

# 734 Series

## A New De Facto Standard for Handheld Digital Multimeters

Model

**73401**  
**73402**

4.5 digits

50,000 count

RS-232C

RMS

Terminal shutters

0.020% (73402, DCV)

0.040% (73401, DCV)

**3-year Warranty**



### Maximum Measurement Accuracy

- 0.020% rdg + 2 dgt (73402, DC voltage)
- 0.040% rdg + 2 dgt (73401, DC voltage)
- RMS measurement for AC and AC+DC measurement
- Superior frequency characteristic allows AC measurements from 10 Hz.

### Highly Reliable

#### Calibration screws/dials eliminated

Performance not influenced over time by external factors such as vibration or degradation of electrical contacts of calibration screws/dials.

- Recommended calibration period: 1 year – double the time for conventional 4.5-digit DMMs

### Easier Calibration

#### User calibration function

The 734 series, simply performing special operations via front panel allows for quick and reliable adjustment. In addition, the series allows for one-touch adjustment of AC voltage- and AC current-to-frequency characteristics that could not be adjusted automatically in the past. The user calibration function leads to improved operation efficiency and cost reduction.

- External standard instrument required for calibration.

### Full Support of Data Management

#### Measured data stored in internal memory

Storage Method:

50 data in manual-mode memory + 600 data in logging-mode memory

You can transmit stored data from internal memory to a personal computer, and process them using application software or spreadsheet software (Excel\*) for data management.

#### Supports real-time measurement

Allows you to connect to a personal computer for storing large amounts of data that cannot be stored in DMM internal memory.

- Optional communication package sold separately (Model 92010: communication cable and DMM application software) is required for data transfer.
- The communication cable employs an infrared system, so the device is electrically insulated.

\* Excel is a registered trademark of Microsoft Corporation, the United States.

### Safe Design

#### Shutters prevent erroneous insertion of test leads into current measurement terminals (terminal shutters)

The current terminals have terminal shutters that prevent erroneous setting of the measurement function and leadwire connections resulting from operational errors. The terminal shutters open and close according to the function switch position.

#### Conforms to EN61010-1 safety standard

Conforms to overvoltage category 1000 V AC/DC, CAT II and 600 V AC/DC, CAT III

### Loaded with Measurement Functions

#### Peak hold function (73402, for DC V/A measurement)

Supports waveforms of 1 ms or greater. You can capture instantaneous crest values not possible with ordinary maximum measurement functions.

#### Relative and percentage value computation

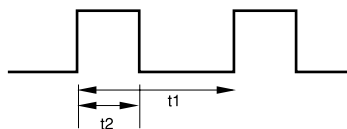
Can display the measured values as the values relative to a reference value (defined by the REL key; even after data hold) or as the percentages of the reference value.

Percentage calculation: (Measured value – reference value) / (reference value), expressed as percentage.

#### Duty ratio (%) measurement

Displays the duty ratio of a pulse waveform:

(High level period/1 cycle of waveform) x 100 = (t2/t1) x 100 [%]



#### AC+DC measurement

Measures RMS of a waveform in which ripple waveforms are superimposed on a direct current.

#### Auto hold

Automatically hold the data measured when the test leads are disconnected from the measured object, thus freeing both hands for performing reliable measurement.

#### Minimum/maximum/average display

Allows recording of minimum, maximum and average values along with their respective times (time passed since the start of measurement)

#### Decibel calculation

Computes the logarithm of an alternating current, and uses it together with the relative value computation to display the relative value. You can select the standard resistance according to the application, such as audio or communication circuit signal measurement.

\* Selectable standard resistance values:

4/8/16/32/50/75/93/110/125/135/150/200/250/300/500/600/800/900/1000/1200Ω

### Full Display Functions

#### 50,000-count, 51-segment bar graph display

#### Allows simultaneous display of frequency and voltage, frequency and duty ratio or decibels and voltage on dual display.

In addition to the above, the sub-display can display the reference value for differential calculation, memory storage numbers for measured data, minimum/maximum/average value recording times, and standard resistance during decibel calculation.

#### Back-lit display (73402)

### Shockproof elastomer casing

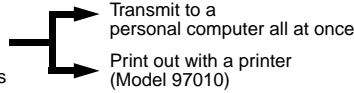
An elastomer material is used for the outer casing in order to provide shock absorption and a good grip, in keeping with the requirements of handheld devices.

