

Acquisition Amplification Antivibration Cell Injection Iontophoresis Noise Elimination Manipulation
Micro-incubation Patch-clamp Perfusion Pipette Manufacture Software Stimulation

Need More Lab Space?

The NeuroLog System provides researchers with a versatile and modular system ideally suited to a range of electrophysiological applications, such as intracellular and extracellular recording, isolated EEG or EMG amplification as well as numerous pulse generation and signal conditioning tasks.

The standard NeuroLog System Case & Power Unit (NL900D) has space for up to 13 modules, however, some of you may find your particular application would only require 3 or 4 modules, making the NL900D seem larger than necessary.

With this in mind, Digitimer have recently designed a **Compact Case & Power Unit (NL905)** which will be ideal for applications requiring no more than 4 modules. The NL905 is fully compatible with all existing NeuroLog System modules, incorporates many of the features included in the NL900D, but is a fraction of the size.



Inside Digitimes 2005

Products Focus - Digitimer now represents three manufacturers of **Incubators and Chambers**, here we illustrate the range of incubation products we can now offer. Whether you need a temperature controlled incubator for **in vitro mammalian cell or slice electrophysiology** or just a simple chamber for **holding Xenopus Oocytes during TEVC recording**, our range of complementary products can provide a practical solution.

Developments - A busy year has seen the arrival of the **New Compact NL905 Neurolog System Case** headlined above, which has space for up to 4 Neurolog Modules. In the Clinical Product Area, our **DS5 Computer Controlled Bipolar Constant Current Stimulator** is in the very final stages of development. Here we provide the first pictures of this new clinical stimulator which we hope to have in full production as you read this.

News from Our Partners - Our annual newsletter gives us the opportunity to update all our customers with news from the various companies we represent, including new products and product enhancements.

Other Stimulating Solutions from Digitimer

Human Nerve & Muscle Stimulation

Our **DS7A/AH High Voltage Constant Current Stimulators** are a very popular choice for percutaneous stimulation within clinical or research environments. The stimulator provides a variable compliance of up to 400V, allowing a maximum current of 100mA (1A with the DS7AH).

The stimulator has a built in trigger button, but also accepts TTL trigger input via a BNC socket on the rear of the unit or triggering from a footswitch. A TTL output, also on the rear, allows triggering of recording equipment. The DS7A has 6 selectable stimulus durations of between 50 μ s and 2000 μ s (restricted to 50-200 μ s with the DS7AH). Electrodes (not supplied) are connected to the stimulator via touch-proof safety sockets. Electrode extension cables or plugs are available from Digitimer.



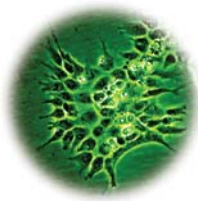
Adding MEPs to Intra-Operative Monitoring

The **D185 MultiPulse Cortical Stimulator** is now used worldwide to help monitor the health of descending spinal cord functions during spinal and aortic surgery.

Transcranial electrical stimulation results in motor evoked potentials that travel down the spinal cord to recording sites on the extremities. Changes in the characteristics of these potentials provide surgeons with crucial feedback relating to the health of the spinal cord. The D185 was the first and only standalone stimulator to be cleared by the FDA for this application. Today, with an output of up to 1000V it remains the most powerful transcranial stimulator available, making intraoperative monitoring an option for patients with pre-existing neuropathologies. Furthermore, the D185 is portable, easily integrated with most intraoperative monitoring systems and provides a cost effective means of adding MEP monitoring to your recording protocols.



Product FOCUS



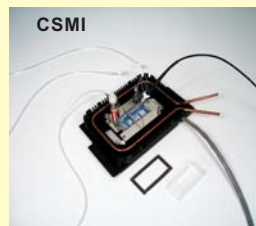
incubators and chambers



Temperature Controlled Micro-incubators from Medical Systems

Digitimer supply & support the full range of Medical Systems temperature controlled micro-incubators. Whether you are working on brain or other tissue slices, cultured or acutely dissociated cells, require static or perfused conditions, there is likely to be an incubator to meet your requirements. The Open Perfusion (PDMI-2), Patch Slice (PSMI) and Chamber Slide (CSMI) incubators feature Peltier controlled heating and cooling via the TC202A bipolar temperature controller unit, allowing temperatures to be maintained between 0°C and 50°C (with

optional water jacket). The PSMI has a low profile design specifically for use with upright microscopes when patch clamp recording from brain slices. The PDMI-2 is designed for use with inverted microscopes and is more suitable for imaging & patch-clamp applications using isolated cells in disposable 35mm petri dishes or the dedicated MSC-TD Teflon/glass coverslip dish. As well as the Peltier driven chambers, there are a number of heated incubators, including the Leiden (LU-CB-1) micro-incubator and Brain Slice Chamber (BSC).



