Manual 2.0

Installation

of HEKA Hardware and Software

HEKA

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1. Introduction

There are three possible installation procedures:

1. Software only e.g.: FITMASTER, PULSEFIT, PULSETOOLS, PULSESIM
2. EPC 10 and Software (PATCHMASTER, PULSE)
3. LIH 1600 or ITC-18 and Software (PATCHMASTER, PULSE), X-CHART)

1.1 Installing Software only

Installing software typically requires two steps:

1. Installing the required software: Described in section 3 *Installing the Software* on page 9
2. Installing the protection key ("dongle"): Described in section 3.5 *Installing the Protection Key* on page 12

1.2 Installing Software plus EPC 10

Installing the software plus the EPC 10 patch clamp amplifier requires five steps:

1. Making the physical connection between the EPC 10 and the computer. Described in section 2.2 *Connecting the EPC* on page 6
2. Installing the required software: You have to install the program itself and the hardware driver (Windows and Mac OS X). Described in section 3 *Installing the Software* on page 9

3. Installing the calibration files. Described in section 3.7 *Installing the Calibration Files for the* Epc 10 on page 14

4. Installing the protection key (dongle): Described in section 3.5 *Installing the Protection Key* on page 12

5. Verifying the installation and testing the performance of the Epc 10 amplifier: Described in the Epc 10 Manual, Chapter *Verifying and Testing the* Epc 10.

The programs Patchmaster and Pulse provide the controls and the graphical representation of the amplifier by a "virtual panel" with "buttons". Signal display is provided by an oscilloscope-like display. Both programs provide the capability of data acquisition and analysis, but can also be used for calibration and self-testing the Epc 10. If you install Patchmaster or Pulse, make sure there is a copy of the two files `SCALE-[Serial #].EPC` and `CFAST-[Serial #].EPC` either in the `E9Screen` folder or in the `Patchmaster/Pulse` folder to provide proper calibration for your Epc 10. These Calibration files are required for the proper function of the Epc 10 amplifier. Please, consult the Epc 10 manual for details.

The hardware driver is required by the various Windows operating systems to enable the programs to talk to the hardware. Steps 1, 3, and 5 are common to both computer platforms, Mac OS as well as Windows, since the software shares the same source code and the same user interface on both computer platforms. The main difference is the installation of the hard- and software (i.e. installation step 2) and some keyboard equivalents. Thus, the pictures in this manual are valid for both computer platforms except for the sections describing installation and computer specific maintenance.

1.3 Installing Software plus LIH 1600 or ITC-18

Installing software plus Lih 1600 or ITC-18 requires three steps:

1. Making the physical connection between the Lih 1600 or ITC-18

and the computer. Described in section *Connecting the* LIH 1600 *and ITC-18* on page 9

2. Installing the required software plus the hardware driver You have to install the program itself, and the hardware driver (Windows and Mac OS X). Described in section *Installing the Software* on page 12

3. Installing the protection key ("dongle"): Described in section *Installing the Protection Key* on page 10

1.4 Naming Conventions

Program Name: All software packages of HEKA use a common installation procedure. Therefore, throughout the present manual, we will address the program to be installed as PATCHMASTER, as a place holder for the program you want to install.

Epc 10, Epc 10 Double, Epc 10 Triple, and Epc 10 Quadro: Throughout the present manual we will address all three amplifiers types as EPC 10. We will explicitly mention the particular amplifiers, where it is required.

Lih 1600 and ITC-18: For installation matters, the LIH 1600 and ITC-18 are handled identically. Exceptions are mentioned explicitly.

Windows versions: The EPC 10, LIH 1600, ITC-18, and all programs from the PATCHMASTER and PULSE family are supported on: Windows 98, and Windows ME, Windows NT 4.0, Windows 2000, and Windows XP. Throughout the present manual we will address all the above Windows versions as "Windows". We will explicitly mention the particular Windows versions, whenever it is required.

