



1010 DC Millivolt Calibrator

Time Electronics

Calibration, Test & Measurement

- **0.01uV to 10V**
- **0.02% Accuracy**
- **Battery / Mains operation**
- **30mA Output Current**
- **10 ppm/hr Stability**
- **Safety Terminals**



The **1010** is a solid state battery powered instrument suitable for applications requiring a precision voltage source of low internal resistance. It has five ranges up to 10V with a resolution up to 0.01uV. Its small size, robust construction and independence of mains power make it easily portable and convenient for laboratory, field and industrial use.

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 Ω 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 ohm and will supply current up to 30mA.

Operation is from battery or mains. When the calibrator is plugged into the mains supply, the internal batteries are automatically recharged. The internal batteries will operate the calibrator when unplugged from the mains. Battery condition can be monitored by the meter on the front panel.

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 0.01uV 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.

Applications include 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 this type of application.

1010 Technical Specifications

Output:	0 – 9.9999V in 5 ranges 0 – 9.9999V in 100 μ V steps 0 – 999.99mV in 10 μ V steps 0 – 99.999mV in 1 μ V steps 0 – 9.9999mV in 0.1 μ V steps 0 – 999.99 μ V in 0.01 μ 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 ohm (typically 0.05 ohms). 10mV & 1mV ranges 1 ohm.
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 1kohm 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 and 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 provided.
Output Noise Level:	10V, 1V 100mV ranges – less than 10ppm of setting $\pm 2 \mu$ V (0-10Hz). 10mV & 1mV ranges – less than $\pm 0.05\mu$ V (0-10 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:	215 x 175 x 190 mm
Weight:	3.3kg
Optional Extras:	Carrying Case Calibration Certificate traceable to NPL UKAS Calibration Certificate

Ordering Information

Code	Description
1010	DC Millivolt Calibrator
9021	Carrying Case
9151	Factory (NPL Traceable) Calibration Certificate
9102	UKAS Calibration Certificate (ISO 17025)

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