

# Test Equipment Solutions Datasheet

Test Equipment Solutions Ltd specialise in the second user sale, rental and distribution of quality test & measurement (T&M) equipment. We stock all major equipment types such as spectrum analyzers, signal generators, oscilloscopes, power meters, logic analysers etc from all the major suppliers such as Agilent, Tektronix, Anritsu and Rohde & Schwarz.

We are focused at the professional end of the marketplace, primarily working with customers for whom high performance, quality and service are key, whilst realising the cost savings that second user equipment offers. As such, we fully test & refurbish equipment in our in-house, traceable Lab. Items are supplied with manuals, accessories and typically a full no-quibble 1 year warranty. Our staff have extensive backgrounds in T&M, totalling over 150 years of combined experience, which enables us to deliver industry-leading service and support. We endeavour to be customer focused in every way right down to the detail, such as offering free delivery on sales, presenting flexible technical + commercial solutions and supplying a loan unit during warranty repair, if available.

As well as the headline benefit of cost saving, second user offers shorter lead times, higher reliability and multivendor solutions. Rental, of course, is ideal for shorter term needs and offers fast delivery, flexibility, try-before-you-buy, zero capital expenditure, lower risk and off balance sheet accounting. Both second user and rental improve the key business measure of Return On Capital Employed.

We are based at Aldermaston in the UK from where we supply test equipment worldwide. Our facility incorporates Sales, Support, Admin, Logistics and our own in-house Lab.

All products supplied by Test Equipment Solutions include:

- No-quibble parts & labour warranty (we provide transport for UK mainland addresses).
- Free loan equipment during warranty repair, if available.
- Full electrical, mechanical and safety refurbishment in our 40GHz in-house Lab.
- Certificate of Conformance (calibration available on request).
- Manuals and accessories required for normal operation.
- Free insured delivery to your UK mainland address (sales).
- Support from our team of seasoned Test & Measurement engineers.
- ISO9001 quality assurance.

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# Multifunction Calibrator

- DCV, ACV, DCI, ACI and  $\Omega$  Functions
- True 1kV AC Performance from a Single Unit
- Configurable to Meet Individual Requirements
- IEEE-488, Autocal, 4101B and 4600 Compatible
- Calibrates DMMs of up to 6 1/2 Digit Scale Length

Over 90% of the typical calibration facility DMM workload consists of a range of instruments varying in performance and capabilities from simple handheld multimeters to the latest generation of mid-performance 5 1/2 and 6 1/2 digit systems DMMs. For these instruments, the model 4700 offers the most cost-effective calibration solution available, providing the necessary performance at an economic price.

## DC and AC Voltage

The standard instrument will source DC voltages from 10 nV to 200V with 90 day,  $\pm 1^\circ\text{C}$  specifications to 4 ppm, which provides a sufficient margin of accuracy over the latest generation of mid-performance half and full rack systems DMMs. With AC voltages from 90 mV to 200V to within 120 ppm, the 4700 is capable of calibrating all but the most accurate AC-measuring meters. The output capability of both functions may be extended to 1100V by the high voltage option. This is resident within the calibrator which is then capable of sour-

cing, from a single, compact unit, the high voltage-high frequency test points required by today's systems DMMs.

## Resistance and Current

Fully floating, high accuracy DC and AC currents are generated using a voltage to current converter which incorporates specially developed low loss shunts and is driven from either the DCV or ACV sections of the calibrator. For applications that require higher currents, such as the calibration of handheld multimeters, the model 4600 Transconductance Amplifier extends the current functions to 11A. Resistance outputs are derived from eight fixed value, hermetically sealed standard resistors, each being 4-wire or 2-wire connected to the output terminals, using ultra high isolation relay switches.

