



**Full-scale 40999, Max. sample rate 100 times/s, 4-1/2 digits**

- **Temperature measurement:  $-50^{\circ}\text{C}$  to  $+1370^{\circ}\text{C}$**
- **DCV, ACV,  $\Omega$ , DCA, ACA,  $^{\circ}\text{C}$ , Hz**
- **Average RMS ACV/ACA**
- **P-P (sine) measurement**
- **AVG (averaging)**

*This function is very effective for measurements when there is a high variance. Averaging 5, 10, 20, 50 and 100 times can be selected using the AVG n button.*

- **REL (relative)**

*The relative value with respect to a reference value is indicated, and the deviation and external thermoelectromotive force in low-voltage measurements can be eliminated by single-touch operations.*

## Specifications

### 1. DC voltage measurement DCV

Range	Resolution	Accuracy $\pm$ (% of reading + digits) (23–5°C, 80% Rh or less)		Input resistance
		SLOW / MID	FAST	
40 mV	1 $\mu\text{V}$	0.04 + 5	0.06 + 20	100 M $\Omega$ or more
400 mV	10 $\mu\text{V}$	0.04 + 2	0.06 + 7	1000 M $\Omega$ or more
4 V	100 $\mu\text{V}$			
40 V	1 mV			
400 V	10 mV			
1000 V	100 mV			
Temperature coefficient		0°C – 18°C, 28°C – 50°C (Accuracy in the range $\times$ 1/10)/°C		
Max. allowable voltage		40 mV – 4V range: +1100 V DC (10 sec), +500 V DC (continuous) 40V – 100V range: $\pm$ 1100 V DC (continuous)		
CMR		110 dB or more (1 k $\Omega$ unbalanced resistance, DC, 50/60 Hz $\pm$ 0.1%.)		
NMR		SLOW, MID: 55 dB or more (1 k $\Omega$ unbalanced resistance, 50/60 Hz $\pm$ 0.1%) FAST: 0 dB		

### 2. AC voltage measurement ACV

Range	Resolution	Frequency	Accuracy $\pm$ (% of reading + digits) (23±5°C, 80% Rh or less)
400 mV	10 $\mu\text{V}$	20 Hz–50 Hz	0.4 + 15*
4 V	100 $\mu\text{V}$	50 Hz–10 kHz	0.2 + 15*
40 V	1 mV	10 kHz–30 kHz	0.3 + 20
400 V	10 mV	30 kHz–100 kHz	1.2 + 40
750 V	100 mV	20 Hz–20 kHz	1.3 + 15*

\* In the MID sampling mode, accuracy is guaranteed at 200 Hz or more.

Temperature coefficient	0°C to 18°C, 28°C to 50°C 400 mV – 400 V range (1/10 of each range and frequency/°C 750 V range (0.1% of rdg $\pm$ 7 d)/°C
Conversion method	True rms (analog computation)
Input Impedance	Approx. 2 M $\Omega$ / 100 pF or less
Max. allowable voltage	780 Vrms (continuous) 1100V peak
Response time (In the same range, within $\pm$ 10 counts from the final value)	SLOW: Max. 2 sec (20 Hz to 100 kHz) MID: Max. 1 sec (200 Hz to 100 kHz)

### 3. Resistance measurement $\Omega$

$\Omega$  function

Range	Resolution	Accuracy $\pm$ (% of reading + digits) (23–5°C, 80% Rh or less)		Input resistance
		SLOW / MID	FAST	
40 $\Omega^*$	1 m $\Omega$	0.08 + 5	0.1 + 10	10 mA
400 $\Omega^*$	10 m $\Omega$	0.06 + 2		10 mA
4 k $\Omega^*$	100 m $\Omega$			100 $\mu\text{A}$
40 k $\Omega$	1 $\Omega$			100 $\mu\text{A}$
400 k $\Omega$	10 $\Omega$			0.1 + 40
4000 k $\Omega$	100 $\Omega$	0.10 + 2	0.2 + 100	1 $\mu\text{A}$
40 M $\Omega$	1 k $\Omega$	0.40 + 5	—	100 nA
400 M $\Omega$	10 k $\Omega$	4.00 + 20	—	10 nA

\* In the 40, 400, 4 k $\Omega$  ranges, accuracy is given after zero  $\Omega$  adjustment by REL computation.

