

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
2/23/2018	V1.4.1	0771326	05
11/30/2017	V1.4	0771326	04
5/08/2017	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

Clarius+ Version 1.4.1

Problem fixes

Issue number	SCS-3743
Subsystem	KCon
Symptom	The "Update Preamp, RPM, and CVIV Configuration" feature in KCON did not enforce the required pairing of SMUs to their calibrated Preamp partners, or PMUs to their calibrated RPM partners.
Resolution	This issue has been corrected.
Issue number	SCS-3744
Subsystem	Installation
Symptom	Errors reported during some PC installations due to incompatibilities with previously installed Microsoft Visual C++ Redistributables.
Resolution	This issue has been corrected.
Issue number	SCS-3746
Subsystem	Clarius
Symptom	Clarius crashes if user opens Formulator for a UTM while in Configuration view.
Resolution	This issue has been corrected.
Issue number	SCS-3751
Subsystem	Clarius, KXCI
Symptom	Under certain conditions, the CVU may return NaN (not a number) readings. Specifically, this could occur the first time a CVU was used from Clarius after a calibration, or whenever there were multiple CVUs installed in a system.
Resolution	This issue has been corrected.

Known problems

Issue 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 will not cause a Save prompt to appear when navigating away from this screen.
Workaround	Save before navigating away from the screen.
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 actually exist. The extra rows are copies of the last valid row.
Workaround	To keep this situation from occurring, setup the subsite and tests completely before collecting data. If 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 hit 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.

Clarius+ Version 1.4

New features/enhancements

Issue number	SCS-1008 / AR54854 / SCS-3322 / SCS-3445
Subsystem	4200A-CVIV
Enhancement	The 4200A-CVIV has been enhanced to include support for the Ground Unit (GNDU) on any output channel. A Ground Unit Sense connection has been added to the CVIV for low-impedance / high-current tests. See the manual for details.
Issue number	SCS-3288 / AR54056 / SCS-3479 / SCS-3532 / SCS-3547
Subsystem	Clarius
Enhancement	PMU current offset correction functionality has been added to Clarius. See the manuals for details.
Issue number	SCS-3299
Subsystem	Clarius
Enhancement	Added "4200A-CVIV switching modes" link in the Clarius+ Help Pane for the cviv-configure and cvu-cviv-comp-collect actions.
Issue number	SCS-3302
Subsystem	Clarius
Enhancement	Added connection diagrams to the help information in both the CVU Compensation User Library (cvucompulib) and the CVIV User Library (cvivulib).
Issue number	SCS-3319
Subsystem	Service
Enhancement	Field installable SMUs and SMU/PAs are now available to add or replace SMUs. These distinct SMUs can be installed at your facility and will maintain their specifications over the standard one-year calibration cycle.
Issue number	SCS-3320 / SCS-593 / SCS-3486
Subsystem	System
Enhancement	Clarius+ V1.4 requires Windows® 10.
Issue number	SCS-3321 / SCS-3451
Subsystem	4200A-CVIV
Enhancement	The 4200A-CVIV has been enhanced to include bias tee capability. See the manuals for details.
Issue number	SCS-3327
Subsystem	Clarius
Enhancement	Added organic TFT and Application Note.
Issue number	SCS-3353
Subsystem	Clarius
Enhancement	Added new organic TFT device to the device library.
Issue number	SCS-3372
Subsystem	4200A-CVIV
Enhancement	The 4200A-CVIV power supply switcher frequency has been changed to minimize potential noise sources.

Issue number	SCS-3386
Subsystem	Clarius
Enhancement	Added "Organics" filter for test, device, and project libraries.
Issue number	SCS-3464
Subsystem	Clarius
Enhancement	Deleting a site now allows for the site to either be deleted or dissolved (if there is only one subsite beneath the site).
Issue number	SCS-3516
Subsystem	Clarius
Enhancement	Added video for "Making CV Measurements in Equilibrium."
Issue number	SCS-3582
Subsystem	Clarius
Enhancement	Added 2D FET device to the device library.
Issue number	SCS-3591
Subsystem	Clarius
Enhancement	Added High Voltage C-V Tests Using 4200A-CVIV Bias Tee Project (cviv-bias-highv) to the Project Library.

