pCLAMP™ Electrophysiology Data Acquisition and Analysis Software

Version 10.4.2

Software Release Notes

July 2014

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Introduction

pCLAMP is the data acquisition and analysis suite from the Axon Instruments Conventional Electrophysiology product line of Molecular Devices. Designed for a variety of experiments, pCLAMP 10.4.2 is the latest version that has become the standard for electrophysiological experimentation and analysis. The flexibility that pCLAMP offers allows researchers to adapt it to many uses outside its traditional applications in electrophysiology.

The pCLAMP 10.4.2 suite consists of:
- Clampex, software for data acquisition and production of stimulus waveforms.
- Clampfit, software for data analysis.
- AxoScope, software for background chart recording.
- MiniDigi, a two-channel digitizer.

Clampex is a versatile and powerful software tool for acquiring digitized data of all types. While excellent for the acquisition of patch-clamp data, it is not limited to measuring voltage- or current-clamp responses. Clampex can be used to measure any physical parameter that can be linearly converted into a voltage. For example, you can monitor and acquire end-plate currents, measure the fluorescence signal from a photomultiplier tube, measure pressure from a strain gauge, or acquire any other combination of analog signals.

Clampfit is powerful data analysis software with a wide variety of statistics, analyses, transforms and layout tools for electrophysiological data.

Together, AxoScope software and the MiniDigi digitizer provide the functionality traditionally performed by a separate chart recorder, for example, for concurrent background recording.

The following topics are included in this chapter:
- Computer System Requirements on page 6
- Software Installation on page 7
- Resetting Program Defaults on page 8
- Printing on page 8
- Obtaining Technical Support on page 8
Computer System Requirements

pCLAMP Software Version 10.4.2 can be installed on a computer with the following system specifications.

Table 1-1: Computer system requirements.

<table>
<thead>
<tr>
<th>Minimum System Requirements</th>
<th>Recommended System Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC with 2 GHz Pentium class CPU&lt;sup&gt;a&lt;/sup&gt;</td>
<td>PC with 2 GHz (or faster) Pentium class CPU&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Windows XP Pro (32-bit)</td>
<td>Windows 7 Pro (32- and 64-bit)</td>
</tr>
<tr>
<td>1.2 GB RAM</td>
<td>4 GB RAM or higher</td>
</tr>
<tr>
<td>CD-ROM drive (for installation)</td>
<td>CD-ROM drive (for installation)</td>
</tr>
<tr>
<td>1024 X 768 display system for Clampfit</td>
<td>1024 X 768 display or higher</td>
</tr>
<tr>
<td>800 X 600 display system for Clampex</td>
<td></td>
</tr>
<tr>
<td>1 USB 1 port (for security key dongle)</td>
<td>High-speed built-in USB 2.0 ports</td>
</tr>
<tr>
<td>1 USB 2.0 port (for Digidata 1440A or 1550)</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup>Multiple processor systems are not supported.

Software Protection Key

A software protection “key”, commonly known as a “dongle”, is provided with Clampex. The USB key is a small device that plugs into the computer’s USB port.

The key is required to configure Clampex to control the digitizer. If the key is not installed, Clampex runs in Demo mode only, restricting you to simulated data.
Software Installation

Prior to loading the pCLAMP CD, you should exit all other Windows programs.

Windows XP/7

Clampex 10.4.2 runs under Windows XP, and Windows 7 (32- and 64-bit), for the Pro, Enterprise and Ultimate editions. The Home edition is not supported. The pCLAMP Setup program automatically detects which operating system is running and loads the correct files.

**Note:** A Windows 7 (32-bit or 64-bit) operating system is recommended.

Automatic CD Loading

When the pCLAMP CD is inserted into the CD-ROM drive, it automatically loads and displays the Setup program. This process may take several seconds to complete.

If you prefer to manually start the pCLAMP Setup program, use the Windows Explorer to go to the CD-ROM drive, or alternate location, and then double-click on the Setup icon.

