

Clamp Meter
CCM 400A

© Users Manual

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CATIV 1000 V - Instrument complies to Measurement Category CATIV 1000V against Earth.

Description:

Measurement **Category CATII** is for measurements performed on circuits directly connected to the low voltage installation, i.e. household appliances, portable tools and similar equipment.

Measurement **Category CATIII** is for measurements performed in the building installation, i.e. distribution boards, circuit breakers, wiring, including cables, bus-bars, junction-boxes, switches, socket-outlet in the fixed installation, and equipment for industrial use and some other equipment, for example, stationary motors with permanent connection to the fixed installation.

Measurement **Category CATIV** is for measurements performed at the source of the low voltage installation, i.e. electricity meters.

The instruction manual contains information and references, necessary for safe operation and maintenance of the instrument. Prior to using the instrument, the user is kindly requested to thoroughly read the instruction manual and comply with it in all sections.

Failure to read the instruction manual or to follow with the warnings and references contained herein can result in serious bodily injury or instrument damage. The respective accident prevention regulations established by the professional associations are to be strictly always enforced.

References

References marked on instrument or in instruction manual.

Warning of a potential danger, follow with instruction manual.

Reference! Please use utmost attention.

Caution! Dangerous voltage. Danger of electrical shock.

Continuous double or reinforced insulation category II IEC 536/DIN EN 61140.

Conformity symbol, the instrument complies with the valid directives. It complies with the EMC Directive 2014/30/EU, with standard EN 61326-1, is fulfilled. It also complies with the Low Voltage Directive 2014/35/EU, with standard EN 61010-2-032, is fulfilled.

Instrument fulfils the WEEE-Directive 2012/19/EU. This marking indicates that this product should not be disposed with other household wastes throughout the EU. To prevent possible harm to the environment or human health from uncontrolled waste disposal, recycle it responsibly to promote the sustainable reuse of material resources. To return your used device, please use the return and collection systems or contact the retailer where the product was purchased. They can take this product for environmentally safe recycling.

1.0 Introduction / Scope of Supply

The clamp meters are characterized by the following features:

- LC display with 4000 counts
- Safety according to DIN VDE 0411/EN 61010, Measurement Category CATIV 1000V
- Voltage, Current and Resistance measurement
- Diode and acoustical Continuity Test Function
- Capacity and Frequency measurement
- Automatic Range Selection
- Impact and shock proof due the robust design

Scope of Supply:

- 1 pc. Clamp Meter
- 2 pcs. Test Leads (1x red, 1x black)
- 2 pcs. Batteries 1,5 V, IEC LR03
- 1 pc. Instruction Manual

2.0 Transport and Storage

Please keep the original packaging for later transport, e.g. for calibration. Any transport damage due to faulty packaging will be excluded from warranty claims.

To avoid instrument damage, it is advised to remove batteries when not using the instrument over a certain time period. However, should the instrument be contaminated by leaking battery cells, you are kindly requested to return it to the factory for cleaning and inspection.

Instruments must be stored in dry and closed areas. In the case of an instrument being transported in extreme temperatures (high or low), a recovery time of minimum 2 hours is required prior to instrument operation.

3.0 Safety References

The operating instructions contain information and references required for safe operation and use of the instrument. Before using the instrument, read the operating instructions carefully and follow them in all respects.

The respective accident prevention regulations established by the professional associations for electrical systems and equipment must be strictly always met.

To avoid electrical shock, the valid safety and VDE regulations regarding excessive contact voltages must receive utmost attention, when working with voltages exceeding 120V (60V) DC or 50V (25V) RMS AC. The values in brackets are valid for limited ranges (as for example medicine and agriculture).

Measurements in dangerous proximity of electrical systems are only to be carried out in compliance with the instructions of a responsible electrical technician, and never alone.

If the operator's safety is no longer ensured, the instrument is to be put out of service and protected against use.

The safety is no longer insured, if the instrument (this includes accessories like test leads, etc.):

- shows obvious damage
- does not carry out the desired measurements
- has been stored for too long under unfavourable conditions
- has been subjected to mechanical stress during transportation or storage
- has been contaminated by leaking batteries

The instrument may only be used within the operating ranges as specified in the technical data section.

Avoid any heating up of the instrument by direct sunlight to ensure perfect functioning and long instrument life.

The instrument for exchanging the batteries only! Prior to opening, the instrument has to be switched off and disconnected from any circuit. Otherwise, danger of electric shock.