Communication Functions and Application Software Allow Analyses and Management of Measurement Data

Data Storage Method

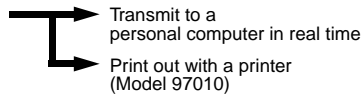
Data storage to DMM's internal memory

50 data values in manual-mode memory  
600 data values in logging-mode memory units



Saving real-time measured data to personal computer

Real-time measured data (only logging measurements)



The number of data that can be stored for real-time measurement depends more specifically on the life of the batteries in the DMM.  
Reference: The cell life of alkaline batteries is approximately 100 hours when transmitting data in real time while measuring DC voltages at 1-second periods.

Data Management

Management with special application software

You can display measured data as a table and trend graphs. Real-time data transmission allows you to see moment-to-moment changes at a glance. In addition, when displaying DMM data on a PC screen they are enlarged to allow you to easily discern new data.

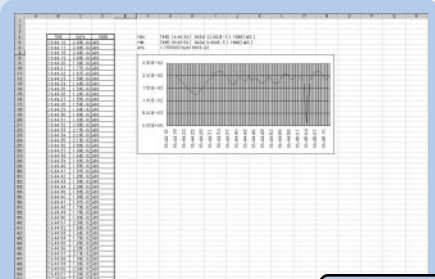
Data management with Excel\* spreadsheet software

The 92010 is provided with a function to import data to an Excel\* spreadsheet file, and graphs can be automatically drawn on the spreadsheet. This allows you to use Excel's extensive editing functions to prepare reports in original formats with ease.

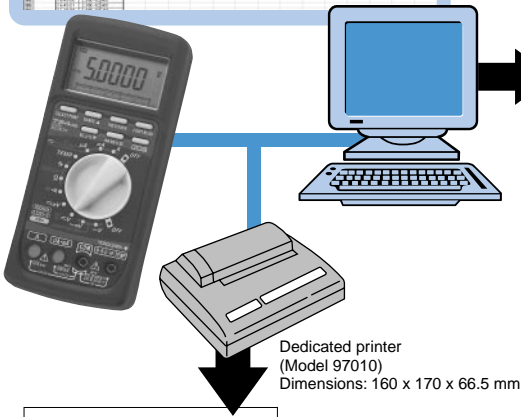
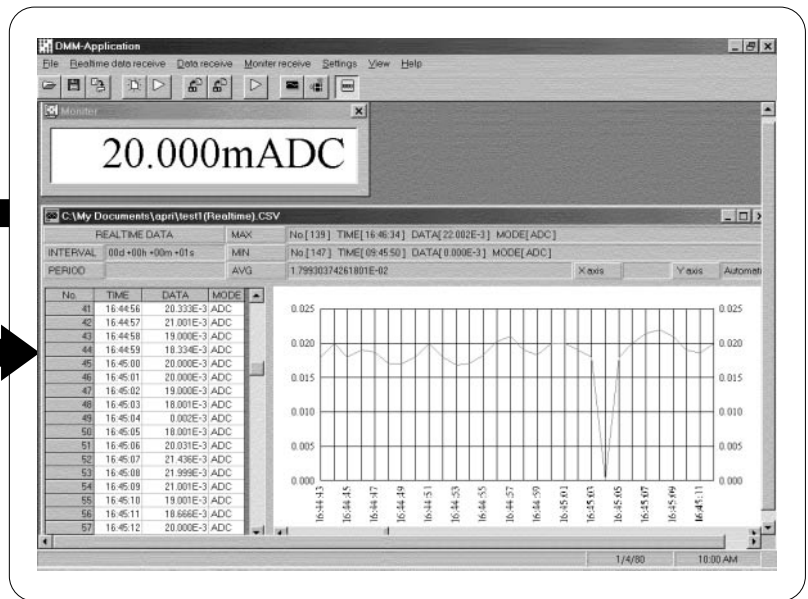
Note: During real-time measurement, importing data to an Excel spreadsheet generates only a table containing the measured values. Generation of a graph is possible after completion of measurement.

\* Excel is a registered trademark of Microsoft Corporation, the United States.

