APPA 301/303/305

DIGITAL MULTIMETER

CE

INSTRUCTION MANUAL

APPA

Advanced Instrument Technology Made Easy

TABLE OF CONTENTS

1. SAFETY

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. To avoid potential hazards, use the product only as specified.

⚠ **CAUTION.** *These statements identify conditions or practices that could result in damage to the equipment or other property.*

⚠ **WARNING.** *These statements identify conditions or practices that could result in personal injury or loss of life.*

Symbols on the product

⚠ Refer to manual ⧈ Double Insulated ⚠ High Voltage

Specific precautions

Use proper Fuse. To avoid fire hazard, use only the fuse type and rating specified for this product.

Do not operate without covers. To avoid personal injury , do not apply any voltage or current to the product without the covers in place.

Electric overload. Never apply a voltage to a connector on the product that is outside the range specified for that connector.

Avoid electric shock. To avoid injury or loss of life, do not connect or disconnect probes or test leads while they are connected to a voltage source.

Do not operate in wet/damp conditions. To avoid electric shock , do not operate this product in wet or damp conditions.

2. PRODUCT DESCRIPTION

All three meters provide many functions and features, Depending on your meter type, each type of meter has own features described in this manual. The following list provides a comparison of the features between meters.

FUNCTION	301	303	305
DC Voltage	•	•	•
AC Voltage	•	•	•
mV Voltage	•	•	•
Resistance	•	•	•
Lo Ohm	•	•	•
Diode Test	•	•	•
Continuity Check	•	•	•
DC Current	•	•	•
AC Current	•	•	•
Capacitance	•	•	•
Frequency	•	•	•
Duty Factor	•	•	•
Temperature (K-Type)	N/A	•	•

FEATURES	301	303	305
Adjustable Auto Power Off	•	•	•
Analog Bargraph Display , 80 Segments Graph	•	•	•
Zoom Analog Bargraph	•	•	•
Center Zero Analog Bargraph	•	•	•
Auto Calibration	•	•	•
Auto HOLD	•	•	•
Autorange With Rang HOLD	•	•	•
Auto Fuse Detector	•	•	•
Beep Guard	•	•	•
dBm / dB Readings With Selectable Ref. Impedance	•	•	•
Delta mode with %	•	•	•
Hazard Warning	•	•	•
Hi / Lo Limits	•	•	•
Storage and Recell up to 7 Memories	•	•	•
Low Battery Indicator	•	•	•
MAX / MIN / MAX—MIN	•	•	•
Peak Hold (0.5ms)	N/A	•	•
Period	•	•	•
Smoothing	•	•	•
Time Stamp For MAX / MIN / MAX - MIN	•	•	•
Time Stamp For Hi / Lo	•	•	•
True RMS (AC /DC + AC)	•	•	•
VAC / Hz / Period Triple Display	•	•	•
Water / Dust Resistant	•	•	•
Zero Reference	•	•	•
Battery (9V)	•	•	•
600V High Energy Fuse	•	•	•
LCD Backlight	•	•	•
Adjustable Auto Backlight Off	•	•	•
RS - 232 Phototropic Serial Port	•	•	•
RS - 232Cable	Option	Option	•
Win DMM300 software	Option	Option	•
Holster and Stand	•	•	•
Safety (IEC, UL, CSA)	•	•	•
CE Mark	•	•	•

3. FRONT PANEL OVERVIEW

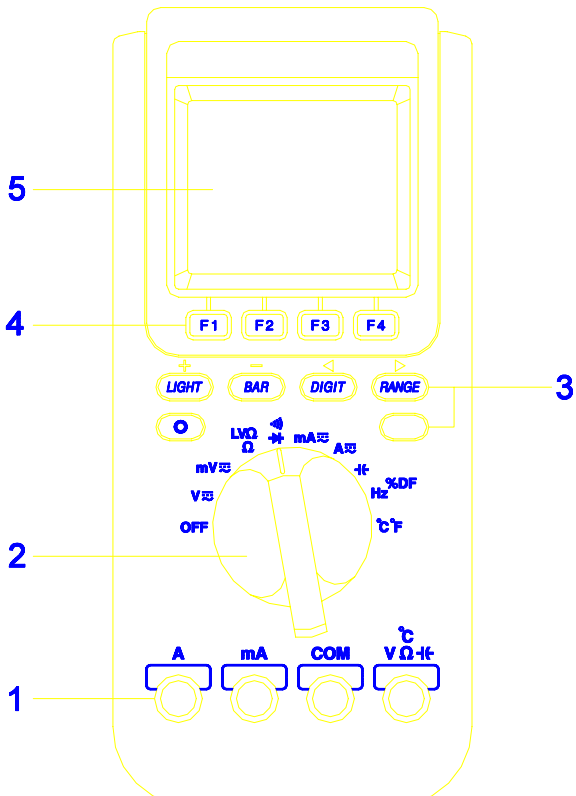


Figure 1

1. Input connectors.
2. Measurement function dial. White labels are the initial settings, yellow labels are selected with the yellow button.
3. Function buttons, set the basic function.
4. Menu function buttons, select the menu indicated in LCD.
5. LCD display with triple numeric readout.

