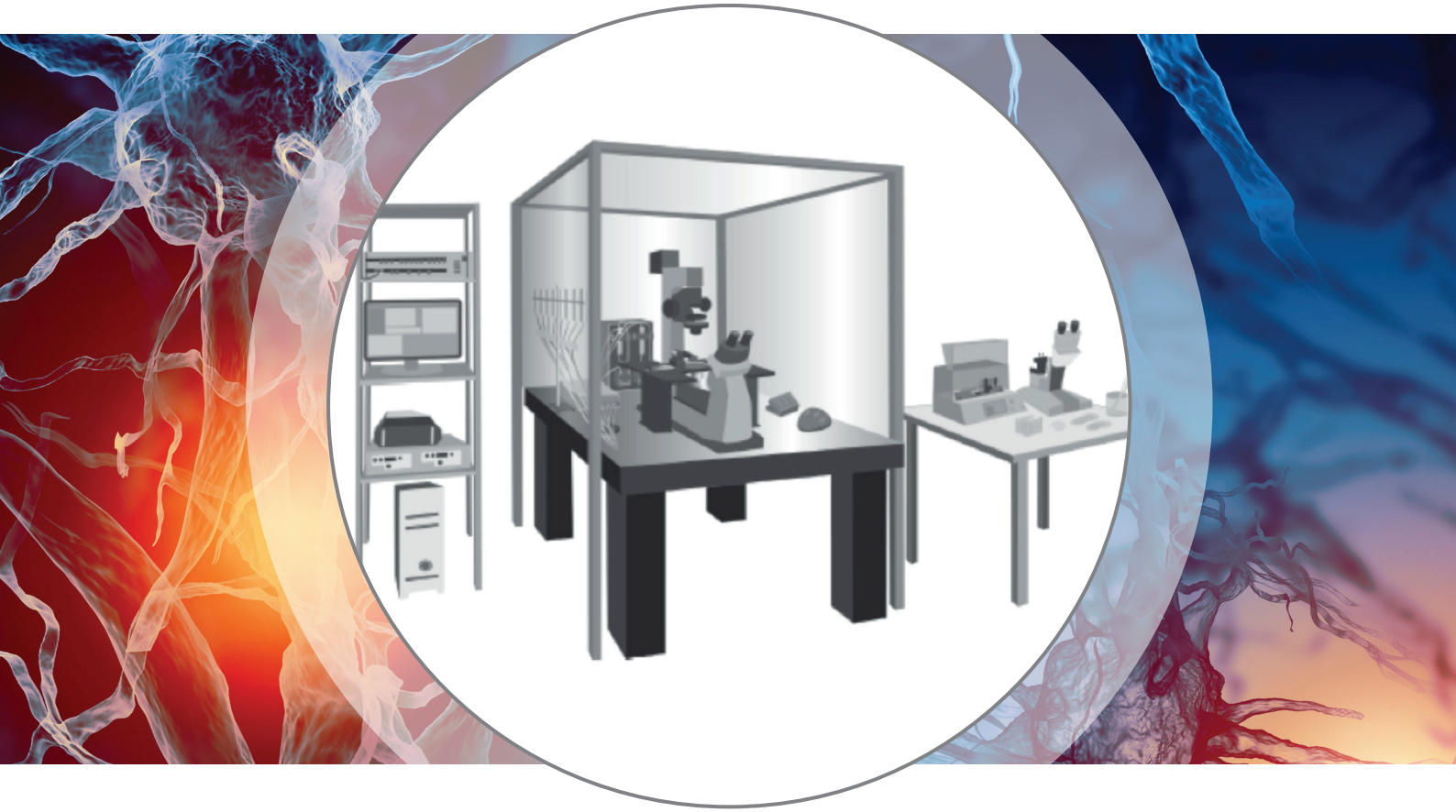
Product Overview

Electrophysiology
2020



- Patch Clamp Amplifier
- Two Electrode Voltage Clamp
- Automated Patch Clamp Systems
- Data Acquisition Boards
- Electrophysiological Accessories
- Electrical Shielding
- Pipette & Electrode Manufacturing
- Software

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For over 45 years HEKA has designed and manufactured sophisticated instrumentation and software for biomedical and industrial research applications. Through the years, HEKA has achieved an unparalleled reputation for precision and quality. Medical, pharmaceutical and industrial research facilities world-wide rely on HEKA ingenuity for their discoveries.
While there have been many changes in research, instrumentation, and software, our commitment to bring innovative technology to our customers remains constant. HEKA is a select group of engineers, biomedical researchers, and computer scientists who pride themselves on the quality of HEKA products. HEKA offers complete pre- and post-sales technical support, and takes care of each customer personally. In every way, HEKA provides solutions.

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HEKA Elektronik GmbH is proud to be part of the Smart Ephys umbrella. Together with our other Harvard Bioscience, Inc. brands Multi Channel Systems GmbH and Warner Instruments we offer complete solutions for electrophysiology. You will find the high-quality products and service that you know and trust from each of the individual companies, but you can get information on all products, complete set-ups (e.g. patch clamp rigs), and product consultation from one source.
Please check out the Smart Ephys website and contact your local sales representative with any questions.

Buy Online

The Smart Ephys one-stop-shop concept applies to online orders as well. Quickly order consumables and accessories via our webshop. Expedite equipment acquisition by generating your own quote for your purchasing department. Payment can be made via invoice (purchase on account), prepayment or credit card.

In the MCS webshop you can find pipette and microelectrode holders, dovetail adapters, shields, O-rings, software dongles, and much more.

shop.multichannelsystems.com

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The EPC 10 USB

EPC 10 USB Patch Clamp Amplifier

The EPC 10 USB Patch Clamp Amplifier is the successor to the famous EPC 9 Patch Clamp Amplifier. It continues the successful tradition of a fully computer-controlled patch clamp amplifier with excellent technical specifications which enables the EPC 10 USB to be a versatile working horse in the scientific community. The EPC 10 covers a large span of applications from whole-cell to single-channel recordings.

Technical Specifications (Highlights)

- Integrated high-resolution, low-noise data acquisition interface (LIH 8+8)
- True Current Clamp Mode
- Extended C-Fast Compensation (80 pF)
- Extended Stimulation Range (2 V, 5 µA)
- Low-Frequency Voltage Clamp Mode
- Resistor switching headstage with three gain ranges (switchable during an experiment)
- Filtering the Voltage Signal in Current Clamp Mode
- Filter 2 Bypass option
- 100 kHz Bandwidth
- Low Noise Performance (31 fA @ 1 kHz in High Gain Range)
- Supports 3-Electrode Mode
- Calibration and Hardware Test option
- MS Windows and Macintosh compatible

More details can be found in the EPC 10 USB brochure.

Applications (Examples)

- Low Noise Whole-Cell Patch Clamp Recordings in Current Clamp (CC) and Voltage Clamp (VC) Mode
- Low Noise Single-Channel Recordings
- Fast Action Potential Recordings
- Fast Switching between VC and CC and vice versa
- Capacitance Measurements in Exo-/Endocytosis studies
- Simultaneous Stimulation and Recording from multiple cells
- Field Potential Recordings
- Bilayer and Nanopores Measurements
- Combined Photometry Experiments
- Combined Imaging (Calcium) Experiments
- Amperometry Measurements
- Capacitance Measurements
- File Template Stimulation
- Long-Term Potentation and Depression studies

Upgrade your EPC 10 to EPC 10 USB

The upgrade involves the replacement of the ITC-1600 interface board with the current LIH 8+8 interface board. This eliminates the need for hardware drivers and PCI cards, only a USB 2.0 port is required for operation.

