

BK PRECISION®

Instruction Manual

Model 312A & 313 Current Clamp Meter

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Thank you for purchasing this instrument. Please read this instruction manual carefully and completely before using your digital clamp meter. Correct operation will insure the best performance and decrease the possibility of damages.

1. Features

- * Jaws opening up to 30mm.
- * The maximum conductor size is $\phi 30\text{mm}$.
- * Safety socket design.
- * Data Hold.
- * Continuity buzzer will sound if circuit impedance is below 40Ω .

2. Specifications

- a).Display: 3 3/4 digits LCD with maximum reading 3999, Plus decimal point, unit symbol indication.
- b).Polarity Indication: Automatic polarity, "-" display for negative input.
- c).Overload Indication: LCD will show a "OL" in the left highest position.
- d).Low Battery Indication : Replace battery when LCD displays "BAT".
- e).Battery Life: 50 hours approx.(alkaline battery recommended)
- f).Sampling Rate: 2 times per second for digital display.
20 times per second for analog display.

- g).Power Supply: R03(AB)/SIZE AAA 1.5V/UM4 battery x2.
- h).Operation Altitude: up to 2000m.
- i).Operating Environment: Indoor use. This instrument has been designed for use in an environment of pollution degree 2.
- j).Auto Power Off: The power will automatically turn off when the range set is unchanged for more than 30 minutes.
- k).Disabling Auto Off: Set the range selector to any range and press ZERO or RANGE button.
- l).Operating Temperature & Humidity: 5°C ~ 40°C, below 80%RH.
- m).Storage Temperature & Humidity: -10°C ~ 60°C, below 70%RH.
- n).Category: CAT II 600V for body.
CAT III 600V for clamp.
- o).Dimension: 195mm(L)x64mm(W)x30mm(H).
- p).Weight: About 240g.(including batteries)
- q).Accessories: Test Leads 、 manual 、 Carrying case 、 Batteries.

Electrical Specifications

Accuracy: $\pm(\dots\%rdg\dots\dgt)$

ACA (Auto/Manual)(312A & 313)

| Range | Resolution | Accuracy 50Hz~60 Hz | Overload Protection |
|-------|------------|------------------------|---------------------|
| 40A | 0.01A | $\pm (2.0\%+10)$ | 600A rms |
| 400A | 0.1A | | (60 second) |

ACV (Auto/Manual)(312A)

| Range | Resolution | Accuracy 50Hz~500 Hz | Input Impedance | Overload Protection |
|-------|------------|-------------------------|-----------------|---------------------|
| 400V | 0.1V | $\pm (1.5\%+5)$ | 10M Ω | 660V rms |
| 600V | 1V | | | |

ACV (Auto/Manual)(313)

| Range | Resolution | Accuracy 50Hz~500 Hz 40Hz~60 Hz | Input Impedance | Overload Protection |
|-------|------------|---------------------------------------|-----------------|---------------------|
| 400mV | 0.1mV | $\pm(1.0\%+3)$ | 100M Ω | DC/AC 660V rms |
| 4V | 1mV | | 11M Ω | |
| 40V | 10mV | $\pm (1.0\%+3)$ | 10M Ω | |
| 400V | 100mV | | | |
| 600V | 1V | | | |

DCV (Auto/Manual)(312A)

| Range | Resolution | Accuracy | Input Impedance | Overload Protection |
|-------|------------|-----------------|-----------------|---------------------|
| 400V | 0.1V | $\pm (1.0\%+3)$ | 10M Ω | 660V rms |
| 600V | 1V | | | |

DCV (Auto/Manual)(313)

| Range | Resolution | Accuracy | Input Impedance | Overload Protection |
|-------|------------|-----------------|-----------------|---------------------|
| 400mV | 0.1mV | $\pm (0.8\%+2)$ | 100M Ω | DC/AC 660V rms |
| 4V | 1mV | | 11M Ω | |
| 40V | 10mV | | 10M Ω | |
| 400V | 100mV | | | |
| 600V | 1V | | | |

DCA (Auto/Manual)(313)

| Range | Resolution | Accuracy | Overload Protection |
|-------|------------|------------|---------------------|
| 40A | 0.01A | ±(2.5%+10) | 600A rms(60 Second) |
| 400A | 0.1A | | |

Frequency (Auto-Ranging)(312A)

| Range | Resolution | Accuracy | Max. Sensitivity | Overload Protection |
|--------|------------|---------------|------------------|---------------------|
| 4KHz | 1Hz | ± (0.8%+3) | 3V rms | DC/AC 600V rms |
| 40KHz | 10Hz | | | |
| 400KHz | 100Hz | | 5V rms | |
| 4MHz | 1KHz | | | |
| 40MHz | 10KHz | | | |

Continuity

| Range | Buzzer | Max. Open Voltage | Overload Protection |
|-------|-----------|--------------------------|---------------------|
| ·) | below 40Ω | About-1.5V _{DC} | 500V rms |