3.1 DISPLAY INDICATORS

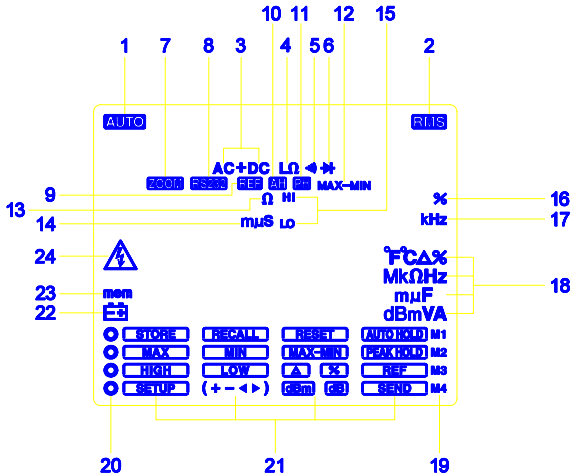


Figure 2

1. Auto range indicator.
2. True RMS mode indicator.
3. AC, DC and AC+DC mode indicators.
4. Low voltage resistance and resistance indicators.
5. Continuity check indicator.
6. Diode test indicator.
7. Zoom indicator for bargraph.
8. Sending data indicator (by RS-232)
9. Reference mode indicator.
10. Auto hold indicator.
11. Peak hold indicator.
12. Maximum, Minimum and Maximum - Minimum indicators.
13. Loading Resistance indicator.
14. Period indicators.
15. High limit and low limit indicators with beeper guard.
16. Percent indicator.
17. Frequency indicator.
18. Main display unit indicators.

19. Menuline 1, Menuline 2, Menuline 3, Menuline 4 indicators.
20. Menuline mark indicator (active when lights).
21. Menu function indicator.
22. is indicator (Low battery)
23. Memory indicator
24. High voltage input warning. (>60V DC, 30V AC rms).

Indicator	Unit	Indicator	Unit
μ	micro	V	Volt
m	milli	A	Ampere
K	kilo	F	Farad
M	mega	Hz	Hertz
△	delta	S	Second
%	percent	℉	Fahrenheit
dB	decibel (1V ref.)	℃	Celsius
dBm	decibel (1 mW on 600Ω)	Ω	ohm

3.2 BUTTONS FUNCTION

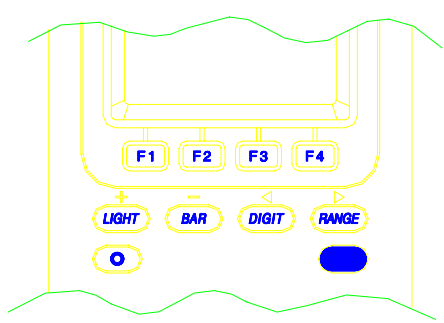


Figure 3

LIGHT

* This button is usd to turn on or turn off the backlight.
* This button is disabled at Recall Menu Function.

BAR

* This button scrolls through the types of bargraph displays.
  Zero at left
  Zero at left, graph zoomed x 10, zoom displayed
  Zero at center
  Zero at center (graph zoomed x 10, zoom displayed)
  Bar off
* This button is disabled at Recall Menu Function.

DIGIT

* 40000 or 4000 indication is switched by pushing "DIGIT" button.
* Reading is refreshed by 2 times per second for 40000 condition and 4 times per second for 4000 condition.

RANGE

* Auto range or Manual range is switched by pushing "RANGE" button go back to auto range from manual range by pushing for about 2 seconds.
* " AUTO " indicates for the status of Auto Range , disappear for the status of Manual Range.

O

* Four row lines of menu functions may be chosen by pushing " o " button sequentially.
* Active line be marked with " o " indicator on the left end of the line.

YELLOW

* The yellow button toggles between dual functions (white or yellow) located on the dial.

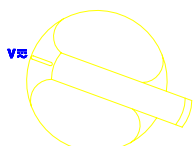
3.3 MENU BUTTONS (F1,F2,F3,F4)

* Use F1,F2,F3,F4 buttons to choose Menu Functions.
* The located Menu Function will be marked with a block " " indicator.
* Refer to 5 MENU FUNCTION DESCRIPTIONS for operating.

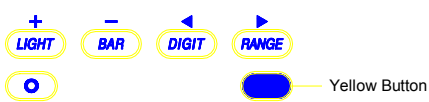
4 OPERATION

4.1 VOLTAGE MEASUREMENTS (DC, AC, AC + DC) (Set to autoranging mode for unknown voltage measurements).

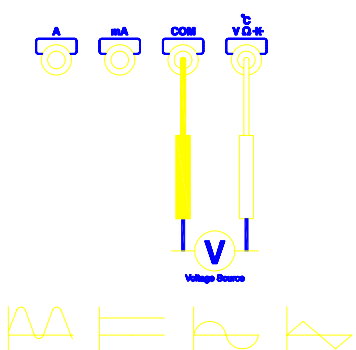
* Set dial.



