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Software Release Notes & Installation Instructions

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 / 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
6/10/2020	V1.8.1	0771326	11
4/23/2020	V1.8	0771326	10
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 and enhancements

Issue number	SCS-5215
Subsystem	Clarius
Enhancement	A Data Export Tool that exports mass data files in <code>.xls</code> format has been added to the tools dialog. Usage instructions.

Problem fixes

Issue number	SCS-5092
Subsystem	4220-PGU, 4225-PMU
Symptom	After powering up the 4200-SCS or 4200A-SCS with a 4220-PGU or 4225-PMU instrument card installed, intermittently the instrument card will not respond to control software.
Workaround	A known workaround to this problem is to run the <code>resethw.exe</code> tool that is available on the 4200-SCS or 4200A-SCS system hard drive. Launch this tool and press reset after the system powers up. Software control of the instrument card will now function properly.
Resolution	This issue has been corrected with 422x-PxU Firmware v2.07.
Issue number	SCS-5204
Subsystem	Clarius
Symptom	SMU Power On/Off sequences did not work properly: <ul style="list-style-type: none"> • Subsite Power on/off sequence: The power Off/On terminals of a device might be transposed. Clicking off and then on the subsite could automatically change the order of the sequence. • ITM power on/off sequence: The order is always the default order. You can manually change the order, and though it appears to save within the test, it always turns on the SMUs in the order of the default. When you click Off/On the ITM, the settings reverse.
Resolution	This issue has been corrected.
Issue number	SCS-5221
Subsystem	KCon CVU Self Test
Symptom	The CVU Self Test reports a failure for the DC VBias Step Up Output Test (300.x and 302.x) after a system power cycle.
Resolution	This issue has been corrected.
Issue number	SCS-5222
Subsystem	KCon CVU Self Test
Symptom	Performing CVU Self Tests in repetition causes the Digital FPGA Phase Lock Loop Test (101.1) to fail.
Resolution	This issue has been corrected.

Known problems

Issue number	SCS-619
Subsystem	Clarius
Symptom	The Configure screen All Parameter view does not include entries for the PMU Load Line Effect Compensation and DUT Resistance options.
Workaround	Select the 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. 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 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-5020
Subsystem	Clarius – User Libraries
Symptom	Depending on the test settings and the device under test (DUT), the <code>multiSMU_SweepV</code> user module in the <code>hivcvulib</code> user library may not control SMU outputs in a way that is optimal for the DUT.
Workaround	The user module may need to be modified to control the differential output voltage across the device terminals.

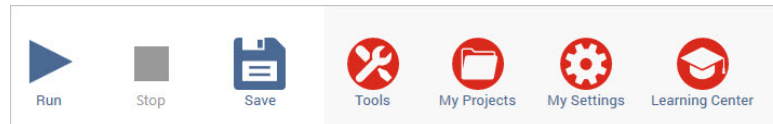
Usage notes

Data Export Tool

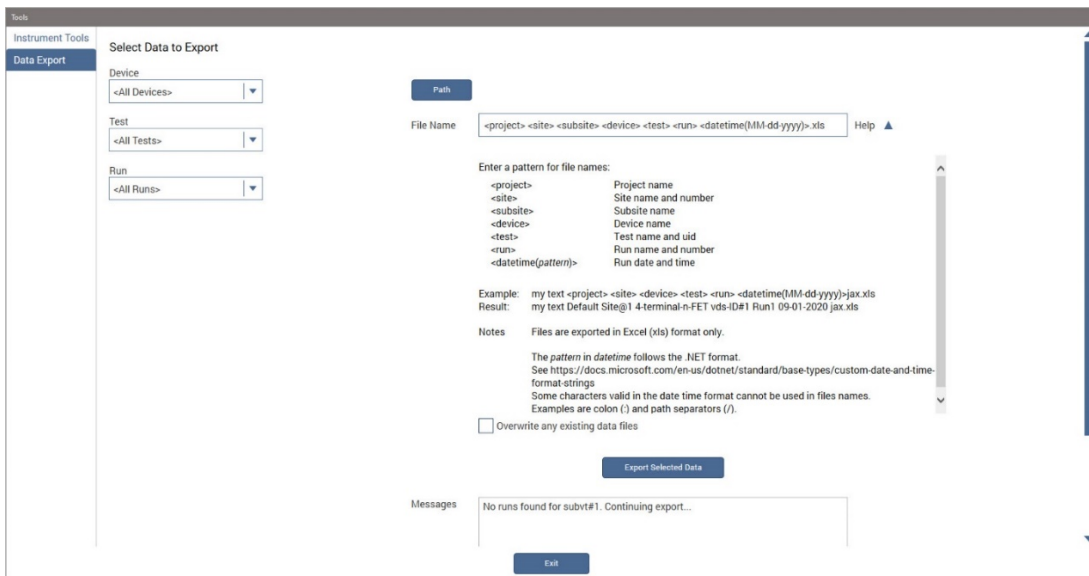
The Data Export Tool is used for the mass export of data from Clarius. The tool is accessed from the **Tools** menu on the right side of the top pane in the main window. Files are exported in Microsoft® Excel .xls format only.

