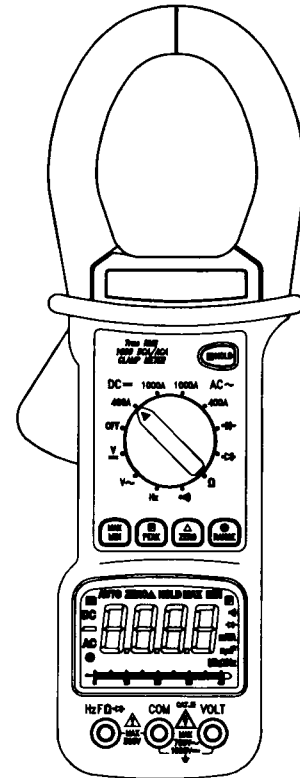


OPERATING INSTRUCTIONS WATDCM2606 DIGITAL CLAMP METER



CE

INTRODUCTION

This manual contains information and warnings which must be followed to ensure safe operation and retain the meter in safe condition.

WARNING

READ "SAFETY INFORMATION" BEFORE USING THE METER.

This clamp meter is a handheld 4000-count instrument that is designed for use in the laboratory, field servicing, at home, and any circumstance where high current measurement is required. The clamp meter is built with a design of finger guard which ensures users operating the instrument under a safety situation; a rugged case that is shock resistant and fire-retardant; and electronic overload protection for all functions and ranges. In addition, a carrying case (optional accessory) is available for easy portability of the meter and avoiding damage.

UNPACKING AND INSPECTION

Upon removing your new Digital Clamp Meter (DCM) from its packing, you should have the following items:

1. Digital Clamp Meter
2. Test Lead Set (one black, one red)
3. 9-Volt Battery (installed in meter)
4. Instruction Manual

If any of the above items are missing or are received in a damaged condition, please contact the distributor from whom you purchased the unit.



SAFETY PRECAUTIONS:


The following safety precautions must be observed to ensure maximum personal safety during the operation, service and repair of this meter:

1. Read these operating instructions thoroughly and completely before operating your meter. Pay particular attention to WARNINGS which will inform you of potentially dangerous procedures. The instructions in these warnings must be followed.
2. Always inspect your meter, test leads and accessories for any sign of damage or abnormality before every use. If any abnormal conditions exist (eg-broken test leads, cracked cases, display not reading, etc.), do not attempt to take any measurements.
3. Do not expose the instrument to direct sun light, extreme temperature or moisture.
4. Never ground yourself when taking electrical measurements. Do not touch exposed metal pipes, outlets, fixtures, etc., which might be at ground potential. Keep your body isolated from ground by using dry clothing, rubber shoes, rubber mats, or any approved insulating material.
5. To avoid electric shock use CAUTION when working with voltages above 40 Vdc or 20 Vac. Such voltages pose a shock hazard.
6. Never exceed the maximum allowable input value of any function when taking a measurement. Refer to the specifications for maximum inputs.
7. Never touch exposed wiring, connections or any live circuit when attempting to take measurements.
8. Do not attempt to operate this instrument in an explosive atmosphere (i.e. in the presence of flammable gases or fumes, vapor or dust).
9. When testing for the presence of voltage, make sure the voltage function is operating properly by reading a known voltage in that function before assuming that a zero reading indicates a no-voltage condition. Always test your meter before and after taking measurements on a known live circuit.
10. Calibration and repair of any instrument should only be performed by qualified and trained service technicians.
11. Do not attempt calibration or service unless trained and another person capable of rendering first aid and resuscitation is present.
12. Remember: Think Safety, Act Safely.







SAFETY INFORMATION

The instrument complies with class II, overvoltage CAT.III 1000V of the IEC1010-1(EN61010-1) ;UL3111-1;and CAN/CSA C22.2 #1010.1-92 standards. Pollution degree 2 in accordance with IEC-664 indoor use. If the equipment is used in a manner not specified, the protection provided by the equipment may be impaired.