* Choose DC, AC or AC + DC



* Connect leads

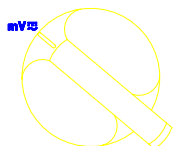


* The AC and AC + DC measurements, provide a true RMS measurement.

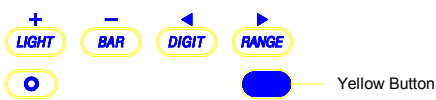
* On AC mode, the frequency and period of the measured signal are displayed simultaneously.

4.2 m VOLTAGE MEASUREMENTS (DC , AC, AC + DC)

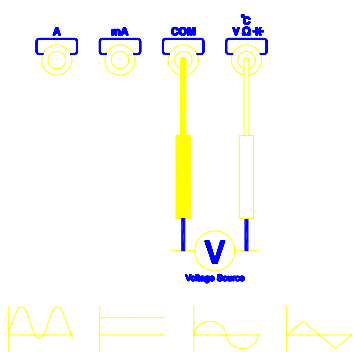
* Set dial.



* Choose DC, AC or AC + DC



* Connect leads

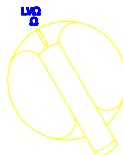


* The AC and AC + DC measurements provide a true RMS measurement.

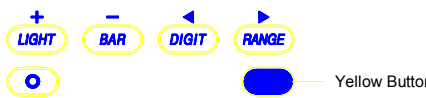
* On AC mode, the frequency and period of the measured signal are displayed simultaneously.

4.3 OHM AND LOW VOLTAGE OHM MEASUREMENTS

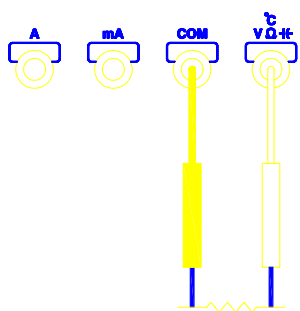
* Set dial.



* Choose Ω or LV Ω



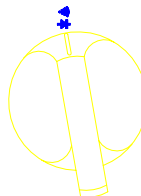
* Connect leads



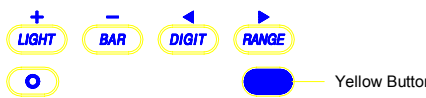
* ⚠ CAUTION : *Remove all power from the circuit before connecting the test leads.*
* LV setting reduces the maximum test voltage level to about 0.5V to avoid turning on semiconductor devices.
* Remove individual components from circuitry for best results.

4.4 DIODE TEST

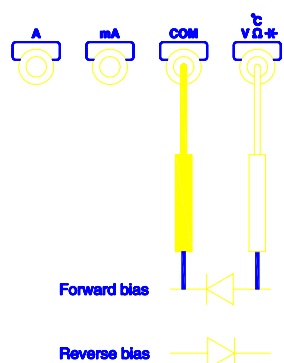
* Set dial.



* Choose diode test.



* Connect leads



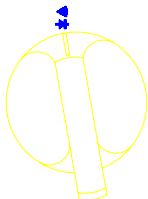
Forward bias
Good = 0.4 to 0.9 V
Bad = 0 or = > 2.0 V

Reverse bias
Good = OL
Bad = <2.0 V

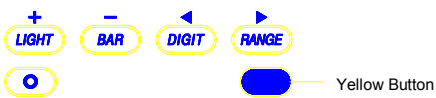
* ⚠ CAUTION : *Remove all power from the circuit before connecting the test leads.*
* Remove individual components from circuitry for best results.

4.5 CONTINUITY CHECK

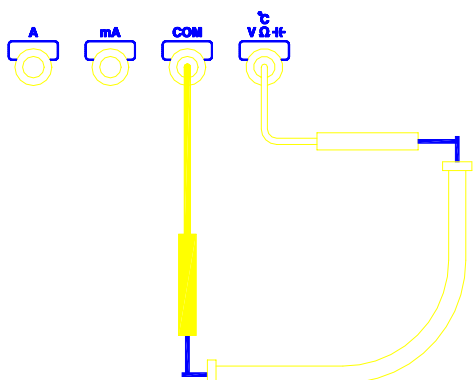
* Set dial.



* Choose continuity check



* Connect leads

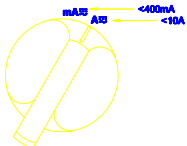


* ⚠ CAUTION : *Remove all power from the circuit before connecting the test leads.*

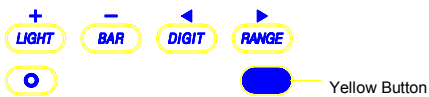
* The beeper sounds if the resistance of the circuit is less than 50Ω .

4.6 CURRENT MEASUREMENTS (DC, AC, AC + DC)

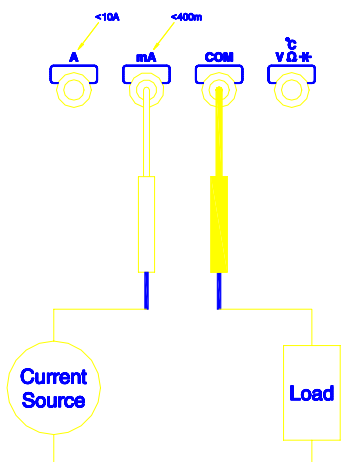
* Set dial.



