



— THE MODEL 4708 —
AUTOCAL MULTIFUNCTION STANDARD



INTERFAX SYSTEMS INC.

Suite 304, Discovery Park
3700 Gilmore Way, Burnaby, B.C.
(604) 430-1410 V5G 4M1

FLEXIBILITY

The 4708's architecture was designed so that the user may configure the unit to meet many different individual requirements. The basic mainframe may be configured with either the DCV option, the ACV option, or both, while the Resistance and Current option makes the unit fully multifunctional. Options may be retrofitted at any time, as required, ensuring that today's investment in equipment can be adapted to tomorrow's requirements.

ACCURACY & CAPABILITY

The unrivalled DC performance of the 4708 is ultimately derived from its zener reference module, which is the result of Datron's many years commitment to zener diode research. This hermetically encapsulated reference module is highly stable – through design as well as conditioning and selection – and offers exceptional performance over a wide temperature span. This combination ensures that the 4708's state of the art stability is maintained without any adjustments – even under difficult ambient measurement conditions.

The reference voltage is fed to an electronic reference divider, which uses pulse width modulation techniques to generate exceptionally low noise DC voltages linear to within 0.1ppm of full scale for the entire life of the instrument.

These features are especially important when calibrating the latest $7\frac{1}{2}$ and $8\frac{1}{2}$ digit systems and standards DMMs.

The 4708 generates unrivalled AC Voltage accuracies at continuously variable frequencies from 10Hz to 1MHz. For even higher performance, any one of five spot calibrated frequencies per range may be selected, enabling the unit to achieve extremely low uncertainties, previously attainable only through the use of complex and laborious thermal transfer standards.

ACV outputs are controlled by a totally electronic, true RMS, internal AC/DC transfer process, which has a wider dynamic range, a faster settling time and superior performance over a wider frequency range than traditional thermal methods permit. The solid state design ensures that the output settling time is not only fast but also totally predictable. This means that manual measurements can be made faster, and software generation is greatly simplified when the 4708 is used in a system.

The vast majority of today's DMMs – including many of the lower performance bench and handheld models – require calibration at frequencies higher than 1kHz on their high voltage ranges. Datron's technological lead in the design of high voltage amplifiers has allowed the installation of a true, full capability 1000V range inside the 4708, so that it can drive high voltages into real loads at high frequencies, such as 1100V at 33kHz or 750V at 100kHz. This means that these high voltage – high frequency tests may be made without the use of a boost amplifier, saving purchase and support costs, size and weight.

Decade resistances are provided by a number of fixed value, hermetically sealed standard resistors, which are 4-wire or 2-wire connected to the output terminals using high isolation relay switches. In addition, the Resistance and Current option generates fully floating, high accuracy DC and AC currents to 2A, using a voltage to current converter driven from the DC and AC voltage sections of the instrument. If higher currents are required, the 4708 is slave mode compatible with the 4600 Autocal Transconductance Amplifier, which effectively provides the calibrator with an 11A DC and RMS AC range.

In short, as well as being the world's most accurate programmable Multifunction calibrator, features such as the internal 1000V amplifier, the high current capability, low weight, low distortion, low noise, high linearity, fast settling times, wide dynamic range and flat frequency response mean that the 4708 provides unmatched all-round practicality and capability.



The Error and Offset functions allow the user to apply an offset of up to $\pm 2\%$ and a gain error of up to $\pm 10\%$ to the displayed output value. Use of these two functions makes offset, gain and linearity testing of DMMs simple and straightforward.

Datron's patented Spec Readout function eliminates the need for a user to make complex and time-consuming calculations on uncertainties. A ROM-based lookup table stores the 4708 specifications for every range of every function, and the microprocessor automatically makes the calculation and displays the uncertainty in the measurement.

PROGRAMMABILITY & SYSTEMS COMPATIBILITY

Every 4708 is equipped with an IEEE-488 interface as standard, to transform it from a bench top calibrator to a computer controllable systems instrument. Basic performance and speed are coupled with features such as programmable string terminators to enable it to adapt to a wide variety of systems configurations.

As well as ease and flexibility of control via the IEEE-488 digital interface, the 4708 provides all analog outputs from a single set of terminals, which are totally isolated when in the 'off' state, making analog connection within a test or calibration system very simple. Its ability to operate in an uncontrolled temperature environment means that the 4708 can be put to work in many different automated areas without having to worry about reduced performance or the need to compromise test specification requirements.

SAFETY

With particular concern for user protection, Datron engineers have devised extensive safety features for the 4708. Specially designed safety terminals guard against accidental contact with live parts while front panel key control of sense and guard connections removes the need for fitting exposed copper links between terminals at dangerously high voltages.

The output of any potentially hazardous voltage requires a fixed sequence of keystrokes, while an audible alarm warns of imminent danger and continues whenever high voltage levels are present. These interlocks are fixed under

hardware control which prevents the user inadvertently resetting to dangerous limits.