  When servicing, use only specified replacement parts or equivalent.

 **WARNING:** To avoid electric shock disconnect measuring terminals before removing battery cover.

The symbols used on this instrument are:

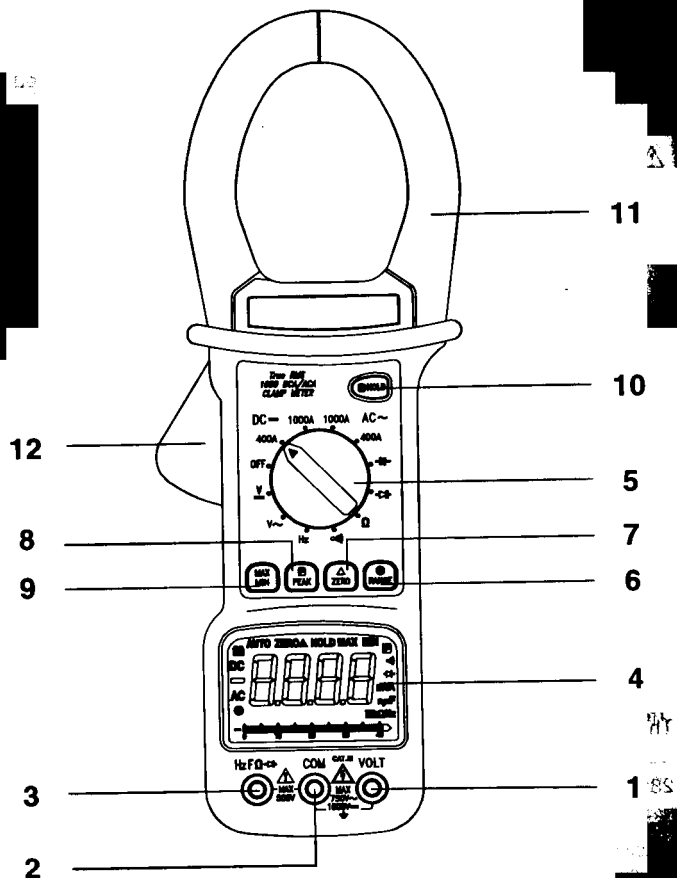
-  Caution, risk of electric shock
-  Caution, refer to accompanying documents
-  Equipment protected throughout by Double insulation (Class II)
-  Alternating current
-  Direct current
-  Ground



This product complies with the requirements of the following European Community Directives: 89/336/EEC (Electromagnetic Compatibility) and 73/23/EEC (Low Voltage) as amended by 93/68/EEC (CE Marking).

However, electrical noise or intense electromagnetic fields in the vicinity of the equipment may disturb the measurement circuit. Measuring instruments will also respond to unwanted signals that may be present within the measurement circuit. Users should exercise care and take appropriate precautions to avoid misleading results when making measurements in the presence of electromagnetic interference.

INSTRUMENT LAYOUT



1. **VOLT Input Terminal**
This is the positive input terminal for VOLT measurements connection is made to it using the red test lead.
2. **COM Common Terminal**
This is the negative (ground) input terminal for all measurement modes except current. Connection is made to it using the black test lead.
3. **HzΩ** **Frequency, Capacitance, Ohms, Diode Input Terminal**
This is the positive input terminal for capacitance, frequency, ohms, and diode measurements. Connection is made to it using the red test lead.
4. **Display**
The display indicates the measured value of a signal, function mode, and annunciator.
5. **Function/Range selector rotary switch**
This rotary switch selects the function, and selects the desired range.
6. **RANGE Button**
Press (RANGE) button to select the Manual Range mode and turn off the "AUTO" annunciator and turn on the "⊕" annunciator. (The meter remains in the range it was in when manual ranging was selected).