The instrument may only be used under those conditions and for those purposes for which it was conceived. For this reason, in particular the safety references, the technical data including environmental conditions and the usage in dry environments must be followed.

The operational safety is no longer ensured if the instrument is modified or altered in any way.

Modifying or changing the instrument will result in expiry of all guarantee and warranty claims against the manufacturer.

The instrument must be operated by trained users only.

Never use the instrument in explosive environment.

Before and after use, always check that the instrument is in perfect working order. Look out e.g. for broken housing, damaged testleads or leaking batteries.

Exposure to a high frequency electromagnetic field (RF) can influence the measurement and lead to wrong display of the current. The interference is temporary and will not cause any damage to the instrument. The original accuracy is completely restored when the module is removed from the RF field. Common sources of RF fields are e.g. handheld 2-way radios (walkie-talkies) or cellular telephones. If such a source is suspected of interfering with this instrument, either turn off the transmitter or increase the distance between the transmitter and the instrument.

4.0 Proper and intended use

This instrument is intended for use in applications described in the operation manual only. Any other usage is considered improper and non-approved usage and can result in accidents or the destruction of the instrument. Any misuse will result in the expiry of all guarantee and warranty claims on the part of the operator against the manufacturer.

We assume no liability for damages to property or personal injury caused by improper handling or failure to observe safety instructions. Any warranty claim expires in such cases. An exclamation mark in a triangle indicates safety notices in the operating instructions. Read the instructions completely before beginning the initial commissioning.

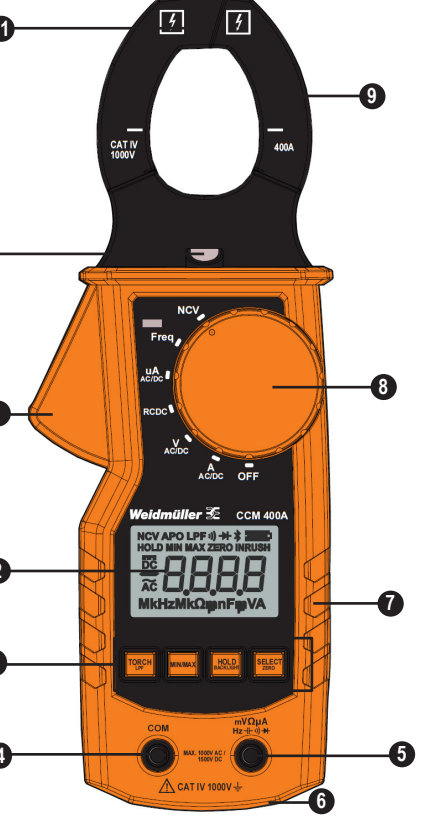
The warranty claim expires in cases of damages caused by failure to observe the instruction! We assume no liability for any resulting damage!

The manufacturer is not responsible for damages to property or personal injury resulting from:

- failure to observe the instructions
- changes in the product that have not been approved by the manufacturer
- the use of alcohol, drugs, or medication

5.0 Operation elements and connections

5.1 Clamp Control and Connection Elements



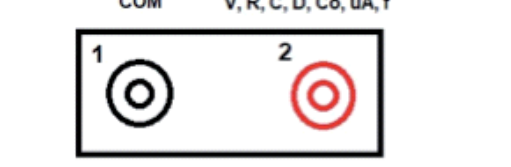
- Clamp trigger
- LC display
- Control keys
- Ground/COM jack for voltage, mA current, resistance, continuity, capacitance, diode, frequency measurements
- Input jack for all measurement from point 4
- On the rear: Battery compartment
- Grip area
- Rotary switch
- Clamp hook
- Torch light
- NCV detection LED

Socket 1

Common (return) terminal for all measurements.

Socket 2

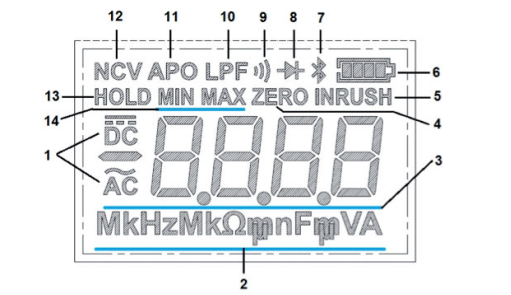
Capacitance, Frequency and uA measurements



5.2 Button Functions

CM has 4 pushbuttons responding to short and long presses. Functions of each button are described in table below.