1.5 Support Hotline

If you have any question, suggestion, or improvement, please contact HEKA's support team. The best way is to send us an e-mail or fax specifying:

- Your postal and E-mail address (or fax number)
- The program name: PATCHMASTER, PULSE, PULSEFIT, TIDA etc.
- The program version number: v8.31, v8.53
- Your operating system and its version: Mac OS 8.5, Mac OS 9.2, Windows 98, Windows XP Prof., etc.
- Your type of computer: Mac G4, Pentium III 600 MHz, etc.
- Your acquisition hardware, if applicable: EPC 10, LIH 1600, ITC-18
- Your amplifier, if applicable: EPC 10, EPC 10 Double, Axon 200B, etc.
- The series number and version of your EPC 10, if applicable: EPC 10 single, version "520552".
- The questions, problems, or suggestions you have
- Under which conditions and how often the problem occurs

We will address the problem as soon as possible.

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2. Hardware Installation

2.1 Connecting the EPC 10

When you receive the EPC 10, please check the packing list to verify that you have all required parts, especially:

1. The EPC 10 amplifier itself
2. The PCI-1600 computer interface card:
3. Two fiber optics cables which will connect the EPC 10 to the computer interface card.
4. The headstage
5. The model cell (in the box with the headstage)
6. The diskette with the calibration files (in the box with the headstage)

First, shut down the computer, open it, and insert the computer interface card (PCI-1600) in a free, matching slot. If there is more than one free slot, place the card away from other cards radiating heat. Close the computer.

Insert the fiber optics cable into the connectors on the card you just inserted. Connect the other end of the cables into the connector labelled "To PCI-1600" at the rear of the EPC 10.

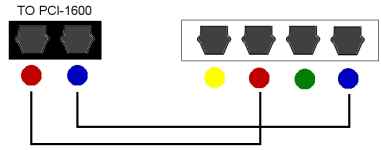

Figure 2.1: Connectors for optical cables

The EPC 10 offers the convenience that two interfaces can be connected to and controlled by a single PCI board in the computer. All input and output channels of the two interfaces are fully synchronized. Consequently, one can connect two EPC 10 amplifiers to one PCI interface card. The new PATCHMASTER software detects both interfaces and uses e.g. the two amplifiers in the same way as an EPC 10 Double amplifier.

Color coding for connecting the EPC 10 to the LIH-1600 computer interface board:

Primary interface:	EPC 10	PCI-1600
	Red	Red
	Blue	Blue
Secondary interface:	EPC 10	PCI-1600
	Red	Yellow
	Blue	Green

Now connect the power cord to the EPC 10 and connect it to the power line.

Finally, place the EPC 10 in its final place and connect the cable of the headstage to its "`Probe`" connector on the front panel of the EPC 10 main unit. Make sure, that the amplifier is switched off, before connecting the headstage.

The EPC 10 is now wired up, and you can proceed to the software installation as described in the section *Software Installation* on page 9.

2.2 Connecting the LIH 1600

When you receive the LIH 1600, please check the packing list to verify that you have all required parts, especially:

1. The LIH 1600 itself
2. The PCI-1600 computer interface card:
3. Two fiber optics cables which will connect the LIH 1600 to the computer interface card.

First, shut down the computer, open it, and insert the computer interface card (PCI-1600) in a free, matching slot. If there is more than one free slot, place the card away from other cards radiating heat. Close the computer.

Insert the fiber optics cable into the connectors on the card you just inserted. Connect the other end of the cables into the connector labelled "To PCI-1600" at the rear of the LIH 1600.

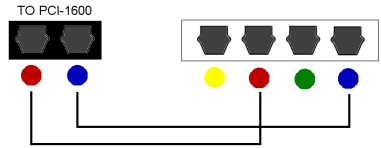

Figure 2.2: Connectors for optical cables

The LIH 1600 offers the convenience that two interfaces can be connected to and controlled by a single PCI board in the computer. All input and output channels of the two interfaces are fully synchronized. Consequently, one can connect two LIH 1600 interfaces to one PCI interface card. The new PATCHMASTER software automatically detects both interfaces.

