CHAUVIN® ARNOUX
CHAUVIN ARNOUX GROUP

C.A 5287
AC/DC TRMS MULTIMETER

C.A 5289
AC+DC TRMS MULTIMETER

50,000-count TRMS multimeters

Greater accuracy for professionals working in industry

- **50,000-count** multimeter with double display and bargraph
- Complies with the IEC-1010 **CAT. III 1,000 V** and **CAT. IV 600 V** standards
- **TRMS AC/DC** voltage and current with the C.A 5287,
  TRMS AC+DC with the C.A 5289
- High accuracy up to **0.025 %**
- Large bandwidth (up to 100 kHz)
- Quick response: 4 measurements/second
- Reading as percentage of scale for **4-20 mA** or **0-20 mA** measurements
- Two-way optical computer interface with SCPI commands

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50,000-count TRMS AC+DC multimeter

C.A 5289

General specifications

Screen	Dual LCD display, 51,000 counts, 21-segment bargraph Automatic polarity indication Backlighting
Functions	VAC+DC, VAC, VDC IAC+DC, IAC, IDC Ω, nS Audible continuity, semi-conductor test °C, °F, Hz 4-20 mA, 0-20 mA Duty cycle / pulse width dBm, dBV
Other functions	Square-signal generator with 28 frequencies + 1 adjustable duty cycle
Modes	Min/Max/Avg, HOLD, AUTO-HOLD, REL, PEAK 1 ms
Operating temperature	0 °C to + 50°C
Storage temperature	-20 °C to +60 °C with battery removed
Relative humidity (RH)	Maximum 80 % RH for temperatures up to 31 °C diminishing linearly to 50 % HR at 50 °C
Temperature coefficient	0.15 x (specified accuracy) /°C (0°C to 18°C or 28°C to 50°C)
Common mode rejection rate (CMRR)	> 90 dB with DC, 50/60 Hz ± 0.1 % (1 kΩ unbalanced)
Normal mode rejection rate (NMRR)	> 60 dB to 50/60 Hz ± 0.1 %
Power supply	One standard 9 V alkaline or carbon zinc battery Integrated system for management of rechargeable 9 V Ni-MH batteries
Battery life	80 hours for DC voltage measurement (approx.) (9 V alkaline battery / 545 mAH) With indication of the battery capacity
Communication interface	Two-way optical link. SCPI command instructions.
Electrical safety	NF EN 61010-1 (2001) and NF EN 61010-2-32 (2002) for 1,000 V CAT III or 600 V CAT IV, pollution degree 2
Electromagnetic compatibility	Complies with the standard on electromagnetic compatibility as per NF EN 61326-1 (07/97) + A1 (10/98) +A2 (09/2001)
Dimensions	44 (H) x 103 (W) x 203 (L) mm
Weight	680 grams with battery

The accuracy is expressed as ± (% of reading + number of counts of least significant digit) at 23 °C ± 5 °C, with a relative humidity of less than 80 %.

DC Voltage

Range	Resolution	Accuracy	Protection against overloads
50 mV	0.001 mV	0.05 % + 50 (2)	1,000 V (1)
500 mV	0.01 mV	0.025 % + 5	
1,000 mV	0.1 mV		
5 V	0.0001 V		1,000 V
50 V	0.001 V		
500 V	0.01 V	0.03 % + 5	
1,000 V	0.1 V		

- Input impedance
  - for the ranges from 50 mV to 1,000 mV: > 1 GΩ
  - for the ranges from 5 V to 1,000 V: 10 MΩ (nominal) with single display or 1.1 MΩ with double display

AC Voltage (root mean square value: 5 % to 100 % of the range)