AUTO CAL

When traceability is a requirement, 100% confidence in the calibration of an instrument is of paramount importance. The only way to be confident in a calibration is through a process of complete and rigorous verification against traceable external standards. The 4708 employs Autocal, the Datron pioneered calibration technique, which stores digital corrections for analog errors measured at calibration. Using only front panel keystrokes, or the equivalent IEEE-488 interface commands, this method is fast, simple, complete, fully traceable and protected from misuse by a rear panel keyswitch.

THE MODEL 4708

AUTO CAL MULTIFUNCTION STANDARD

EASE OF USE

A major design objective of the 4708 was to make it simple and straightforward to operate. Rapid rolling up and down keys are used for fast and easy setting of amplitude and frequency, with two further keys provided to allow immediate selection of full range (eg 0.1, 1, 10 etc) and zero, the two most common DMM calibration points. For other values, once the required output is selected, decade switching may be performed with just one keypress, making it simple to calibrate at other test points.

4708 ABBREVIATED SPECIFICATIONS

FUNCTION	RANGE	FREQUENCY (Hz)	UNCERTAINTY ± (ppm Output + Floor)		
			24 Hour Relative to Cal Standards 23°C±1°C [1]	1 Year Total Uncertainty 23°C±5°C [2]	1 Year Spot Calibrated Total Uncertainty 23°C±5°C [2]
DC VOLTAGE [3]	100.00µV to 100.00000mV 1.000000V 10.000000V 100.00000V 1000.0000V		2 + 0.4µV	12 + 0.5µV	
			1 + 0.8µV 0.5 + 3µV 1 + 50µV 1 + 500µV	8 + 1µV 4.5 + 3µV 8 + 50µV 10 + 500µV	
AC VOLTAGE [6]	1.0000mV to 100.0000mV	10-31	90 + 5µV	140 + 6µV	120 + 6µV
		32-330	50 + 5µV	100 + 6µV	80 + 6µV
		300-10k	40 + 5µV	90 + 6µV	70 + 6µV
		10k-33k	50 + 5µV	240 + 6µV	220 + 6µV
		30k-100k	200 + 5µV	750 + 6µV	530 + 6µV
100k-330k	550 + 10µV [4]	1450 + 11µV [4]	800 + 6µV		
300k-1M	1250 + 22µV [5]	2450 + 23µV [5]	1450 + 6µV		
1.000000V	10-31	60 + 30µV	110 + 30µV	100	
		32-330	30 + 20µV	70 + 20µV	50
		300-33k	20 + 10µV	60 + 10µV	40
		30k-100k	50 + 20µV	130 + 20µV	100
		100k-330k	150 + 100µV	350 + 100µV	250
300k-1M	900 + 400µV	1800 + 400µV	1300		
10.000000V	10-31	60 + 300µV	110 + 300µV	100	
		32-330	30 + 200µV	70 + 200µV	50
		300-33k	20 + 100µV	60 + 100µV	50
		30k-100k	50 + 200µV	130 + 200µV	100
		100k-330k	150 + 1mV	350 + 1mV	250
300k-1M	900 + 4mV	1800 + 4mV	1300		
100.00000V	10-31	70 + 3mV	120 + 3mV	100	
		32-330	40 + 2mV	80 + 2mV	60
		300-10k	30 + 1mV	70 + 1mV	60
		10k-33k	40 + 2mV	80 + 2mV	60
		30k-100k	70 + 3mV	170 + 3mV	130
100k-200k	250 + 10mV	600 + 10mV	400		
1000.0000V	45-330	110 + 20mV	170 + 20mV	160	
		300-10k	70 + 20mV	130 + 20mV	120
		10k-33k	110 + 20mV	190 + 20mV	170
		30k-100k [7]	650 + 40mV	1050 + 40mV	250
RESISTANCE	10Ω		4	35	
	100Ω & 1kΩ		1.5	14	
	10kΩ		1.5	13	
	100kΩ		1.5	22	
	1MΩ		4	42	
	10MΩ		10	67	
	100MΩ		15	270	
DC CURRENT [9]	100.0000µA 1.000000mA 10.00000mA 100.0000mA 1.000000A 10.00000A [8]		10 + 2nA	109 + 2nA	
			5 + 10nA 5 + 100nA 5 + 1µA 10 + 20µA 30 + 500µA	49 + 10nA 49 + 100nA 49 + 1µA 121 + 20µA 150 + 500µA	
AC CURRENT [9]	100.0000µA	10-1k	160 + 6nA	700 + 16nA	450
		1k-5k	200 + 10nA	1150 + 20nA	800
	1.000000mA	10-1k	100 + 60nA	450 + 160nA	320
		1k-5k	150 + 60nA	550 + 160nA	320
	10.000000mA	10-1k	100 + 0.6µA	450 + 1.6µA	320
		1k-5k	150 + 0.6µA	550 + 1.6µA	320
100.00000mA	10-1k	100 + 6µA	450 + 16µA	320	
	1k-5k	150 + 6µA	550 + 16µA	320	
1.000000A	10-1k	400 + 60µA	600 + 160µA	350	
		550 + 100µA	850 + 200µA	500	
	1k-5k	220 + 1.4mA	520 + 1.5mA	480	
10.00000A [8]	1k-5k	670 + 1.5mA	1100 + 1.7mA	770	
	5k-20k	5000 + 25mA	8000 + 30mA	5000	

