Multifunction Calibrator

- **DCV, ACV, DCI, ACI and Ω 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 5½ Digit Scale Length**

The model 4705 is a low cost, fully multifunction, programmable calibrator which has all functions fitted as standard. It is designed to calibrate DMMs of up to 5½ 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, ±1°C total uncertainties to 21 ppm, and so has a comfortable margin of calibration accuracy over those 5½ 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 90μV to 1100V, at frequencies continuously variable between 10 Hz and 100 kHz, with total 90 day, ±1°C uncertainties to 400 ppm. The solid state 1000V range drive circuitry is installed inside the unit, and is able to drive a capacitive load of 300pF. This means that all of the high voltage-high frequency test points required by today's 4½ to 5½ digit bench and lower performance systems instruments may be sourced by one single, compact unit.

Resistance and Current

The 4705 will source continuously variable DC and AC currents to 2A, with total 90 day, ±1°C uncertainties to 100 ppm and 555 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 10Ω and 100MΩ available, in both 2 and 4-wire configurations, with 90 day, ±1°C total uncertainties to 15 ppm.

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 at all times 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 differ from that indicated on the 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 5½ digit systems DMMs.

MODEL 4705

SPECIFICATIONS

DC Voltage

Ranges: 100μV to 1000V in decades.
Full scale: 2 x range except 1000V range, where max output=1100V.
Resolution: 1 digit in 1,999,999 or 100nV, whichever is greater.
Total Uncertainty: 90 day, 23° ±1°C (±ppm Output ±μV).

100μV to 100mV Ranges:	24±2
1V Range:	21±2
10V Range:	20±20
100V Range:	22±200
1000V Range:	25±2mV

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: 100μV to 100mV ranges: 100Ω.
1V to 1000V ranges: 25 mA max.

AC Voltage

Ranges: 1mV to 1000V in decades.
Full scale: 2 x range except 1000V range, where max output=1100V.
Resolution: 1 digit in 199,999 or 1μV, whichever is greater.
Frequency: Ranges: 100 Hz to 1 MHz in decade steps. Resolution: 1% of range. Accuracy <±100 ppm.
Sensing: Selectable remote/local sensing on 1V to 1000V ranges.
Guarding: Selectable remote/local guarding.
Maximum Capacitive load: 1000pF on 1V to 100V ranges, 300pF on 1000V range.
Total Uncertainty: 90 day, 23° ±1°C (±ppm Output±μV).

1mV Range:	
380±22	(10-31 Hz)
480±20	(32 Hz-33 kHz)
0.13%±21	(30-100 kHz)
10mV Range:	
380±23	(10-31 Hz)
480±21	(32 Hz-33 kHz)
0.13%±22	(30-100 kHz)
100mV Range:	
380±34	(10-31 Hz)
480±32	(32 Hz-33 kHz)
0.13%±37	(30-100 kHz)
1V Range:	
430±120	(10-31 Hz)
350±100	(32 Hz-33 kHz)
440±160	(30-100 kHz)
10V Range:	
430±1.2 mV	(10-31 Hz)
350±1 mV	(32 Hz-33 kHz)
440±1.6 mV	(30-100 kHz)
100V Range:	
430±12 mV	(10-31 Hz)
360±10 mV	(32 Hz-33 kHz)
470±16 mV	(30-100 kHz)
1000V Range:	
470±120 mV	(45-330 Hz)
390±100 mV	(300 Hz-10 kHz)
480±160 mV	(10-33 kHz)

Settling times: to 100 ppm of step size: <10s (10-32 Hz), <3s (33-330 Hz), <1s (>330 Hz).

DC Current

Ranges: 100μA to 1A in decades.
Full scale: 2 x range.
Resolution: 1 digit in 199,999 or 1nA, whichever is greater.
Total Uncertainty: 90 day, 23° ±1°C (±ppm Output±nA).

100μA Range:	84±3
1mA Range:	82±30
10mA Range:	82±300
100mA Range:	82±3μA
1A Range:	191±40μA
10A Range (Requires Model 4600):	95±520μA

Guarding: Selectable remote/local guarding.

AC Current

Ranges: 100μA to 1A in decades.
Full scale: 2 x range.
Resolution: 1 digit in 199,999 or 1nA, whichever is greater.
Total Uncertainty: 90 day, 23° ±1°C (±ppm Output±nA).

100μA Range:	
800±16	(10-1 kHz)
1450±20	(1k-5 kHz)
1mA Range:	
475±160	(10-1 kHz)
605±160	(1k-5 kHz)
10mA Range:	
475±1.6μA	(10-1 kHz)
605±1.6μA	(1k-5 kHz)
100mA Range:	
475±16μA	(10-1 kHz)
605±16μA	(1k-5 kHz)
1A Range:	
690±160μA	(10-1 kHz)
990±200μA	(1k-5 kHz)
10A Range: (Requires Model 4600)	
630±2.3mA	(10-1 kHz)
1230±2.4mA	(1k-5 kHz)

Guarding: Selectable remote/local guarding.

Resistance

Ranges: 10Ω to 100MΩ 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.
Total Uncertainty: 90 day, 23° ±1°C (±ppm Output).

10Ω	±55
100Ω & 1kΩ	±16
10kΩ	±15
100kΩ	±24
1MΩ	±62
10MΩ	±162
100MΩ	±325

GENERAL

Calibration: Autocal from front panel or via the IEEE-488 interface
Environmental:
Operating temp: 0° to +50°C.
Storage temp: −40° 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±10%, 50 Hz or 60 Hz. Consumption 370VA standby, 660VA full power.

CONFIGURATION

Model 4705: DCV, ACV, DCI, ACI and Ω functions IEEE-488 interface.

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