Range	Resolution	Accuracy				
		20~45 Hz	45~1 kHz	1 k~10 kHz	10 k~20 kHz	20 k~100 kHz
50 mV (1)	0.001 mV	1 % + 60	0.4 % + 40	0.7 % + 40	1.5 % + 40	3.5 % + 120
500 mV (1)	0.01 mV	1 % + 60	0.4 % + 25	0.4 % + 25	1.5 % + 40	3.5 % +120
1,000 mV (1)	0.1 mV	1 % + 60	0.4 % + 25	0.4 % + 25	1.5 % + 40	3.5 % +120
5 V	0.0001 V	1 % + 60	0.4 % + 25	0.4 % + 25	1.5 % + 40	3.5 % + 120
50 V	0.001 V	1 % + 60	0.4 % + 25	0.4 % + 25	1.5 % + 40	3.5 % + 120
500 V	0.01 V	1 % + 60	0.4 % + 25	0.4 % + 25	1.5 % + 40	3.5 % (3)
1,000 V	0.1 V	1 % + 60	0.4 % + 40	0.4 % + 40	1.5 % (4)	No spec.

- Input impedance
  - for the ranges from 50 mV to 1,000 mV: > 1 GΩ
  - for the ranges from 5 V to 1,000 V: 1,1 MΩ (nominal) 1.1 MΩ (nominal) in parallel with <100 pF (nominal)
- Crest factor: ≤ 3

(1) Protection 1,000 Vrms for Ip-p < 0.3 A

(2) The accuracy is ± (0.05 % +5) if the relative function is used to offset the thermal effect (short test leads) before measuring the signal.

(3) For input voltages lower than 200 Vrms, add 120 counts: 3.5 % + 120

(4) For input voltages lower than 200 Vrms, add 40 counts: 1.5 % + 40

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AC+DC Voltage (root mean square value: 5 % to 100 % of the range)

Range	Resolution	Accuracy				
		30~45 Hz	45~1 kHz	1 k~10 kHz	10 k~20 kHz	20 k~100 kHz
50 mV (1)	0.001 mV	1.2 % + 80	0.4 % + 60	0.7 % + 60	1.5 % + 60	3.5 % + 220
500 mV (1)	0.01 mV	1.2 % + 65	0.4 % + 30	0.4 % + 30	1.5 % + 45	3.5 % + 125
1,000 mV (1)	0.1 mV	1.2 % + 65	0.4 % + 30	0.4 % + 30	1.5 % + 45	3.5 % + 125
5 V	0.0001 V	1.2 % + 65	0.4 % + 30	0.4 % + 30	1.5 % + 45	3.5 % + 125
50 V	0.001 V	1.2 % + 65	0.4 % + 30	0.4 % + 30	1.5 % + 45	3.5 % + 125
500 V	0.01 V	1.2 % + 65	0.4 % + 30	0.4 % + 30	1.5 % + 45	3.5% (5)
1,000 V	0.1 V	1.2 % + 65	0.4 % + 45	0.4 % + 45	1.5 % (6)	No spec.

- Input impedance:
• for the ranges from 50 mV to 1,000 mV: > 1 GΩ
• for the ranges from 5 V to 1,000 V: 1.1 MΩ (nominal) in parallel with < 100 pF (nominal)

- Crest factor: ≤ 3

dB (calculation of decibels)

dB base	Reference	Default reference
1 mW (dBm)	1 to 9.999 Ω	600 Ω
1 V (dBV)	1 V	1 V

General remarks:
The power decibels display uses the reference 1 mW whereas the voltage decibels display uses the reference 1 V.
Although the formula shows that the accuracy of the result depends on the accuracy of the voltage measurement, an additional error of 0.3 dB should be added due to the calculation.
Autoranging is used for measurements in decibels. The bandwidth depends on the voltage measurement.

DC Current

Range	Resolution	Accuracy	Load voltage / Shunt	Protection against overloads
500 µA	0.01 µA	0.05 % + 5 (7)	0.05 V (100 Ω)	440 mA HRC fuse 10 x 38 mm 1,000 V / 30 kA
5 000 µA	0.1 µA	0.05 % + 5 (7)	0.5 V (100 Ω)	
50 mA	0.001 mA	0.15 % + 5 (7)	0.08 V (1 Ω)	
500 mA	0.01 mA	0.15 % + 5 (7)	0.8 V (1 Ω)	11 A HRC fuse 10 x 38 mm 1,000 V / 30 kA
5 A	0.0001 A	0.2 % + 10	0.1 V (0.01 Ω)	
10 A (8)	0.001 A	0.2 % + 5	0.21 V (0.01 Ω)	