AutoMate OPC-1 Xenopus Oocyte Perfusion Chamber

The **AutoMate** OPC-1 is a perfusion chamber designed for very low volume (<20µl) perfusion of Xenopus oocytes during two electrode voltage clamp recording. The chamber is supplied with stage adapters to fit popular stereo microscopes. The low chamber volume means that drug applications can be performed rapidly, improving efficiency and leading to less solution wastage. As an option, it can be supplied with the micromanifold shown.



AutoMate PCP-1 Petri Dish Perfusion Chamber

The **AutoMate** PCP-1 is a perspex insert designed to fit inside standard disposable 35mm petri dishes, allowing bath perfusion of isolated cells. Hidden inflow and adjustable outflow routes to the dish provide liquid fluctuation dampening and bubble prevention features.

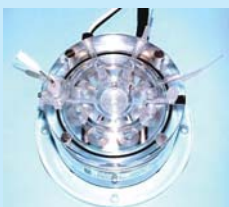
Both the OPC-1 and PCP-1 are fully compatible with the perfusion systems manufactured by AutoMate Scientific.

PCP-1

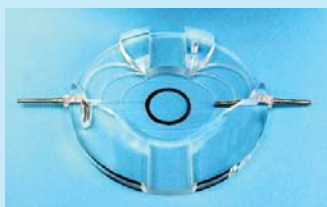
Brain Slice Chambers from Scientific Systems Design Inc.

We are pleased to announce that Digitimer now represents Canadian-based **Scientific Systems Design Inc.**, which specializes in the design and manufacture of instrumentation for neuroscience. Their product range currently includes an array of recording chambers specifically designed for the recording requirements of neuroscientists. They currently offer three types of brain slice chamber, each providing alternative features. The BSC1 chamber is suitable for submerged or interface recording from a single slice, while the BSC2 can be configured for single

or double slice interface recording. The BSC3 is a six well chamber for submerged or interface recording. Each well is supplied by a separate perfusion line making it an ideal chamber for high throughput pharmacological studies. Scientific Systems Design also manufacture a range of microscope stage chambers, including the MS1 (pictured). All SSD chambers can be heated using the PTC03 low noise temperature controller.



BSC1



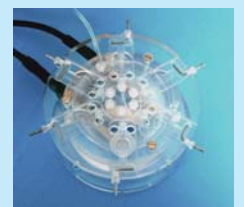
MS1



PTC03



BSC2



BSC3

Developments@Digitimer

Your Idea Could Become Our Next Product

For over thirty years Digitimer has provided life scientists and clinicians with tools designed for medical and research applications. Many of our products started life as ideas suggested to Digitimer by existing customers who were unable to find the device they needed or the function they required within the existing range of available instrumentation.

Using our design and production expertise as well as our detailed knowledge of the requirements of the medical device directive and CE certification procedures, we are often able to provide a solution for our customers. This can be in the form of either modifications to existing products or the development of new ones.

If you are a scientist or engineer working in the academic or private sector, please feel free to contact us in order to discuss how we can help with any product ideas you might have.



The First Look at the DS5 Computer Controlled Stimulator New Developments In Peripheral Nerve Diagnostics

We are pleased to announce the imminent launch of our NEW DS5 Bipolar Constant Current Stimulator. This eagerly anticipated device should be in production as this issue of Digitimes goes to the press. Although the DS5 has been primarily designed for clinical studies of peripheral nerves using threshold tracking techniques, we hope it will prove an extremely popular stimulator amongst researchers who want to safely apply a computer controlled constant current stimulus to a patient or research subject.



DS5 Bipolar Constant Current Stimulator

Unlike other clinical stimulators, the DS5 is not a traditional "pulse stimulator". Instead, the DS5 will produce an isolated constant current stimulus proportional to a voltage applied at its input, with the shape of the input waveform describing the shape of the stimulus. As a result, when driven by a computer running appropriate software, the DS5 is capable of generating a stimulus consisting of multiple components including sine waves, ramps, square waves or totally arbitrary waveforms. The DS5 has been developed in collaboration with Professor Hugh Bostock (Institute of Neurology, London), who has produced a specialist software package known as QTRAC which can be used with the DS5 to facilitate the threshold tracking measurements alluded to above. QTRAC monitors the EMG signal recorded from a subject and compares this with a "target response". The resultant error signal is used to modulate the amplitude of

the test stimulus. Once a baseline level of excitability is established, conditioning pulses can be applied to examine their effect on the excitability of the nerve being studied.