Order Number	*Product Name*	*Description*
895135	**EPC 10 Single**	Upgrade of EPC 10 Single to EPC 10 USB Single
895134	**EPC 10 Double**	Upgrade of EPC 10 Double to EPC 10 USB Double
895136	**EPC 10 Triple**	Upgrade of EPC 10 Triple to EPC 10 USB Triple
895133	**EPC 10 Quadro**	Upgrade of EPC 10 Quadro to EPC 10 USB Quadro

Upgrading your EPC 10 to a USB version requires at least hardware revision "F" or later. Please contact us to get further information.

All EPC 10 USB Patch Clamp Amplifiers are ready to be connected to a PC or Macintosh computer via USB 2.0.

EPC 10 USB Amplifiers

Our classic packages starting with an EPC 10 USB Single up to our workhorse, the Quadro.

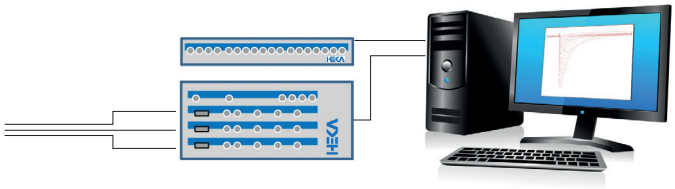
Order Number	*Product Name*	*Description*
895000	**EPC 10 USB Single** Patch Clamp Amplifier	EPC 10 USB Patch Clamp Amplifier with a Red Star Headstage including Mounting Plates, Pipette Holder (1.5 mm OD) and a Model Circuit (MC-10)
895001	**EPC 10 USB Double** Patch Clamp Amplifier	EPC 10 USB Double Patch Clamp Amplifier with two Red Star Headstages including Mounting Plates, two Pipette Holder (1.5 mm OD) and a Model Circuit (MC-10)
895002	**EPC 10 USB Triple** Patch Clamp Amplifier	EPC 10 USB Triple Patch Clamp Amplifier with three Red Star Headstages including Mounting Plates, three Pipette Holders (1.5 mm OD) and a Model Circuit (MC-10)
895003	**EPC 10 USB Quadro** Patch Clamp Amplifier	EPC 10 USB Quadro Patch Clamp Amplifier with four Red Star Headstages including Mounting Plates, four Pipette Holders (1.5 mm OD) and a Model Circuit (MC-10)

No software is included. Different configurations are available on request.

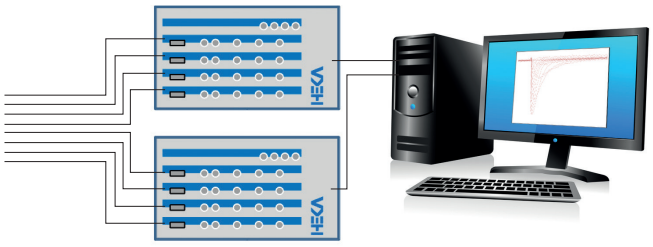
Extend your EPC 10 USB Patch Clamp Amplifiers

You can connect two EPC 10 USB or one EPC 10 USB and one data acquisition interface (InstruTECH LIH 8+8) to extend the number of available recording channels. Any combination (up to two) of EPC 10 USB amplifiers and LIH 8+8 interfaces is possible.

Example 1: *1x EPC 10 USB Triple Patch Clamp Amplifier + 1x LIH 8+8 stand-alone data acquisition interface*



Example 2: *1 x EPC 10 USB Quadro Patch Clamp Amplifier + 1 x EPC 10 USB Quadro Patch Clamp Amplifier*



Example 1:

Device	# Probes	# Free A/D Inputs	# Free D/A Outputs
LIH 8+8	0	8	4
EPC 10 USB Triple	3	1	1
Σ	3	9	5

Example 2:

Device	# Probes	# Free A/D Inputs	# Free D/A Outputs
EPC 10 USB Quadro	4	0	0
EPC 10 USB Quadro	4	0	0
Σ	8	0	0

For joining two units a short CAT-5 cable (< 0.5 m) and the software PATCHMASTER/PATCHMASTER NEXT or EPCMaster is required.

EPC 10 USB Patch Clamp Amplifier Systems

Complete packages of our EPC 10 USB Patch Clamp Amplifiers including headstages (Red Star or S-Probe), software license and accessories.

EPC 10 USB with Red Star Headstage

Order Number	*Product Name*	*Description*
895273	**EPC 10 USB Single System** with Red Star Headstage	EPC 10 USB Single Patch Clamp Amplifier with a Red Star Headstage including Mounting Plates, one Pipette Holder (1.5 mm OD), one Model Circuit (MC-10) and a PATCHMASTER NEXT Software License
895274	**EPC 10 USB Double System** with Red Star Headstages	EPC 10 USB Double Patch Clamp Amplifier with two Red Star Headstages including Mounting Plates, two Pipette Holders (1.5 mm OD), one Model Circuit (MC-10) and a PATCHMASTER NEXT Software License
895275	**EPC 10 USB Triple System** with Red Star Headstages	EPC 10 USB Triple Patch Clamp Amplifier with three Red Star Headstages including Mounting Plates, three Pipette Holders (1.5 mm OD), one Model Circuit (MC-10) and a PATCHMASTER Software License
895276	**EPC 10 USB Quadro System** with Red Star Headstages	EPC 10 USB Quadro Patch Clamp Amplifier with four Red Star Headstages including Mounting Plates, four Pipette Holders (1.5 mm OD), one Model Circuit (MC-10) and a PATCHMASTER NEXT Software License

EPC 10 USB with S-Probe Headstage

Order Number	*Product Name*	*Description*
895277	**EPC 10 USB Single System** with S-Probe Headstage	EPC 10 USB Single Patch Clamp Amplifier with a S-Probe Headstage including Dovetail adapter, one Pipette Holder (1.5 mm OD), one Model Circuit (MC-10) and a PATCHMASTER NEXT Software License
895278	**EPC 10 USB Double System** with S-Probe Headstage	EPC 10 USB Double Patch Clamp Amplifier with two S-Probe Headstages including Dovetail adapter, two Pipette Holders (1.5 mm OD), one Model Circuit (MC-10) and a PATCHMASTER NEXT Software License
895279	**EPC 10 USB Double System** with S-Probe Headstage	EPC 10 USB Triple Patch Clamp Amplifier with three S-Probe Headstages including Dovetail adapter, three Pipette Holders (1.5 mm OD), one Model Circuit (MC-10) and a PATCHMASTER NEXT Software License
895280	**EPC 10 USB Quadro System** with S-Probe Headstage	EPC 10 USB Quadro Patch Clamp Amplifier with four S-Probe Headstages including Dovetail adpater, four Pipette Holders (1.5 mm OD), one Model Circuit (MC-10) and a PATCHMASTER NEXT Software License