Problem fixes

Issue number	SCS-44
Subsystem	Clarius
Symptom	ACS installed on a 4200A-SCS causes a blue screen system crash when closing ACS.
Resolution	This issue has been corrected.
Issue number	SCS-3247/AR56302
Subsystem	Manuals
Symptom	The formula for interface trap capacitance CIT and density DIT are incorrect in the Reference Manual.
Resolution	This issue has been corrected.
Issue number	SCS-3262
Subsystem	Clarius
Symptom	Formulas created in the formulator may appear twice in the data sheet.
Resolution	This issue has been corrected.
Issue number	SCS-3263
Subsystem	Clarius
Symptom	Formulas deleted in the formulator may still appear in the data sheet.
Resolution	This issue has been corrected.

Issue number	SCS-3266/AR56720
Subsystem	Clarius
Symptom	Clarius crashes while using graph Data Variables dialog in Analyze View.
Resolution	This issue has been corrected.
Issue number	SCS-3267/AR56720
Subsystem	Clarius
Symptom	Clarius graph cursors may disappear while changing Run History selections in Analyze View.
Resolution	This issue has been corrected.
Issue number	SCS-3268/AR56720
Subsystem	Clarius
Symptom	Some of the IV curves in graph disappeared while changing Run History selections in Analyze View.
Resolution	This issue has been corrected.
Issue number	SCS-3269 / AR56720
Subsystem	Clarius
Symptom	Graph Cursors Info box jumping to graph right bottom corner after closing the Cursor dialog in Analyze View.
Resolution	This issue has been corrected.
Issue number	SCS-3283
Subsystem	Datasheet
Symptom	The 4200A-SCS datasheet incorrectly specified two meter preamp cables instead of the three meter cables provided.
Resolution	This issue has been corrected.
Issue number	SCS-3285
Subsystem	KCON
Symptom	KCON cal/verify may crash if the calibration date for an instrument is corrupted or missing.
Resolution	This issue has been corrected.
Issue number	SCS-3293
Subsystem	Clarius
Symptom	Clicking around in the Clarius project tree while subsite stressing is underway can cause Clarius to lag.
Resolution	This issue has been corrected.
Issue number	SCS-3296 / AR57283
Subsystem	Clarius
Symptom	A parameter set in KULT with a data type of L_ARRAY_T will be improperly recognized if the value exceeds 1000.
Resolution	This issue has been corrected.

Issue number	SCS-3298
Subsystem	4200A-CVIV
Symptom	A pop-up message should be provided if an invalid CVIV configuration is requested.
Resolution	This issue has been corrected.
Issue number	SCS-3300
Subsystem	KCon
Symptom	There is no notification when an error occurs during a scan/update in KCON.
Resolution	This issue has been corrected.
Issue number	SCS-3345
Subsystem	Clarius
Symptom	The checkbox states may be lost when importing a project created in 1.4 or later in earlier versions of Clarius.
Workaround	Recheck the desired nodes in the machine running version 1.3.
Resolution	Tests in Clarius use two different <code>ini</code> files to store data. One stores information for all linked tests, and the other is specific to the test instance as shown in the project tree. Prior to Clarius 1.3, the checked and expanded states were stored in the shared configuration file. This data has been moved to the node-specific file in Clarius 1.4.
Issue number	SCS-3356
Subsystem	Clarius
Symptom	If you created a test under the 3terminal-generic device and added it to the library, you will not be able to add this test to the 3 terminal-generic device in Clarius 1.4. The issue is that the test incorrectly assumes a 4-terminal device instead of a 3-terminal device is being used.
Workaround	Locate your test under <code>C:\S4200\kiuser\library\tests</code> . Locate and open both the <code>kta</code> and <code>ktp</code> files associated with the test. The file name will include the name of your test (Example: <code>MyTest.kta</code> , <code>MyTest#1.ktp</code>) Locate the terminal setting: <pre>[Terminals] Number=4</pre> Change <code>Number=4</code> to <code>Number=3</code> .
Resolution	This issue has been corrected.
Issue number	SCS-3357
Subsystem	Clarius
Symptom	The current implementation of Clarius does not enforce matching the number of device terminals when copying linked ITMs.
Resolution	This issue has been corrected.
Issue number	SCS-3358
Subsystem	Clarius
Symptom	The paste option in the context menu of the project tree should be disabled when an operation is invalid.
Resolution	This issue has been corrected.