Data Layout Example on Excel\* Spreadsheet



Example of Document Windows in DMM Application Software



Example Printout of Stored Logging Data

L001 N,+0.9998 VDC  
L002 N,+0.9997 VDC  
L004 N,+0.9999 VDC  
L005 N,+0.9999 VDC  
L006 N,+0.9998 VDC  
L007 N,+0.9998 VDC  
L008 N,+0.9998 VDC  
L009 N,+0.9998 VDC  
L010 N,+0.9999 VDC  
L011 N,+0.9998 VDC  
L012 N,+0.9998 VDC  
L013 N,+0.9998 VDC  
L014 N,+1.0000 VDC  
L015 N,+0.9999 VDC  
L016 N,+1.0000 VDC  
L017 N,+1.0000 VDC  
L002 VDC

Characters represent the following information, starting from the left.

- L: Logging memory
- 3-digit numeral: Data number
- N: Normal measured value (O: "OL" indication on the DMM display)
- 5-digit numeral: Measured value
- VDC: Unit (example shows DC voltage)

92010 Communications Package Specifications

Communication cable

Cable length: Approximately 1.5 m  
Connector on the side of the PC: D-sub 9-pin

- A separate RS-232C cable (Model 91015) is required for connection to a printer.

Application software

System requirements of PC

Model: PC/AT compatible  
Operating system: Windows\* 98 or 95  
CPU: Pentium 100 MHz or higher recommended  
Memory: 16 MB or larger recommended  
CRT: 800 x 500 pixels of resolution or higher recommended

Logging interval Any setting from 1 second, minimum

- A computer with a higher CPU should be used if the computer fails to receive measured data.

\* Windows is a registered trademark of Microsoft Corporation, the United States.

**General Specifications of**

**73401 / 02**

**Optional Accessories**

Additional Functions	RS-232C, data memory, max/min value memory, relative /percentage value computation, logarithm computation, data/auto hold, peak hold (73402), overvoltage warning, backlight(73402)
Display	Digital display: 50,000-count digital reading and 51-segment bar graph
Measuring Rate	Digital display: 3 times/sec Bar graph display: 10 times/sec
Operating Temp. and Humidity	-10°C to 50°C; 80% RH or less at -10°C to 40°C, or 70% RH or less at 40°C to 50°C (no condensation)
Storage Temp. and Humidity	-25°C to 60°C, 70 RH or less (no condensation)
Temperature Coefficient	Add the accuracy 0.05%/°C to the basic accuracy at a temperature within -10°C to 18°C and 28°C to 50°C
Withstanding Voltage	5.55 kV, AC for 1 minute (between input terminals and casing)
Power Supply	Two AA (R6) dry cells
Battery Life	Approx. 120 hours (for continuous DC voltage measurement with alkaline cells)
Auto Power Off	The power is automatically turned off when no operation is made for approx. 20 minutes (can be disabled).
Dimensions	85 (W) x 191 (H) x 40 (D) mm
Weight	Approximately 450 g (including batteries)
Compliance with Standards	Safety EN61010-1 (1995); EN61010-2-031 (1995) (AC/DC 1000 V, CAT II; AC/DC600 V, CAT III) EMC EMI: EN55011 (1998); EN61326-1 (1998) + A1 (Class B, Group 1) EMS: EN50082-1 (1997); EN61326-1 (1998) + A1
Standard Accessories	Instruction manual:1, Test lead set (RD031):1, AA (R6) dry cells(built in):2

Name	Model	Specification
DMM communication package	92010-E	RS-232C cable + DMM software
Temperature probe	92010-E/P	As above + Model 91015
	90050	For liquids: -50°C to 600°C
	90051	For liquids: -50°C to 600°C
	90055	For surfaces: -20°C to 250°C
Carrying case (hard)	90056	For surfaces: -20°C to 500°C
	B9646HH	Houses the DMM and test leads.
Test leads	93014	Houses the DMM, probes, and RS-232C cable.
	RD031	Red / black (1 set)
Fuse	A1518EF	500 mA/600 V
Printer	A1519EF	15 A/600 V
	97010	
AC adapter for printer	94006	For Europe
Thermal printing paper	94007	For USA
	97080	10 rolls
RS-232C cable	91015	For printer connection (male-male; 9-pin D-sub)

**Performance**

Test conditions: Temperature and humidity = 23°C ± 5°C, 80% RH or less; Accuracy = ±(% rdg + dgt). Note: A response time is the time required for achieving the accuracy specified for the corresponding range.