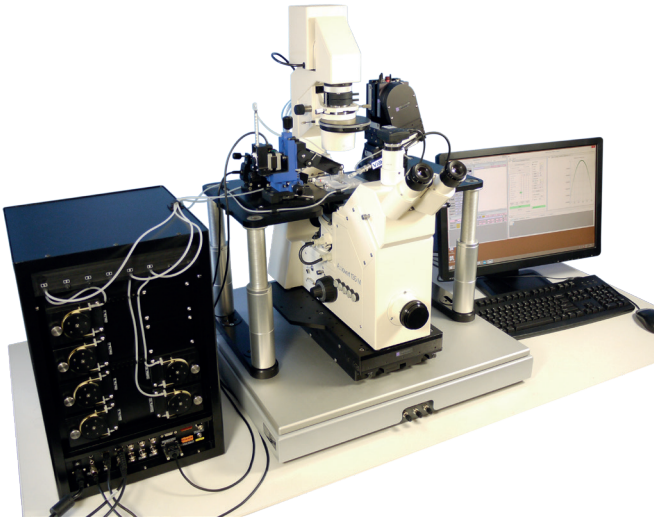
All EPC 10 USB Patch Clamp Amplifiers are ready to be connected to a PC or Macintosh computer via USB 2.0. Different configurations are available on request.

PatchServer

The PatchServer is an automatic patch clamp system that can establish whole-cell recording or excised-patch configurations using tools and techniques from the manual patch approach.

It utilizes standard glass pipettes and employs step-by-step procedures that would be applied by human experimenters in the classical Patch-Clamp procedure as well. Suspended cells are provided by a cell delivery system, caught by a "Catch pipette" and held in position until they are picked up by the recording pipettes. The precise and fast automated pipette positioning is accomplished by our unique guidance system.

The PatchServer combines the advantages from automatic and manual patch clamp, respectively. Automation improves ease of use and throughput, while still providing the high data quality of the glass-pipette based manual patch method. The PatchServer with its modular design adds automation to a classical patch clamp setup. I.e., the setup can still be used manually without modification.



Order Number	*Product Name*	*Description*
891166	**PatchServer** Basic-1	One-channel PatchServer setup for automatic establishment of any patch clamp recording configuration on suspended cells. Includes main unit, platform, catch pipette holder with amplifier, software, data acquisition computer with preinstalled software, accessories, and installation.
891167	**PatchServer** Basic-4	Four-channel PatchServer setup including all above mentioned features.

Let us help you configure a complete automated patch clamp rig! Just like our manual patch rig integration services (see page 18) we can offer you a complete set up including microscope, table, cage and peripherals all designed to work together with the PatchServer.

Technical Specifications (Highlights)

- Fully automated Patch-Clamping with standard glass pipettes
- Simultaneous, individual 4-channel recordings
- Low operating costs
- Cells can be visually identified and selected
- Piezo-driven sub-millisecond solution exchange (optional)
- Makes manual patch clamp easier and more efficient
- Visual evaluation of single cells before experiment
- Automated cell supply and Giga-Ohm sealing
- Automatically establishes whole-cell recording configuration
- Highest data quality at low running costs

Applications (Examples)

- Ultra-fast compound application for recording from ligand gated ion channels
- Selection of cells from heterogeneous preparations, based on visual criteria (e.g. size, morphology, fluorescence)
- Works with spherical cells in suspension

More details can be found in the Multi Channel Systems PatchServer brochure.

EPC 800 USB Patch Clamp Amplifier

The EPC 800 USB is a patch clamp amplifier for manual and computer-controlled operation. The Manual Mode was designed especially for researchers who desire manual user control through knobs and dials, while at the same time, longs for some degree of computer communication and automatic control. This amplifier is truly a unique hybrid patch-clamp amplifier with its design and feature-set primarily based upon the manually controlled EPC 8. The EPC 800 USB is the most flexible patch clamp amplifier HEKA has ever produced: a stand-alone amplifier that can be combined with any existing AD/DA interface and its compatible data acquisition software.

Technical Specifications (Highlights)

- True Current Clamp Mode
- Automatic or Manual Capacitance Compensation
- Voltage Clamp Mode
- Low-Frequency Voltage Clamp Mode
- Current Clamp & Bridge Mode
- Resistor switching headstage with three gain ranges (switchable during an experiment)
- Telegraphing outputs for Gain, Bandwidth, Mode & C-Slow
- Operate in Local, Local & Telegraphing or Remote Mode
- Multi-Parameter Display
- MS Windows and Macintosh compatible

Applications (Examples)

- Whole-Cell Patch Clamp Recordings
- Single-Channel Recordings
- Fast Action Potential Recordings
- Capacitance Measurements in Exo-/Endocytosis studies
- Long-Term Potentation and Depression studies
- Combined Photometry Experiments
- Combined Imaging (Calcium) Experiments
- File Template Stimulation

More details can be found in the EPC 800 USB brochure.

Order Number	*Product Name*	*Description*
895004	**EPC 800 USB** Patch Clamp Amplifier	1x EPC 800 USB Patch Clamp Amplifier 1x Red Star Headstage including Mounting Plates 1x Pipette Holder (1.5 mm OD) 1x Model Circuit (MC-10)
895259	**EPC 800 USB** Main Unit	1x EPC 800 USB Patch Clamp Amplifier

All EPC 800 USB Patch Clamp Amplifier are ready to be connected to a PC or Macintosh computer via USB 2.0. EPC 800 USB Main Unit (895259) does not contain any headstage, pipette holder, or model circuit.

InstruTECH LIH 8+8 Data Acquisition Interface

The InstruTECH LIH 8+8 is a high resolution, low-noise scientific data acquisition system. It utilizes the latest USB 2.0 and high speed processing technologies. The analog input and output channels are isolated from the digital lines that communicate with the computer. Each analog channel has it's own separate ground patch and the digital section has a completely different ground. The result is complete isolation of the acquisition side from the computer side with full 16 bit capability and low noise. The LIH 8+8 provides expandability and versatility that will satisfy both current and future needs.

Technical Specifications (Highlights)

- 8x Analog Differential Inputs (16-bit)
- 4x Analog Differential Outputs (16-bit)
- 16x Digital Input and Output Channels
- External Trigger Input
- 400 kHz Throughput Aggregate
- Separate Grounding Line for each Analog Channel
- MS Windows and Macintosh compatible

More details can be found in the InstruTECH LIH 8+8 brochure.

Order Number	*Product Name*	*Description*
	InstruTECH	InstruTECH LIH 8+8 Data Acquisition Interface
895035	**LIH 8+8**	

Ready to be connected to a PC or Macintosh computer via USB 2.0. For control and data acquisition the software PATCHMASTER NEXT, CHARTMASTER or POTMASTER is required.

iTEV 100 - Coming soon (2020)

Succeeding iTEV 90, the iTEV 100 is a fully computer controlled two-electrode clamp amplifier system that provides automated test and calibration routines. The iTEV 100 has a built-in interface and is controlled by the PATCHMASTER family of software.