AC Current (root mean square: 5 % to 100 % of the range)

Range	Resolution	Accuracy				Protection against overloads
		20~45 Hz	45~2 kHz	2 k~20 kHz	20 k~100 kHz	
500 µA (10)	0.01 µA	1.5 % + 50	0.7 % + 20	3 % + 80	5 % + 80	440 mA HRC fuse 10 x 38 mm 1 000 V / 30 kA
5 000 µA	0.1 µA	1.5 % + 40	0.7 % + 20	3 % + 60	5 % + 80	
50 mA	0.001 mA	1.5 % + 40	0.7 % + 20	3 % + 60	5 % + 80	
500 mA	0.01 mA	1.5 % + 40	0.7 % + 20	3 % + 60	5 % + 80	
5 A	0.0001 A	2 % (9)	0.7 % + 20	3 % + 60	No spec.	11 A HRC fuse, 10 x 38 mm 1,000 V / 30 kA
10 A (8)	0.001 A	2 % (9)	0.7 % + 20	< 3 A / 5 kHz	No spec.	

- Crest factor ≤ 3

AC+DC Current (root mean square value: 5 % to 100 % of the range)

Range	Resolution	Accuracy			Protection against overloads
		30~45 Hz	45~2 kHz	2 k~20 kHz	
500 µA (10)	0.01 µA	1.6 % + 55	0.8 % + 25	3.1 % + 85	440 mA HRC fuse 10 x 38 mm 1,000 V / 30 kA
5,000 µA	0.1 µA	1.6 % + 45	0.8 % + 25	3.1 % + 65	
50 mA	0.001 mA	1.7 % + 45	0,9 % + 25	3.2 % + 65	
500 mA	0.01 mA	1.7 % + 45	0,9 % + 25	3.2 % + 65	
5 A	0.0001 A	2.2 % + 50 (11)	0,9 % + 30	3.2 % + 70 < 3 A / 5 kHz	11 A HRC fuse - 10 x 38 mm 1,000 V / 30 kA
10 A (8)	0.001 A	2.2 % (12)	0,9 % + 25		

- Crest factor ≤ 3

(1) Protection 1,000 Vrms for Ip-p < 0.3 A

(5) For input voltages lower than 200 Vrms, add 125 counts: 3.5 % + 125

(6) For input voltages lower than 200 Vrms, add 45 counts: 1.5 % + 45

(7) Always use the "Relative" function to offset the thermal effect with the measurement leads open before measuring the signal. If the "Relative" function is not used, you must add 20 counts to the accuracy. The thermal effect could occur in the following cases:
- Overheating due to manipulation error by a applying a high voltage of 50 V to 1,000 V for resistance measurement, diode test and mV functions.
- Overheating after battery recharging.
- Overheating after measuring a current higher than 500 mA: it is recommended to leave the multimeter to cool for twice the time that the current is applied.

(8) An additional 0.5% error should be applied to the accuracy of the 10 A calibre when measuring currents between 10 A and 20 A for a maximum of 30 seconds. After a current measurement > 10 A, and before carrying out any low-current measurements, leave the multimeter to cool for twice the time that the current was applied.

(9) For currents < 3 Arms, ad an uncertainty of 40 counts (2 % + 40)

(10) Minimum intensity measured Imin > 35 µArms

(11) For currents lower than 3 Arms, add 50 counts: 2.2 %+ 50

(12) For currents lower than 3 Arms, add 45 counts: 2.2 % + 45

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Peak value (capture of changes)

Signal width	Accuracy for mV / Voltage / DC Current
Single event > 1 ms	2 % + 400 for all ranges
Repetitive > 250 µs	2 % + 1,000 for all ranges

