer, see PC installation.

NOTE: If you are installing Clarius+ on a 4200A-SCS, all CVU Open, Short, and Load compensation constants must be re-acquired after V1.3 is installed.

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

CAUTION: Installing Clarius+ software will reinstall the `C:\S4200\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 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 USB port.
2. Double-click the **setup.exe** file on the USB drive.
3. Follow the on-screen installation instructions.

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

1. Unzip the downloaded file.
2. Double-click the **setup.exe** file to install the software on your 4200A-SCS.
3. Follow the on-screen installation instructions.

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 needs 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

When Windows has completed startup, select **Start** > **Keithley Instruments** > **Initialize New User**. This will initialize the user who is currently logged on.

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 present hardware and firmware versions of your 4200A-SCS instruments, use the KCon utility and select each instrument.
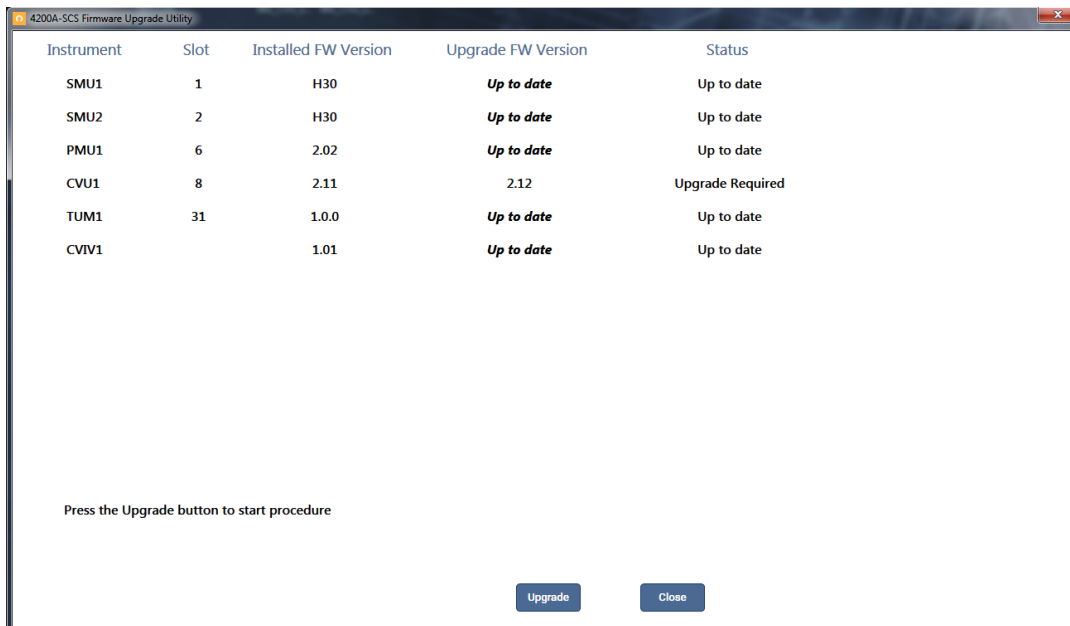
NOTE: The firmware upgrade program will automatically indicate the hardware that needs upgraded to the approved or latest firmware version.

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 instruments:

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**.

4200A-SCS Firmware Upgrade Utility				
Instrument	**Slot**	**Installed FW Version**	**Upgrade FW Version**	**Status**
SMU1	1	H30	*Up to date*	Up to date
SMU2	2	H30	*Up to date*	Up to date
PMU1	6	2.02	*Up to date*	Up to date
CVU1	8	2.11	2.12	Upgrade Required
TUM1	31	1.0.0	*Up to date*	Up to date
CVIV1		1.01	*Up to date*	Up to date

Press the Upgrade button to start procedure

[Upgrade]   [Close]

PC installation

You can install Clarius+ on a personal computer.

With a PC installation, you can:

- Develop projects and tests that can be transferred to the 4200A-SCS.
- Import and manipulate data that was collected on a 4200A-SCS.
- Mimic your 4200A-SCS hardware configuration in KCon.
- Create SegArb and FullArb definitions in KPulse.
- Review content in the Learning Center.

When operated on a personal computer, the following limitations apply:

- You cannot make measurements.
- You cannot run tests.
- KXCI, Firmware Upgrade, Initialize New User, and KULT are not supported.

CAUTION: If you are installing Clarius+ on a personal computer, you cannot have any components of 4200 KTEI installed on the personal computer. You must remove them before installation. You cannot run KTEI and Clarius+ on the same computer.

NOTE: During installation, Clarius+ will install the ClariusWeb web server to support the Learning Center and help pane. If you uninstall Clarius+, you must uninstall the ClariusWeb server separately. In Uninstall or Change a Program, select "Turn Windows features on or off." Clear **Internet Information Services** and select **OK**.