Installing pCLAMP—Standard Installation

The following procedure explains how to install the pCLAMP suite.

1. Run the Setup pCLAMP program from the CD ROM, or alternate location.

2. In the Choose Destination dialog box, you can change the destination drive and directory where pCLAMP is installed.

   The amount of hard disk space required for this installation and the amount of space available on the hard disk are displayed. The default Molecular Devices Program Folder is created and program icons are added to it. You can rename the Program Folder or select one of the existing folders. Setup will then copy the pCLAMP files to the computer.

3. For Clampex to run properly, you may need to restart the computer. Before restarting, if used, remove the pCLAMP CD from the drive.
**Uninstalling pCLAMP**

To uninstall pCLAMP:

1. Go to Windows **Start > All Programs > Molecular Devices > pCLAMP 10.4**.
2. Select **Uninstall pCLAMP 10.4**.

**File Locations**

User-related files, such as data and parameter files, are stored in their own folders in `\Documents and Settings\[user name]\My Documents\pCLAMP\...`

System-related files, such as for the Lab Bench, System Lab Book, and user-defined telegraphs, are stored in the folder `\Documents and Settings\All Users\Application Data\Molecular Devices\pCLAMP\`. Program application files are stored by default in the folder `\Program Files\Molecular Devices\pCLAMP 10.4`.

**Resetting Program Defaults**

The **Start > All Programs > Molecular Devices > pCLAMP 10.4** folder contains the utility **Reset to Program Defaults**, which resets pCLAMP settings back to their default values. This is useful when you feel that you have diverged from the normal setup to a point beyond your control, and you would like to return to the factory defaults. Note that settings for other programs may be displayed in the list of registry items—select the item(s) relevant to your situation.

**Printing**

pCLAMP supports all printers and plotters that have been installed through the Microsoft Windows operating system.

**Obtaining Technical Support**

Molecular Devices is a leading worldwide manufacturer and distributor of analytical instrumentation. We are committed to the quality of our products and to fully supporting our customers with the highest possible level of technical service.

Our support web site, [http://www.moleculardevices.com/Support.html](http://www.moleculardevices.com/Support.html), has a link to the Knowledge base with technical notes, software upgrades, and other resources. If you do not find the answers you are
seeking, follow the links to the Technical Support Service Request Form to send an email message to a pool of technical support representatives. You can contact your local representative or contact Molecular Devices Technical Support by telephone at 800-635-5577 (U.S. only) or +1 408-747-1700. In Europe call +44 (0) 118 944 8000.

When you contact Technical Support, have the following information ready:

- A description of the problem including when it happened and what the system was doing when it happened.
- Screen captures of any error messages displayed.
- A description of any changes made to the system recently, such as updates, patches, or configuration changes.
- Your contact information.
- The full 4-digit software version number, see Help > About.
- The model of the Digidata digitizer you are using.
pCLAMP™ Software Version 10.4.2
Software Release Notes

Introduction

The pCLAMP™ Electrophysiology Data Acquisition and Analysis Software Version 10.4.2 update is a minor release. The following is a summary of the changes incorporated in this update as compared to version 10.4.1, the last general release of the pCLAMP Software.

• Issues Addressed

Issues Addressed

**Digidata 1550 Analog Input Offset Calculation Differs Between pCLAMP Software v. 10.4.1 and v. 10.4.0**

Tracking ID: 4630

pCLAMP Software version 10.4.1 includes a firmware update that incorrectly applies the factory-calibration to the offset parameters for the analog input. In some cases this causes the measurements of small signals to be less accurate than specified.

Resolution:
Fixed.

Impact of fix:
This fix has no impact on current workflow.
Introduction

The pCLAMP™ Electrophysiology Data Acquisition and Analysis Software Version 10.4.1 update is a minor release. The following is a summary of the changes incorporated in this update as compared to version 10.4.0, the last general release of the pCLAMP Software.