Resistance / Continuity test

Range	Resolution	Accuracy	Measurement current	Protection against overloads
500 Ω (13)	0.01 Ω	0.05 % + 10	1,0 mA	1,000 Vrms (1)
5 kΩ (13)	0.0001 kΩ	0.05 % + 5	0.38 mA	
50 kΩ	0.001 kΩ		38 µA	
500 kΩ	0.01 kΩ		3,8 µA	
5 MΩ	0.0001 MΩ	0.2 % + 5	345 nA	
50 MΩ (14)	0.001 MΩ	1 % + 5	200 nA	
500 MΩ	0.01 MΩ	3 % +10 < 200 MΩ 8 % +10 > 200 MΩ	200 nA	
500 nS (15)	0.01 nS	1 % + 10	200 nA	

General remarks:
Maximum open-circuit voltage: < + 4.8 V
Instantaneous continuity: the built-in buzzer sounds when the resistance is less than 10.0 Ω.

Diode test (1) / Continuity test

Range	Resolution	Accuracy	Measurement current	Open-circuit voltage
Diode	0.1 mV	0.05 % + 5	Env. 1,0 mA	< + 4.8 VDC

Instantaneous continuity: the built-in buzzer sounds when the reading is less than 50 mV approx.

Capacitance (1)

Range	Resolution	Accuracy	Number of measurements
10 nF	0.001 nF	1 % + 8	4 times/sec.
100 nF	0.01 nF	1 % + 5	
1,000 nF	0.1 nF		
10 µF	0.001 µF		
100 µF	0.01 µF		
1,000 µF	0.1 µF		1 times/sec.
10 mF	0.001 mF		0.1 times/sec.
100 mF	0.01 mF	3 % + 10	0.01 times/sec.

For capacitors with low values, use the “Relative” mode to offset the residual capacitance. The maximum display for each range is 11,000 counts.

Temperature

Thermocouple type	Measurement range	Resolution	Accuracy
K	-200 °C ~ +1,372 °C	0.1 °C	0.3 % + 3 °C
	-328 °F ~ +2,502 °F	0.1 °F	0.3 % + 6 °F
J	-210 °C ~ +1,200 °C	0.1 °C	0.3 % + 3 °C
	-346 °F ~ +2,192 °F	0.1 °F	0.3 % + 6 °F

The accuracy does not include the tolerance of the probe, and the temperature probe connected to the multimeter must be placed in the location where it will be used at least 1 hour in advance.

Frequency display when measuring V or A

Range	Resolution	Accuracy	Min. input frequency
99.999 Hz	0.001 Hz	0.02 % + 3 < 600 kHz	1 Hz
999.99 Hz	0.01 Hz		
9.9999 kHz	0.0001 kHz		
99.999 kHz	0.001 kHz		
999.99 kHz	0.01 kHz		

The maximum acceptable voltage is determined by the following formula: [voltage of signal measured] x [frequency of signal measured] < 20,000,000 without exceeding 1,000 V.

(1) Protection 1,000 Vrms for Ip-p < 0.3 A
(13) The accuracy of 500 Ω and 5 kΩ is specified after application of the relative function, which is used to subtract the resistance of the measurement leads and the thermal effect.
(14) For the 50 MΩ range, the relative humidity is specified as less than 60 %.
(15) The accuracy is specified for < 50 nS, after application of the relative function when the measurement leads are open.

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Signals for voltage

Sensitivity according to frequency and trigger level

Input range (Maximum input for specified accuracy = 10 x range or 1,000 V)	Minimum sensitivity (RMS value – sine wave)		Trigger level for DC coupling	
	20 Hz-200 kHz	> 200 kHz ~ 500 kHz	< 100 kHz	> 100 kHz ~ 500 kHz
50 mV	10 mV	25 mV	10 mV	25 mV
500 mV	70 mV	150 mV	70 mV	150 mV
1,000 mV	120 mV	300 mV	120 mV	300 mV
5 V	0.3 V	0.5 V	0.6 V	1.5 V
50 V	3 V	5 V	6 V	15 V
500 V	30 V < 100 kHz	No spec.	60 V	No spec.
1,000 V	50 V <100 kHz	No spec.	120 V	No spec.

