

**USER'S MANUAL**

**Model: InstruTECH USB-16**

**USB 2.0 HOST ADAPTER FOR ITC-16 AND EPC 9**



**HEKA  
Instruments  
Inc.**

2128 Bellmore Avenue  
Bellmore, NY 11710-5606 USA  
Tel: (516) 882-1155 Fax: (516) 467-3125  
[ussales@heka.com](mailto:ussales@heka.com) [support@heka.com](mailto:support@heka.com)  
<http://www.heka.com/>

**HEKA Elektronik Dr. Schulze GmbH**

Wiesenstraße 71  
D-67466 Lambrecht/Pfalz  
Germany  
Phone: +49 (0)6325 9553-0  
Fax: +49 (0)6325 9553-50  
Email: [sales@heka.com](mailto:sales@heka.com),  
[support@heka.com](mailto:support@heka.com)

**HEKA Electronics Incorporated**

47 Keddy Bridge Road  
R.R. #2  
Mahone Bay, NS B0J 2E0  
Canada  
Phone: +1 902 624 0606  
Fax: +1 902 624 0310  
Email: [nasales@heka.com](mailto:nasales@heka.com), [support@heka.com](mailto:support@heka.com)

**HEKA Instruments Incorporated**

2128 Bellmore Avenue  
Bellmore, NY  
11710-5606 U.S.A.  
Phone: +1 516 882-1155  
Fax: +1 516 467-3125  
Email: [ussales@heka.com](mailto:ussales@heka.com), [support@heka.com](mailto:support@heka.com)

## **Table of Contents**

Table of Contents .....	3
1 General Information .....	4
1.1 Product Intended Usage .....	4
1.2 Accessories.....	4
1.3 Unpacking .....	4
1.4 Purchase Information .....	5
1.5 Technical Specifications .....	6
1.6 Description .....	6
2 Installation.....	8
3 Troubleshooting .....	9
4 Additional Software .....	10
4.1 Available Driver Software .....	10
4.2 Igor XOP's .....	10
5 Product Upgrades.....	11
6 Digital I/O Connector PIN Assignments .....	12
7 Warranty and Technical Support .....	13
7.1 Limited Warranty .....	13
7.2 Limitation of Liability.....	14
7.3 Obtaining Warranty Service.....	14
7.4 Obtaining Out-of-Warranty Service.....	14
7.5 Technical Support .....	15

# **1 General Information**

## **1.1 Product Intended Usage**

The InstruTECH *USB-16* is intended for research use only in a laboratory by persons trained in its use. Users are expected to be able to properly operate the InstruTECH *USB-16* and associated instruments.

The InstruTECH *USB-16* is not intended for medical use. The InstruTECH *USB-16* is not intended for use in life support situations, or in situations where improper operation or failure of the InstruTECH *USB-16* can result in personal injury.

HEKA Instruments Incorporated makes no representation that the design, implementation, testing, or manufacture of the InstruTECH *USB-16* meet reasonable standards for use as a medical product.

As stated in the HEKA Instruments Incorporated Limited Warranty Statement, supplied with each product, "HEKA Instruments, Inc expressly disclaims all warranties to buyer except the limited warranty set forth above, including without limitation to any and all implied warranties of merchantability and fitness for a particular purpose."

## **1.2 Accessories**

The following items should have been packed with your InstruTECH *USB-16 Host Interface*:

- 1 InstruTECH *USB-16* host interface adapter
- 1 RC-16/12 Cable assembly
- 1 USB Cable assembly
- 1 User's manual

If any of these items are missing please contact HEKA Instruments Incorporated immediately.

## **1.3 Unpacking**

After unpacking the InstruTECH *USB-16* and accessories from the shipping carton, please inspect each piece for any signs of shipping damage. Please contact the delivering carrier and HEKA Instruments Incorporated immediately if there is any damage. Do not dispose of the shipping carton. The carrier will want to examine the shipping carton to process a damage claim. HEKA Instruments Incorporated insures all shipments to cover shipping damage. It is also advisable to keep the shipping carton in the event that the instrument must be returned for service.

**1.4 Purchase Information**

Take the time now, while getting started, to record some purchase information here. This will make it easier to locate this information should this become necessary in the future.

