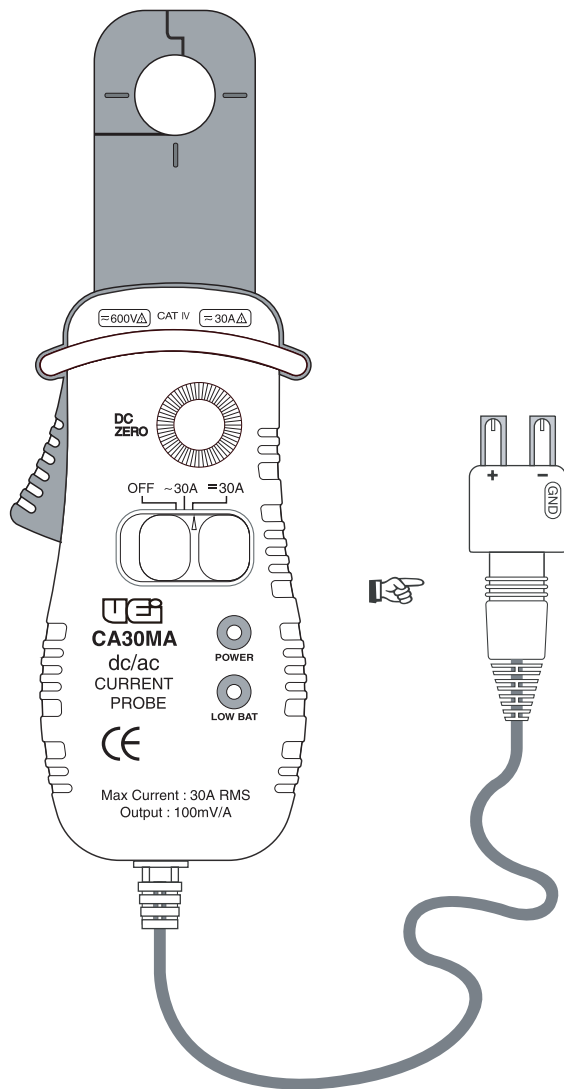


# CA30MA

## High Resolution dc/ac mA Current Probe For Oscilloscopes & Automotive Uses

### Instruction Sheet



## UEI CA30MA Low Amp Clamp Adapter

### Limited Warranty

The CA30MA is warranted to be free from defects in materials and workmanship for a period of three years from the date of purchase. If within the warranty period your instrument should become inoperative from such defects, the unit will be repaired or replaced at UEI's option. This warranty covers normal use and does not cover damage which occurs in shipment or failure which results from alteration, tampering, accident, misuse, abuse, neglect or improper maintenance. Batteries and consequential damage resulting from failed batteries are not covered by warranty.

Any implied warranties, including but not limited to implied warranties of merchantability and fitness for a particular purpose, are limited to the express warranty. UEI shall not be liable for loss of use of the instrument or other incidental or consequential damages, expenses, or economic loss, or for any claim or claims for such damage, expenses or economic loss. A purchase receipt or other proof of original purchase date will be required before warranty repairs will be rendered. Instruments out of warranty will be repaired (when repairable) for a service charge. Return the unit postage paid and insured to:

**1-800-547-5740 • FAX: (503) 643-6322**  
**Service: (800) 308-7709**  
**www.ueitest.com • Email: info@ueitest.com**

This warranty gives you specific legal rights. You may also have other rights which vary from state to state.

The CA30MA is a specially designed high resolution clamp-on DC/AC mA current adapter. This probe will allow your oscilloscope /multimeter to measure low current up to 30 A with 1 mA resolution and an accuracy of 1%. With this clamp there is no need to break the circuit as is typical with digital multimeters or other low current measurement techniques.

The extended measurement jaw allows measurements in a narrow space. The DC current zero setting is easily performed with a simple thumbwheel adjustment.

Use this adapter for effective troubleshooting of low current circuits on many automotive systems. Current measurements are often more effective than voltage tests, and can be done without interrupting the supply from the battery or other current carrying conductors. This can be especially helpful on electric or hybrid vehicle systems.

Some of the common or essential test points on hybrid electric vehicles are as follows;

- Battery leakage current (normally near 15 mA), when all systems are turned off. This can be used as a quality indicator on an Electrical Check Out System for production line quality assurance testing or as a fault identifier for diagnostic units in large service centers.
- Current drain of the ECU controlling the ISG (or ISA) system. This can be as low as 10 mA when the ignition is turned off. Use the adapter to perform this test without disconnecting the battery cable to prevent the ECU from losing stored data.

\* The ISG (or ISA) system is made of the following elements;

- A 3-phase AC motor integrated into the internal combustion motor.
- An AC to DC converter that rectifies the AC generated by the 3-phase motor.
- A DC to AC converter that provides the required voltages.
- The electronics controlling the ISG system.
- The energy management system. (ECU controlling the ISG)

Rapid waveform tracking is also a key feature of this low current probe, making it useful for displaying changing current waveforms on your digital storage oscilloscope. One example is to use this for displaying and adjusting currents in electronic fuel injectors. The CA30MA has a frequency range of DC to 20 kHz and a di/dt tracking capability in excess of 20 A/ $\mu$ s.

### APPLICATION PROCEDURES

#### ⚠ Caution!

1. For OSCILLOSCOPES, insert the BNC connector into the CH1 terminal of any OSCILLOSCOPE with a minimum input impedance of 1 M $\Omega$ .