Color coding for connecting the LIH 1600 to the LIH 1600 computer interface board:

Primary interface:	LIH 1600	PCI-1600
	Red	Red
	Blue	Blue
Secondary interface:	LIH 1600	PCI-1600
	Red	Yellow
	Blue	Green

Now connect the power cord to the LIH 1600 and connect it to the power line.

The LIH 1600 is now wired up, and you can proceed to the software installation as described in the following section.

2.3 Connecting the EPC 10 PLUS

When you receive the EPC 10 PLUS, please check the packing list to verify that you have all required parts, especially:

1. The EPC 10 PLUS amplifier itself
2. The PCI-18 computer interface card:
3. One shielded cable which will connect the EPC 10 PLUS to the computer interface card.
4. The headstage
5. The model cell (in the box with the headstage)
6. The diskette with the calibration files (in the box with the headstage)

First, shut down the computer, open it, and insert the computer interface card (PCI-18) in a free, matching slot. If there is more than one free slot, place the card away from other cards radiating heat. Close the computer.

Insert the shielded cable into the connectors on the card you just inserted. Connect the other end of the cable into the connector labelled "To PCI-18" at the rear of the EPC 10 PLUS.

Now connect the power cord to the EPC 10 PLUS and connect it to the power line.

Finally, place the EPC 10 PLUS in its final place and connect the cable of the headstage to its "`Probe`" connector on the front panel of the EPC 10 PLUS main unit. Make sure, that the amplifier is switched off, before connecting the headstage.

The EPC 10 PLUS is now wired up, and you can proceed to the software installation as described in the following section.

3. Software Installation

3.1 Windows NT 4.0, Windows 2000, and Windows XP

In case of a Windows 2000 or Windows XP computer, the plug-and-play system will automatically detect the PCI-1600 board and ask for an appropriate driver. Insert the HEKA CD into the CD-ROM drive of your computer and go to the folder "Install\ITC_Drivers". Load the file "`InstruTECH.inf`" and then follow the instructions of the software. Finally, you should get the message, that the driver was successfully installed.

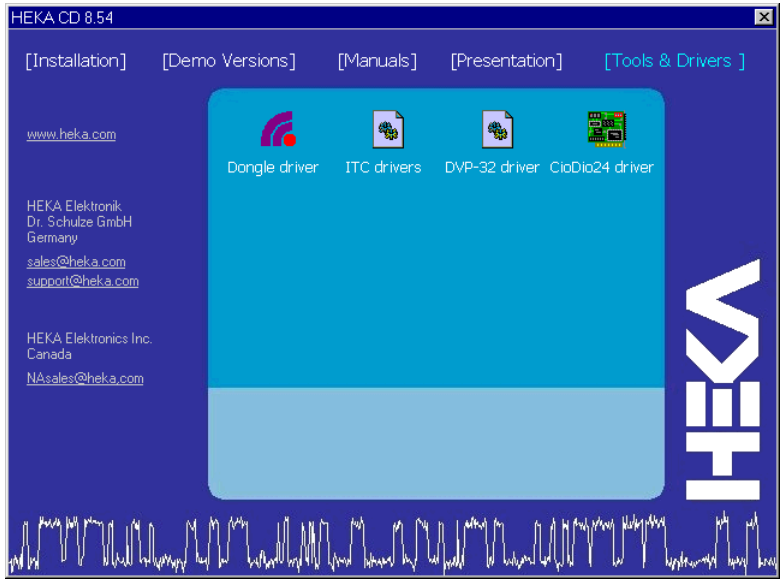

Figure 3.1: Installation screen on Windows platform

On Windows NT computers, the new hardware is not detected automatically. Please insert the HEKA CD and wait until the HEKA Installation program comes up. Switch to the `[Tools & Drivers]` section and then click on the `ITC Drivers` icon. Follow the instructions of the software.