Resistance (Auto/Manual)(313)

| Range | Resolution | Accuracy | Max. Sensitivity | Overload Protection |
|-------|------------|----------|---------------------------|----------------------------------|
| 400Ω | 0.1Ω | ±(1%+5) | about -1.5V _{DC} | DC/AC 600V rms (60 Second) |
| 4KΩ | 1Ω | ±(1%+3) | About-0.45V _{DC} | |
| 40KΩ | 10Ω | | | |
| 400KΩ | 100Ω | | | |
| 4MΩ | 1KΩ | ±(3%+3) | | |
| 40MΩ | 10Ω | | | |

Resistance (312A)

| Range | Resolution | Accuracy | Max. Open Voltage | Overload Protection |
|-------|------------|----------|--------------------------|---------------------|
| ·) Ω | 0.1Ω | ±(1%+5) | About-1.5V _{DC} | 600V rms |

3. Instrument Description

- a. Inductive clamp jaw.
- b. Safety guard.
- c. Jaw Trigger.
- d. Rotary Range Selector.
- e. LCD
- f. COM Jack: it is used for the connection of negative signal input while measuring DCV, ACV, Ω / ·|) .
- g. V / Ω Jack: It is used for the connection of positive signal input while measuring DCV, ACV, Ω / ·|) .
- h. RANGE Button: Manual ranging is allowed while the button is pressed, and the symbol MANU is shown on LCD, The auto ranging mode is activated again while pressing the button for more than 2 seconds or setting the range.
- i. DATA HOLD button: The reading data shown on LCD can be locked while pressing the button.
- j. ZERO button: The reading data shown on LCD can be reset to 0 while the button is pressed once, and the symbol "ZERO" is also displayed on LCD, Press the button again, the data

cleared can be shown on LCD, and the symbol "ZERO" begins to blink. To abort the zero mode, hold down the button for more than 1 second.(313)

Note: When this button is pressed, the range is unchanged.

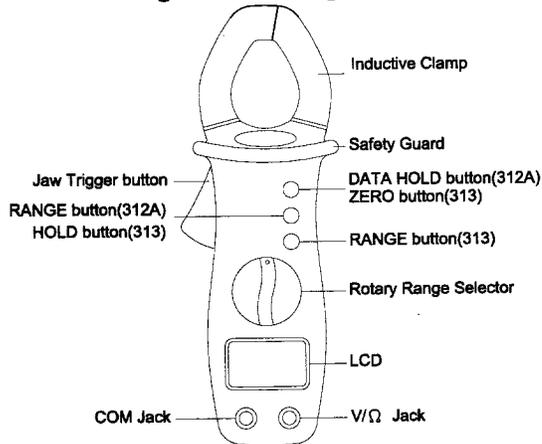


Fig.(1)

4. Measurement

4-1. Notes

1. Check if the batteries are installed properly.
2. Check if the LCD and the range indicator show the same as the function desired.
3. When changing the range, first remove the tested conductor or electrical circuit from the

clamp jaw in order to avoid damage to the meter.

4. Strong vibrations and impacts, may cause damage to the instrument.
5. Do not test or connect to any circuit with voltage or current exceeding the specified overload protection.
6. When measuring resistance, Please do not apply any voltage, though there is a protection circuit, excessive voltage will still cause meter damage.
7. When measuring current, first remove the test leads from common and voltage / resistance jacks.
8. When measuring current, any strong current near or close to the clamp jaw will affect the accuracy.
9. This instrument is not available for the non-sine wave AC signal, otherwise there will be a great error.
10. When measuring current, always put the tested conductor in the center of the clamp jaw so as to obtain a more accurate reading.
11. During measuring, if the value of reading or indication of sign remain unchanged, check if the DATA HOLD function is active and the symbol \boxed{H} is displayed on the LCD.
12. In order to avoid reading incorrect data, you

- have to replace the batteries immediately when the symbol BAT appears on the LCD.
13. Do not touch the circuit board when changing the battery to prevent damage caused by static electricity.

4-2. AC Current (ACA) measurement

Make sure that all the test leads are disconnected from the meter's terminal for current measurement.

1. Select "~A" range.
2. Open the clamp and put the tested conductor in the center of the clamp jaws (See Fig.2).(No gap is allowed between the connections of clamp jaws)
3. The current value will be indicated on the LCD.
4. If the reading is difficult, press the DATA HOLD button to hold the obtained value. To exit from this function press DATA HOLD button again.

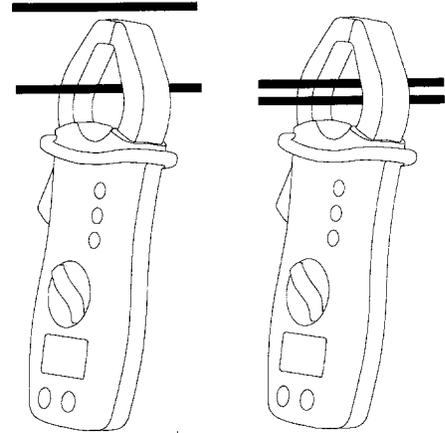


Fig.(2)

4-3. AC Voltage (ACV) measurement

Maxim input for DCV or ACV is 600V. Do not attempt to take any voltage measurement that exceeds the limits. Exceeding the limits could cause electrical shock and damage the clamp meter.