- Modified
- Issues Addressed

Modified

In all Acquisition Modes, except Gap-free, in the Trigger tab of the Edit Protocol dialog, when the Trigger source is set to Digitizer START Input, the Timeout (ms) field now displays. Use it to set the maximum time the system polls for an external START trigger before it checks for user-intervention, such as clicking Stop, and responds to the intervention or resumes polling. Set this polling duration longer than your trigger interval.

Issues Addressed

Manual Adjust Baseline Greater than the Allowable Clampfit Limit Causes Crash

Tracking ID: 99

In Clampfit, manually adjusting the baseline beyond the allowable limit of 100 causes a software crash.

Resolution:
Fixed.

Impact of fix:
This fix has no impact on current workflow.
Space Bar Trigger Incorrectly Sets Intersweep Holding on Analog Out Channel 0

Tracking ID: 2284
With certain protocols, Analog Out #0 incorrectly goes to a saturating negative value between triggers.

Resolution:
Fixed.

Impact of fix:
This fix has no impact on current workflow.

Data Appear in Incorrect Channels

Tracking ID: 2296
Once in several trials, the data is displayed to be coming from an incorrect channel and the timing looks shifted.

Resolution:
The software now validates protocols and verifies the number of acquisition channels. Protocols that use an external START trigger may require the activation of additional acquisition channels in order to run. The number of analog input channels acquired must be 1 or a multiple of 2, for example, 2, 4, 8, or for Digitdata 1440A, 16 channels.

Impact of fix:
Existing protocol files may need modifying.

Invalid Protocol Timings Cause the Software to Crash

Tracking ID: 3209
A protocol that contains wrong timing causes the software to crash.

Resolution:
Invalid User list values for Epoch Duration in protocols are now prevented from being saved.

Impact of fix:
Existing protocol files may need modifying.
Older Clampex Data Re-saved in Clampfit 10.3 Cannot be Concatenated

Tracking ID: 3293
Data files acquired in Clampex 9.2 as ABF 1.83 and then re-saved in Clampfit 10.3.1.4 as ABF 2.00 cannot be concatenated.

Resolution:
The concatenation problem has been fixed.

Impact of fix:
This fix has no impact on current workflow.

Incorrect Unit for Protocol Mode/Rate Throughput

Tracking ID: 3355
The unit that is used to display data throughput is incorrect. It should be samples per second.

Resolution:
Samples per second is now correctly labelled.

Impact of fix:
This fix has no impact on current workflow.

P/N Leak Subtraction Does Not Completely Compensate Signals During Step Transitions

Tracking ID: 3964
Using P/N leak Subtraction, extra spikes are detected in the data.

Resolution:
Fixed.

Impact of fix:
This fix has no impact on current workflow.
EEPROM CRC Error on a Digitizer is not Recognized by the Software

Tracking ID: 4060
If there is an EEPROM CRC error on the digitizer, the software is not aware of the error.

Resolution:
The software now detects the digitizer EEPROM CRC error and displays an error message.

Impact of fix:
This fix has no impact on current workflow.

Waveform Preview Does not Display Digital Channels Correctly

Tracking ID: 4074
When the protocols are updated, the Waveform Preview dialog does not display digital channels correctly.

Resolution:
Fixed.

Impact of fix:
This fix has no impact on current workflow.

Membrane Test Freezes the Software

Tracking ID: 4106
After running the Membrane Test for 15 to 30 minutes, when you use the MultiClamp 700 Commander to switch between voltage-clamp (VC) and current-clamp (IC) modes, Clampex freezes for several minutes.

Resolution:
Fixed.

Impact of fix:
This fix has no impact on current workflow.
Create Stimulus Waveform in Clampfit Shows Disabled Digital Outputs

Tracking ID: 4126
In Clampfit, in the Create Stimulus Waveform Signal dialog the Digital Output channels 0 thru 4 are disabled and unselectable.

Resolution:
All of the Digital Output channels are now available for selection.

Impact of fix:
This fix has no impact on current workflow.