* Choose DC, AC or AC + DC



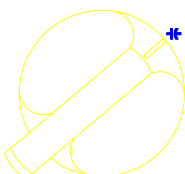
* Connect leads



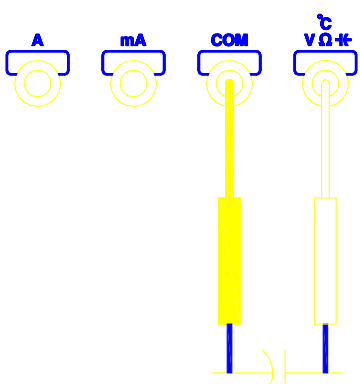
* ⚠ CAUTION : *Limit large current measurements (10 to 20A) to 30 seconds and allow two minutes of cooling between measurements.*
* Do not connect to circuits with > 600V.
* The AC and AC + DC measurements provide true RMS.
* On AC mode, the frequency and period of the measured signal are displayed simultaneously.

4.7 CAPACITANCE MEASUREMENTS

* Set dial.



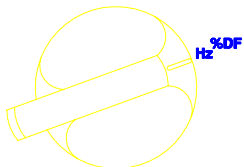
* Connect leads, zero stray capacitance for low capacitance measurements.



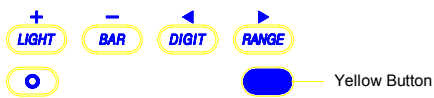
* ⚠ CAUTION : *Remove all power from the circuit and discharge Capacitors before connecting the test leads.*
* Remove individual components from circuity for best results.

4.8 FREQUENCY AND DUTY FACTOR MEASUREMENTS

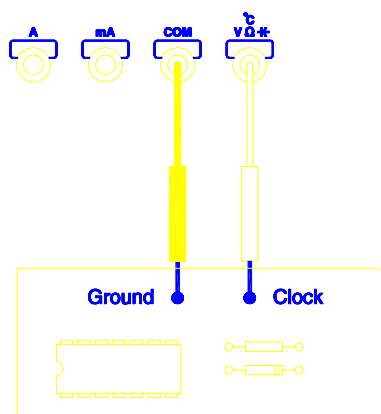
* Set dial.



* Choose frequency or duty factor



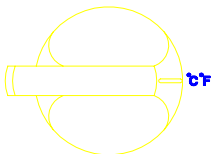
* Connect leads



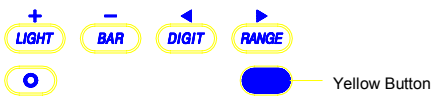
* The duty factor displays the percent of the signal that is high.
* The period is displayed in frequency mode.
* The period and frequency are also displayed in duty factor mode.

4.9 TEMPERATURE MEASUREMENTS

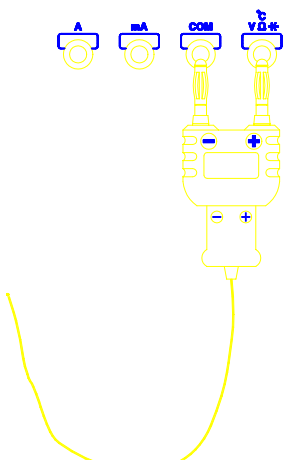
* Set dial.



* Choose Celsius or Fahrenheit.



* Connect leads.



* This setting requires an optional temperature probe and adapter. Refer to Accessories .
* The room temperature is displayed at right upper numeric block.

5. MENU FUNCTION DESCRIPTIONS

In Menu Function RECALL, SETUP, SETTING HIGHT, LOW Limits or REF modes, when the indicator (+ - ◀ ▶) is displayed then the buttons of LIGHT, BAR, DIGIT, RANGE will be changed to INCREASE (+), DECRESE (-), LEFT SHIFT (◀), RIGHT SHIFT (▶) functions.
Operating results by MENU FUNCTIONS un-stored in memory will be abandoned if active MENU FUNCTION is switched.

5.1 STORE

* When pushing the F1 button, the meter stores the present reading in memory and the **mem** indicator, the stored squential number and the stored value are displayed up.
* There are 7 memories.
* The memory data will be cleared when change range or change rotary function.

5.2 RECALL

* The F2 button toggles the recall mode on and off.
* Push F2 button then use the ◀ , ▶ buttons to choose the memories then the **mem** indicator, the appositional sequence number and the stored value are displayed.

5.3 RESET

* Push F3 button to clear the stored memory data and set HIGH Limits, LOW Limits and REF value to default values.

5.4 AUTO HOLD

* Auto hold is activated when a stable reading is first achieved.
* The F4 button toggles the auto hold mode on and off.
* With auto hold on, the instrument beeps when the reading is updated, the auto hold reading is displayed at right upper numeric block and displays the AH indicator.