The DS5 stimulator has four input voltage ranges: $\pm 1V$, $\pm 2.5V$, $\pm 5V$ and $\pm 10V$ making it widely compatible with other laboratory hardware. Three stimulus output ranges are included: $\pm 10mA$, $\pm 25mA$ and $\pm 50mA$, with selection either by front panel controls or Windows PC Control Software (via USB connection). On the rear of the device are two BNC sockets, one accepting the voltage input waveform, the other providing a Monitor Output, allowing the stimulus waveform to be fed into a data acquisition system so it can be recorded alongside your EMG data.

NL905 Compact NeuroLog System Case - Half the Size... Twice as Convenient

Until now EVERY NeuroLog System sold by Digitimer has included our standard 19" rack mountable NL900 Case & Power Supply Unit. While the NL900 has gone through several incarnations over the years, it has always allowed for installation of up to 13 standard width NeuroLog modules. In response to customer feedback, we recently decided that it was time for us to offer our customers a choice of NeuroLog System Cases, so that those of you needing only a few modules could house them in a smaller case, which would not only take up less room on a bench, but would also be more portable and less expensive.



NL905 Stimulation Configuration

The NL905 Compact Case & Power Supply Unit is a fully featured version of the NL900D Neurolog System Case, but only allows for installation of up to 4 single width NeuroLog modules. Four module bays will typically provide enough space for a four channel isolated EMG amplifier with filtering options; an extracellular micro-electrode amplifier with filtering and spike detection or a pulse train generator/constant current stimulator (as shown above).

The NL905 has a front panel power switch and LED as well as a module locking bar - all features familiar to current NeuroLog users. The case has flip-out feet so it can be bench mounted at an angle for easier access to the controls. The NL905 is finished in grey with a Nextel suede coating, making it extremely abrasion resistant.

NeuroLog
SYSTEM





Flyion Flyscreen 8500

The last few years have seen an increasing number of companies offer patch-clamp systems providing enhanced levels of automation and parallel task processing. The ability to screen for ion channel activity has implications not only in the discovery of new

drugs whose therapeutic action is via an ion channel, but also in toxicology screening of new drug candidates with the aim of identifying adverse reactions mediated through ionotropic effects.

One of the leading companies in this patch clamp revolution is Flyion, based in Germany, which has developed a novel approach to automated patch clamping. "Flip the Tip" technology turns traditional patch clamping inside out, by facilitating whole cell recordings from cells that are held with a high resistance seal inside the tip of a traditional glass electrode. The **Flyscreen 8500** (pictured) uses racks of these specially mounted FlipTips in combination with a totally automated liquid and cell handling robot to make recordings from up to 6 cells asynchronously. The **Flyscreen 8500** makes use of the HEKA EPC10 patch clamp amplifier (a six channel system requiring two EPC10 Triple amplifiers). The FlyScreen

Suite software provides the control interface although HEKA's PatchMaster Software operates in the background and can be accessed at any time.

Through their partnership with Flyion, HEKA Elektronik offer a two



channel Academic Version of the **Flyscreen 8500**, which in the UK is available exclusively from Digitimer. It is hoped that this two channel version would be within the budgetary reach of



HEKA EPC10 Patch Clamp Amplifier

some academic institutions, perhaps as part of a core facility within a department or institute. Each system is supplied with a HEKA EPC10 Double amplifier although it is possible to upgrade your existing EPC9 or EPC10 system to a Flyscreen 8500.

Please contact Digitimer for full details on the full range of patch-clamp hardware and software available from HEKA as well as data acquisition hardware and software products from Instrutech and Bruxton.

Don't Forget We Can Also Source Many Complementary Items Including Anti-vibration Tables & Microscopes

If you are putting together a grant application, ask us to quote you as a single source supplier



Compact Mechanical Manipulators for Non-Robotic Patch Clamp Applications!

NMN-21 Manual Operation for Simplicity & High Performance



NMN-21

Drift and electromagnetic disturbance are critical problems in patch clamping work and this mechanical micromanipulator was developed specifically for patch clamping: it does not employ a liquid hydraulic system, has no spring and is not driven by a motor. Its body is designed to absorb vibrations, so that even at high magnifications, problems of "jitter" are virtually non-existent. Based on a drum type design and with a very stable centre of gravity, this model provides you with exceptional performance. The overall design is compact, so installation requires a minimum of space. With coarse and fine manipulators integrated in the compact body, the NMN-21 handles the full range of required movements from positioning a pipette within the field of view to placement of the pipette tip against a cell. The micromanipulator can be mounted directly on the isolation table with the NMN-C magnetic stand (sold

separately). For attachment to the microscope, a suitable adaptor is required.

