

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

- **Temperature measurement: -50°C to $+1370^{\circ}\text{C}$**
- **Power measurement up to 2500 W**
- **DCV, ACV, Ω , DCA, ACA, $^{\circ}\text{C}$, Hz, W**
- **True RMS ACV/ACA**
- **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 μV	0.04 + 5	0.06 + 20	100 M Ω or more
400 mV	10 μV	0.04 + 2	0.06 + 7	1000 M Ω or more
4 V	100 μV			
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 x 1/10)/°C			
Max. allowable voltage	40 mV – 4 V range: +1100 V DC (10 sec), +500 V DC (continuous)			
	40 V – 100 V range: \pm 1100 V DC (continuous)			
CMR	110 dB or more (1 k Ω unbalanced resistance, DC, 50/60 Hz \pm 0.1%)			
NMR	SLOW, MID: 55 dB or more (1 k Ω unbalanced resistance, 50/60 Hz \pm 0.1%) FAST: 0 dB			

2. AC voltage measurement ACV

AC function : Input exceeding 5% or more of the range (in the 750 V range 100 V or more)

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

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

AC + DC function : Input exceeding 5% or more of the range (in the 750 V range 100 V or more)

Range	Resolution	Frequency	Accuracy \pm (% of reading + digits) (23+5°C, 80% Rh or less)
400 mV	10 μV	15 Hz–50 Hz	0.4 + 40*
4 V	100 μV	50 Hz–10 kHz	0.2 + 40*
40 V	1 mV	10 kHz–30 kHz	0.3 + 40
400 V	10 mV	30 kHz–100 kHz	1.2 + 110
750 V	100 mV	15 Hz–20 kHz	0.3 + 30*
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)		
Crest factor	3 or less (full scale)		
Input Impedance	Approx. 2 M Ω / 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)		

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

3. Resistance measurement Ω

Ω function

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

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

L0- Ω function

Range	Resolution	Accuracy \pm (% of reading + digits) (23 \pm 5°C 80% Rh or less)		Measuring current
		SLOW / MID	FAST	
400 Ω *	10 m Ω	0.2 + 5	0.3 + 60	100 μA
4 k Ω *	100 m Ω			
40 k Ω	1 Ω			
400 k Ω	10 Ω			
4000 k Ω	100 Ω			
40 M Ω	1 k Ω	0.4 + 10	—	100 nA
		3.0 + 30	—	10 nA

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

Temperature coefficient	0°C to 18°C, 28°C to 50°C Ω 40 Ω to 4000 k Ω , LO- Ω 400 Ω to 400 k Ω range (Accuracy in the range or rate x 1/10)/°C Ω 40 M Ω to 400 M Ω , LO- Ω 4000 k Ω to 400 M Ω range (Accuracy in the range or rate x 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 μA	10 nA	0.2 + 5	0.2 + 20	500 mV or less
4 mA	100 nA			
40 mA	1 μA			
400 mA	10 μA			
4 A	100 μA			
10 A	1 mA	0.2 + 5	0.2 + 15	1.1 V or less
Temperature coefficient	0°C to 18°C, 28°C to 50°C (Accuracy in the range or rate x1/10)/°C			
Max. allowable current	400 μA 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

AC function : Input exceeding 5% of the range (1A or more in the 10A range)

Range	Resolution	Accuracy ± (% of reading + digits) (23 ± 5°C, 80% Rh or less)		Voltage drop across input terminals (full scale)
		15 Hz – 50 Hz*	50 Hz – 1 kHz*	
400 µA	10 nA	0.7 + 30	0.5 + 30	500 mVrms or less
4 mA	100 nA			
40 mA	1 µA			
400 mA	10 µA			
4 A	100 µA	1.0 + 30	0.7 + 30	200 mVrms or less
10 A	1 mA			

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

AC + DC function : Input exceeding 5% of the range (1A or more in the 10A range)

Range	Resolution	Accuracy ± (% of reading + digits) (23 ± 5°C, 80% Rh or less)		Voltage drop across input terminals (full scale)
		15 Hz – 50 Hz*	50 Hz – 1 kHz*	
400 µA	10 nA	0.7 + 40	0.5 + 40	500 mVrms or less
4 mA	100 nA			
40 mA	1 µA			
400 mA	10 µA			
4 A	100 µA	1.0 + 40	0.7 + 40	200 mVrms or less
10 A	1 mA			
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)			
Crest factor	3 or less (full scale)			
Max. allowable current	400 µA to 400 mA range: 0.5 A 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)			

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

Arithmetic operations

Max/min operation

Maximum and minimum values of measured value can be stored in memory within the same function and range.

Data storage

Addresses are assigned together with function, range and presence / absence of arithmetic operations for up to 1000 measured data then held in memory. The stored data can be read using the REC key.

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.

$Y = X - A$ (X and Y 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.

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

Range	Resolution	Accuracy ± (% of reading + digits) (23 ± 5°C, 80% Rh or less)	
		-50°C – +256°C +256°C – +1370°C	0.1 + 15 0.1 + 20
-50°C – +1370°C	0.1°C		
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. Power measurement

Range	1 range on y
Measuring range	0 – 2500 W
Input range	Voltage 85 – 250 (V) (40 Hz – 400 Hz), Current 0 – 10 (A) (40 Hz – 400 Hz)
Input characteristics	DC-coupled 3-wire input (V, A, COM) V: (DC + AC)V same as 400V range, Crest factor: 2 or less A: (DC + AC)A same as 400V range, Crest factor: 3 or less
Conversion method	Analog computation method
Accuracy ± (% of reading + digits)	100V line 0.5 + 20 (cos φ = 1, 40 Hz – 70 Hz), 1.0 + 30 (cos φ = 1, 70 Hz - 400 Hz) 200V line 0.7 + 30 (cos φ = 1, 40 Hz - 70 Hz), 1.2 + 40 (cos φ = 1, 70 Hz - 400 Hz) Influence of power factor: within ±0.5% or rdg (cos φ = ±0.5, 50/60 Hz)
Temperature coefficient	0°C to 18°C, 28°C to 50°C (±0.08% of rdg ±3d)/°C

Sampling rate

Function	SLOW	MID	FAST
DCV DCA HI-Ω Lo-Ω	Approx. 4 times sec	Approx. 20 times sec	Approx. 100 times sec
ACV ACA	Approx. 4 times sec	Approx. 20 times sec	—
°C	Approx. 2 times sec	Approx. 10 times sec	—
W	Approx. 1 times sec	—	—

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
- Stored address, stored data (VOAC 7413)

General specifications

Indication

7-segment LED, letter height 11 mm

Full scale

40999 (A/D conversion full scale)

99999 (REL operation full scale)

Over indication

UUUUU (A/D conversion/operation over)

Operation method

Drift compensation type triple integration

Polarity indication

“—” is indicated when the polarity is negative

Range selection

AUTO/MANUAL or external control (when an optional unit is used)

Function selection

MANUAL or external control (when an optional unit is used)

Auto ranging

UP level: when 40999 counts is exceeded

DOWN level: less than 03600 counts

Withstand voltage

±500 V DC

Power requirements

AC100V ±10%, 50/60 Hz

Options 117V, 217V or 234V AC

Power consumption

6 W or less

Operating temperature range

0°C to 50°C

Operating humidity range

80% Rh or less (0°C to 40°C)

60% Rh or less (40°C to 50°C)

Dimensions

191 ± 2 W x 80 ± 2 H x 260 ± 2 L mm

Weight

Approx. 1.8 kg

Accessories

Power cord (1), fuse (4), measuring leads (one set), alignment tool (1), bag to store accessories (1), instruction manual (1)