## Flexibility and Ease of Use

A major design objective of the 4700 was to make it simple and straightforward to operate. Rapid rolling up/down keys are used for fast and easy setting of ampli-

tude and frequency. The selected output is displayed on a high brightness display, while the patented spec. readout feature eliminates the need to make complex and tedious calculations of the accuracy of the applied signal. Deviation controls—Error and Offset—enable the output of the calibrator to be varied from that indicated on the main output display, useful for checking the linearity and calibration of measuring instruments.

The 4700 is not limited to applications inside the calibration laboratory. Its rugged construction and insensitivity to temperature variations (specifications are available for  $23^\circ\text{C} \pm 10^\circ\text{C}$  operation) mean that the instrument is equally suited to applications outside of the traditional calibration environment. As an accurate test source or stimulus, the 4700 provides a highly cost effective solution to meet the growing requirements in A.T.E.s for improved test accuracy and confidence. For example, the basic 4700—without any options—can

be installed as an Integral source within an ATE rack to provide accurate, stable, programmable DC and AC voltages up to 200V.

In addition, the instrument is compatible with the Datron 4101B Multimeter Calibration software package. Together, the 4700 (optionally configured with the model 4600) and 4101B can form the basis of a compact, rugged and highly versatile automated calibration system capable of calibrating any multimeter from simple handhelds up to 5 1/2 and 1/2 digit systems DMMs.

### SPECIFICATIONS

#### DC Voltage

**Ranges:** 100  $\mu$ V to 1000V in decades.  
**Full scale:** 2 x range except 1000V range, where max output is 1100V.  
**Resolution:** 1 digit in 19,999,999 or 10 nV, whichever is greater.  
**Accuracy:** 90 days, 23°C  $\pm$  1°C:  $\pm$ (ppm Output + ppmFS)  
 100  $\mu$ V to 100 mV Ranges: 6 + 0.8  $\mu$ V  
 1V Range: 6 + 0.8  
 10V Range: 4 + 0.5  
 100V Range: 6 + 1.0  
 1000V Range (Option 10): 6 + 0.5  
**Sensing:** Selectable remote/local sensing on 1V to 1000V ranges.  
**Guarding:** Selectable remote/local guarding.  
**Settling Time:** <1s to 10 ppm of step size.  
**Output Impedance/Max output current:** 100  $\mu$ V to 100 mV ranges: 100 $\Omega$ .  
 1V to 1000V range: 25 mA max.

#### AC Voltage

**Ranges:** 1 mV to 1000V in decades.  
**Full scale:** 2 x range except 1000V range, where max output is 1100V.  
**Resolution:** 1 digit in 1,999,999 or 100 nV, whichever is greater.  
**Frequency:** Ranges: 100 Hz to 1 MHz in decade steps. Resolution: 1% of range.  
**Accuracy:**  $\pm$ 100 ppm.  
**Sensing:** Selectable remote/local sensing on 1V to 1000V ranges.  
**Guarding:** Selectable remote/local guarding.  
**Maximum Capacitive Load:** 1000 pF on 1V to 100V ranges, 300 pF on 1000V range.  
**Accuracy:** 90 days, 23°C  $\pm$  1°C:  $\pm$ (ppm Output + ppmFS)  
 1 mV to 100 mV Ranges  
 10 to 31 Hz: 250 + 60 + 10  $\mu$ V  
 32 Hz to 33 kHz: 200 + 40 + 10  $\mu$ V  
 30k to 100 kHz: 600 + 60 + 10  $\mu$ V  
 100k to 330 kHz: 0.2% + 0.02% + 20  $\mu$ V  
 300k to 1 MHz: 0.6% + 0.2% + 30  $\mu$ V

#### 1V and 10V Ranges

10 to 31 Hz: 200 + 40  
 32 Hz to 33 kHz: 120 + 20  
 30k to 100 kHz: 200 + 30  
 100k to 330 kHz: 600 + 200  
 300k to 1 MHz: 0.4% + 0.1%