5.5 MAX, MIN, MAX-MIN

* The F1 or F2 or F3 buttons toggles the MAX/ MIN/ MAX-MIN on and off.
* When the F1 button is pressed, MAX indicator is displayed and the value displayed at right upper numeric block is the most recent maximum value.
* When the F2 button is pressed, MIN indicator is displayed and the value displayed at right upper numeric block is the most recent minimum value.

* When the F3 button is pressed , MAX-MIN indicator is displayed and the value displayed at right upper numeric block is the most recent maximum value minus the most recent minimum value.

5.6 PEAK HOLD

* The F4 button toggles the peak hold on and off.
* On the peak hold mode, pushe the F1 button to display peak hold max value.
* On the peak hold mode, pushe the F2 button to display peak hold min value.
* On the peak hold mode, pushe the F3 button to display peak hold max-min value.
* The beeper sounds when new minimum or maximum values are detected.

5.7 HIGH, LOW

* When HIGH, LOW are activated, the meter is in a comparison mode, comparing present reading to high and low limits.
* First pushing F1 button then use the +, - , ◀ , ▶ buttons to set high limits at the right upper mumeric black , push F1 button again, active high mode function and the defined high limits are displayed the left upper mumeric block.
* First pushing F2 button then use +, - , ◀ , ▶ buttons to set low limits at the right upper mumber, pushing F2 button again, active low mode function and defined low limit are displayed at the right upper numeric block.
* When present readings exceed the limits, either HI or LO is indicated and the beeper sounds.
* The high, Low limits will be set to default value when change range or rotary function.

5.8 △ (DELTA) / % (PERCENT)

* In this mode, F3 toggles between △ / % , push for about 2 seconds for exit.
* Both △ and % functions differ and percentize the input values by the reference value settled by REF function that default value is undefined.
* Push F3 button without settled REF to enter △ mode and toggle these function, the value before entering is stored in REF until exit.
* In this mode, the reference value is displayed at the left upper numeric block with REF symbol displaying at its right top, the actual input value is at the right upper numeric block and the accessed value is at the main mumeric display.

5.9 REF (REFERENCE)

* The F4 button turns REF mode on and off.
* In the REF mode, the REF indicator appears in the display and use the +, - , ◀ , ▶ buttons to set reference value in the display.
* On setting , the input value is at right upper numeric block and being settled value is at main display.
* The reference value will be abandoned when change range or rotary function.

5.10 SETUP

* In the setup mode, you can adjust parameters for various operations as desired. Turning the meter off does not affect saved setups.
* The F1 button enters and exits setup mode. Exit setup mode by F1 to store settled parameters, exit setup mode by the yellow button or the rotary switch to un-store settlings.
* In the setup mode, use the + , - , ◀ , ▶ buttons to choose various operations.
  + : Increases selected digit values or toggles default settings.
  - : Decreases selected digit values or toggles default settings.
  ◀ : Scrolls left through a list of menu prompts in the setup mode.
  ▶ : Scrolls right through a list of menu prompts in the setup mode.
* Menu prompts of setup mode are as follows:
  bEEP. : Set beeper on or off.
  A.P.O. : Set the time for auto power off.
  b. LItE : Set the time for auto back light off.
  HAZ. : Set hazard detect function on or off.
  L. FrEq : Set power line frequency to 50Hz or 60Hz.
  LoAd : Set dBm load in the dBm mode.
  rESEt : Set the setup options of meter to the default setting except power line frequency setting.

5.11 dBm, dB

* Push F3 button to enter dBm display mode and toggle between dBm and dB. Pushing F3 button for about two seconds exits dBm / dB mode.
* In the dBm mode, the dBm load is displayed at the left upper mumeric block. In the dBm / dB mode, the measured value is displayed at the right upper place.

5.12 SEND

* Push F4 button to send the information of meter out.
* When send is activating , RS232 indicator appears in the display.

6. SPECIAL FEATURE DESCRIPTIONS

6.1 Auto fuse detection

The meter checks the integrity of the internal fuses for the mA, A measurements.

If an open fuse is detected , FUSE is displayed and beep sounds continuously.

6.2 Probe input guard

The meter beeps continuously and displays ProbE if a probe is inserted in a current input connector and a measurement other than current is selected.

6.3 Buzzer

A single beep indicates correct operation; two beeps indicate a warning or error condition. Use the Setup menu to set the buzzer mode on or off.

7. POWER-UP OPTIONS

Press button while turning meter on.

LIGHT : Display LCD all segment

BAR : Display software version.

DIGIT : Test switch & buttons.

RANGE : Test LCD segment one by one.

AUTO POWER OFF : The meter turns itself off within a settled period if no controls or settings are changed. Restore power by switching dial.

8. SPECIFICATIONS

All specifications are warranted unless noted typical.

Stated accuracies are at 23°C ± 5°C at less than 80% relative humidity and without the battery indicator displayed.