Personal computer requirements

The personal computer must meet the following minimum requirements:

- Memory: Minimum 8 GB RAM
- Display resolutions:
  - 1920 x 1080 (recommended)
  - 1680 x 1050
  - 1600 x 900
  - 1440 x 900
  - 1366 x 768
- Free hard drive space: 10 GB (SSD recommended)
- Operating system – one of the following:
  - Windows 7 (32 bit or 64 bit)
  - Windows 10 (64 bit)

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

CAUTION: Installing Clarius+ software will reinstall the `C:\S4200\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 archive area on the hard drive of the personal computer. Copy the files back after installation to restore them.

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

You must be logged in as an administrator to install 4200A-SCS Clarius⁺ software.

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

1. Insert the **4200A-SCS Clarius⁺ software** USB flash drive into a USB port.
2. Double-click the **setup.exe** file on the USB drive.
3. Follow the on-screen installation instructions.

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

1. Unzip the downloaded file.
2. Double-click the **setup.exe** file to install the software on your 4200A-SCS.
3. Follow the on-screen installation instructions.

STEP 3. How to add and remove instruments in KCon

To use the Clarius⁺ software, you will need to adjust the virtual instruments using the Keithley Configuration application (KCon). You can set them up to match your 4200A-SCS system or to experiment with other system configurations.
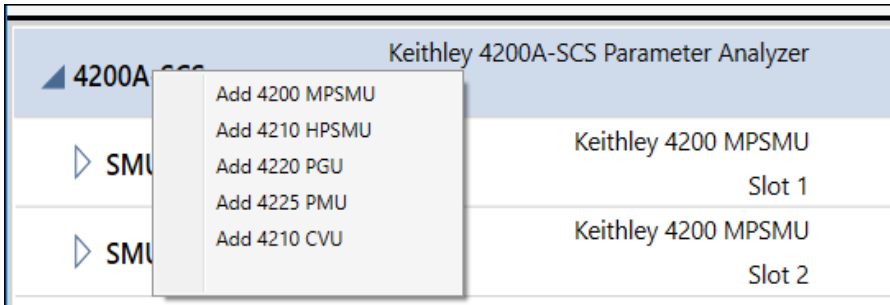
To add instruments using KCon:

1. Open **KCon**.
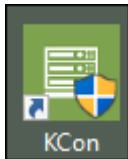
The Keithley Configuration Utility PC Edition opens.

2. To remove an instrument, right-click the instrument and select the remove option for the instrument.

3. To add an instrument, right-click 4200A-SCS and select the instrument you want to add.

4. Select **Save**.

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
5/15/2017	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

SCS number	SCS-192
Subsystem	**Clarius⁺ PC Installation**
Enhancement	Clarius⁺ can now be installed on personal computer in same manner as installing on a 4200A system. See PC installation in these Release Notes for limitations and computer requirements.

SCS number	SCS-367
Subsystem	**Clarius**
Enhancement	Clarius saves the application view (including the Select, Configure, or Analyze screen selection and related tab selections) and the project configuration. This view is restored when the project is subsequently opened.

Problem fixes

SCS number	SCS-339
Subsystem	Clarius
Symptom	Clarius hangs on startup if the CVU cables on the 4200A-CVIV Switch are misconfigured.
Resolution	This issue has been corrected.

SCS number	SCS-346/AR55969
Subsystem	Datasheet
Symptom	The cabling information in the Supplied Accessories section of the 4200A-SCS datasheet was confusing.
Resolution	This issue has been corrected.

SCS number	SCS-462
Subsystem	Clarius
Symptom	The Clarius subsite stress mode allows users to enter out of range values and saves them in the project.
Resolution	This issue has been corrected.

SCS number	SCS-662
Subsystem	Clarius
Symptom	Clarius would crash if the configuration file (.kcf) doesn't match the hardware or is missing. This is an unusual situation.
Resolution	This issue has been corrected.

SCS number	SCS-3177/AR56215
Subsystem	Clarius
Symptom	In the SMU Test Settings view, the Auto A/D Aperture checkbox may disappear when moving between ITMs.
Resolution	This issue has been corrected.

SCS number	SCS-3188/SCS-3192/AR55967/AR55753
Subsystem	4225-RPM
Symptom	RPM detection of SMU connections may not detect a connected SMU.
Resolution	This issue has been corrected.

SCS number	SCS-3196
Subsystem	Clarius
Symptom	Certain corrupted subsite data files can cause Clarius to crash.
Resolution	This issue has been corrected.

SCS number	SCS-3197
Subsystem	Clarius
Symptom	Certain corrupted project data files can cause Clarius to crash.
Resolution	This issue has been corrected.

Known problems

SCS number	**SCS-24**
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.
SCS 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.
Work-around	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.

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, and 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:

1. 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.
2. Use smaller sweep and ramp rates (dv/dt or di/dt).
3. 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. `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 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 "Leave Stress Conditions On" setting, 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 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, once again to prevent damaging relays.

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>	<n/a>
4210-CVU	ALL (3.0, 3.1, 4.0 and later)	2.12
4220-PGU/4225-PMU[2]	1.0 and later	2.05
4225-RPM/4225-RPM-LR	1.0 and later	2.00
4200A-CVIV[3]	1.0	1.03
4200A-TUM	1.0	1.0.0

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[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.