6 Micro Second Delay at the Start of Acquisition

Tracking ID: 4134
There is 6 micro second delay at the start of an acquisition.

Resolution:
The 6 micro second delay has been removed and the data is being acquired correctly.

Impact of fix:
This fix has no impact on current workflow.
ABF 1.8 File Conversion Compatibility Issue

Tracking ID: 4224
Data files acquired in pCLAMP 10.4.0 as ABF 2.03 and re-saved as ABF 1.8 files cannot be opened in earlier versions of pCLAMP.
**Resolution:**
Fixed.
**Impact of fix:**
This fix has no impact on current workflow.

Episodic Demo Does not Work in pCLAMP 10.4

Tracking ID: 4243
When trying to run the Episodic Demo a blank screen is displayed.
**Resolution:**
Fixed.
**Impact of fix:**
This fix has no impact on current workflow.

Some pCLAMP 9 Protocols Do Not Work Properly in pCLAMP 10.4

Tracking ID: 4278
Certain pCLAMP 9.x protocols used in Clampex 10.4 cause warning messages to display that say two or more signals are allocated to the same physical channel, or that say the Waveform Tab has an error.
**Resolution:**
Fixed.
**Impact of fix:**
This fix has no impact on current workflow.
**ABF 1.8 Files Recorded with Clampex 10.4 Have Incorrect Scaling**

Tracking ID: 4366

Files recorded with Clampex 10.4.0, when re-saved as ABF 1.8 (integer), have incorrect scaling.

**Resolution:**

Fixed.

**Impact of fix:**

This fix has no impact on current workflow.

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**ABF 2.03 Files Re-Saved in Clampex 10.4 to ABF 1.8 do not Open in Clampex 10.3**

Tracking ID: 4402

pCLAMP 10.4.0 ABF 2.03 data files are not compatible with earlier versions of pCLAMP. Even when re-saved to the older compatible ABF 1.8 file format, the data files cannot be opened in pCLAMP software versions 10.0 through 10.3.

**Resolution:**

Fixed.

**Impact of fix:**

This fix has no impact on current workflow.

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**ABF File Support Pack Not Updated for ABF 2.03**

Tracking ID: 4422

The ABF File Support Pack is not updated to support pCLAMP version 10.4.0 of ABF version 2.03 with 8 analog outputs.

**Resolution:**

Fixed.

**Impact of fix:**

This fix has no impact on current workflow.
Initial Holding Level Sample Point from Last Epoch

Tracking ID: 4512

Using a Digidata 1550, if the holding voltage is set to Use last Epoch, the first sample point does not use the expected last Epoch holding level.

Resolution:
Fixed.

Impact of fix:
This fix has no impact on current workflow.
Introduction

The pCLAMP™ Electrophysiology Data Acquisition and Analysis Software version 10.4.0 update is a minor release. The following is a summary of the changes incorporated in this update as compared to version 10.3.2, the last general release of the pCLAMP Software.

New

Software support added to include the new Digidata 1550 Digitizer.

Issues Addressed

Scope Trigger BNC Output Not Sending Correct Output for Episodic Mode

Tracking ID: 2285

The Scope trigger output in Clampfit software goes low at the end of the last holding period (H2) instead of at the beginning, which fails to always give a correct timing signal per episodic sweep.

Resolution:

The Scope trigger in Clampfit software goes low at the beginning of holding period (H2), which always gives a correct timing signal per episodic sweep when using Digidata 1550 Series, Digidata 1440A Series, and Digidata 132x Series digitizers.

Impact of fix:

This fix has no impact on current workflow.
Introduction

The pCLAMP™ Electrophysiology Data Acquisition and Analysis Software version 10.3.2 update is a minor release. The following is a summary of the changes incorporated in this update as compared to version 10.3.1, the last general release of the pCLAMP Software.

Issues Addressed

PatchXpress Acquired Data with P/N leak Subtraction Enabled, Display Incorrectly in Clampfit

Tracking ID: 3930

In Clampfit software, data acquired by PatchXpress 2.0 or 2.0.1 with the P/N Leak Subtraction enabled, the sweep duration displays half of the actual value and the sampling rate displays double the actual value.