LO- $\Omega$  function

Range	Resolution	Accuracy $\pm$ (% of reading + digits) (23±5°C 80% Rh or less)		Measuring current
		SLOW / MID	FAST	
400 $\Omega^*$	10 m $\Omega$	0.2 + 5	0.3 + 60	100 $\mu\text{A}$
4 k $\Omega^*$	100 m $\Omega$			100 $\mu\text{A}$
40 k $\Omega$	1 $\Omega$			10 $\mu\text{A}$
400 k $\Omega$	10 $\Omega$		0.4 + 300	1 $\mu\text{A}$
4000 k $\Omega$	100 $\Omega$		0.4 + 10	—
40 M $\Omega$	1 k $\Omega$	3.0 + 30	—	10 nA

\* In the 400, 4 k $\Omega$  ranges, accuracy is given after zero  $\Omega$  adjustment by REL computation.

Temperature coefficient	0°C to 18°C, 28°C to 50°C $\Omega$ 40 $\Omega$ to 4000 k $\Omega$ , LO- $\Omega$ 400 $\Omega$ to 400 k $\Omega$ range (Accuracy in the range or rate $\times$ 1/10)/°C $\Omega$ 40 M $\Omega$ to 400 M $\Omega$ , LO- $\Omega$ 4000 k $\Omega$ to 400 M $\Omega$ range (Accuracy in the range or rate $\times$ 1/10) $\pm$ (0.1% of rdg $\pm$ 3 d)/°C
Terminal open-circuit voltage	6.8 V or less
Max. protective voltage	$\pm$ 500 V DC

### 4. DC current measurement DCA

Range	Resolution	Accuracy $\pm$ (% of reading + digits) (23 + 5°C, 80% Rh or less)		Voltage drop across input terminals (full scale)
		SLOW / MID	FAST	
400 $\mu\text{A}$	10 nA	0.2 + 5	0.2 + 20	500 mV or less
4 mA	100 nA			
40 mA	1 $\mu\text{A}$			
400 mA	10 $\mu\text{A}$			
4 A	100 $\mu\text{A}$			
10 A	1 mA	0.2 + 5	0.2 + 15	200 mV or less
Temperature coefficient	0°C to 18°C, 28°C to 50°C (Accuracy in the range or rate $\times$ 1/10)/°C			
Max. allowable current	400 $\mu\text{A}$ to 400 mA range: 0.5 A DC (continuous), 4 A, 10 A range: 10 A DC (continuous)			
Auto ranging	Possible only for the same input terminals (not possible with auto ranging between 400 mA and 4 A range)			

## 5. AC current measurement ACA

Range	Resolution	Accuracy ± (% of reading + digits) (23 ± 5°C, 80% Rh or less)		Voltage drop across input terminals (full scale)
		20 Hz – 50 Hz*	50 Hz – 1 kHz*	
400 µA	10 nA	0.5 + 20	0.4 + 20	500 mVrms or less
4 mA	100 nA			
40 mA	1 µA			
400 mA	10 µA	0.8 + 20	0.5 + 20	1.1 Vrms or less
4 A	100 µA			
10 A	1 mA			200 mVrms or less

\*In the MID sampling mode, accuracy is guaranteed at 200 Hz or more

Temperature coefficient	0°C to 18°C, 28°C to 50°C (Accuracy in the range or frequency x 1/10) °C
Conversion method	True rms (analog computation)
Max. allowable current	400 µA to 400 mA range: 0.5A DC + AC (continuous), 4 A, 10 A range: 10 A DC + AC (continuous)
Auto ranging	Possible only for the same input terminals (not possible with auto ranging between 400 mA and 4 A range)
Response time (in the same range, within + 10 counts from the final value)	SLOW: Max. 2 sec (20 Hz – 1 kHz) MID: Max. 1 sec (200 Hz – 1 kHz)