NMN-25 Narrow Body Design for Multi-Channel Recording

The NMN-25 features a thin driving unit ideal for multi-channel recording. In addition, the placement of handles in one direction instead of three and the adoption of a simpler holder fixing section, enables several manipulators to be installed and operated close together without interfering with each other. When mounted on a large isolation platform, multiple manipulators can be directed at the preparation. Like the NMN-21, this manual manipulator integrates coarse and fine movements and employs a body design which absorbs vibrations. As a result, operation is precise and stable - free from concerns about drifting and electromagnetic disturbance. A suitable adaptor is required for microscope attachment.

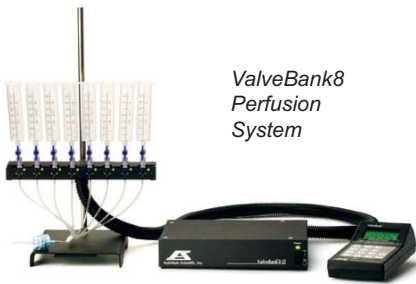


NMN-25

Narishige manufacture a wide range of micro-manipulation, cell injection and pipette fabrication equipment. Please browse their products online at www.digitimer.com or request a brochure from us.

Perfusion Products Flowing Along the AutoMate Pipeline

AutoMate Scientific have announced the US launch of two new products to complement their existing range of valve controlled perfusion systems and chambers. Digitimer look forward to being able to offer the SmartSquirt and ThermoClamp in the coming months, once they have been CE certified for sale in Europe.



*ValveBank8
Perfusion
System*

The **SmartSquirt** is a low volume pressurised drug application system allowing you to deliver as little as 100µl of precious drugs and switch between them in milliseconds while perfusing from a single tip. Cross-contamination is minimised with "BackStop" back-flow prevention and a special 3-way relief valve design stops liquid flow quickly. Ejection timing is managed by the AutoMate ValveBank or ValveLink valve controllers, whilst the valves themselves and the pressure controls are housed in small box near the microscope. The system Includes a pressurised large-volume reservoir for buffer. The **SmartSquirt** is perfect for programmable dispensing, microinjection, perfusion or spritzing of reproducible micro-litre volumes.

The **ThermoClamp Temperature Controller and Heated Perfusion Pencil** provide you with an effective means to control bath and perfusate temperature simultaneously during rapid, switchable drug application. Thermocouples within the pencil and bath allow ThermoClamp to control the bath temperature within 1°C of your set point. Flow rates of up to 5ml/min can be achieved while maintaining the bath temperature at a stable 37°C.



*SmartSquirt Pressurised
Drug Delivery System*



ThermoClamp Temperature Controller



Heated Perfusion Pencil



50Hz/60Hz Mains Noise Removal without Filtering



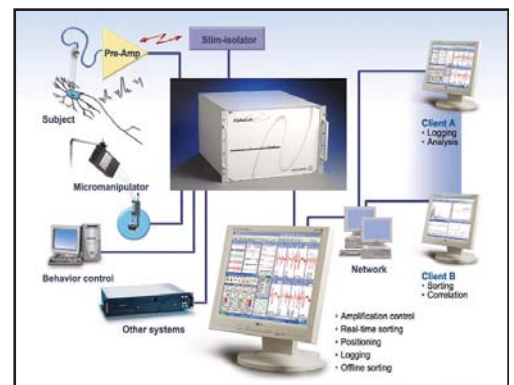
A remarkable device from Quest Scientific, the HumBug removes unwanted mains noise from an analogue signal without any of the "side effects" of filtering. The HumBug continuously monitors the mains noise and subtracts it from the signal in real time, without any waveform distortion, frequency loss, DC shift, signal attenuation or phase errors. If you have a problem with excessive mains interference and you haven't been able to remove it effectively by conventional means, then perhaps the HumBug is for you. Please contact Digitimer to arrange a no obligation loan.