Resolution:

The issue is fixed in PatchXpress software version 2.0.2. Data sets acquired in PatchXpress software version 2.0 or 2.0.1 with the P/N Leak Subtraction enabled display correctly in the Clampfit software in the pCLAMP software version 10.3.2.

Impact of fix:

This fix has no impact on current workflow.
Introduction

The pCLAMP™ Electrophysiology Data Acquisition and Analysis Software version 10.3.1 update is a minor release. The following is a summary of the changes incorporated in this update as compared to version 10.3.0.2, the last general release of the pCLAMP Software.

Issues Addressed

Read only files cannot be opened

Tracking ID: 148

When the Clampfit software attempts to open a file marked as read-only, it returns an error that the file is already open.

Resolution:
The Clampfit software can open read-only files without generating an error.

Impact of fix:
This fix has no impact on current workflow or data.

Protocol shows positive durations only

Tracking ID: 855

In the Protocol Editor of the Clampex software, the Waveform tab’s Delta duration does not allow negative values.

Resolution:
Negative protocol duration values are allowed.

Impact of fix:
This fix has no impact on current workflow or data.
**P/N corrected data is not displayed with long signal names**

Tracking ID: 984
If the signal name is ten characters long, then when a file with P/N corrected data is reopened the corrected data is not shown.

**Resolution:**
P/N corrected data displays properly for 10-character signal names.

**Impact of fix:**
This fix has no impact on current workflow or data.

**Clampex Membrane Test gives incorrect values after Configure menu is used**

Tracking ID: 1280
In the Clampex software, opening the Membrane Test Setup from the Configure menu while the Membrane Test is running causes the Membrane Test to return incorrect values.

**Resolution:**
Correct values appear in the Membrane Test after opening the Membrane Test Setup from the Configure menu.

**Impact of fix:**
This fix has no impact on current workflow or data.

**Math Channel causes crash in AxoScope**

Tracking ID: 1687
In the AxoScope software, activating the Math channel while acquiring data crashes the program.

**Resolution:**
Activating the Math channel while acquiring data runs as expected with no program crash.

**Impact of fix:**
This fix has no impact on current workflow or data.
User List with longer than 100 characters causes Clampex to crash

Tracking ID: 1813

In the Clampex software, entering a user list of 100 characters crashes the program. The behavior seems to occur only when Epoch Durations are adjusted with the user list.

Resolution:
Entering a long user list does not crash the program.

Impact of fix:
This fix has no impact on current workflow or data.

Slow rate-only saved files with P/N do not open in Clampfit

Tracking ID: 1916

Using the Clampfit software to open a protocol file that uses the Epoch Duration Slow rate and P/N Leak Subtraction at the same time crashes the program.

Resolution:
Opening a protocol file that uses the Epoch Duration Slow rate and P/N Leak Subtraction at the same time does not crash the program.

Impact of fix:
This fix has no impact on current workflow or data.

UserDefinedInstrument.ini file is not being read

Tracking ID: 1932

Modifying the UserDefinedInstrument.ini file does not affect the settings in the Clampex software.

Resolution:
Users can modify the UserDefinedInstrument.ini file and the changes appear in the Clampex software.

Impact of fix:
This fix has no impact on current workflow or data.
Custom Function cannot be entered

Tracking ID: 2002
In the Clampfit software, defining a custom function in the Fit dialog generates an error message stating the a custom function has not been defined.

Resolution:
A custom function can be defined in the Fit dialog without generating the error message.

Impact of fix:
This fix has no impact on current workflow or data.

Non-stationary analysis - wrong formula with parabolic equation

Tracking ID: 2003
In the Clampfit software, the formula used to calculate the parabolic fit to non-stationary data is incorrect.

Resolution:
The parabolic fit to non-stationary data is calculated correctly.

Impact of fix:
This fix has no impact on current workflow or data.