5.3 LCD Segments



No.	Symbol	Meaning
1	AC DC	Alternating current, Direct current
2	Mk Hz Mk Ω	Measurement units
3	-8888	Measurement value
4	ZERO	Zeroing in DC clamp mode
5	INRUSH	Inrush mode (Not Available)
6	Battery icon	Battery gauge
7	Bluetooth symbol	Bluetooth (Not Available)
8	Diode symbol	Diode test
9	Continuity symbol	Continuity test
10	LPF	LP Filter (AC) enabled
11	APO	Automatic power OFF enabled
12	NCV	Non-contact voltage active
13	HOLD	HOLD is enabled. Display freezes current reading
14	MIN/MAX	Maximum, minimum, average reading
Error Messages on LCD		
OL		The input out of range

5.4 Power up options

Automatic Power off function (APO) is turned ON by default. APO will turn off CM if passes 15 min without activity.

Button	Power up option
HOLD/Backlight + Rotary switch	Holding HOLD button while rotating switch from OFF to other position switch off Automatic Power OFF feature (APO is ON by default).

5.5 User Interface description

With the rotary switch user can select the measurement mode. If CM is in current [A] or voltage [V] mode it will be by default selected AC. Selection DC is manually using **SELECT/ZERO** button.

6.0 Measurements

When connecting the test leads to the circuit or device, connect the common (**COM**) test lead before connecting the live lead; when removing the test leads, remove the live lead before removing the common test lead.

6.1 Voltage measurement

To avoid electrical shock, the valid safety measures and VDE directives strictly have to be met concerning excessive contact voltage when working with voltages exceeding 120V (60V) DC or 50V (25V) rms AC. The values in brackets are valid for limited areas (such as e.g. medicine, agriculture).

- Set rotary switch to V position.
- After CM powers on connect the black test lead to the COM socket and the red test lead to the V/Ω/Cap socket.
- By default, CM will be in AC measuring mode, to set if for DC press shortly **SELECT/ZERO** button.
- Connect test leads to UUT.
- The measured value displayed on the LCD.

6.2 Current measurement

Ensure that the measurement circuit is not live when connecting the measurement instrument.

The instruments may only be used in current circuits protected with 400A up to a nominal voltage of 1000V. The nominal cross section of connecting line has to be respected and a safe connection has to be ensured.

µA DC

- Set rotary switch to µA position.
- After CM powers on connect the black test lead to the COM socket and red test lead to the V/Ω/Cap./µA socket
- Connect test leads to UUT.
- The measured value displayed on the LCD.

5.6 Diode test

- Set rotary switch to A position.
- After CM powers on connect clamp conductor with unknown current.
- By default, CM will be in AC measuring mode. Pressing shortly **SELECT/ZERO** button will switch it to DC mode.
- When measuring DC current use long press on **SELECT/ZERO** button to null LCD showing.
- The measured value displayed on the LCD.

6.3 Resistance measurement

Prior to any resistance measurement it has to be ensured that the resistor to be tested is not live. Failure to comply with this prescription can lead to dangerous corporal user injuries or cause instrument damage. Additionally, external voltages falsify the measurement result.

Set rotary switch to Ω/Diode/Cap/Continuity position.

- After CM powers on use short presses of the **SELECT/ZERO** button to change measurement mode to Resistance.
- Connect the black test lead to the COM socket and red test lead to the V/Ω/Cap socket.
- Connect test leads to UUT.
- The measured value displayed on the LCD.

6.4 Continuity test

Prior to any continuity test, it must be ensured, that the element to be tested is not live. Failure to comply with this prescription can lead to dangerous corporal user injuries or cause instrument damage. Additionally, external voltages falsify the measurement result.

The shown value is indicative. The accuracy of continuity mode is lower than in resistance measurement mode. Because of that the resistance measurement shall be used for accurate results.

- Set rotary switch to Ω/Diode/Capacitance/Continuity position.
- After CM powers on use short presses of the **SELECT/ZERO** button to change measurement mode to Continuity.
- Connect the black test lead to the COM socket and red test lead to the V/Ω/Capacitance/µA socket.
- Connect test leads to UUT.
- The measured value displayed on the LCD.