If the HEKA installation program should not start automatically, run the driver installation software (setup.exe) in the folder "Install\ITC_Drivers" from the HEKA CD.

To be able to use our software (PATCHMASTER, PULSE, TIDA) a software protection key (Dongle) is required. Please insert the Rainbow protection key (labelled "SENTINEL SuperPro") in the parallel printer port of your computer ("LPT1" or "LPT2"). If you have a local printer connected to your computer attach the key between the parallel port and the printer cable. To install the protection key driver use the `Dongle Driver` icon in the `Tools & Drivers` section of the HEKA installation program or open the folder "Install → Rainbow" and proceed run "setup.exe". For details please refer to section 3.5 on page pagerefsec:protection.

> ***Important note:*** *Windows does not allow you to install a driver, if you do not have administrative rights. Make sure to login as "Administrator" before performing any driver installation!*

Now, you can install and run the acquisition software (PATCHMASTER, PULSE, or TIDA).

3.2 Windows 98

In case of a Windows 98 computer, the plug-and-play system will automatically detect the PCI-1600 board and ask for an appropriate driver. Insert the HEKA CD into the CD-ROM drive of your computer and go to the folder "Install\ITC_Drivers". Load the file "`InstruTECH.inf`" and then follow the instructions of the software. Finally, you should get the message, that the driver was successfully installed.

3.3 Mac OS 9.x

Please open the “Installers” folder from the HEKA installation screen and run the PATCHMASTER or PULSE installer. The driver for the hardware protection key (“dongle”) is automatically installed with the software. PATCHMASTER users should make sure, that the `Carbon.lib` on the computer is v1.6 or higher (information on the installed `Carbon.lib` can be found in the APPLE SYSTEM PROFILER). We tested the program using CarbonLib version 1.6, dated 16-Dec-2002. That file can be freely downloaded from Apple’s web site.

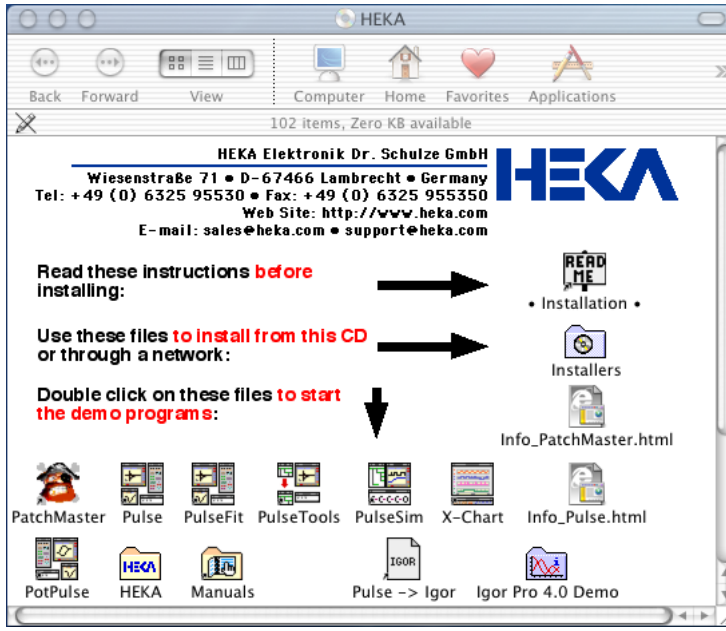

Figure 3.2: Installation screen on Mac OS 9

3.4 Mac OS X

On the Mac OS X operating systems, drivers for the hardware protection key ("dongle") and for the EPC 10 need to be installed. The installer for the EPC 10 amplifier can be found in the `Driver Installers/Drivers_Mac OSX/Installer for ITC drivers` folder. Please double-click on the installer icon to run the program.

The dongle driver is installed by copying the "Eve3.framwork" (in the `Rainbow drivers` folder) into the `/Library/Frameworks` folder on your computer.