**• DC Voltage Measurement (V)**

Range	Accuracy		Input Resistance	Maximum Input Voltage
	73401	73402		
50.000 mV	0.1 + 10	0.05 + 10	Approx. 100 MΩ	1000 Vrms AC, 1000 V DC
500.00 mV	0.04 + 2	0.02 + 2		
240.00 mV				
5.0000 V	0.07 + 2	0.025 + 5	10 MΩ	1000 Vrms AC, 1000 V DC
50.000 V				
500.00 V				
1000.0 V		0.03 + 2		

Response time: 1 second or less  
 NMRR: 80 dB or greater for 50/60 Hz ± 0.1%  
 CMRR: 120 dB or greater for 50/60 Hz (Rs = 1 kΩ)

**• AC Voltage Measurement (V)**

Model 73401 AC coupling, RMS detection, crest factor: <3

Range	Accuracy				Input Impedance	Maximum Input Voltage
	10 – 20 Hz	20 Hz – 1 kHz	1 – 10 kHz	10 – 20 kHz		
500.00 mV					11 MΩ, <50 pF	1000 Vrms AC, 1000 V DC
5.0000 V	*1	*1	*1	*2		
50.000 V	1.5+30	0.7+30	0.7+30	2+50		
500.00 V					10 MΩ, <50 pF	1000 Vrms AC, 1000 V DC
1000.0 V	*2	*2	3 + 30 *2			

Model 73402 AC coupling, RMS detection, crest factor: <3

Range	Accuracy					Input Impedance	Maximum Input Voltage
	10 – 20 Hz	20 Hz – 1 kHz	1 – 10 kHz	10 – 20 kHz	20 – 50 kHz		
500.00 mV						11 MΩ, <50 pF	1000 Vrms AC, 1000 V DC
5.0000 V	*1	*1	*1	*1	*2		
50.000 V	1 + 30	0.4 + 30	0.4 + 30	1 + 40	2 + 70		
500.00 V						10 MΩ, <50 pF	1000 Vrms AC, 1000 V DC
1000.0 V	*2	*2	3 + 30 *2				

\*1: At 5 to 100% of range \*2: At 10 to 100% of range  
 Response time: 2 seconds or less  
 CMRR: 80 dB or greater for DC to 60 Hz (Rs = 1 kΩ)

**• DC Voltage + AC Voltage (V + V)**

Model 73401 Maximum effective display: 5000; crest factor: <3

Range	Accuracy				Input Impedance	Maximum Input Voltage
	DC, 10 – 20 Hz	DC, 20 Hz – 1 kHz	DC, 1 – 10 kHz	DC, 10 – 20 kHz		
5.000 V					11 MΩ, <50 pF	1000 Vrms AC, 1000 V DC
50.00 V	*1	*1	*1	*1		
500.0 V	1.5 + 10	1 + 10	1 + 10	2 + 10		
1000.0 V	*2	*2				

Model 73402 Maximum effective display: 5000; crest factor: <3

Range	Accuracy					Input Impedance	Maximum Input Voltage
	10 – 20 Hz	20 Hz – 1 kHz	1 – 10 kHz	10 – 20 kHz	20 – 50 kHz		
5.000 V						11 MΩ, <50 pF	1000 Vrms AC, 1000 V DC
50.00 V	*1	*1	*1	*1	*2		
500.0 V	1.5 + 10	0.5 + 10	0.5 + 10	1 + 10	2 + 10		
1000.0 V	*2	*2					

\*1: At 5 to 100% of range \*2: At 10 to 100% of range  
 Response time: Approximately 5 seconds  
 CMRR: 80 dB or greater for DC to 60 Hz (Rs = 1 kΩ)

**• AC Current Measurement (A)**

Model 73401 Crest factor: <3

Range	Accuracy		Voltage Drop	Maximum Input Current
	10 – 20 Hz	20 Hz – 1 kHz		
500.00 μA			<0.11 mV/μA	500 mA (fuse-protected)
5000.0 μA				
50.000 mA				
500.00 mA	1.5 + 20	1 + 20	<4 mV/mA	15 A (fuse-protected)
5.0000 A				
10.000 A				

Model 73402 Crest factor: <3

Range	Accuracy			Voltage Drop	Maximum Input Current	
	10 – 20 Hz	20 Hz – 1 kHz	1 – 5 kHz			
500.00 μA				<0.11 mV/μA	500 mA (fuse-protected)	
5000.0 μA						
50.000 mA						
500.00 mA	1 + 20	0.75 + 20	1 + 30	<4 mV/mA	15 A (fuse-protected)	
5.0000 A						
10.000 A						