8.1 General specifications

Characteristics	Description
LCD display digits	4 3/4 or 3 3/4
Bargraph segments	80 Segment Graph
Display count	40,000 or 4,000
Numeric update rate	2 times / sec (40,000 count) 4 times / sec (4,000 count)
Bargraph	20 times/sec
Polarity display	Automatic
Overrange display	OL is displayed
Low voltage indicator	is indicated
Automatic power-off time	User selectable (default = 30 minutes)
Power source	One 9V dry cell battery
Maximum input voltage	1000V (750V AC) CAT Ⅱ between V and COM
Maximum floating voltage	1000V (750V AC) CAT Ⅱ between any terminal and earth ground
Maximum input current	400mA between mA and COM 10A continuous between A and COM (20A for 30 seconds)
Maximum open circuit Voltage (current inputs)	600V between A and COM and between mA and COM
Overload protection mA connector	1A (600V) fast blow fuse
A connector	15A (600V) fast blow fuse
V connector	1100 Vp V~ V⎓ AC+DC 850 Vp mV~ mV⎓ AC+DC LVΩ Ω•))) ⊣⊢ Hz% DF ℃ ℉
Temperature Coefficient	0.1 x (Spec.Accuracy) per ℃, < 18℃ or > 28℃.
Battery Life	100 hours typical (alkaline)

8.2 Measurement Characteristics

(All at 23°C ± 5°C ,< 80% R.H.) Multiply accuracy digits by 10 in 40000 count Mode.

1. VOLTAGE :

DCV	301	303	305
40mV	± (0,20% + 8d)	± (0,10% + 8d)	± (0,06% + 8d)
400mV	± (0,20% + 2d)	± (0,10% + 2d)	± (0,06% + 2d)
4V,40V,400V,1000V	± (0,20% + 2d)	± (0,10% + 2d)	± (0,06% + 2d)

ACV	301	303	305
400mV 40Hz ~ 100Hz 100Hz ~ 1KHz	 ± (1,20% + 5d) ± (2,00% + 5d)	 ± (0,90% + 5d) ± (1,50% + 5d)	 ± (0,70% + 5d) ± (1,00% + 5d)
4V 40Hz ~ 100Hz 100Hz ~ 1 KHz 1 KHz ~ 10 KHz 10 KHZ ~ 20 KHz 20 KHz ~ 50 KHz 50 KHz ~ 100 KHz	 ± (1,00% + 5d) ± (2,00% + 5d) ± (3,00% + 6d)	 ± (0,90% + 5d) ± (1,50% + 5d) ± (2,50% + 6d) ± (3,50% + 7d) ± (5,50% + 8d)	 ± (0,70% + 5d) ± (1,00% + 5d) ± (2,00% + 6d) ± (3,00% + 7d) ± (5,00% + 8d) ± (10,00% + 10d)
40V 40Hz ~ 100Hz 100Hz ~ 1 KHz 1 KHz ~ 10 KHz 10 KHZ ~ 20 KHz 20 KHz ~ 50 KHz 50 KHz ~ 100 KHz	 ± (1,20% + 5d) ± (2,00% + 5d) ± (3,00% + 6d)	 ± (0,90% + 5d) ± (1,50% + 5d) ± (2,50% + 6d) ± (3,50% + 7d) ± (5,50% + 8d)	 ± (0,70% + 5d) ± (1,00% + 5d) ± (2,00% + 6d) ± (3,00% + 7d) ± (5,00% + 8d) ± (10,00% + 10d)
400V 40Hz ~ 100Hz 100Hz ~ 1 KHz 1 KHz ~ 10 KHz 10 KHZ ~ 20 KHz 20 KHz ~ 50 KHz	 ± (1,20% + 5d) ± (2,00% + 5d) ± (3,00% + 6d)	 ± (0,90% + 5d) ± (1,50% + 5d) ± (2,50% + 6d) ± (3,50% + 7d) ± (5,50% + 8d)	 ± (0,70% + 5d) ± (1,00% + 5d) ± (2,00% + 6d) ± (3,00% + 7d) ± (5,00% + 8d)
750V 40Hz ~ 100Hz 100Hz ~ 1 KHz	 ± (1,20% + 5d) ± (2,00% + 6d)	 ± (0,90% + 5d) ± (1,50% + 6d)	 ± (0,70% + 5d) ± (1,00% + 6d)
Bandwidth	40Hz ~ 10 KHz	40Hz ~ 50 KHz	40Hz ~ 100 KHz

dBm (typical) : -15 dBm to + 55 dBm (0 dBm = 1 mW into 600Ω) .

dBv (typical) : -80 dBv to + 50 dBv (0 dBv = 1 Vrms).

Note : (ACV only)

Add additional 40D for reading under 30% of range.

Specifications exclude under 20% of range for 20KHz ~ 100KHz.

Resolution : 1μV in the 40mV range.

Input Impedance : 10MΩ , < 100pF.

Overload Protection : 1000V dc, 750V rms.

AC Conversion Type : AC Coupled True RMS responding.

AC+DC Volts : Same as AC(RMS) + 1.00%+8d.

