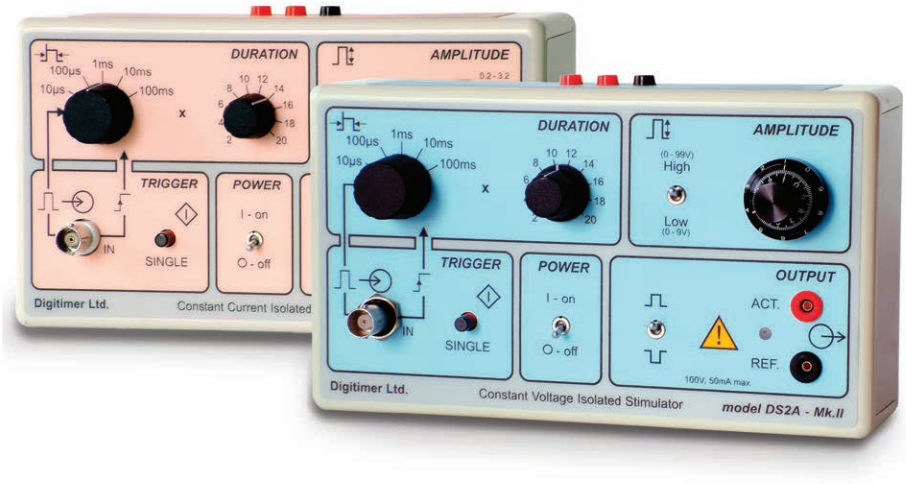
Deliver precise constant voltage or current stimuli.



DS2A Constant Voltage, DS3 Constant Current, DS4 Bi-phasic Stimulus Isolators

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

- In order to minimize artifacts introduced into electrophysiological data, it is desirable to electrically isolated the stimulator from both ground and 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 three isolated stimulators either provide constant voltage (DS2A), constant current (DS3), or bi-phasic output (DS4) giving you the ability to choose the stimulator which best suits your experimental needs.

DS2A Constant Voltage Stimulator

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

DS3 Constant Current Stimulator

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

DS2A & DS3 Features:

- Accurate and reproducible stimulus characteristics.
- Switchable polarity, variable output and duration ranges (20 µs to 2 sec).
- 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 AutoMate Scientific.
- Power provided by standard batteries. Note that current is only drawn during pulse delivery.

DS4 Bi-phasic Stimulator

- Voltage input ranges of ±1V, ±2.5V, ±5V and ±10V.
- Output in 4 overlapping ranges of ±10µA, ±100µA, ±1mA & ±10mA)
- ±48 V compliance provided.
- GATE input allows multiple DS4's connected to one DAC out.

Additional Specifications

DS2A & DS3 Trigger

A positive pulse between 3 V and 20 V is required to trigger these stimulators. The trigger input current varies from 6 mA to 62 mA over the above voltage range. Trigger pulse duration should not normally be less than 4 µs.

DS2A & DS3 Pulse Duration

Range: 20 µs to 2 sec. One dial allows continuous adjustment from 2 to 20, while another is used to select the range (from 10 µs, 100 µs, 1 ms, 10 ms, 100 ms or external source) with ±10% accuracy.

Trigger Isolation

Optical coupling is employed between the trigger source and the stimulator circuitry. The capacity coupling is less than 3 pF.

Batteries (DS2a & DS3)
11 x PP3 9V, IEC-6R61 style batteries. Current is only drawn when delivering a pulse. Note that battery test sockets are built-in.

Batteries (DS4)
The DS4 includes a ±15V external power supply or accepts 10x 12V GP23A batteries.

Mounting
One or two stimulators may be mounted in a 19" rack using a specially fabricated frame (model D121-11) available from AutoMate Scientific.

Dimensions
Panel size: 190 mm x 110 mm.

Weight
800 g complete with batteries

Output terminals
A pair of 2 mm touch-proof sockets on the front panel spaced at 0.75".

Indicator
An LED operates for the duration of each output pulse.

Technical Specifications

- **Output:**
  DS2A-Mk.II (Constant voltage): Two ranges provide 99 V (high) and 9 V (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 µs and fall time <3 µs into resistive load.

  DS3 (Constant current): Output between 2 µA and 32 mA. Control is achieved by a variable range switch with four selections (10 µA, 100 µA, 1mA, 10 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 Output Discharge (Clamp) Circuit that operates for 20 µs after each stimulus pulse. This will discharge cells with capacitances as high as 1000 pF.

  DS4 (Bi-phasic): Bi-phasic constant current proportional to the input voltage up to 5 kHz signals. ±10µA; ±100µA; ±1mA; ±10mA for a full scale input. >2µs duration. An "inactivity sensor" reduces battery usage and damaging "leak currents" during infrequent stimulation, while maintaining low levels of zero crossing distortion for repetitive waveforms.

Ordering Information

Part No.	Isolated Stimulators
DS2A	Constant voltage stimulator
DS3	Constant current stimulator
DS4	Bi-phasic stimulator
D121-11	19" rack frame for two stimulators or DG2A

International prices add 20%. Email or visit web store for latest prices.

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