In the Manual Range mode, each time you press (RANGE) button, the range (and the input range annunciator) increments, and a new value is displayed. To exit the Manual Range mode and return to autoranging, press and hold down (RANGE) button for 2 seconds. The "AUTO" annunciator turns back on and the "⊕" annunciator turns off.
7. **ZERO Δ Button**
Press (ZERO) button to enter the Relative mode, the "ZERO Δ" annunciator turns on, zero the display, and stores the displayed reading as a reference value. Press and hold down the (ZERO) button for 2 seconds to exit the relative mode.

In the Relative mode, the value shown on the LCD is always the difference between the stored reference value and the present reading. For example, if the reference value is 24.00V and the present reading is 12.50V, the display will indicate -11.50V. If the new reading is the same as the reference value, the display will be zero.

This feature also is made as DCA ZERO adjustment.

8. PEAK BUTTON

This measurement function is used to measure the peak value of a signal. It is useable with AC Current measurements. To use this function, select the function and range and press the peak hold switch. When this is done, the "P" will appear in the display. Next, by inputting a signal, the peak hold function operates. This peak hold value is held in digital memory for a long period. To cancel the function, press the peak hold switch once again.

9. MIN / MAX Button

Press (MIN / MAX) button to enter the MIN MAX Recording mode. The minimum, maximum values are then reset to the present input, the readings are stored in memory, and the "HOLD" annunciator turns on. Push the button to cycle through the minimum (MIN), maximum (MAX), and present readings. The MIN or MAX annunciator turns on to indicate what value is being displayed.

In the MIN MAX Recording mode, press (HOLD) button to stop the recording of readings, press again to restart recording. If recording is stopped, the minimum, maximum, or present values and analog display are frozen. In the MIN MAX Recording mode, when a new minimum value is exceed the actual minimum readings or a new maximum value is overload, the minimum or maximum value will held on the display, but the analog display continues to be active.

Press the button to perform peak mode in ACA ranges, and MIN/MAX mode in other ranges.

10. HOLD Button

Press (HOLD) button to toggle in and out of the Data Hold mode, except if you are already in the MIN MAX Recording mode.

In the Data Hold mode, the "HOLD" annunciator is displayed and the last reading is held on the display, the beeper emits a tone, and the automatic power-off feature is disabled. Pressing (MIN / MAX) button when you are in the Data Hold mode causes you to exit Data Hold and enter the MIN MAX Recording mode.

In the MIN MAX Recording mode, press (HOLD) button to stop the recording of readings, press (HOLD) again to resume recording.

11. Transformer jaws

Pick up the AC or DC current flowing through the conductor. The "+" marking on the jaw indicates direction of DC current existing on the conductor being tested which follows forward and vertically with jaws, and reading shown on display is positive.

12. Trigger

Press the lever to open the transformer. When the lever is released, the jaws will close again.

13. Other Functions

Auto Power Off

Automatic power-off extends the life of the battery by turning the meter off, after approximately 30 minutes of inactivity.

To turn the meter back on, simply push RANGE button, or turning meter off then back on.

HOW TO MAKE MEASUREMENTS

Before making any measurements read safety precautions. Always examine the instrument and accessories used with the instrument for damage, contamination (excessive dirt, grease, etc.) and defects. Examine the test leads for cracked or frayed insulation and make sure the lead plugs fit snugly into the instrument terminals. If any abnormal conditions exist, do not attempt to make any measurements.

VOLTAGE MEASUREMENTS

1. Turn off power to the device under test and discharge all capacitors.
2. Plug the black test lead into the COM input jack on the meter and connect the test lead tip to a grounded point (the reference point for measurement of voltage).
3. Select the desired AC voltage range (V_{\sim}), or DC voltage range (V_{\rightarrow}). If the magnitude of the voltage to be measured is unknown always start with the highest range.

WARNING

To avoid possible electric shock, instrument damage and / or equipment damage, do not attempt to take any voltage measurements if the voltage is above 1000Vdc / 750Vac. 1000Vdc and 750Vac are the maximum voltages that this instrument is designed to measure. The "COM" terminal potential should not exceed 500V measured to ground.