Finally copy the "HEKA" folder and its content to your hard disk and re-boot your computer.

3.5 Installing the Protection Key

Most HEKA programs are protected by a protection key ("dongle"). The first time you install a program requiring a protection key, you will have to install the key itself and its driver.

If you want to install on:
Mac OS computer -> go to section *Mac OS Installation* on page 12
Windows computer -> go to section *Windows Installation* on page 13

3.5.1 Mac OS Installation

There are 3 types of protection keys:

1. The old key for the ABD-bus: a square box (6 x 4 x 3 cm) labeled "SENTINEL Eve™"
2. The new key for the ADB-bus: a small, round cylinder labeled "SENTINEL Eve3™"
3. The key for the USB-bus: a small, pink plug.

To connect the ABD key, turn the computer off and insert the hardware key between the computer and the cable of your keyboard. This will put it outside your desk space.

To connect the USB key: just plug it in a free USB connector. It has to be the only device connected to that USB-branch. The required driver will be installed during the "easy" installation procedure of your program. After the next start of your computer the protection key and its driver will be functional. You can delay the re-start of the computer till after installation of your program.

3.5.2 Windows Installation

Insert the Rainbow protection key (labeled "SENTINEL SuperPro™") in the parallel printer port of your computer ("LPT1" or "LPT2"). If you have a local printer connected to your computer attach the key between the parallel port and the printer cable.

It is often not necessary to install the driver for the protection key: usually Win98 computers do not need additional drivers to support the key. However, if you are using Windows NT, Windows 2000 or Windows XP, you will have to install the protection key driver.

> ***Note:*** *Windows NT, Window 2000, and Windows XP do not allow you to install a driver, if you do not have administrative rights. Make sure to login as "Administrator" before performing any driver installation!*

To install the protection key driver, insert the HEKA CD and use the `DONGLE DRIVER` icon in the `TOOLS & DRIVERS` section of the HEKA installation program or open the folder `Install ->Rainbow` and proceed run `setup.exe`. Follow the instructions of the invoked installer.

3.6 Windows: Updating the hardware driver

If you need only to update the hardware driver, you can run the installation from the Tools & Drivers section of the installation screen. Run the

installation to completion, and reboot your computer. The new hardware driver will have replaced the previous one.

3.7 Installing the Calibration Files for the EPC 10

In contrast to any other existing patch clamp amplifier, the EPC 10 family of amplifiers can be calibrated by the user. When you purchase a new EPC 10 amplifier this calibration has already been performed by HEKA. Together with your EPC 10 you have received a diskette containing the 2 calibration files:

- **SCALE-xxxxxx.EPC**, the actual calibration file,
- **CFAST-xxxxxx.EPC**, the lookup table for fast capacitance cancellation,

The "xxxxxx" string in the file names identifies the amplifier by its serial number.

An EPC 10 Double - which contains two amplifiers in one case - requires 2 scale files for each amplifier as well. This makes a total of 4 calibration files.

For the first amplifier:

- SCALE-xxxxxx.EPC and
- CFAST-xxxxxx.EPC

For the second amplifier:

- SCALE-xxxxxx.EP2 and
- CFAST-xxxxxx.EP2

The EPC 10 Triple and EPC 10 Quadro will need 6 and 8 files, respectively. To properly install the calibration files, just copy all required files to the E9SCREEN folder, which is in the HEKA folder on your hard disk. In case you cannot find the calibration files anymore, you can generate a new set of calibration files as described in the Chapter Calibrating the EPC 10 in the EPC 10 Manual.

> ***Note:*** *It is very advisable to store the calibration files only in the one place. The best place to put the calibration files is the E9Screen folder. Most users will run more than one program which needs the calibration files to properly control the* EPC 10*, e.g. PULSE and* PATCHMASTER*. Both programs will load by default the calibration files from the E9Screen folder. If the calibration files are in multiple places the programs may load different calibration files with possibly unpleasant consequences!*

Copy the files with the names, i.e., SCALE-xxxxxx.EPC and CFAST-xxxxxx.EPC from the floppy into the E9SCREEN folder on the hard disk.