Highlights of iTEV 100

- Different Current Headstages for different purposes (Oocytes, Neurons...)
- Voltage Headstage
- Compliance voltage ~200 V
- Separate τ and Gain settings for current clamp and voltage clamp recordings
- New PID controller for smoothed Gain adjustment

Headstages (Probes)

Red Star Headstage

The Red Star Headstage is used with the EPC 10, EPC 10 USB or the EPC 800 USB Patch Clamp Amplifiers. It offers excellent noise levels in the most important 1 - 10 kHz bandwidth. Further, it has three feedback resistors (50 GΩ, 500 MΩ, 5 MΩ) for three gain ranges which are switchable during the measurement. The Red Star Headstage is also noise-optimized for demanding single-channel recordings. The amplifier (EPC 10 USB) and the headstage need to be calibrated using PATCHMASTER NEXT or EPCMaster software.

Order Number	*Product Name*	*Description*
895008	**Red Star Headstage**	Red Star Headstage with 240 cm flexible connection cable (42 g, 90x17x14.5 mm [LxWxH])

S-Probe Headstage

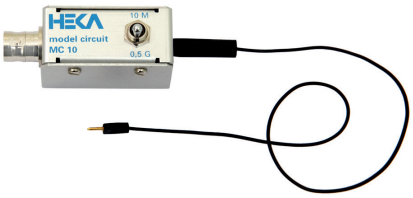
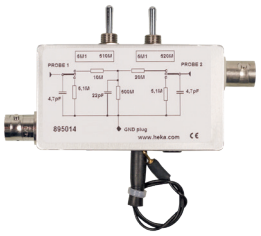
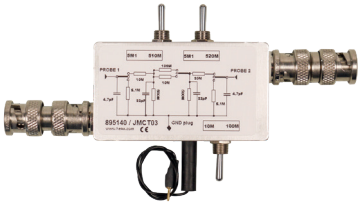
The unique feature of the S-Probe is the significantly reduced size and weight compared to our standard headstages. This allows for compatibility with a wider range of applications, especially when experimental space is limited or where the weight of the headstage itself matters. The electrical specifications of the S-Probe are identical to our standard Red Star Headstage, with the added feature of an optional bath sense connection enabling operation in 3-Electrode mode (with EPC 10 USB only). It is compatible with a new EPC 10 USB or EPC 800 USB amplifier and is also available as an upgrade. Check with our support team to find out if this headstage is supported by your HEKA patch clamp amplifier. The amplifier (EPC 10 USB) and the headstage need to be calibrated using PATCHMASTER NEXT or EPCMaster software.

Order Number	*Product Name*	*Description*
895137	**S-Probe Headstage**	S-Probe Headstage with 248 cm flexible ribbon cable and a BNC to SMA connector (24 g,49x17x14.5 mm [LxWxH])

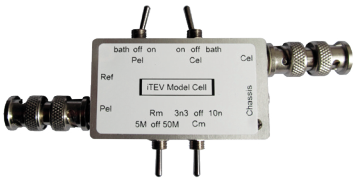
Headstage Accessories

Order Number	*Product Name*	*Description*	
895132	**Standard Headstage Mounting Plate**	Standard Headstage Mounting Plate for the Red Star Headstage	
895020	**Dovetail Mounting Plate**	Dovetail Mounting Plate for the Red Star Headstage	
895315	**Dovetail adapter plate for S-Probe** (long)	Dovetail Adapter Plate (long version) for the S-Probe	
895314	**Dovetail adapter plate for S-Probe** (short)	Dovetail Adapter Plate (short version) for the S-Probe	
895104	**Ground Connector Pin**	Pin to connect the bath electrode to the GND connector of the headstage (pack of 10 Pins).	
895190	**Cable Set Preamplifier**	Pack of two 25 cm long cables with 1 mm pin jacks for connecting the GND, COUNTER or REF electrode to a preamplifier.	

Model Cells for Patch Clamp Amplifiers

Order Number	*Product Name*	*Description*	
895013	**MC 10**	The model cell "MC 10" mimics a model circuit of a biological cell with 500 MΩ membrane resistance, 5 MΩ access resistance and 22 pF cell capacitance. It is essential for testing and calibrating the EPC 10 USB Patch Clamp Amplifiers.	
895014	**MC-TESC1**	Model circuit for two recordings (VC/CC) of one cell mimicking 10 MΩ and 20 MΩ access resistance, 500 MΩ membrane resistance and 22 pF membrane capacitance.	
895140	**MC-TETC3**	Model circuit for two recordings from two cells, which are coupled by a gap-junction. Both cells have 500 MΩ membrane resistance, 22 pF membrane capacitance. The access resistance is either 10 or 20 MΩ. There is an additional switch to mimic a gap-junction conductance by a 10 or 100 MΩ series resistance.	

Model Cells for Two Electrode Voltage Clamp Amplifiers

Order Number	*Product Name*	*Description*	
895176	**MC-ITEV1 - Oocyte**	Model circuit simulating a two electrode recording configuration from an oocyte. The model cell has a switchable membrane resistance (10/100 kΩ) and a switchable membrane capacitance (100/220 nF). This model cell is essential for testing and calibrating the iTEV 90 amplifier.	
895139	**MC-ITEV2 - Neuron**	Model circuit simulating a two electrode recording configuration from a neuron. The model cell has a switchable membrane resistance (10/100 MΩ) and a switchable membrane capacitance (10/3.3 nF).	

Pipette Holder

BNC-Type

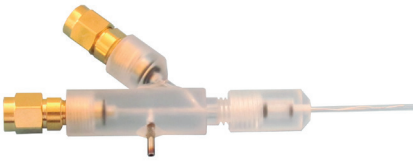
BNC-Type Pipette Holders are made of extreme low-noise polycarbonate with a BNC connector. Suitable for all EPC 7, 8, 9 and EPC 10 / EPC 10 USB Patch Clamp Amplifier standard headstages.

Order Number	*Product Name*	*Description*
895227	**Pipette Holder** BNC Type 1.0 mm	Pipette Holder BNC Type 1.0 mm OD
895228	**Pipette Holder** BNC Type 1.3 mm	Pipette Holder BNC Type 1.3 mm OD
895229	**Pipette Holder** BNC Type 1.5 mm	Pipette Holder BNC Type 1.5 mm OD
895230	**Pipette Holder** BNC Type 1.7 mm	Pipette Holder BNC Type 1.7 mm OD
895231	**Pipette Holder** BNC Type 2.0 mm	Pipette Holder BNC Type 2.0 mm OD
895226	**Electrode Connector** BNC Type	BNC Type Electrode Connector
895232	**Holder O-Ring S-Holder** back end	Back end sealing O-ring for air tight seal between pipette holder and electrode connector pin (pack of 10).
895103	**Electrode Connector Pin**	Gold Pin to connect the silver wire to the headstage input (*old BNC-type only!*).

new

Theta-Pipette Holder

Three-port pipette holder for theta glass. The two electrical ports have male SMA connectors. A 1.5 mm (OD) steel tube enables connection to a pipette pressure control system.