Date of purchase: ..... \_\_\_\_\_

Dealer: ..... \_\_\_\_\_

Dealer telephone number: ..... \_\_\_\_\_

Dealer fax number:..... \_\_\_\_\_

Dealer email address: ..... \_\_\_\_\_

Contact name at dealer: ..... \_\_\_\_\_

InstruTECH USB-16 Serial number: ..... \_\_\_\_\_

Other notes:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## **1.5 Technical Specifications**

### **◆ USB host interface:**

The InstruTECH *USB-16* host interface is a USB 2.0 adapter that interfaces the ITC-16 data acquisition system or the EPC-9 computerized patch clamp amplifier to a host computer that has USB 2.0 Hi-Speed ports (480Mbps).

Please note that many newer computer systems are supplied with multiple USB 2.0 ports, but only some of these ports are capable of Hi-Speed operation. The InstruTECH *USB-16* will interface with slower USB ports but overall performance will be greatly diminished. For optimal performance, the InstruTECH *USB-16* should only be connected to a USB 2.0 Hi-Speed port.

If the computer system does not have a Hi-Speed USB 2.0 port, then a USB 2.0 adapter may be used. These adapters are available in many configurations (PCI, PC Slot, etc).

### **◆ Power requirements:**

Powered by USB bus.

### **◆ Warranty:**

One year, parts and labor.

## **1.6 Description**

The InstruTECH *USB-16*, USB 2.0 Bus host interface adapter will allow the InstruTECH *ITC-16* data acquisition system or HEKA EPC-9 computerized patch clamp amplifier to be used with computers featuring USB 2.0 Hi-Speed ports. The InstruTECH *USB-16* is compatible with MacOS X (10.2 and above), and Windows 2000, XP and Vista.

True Plug and play capabilities: Simply connect the InstruTECH *USB-16* to an available Hi-Speed USB 2.0 port on the host computer system using the supplied USB cable. The computer will automatically identify the InstruTECH *USB-16* and install the appropriate system drivers, if needed. This connection scheme greatly reduces start-up time. It is no longer necessary to open the computer to add a board. Simply make all of the connections to the recording setup and execute the data acquisition software. Within minutes, data can be acquired.

Greater computer support: In the past, many data acquisition devices could only be interfaced to high-end desktop computers with available bus slots (i.e. ISA, PCI, etc). This typically meant that only larger footprint and more expensive computer systems could be used. Today, virtually all desktop and laptop computers on the market provide USB ports. It is now possible to use low-cost, small form factor systems (i.e. iMac, Mac mini, etc) with the InstruTECH *USB-16* for data acquisition applications.

Hot Swappable: Another advantage of the USB based data acquisition host interface is that it can be installed or removed while the computer is running. Just plug the device in, use it, and unplug it when done. There is no need to power down the computer. The

Instru<sup>T</sup>TECH USB-16 is self-enumerating and self-identifying. The device driver is dynamically loaded when connected and dynamically unloaded when disconnected.

## **2 Installation**

1. Install the RC-16/12 cable between the InstruTECH *ITC-16* interface labeled **“HOST COMPUTER”** and the InstruTECH *USB-16* labeled **“To ITC-16”**. The connectors on either end of the cable are keyed and will only mate when properly inserted. Fix the connectors in place with the screws attached to the connector. This is important to ensure a good electrical contact.
2. Install the USB cable to the InstruTECH *USB-16* labeled **“To USB”** and an available USB 2.0 Hi-speed port on the computer.
3. You are now ready to power up the system and install the driver software. The ITC-16/USB is supported on Apple MacOS X (10.2 and above) and Windows 2000, XP and Vista. Download the appropriate driver installer from our web site, <http://www.heka.com/>. Follow the installation instructions provided with the acquisition software that will be used with this *USB* interface.

### **3 Troubleshooting**

Most problems arise from incorrect installation of the hardware, and/or incorrect use of the software. The first thing to check is for proper installation of the hardware interface.

Check the HEKA website for a newer version of the driver. At times we make changes based on operating system changes, enhancements or bug fixes.

Check the cable connecting the InstruTECH *USB-16* host to the *ITC-16* interface. Make sure both ends are plugged in securely and that the cable is not damaged.

Check the USB cable connecting the InstruTECH *USB-16* and the host computer. Make sure both ends are plugged in securely and that the cable is not damaged.

Make sure that the computers USB port is USB 2.0 Hi-speed.

If all of the above steps fail to resolve the problem, contact HEKA Instruments or your dealer for assistance.