P/N generates ABF files with data points all at zero

Tracking ID: 2009
Saving a file in ABF format from the Clampex software sets data points to zero in the ABF file.

Resolution:
Data points are correctly saved in ABF format.

Impact of fix:
This fix has no impact on current workflow or data.
Protocol with four active analog waveforms crashes Clampex

Tracking ID: 2079
In the Clampex software, stimulating on four analog channels while digital outputs are enabled crashes the program.

Resolution:
Stimulating on four analog channels while digital outputs are enabled does not crash the program.

Impact of fix:
This fix has no impact on current workflow or data.

Save Results in ATF from Clampex 9 does not open in Clampfit 10

Tracking ID: 2204
Results saved in an ATF file from the Clampex 9 software do not appear when the ATF file is opened in the Clampfit 10 software.

Resolution:
The Clampfit 10 software correctly opens ATF files generated using the Clampex 9 software.

Impact of fix:
This fix has no impact on current workflow or data.

Enhance error handling in Data Reduction

Tracking ID: 2206
In the Clampfit software Data Reduction dialog, typing an incorrect Reduction factor generates an error message that displays the incorrect name for the selected Method.

Resolution:
The name of the selected Method appears in the error message.

Impact of fix:
This fix has no impact on current workflow or data.
Create data command, produces wrong values in divide-by zero calculations

Tracking ID: 2207
In the Clampfit software, entering a formula in Create Data that divides by zero generates the number 1 in some of the cells.

Resolution:
Entering a formula in Create Data that divides by zero generates blank cells.

Impact of fix:
This fix has no impact on current workflow or data.

Copying & pasting data from Power Spectrum causes rounding errors

Tracking ID: 2217
In the Clampfit software, copying and pasting from the results spreadsheet rounds the data.

Resolution:
Copying and pasting from the results spreadsheet retains greater than six decimal places.

Impact of fix:
This fix has no impact on current workflow or data.

Fast/Slow rates create files that crash Clampfit

Tracking ID: 2219
Opening a file in the Clampfit software that was generated with data acquired using the Clampex software with Epoch Duration Slow rates crashes the Clampfit program.

Resolution:
Opening a data file that was generated using the Epoch Duration Slow rate does not crash the program.

Impact of fix:
This fix has no impact on current workflow or data.
Membrane Test Pulse and Holding level reverts to Bath 0 Stage settings

Tracking ID: 2677
In a Membrane Test that Enables #0 and #1 channels, the Pulse and Holding settings show the Bath #0 settings when the Membrane Test is reopened, regardless of the selection that was made before it was closed. Users need to click on the current selection to activate the correct Pulse and Holding levels.

Resolution:
When a Membrane test is reopened, the settings reflect the levels for the Output and Stage combination that was selected before the test was closed.

Impact of fix:
If users were clicking on the current selection to activate the correct Pulse and Holding levels, this workaround is no longer needed. This fix has no other impact on current workflow or data.

Event Statistics inappropriately displays standard deviation for event frequency

Tracking ID: 2743
In the Event Statistics dialog of the Clampfit Software, the Event Frequency has a standard deviation associated with the measurement. The standard deviation should no be displayed.

Resolution:
The Event Frequency no longer displays the standard deviation.

Impact of fix:
This fix has no impact on current workflow or data.

DD1440A outputs incorrect pulse at end of sweep

Tracking ID: 3017
With some protocols, there is an incorrect pulse output after a trial. This affects only the DD1440A instrument.

Resolution:
The incorrect pulse output no longer appears.

Impact of fix:
This fix has no impact on current workflow or data.
Telegraphing for Warner PC-505B instrument causes Lab Bench Inputs to be grayed out

Tracking ID: 3099
In the Clampex software, Lab Bench Input settings are incorrectly disabled for the Warner PC505B instrument.

Resolution:
Lab Bench Input settings are enabled for the Warner PC505B instrument.

Impact of fix:
This fix has no impact on current workflow or data.