The accuracy for the duty cycle and pulse width is based on one 5 V square-signal input on the 5 VDC range.
For AC coupling, the duty cycle range can be measured at 5 % ~ 95 % of the full range if the frequency of the signal is > 20 Hz.

Signals for current

Input range	Minimum sensitivity (RMS value – sine wave)
	20 Hz-20 kHz
500 µA	100 µA
5,000 µA	250 µA
50 mA	10 mA
500 mA	25 mA
5 A	1 A
10 A	2.5 A

Maximum input: please refer to AC current measurement.

Frequency meter

Division of signal by 1 (secondary display "- 1 –")

Range	Resolution	Accuracy	Sensitivity	Min. input freq.
99.999 Hz	0.001 Hz	0.002 % + 5 < 2 MHz	100 mVrms	0.5 Hz
999.99 Hz	0.01 Hz			
9.9999 kHz	0.0001 kHz			
99.999 kHz	0.001 kHz			
999.99 kHz	0.01 kHz		200 mVrms	
9.9999 MHz	0.0001 MHz			

The maximum measurement level is < 30 Vp-p (peak-peak voltage).
To optimize the number of measurements per second for low frequencies, the minimum measurement frequency must be set in the SET-UP menu.
All frequency meters are liable to give erroneous measurements when measuring low-voltage, low-frequency signals. It is essential to shield the inputs against external noise in order to reduce measurement errors to a minimum.

Division of signal by 100 (secondary display "-100 –")

Range	Resolution	Accuracy	Sensitivity	Min. input freq.
9.9999 MHz	0.0001 MHz	0.002 % + 5 < 20 MHz	300 mVrms	1 MHz
99.999 MHz	0.001 MHz		500 mVrms	

Duty cycle

Range	Accuracy of full scale	Mode
0.01 %~99.99 %	0.3 % per kHz + 0.3 %	DC coupling

The accuracy for the duty cycle and the pulse width is based on a 5 V square-wave signal without signal division.

Pulse width

Range	Resolution	Accuracy
500 ms	0.01 ms	0.2 % + 3
2,000 ms	0.1 ms	0.2 % + 3

The accuracy for the duty cycle and the pulse width is based on a 5 V square-wave signal without signal division.
The positive or negative pulse width must be greater than 10 µs and the duty cycle should be taken into account. The pulse width scale is determined by the signal's frequency.

Square-signal generator

Output	Range	Resolution	Accuracy
Frequency	0.5 - 1 - 2 - 5 - 10 - 15 - 20 - 25 - 30 - 40 - 50 - 60 - 75 - 80 - 100 - 120 - 150 - 200 - 240 - 300 - 400 - 480 - 600 - 800 - 1,200 - 1,600 - 2,400 - 4.800 Hz	0.01 Hz	0.005 % + 2
Duty cycle (16)	0.39 % ~ 99,60 %	0.390625 %	0.4% of full scale (17)
Pulse width (16)	1 / Frequency	Range / 256	0.2 ms + range / 256
Amplitude	Fixed 0~+ 2.8 V	0.1 V	0.2 V

• Output impedance: 3.5 kΩ maximum

(16) The positive or negative pulse width must be greater than 50 µs for adjustment of the duty cycle or the pulse width at a different frequency. Otherwise, the accuracy and the range will be different from the definition.

(17) For a signal frequency greater than 1 kHz, an extra 0.1 % per kHz must be added to the accuracy.

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50,000-count TRMS AC/DC multimeter