4. Plug the red test lead into the VOLT input jack on the meter and connect the circuit where a voltage measurement is required. Voltage is always measured in parallel across a test point.
5. Turn on power the circuit /device to be measured and make the voltage measurement reduce the range setting if set too high until a satisfactory reading is obtained.
6. After completing the measurement, turn off power to the circuit / device under test , discharge all capacitors and disconnect the meter test leads.

CURRENT MEASUREMENTS

WARNING

These Snap-Arounds are designed to take current measurements on circuits with a maximum voltage difference of 500VAC between any conductor and ground potential. Using the Snap-Around for current measurements on circuits above this voltage may cause electric shock, instrument damage and/or damage to the equipment under test. Before measuring current make certain that the test leads are removed from the instrument.

The Snap-Around is overload protected up to 500VAC for up to 1 min. Do not take current readings on circuits where the maximum current potential is not known . Do not exceed the maximum current that this instrument is designed to measure.

1. Set Function Switch to ACA /DCA 1000A Range.
2. Press the trigger to open the transformer jaws and clamp them around a conductor. Jaws should be completely closed before taking a reading.
3. The most accurate reading will be obtained by keeping the conductor across center of the transformer jaws.
4. The reading will be indicated on the display.
5. Reduce the range setting if set too high until a satisfactory best resolution reading is obtained.

RESISTANCE MEASUREMENTS

WARNING

Attempting resistance or continuity measurements on live circuits can cause electrical shock, damage to the instrument and damage to the equipment under test. Resistance measurements must be made on de-energized (DEAD) circuits only for maximum personal safety. The electronic overload protection installed in this instrument will reduce the possibility of damage to the instrument but not necessarily avoid all damage or shock hazard.

1. Turn off any power to the resistor to be measured. Discharge any capacitors. Any voltage present during a resistance measurement will cause inaccurate readings and could damage the meter if exceeding the overload protection of 500VDC or AC.
2. Insert the BLACK and RED test leads into the COM and Ω input terminals respectively.
3. Select the (Ω) position by turning the rotary selector switch.
4. Connect the BLACK and RED test probe tips to the circuit or device under test, making sure it is de-energised first.
5. Open circuits will be displayed as an overload condition.
6. The resistance in the test leads can diminish accuracy on the lowest (400Ω) range. The error is usually 0.1 to 0.2Ω for a standard pair of test leads. To determine the error, short the test leads together and then use the (ZERO) Relative mode to automatically subtract the lead resistance from resistance measurements.
7. After completing the measurement, disconnect the DCM test leads.

CONTINUITY TESTING

1. Select the (diode symbol) position by turning the rotary selector switch.
2. Follow steps 2 and 4 as for resistance measurements.
3. An audible tone will sound for resistance less than approximately 40Ω . After all measurements are completed, disconnect the test leads from the circuit and from the DCM input terminals.

DIODE TESTING

CAUTION

Measurements must only be made with the circuit power OFF.

1. Set the (diode symbol) position by turning the rotary switch.
2. Follow steps 2 and 4 as for resistance measurements.

3. The RED lead should be connected to the anode and the BLACK lead to the cathode. For a silicon diode, the typical forward voltage should be about 0.6V silicon diode or 0.3 V for germanium diode.
4. If the diode is reverse biased or there is an open circuit the reading displayed will be between 3.000V and 3.400V.

