



# Time Electronics

## 1010 DC Voltage Calibrator



- **0.01 $\mu$ V to 10V in 5 ranges**
- **Accuracy 0.02%**
- **10ppm/hr stability**
- **30mA output current**
- **Safety terminals**
- **Battery or mains operation**
- **40 hours typical use between charges**
- **Battery level indicator**
- **Optional carry case**

### DESCRIPTION

A highly stable and accurate mains or battery powered calibrator suitable for applications requiring a precision voltage source of low internal resistance. It has five ranges up to 10V with a resolution up to 0.01 $\mu$ V. The compact and robust design make it easily portable and well suited to laboratory, field and industrial use. A carry case is available to house the instrument for transport or storage.

Voltage outputs are set by selecting the range switch and dialling up the desired value on the thumbwheel switch. Output polarity may be selected using the normal/off/reverse switch.

The calibrator's output resistance is typically 500m $\Omega$  on the 10V, 1V and 0.1V ranges. The maximum output current that can be drawn on these ranges is limited to 25mA maintaining specification. The lower ranges have an output resistance of 1 $\Omega$  and will supply current up to 30mA.

A precision zener diode is used as a reference source that provides an input to a F.E.T. chopper amplifier system operating in a feedback stabilised mode. The gain value is determined by a set of precision metal film resistors, selected by the 5-decade thumbwheel switch on the front panel. The output voltage is variable from 0.01 $\mu$ V to 9.9999V in 5 ranges.

For complete reliability, the calibrator range switch employs two contacts in parallel for each position in case one contact fails, ensuring the calibrator will still function correctly.

The 1010 can be powered from mains supply or by the internal rechargeable battery pack. When the calibrator is plugged into the mains supply the internal batteries will automatically start to recharge. If unplugged from the mains during operation the internal batteries will continue to power the instrument. Full charge allows 40 hours typical use. The battery condition monitored by a meter on the front panel.

**Safety Terminals:** Fitted as standard and fully compatible with 4mm shrouded plugs, as well as standard plugs, bare wires, and spade terminals.

### APPLICATIONS

The 1010 can be used for calibration, linearity, and gains stability measurements on DC amplifiers, digital and electronic voltmeters, data loggers and chart recorders. It's high 10ppm per hour stability and very low noise levels are ideal for these types of applications.

# 1010 Specifications

## TECHNICAL SPECIFICATION

Output .....	0 to 9.9999V in 5 ranges 0 to 9.9999V in 100 $\mu$ V steps 0 to 999.99mV in 10 $\mu$ V steps 0 to 99.999mV in 1 $\mu$ V steps 0 to 9.9999mV in 0.1 $\mu$ V steps 0 to 999.99 $\mu$ V in 0.01 $\mu$ V steps
Accuracy .....	10V & 1V ranges: $\pm$ 0.02% of setting + $\pm$ 0.005% of range. 100mV range: $\pm$ 0.05% of setting + $\pm$ 0.005% of range, $\pm$ 1 $\mu$ V. 10mV & 1mV ranges: $\pm$ 0.05% of setting + $\pm$ 0.005% of range, $\pm$ 4 $\mu$ V.
Output Resistance .....	10V, 1V, & 100mV ranges Less than 0.1 $\Omega$ (typically 0.05 $\Omega$ ). 10mV & 1mV ranges 1 $\Omega$ .
Maximum Output Current .....	10V, 1V & 100mV ranges = 25mA. 10mV & 1mV ranges = up to short circuit value 30mA, although it should be noted that loads of greater than 1k $\Omega$ will give greater than 0.1% error.
Maximum Overload .....	The instrument can withstand continuous short circuit on the output for all ranges. The 10V, 1V & 100mV ranges have an automatic output current limit set at approximately 30mA.
Output Voltage Stability .....	Less than 30ppm per $^{\circ}$ C (0 to +50 $^{\circ}$ C). Less than 5ppm per V variation in supply voltage. Less than 75ppm per year. Less than 10ppm per hour at constant temperature.
Output Polarity .....	Positive or negative switch selected. A centre 'off' position is also provided.
Output Noise Level .....	10V, 1V, & 100mV ranges = less than 10ppm of setting $\pm$ 2 $\mu$ V (0 to 10Hz). 10mV & 1mV ranges = less than $\pm$ 0.05 $\mu$ V (0 to 10 Hz).
Reference Sources .....	Precision zener diode selected after a special ageing process for a temperature coefficient better than 5 ppm per $^{\circ}$ C and stability better than 10ppm per month, non cumulative.
Power Supply .....	Time Electronics power unit type PU2 which is housed in the rear of the 1010. The PU2 will power the 1010 direct from the mains or an internal rechargeable battery. The battery is automatically charged when mains power is connected. Access to the power supply is from the back of instrument.
Battery Level Indicator .....	A front panel display provides a continuous indication of the battery state.

## GENERAL SPECIFICATION

Dimensions .....	W217 x H160 x D193mm
Weight .....	3.3kg
Optional Extras .....	Carry Case Calibration Certificates – traceable to NPL and UKAS
Country of Origin .....	UK

## ORDERING INFORMATION

1010 .....	DC Voltage Calibrator
9021 .....	Carry Case
C151 .....	Factory (NPL Traceable) Calibration Certificate
C102 .....	UKAS Calibration Certificate (ISO 17025)

Due to continuous development Time Electronics reserves the right to change specifications without prior notice.

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