

# 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 as Standard
- ACV Output from 10 Hz to 100 kHz
- True 1kV AC Performance from a Single Unit
- IEEE-488, Autocal, 4101B and 4600 Compatible
- Calibrates DMMs of up to 5 1/2 Digit Scale Length

The model 4705 is a low cost, fully multi-function, programmable calibrator which has all functions fitted as standard. It is designed to calibrate DMMs of up to 5 1/2 digit scale length without the addition of external performance enhancement techniques, such as the use of a standards DMM to monitor the output.

An IEEE-488 interface is fitted as standard, so the unit can readily be integrated into a cost effective automated calibration system. Furthermore, its rugged construction makes it ideal for applications outside of the calibration laboratory, while its insensitivity to temperature variations ensures that a minimal loss of accuracy is experienced when the unit is installed in an A.T.E. rack.

## DC and AC Voltage

The 4705 is capable of sourcing continuously variable DC voltages from 100 nV to 1100V with 90 day,  $\pm 1^\circ\text{C}$  specifications to 15 ppm, and so has a comfortable

margin of calibration accuracy over those 5 1/2 digit DMMs and below that constitute 80% of the typical calibration laboratory DMM workload. The outputs are truly bipolar, which removes the need for an operator to change test lead connections when a change of polarity is required.

AC voltages are available from 90 mV to 1100V, at frequencies continuously variable between 10 Hz and 100 kHz, with 90 day,  $\pm 1^\circ\text{C}$  specifications to 250 ppm. The solid state 1000V range drive circuitry is integral to the unit, and is able to drive a capacitive load of 300 pF. This means that all of the high voltage-high frequency test points required by today's 4 1/2 to 5 1/2 digit bench and lower performance systems instruments may be sourced by a single, compact unit.

## Resistance and Current

The 4705 will source continuously variable DC and AC currents to 2A, with 90 day,  $\pm 1^\circ\text{C}$  specifications to 50 ppm and 220 ppm respectively. For applications

that require higher currents, such as calibration of handheld multimeters, the model 4600 Transconductance Amplifier extends the current function to 11A. The resistance function makes resistances between 10 $\Omega$  and 100 M $\Omega$  available, in both 2 and 4-wire configurations, with 90 day,  $\pm 1^\circ\text{C}$  specifications to 6ppm.

## Flexibility and Ease of Use

A major design objective of the 4705 was to make it simple and straightforward to operate. Rapid rolling up/down keys are used for fast and easy setting of amplitude 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.

In addition, the instrument is compatible with the Datron 4101B Multimeter Calibration software package. Together, the 4705 (optionally configured with the model 4600) and 4101B can form the basis of a compact, rugged, cost-effective and highly versatile automated calibration system capable of calibrating any multimeter from simple handhelds up to 5 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 1,999,999 or 100 nV, whichever is greater.  
**Accuracy:** 90 day, 23°C  $\pm$  1°C:  $\pm$ (ppm Out-put + ppmFS)  
 100 mV to  
 100 mV Ranges: 15 + 1  $\mu$ V  
 1V Range: 15 + 1  
 10V Range: 15 + 1  
 100V Range: 15 + 1  
 1000V Range: 15 + 1

**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 mV to 100 mV ranges: 100  $\Omega$

1V to 1000V ranges: 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 199,999 or 1  $\mu$ V, 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 VpF on 1V to 100V ranges, 300 VpF on 1000V range.

**Accuracy:** 90 day, 23°C  $\pm$  1°C:  $\pm$ (ppm Out-put + ppmFS)

#### 1 mV to 100 mV Ranges:

300 + 60 + 10  $\mu$ V (10 - 31 Hz)

250 + 60 + 10  $\mu$ V (32 Hz - 33 kHz)

800 + 80 + 10  $\mu$ V (30k - 100 kHz)

#### 1V, 10V, 100V Ranges:

300 + 60 (10 - 31 Hz)

250 + 50 (32 Hz - 33 kHz)

300 + 80 (30k - 100 kHz)

#### 1000V Range:

300 + 60 (45 - 330 Hz)

250 + 50 (300 - 10 kHz)

300 + 80 (10k - 33 kHz)

**Settling times:** to 100 ppm of step size:

<10s (10-32 Hz), <3s (33-330 Hz), <1s

(>330 Hz).

#### DC Current

**Ranges:** 100 mA to 1A in decades.

**Full scale:** 2 x range.

**Resolution:** 1 digit in 199,999 or 1 nA, whichever is greater.

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

100  $\mu$ A, 1 mA, 10 mA and 100 mA Ranges:

50 + 15

1A Range: 115 + 20

10A Range (Requires Model 4600):

65 + 25

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

#### AC Current

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

**Full scale:** 2 x range.

**Resolution:** 1 digit in 199,999 or 1 nA, whichever is greater.

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

100  $\mu$ A Range:

400 + 80 (10 Hz - 1 kHz)

550 + 100 (1k - 5 kHz)

1 mA, 10 mA and 100 mA Ranges:

220 + 80 (10 Hz - 1 kHz)

350 + 80 (1k - 5 kHz)

1A Range:

400 + 80 (10 Hz - 1 kHz)

550 + 100 (1k - 5 kHz)

10A Range: (Requires Model 4600)

500 + 115 (10Hz - 1 kHz)

950 + 120 (1k-5 kHz)

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

#### Resistance

**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 1,999,999.

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

**Output:**

10  $\Omega$  30

100  $\Omega$ , 1 k $\Omega$ , 10 k $\Omega$  & 100 k $\Omega$  6

1M $\Omega$  25

10M $\Omega$  100

100M $\Omega$  125

### GENERAL

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

**Environmental:**

Operating temp: 0°C 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

42: Alternative Rear Output

80: 115V 60 Hz Line Operation

81: 115V 50 Hz Line Operation

90: Rack Mounting Kit

### FACTORY/FOB

Indianapolis, IN & Norwich, England

### ORDER INFORMATION

**Model 4705**

**Option 42**

**Option 80**

**Option 81**

**Option 90**