CAPACITANCE MEASUREMENT


1. Turn off power to the device under test and discharge all capacitors.
2. Discharge all voltage from the capacitor before measuring its capacitance value.
NOTE: A safe way to discharge a capacitor is to connect a 100k Ω resistor across the two capacitor leads.
3. Set the rotary selector switch to the (diode symbol) range.
4. Plug the BLACK and RED test leads into the COM and F input terminals respectively.
5. Touch the probes to the capacitor. Always observe polarity markings when measuring polarized capacitors.
6. The measurement accuracy of capacitors can be improved by first using the "ZERO" (Relative mode) to zero the display and automatically subtract the residual meter and test lead capacitance. Since the Relative mode also selects manual ranging,
7. Residual voltage charges on the capacitor, or capacitors with poor insulation resistance or poor dielectric absorption may cause measurement errors.
8. After completing the measurement, disconnect the DCM test leads.

FREQUENCY MEASUREMENTS

1. Set the rotary selector switch to the (Hz) position.
2. Plug the BLACK and RED test leads into the "COM" and "Hz" input terminals respectively.
3. Apply the test probes to the points across which the frequency is to be measured, and read the result directly from the display.

NOTE: For frequencies below 100Hz and greater than 100KHz, the display may not be stable. For frequencies below 1Hz, the display shows 00.00Hz.

SPECIFICATIONS

- **Display:** 3 1/2 digit(4000 counts), 9999 counts(Frequency mode), 42 segments analog bar graph and function/units sign annunciators.
- **Polarity:** Automatic, (-) negative polarity indication.
- **Overrange Indication:** MSD (Most Significant Digit) blinks.
- **Low Battery Indication:** The "  " is displayed when the battery voltage drops below accurate operating level.
- **Measurement Rate:** 2/sec, nominal. 1/sec, Capacitance and Frequency mode. 20/sec, Analog Display.
- **Operating Environment:** 0to 50° at < 70% R.H.
- **Storage Environment:** -20to 60° at < 80% R.H.
- **Temperature Coefficient:** 0.1 x (specified accuracy) /°C < 18° or > 28°).
- **Auto Power Off:** 30 minutes after rotary switch or mode changes.
- **Altitude:** 6561.7 Feet (2000 M)
- **Power:** Standard 9-volt battery, NEDA 1604, IEC 6F22, JIS 006P.
- **Battery Life:** 100 hours typical with alkaline battery.
- **Jaw Opening Capability:** 57mm conductor, 70x18mm bus bar.
- **Size (H x W x D):** 10.9 x 4.0 x 1.9 inches (277 x 102 x 49 mm).
- **Weight:** Approx. 18.9 OZ / 540g grams (including battery).

* Accuracy is given as \pm [% of reading]+[number of least significant digits]) at 18 °to 28 °, with relative humidity up to 70%.

DC volts

Range	Resolution	Accuracy	Input Impedance
400mV	100 μ V	\pm (0.5% rdg+1d)	>1000M Ω
4V	1mV	\pm (0.5% rdg+1d)	11M Ω
40V	10mV	\pm (0.5% rdg+1d)	10M Ω
400V	100mV	\pm (0.5% rdg+1d)	10M Ω
1000V	1V	\pm (0.5% rdg+1d)	10M Ω

Overload protection: 1000V DC or 750V AC RMS

AC Volts (True RMS sense)

Range	Resolution	Accuracy(50-500Hz)
*400mV	100 μ V	\pm (1.5% rdg+4d)
4V	1mV	\pm (1.5% rdg+4d)
40V	10mV	\pm (1.5% rdg+4d)
400V	100mV	\pm (1.5% rdg+4d)
750V	1V	\pm (1.5% rdg+4d)

* Effective accuracy: Input signal >40mV, frequency response: 50Hz to 100Hz
 Input Impedance: Same as DCV function with less than 100pF
 Crest Factor: \leq 3

Overload protection: 1000V DC or 750V AC rms

AC current (True RMS sense)

Range	Resolution	Accuracy
400A	100mA	0-600A \pm (1.5%rdg+5d)50-60Hz >600A \pm (2.0%rdg+5d)50-60Hz
1000A	1A	0-600A \pm (3.0%rdg+5d)61-400Hz >600A \pm (3.5%rdg+5d)61-400Hz

Crest Factor: \leq 3

Overload Protection: 1200A for 60 seconds maximum.