C.A 5287

General specifications

Screen	Dual LCD display, 51,000 counts, 21-segment bargraph Automatic polarity indication – Backlighting
Functions	VAC, VDC IAC, IDC Ω, nS Audible continuity, semi-conductor test °C, °F, Hz Duty cycle / Pulse width dBm, dBV
Modes	Min/Max/Avg, HOLD, Auto-HOLD, REL, PEAK 1 ms
Operating temperature	0°C to +50°C
Storage temperature	-20 °C to +60 °C with battery removed
Relative humidity (RH)	Maximum 80 % RH for temperatures up to 31 °C diminishing linearly to 50 % HR at 50 °C
Temperature coefficient	0.15 x (specified accuracy) /°C (0 °C to 18 °C or 28 °C to 50 °C)
Common mode rejection rate (CMRR)	> 90 dB with DC, 50/60 Hz ± 0.1 % (1 kΩ unbalanced)
Normal mode rejection rate (NMRR)	> 60 dB to 50/60 Hz ± 0.1 %
Power supply	One standard 9 V alkaline or carbon zinc battery. Integrated system for management of rechargeable 9 V Ni-MH batteries
Battery life	80 hours for DC voltage measurement (approx.) (9 V alkaline battery / 545 mAH). With indication of the battery capacity.
Communication interface	Two-way optical link. SCPI command instructions.
Electrical safety	NF EN 61010-1 (2001) and NF EN 61010-2-32 (2002) for 1,000 V CAT III or 600 V CAT IV, pollution degree 2
Electromagnetic compatibility	Complies with the standard on electromagnetic compatibility as per NF EN 61326-1 (07/97) + A1 (10/98) +A2 (09/2001)
Dimensions	44 (H) x 103 (l) x 203 (L) mm
Poids	680 grams with battery

The accuracy is expressed as ± (% of reading + number of counts of least significant digit) at 23°C ± 5 °C, with a relative humidity of less than 80 %.

DC Voltage

Range	Resolution	Accuracy	Protection against overloads
50 mV	0.001 mV	0.05 % + 50 (18)	1,000 V (1)
500 mV	0.01 mV	0.03 % + 5	
1,000 mV	0.1 mV		
5 V	0.0001 V		1,000 V
50 V	0.001 V		
500 V	0.01 V		
1,000 V	0.1 V		

- Input impedance
  - for the ranges from 50 mV to 1,000 mV: > 1 GΩ
  - for the ranges from 5 V to 1,000 V: 10 MΩ (nominal) with single display or 1.1 MΩ with double display

AC Voltage (root mean square value: 5 % to 100 % of the range)

Range	Resolution	Accuracy			
		30~45 Hz	45~1 kHz	1 k~10 kHz	10 k~30 kHz
50 mV (1)	0.001 mV	1 % + 60	0.6 % + 40	1.0 % + 40	1.6 % + 60
500 mV (1)	0.01 mV	1 % + 60	0.6 % + 25	1.0 % + 40	1.6 % + 60
1,000 mV (1)	0.1 mV	1 % + 60	0.6 % + 25	1.0 % + 25	1.6 % + 40
5 V	0.0001 V	1 % + 60	0.6 % + 25	1.0 % + 25	1.6 % + 40
50 V	0.001 V	1 % + 60	0.6 % + 25	1.0 % + 25	1.6 % + 40
500 V	0.01 V	1 % + 60	0.6 % + 25	1.0 % + 25	1.6 % (19)
1,000 V	0.1 V	1 % + 60	0.6 % + 40	1.0 % (20)	No spec.

- Input impedance:
  - for the ranges from 50 mV to 1,000 mV: > 1 GΩ.
  - for the ranges from 5 V to 1,000 V: 1.1 MΩ (nominal) in parallel with <100 pF (nominal)
- Crest factor: ≤ 3

dB (calculation of decibels)

Base for dB	Reference	Default reference
1 mW (dBm)	1 to 9 999 Ω	600 Ω
1 V (dBV)	1 V	1 V

Remarks

The power decibels display uses the reference 1 mW whereas the voltage decibels display uses the reference 1 V.
Although the formula shows that the accuracy of the result depends on the accuracy of the voltage measurement, an additional error of 0.3 dB should be added due to the calculation.
Autoranging is used for measurements in decibels. The bandwidth depends on the voltage measurement.

(1) Protection 1,000 Vrms for Ip-p < 0.3 A

(18) The accuracy is ± (0.05 % +5) if the relative function is used to offset the thermal effect (short test leads) before measuring the signal.

