

## DS2A-Mk.II & DS3 Isolated Stimulators

Brief pulses of electricity are used in various biomedical research applications as a stimulus to excite nerve or muscle fibres. Several factors need to be considered when choosing the right stimulator.

- In order to minimise artefacts introduced into electrophysiological data, it is desirable that the stimulator should be electrically isolated both from ground and from the trigger device.
- The voltage required to send current through tissues can vary greatly, making it important to have control over the stimulus driving force.
- Large impedance variations during an experiment can result in loss of the stimulus. In this event, a constant current stimulator may be more suitable.

Our two isolated stimulators either provide constant voltage (*DS2A-Mk.II*) or constant current (*DS3*), giving you the ability to choose the stimulator which best suits your experimental needs.

### DS2A-Mk.II Constant Voltage Stimulator

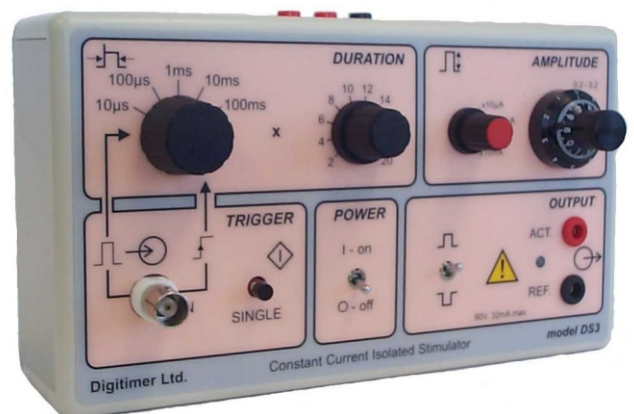


The latest version of the DS2A gives:

- External control of pulse duration.
- Overload protection circuit preventing current in excess of 50mA being delivered

### DS3 Constant Current Stimulator

- Four current ranges allow precise control of output between 2µA and 32mA.
- Output discharge (Clamp) circuit prevents capacitance build-up during stimulus trains, which is important to prevent stimulus loss.
- 90V compliance provided.



**Both units feature:**

- Accurate and reproducible stimulus characteristics.
- Switchable polarity, variable output and duration ranges (20µs to 2s).
- External pulse duration control through the BNC trigger input.
- A single-shot button, which operates irrespective of trigger inputs.
- Cases manufactured from insulating material may be rack mounted using an optional mounting frame (Model D121-11) available from **Digitimer Ltd.**
- Power provided by standard batteries. Note that current is only drawn during pulse delivery.

# Technical Specifications

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<b>Output:</b>	<b>DS2A-Mk.II (Constant voltage)</b> Two ranges provide 99V (high) and 9V (low) maximum output. A multi-turn dial allows output to be selected as a percentage of maximum. Square wave pulse profile with typical rise time $<1\mu\text{s}$ and fall time $<3\mu\text{s}$ into resistive load. <b>DS3 (Constant current)</b> Output between $2\mu\text{A}$ and $32\text{mA}$ . Control is achieved by a variable range switch with four selections ( $10\mu\text{A}$ , $100\mu\text{A}$ , $1\text{mA}$ , $10\text{mA}$ ) and a three-turn dial. Pulses from high impedance stimulators (constant current units) can result in cells “charging-up” between stimuli, leading to stimulus loss. This problem has been overcome in the DS3, which has an <b>Output Discharge (Clamp) Circuit</b> that operates for $20\mu\text{s}$ after each stimulus pulse. This will discharge cells with capacitances as high as $1000\text{pF}$ .
<b>Pulse Duration:</b>	Range: $20\mu\text{s}$ to 2s. One dial allows continuous adjustment from 2 to 20, while another is used to select the range (from $10\mu\text{s}$ , $100\mu\text{s}$ , $1\text{ms}$ , $10\text{ms}$ , $100\text{ms}$ or external source). Internal pulse duration values have $\pm 10\%$ accuracy.
<b>Output terminals:</b>	A pair of 2mm touch-proof sockets on the front panel spaced at 0.75”.
<b>Polarity Switch:</b>	<i>Normal:</i> Red output terminal positive. <i>Reverse:</i> Red output terminal negative.
<b>Indicator:</b>	An LED operates for the duration of each output pulse.
<b>Compliance: (DS3 only)</b>	90V from 10 x 9V batteries. This reduces to 87V at the top of each output range. Note that battery voltage will drop from 9V to $\sim 6\text{V}$ with “old” batteries.
<b>Overload: (DS2A only)</b>	An automatic overload circuit prevents excessive output current being drawn by reducing the output pulse duration to $<10\mu\text{s}$ when a current of greater than $50\text{mA}$ is detected.
<b>Single Shot:</b>	A single-shot push button is provided. This operates at all times irrespective of trigger input.
<b>Trigger:</b>	A positive pulse of between 3V and 20V is required to trigger the stimulator. The trigger input current varies from $6\text{mA}$ to $62\text{mA}$ over the above voltage range. Trigger pulse duration should not normally be less than $4\mu\text{s}$ .
<b>Trigger Isolation:</b>	Optical coupling is employed between the trigger source and the stimulator circuitry. The capacity coupling is less than $3\text{pF}$ .
<b>Batteries:</b>	11 x PP3, IEC-6R61 style batteries. Current is only drawn when delivering a pulse. Note that battery test sockets are built-in.
<b>Mounting:</b>	One or two stimulators may be mounted in a 19” rack using a specially fabricated frame (model D121-11) available from <b>Digitimer Ltd.</b>
<b>Dimensions:</b>	Panel size: $190\text{mm} \times 110\text{mm}$ . Depth: $80\text{mm}$ over knobs.
<b>Weight:</b>	$800\text{g}$ complete with batteries.

Digitimer reserve the right to alter specifications and price without prior notification



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**Digitimer Ltd**, 37 Hydeway, Welwyn Garden City, Hertfordshire, AL7 3BE, England

**Tel.** +44 (0)1707 328347; **Fax:** +44 (0)1707 373153;

**E-mail:** sales@digitimer.com; **Website:** www.digitimer.com

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