DC current

Range	Resolution	Accuracy
400A	100mA	0-600A \pm (1.5%rdg+5d)
1000A	1A	600A-800A \pm (2.5%rdg+5d) >800A \pm (3.5%rdg+5d)

Overload Protection: 1200A for 60 seconds maximum.

Resistance

Range	Resolution	Accuracy	Open Circuit Volts
400 Ω	0.1 Ω	\pm (1.2% rdg+4d)	0.4Vdc
4k Ω	1 Ω	\pm (1.0% rdg+2d)	0.4Vdc
40k Ω	10 Ω	\pm (1.0% rdg+2d)	0.4Vdc
400k Ω	100 Ω	\pm (1.0% rdg+2d)	0.4Vdc
4000k Ω	1k Ω	\pm (1.5% rdg+4d)	0.4Vdc
40M Ω	10k Ω	\pm (2.0% rdg+4d)	0.4Vdc

Overload protection: 500V DC or RMS AC

Continuity Test

Range	Audible Threshold	Response Time	Open Circuit Volts
400 Ω	Less than 40 Ω	Approx. 100ms	0.4Vdc

Overload Protection: 500VDC or RMS AC

Diode Test

Range	Resolution	Accuracy	Test Current	Open Circuit Volts
4V	1mV	\pm (1.0% rdg + 2d)	0.6 mA	3.2Vdc typical

Overload Protection: 500VDC or RMS AC

Capacitance

Range	Resolution	Accuracy (With film capacitor or better)
4 nF	0.001 nF	\pm (1.5% rdg+40d) in Relative mode
40 nF	0.01 nF	\pm (1.5% rdg+4d) in Relative mode
400 nF	0.1 nF	\pm (1.5% rdg+4d)
4 μ F	0.001 μ F	\pm (1.5% rdg+4d)
40 μ F	0.01 μ F	\pm (1.5% rdg+4d) at < 20 μ F \pm (5.0% rdg+4d) at > 20 μ F

Overload Protection: 500V DC or RMS AC

Frequency

Range	Resolution	Accuracy	Trigger Level
100Hz	0.01Hz	\pm (0.1% rdg+10d)	2.5V
1KHz	0.1Hz	\pm (0.1% rdg+4d)	2.5V
10KHz	1Hz	\pm (0.1% rdg+4d)	2.5V
100KHz	10Hz	\pm (0.1% rdg+8d)	2.5V
400KHz	100Hz	\pm (0.1% rdg+20d)	2.5V

Overload protection: 500VDC or RMS AC

NOTE: For frequencies below 100Hz and greater than 100KHz, the display may not be stable. For frequencies below 1Hz, the display shows 00.00Hz.

MAINTENANCE


Maintenance consists of periodic cleaning and battery replacement. The exterior of the instrument can be cleaned with a dry clean cloth to remove any oil, grease or grime. Never use liquid solvents or detergents.

Repairs or servicing not covered in this manual should only be performed by qualified personnel.

REPLACING THE BATTERY

WARNING

TO AVOID ELECTRICAL SHOCK, DISCONNECT THE TEST LEADS AND ANY INPUT SIGNALS BEFORE REPLACING THE BATTERY. REPLACE ONLY WITH SAME TYPE OF BATTERY.

This meter is powered by a NEDA type 1604 or equivalent 9-volt battery. When the meter displays the "  " the battery must be replaced to maintain proper operation. Use the following procedure to replacing the battery:

1. Disconnect test leads from any live source, turn the rotary switch to OFF, and remove the test leads from the input terminals.
2. The battery cover is secured to the bottom case by a screw. Using a Phillips-head screwdriver, remove the screw from the battery cover and remove the battery cover.
3. Remove battery and replace with a new equivalent 9-volt battery.
4. Replace the battery cover and reinstall the screw.

NOTE