For automotive uses, insert the detachable banana adapter into the BNC connector first and then insert the black banana plug into the COM jack and the red banana plug into the V- $\Omega$  jack of any multimeter with a minimum input impedance of 10 M $\Omega$ .

2. Set your multimeter or OSCILLOSCOPE to the DC mV function.
3. Set the power switch to the desired range (either AC 30A or DC 30A). The green LED will light to indicate that the clamp is switched on.
  - a. When performing DC current measurements, use the DC zero adjustment thumbwheel on the clamp unit to set zero on your multimeter.
4. Clamp the jaws around the current carrying conduct to measure the current.

Note: Multiply the reading displayed on the OSCILLOSCOPE / Multimeter by "10" to determine the current in mA.

As example: A DMM with a display of 12.5 mV DC x 10 = 125 mA (This is easily done by shifting the decimal one place to the right)

### APPLICATION NOTES

1. When measuring DC current, the output is positive when the current is flowing from the front of the CA30MA to the back. There is an arrow on the side of the current clamp to indicate current flow direction for a positive reading.
2. When measuring above 15A DC if large differences in the readings are obtained on consecutive tests try the following;
  - a. Remove the clamp from the wire under test
  - b. Re-zero the clamp adapter
  - c. Repeat the test
3. When measuring DC current a hysteresis effect (magnetic memory) may occur causing difficulty when trying to zero the meter. If this occurs open and close the jaw several times to remove the hysteresis and then retry the zero adjustment.

Note: If the CA30MA has been exposed to current exceeding 30A DC it may not zero. If this occurs reverse the clamp on the high current wire under test to remove the magnetic memory caused by the high current measurement.

### WARNING!

If the equipment is used in a manner not specified by the manufacturers the protection provided by the equipment may be impaired.

To assure continued safe use of this probe, inspect the probe before use for cracks or missing portion of the insulating cover, or for loose or weakened components. Specifically inspect the insulation surrounding the clamp jaws and clamp lever. Any probe that fails this inspection should be made inoperable by taping the clamp shut and returning for service.

### OPERATOR SAFETY

1. Do not clamp around conductors with voltages equal to or exceeding 300V DC or 240 V RMS AC.
2. To avoid physical injury do not use for measurements on bare conductors or conductors with cracked or frayed insulations.
3. Do not touch the conductor under test, and hold the clamp adapter only in the area under the hand guard.

### SPECIFICATIONS

#### GENERAL

Captured Conductor Size: 19 mm maximum  
 Low Battery Indicator: red LED lighting  
 Operating Temperature: 5°C to 40°C  
 Storage Temperature: -20°C to + 70°C  
 Relative Humidity: 0% to 80%  
 Altitude : 0 to 2000 meters  
 Battery Type: =9V DC, NEDA 1604, 6F22, 006P  
 Battery Life: 100 hours typical with alkaline  
 Weight: 300 g  
 Output: Coaxial Cable with a BNC connector  
 Dimensions: 200mm (H) x 72mm(W) x 38 mm(D)  
 Pollution Degree: 2  
 Measurement Category: CAT IV 600 V and CAT III 1000 V

### **ELECTRICAL (At 23 ± 5 °C, 70% R.H. maximum)**

Effective Frequency Range : dc to 20 kHz (0.5 dB)

System accuracy : Current clamp accuracy + OSCILLOSCOPE/ MULTIMETER accuracy

Current Clamp Accuracy (dc to 20 kHz)

dc 30 A range : 100 mV/A  
 ± (1% of reading + 2 mA)

ac 30 A range : 100 mV/A  
 ± (1% of reading + 2 mA)

Maximum Resolution : 1 mA dc/ac

Minimum Measurement : 5 mA dc/ac

di/dt Tracking Capability : > 20 A/μs

Conductor Position Sensitivity : ± 1% relative to center reading

Load Resistance : 10 kΩ typical

Temperature Coefficient : 0.1 x (specified accuracy) per degree C.  
 (0°C to 18°C, 28°C to 50°C)

### CLEANING

Periodically clean your meter's case using a damp cloth.

Do not use abrasives, cleaning solvents or strong detergents, as they may damage the finish or affect the reliability of the structural component.

### SERVICE AND REPLACEABLE PARTS

- Battery IEC 6LR61
- Banana plug : supplied by manufacturer.
- BNC connector : supplied by manufacturer.

### BATTERY REPLACEMENT

When the "LOW BAT" LED of this probe is turned on, replace the same type of battery installed within the probe.

Do not clamp the jaw around a conductor and disconnect the output cable from any measurement equipment during battery replacement. Remove the screw of the battery cover of the Meter and lift off the cover of the Meter, Replace the battery. Attach the battery cover to the meter, and reinstall the screws.

### SAFETY INFORMATION

The Probe is designed and tested according to EN61010-1 :2002 and EN 61010-2-032 : 2002 (OvervoltageCategory IV), Safety Requirements for Hand-held Current Clamps for Electrical Measurement and Test, and the EMC Directive (EN 61326-1 : 2006 and EN 61326-2-2 : 2006).

### **CAUTION (Risk of electric shock)**


Do not touch the conductor under test. Hold the clamp adapter only in the area under the hand guard (separate from the test jaws)


#### International Symbols:

 dc - Direct current

 AC (Alternating Current)

 Both dc and ac

 Double insulation

 Caution (Refer to accompanying documents)