(19) For voltages of less than 200 Vrms, add 40 counts: 1.6 % + 40

(20) For voltages of less than 200 Vrms, add 40 counts: 1.0 % + 40

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Crest value (capture of changes)

Signal width	Accuracy for mV / Voltage/DC Current
Unique event > 1 ms	2 % + 400 for all the ranges
Repetitive > 250 µs	2 % + 1,000 for all the ranges

DC Current

Range	Resolution	Accuracy	Load voltage / Shunt	Protection against overloads
500 µA	0.01 µA	0.1 % + 5 (21)	0.06 V (100 Ω)	440 mA HRC fuse 10 x 38 mm 1,000 V / 30 kA
5 000 µA	0.1 µA	0.1 % + 5 (21)	0.6 V (100 Ω)	
50 mA	0.001 mA	0.2 % + 5 (21)	0.09 V (1 Ω)	
500 mA	0.01 mA	0.2 % + 5 (21)	0,9 V (1 Ω)	11 A HRC fuse 10 x 38 mm 1,000 V / 30 kA
5 A	0.0001 A	0.2 % + 10	0.2 V (0.01 Ω)	
10 A (8)	0.001 A	0.2 % + 5	0.4 V (0.01 Ω)	

AC Current (root mean square value: 5 % to 100 % of the range)

Range	Resolution	Accuracy			Protection against overloads
		30~45 Hz	45~2 kHz	2 k~20 kHz	
500 µA (10)	0.01 µA	1.5 % + 50	0.8 % + 20	3 % + 80	440 mA HRC fuse 10 x 38 mm 1,000 V / 30 kA
5 000 µA	0.1 µA	1.5 % + 40	0.8 % + 20	3 % + 60	
50 mA	0.001 mA	1.5 % + 40	0.8 % + 20	3 % + 60	
500 mA	0.01 mA	1.5 % + 40	0.8 % + 20	3 % + 60	
5 A	0.0001 A	2 % + 40 (22)	0.8 % + 20	3 % + 60	11 A HRC fuse, 10 x 38 mm 1,000 V / 30 kA
10 A (8)	0.001 A	2 % + 40 (22)	0.8 % + 20	< 3 A / 5 kHz	

• Crest factor ≤ 3

Resistance

Range	Resolution	Accuracy	Measurement current	Protection against overloads
500 Ω (23)	0.01 Ω	0.08 % + 10	1,0 mA	1,000 Vrms (1)
5 kΩ (23)	0.0001 kΩ	0.08 % + 5	0.38 mA	
50 kΩ	0.001 kΩ		38 µA	
500 kΩ	0.01 kΩ		3.8 µA	
5 MΩ	0.0001 MΩ	0.2 % + 5	345 nA	
50 MΩ (24)	0.001 MΩ	1 % + 5	200 nA	
500 nS (25)	0.01 nS	1 % + 10	200 nA	

General remarks:
Maximum open-circuit voltage: < + 4.8 V
Instantaneous continuity: the built-in buzzer sounds when the resistance is less than 10.0 Ω.

Diode test (1) / Continuity test

Range	Resolution	Accuracy	Measurement current	Open circuit voltage
Diode (1)	0.1 mV	0.05 % + 5	Approx. 1.0 mA	< + 4.8 VDC

The built-in buzzer is triggered when the reading is below 50 mV approx.

Capacitance (1)

Range	Resolution	Accuracy	Full-scale measurement rate
10 nF	0.001 nF	1 % + 8	4 times/sec.
100 nF	0.01 nF	1 % + 5	
1,000 nF	0.1 nF		
10 µF	0.001 µF		
100 µF	0.01 µF		
1,000 µF	0.1 µF		1 time/sec.
10 mF	0.001 mF		0.1 times/sec.
100 mF	0.01 mF	3 % + 10	0.01 times/sec.

For capacitors with low values, use the “Relative” mode to offset the residual capacitance.
The maximum display for each range is 11,000 counts.

(1) Protection 1,000 Vrms for Ip-p < 0.3 A

(8) An additional 0.5% error should be applied to the accuracy of the 10 A calibre when measuring currents between 10 A and 20 A for a maximum of 30 seconds. After a current measurement > 10 A, and before carrying out any low-current measurements, leave the multimeter to cool for twice the time that the current was applied.