Order Number	*Product Name*	*Description*
895296	**Theta-Pipette Holder** SMA 1.2 mm	Theta-Pipette Holder SMA Type (1.2 mm OD) with two contacted silver wires
895297	**Theta-Pipette Holder** SMA 1.5 mm	Theta-Pipette Holder SMA Type (1.5 mm OD) with two contacted silver wires
895298	**Theta-Pipette Holder** SMA 2.0 mm	Theta-Pipette Holder SMA Type (2.0 mm OD) with two contacted silver wires

SMA-Type

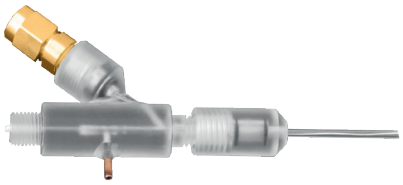
SMA-Type Pipette Holders are made of extreme low-noise polycarbonate with a SMA connector. Suitable only for S-Probe Headstages.

Order Number	*Product Name*	*Description*
895148	**Pipette Holder** SMA Type 1.0 mm	Pipette Holder SMA Type 1.0 mm OD
895149	**Pipette Holder** SMA Type 1.3 mm	Pipette Holder SMA Type 1.3 mm OD
895150	**Pipette Holder** SMA Type 1.5 mm	Pipette Holder SMA Type 1.5 mm OD
895151	**Pipette Holder** SMA Type 1.7 mm	Pipette Holder SMA Type 1.7 mm OD
895152	**Pipette Holder** SMA Type 2.0 mm	Pipette Holder SMA Type 2.0 mm OD
895146	**SMA Type Electrode Connector**	SMA Type Electrode Connector
895232	**Holder O-Ring S-Holder** back end 2.0 mm	Back end sealing O-ring for air tight seal between pipette holder and electrode connector pin (pack of 10)

new

Opto-Pipette Holder

A straight optical port (SMA Type) couples a HEKA cannula to an optical fiber. Under 40 degrees, a second SMA Type port connects a silver wire. Under 90°, a third 1.5 mm OD steel tube allows connection to a pressure control device. The cannula and silver wire can be inserted to a pipette with 1.5 mm OD and 0.86 mm ID.



Order Number	*Product Name*	*Description*
895295	**Opto-Pipette Holder** SMA 1.5 mm	Opto-Pipette Holder SMA Type (1.5 mm OD) with one cannula and a silver wire.
895290	**SMA Fiber Holder - Dovetail**	The holder with dovetail adapter plate is used to couple a SMA optical fiber with a SMA-type optical holder.
895291	**Glass Rod Holder** SMA Type 1.0 mm	Glass Rod Holder that accepts a 1.0 mm OD glass rod and can be coupled to an optical fiber with the SMA Fiber Holder.
895312	**Glass Rod Holder** SMA Type 2.0 mm	Glass Rod Holder that accepts a 2.0mm OD glass rod and can be coupled to an optical fiber with the SMA Fiber Holder.

new

Microelectrode Holder

Connects microelectrodes or carbon fiber electrodes via a clip inside the gold pin which can hold wires in the diameter of >0.6 to 0.8 mm without soldering.

Order Number	*Product Name*	*Description*
895302	**Holder Microelectrode** SMA 2.0 mm	Microelectrode Holder SMA Type (2.0 mm OD)

Pipette Holder Accessories

Replacement Cap Sets

The Replacement Cap Sets can be used for BNC-Type and SMA-Type Pipette Holders.

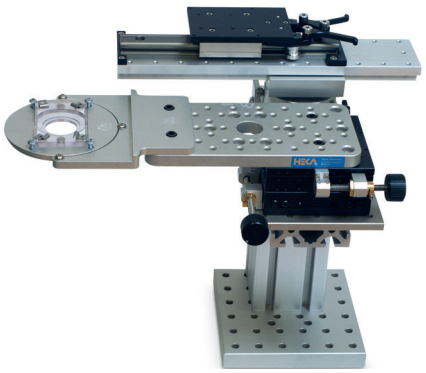
Order Number	*Product Name*	*Description*
895016	**Replacement Cap Set** 1.0 mm	Screw Cap, Distance Sleeve and two O-rings
895097	**Replacement Cap Set** 1.3 mm	Screw Cap, Distance Sleeve and two O-rings
895098	**Replacement Cap Set** 1.5 mm	Screw Cap, Distance Sleeve and two O-rings
895099	**Replacement Cap Set** 1.7 mm	Screw Cap, Distance Sleeve and two O-rings
895100	**Replacement Cap Set** 2.0 mm	Screw Cap, Distance Sleeve and two O-rings

O-rings for Probe Holders

The O-rings replacement sets can be used for BNC-Type and SMA-Type Pipette Holders.

Order Number	*Product Name*	*Description*
895017	**Holder O-Ring** 1.0 - 1,7 mm	O-rings for Pipette Holders for outer diameters in the range from 1.0 to 1.7 mm (pack of 10).
895101	**Holder O-Ring** 2.0 mm	O-rings for Pipette Holders for outer diameter of 2.0 mm (pack of 10).

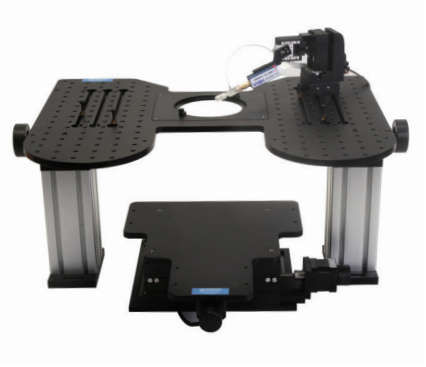
Gantry Stage Tower



The Gantry Stage Tower is an assembly to hold a perfusion chamber and a micromanipulator on the same support tower. The stable alignment eliminates deflection between the examined cell and the micromanipulator. The micromanipulator is placed on a linear slide to facilitate access for pipette exchange. The chamber adaptation is mounted on a manual X/Y translation table. The tower allows height adjustment for the micromanipulator in the range of 300-420 mm. Other height ranges and adaptation to other chamber systems are available on request.

Order Number	*Product Name*	*Description*
895023	**Gantry Stage Tower**	Gantry Stage Tower including Universal Mounting Frame for 35 mm culture dishes and specimen slides

Hybrid Stage for Microscopy



The Hybrid Stage from Warner Instruments for Microscopy provides a stable platform for patch clamp studies and other experiments. The height is position able in the Z-axis direction, while the microscope is moved in the X-Y plane by a smooth, high precision translator with stepper motors. The XY-translatoris avalible with manual and motorized control. We offer different platforms for inverted and upright microscopes.
Motorization can be upgraded any time. It offers a travel range of 381 mm for all dimensions. The stage comes with rails for easy positioning of tools.

Hybrid Stage for Inverted Microscope - metric threads

Order Number	*Product Name*	*Description*
642373	**MMN-ET-M**	Stage with XY translator, fits Nikon Eclipse T inverted, metric thread
642374	**MML-DM-M**	Stage with XY translator, fits Leica DMI8 inverted, metric thread
642375	**MMO-IX-M**	Stage with XY translator, fits Olympus IX-73 inverted, metric thread
642375	**MMZ-AX-M**	Stage with XY translator, fits Zeiss Axiovert inverted, metric thread

Hybrid Stage for Upright Microscope - metric threads

Order Number	*Product Name*	*Description*
642377	**MMN-FN1-M**	Stage with XY translator, fits Nikon E600 FN1 upright, metric thread
642378	**MML-LFS-M**	Stage with XY translator, fits Leica DM LFS upright, metric thread
642379	**MMO-X51-M**	Stage with XY translator, fits Olympus BX-51WI upright, metric thread
642380	**MMZ-2FS-M**	Stage with XY translator, fits Zeiss Axioscope 2FS upright, metric thread

Your Microscope is not listed? Contact our sales team for customization!