GENERAL	
POWER	100/120/220/240V±10%, 50Hz or 60Hz, 370VA (660VA Max).
OPERATING TEMPERATURE	0°C to +50°C.
STORAGE TEMPERATURE	-40°C to +70°C.
DIMENSIONS (H × W × D)	178mm × 455mm × 563mm (7" × 17.9" × 22.2").
WEIGHT	36kg (80lbs).
SAFETY	Designed to UL1244, IEC348, BS4743.
WARRANTY	1 year.

NOTES

- Relative Uncertainty specifications include all the effects of stability, temperature coefficient, noise, linearity, line and load regulation.
- Total Uncertainty specifications include all the effects listed in [1] plus calibration uncertainty relative to National Standards added arithmetically.
- Output current 25mA, except for 100µV to 100mV ranges which have a 100Ω output impedance.
- Add 2µV for 10mV range and 20µV for 100mV range.
- Add 18µV for 10mV range and 198µV for 100mV range.
- Output current/impedance:
1mV to 100mV: 30Ω
1V: 25mA
10V: 60mA
100V: 120mA
1000V: <3.3kHz, 15mA;
>3.0kHz, 65mA.
- 750V Max.
- Requires Model 4600 Transconductance Amplifier.
- Compliance 3Vrms to 2A, 2Vrms to 11A.

ORDERING INFORMATION

- 4708MF: Multifunction Mainframe
 Option 10: DC Voltage
 Option 20: AC Voltage
 Option 30: Ohms and Current (to 2A)
 (Requires Option 10, or 20, or both)
 Option 42: Alternative Rear Output
 Option 90: Rack Mount Kit
- 4600: 11A Transconductance Amplifier
 440151: Slave Mode Kit
 Option 90: Rack Mount Kit



THE WORLD'S MOST ACCURATE MULTIFUNCTION CALIBRATOR

The 4708 is the world's most accurate, fully multifunction, programmable calibrator. A major advance on the well proven and highly successful Datron 4700 series of calibrators, it is a single instrument capable – by itself – of calibrating today's highest accuracy $7\frac{1}{2}$ and $8\frac{1}{2}$ digit DMMs – offering performance and capability in up to five functions which even the best dedicated single function calibrators cannot match.

- The Ultimate in Very High Performance Multifunction Calibrators: total 1 year $\pm 5^{\circ}\text{C}$ uncertainties to better than 4.7ppm (DCV) and 40ppm (ACV).
- Flexibility for the Future – Configure as DCV only, ACV only or Fully Multifunction.
- Fully Variable ACV output from 10Hz to 1MHz, providing 1100V at 33kHz or 750V at 100kHz. No additional boost amplifier required.
- IEEE-488 Compatible.
- Extend Capabilities with the Model 4600 Autocal Transconductance Amplifier for high current calibration and the 4101B Software for PC-based automation.





THE DATRON CALIBRATION & MEASUREMENT RANGE

Datron Instruments leads the world in the design and manufacture of programmable calibrators, automated calibration systems and digital multimeters. Complementing the Datron Instruments range, other divisions within the Group are also engaged in the production of some of the world's finest test instruments. To assist you, data sheets are available with more detailed product information and full specifications. Contact us now and we will be pleased to send you the information you require.

UNITED KINGDOM

DATRON INSTRUMENTS LIMITED

Hurricane Way, Norwich Airport
Norwich, England NR6 6JB
Telephone: (0603) 404824
Fax: (0603) 483670
Telex: 975173

EUROPE

WAVETEK ELECTRONICS GmbH

Hans-Pinsel-Strasse 9-10
D-8013 Haar bei Munich
West Germany
Telephone (089) 46109-40
Fax: (089) 463223
Telex: 5212996

ASIA, PACIFIC & S. AMERICA

WAVETEK INTERNATIONAL SALES

9145 Balboa Avenue
San Diego, CA 92123
Telephone: (619) 450-9971
Fax: (619) 450-0325
TWX: (230) 756953

NORTH AMERICA

WAVETEK

WESTERN AREA SALES

9045 Balboa Avenue
San Diego, CA 92123
Telephone: (619) 565-9234
Fax: (619) 565-9558
TWX: (910) 335-2007

WAVETEK

SOUTHEAST AREA SALES

2085 US 19 North, Suite 102
Clearwater, Florida 33575
Telephone: (813) 797-1792
Fax: (813) 791-0779

WAVETEK

NORTHEAST AREA SALES

1 Executive Blvd, Suite 206
Suffern, New York 10901
Telephone: (914) 357-5544
Fax: (914) 357-5609

YOUR LOCAL AGENT/REPRESENTATIVE