Issue number	SCS-3368
Subsystem	Clarius, KULT
Symptom	The RPM_ILimit_Control user library was not visible in Clarius and KULT.
Workaround	Delete <code>RPM_ILimit_Control_visibility</code> file in C:\s4200\kiuser\usrlib\RPM_ILimit_Control\help directory.
Resolution	This issue has been corrected.
Issue number	SCS-3391
Subsystem	Clarius
Symptom	Deleting a site in the tree hides it, but keeps its children. You can create a project by adding a test and device first. Then, you can add a site and subsite. There is no undo feature in Clarius. Hiding the site was to allow the user to get back to a state where the site and subsite is hidden. This behavior causes confusion.
Workaround	The old workaround was to delete each item under the site directly.
Resolution	This issue has been corrected. Deleting a site will now delete its children.
Issue number	SCS-3443 / AR60377
Subsystem	KCon
Symptom	The 4225-PMU calibration report has incorrect specifications for the 40 V / 800 mA range.
Workaround	Due to an additional guard band in the calibration pass / fail status, previously calibrated units did not falsely report failing units as passing.
Resolution	This issue has been corrected. The calibration software has been updated to correct the specifications in generated calibration reports. Note that a calibration is required to generate a corrected report.
Issue number	SCS-3573
Subsystem	Clarius
Symptom	Load Run History configuration operation fails to load formulas.
Resolution	This issue has been corrected.
Issue number	SCS-3578/AR60563
Subsystem	KULT
Symptom	Under some conditions, installing the 4200-COMPILER fails to enable the compiler in KULT.
Resolution	This issue has been corrected.
Issue number	SCS-3579
Subsystem	Release notes
Symptom	Instructions need to be in the Release Notes for using Windows mapped network drives with Clarius+ on a PC.
Resolution	The issue has been corrected. See the "Windows mapped network drive error" section of the Release Notes.

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. 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. 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 `ki82u1ib`, please note that `ki82u1ib` depends on `ki590u1ib` and `winu1ib`. You must specify these dependencies in the Options > Library Dependencies menu in KULT before building `ki82u1ib`. 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.

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 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 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 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.

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.

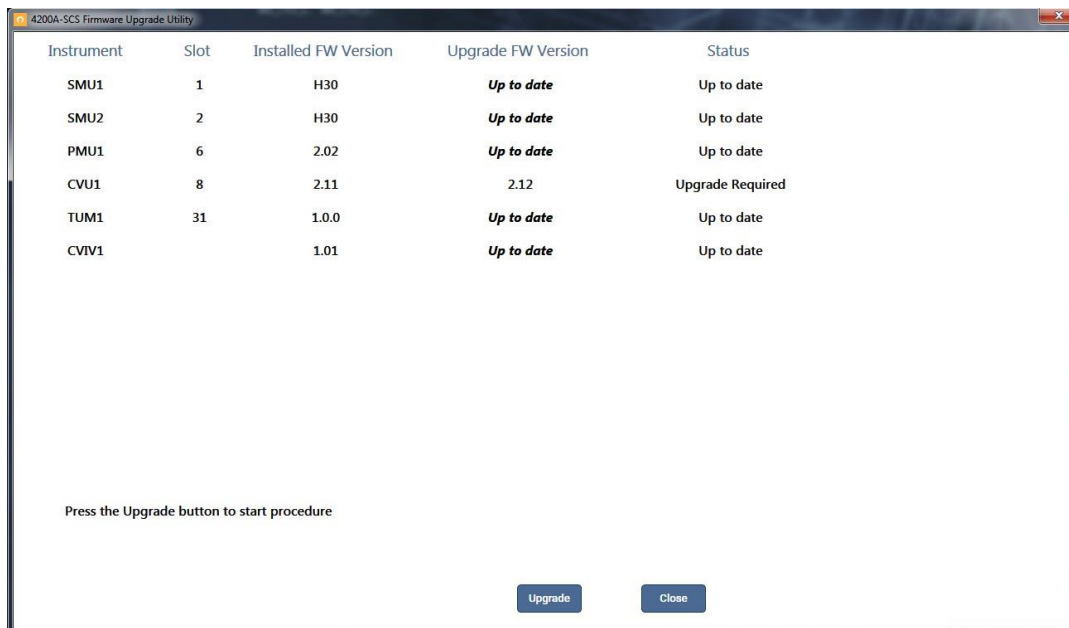
Repeat steps 1 and 2 for both Keithley accounts and for any additional accounts added by the system administrator.

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 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	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)	2.13
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.

Installation and firmware upgrade are now complete.