Cables

Order Number	*Product Name*	*Description*
895102	**Connecting cable** DG4 / EPC 10 USB	Cable to connect the DG4 / Lambda-10/2 or Lambda-10/3 with the digital outputs of the EPC 10 USB / InstruTECH LIH 8+8
895113	**Connecting Cable** ValveLink 8 / EPC 10 USB	Cable to connect the ALA ValveLink 8 with the digital outputs of the EPC 10 USB / InstruTECH LIH 8+8
895214	**Trigger Cable 0-7**	SubD 25 to 8 BNC cable to connect the digital outputs of the EPC 10 USB / InstruTECH LIH 8+8 to BNC connectors. Provides access to digital output channels 0 to 7 via BNC connectors.
895323	**Trigger Cable 8-15**	SubD 25 to 8 BNC cable to connect the digital outputs of the EPC 10 USB / InstruTECH LIH 8+8 to BNC connectors. Provides access to digital output channels 8 to 15 via BNC connectors.
895244	**Master/Slave Sync Cable**	Short (50 cm) Cat-5 cable to connect the Master/Slave ports at the InstruTECH LIH 8+8.

Faraday Cages

In many applications, the signal-to-noise ratio can be improved only with the use of a Faraday cage. A Faraday cage shields by suppressing electromagnetic waves due to high surface conductance and high permeability. They are made of steel without the use of stainless steel or aluminum and painted blue. The walls are of rugged construction and consist of coated punched sheet metal.
All instruments can be grounded at one central grounding point, which can be freely positioned by the user.

Order Number	*Product Name*	*Description*
895071	**Faraday Cage** Standard	Stand-alone Faraday Cage (190 x 110 x 83 cm)
895072	**Faraday Cage** (Demountable)	Stand-alone Faraday Cage (190 x 130 x 100 cm)
895073	**Faraday Cage Custom Measure** (Demountable)	Stand-alone Faraday Cage Dimensions according to prior agreement
895074	**Faraday Cage Large Version N** (Demountable)	Stand-alone Faraday Cage (190 x 130 x 100 cm)
895075	**Faraday Cage Large Version T** (Demountable)	Stand-alone Faraday Cage (190 x 130 x 100 cm)

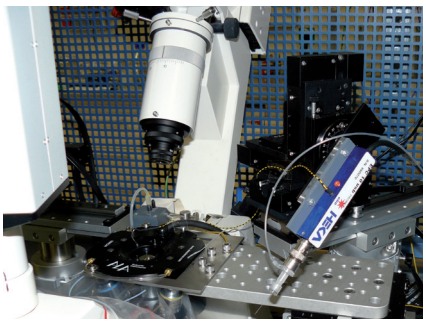
new **895289** **Shielding Cloth Kit**

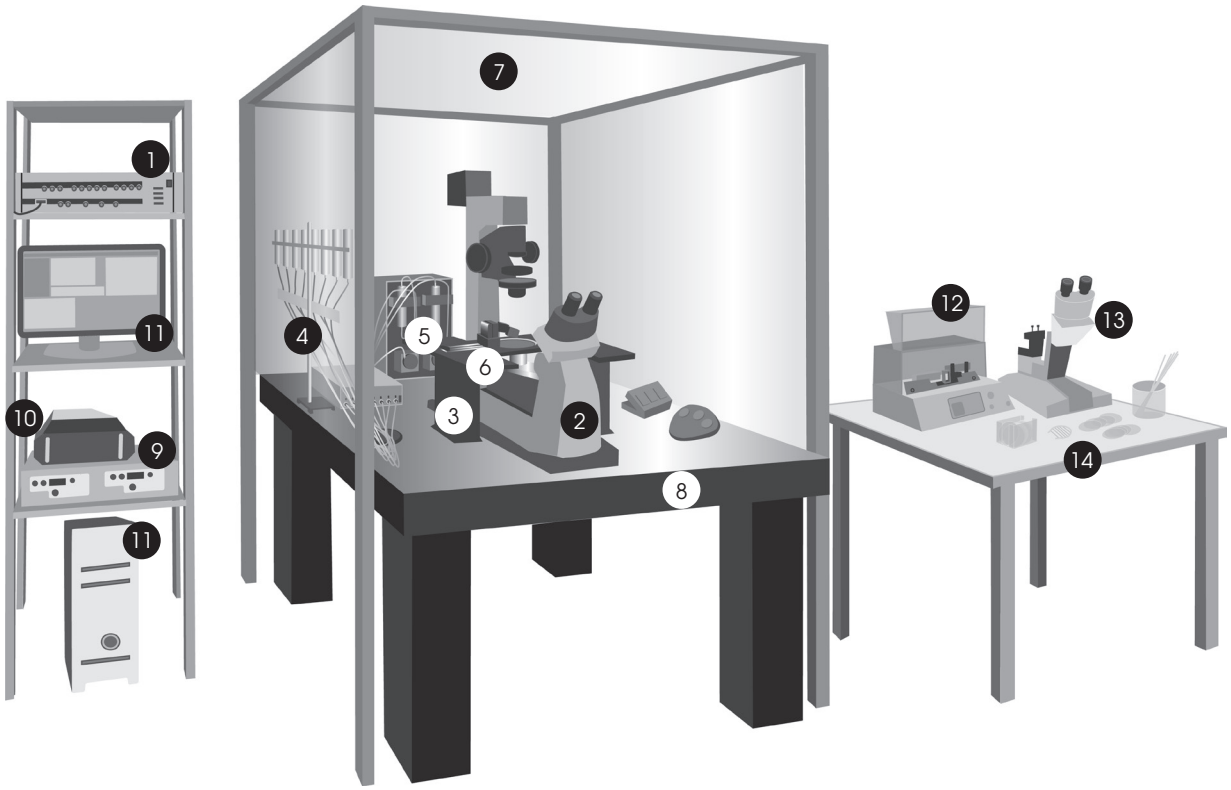
High performance and extra lightweight conducting fabrics for flexible shielding purposes. Dampening is better than 65 dB up to GHz frequency range.
Thickness: 85 µm; Weight: 34 g/m^2.
Dimension: 110 x 110 cm. It includes one crocodile clamp and one cable (100 cm) with banana plugs.

Integrated Patch Rigs

Patch Clamping diverges into many different applications requiring diverse hardware and software solutions. In order to facilitate the process of setting up a new laboratory, HEKA designs customer specific solutions, integrating all required hardware devices and software systems into a complete set-up.

