



Time Electronics 1010 DC Voltage Calibrator



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 10 V with a resolution up to $0.01 \mu\text{V}$. 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 output resistance is typically $500 \text{ m}\Omega$ on the 10 V, 1 V and 0.1 V ranges. The maximum output current that can be drawn on these ranges is limited to 25 mA maintaining specification. The lower ranges have an output resistance of 1Ω and will supply current up to 30 mA.

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 $0.01 \mu\text{V}$ to 9.9999 V 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 output connections are via safety terminals that are compatible with 4 mm shrouded plugs, standard plugs, bare wires, and spade terminals. These terminals are specifically designed with safety features including limited opening distance and a raised flange around the metal connection surface. This ensures that the clearances are sufficient to make the exposed metal parts touch-proof.

Features

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

Portable Operation

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. An LED indicator on the front panel displays the battery condition.

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 10 ppm per hour stability and very low noise levels are ideal for these types of applications.



Technical Specifications

Output.....	0 to 9.9999 V in 5 ranges: 10 V range: 0 to 9.9999 V in 100 μ V steps. 1 V range: 0 to 999.99 mV in 10 μ V steps. 100 mV range: 0 to 99.999 mV in 1 μ V steps. 10 mV range: 0 to 9.9999 mV in 0.1 μ V steps. 1 mV range: 0 to 999.99 μ V in 0.01 μ V steps.
Accuracy	10 V and 1 V ranges: $\pm$ (0.02 % of setting + 0.005 % of range). 100 mV range: $\pm$ (0.05 % of setting + 0.005 % of range + 1 μ V). 10 mV and 1 mV ranges: $\pm$ (0.05 % of setting + 0.005 % of range + 4 μ V).
Output resistance	10 V, 1 V, and 100 mV ranges: Less than 0.1 Ω (typically 0.05 Ω). 10 mV and 1 mV ranges: 1 Ω .
Maximum output current	10 V, 1 V and 100 mV ranges: 25 mA. 10 mV & 1 mV ranges: Up to short circuit value 30 mA, <i>Note: Loads of greater than 1 kΩ will give greater than 0.1 % error.</i>
Maximum overload	The instrument can withstand continuous short circuit on the output for all ranges. The 10 V, 1 V and 100 mV ranges have an automatic output current limit set at approximately 30 mA.
Output voltage stability	Less than 30 ppm per $^{\circ}$ C (0 to + 50 $^{\circ}$ C). Less than 5 ppm per V variation in supply voltage. Less than 75 ppm per year. Less than 10 ppm per hour at constant temperature.
Output polarity	Positive or negative switch selected. A centre 'off' position is also provided.
Output noise level	10 V, 1 V, & 100 mV ranges: Less than 10 ppm of setting $\pm$ 2 μ V (0 to 10 Hz). 10 mV & 1 mV ranges: Less than $\pm$ 0.05 μ V (0 to 10 Hz).
Reference source	Precision zener diode selected after a special ageing process for a temperature coefficient better than 5 ppm per $^{\circ}$ C and stability better than 10 ppm 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 LED provides an indication of the battery condition.

General Specifications

Dimensions	W 217 x H 160 x D 193 mm.
Weight.....	3.3 kg.
Optional extras	Leather carry case. Calibration certificates - traceable (Factory) or accredited (ISO 17025).
Country of origin.....	UK.

Ordering Information

1010.....	DC Voltage Calibrator
9021.....	Carry case
C151	Traceable calibration certificate (Factory)
C102	Accredited calibration certificate (ISO 17025)

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