(10) Minimum intensity measured Imin >35 µArms

(11 For currents lower than 3 Arms, add 50 counts: 2.2 %+ 50

(12) For currents lower than 3 Arms, add 45 counts: 2.2 % + 45

(21) Always use the “Relative” function to offset the thermal effect with the measurement leads open before measuring the signal. If the “Relative” function is not used, you must add 20 counts to the accuracy. The thermal effect could occur in the following cases:
- Overheating due to manipulation error by a applying a high voltage of 50 V to 1,000 V for resistance measurement, diode test and mV functions.
- Overheating after battery recharging.
- Overheating after measuring a current higher than 500 mA: it is recommended to leave the multimeter to cool for twice the time that the current is applied.

(22) For currents < 3 Arms, add un uncertainty of 40 counts (2 % + 40)

(23) The accuracy of 500 Ω and 5 kΩ is specified after application of the relative function, which is used to subtract the resistance of the measurement leads and the thermal effect.

(24) For the 50 MΩ range, the relative humidity is specified as less than 60 %.

(25) The accuracy is specified for < 50 nS, after application of the relative function when the measurement leads are open.

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Temperature

Thermocouple type	Range	Resolution	Accuracy
K	-200 °C ~ +1 372 °C	0.1 °C	0.3 % + 3 °C
	-328 °F ~ +2 502 °F	0.1 °F	0.3 % + 6 °F

The accuracy does not include the tolerance of the probe, and the temperature probe connected to the multimeter must be placed in the location where it will be used at least 1 hour in advance.

Frequency

Range	Resolution	Accuracy	Min. Input Frequency
99.999 Hz	0.001 Hz	0.02 % + 3 < 600 kHz	1 Hz
999.99 Hz	0.01 Hz		
9.9999 kHz	0.0001 kHz		
99.999 kHz	0.001 kHz		
999.99 kHz	0.01 kHz		

The maximum acceptable voltage is determined by the following formula: [Voltage of signal measured] x [Frequency of signal measured] < 20,000,000 without exceeding 1,000 V.

Sensitivity for voltage

Sensitivity according to the frequency and trigger level

Input range (Maximum input for specified accuracy = 10 x range or 1,000 V)	Minimum sensitivity (rms value – sine wave)		Trigger level for DC coupling	
	20 Hz-100 kHz	> 100 kHz~ 200 kHz	< 100 kHz	> 100kHz ~ 200 kHz
50 mV	10 mV	15 mV	10 mV	15 mV
500 mV	25 mV	35 mV	60 mV	70 mV
1,000 mV	40 mV	50 mV	100 mV	150 mV
5 V	0.25 V	0.5 V	0.5 V / 1.25 V <100 Hz	0.6 V
50 V	2,5 V	5 V	5 V	6 V
500 V	25 V	No spec.	50 V	No spec.
1,000 V	50 V	No spec.	300 V	No spec.

Duty cycle

Range	Accuracy of full scale	Mode
0.01 %~99.99 %	0.3 % par kHz + 0.3 %	DC coupling

The accuracy for the duty cycle and pulse width is based on one 5 V square-signal input on the 5 VDC range.
For AC coupling, the duty cycle range can be measured at 5 % ~ 95 % of the full range if the frequency of the signal is > 20 Hz.

Pulse width

Range	Resolution	Accuracy
500 ms	0.01 ms	0.2 % + 3
2,000 ms	0.1 ms	

The positive or negative pulse width must be greater than 10 µs and the duty cycle should be taken into account. The pulse width scale is determined by the signal's frequency.

Sensitivity for current

Input range	Minimum sensitivity (rms value – sine wave)
	20 Hz-20 kHz
500 µA	100 µA
5,000 µA	250 µA
50 mA	10 mA
500 mA	25 mA
5 A	1 A
10 A	2.5 A

Maximum input: please refer to AC current measurement.

For assistance and ordering

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