1. Select "V~" range.
2. Insert the test leads into the jacks. The red test lead plug into V/ Ω jack, and the black test lead plug into COM jack.
3. Connect the two long ends of test leads to the desired circuit, and then reading will be

displayed.

4. If the reading is difficult to read, Press DATA HOLD button to hold the obtained value. To exit from this function, press DATA HOLD button again.

4-4.DC Voltage (DCV) measurement

Maximum input for DCV or ACV is 600V. Do not attempt to take any voltage measurement that exceeds the limits. Exceeding the limits could cause electrical shock and damage the clamp meter.

1. Select " $\text{---}V$ " range.
2. Insert the test leads into the jacks. The red test lead plugs into the V/Ω jack and the black test lead plugs into the COM jack.
3. Connect the two long ends of test leads to the desired circuit.
4. If the reading is difficult to read, press DATA HOLD button to hold the obtained value. To exit from this function, press DATA HOLD button again.

4-5. DC Current (DCA) measurement

Make sure that all the test leads are disconnected from the meter's terminal for current measurement.

1. Select " $\text{---}A$ " range.
2. Check if the display shows zero in advance. If the display doesn't show zero, press "ZERO" button. (If the current measurement is over

40A, press "RANGE" button to select 400A range before zeroing.

3. Open the clamp and put the tested conductor in the center of the clamp jaws (See Fig.2). (No gap is allowed between the connections of clamp jaws).
4. The current value will be indicated on the LCD.
5. The excesses magnetic value should be deducted from the reading data if auto zero is not performed.

4-6. Resistance measurements

Before taking any in circuit resistance measurement, remove power from the circuit being tested and discharge all the capacitors. If a reading is over range, the message "OL" will be displayed.

1. Select " $\Omega/ \text{---}$ " range.
2. Insert the test leads into the jacks, the red test lead plug into the " V/Ω " jack, and the black test lead plug into the COM jack.
3. Connect the two long ends of test leads to the desired circuit, then reading will be displayed.
4. Press DATA HOLD button to hold the value when taking resistance measurement, if it's necessary.

4-7. Continuity test

1. Select " $V/ \text{---}$ " range.
2. Insert the test leads into the jacks. The red test

lead plugs into the V/ Ω jack, and the black test lead plugs into the COM jack.

3. Connect the two long ends of test leads to the desired circuit, then the reading will be displayed. While the buzzer sounds the resistance value will be 40 Ω or lower.

4-8. Frequency Measurement

1. Select "Hz" range.
2. Insert the test leads into the jacks, the red test lead plug into the V/ Ω jack, and the black test lead plug into the COM jack.
3. Connect the two long ends of test leads in parallel to the desired circuit, under test.

5. Symbols Description

1. --- : DC Voltage or Current.
2. \sim : AC Voltage or Current.
3. $\overline{\sim}$: DC/AC Voltage or Current
4. \perp : Ground
5. \square : Meter Double insulated.
6. \triangle : Caution
7. \triangle : Danger high voltage: risk of electric shock.

6. Safety precaution

Take extreme care for the following conditions while measuring:

1. Measuring voltage over 20V as it may cause human body electricity conduction.
2. Measure AC power.
3. Do not measure voltage, current under humid or wet environment.
4. If any unusual condition of test leads's end (metal part). And attachment of the meter, such as breakage, deformation, fracture, foreign substance, No display, etc., do not conduct any measurements.
5. Do not contact any exposed metal (conductive) parts, such as end of test lead, jack, fixing object, circuit etc.,
6. Keep clear from the object waiting for measuring.
7. Do not operate the meter under the environment with explosive gas (material), combustible gas(material) steam or filled with dust.
8. In order to avoid reading incorrect data, you have to replace the batteries immediately when the symbol BAT appears on the LCD.
9. In order to avoid damage caused by contamination and static electricity, do not touch the circuit board when replacing the batteries.

7. Maintenance Notes

7-1. If the symbol "BAT" is shown on the display while measuring, you have to replace the batteries.

1. Remove all test leads and the conductor under test before performing battery replacement.
2. Set the range to OFF position.
3. Remove the screws from the battery cover with screwdriver, and detach the battery cover from the bottom cover.
4. Remove the batteries from battery holder carefully, (replace them with new batteries UM-4 or SIZE 1.5V x 2).
5. Attach the battery cover back to its right place, and replace the screws.

7-2. Maintenance and Care

1. This meter is a precision digital instrument. Whether in use or in storage, please do not exceed the specification requirements to avoid any possible damage or danger during use.
2. Do not use strong or abrasive detergents, water, or wet cloths to clean the instrument. Only use a dry cloth to clean the instrument.
3. Do not place this meter in high temperature or humidity or expose to direct sunlight.
4. Once the measurement is completed, turn the rotary switch to off. Remove the batteries from

battery holder if the instrument is not be used for a long period in order to avoid the liquid leakage from the battery.

5. Service should only be performed by a qualified technician.

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1031 Segovia Circle
Placentia, CA 92870-
7137 USA
TEL: 714-237-9220
FAX: 714-237-9214
www.bkprecision.com