Programs which control the EPC 10, will search for the scale files during the initialization of the EPC 10. They scan the following folders for the matching calibration files in this order:

1. The scale file with the name (SCALE-xxxxxx.EPC) is searched in the "sister" E9Screen folder.
2. The scale file with the long name is searched in the "home path".
3. The user is asked to locate the file, if it was not found.
4. Last, the CFast file is loaded from the same folder as the scale file using the same file name size, i.e. long or short.

> ***Note:*** *A "sister" folder is a folder with the same level in the parent folder. In the following example the folders E9Screen and PULSE are "sister" folders. This search strategy enables all HEKA programs to share one set of calibration files, usually located in the E9Screen folder.*

4. Testing the system

For a general test of your acquisition system please refer to the chapter *Verifying and Testing the* EPC 10 of the EPC 10 manual.

4.1 Calibrating the EPC 10

A calibration of the new amplifier is usually not necessary, since you can use the calibration files supplied by HEKA. However, it is advisable to recalibrate the EPC 10 twice a year or whenever the frequency response of the amplifier is not accurate or offset currents become noticeable.

> ***Note:*** *The calibration file contains the settings of the digital switches and controls of the amplifier. These are unique to a given combination of amplifier and headstage (probe) and cannot be used for another* EPC 10*. Therefore, you have to recalibrate the amplifier, when you replace the probe! This is a big advantage of the* EPC 10*, since you can use any probe with any amplifier and replace a broken probe without having to send the amplifier in for re-calibration.*

Before starting the calibration make sure that the amplifier has reached its operational temperature, since the calibration depends on temperature. We advice to let the EPC 10 warm up for 60 minutes after powering the amplifier on. The calibration procedure can be performed with PATCHMASTER, PULSE. In the program, go to the EPC10 → `Test and Calibrate` menu. This menu contains all the items involved in calibration generation of scale files. If there is no valid calibration, the menu item `Make CFast Table` will be disabled. If you have an EPC 10 Double or Triple this menu item will also be disabled, unless each amplifier has been calibrated correctly.

To perform the calibration select `Calibrate` from the `Test and Calibrate` menu. The software will warn you that this procedure may take up to 10

minutes, depending on the speed of your computer. Go ahead by clicking the `Yes` button.

Then you are instructed to remove anything from the probe and shield its input: You can use the metallic cap that came with your EPC 10 and put it on the BNC connector of the probe to shield it. Please make sure that really nothing except the metallic cap is connected to the probe (the black GND pin jack should be free) and that no BNC cables are connected to the inputs and outputs of the EPC 10 !

At the end of the calibration, the software will let you know, whether the calibration succeeded or failed. If it succeeded, the program will automatically generate a new calibration (scale) file.

> ***Note:*** *It is not advisable to change the name of the calibration file, because in that case you would have to manually load the scale file during every initialization. It is very advisable to store the calibration files only in the one place. The best place to put the calibration files is the E9Screen folder.*

Finally, the software re-initializes the amplifier.

4.2 Creating the C-fast Lookup Table

PATCHMASTER and PULSE try to load the C-fast lookup table from the same location as the calibration file when initializing the EPC 10. You will get an appropriate error message, if the Cfast file was not successfully loaded. To create a new C-fast lookup table select `Make CFast Table` from the `Test & Calibrate` menu. A confirmation dialog will be displayed and will instruct you to remove anything from the probe and shield its input.

Again, please make sure that nothing is connected to the probe except for the metallic cap that came with your amplifier. Now the software will create the C-fast lookup table. This usually takes a few minutes. The software will ask you to save the modified C-fast lookup table to disk and suggest a reasonable path and file name corresponding to your active calibration. Finally, the software re-initializes the EPC 10. If you have an EPC 10

Double or Triple, you should continue and create the C-fast lookup table of the second and third amplifier.

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