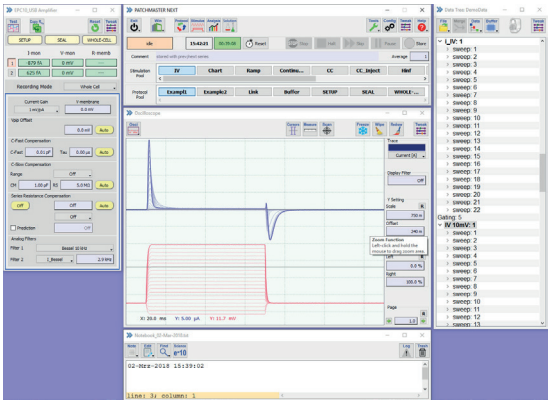
To avoid the hassle picking the right components and setting up a system HEKA offer this special service. Contact our sales representatives (sales@heka.com) to get your personalized quote for a complete patch clamp setup.





1. Amplifier and data acquisition
2. Microscope
3. Stage
4. Perfusion system/chambers
5. Pump – vacuum or bath outflow
6. Micromanipulator
7. Faraday cage
8. Table
9. Temperature control
10. Stimulus generator
11. PC/software
12. Puller
13. Microforge-grinding, beveler
14. Capillary/coverslips/accessories

PATCHMASTER NEXT



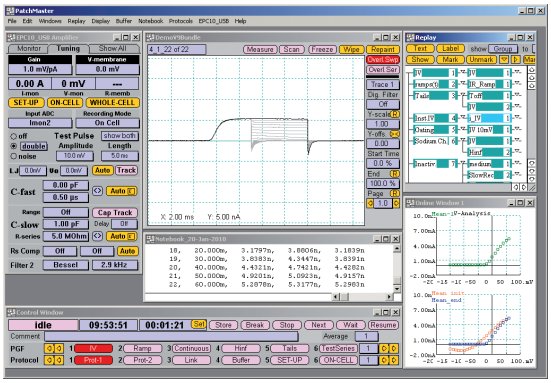
PATCHMASTER NEXT is a new version of our famous PATCHMASTER software. It retains the multi-channel stimulation and data acquisition capabilities of its predecessor, but offers a brand new graphical user interface to increase user-friendliness and accelerate familiarization with its work flow. PATCHMASTER NEXT is currently only compatible with the EPC 10 USB Patch Clamp Amplifiers but will soon also support the EPC 800 USB Patch Clamp Amplifier and the InstruTECH LIH 8+8 data acquisition interface.

The purchase of a license includes free updates.

Order Number	*Product Name*	*Description*
895245	**PATCHMASTER NEXT**	1x USB 2.0 Dongle containing the PATCHMASTER NEXT license
895246	**PATCHMASTER NEXT** Upgrade	Upgrade from PULSE Software to PATCHMASTER NEXT software. The customer needs to send his PULSE Dongle and gets back an USB Dongle containing the PATCHMASTER NEXT license.
895247	**Dongle Exchange** PATCHMASTER NEXT	Exchange of an old or broken PATCHMASTER or PATCHMASTER NEXT dongle. The customer needs to return the original dongle before the replacement can be sent.

PATCHMASTER NEXT runs on MS Windows 10 (64-bit) or Apple OS ≥ 10.6.
All PATCHMASTER NEXT dongles contain a valid PATCHMASTER license, too.

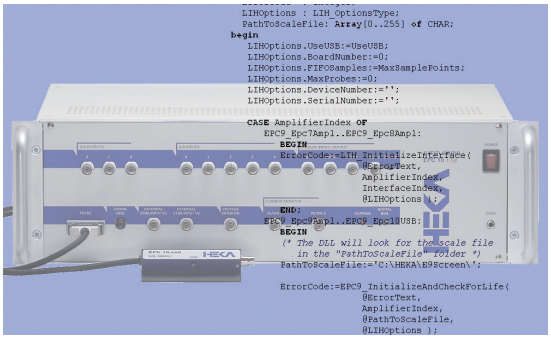
PATCHMASTER



PATCHMASTER is a multi-channel stimulation and data acquisition software with programmable experiment control and automation. It supports all HEKA Patch Clamp Amplifiers, starting from EPC 7 up to EPC 10 USB as well as all HEKA or InstruTECH data acquisition interfaces.

PATCHMASTER licenses were replaced by PATCHMASTER NEXT licenses as no further developments will be made for PATCHMASTER. Every dongle for PATCHMASTER NEXT contains a valid license for PATCHMASTER which allows the user to use either version. PATCHMASTER NEXT will replace PATCHMASTER once compatibility and functionality are matched.

EPC DLL



C-DLL to integrate HEKA amplifiers and data acquisition systems in customer software. Includes documentation and use of the support hotline. The EPC DLL is available for 64 bit operating systems.

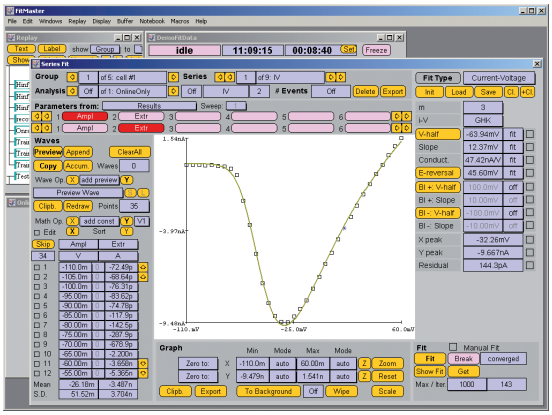
The purchase of a license includes free updates.

Order Number	*Product Name*	*Description*
895049	**EPC DLL**	Contains a C-DLL library and documentation.

PATCHMASTER runs on MS Windows 7, 8 and 10 (32/64-bit) or Apple OS ≥ 10.6.
EPC DLL available for MS Windows (32/64-bit) and Macintosh Framework.

Software

FITMASTER

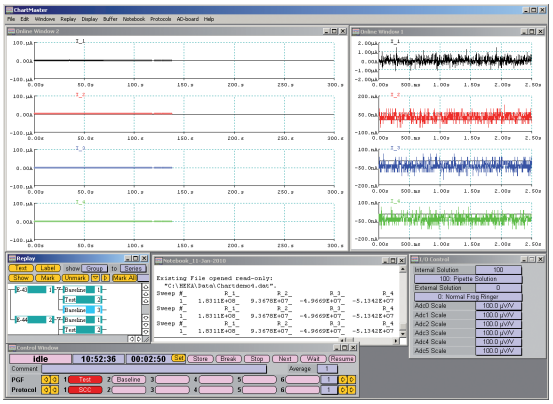


FITMASTER is an Analysis Tool including curve-fitting modules optimized for data acquired with PATCHMASTER, CHARTMASTER or POTMASTER.

The purchase of a license includes free updates.

Order Number	*Product Name*	*Description*
895046	**FITMASTER**	USB 2.0 Dongle containing the FITMASTER license
895107	**Dongle Exchange** FITMASTER	Exchange of an old or broken FITMASTER dongle. The customer needs to return the dongle before the replacement can be sent.

CHARTMASTER

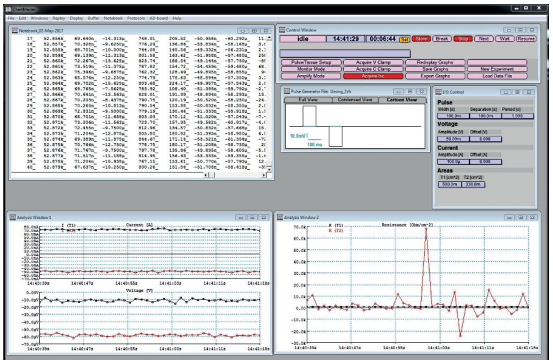


CHARTMASTER is a multi-purpose stimulation and data acquisition software with programmable experiment control and automation. It supports any HEKA Data Acquisition Interface like ITC-16, ITC-18, ITC-1600 and LIH 8+8. In combination with an HEKA Data Acquisition Interface any other Patch Clamp Amplifier can be used.