Crest Factor : +1.5% addition error for C.F. from 1.4 to 3

+3.0% addition error for C.F. from 3 to 4

2. CURRENT

DCA	301	303	305
40mA, 400 mA	± (0,50% + 4d)	± (0,30% + 4d)	± (0,20% + 4d)
4A, 10A	± (0,50% + 4d)	± (0,30% + 4d)	± (0,20% + 4d)

ACA	301	303	305
40mA, 400mA, 4A, 10A	± (1,20% + 8d)	± (1,00% + 8d)	± (0,80% + 8d)
Bandwidth	40Hz ~ 400Hz	40Hz ~ 400Hz	40Hz ~ 400Hz

Range : 40mA,400mA,4A,10A.

Resolution : 1μA in the 40mA range.

Burden Voltage : 800mV max. for mA input, 1V max. for A input.

AC Conversion Type : AC Coupled True RMS responding.

Input Protection : Equipped with High Energy Fuse.

1A,600V, IR 10KV fuse (Bussmann BBS-1 or equivalent) for mA input.

15A,600V, IR 100KV fuse (Bussmann KTK 15 or equivalent) for A input.

AC+DC Current : Same as AC(RMS) + 1.00% + 8d

C.F. : Same as ACV.

3. PEAK HOLD : +[±(0.7% + 20d)] additional error for > 10% of full scale.

4. RESISTANCE:

OHM	301	303	305
4OOΩ, 4KΩ	±(0,50% + 2d)	±(0,40% + 2d)	±(0,30% + 2d)
40KΩ, 400KΩ	±(0,50% + 2d)	±(0,40% + 2d)	±(0,30% + 2d)
4MΩ	±(0,50% + 4d)	±(0,40% + 4d)	±(0,30% + 4d)
40MΩ	±(5,00% + 5d)	±(5,00% + 5d)	±(5,00% + 5d)

LV OHM	301	303	305
4KΩ, 40KΩ, 400KΩ	±(1,00% + 2d)	±(0,80% + 2d)	±(0,60% + 2d)
4MΩ	±(1,00% + 4d)	±(0,80% + 4d)	±(0,60% + 4d)
40MΩ	±(7,00% + 5d)	±(7,00% + 5d)	±(7,00% + 5d)

Resolution : 0.01Ω in the 400Ω range.

Open Circuit Voltage : 3.3V
Open Circuit Low Voltage : 0.6V
Input Protection : 600V rms.

5. CONTINUITY CHECK

Continuity Threshold : Approx. 50Ω

Continuity Indicator : 2KHz Tone Buzzer.
Input Protection : 600V rms.

6. DIODE TEST

Test Current : 1.1mA (Typical)
Open Circuit Voltage : 3.3V DC (max).
Input Protection : 600V rms.

7. CAPACITANCE

Capacitance	301	303	305
4nF,40nF,400nF, 4μ F	±(1,90% + 20d)	±(1,40% + 20d)	±(0,90% + 20d)
40μ F, 400μ F	±(2,90% + 20d)	±(2,40% + 20d)	±(1,90% + 20d)
4mF, 10mF	±(3,90% + 20d)	±(3,40% + 20d)	±(2,90% + 20d)

Note : For best measurements, with △ mode on nF ranges.

Range : 4nF,40nF,400nF, 4μF, 40μF, 400μ F, 4mF, 10mF
Resolution : 1pF in the 4nF range.
Input Protection : 600V rms

8. FREQUENCY COUNTER
Range : 400Hz, 4KHz, 40KHz, 400KHz, 4MHz.
Resolution : 0.01Hz in the 400Hz range.
Accuracy : ±(0.01% + 1d)

Sensitivity : 0.5Vp-p, for 15Hz ～ 1MHz, 1Vp-p, for 1MHz ～ 4MHz.

Min . Frequency : 15Hz.
Input Protection : 600V rms.

9. DUTY FACTOR
Range : 20% ~ 80%
Resolution : 0.1%.
Accuracy : ±6d (15Hz ~ 10KHz , 5Vp-p).

10. TEMPERATURE

Temperature	301	303	305
-50°C ~ 1200°C		1°C + 1d	1°C + 1d
-100°C ~ –50°C		2°C + 1d	2°C + 1d
-200°C ~ –100°C		3°C + 1d	3°C + 1d

Multiple the accuracy by 2 for °F.

Range : -200°C ～ 1200°C

Resolution : 0.1°C
input protection : 600V rms.

8.3 Physical characteristics

Characteristic	Description
Dimensions (H x W x D)	200mmx90mmx42mm 212mmx100mmx55mm(withholster)
Weight (with battery)	420g
With holster	650g

8.4 Environmental characteristics

Characteristic	Description
Temperature operating	0 to + 50°C
Non-Operating (storage)	-20 to + 60°C
Humidity (operating)	< 80% R.H.
Altitude Operating	2,222 m (7290 ft.)
Non-Operating	12,300 m (40354 ft.)
Vibration & shock Operating	MIL-T-28800E TYPE II Class 5 2.66gRMS, 5 to 500 Hz, 3axes (10 minutes each)
Dust / Water Protection IP Rating	IP 64.
Indoor Use	