## 6 Temperature measurement °C (range: 1 range only)

Range	Resolution	Accuracy ± (% of reading + digits) (23 ± 5°C, 80% Rh or less)	
		-50°C – +1370°C	-50°C – +256°C +256°C – +1370°C
Temperature coefficient	0.1°C	0.1 + 15	0.1 + 20
Temperature coefficient	0°C to 18°C, 28°C to 50°C ±0.1°C/°C		
Thermocouple used	Type K (JIS)		

\*The accuracy of the thermocouple is not included

## 7. Frequency measurement Hz

Range (auto range only)	Max. resolution	Accuracy ± (% of reading + digits) (23±5°C, 80%Rh or less)	Input sensitivity
10 Hz–40 Hz	0.001 Hz	0.05 + 2	50 mV (400 mV range)
40 Hz–400 Hz	0.01 Hz		
400 Hz–4 kHz	0.1 Hz		
4 kHz–40 kHz	1 Hz		
40 kHz–200 kHz	10 Hz		200 mV (400 mV range)
Temperature coefficient	0°C to 18°C 28°C to 50°C ±0.5 digit/°C		
Measuring method	Reciprocal method		
Input attenuator	Selected by the range key 400 mV range to 400 V range		

### Sampling rate

Function	SLOW	MID	FAST
DCV DCA HI-Ω LΩ-Ω	Approx. 4 times sec	Approx. 20 times sec	Approx. 100 times sec
ACV ACA	Approx. 4 times sec	Approx. 20 times sec	—
Hz	Approx. 2.5 times sec	—	—
°C	Approx. 2 times sec	Approx. 10 times sec	—

## Arithmetic operations

### P-P operation

The peak-to-peak value of the input can be obtained when measuring ACV and ACA

$$Y = 2\sqrt{2} \cdot X \quad Y: \text{Indication}$$

X: Measured value

\* Digits other than those indicated are rounded off.

### Averaging (shift averaging)

The shift averaging of 5, 10, 20, 50 and 100 times is performed. When the GP-IB unit is used, averaging from 2 to 255 times can be specified using a command.

### REL operation

The relative value with respect to the reference measured value is indicated.

$$Y = X - A \quad (X \text{ and } Y \text{ are the same function})$$

where A: reference measured value

X: measured value

### Continuity test

Range Same as resistance measurement

Threshold value: 1700 ±1000 counts

Accuracy in measurement (Accuracy in resistance measurement) x 2

Sampling rate Approx. 20 times/sec fixed

### Others

#### A/D conversion

Converting method: Triple integration

Input integrating time

SLOW/MID: 20 msec during 50 Hz

16.67 msec during 60 Hz

FAST: 2 msec (50/60 Hz)

In the AC operation, 50/60 Hz is automatically set.

50 or 60 Hz can also be set using the LINE f key.

### Battery backup

When the setup is on, the multimeter is automatically set to the previous state when the power is switched on.

What are to be backed up include

- Functions when the power is switched OFF
- Arithmetic ON/OFF, sampling rate per function
- Number of averaging in AVG operation
- Standard measured value in REL operation

### General specifications

Indication

Full scale

Over indication

Operation method

Polarity indication

Range selection

Function selection

Auto ranging

Withstand voltage

Power requirements

Power consumption

Operating temperature range

Operating humidity range

Dimensions

Weight approx.

Accessories

7-segment LED, letter height 11 mm

40999 (A/D conversion full scale)

99999 (REL operation full scale)

UUUUU (A/D conversion/operation over)

Drift compensation type triple integration

“—” is indicated when the polarity is negative

AUTO/MANUAL or external control (when

an optional unit is used)

MANUAL or external control (when an

optional unit is used)

UP level: when 40999 counts is exceeded

DOWN level: less than 03600 counts

±500 VDC

AC100V ±10%, 50/60 Hz

Options 117V, 217V or 234V AC

6 W or less

0°C to 50°C

80% Rh or less (0°C to 40°C)

60% Rh or less (40°C to 50°C)

191 ±2W x 80±2H x 260±2L mm

1.8 kg

Power cord (1), fuse (4), measuring leads

(one set), alignment tool (1),

bag to store accessories (1), Instruction

manual (1)