Maximize Your Data Collection with the NEW AlphaLab Pro The Complete Microelectrode Recording System

Integrated into a single console, the AlphaLab allows you to manage your experiment from a single software interface and stream the data to several other computers in a network. In addition, you can sort spikes in real time and perform various data analyses while you are running the experiment. This setup maximizes your time efficiency as you no longer have to wait until the end of the experiment before starting data processing. In addition, because all instruments can be accessed from one computer, you no longer have to run between different systems to change settings. The fully featured AlphaLab system can offer the following: Electrode Manipulation; Signal Amplification & Filtering; Acquisition of Spike, LFP, Digital and Coded Events; Realtime Spike Discrimination & Analysis; Offline Spike Sorting & Correlation and Data Streaming to Multiple Computers.

OTHER NEWS FROM ALPHA OMEGA - The Alpha Spike Detector (ASD) now features enhanced template definitions, allowing you to control the number of template points as well as the spacing between them. All Alpha Omega products now support TCP (Transmission Control Protocol), meaning workloads can be split between computers. Data recorded using their clinical systems can now be saved in Plexon or CED format for subsequent analysis.



Other Digitimer Products

D380 Dye Marker: Battery Powered Iontophoresis for Cell Labelling

The **D380 Iontophoretic Marker** provides a compact and easy to use solution for dye labelling of cells or injection of pharmacological agents. Electrophysiologists often use an existing patch clamp amplifier to provide current to carry out such tasks, however, if these techniques are not already being used in the laboratory, alternative iontophoretic devices are often prohibitively expensive. The D380 provides a cost effective answer, delivering currents of up to $\pm 12\text{nA}$, with a holding current of up to $\pm 6\text{nA}$. A deblock button provides a means of removing blockages from the end of electrodes and an LCD display allows continuous monitoring of several parameters.



D380 Dye Marker

A Simple Source of Trigger Pulses & Delays



DG2A Trigger Generator

The **DG2A Trigger Generator** is a compact, free-standing, battery powered device which can be used to generate trigger pulses necessary for repetitive stimulation. Also featuring DELAY controls, it can be used for determining nerve or axonal Effective Refractory Period (ERP) through the production of a delayed second pulse.

Various modes allow output pulses to be produced singularly, continuously or in a burst, with the burst/train duration and pulse frequency determined by the front panel controls. In each of the modes (except FREE-RUN), outputs can be initiated either by the front panel push button, a TTL compatible trigger/gating pulse or a suitable foot switch. The unit is especially suitable for use with our range of isolated stimulators.

8-Channel Computer Controlled Isolated Amplifier

The **D360 8-Channel Isolated Amplifier** can be used for multi-channel AC amplification of electro-encephalography (EEG), evoked potential (EP), electro-cardiography (ECG) or electromyography (EMG) signals. The control software provides gain, filter, impedance checking and deblock functions. Analogue output to your acquisition interface is via connectors on the rear of the unit or from 8 BNC sockets on the front. The D360 has been designed within the requirements of the medical devices directive through implementation of the EN60601 Standard.



D360 8 Channel Isolated Amplifier

Isolated Constant Current or Constant Voltage Stimulators

The **Digitimer DS2A (constant voltage) and DS3 (constant current) Isolated Stimulators** are popular in electrophysiology laboratories all over the world. Their compact and user friendly design has generated a loyal following amongst researchers wishing to precisely stimulate nerve or muscle from an isolated power source.



DS3 - Constant Current

DS2A - Constant Voltage



Both units can be triggered manually using the front panel single-shot button or automatically in response to TTL compatible trigger pulses. In addition, pulse duration can be defined by (i) the settings of the front panel control dials (ii) the duration of the incoming trigger pulse or (iii) the length of time that the single-shot button is held down. Power for both stimulators is derived from eleven standard 9V batteries, which offer low noise, long life. Power is only drawn from the batteries when a stimulation pulse is passed. One or two stimulators can be 19" rack mounted using our D121-11 mounting frame. In addition, the mounting frame also accepts our DG2A Trigger Generator, a device which provides a simple method of repetitively triggering the DS2A or DS3.

MultiChannel Stimulation for Multiple Organ Baths

The **D330 MultiStim System** is a modular and versatile multi-channel stimulator for biomedical scientists requiring accurate *in vitro* stimulation of multiple low impedance tissue preparations with different stimulating voltages or currents. Timing modules are available to generate pulses, variable in frequency and duration, which can be controlled as trains using a gating waveform, variable in repetition rate and duration or pulse count. Sockets are fitted to allow full external control and synchronisation if required. The D330 MultiStim System comes as a 19" rack-mountable unit that can house up to ten stimulation channels - along with the pulse train generator, gating and meter modules. In order to help with module selection, a number of application diagrams are downloadable from the Support section of our website.



If enclosed, please use our Faxback Form. Alternatively, visit our website or contact us directly for further product & pricing information

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