Shown above are the accuracy at 5 to 100% of range (10 to 100% for 10 A range).  
 Response time: 2 seconds or less

**• DC Current Measurement (A)**

Range	Accuracy		Voltage Drop	Maximum Input Current
	73401/02			
500.00 μA	0.2 + 2		<0.11 mV/μA	500 mA (fuse-protected)
5000.0 μA				
50.000 mA				
500.00 mA				
5.0000 A	0.6 + 2		<0.1 V/A	15 A (fuse-protected)
10.000 A				

Response time: 1 second or less

**• DC Current + AC Current (A + A)**

Model 73401 Maximum effective reading: 5000; crest factor: <3

Range	Accuracy		Voltage Drop	Maximum Input Current
	DC, 10 – 20 Hz	DC, 20 Hz – 1 kHz		
500.0 μA	2 + 10	1.5 + 10	<0.11 mV/μA	500 mA (fuse-protected)
5000.0 μA				
50.00 mA				
500.0 mA				
5.000 A	2 + 10	1.5 + 10	<0.1 V/A	15 A (fuse-protected)
10.00 A				

Model 73402 Maximum effective reading: 5000; crest factor: <3

Range	Accuracy			Voltage Drop	Maximum Input Current
	DC, 10 – 20 Hz	DC, 20 Hz – 1 kHz	DC, 1 – 5 kHz		
500.0 μA	1.5 + 10	1 + 10	1.5 + 10	<0.11 mV/μA	500 mA (fuse-protected)
5000.0 μA					
50.00 mA					
500.0 mA					
5.000 A	2 + 10	1.5 + 10	3 + 10	<0.1 V/A	15 A (fuse-protected)
10.00 A					

Shown above is the accuracy at 5 to 100% of range (10 to 100% for 10 A range).  
 Response time: Approximately 5 seconds

**• Resistance Measurement (Ω)**

Range	Accuracy		Maximum Testing Current	Open-circuit Voltage	Input Protection Voltage
	73401	73402			
500.00 Ω	0.1 + 2	0.05 + 2	<1 mA	<2.5 V	600 Vrms
5.0000 kΩ					
50.000 kΩ					
500.00 kΩ					
5.0000 MΩ	0.5 + 2		<1.5 μA		
50.000 MΩ	1 + 2				

\*1: Accuracy after zero calibration  
 Response time: 3 seconds or less for 500 Ω to 500 kΩ, 10 seconds or less for 5 MΩ to 50 MΩ

**• Continuity Check (⚡)**

Maximum effective display: 5000

Range	Continuity Beeper	Testing Current	Open-circuit Voltage	Input Protection Voltage
500.0 Ω	Buzzer sounds at 100 ± 50 Ω or less.	Approx. 0.5 mA	<5 V	600 Vrms

**• Diode Test (⇄)**

Range	Accuracy	Testing Current (Vf = 0.6 V)	Open-circuit Voltage	Input Protection Voltage
2.4000 V	1 + 2	Approx. 0.5 mA	<5 V	600 Vrms

**• Temperature Measurement (TEMP)**

Range	Accuracy	Input Protection Voltage
-50.0°C to 800.0°C	1 + 1.5°C	600 Vrms

Temperature probe: Type K thermocouple sensor (optional)

**• Frequency Measurement (Hz)**

Maximum effective display: 9999

Range (auto-ranging)	Accuracy	Input Range
2.000 – 9.999 Hz	0.02 + 1	10 to 100% of range
9.00 – 99.99 Hz		
90.0 – 999.9 Hz		
900 – 9999 Hz		
9.00 – 99.99 kHz		

Coupling type: AC coupling

**• Capacitance Measurement (F)**

Maximum effective display: 5000

Range	Accuracy	Input Protection Voltage
5.000 nF	1 + 5	600 Vrms
50.00 nF		
500.0 nF		
5.000 μF		
50.00 μF		
500.0 μF	2 + 5	
5.000 mF	3 + 5	
50.00 mF		

**• Duty Cycle Measurement (%)**

Range	Accuracy	Input Range
10 – 90%	±1% *1	40 to 100% of range

\*1: For input of a square wave with a frequency within 10.00 to 500.0 Hz

**• Peak Hold Function (PH)**

(73402 only) Maximum effective display: 5000

Range	Accuracy	Response Time
DC V, DC A	±100 digits	>1 ms

\*1: Accuracy after zero calibration