#### 100V Range

10 to 31 Hz: 200 + 40  
 32 Hz to 33 kHz: 120 + 20  
 30k to 100 kHz: 250 + 40

#### 1000V Range (Option 10)

45 to 330 Hz: 200 + 50  
 300 Hz to 10 kHz: 150 + 50  
 10k to 33 kHz: 250 + 50

**Settling times:** To 100ppm of step size.

10 to 32 Hz: <10s  
 33 to 330 Hz: <3s  
 >330 Hz: <1s

#### DC Current (Option 20)

**Ranges:** 100  $\mu$ A to 1A in decades.

**Full scale:** 2 x range.

**Resolution:** 1 digit in 1,999,999 or 100pA, whichever is greater.

**Accuracy:** 90 days, 23°C  $\pm$  1°C:  $\pm$ (ppm Output + ppmFS)

100  $\mu$ A Range: 50 + 10

1 mA Range: 40 + 7

10 mA Range: 40 + 7

100 mA Range: 40 + 7

1A Range: 100 + 15

10A Range: (Requires Model 4600): 60 + 25

**Guarding:** Selectable remote/local guarding.

#### AC Current (Option 20)

**Ranges:** 100  $\mu$ A to 1A in decades.

**Full scale:** 2 x range.

**Resolution:** 1 digit in 1,999,999 or 100 pA, whichever is greater.

**Accuracy:** 90 days, 23°C  $\pm$  1°C:  $\pm$ (ppm Output + ppmFS)

#### 100 $\mu$ A Range

10 Hz to 1 kHz: 400 + 80

1k to 5 kHz: 550 + 100

#### 1 mA Range

10 Hz to 1 kHz: 220 + 80

1k to 5 kHz: 350 + 80

#### 10 mA Range

10 Hz to 1 kHz: 220 + 80

1k to 5 kHz: 350 + 80

#### 100 mA Range

10 Hz to 1 kHz: 220 + 80

1k to 5 kHz: 350 + 80

#### 1A Range

10 Hz to 1 kHz: 400 + 80

1k to 5 kHz: 550 + 100

10A Range: (Requires Model 4600):

10 Hz to 1 kHz: 400 + 95

1k to 5 kHz: 820 + 90

**Guarding:** Selectable remote/local guarding.

#### Resistance (Option 20)

**Ranges:** 10 $\Omega$  to 100 M $\Omega$  in decades (Ranges are nominal, actual calibrated values are displayed).

**Connections:** Selectable 2 or 4-wire, remote/local guard.

**Display resolution:** 1 digit in 19,999,999.

**Accuracy:** 90 days, 23°C  $\pm$  1°C:  $\pm$ (ppm Output):

10 $\Omega$ : 20  
 100 $\Omega$ , 1 k $\Omega$ , 10 k $\Omega$ , 100 k $\Omega$ : 6  
 1M $\Omega$ : 20  
 10M $\Omega$ : 50  
 100M $\Omega$ : 100

### GENERAL

**Calibration:** Autocal from front panel or via the IEEE-488 interface.

#### Environmental

**Operating Temp:** 0° to +50°C.

**Storage Temp:** -40°C to +70°C.

**Dimensions:** 178 mm (7 in.) high, 455 mm (17.9 in.) wide, 563 mm (22.2 in.) deep.

**Weight:** 36 kg (80 lb).

**Power:** 100/120/220/240 Vac  $\pm$ 10%, 50 Hz or 60 Hz. Consumption 370 VA standby, 660 VA full power.

### OPTIONS

10: 1000V Ranges for DCV and ACV

20: DCI, ACI and  $\Omega$

42: Alternative Rear Output

80: 115V 60Hz line operation.

81: 115V 50Hz line operation.

90: Rack Mounting Kit

### FACTORY/FOB

Indianapolis, IN & Norwich, England

### ORDER INFORMATION

Model 4700

Option 10

Option 20

Option 42

Option 80

Option 81

Option 90