## **4 Additional Software**

### **4.1 Available Driver Software**

HEKA Instruments Incorporated has available driver software for researchers and developers who wish to write custom applications using the *InstruTECH data acquisition systems*. These drivers and appropriate manuals are available in both MacOSX and Windows formats. They are available from HEKA Instruments Incorporated by request. By email send a message to [support@heka.com](mailto:support@heka.com) and request the *ITC* drivers for the operating system of your choice.

### **4.2 Igor XOP's**

HEKA Instruments Incorporated has available an XOP for Wavemetrics Igor Pro that will allow researchers and developers to write custom applications using the InstruTECH data acquisition systems and WaveMetrics Igor Pro software. These XOP's including the appropriate help file is available from <http://www.heka.com/>. By email send a message to [support@heka.com](mailto:support@heka.com) and request the *ITC-16* XOP's for the operating system of your choice.

## **5 Product Upgrades**

The InstruTECH *USB-16* card is designed to be firmware upgradeable by users, should this ever become necessary to keep up with new developments in the specification for the USB bus. Do not attempt to do such an upgrade without the approval of HEKA Instruments Incorporated or one of its authorized agents. **If this upgrade is performed improperly, the InstruTECH *USB-16* card will malfunction and become unusable.**

First you must acquire the proper upgrade software from HEKA Instruments Incorporated or one of its representatives. These upgrades will be announced on our Web site. Update software will be made available in MacOSX and Windows formats. After the software is executed a successful completion message will be displayed. The InstruTECH *USB-16* should then be unplugged from the USB port and then reconnected. The update has now been completed.

## **6 Digital I/O Connector PIN Assignments**

Below is a listing of the pin assignments of the Digital I/O port on the *USB-16* host interface adapter. The Digital I/O port is a standard 68-pin mini DIN connector (same as SCSI cables).

<b>Pin</b>	<b>Assignment</b>	<b>Pin</b>	<b>Assignment</b>
1	Ground	35	Ground
2	Ground	36	Asynchronous TTL Out 0
3	Ground	37	Asynchronous TTL Out 1
4	Ground	38	Asynchronous TTL Out 2
5	Ground	39	Asynchronous TTL Out 3
6	Ground	40	Asynchronous TTL Out 4
7	Ground	41	Asynchronous TTL Out 5
8	Ground	42	Asynchronous TTL Out 6
9	Ground	43	Asynchronous TTL Out 7
10	Ground	44	Asynchronous TTL Out 8
11	Ground	45	Asynchronous TTL Out 9
12	User Out	46	Asynchronous TTL Out 10
13	Ground	47	Asynchronous TTL Out 11
14	Timer Out 2	48	Asynchronous TTL Out 12
15	Ground	49	Asynchronous TTL Out 13
16	Timer Out 1	50	Asynchronous TTL Out 14
17	Ground	51	Asynchronous TTL Out 15
18	Timer Out 0	52	Asynchronous TTL IN 15
19	Ground	53	Asynchronous TTL IN 14
20	Interrupt	54	Asynchronous TTL IN 13
21	Ground	55	Asynchronous TTL IN 12
22	Timer 2	56	Asynchronous TTL IN 11
23	Ground	57	Asynchronous TTL IN 10
24	Timer 1	58	Asynchronous TTL IN 9
25	Ground	59	Asynchronous TTL IN 8
26	Timer 0	60	Asynchronous TTL IN 7
27	Ground	61	Asynchronous TTL IN 6
28	Ground	62	Asynchronous TTL IN 5
29	Ground	63	Asynchronous TTL IN 4
30	Ground	64	Asynchronous TTL IN 3
31	Ground	65	Asynchronous TTL IN 2
32	Ground	66	Asynchronous TTL IN 1
33	Ground	67	Asynchronous TTL IN 0
34	Ground	68	Ground

## **7 Warranty and Technical Support**

### **7.1 Limited Warranty**

HEKA Instruments Incorporated warrants to the first purchaser, for a period of one year from the date of purchase (invoice date), that this HEKA Instruments Incorporated product (hereafter referred to as the "Product") will be free from defects in workmanship and materials, and agrees that it will, at its option, either repair the defect or replace the defective Product or part thereof at no charge to the purchaser for parts and labor. The Product must be returned to HEKA Instruments Incorporated properly packaged with a written explanation of the problem, with transportation charges prepaid and the shipment fully insured. The Customer is responsible for all duties, taxes, and freight charges, if applicable. HEKA Instruments Incorporated will return the Product, postpaid and insured, in the most appropriate method as determined by HEKA Instruments Incorporated. If the Customer desires a faster shipping service, the Customer must pay any additional special delivery expenses.