6.5 Diode test

- Prior to any diode test, it must be ensured, that the element to be tested is not live. Failure to comply with this prescription can lead to dangerous corporal user injuries or cause instrument damage. Additionally, external voltages falsify the measurement result.
- Resistors and semiconductor paths in parallel to the diode cause falsified measurement results.
- Set rotary switch to Ω/Diode/Capacitance/Continuity position.
- After CM powers on use short presses of the

SELECT/ZERO button to change measurement mode to Diode test.

- Connect the black test lead to the COM socket and red test lead to the V/Ω/Capacitance/µA socket.
- Connect test leads to UUT.
- The measured value displayed on the LCD.

6.6 Capacitance measurement

Prior to any capacity test, it must be ensured, that the capacity to be tested is not live. Failure to comply with this prescription can lead to dangerous corporal user injuries or cause instrument damage. Additionally, external voltages falsify the measurement result.

Resistors and semiconductor paths in parallel to the capacity cause falsified measurement results.

Ensure that capacitors are discharged prior testing!

- Set rotary switch to Ω/Diode/Capacitance/Continuity position.
- After CM powers on use short presses of the **SELECT/ZERO** button to change measurement mode to Capacitance.
- Connect the black test lead to the COM socket and red test lead to the V/Ω/Capacitance / µA socket.
- Connect test leads to UUT.
- The measured value displayed on the LCD.

6.7 Frequency measurement

- Set rotary switch to Frequency position.
- After CM powers on connect the black test lead to the COM socket and red test lead to the V/Ω/Capacitance/µA socket.
- Connect test leads to UUT.
- Read the measurement result displayed on the display.

6.8 NCV (non-contact voltage) measurement – AC only

Use this function just like indicator and always check presence of voltage using V mode of the clamp!

NCV antenna of the CM is positioned on the right side next to the rotary switch. Rough estimation of the voltage level is presented with a number of dashes on LCD (max 3 dashes/levels)

- Set rotary switch to NCV position.
- After CM powers on bring CM antenna area (right side of the clamp next to the rotary switch) near live conductor.
- Number of dashes on LCD will roughly represent level of live voltage, NCV sign will be present on LCD and the NCV LED will be illuminated.

7.0 Additional Features

7.1 MAX/MIN

Short press on **MIN/MAX** button switches between minimum, maximum and normal value. This feature is disabled by default. Short press on the button enables displaying MAX value first. Another short press activates displaying MIN value, then MAX and normal value cyclically. These features

can be activated in all measurement modes. Appropriate LCD segments will be turned on to signalize MAX or MIN.

7.2 HOLD feature

This function enables/disables LCD refreshing. Once the user presses **HOLD** button (short press) CM will stop updating LCD. Pressing the button again CM continues with normal operation. Hold feature is available in all measurement modes. When **HOLD** feature is enabled, **HOLD** segment will be turned on.

7.3 CM Backlight ON/OFF

When powered up, long press on **HOLD/Backlight** button toggles backlight on/off. When on it is deactivated by timeout (1 minute) or with another long press on **HOLD/Backlight** button long press. LCD backlight. Control is available in all measurement modes.

7.4 CM Torch Light ON/OFF

When powered up, short press on **Torch/LPF** button toggles torch light on/off. When on it is deactivated by timeout (1 minute) or with another short press on **Torch/LPF** button long press. LCD backlight. Control is available in all measurement modes.

7.5 APO feature

Automatic Power Off after 15 minutes is active by default, APO LCD segment is turned on to signalize this behavior. In order to disable APO, the device must be turned off. User must keep pressed **HOLD/Backlight** button and move rotary switch from OFF to any measurement position. When APO is disabled, APO LCD segment will be turned off.

7.6 LPF feature (Low Pass Filter)

DLPF first order filter provides noise cancelation in ACA and ACV modes. Using of LPF can lower accuracy.

When powered up, long press on **Torch/LPF** button toggles LPF on/off. LPF is available in Current and Voltage AC measurement modes. By default, LPF is turned off.

8.0 Maintenance

If the instrument in compliance with the instruction manual, no special maintenance is required. Should operational problems occur during daily use, our consulting service will be at your disposal, free of charge. If functional errors occur after expiration of warranty, our sales service will repair your instrument without delay.

8.1 Cleaning

If the instrument is dirty after daily usage, it is advised to clean it by using a humid cloth and a mild household detergent. Prior to cleaning, ensure that instrument is switched off and disconnected from external voltage supply and any other instruments connected (such as UUT, control instruments, etc.).