To use the Data Export Tool:

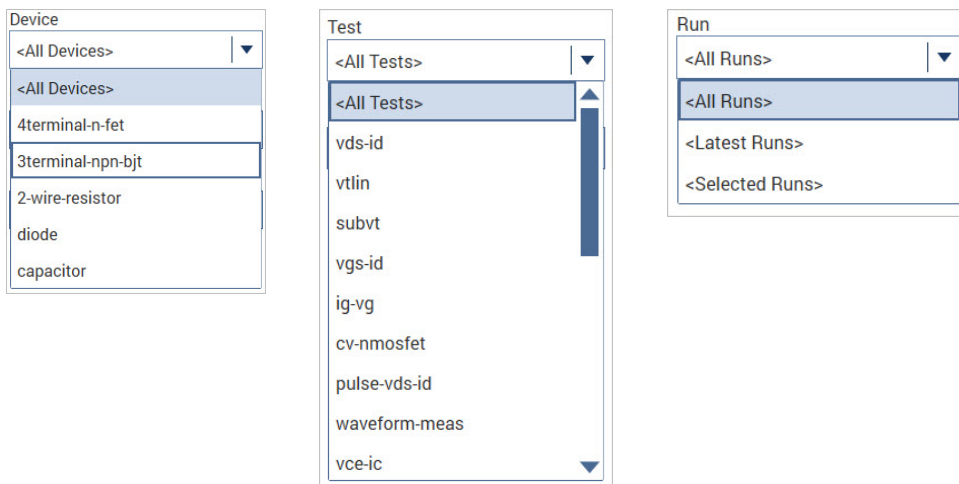
1. Select **Tools** to open a window with the Data Export option.



2. Select **Data Export**.



3. Select the site or subsite (if applicable), then the device, test, and runs you want included in the export.



4. Specify the path where you want to save the file.
5. Name the file. The tool provides an optional file-naming template that can be modified with custom text. To use the template, populate each of the text fields in the file-name field using the following guide:
 - <project> is the project name

- `<site>` is the site name and number
 - `<subsite>` is the subsite name
 - `<device>` is the device name you can select in the drop-down list.
 - `<test>` is the test name and `uid` you can select in the drop-down list.
 - `<run>` is the run name and number you can select in the drop-down list.
 - `<datetime (pattern)>` is the run date and time using the .NET format. For detail information on the datetime format, see <https://docs.microsoft.com/en-us/dotnet/standard/base-types/custom-date-and-time-format-strings>
6. Overwrite a previously saved export or save to a new file name.
 7. Select **Export Selected Data**. A data export progress bar is displayed.

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 UTM, 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.

421x-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.

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:

- 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 `ki82uilib`, please note that `ki82uilib` depends on `ki590uilib` and `winuilib`. You must specify these dependencies in the Options > Library Dependencies menu in KULT before building `ki82uilib`. 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:** The default current measurement range for 4200 SMUs with preamplifiers.
- **Limited Auto – 100nA:** 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 - 10pA range

Subsite Stress Mode

In Stress/Measure Mode, selecting 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, help pane PDF link errors

When installing Clarius+ on a personal computer, PDF links may not open in Clarius from the help pane if you have Adobe® 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**.

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 V1.2 is installed.

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

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. Select the **DOWNLOADS** link.
3. From the DOWNLOAD TYPE list, select **Software**.
4. For MODEL OR KEYWORD, type `4200A` and select **SEARCH**.
5. Select 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, select 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

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.

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

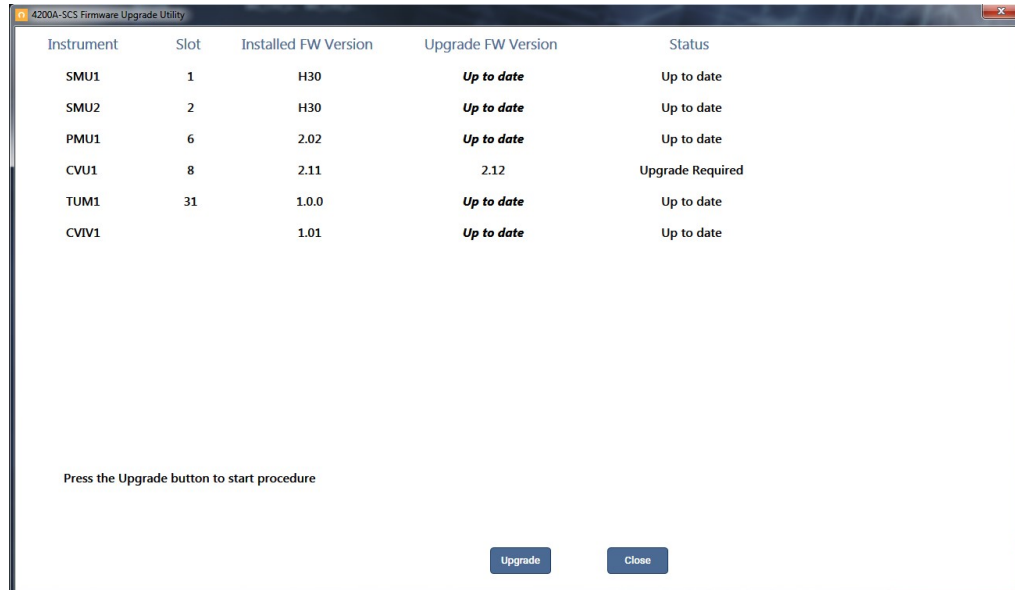
- Clarius software checks for compatible instrument firmware during startup and does not run if all instruments are not upgraded to compatible firmware versions.
- To find the current hardware and firmware versions of your 4200A-SCS cards, use the KCon utility and select each card.
- The firmware upgrade program automatically indicates the hardware that needs to be upgraded to the approved or latest firmware version.
- 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
420x-SMU/421x-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	–
421x-CVU	ALL (3.0, 3.1, 4.0, and later)	2.15
4220-PGU/4225-PMU ²	1.0 and later	2.07
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 several different models of SMUs available in the 4200A-SCS: 420x-SMU (medium power) and 421x-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.