This warranty does not apply to shipping damage. HEKA Instruments Incorporated fully insures all shipments. Any claims of damage upon receipt must be filed with the carrier and HEKA Instruments Incorporated immediately.

This warranty does not apply to any exterior appearance item of the Product which has been damaged or defaced, which has been subjected to misuse and abuse, abnormal service or handling, or which has been altered or modified in design or construction.

This warranty does not apply to any interconnection cables supplied with the Product.

This warranty does not apply if any unauthorized repairs, modifications or alterations have been made to the Product, without written approval from HEKA Instruments Incorporated.

This warranty applies to software products only to the extent of maintenance release software to correct improper operation of the Product. Software updates to increase the capabilities of the present Product are not to be provided under the terms of this warranty. Updates will be available for free download on <http://www.heka.com/>.

No sales organizations, other than HEKA Instruments Incorporated itself, are authorized to make any warranties other than those described above, or to extend the duration of any warranties beyond the time period described above on the behalf of HEKA Instruments Incorporated. If HEKA Instruments Incorporated agrees to such a modification of this warranty, HEKA Instruments Incorporated will furnish a modified copy of this agreement, which must be presented if a claim is being made under these modified terms.

## **7.2 Limitation of Liability**

Title, risk of loss or damage, and other incidents of ownership shall pass to the customer upon due tender of goods.

HEKA Instruments Incorporated shall not be liable for delays in delivery or failure to perform due directly or indirectly to (i) causes beyond HEKA Instruments Incorporated reasonable control, (ii) acts of God, acts (including failure to act) of any governmental authority (de jure or de facto), wars (declared or undeclared), governmental priorities, port congestion, riots, terrorism, revolutions, fires, floods, sabotage, nuclear incidents, earthquakes, storms, epidemics, or (iii) inabilities, due to causes beyond HEKA Instruments Incorporated reasonable control, to obtain necessary labor, materials, components, facilities, energy, fuel, transportation, governmental authorizations or instructions, material or information required from the customer.

Notwithstanding any other provisions, the total limitations of HEKA Instruments Incorporated, including its subcontractors or suppliers, on any and all claims, whether in contract, warranty, or otherwise, arising out of, connected with, or resulting from the performance or non-performance of any agreement resulting here from or from the manufacture, sale, delivery, resale, repair, replacement or use of any equipment or the furnishing of any service, shall not exceed the price allocable to the Product or service which gives rise to the claim. Any such liability shall terminate upon the expiration of the warranty period (one year from the shipping date of invoice), except as to title.

Notwithstanding any other provisions, in no event, whether as a result of breach of contract, warranty, or otherwise, shall HEKA Instruments Incorporated, or its subcontractors or suppliers, be liable for any special consequential, incidental, indirect or exemplary damages, including, but not limited to, loss of profit or revenues, loss of use of the equipment or any associated equipment, cost of capital, cost of substitute goods, facilities, services or replacement power, downtime costs or claims of Customer's clients for such damages.

## **7.3 Obtaining Warranty Service**

Warranty service of this Product can be obtained by returning the Product, post paid and insured, to HEKA Instruments Incorporated, or one of its sales agents. Prior authorization before shipping the product is advised for the most expedient service.

## **7.4 Obtaining Out-of-Warranty Service**

HEKA Instruments Incorporated takes pride on its superb, long-standing repair and maintenance service of its products. In fact, support is still available for the HEKA produced EPC 7 - also known as List amplifier - which was introduced in 1982.

If a unit requires service after the warranty period has expired, please contact HEKA Instruments Incorporated service department for consultation. If return of the unit is necessary, then shipping instructions will be provided. Once the unit has been received

and diagnosed, a repair quote will be supplied for approval. Repairs are warranted for 90 days.

## **7.5 Technical Support**

HEKA Instruments Incorporated provides exceptional pre and post sales customer support from our trained international sales representatives. Customer support is free of charge for registered users of HEKA products.

Check the HEKA website, [www.heka.com](http://www.heka.com), for updated versions of driver and/or application software. There are also many tutorial documents available that may help resolve product-specific questions. If the problem is not resolved, please supply the following information when corresponding:

- Serial number of the InstruTECH USB-16 interface
- Operating system version
- Driver software version number
- Application software version number
- Detailed information describing the problem