Prior to cleaning, ensure that instrument is switched off and disconnected from any external voltage supply and any other instrument connected (such as UUT, control instruments, etc.).

strument connected (such as UUT, control instruments, etc.) and not clamped to a live conductor.

Never use acid detergents or dissolvents for cleaning.

8.2 Calibration Interval

The instrument has to be periodically calibrated by our service department in order to ensure the specified accuracy of measurement results. We recommend a calibration interval of two years.

8.3 Battery Replacement

Prior to battery replacement, disconnect the instrument from any connected test leads and ensure that the instrument is not clamped to a live conductor. Only use batteries as described in the technical data section!

- Switch off instrument. Disconnect test leads.
- Loosen the screws on the instrument rear. Lift the battery case cover.
- Remove discharged batteries.
- Insert new batteries.
- Replace the battery case cover and retighten the screws.

Please consider your environment when you dispose of your batteries or accumulators. They belong in a rubbish dump for hazardous waste. In most cases, the batteries can be returned to their point of sale.

Please, comply with the respective valid regulation regarding the return, recycling and disposal of used batteries and accumulators.

If an instrument is not used over an extended time period, the accumulators or batteries must be removed. Should the instrument be contaminated by leaking battery cells, the instrument has to be returned for cleaning and inspection to the factory.

9.0 Technical Data

Display:	3 3/4 digit, LC display
Total Display:	4000 Digits
Polarity display:	automatic
Battery status display:	Empty Battery Symbol appears (< 2.5 V)
Measurement Category:	CATIV / 1000V
Pollution Degree:	2
Power Supply:	Batteries, 2 x 1,5 V, AAA
Dimension:	Approx. 220x80x42 mm
Weight:	Approx. 268 g (without batteries)
Ambient Conditions	
Operating Temperature:	0...50°C (0...80% rel. humidity)
Storage Temperature:	-10...60°C (0...80% rel. humidity) (without batteries)
Height above sea level:	up to 2000 m
Overload Protection	High impedance

Feature	Range *1	Basic Accuracy
Continuity Buzzer switching point	<10 – 50 Ω	
Diode Test	0 – 1 V	
Capacitance	51.2nF *6	±10% typically
	512.0nF	±(1,5% of measurement val. + 5 digits)
	5.120uF 51.2uF 100uF *7	±10% typical
Frequency	5.000Hz	+/- 0.1% + 1D
	50.00 Hz	
	500.0Hz	
	5.000 kHz	
	50.00 kHz	
	500.00 kHz 5.000 MHz	
TRMS	✓	
NCV	✓	
LPF	✓	
Overvoltage Category	CATIV 1000V	
Backlight	✓	
Torch Light	✓	
LPF -3dB freq.	1 kHz	

Technical Data refer to 23°C ± 5°C at < 80% rel. Humidity Temperature Coefficient 0.15 % specified Accuracy per 1°C (< 18° and > 28°C.

Feature	Range *1	Basic Accuracy
DC Voltage	400 m	±(1,5% of meas. val. + 5 digits)
	4 V	
	40V 400V 1500V	
AC Voltage *2 *3 *5	400 m	±(1,5% of meas. val. + 5 digits) ±(1% of meas. val. +5 digits)
	4 V	
	40V 400V 1000V	
DC Current Jaws	40 A	±(2% of meas. val. + 5 digits)
	400 A	
DC Current-Jacks	400 uA	±(1,5% of meas. val. + 5 digits)

AC Current-Jaws *3 *4	40 A	±(2% of meas. val. + 5 digits)
AC Current-Jacks *2 *5	400 uA	±(1,8% of meas. val. + 5 digits)
Resistance	400Ω 4 kΩ 40 kΩ	±(1,5% of meas. val. + 3 digits)

- *1: The lowest range is specified from 5 % of range to 100 % of range.
- *2: Signal BW 40Hz ... 1 kHz.
- *3: If signal is mixed (AC+DC) only pure AC component will be taken into account.
- *4: Frequency of AC current up to 400 Hz.
- *5: With increasing frequency (over 400 Hz) accuracy decreases.
- *6: Specification is valid for Capacitance > 10nF.
- *7: Maximum measurement time is 15 s.

Correctness of the operating instructions

These operating instructions have been created with due care and attention. No claim is made nor guarantee given that the data, illustrations and drawings are complete or correct. All rights are reserved regarding changes, print failures and errors.

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