8.5 Certifications and compliances

Safety	Designed to IEC 1010-1, UL3111-1 and CSA specifications
Input rating	1000V DC Category Ⅱ
	600V DC Category Ⅲ
	750V AC Category Ⅱ
	600V AC Category Ⅲ
Overvoltage category	CAT Ⅲ : Distribution level mains, fixed installation.
	CAT Ⅱ : Local level mains, appliances, portable equipment.
	CAT Ⅰ : Signal level, special equipment or parts of equipment, telecommunication, electronics.
Pollution Degree 2	Do not operate in environments where conductive Pollutants may be present.
EC Declaration of Conformity	Meets the intent of Directive 89/336/EEC for Electromagnetic Compatibility and Low Voltage Directive 73/23/EEC for Product Safety. Compliance was demonstrated to the following specifications as listed in the official Journal of the European Communities: EN 55011 Class A : Radiated and Conducted Emissions. EN 50082-1 Immunity : IEC 801-2 Electrostatic Discharge IEC 801-3 RF Radiated EN 61010-1 Safety requirements for electrical equipment for measurement, control, and laboratory use.

9 MAINTENANCE

Protect the meter from adverse weather conditions. The meter is not waterproof.

Do not exprose the LCD display to direct sunlight for long periods of time.

⚠ **CAUTION** . To avoid damage to the meter, do not expose it to sprays, liquids, or solvents.

Clean the exterior of the meter by removing dust with a lint-free cloth. Use care to avoid scratching the clear plastic display filter.

For further cleaning, use a soft cloth or paper towel dampened with water. You can use a 75% isopropyl alcohol solution for more efficient cleaning.

⚠ **CAUTION.** To avoid damage to the surface of the meter, do not use abrasive or chemical cleaning agents.

BATTERY REPLACEMENT (refer to Figure 4)

1. Disconnect the test leads from any circuit under test and turn off meter.
2. Remove the test leads from meter.
3. Loosen the screw from the battery cover on bottom case.
4. Remove battery cover.
5. Install a new battery after removing the original one.
6. Assemble battery cover onto bottom case with screw driver and the screw described in step 3.

FUSE REPLACEMENT (refer to Figure 5)

1. Follow step 1 to step 4 described in Battery Replacement.
2. Remove the battery from meter.
3. Remove 4 screws installed between the top case and bottom case of meter.
4. Separate the battery snape and bottom case of meter.
5. Remove 4 screws installed between the PCB and top case of meter.
6. Separate the top case and PCB of meter.
7. Replace a new fuse (FUSE 1 or FUSE 2).
8. Assemble the top case and PCB of meter.
9. Install the battery snap in the battery box in bottom case.
10. Assemble the top case, PCB, and bottom case of meter.
11. Install the battery removed before and assemble the battery cover .

Battery and Fuse Replacement

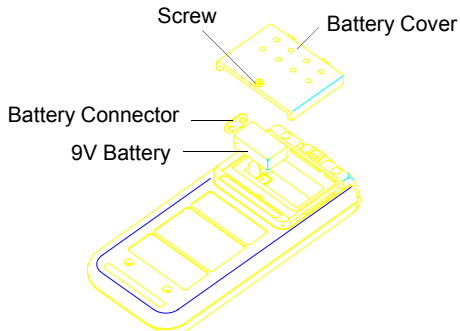


Figure 4

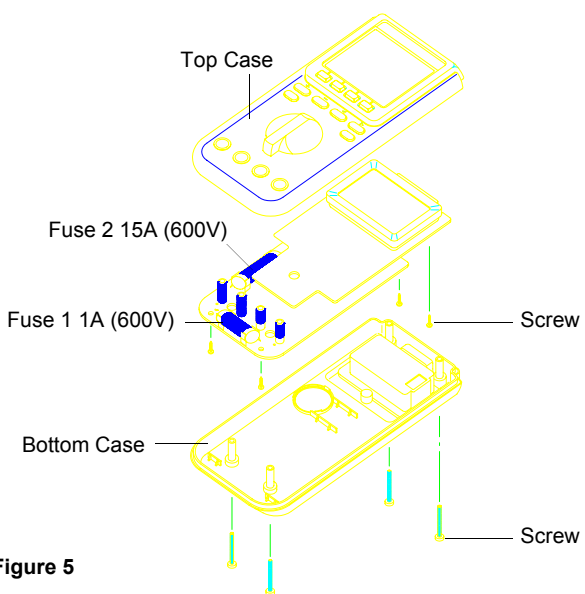


Figure 5

⚠ **WARNING :** Installing improper fuses can cause injury and product damage.

10. ACCESSORIES

	301	303	305
Gift Box	•	•	•
Meter	•	•	•
Holster + Tilt	•	•	•
Battery (9V Alkaline)	•	•	•
Manual	•	•	•
Test Leads	•	•	•
Aligator Clip	•	•	•
Temp. Socket	N/A	•	•
K-Type Sensor (50BK)	N/A	•	•
RS 232 Cable (with Adapter DB9M to DB25F)	Option	Option	•
CD ROM	Option	Option	•
Carrying Case.	Option	Option	Option

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