The purchase of a license includes free updates.

Order Number	*Product Name*	*Description*
895048	**CHARTMASTER**	USB 2.0 Dongle containing the CHARTMASTER license
895051	**Dongle Exchange** CHARTMASTER	Exchange of an old or broken CHARTMASTER dongle. The customer needs to return the original dongle before the replacement can be sent.

USSINGCHART

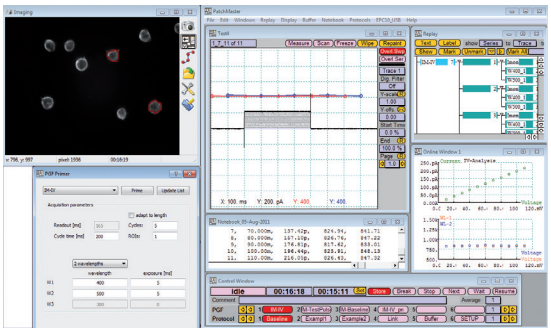


Multi-channel data acquisition software designed specifically for epithelial transport studies. This software is part of a package containing epithelial voltage clamp amplifiers from Warner Instruments. 2, 4, 6 or 8 channel configurations are available on request.

Order Number	*Product Name*	*Description*
895285	**USSINGCHART**	USB 2.0 Dongle containing the USSINGCHART license

CHARTMASTER and FITMASTER run on MS Windows 7, 8 and 10 (32/64-bit) or Apple OS ≥ 10.6
USSINGCHART runs on MS Windows 7, 8 and 10 (32/64-bit).

SmartLUX



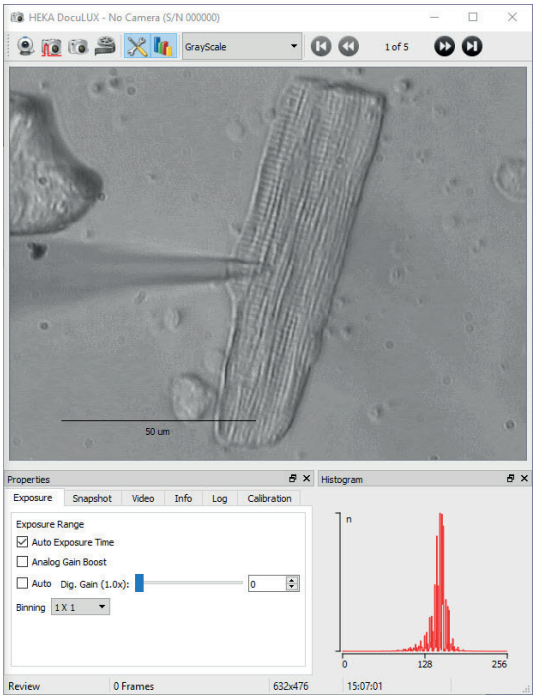
SmartLUX is an imaging extension for our PATCHMASTER, POTMASTER and CHARTMASTER software. Together with the software it controls the light source and the camera. Image acquisition is synchronized with the stimulation and data acquisition of the main program. The mean fluorescence values of the assigned ROIs are stored as additional data traces.
Further, imaging and electrophysiological data are linked to each other.

The purchase includes free updates.

Order Number	*Product Name*	*Description*
895050	**SmartLUX**	SIDX License Document including software package and manual
895165	**CCD Research Camera**	CCD Research Camera (2/3" monochrome, 14-bit, 1360 x 1024 pixel, USB 3.0) including a Trigger Cable

Cameras from the following manufacturers are available: *Andor, QImaging, Photometrics, Hamamatsu and PCO*. Please contact us to learn more about the supported camera models.

DocuLUX



DocuLUX is a camera system containing either a monochrome or color camera together with the software. It is a low-cost bundle which provides enormous help for visualizing and documenting your specimen before, during or after your experimental recordings. DocuLUX can be used together with PATCHMASTER, POTMASTER or CHARTMASTER or as a stand-alone software.

The DocuLUX software can only be used with the camera provided by HEKA.

The purchase includes free updates.

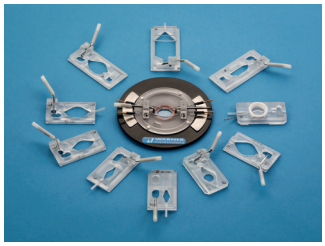
Order Number	*Product Name*	*Description*
895286	**DocuLUX Camera System** CT-1600 x 1200	Color CMOS camera with 1/1.8" sensor (1600x1200 resolution, 4.5 µm pixel size, binning 1 x 1 and 2 x 2, 8-bit, C-mount), Trigger Cable (Hirose to BNC), USB 3.0 cable and a software manual
895287	**DocuLUX Camera System** MT-1600 x 1200	Monochrome CMOS camera with 1/1.8" sensor (1600 x 1200 resolution, 4.5 µm pixel size, binning 1 x 1 and 2 x 2, 8-bit, C-mount), Trigger Cable (Hirose to BNC), USB 3.0 cable and a software manual

SmartLUX and DocuLUX run on MS Windows 7, 8 and 10 (32/64-bit).

Notes

Buy Online at shop.multichannelsystems.com

SE Smart Ephys | WARNER INSTRUMENTS a division of Harvard Bioscience, Inc.



Warner Instruments, another Harvard Bioscience subsidiary, provides:

Chambers
These chambers are the gold standard. Over 70 different chamber designs are available including closed and open bath, with or without field stimulation and more. Using the stage adapters, they are compatible with almost every microscope. Microincubation is also possible.

Perfusion Systems
6 and 8 channel perfusion systems fulfill almost every need. These systems can be equipped with pinch, PTFE or mini valves depending on the requirements. The Fast-Step perfusion system permits solution changes within less than 20 ms.

Temperature Control
Heating-only as well as heating and cooling temperature controllers which can be attached to in-line solution heaters, platforms and objectives.

Microinjectors
A range of microinjectors that are among the best available worldwide. All models can be controlled by a foot switch.

Capillary Glass
A huge selection of capillary glass ranging from 75 up to 150 mm in length, 1 to 3 mm in diameter, with and without filament and more.

We provide microscope systems, manipulators, stages, pullers and vibration isolation tables as a sales partner of Märzhäuser Wetzlar, Luigs & Neumann, Olympus, Sensapex, Sutter, TMC (a Business Unit of AMETEK), ZEISS, and others*.

MÄRZHÄUSER WETZLAR

OLYMPUS

SENSAPEX

SUTTER INSTRUMENT

TMC VIBRATION CONTROL

Luigs & Neumann GmbH Feinmechanik und Elektrotechnik

AMETEK ULTRA PRECISION TECHNOLOGIES

ZEISS Authorized Dealer

** Availability varying worldwide. Please talk to your sales representative for further information.*

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