INSTRUCTION MANUAL

Milwaukee Wine Lab Photometer

Mi451
Copper

CE

Milwaukee

www.milwaukeetesters.com

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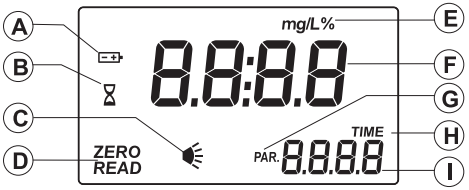

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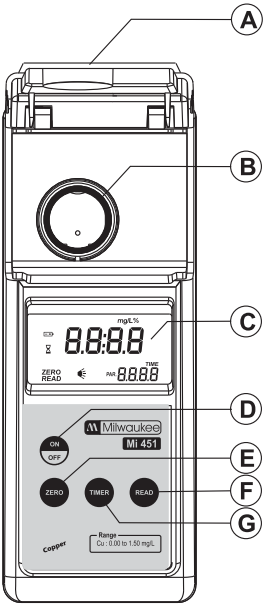


GENERAL DESCRIPTION

Thank you for choosing Milwaukee. This instruction manual will provide you the necessary information for correct use of the meter.

Mi451 is an auto-diagnostic portable microprocessor meter. It has an advanced optical system based on a special tungsten lamp and a narrow band interference filter that allows most accurate and repeatable readings. All instruments are factory calibrated.

The auto-diagnostic feature of this meter ensures always optimal measurement conditions to perform most precise readings. The light level is automatically adjusted each time a zero-measurement is made, and the temperature of the lamp is controlled to avoid overheating.

SIGNIFICANCE OF USE

Grapes accumulate normally only a small amount of copper by natural translocation from roots. Unless exposed to significant airborne pollution or vineyard sprays, increased concentrations in wine result from contamination during post-fermentation processing, like contact with non stainless steel equipment and as impurities in fining agents and filter media.

The copper concentration in wine is normally low, less than 0.10 to 0.30 mg/L, because excess copper is precipitated during fermentation due to adsorption onto the yeast cells. This adsorption and precipitation can reduce the initial copper concentration with 40 to 89%. At higher concentration copper plays an important role in catalysing oxidation reactions of wine phenols.

It is important to check the copper content both in must and in wine, because at levels above 9 mg/L copper becomes a metabolic toxin that inhibits or delays alcoholic fermentation, and concentrations exceeding 1 mg/L may be sensorial detected and should be avoided.

Other copper related problems can be manifested as formation of white haze (in white wines) and later as a reddish-brown amorphous precipitate. This precipitated 'casse' develops only under the strongly reducing conditions found in bottled wines. It has been found that this casse is a mixture of copper compounds and proteins.

Factors favouring and inhibiting copper casse formulation in wine

Necessary conditions for copper case formation	Preventive Measures
strong reducing conditions	copper levels at less than 0.3 mg/L
low iron concentrations	limit SO_2 addition
high protein levels	cold-stabilize and bentonite fine to reduce proteins in white wine
light and heat	

This meter is supplied with:

- Two sample cuvets and caps
- Reagents for 20 tests (Mi551A-0, Mi551B-0, Mi551C-0, Mi551D-0)
- Two 20 ml vials with caps
- Two 1 ml plastic pipettes
- Two 3 ml plastic pipettes
- Two spoons
- Four 1.5V AA batteries
- Tissue for wiping cuvets
- Instruction Manual
- Instrument Quality Certificate

SPECIFICATIONS

Range	0.00 to 1.50 mg/L
Resolution	0.05 mg/L
Precision	SD±0.05 mg/L @ 0.50 mg/L
Light Source	Tungsten lamp
Light Detector	Silicon Photocell with narrow band interference filter @ 560 nm
Method	The reaction between Copper and the reagents causes a purple tint in the sample.
Environment	0 to 50 °C (32 to 122 °F) ; max 95% RH non-condensing
Battery Type	4 x 1,5 volt AA batteries
Auto-Shut off	After 15' of non-use in *measurement mode*.
Dimensions	225 x 85 x 80 mm (8.7 x 3.3 x 3.1")
Weight	500 g (17,6 oz.).

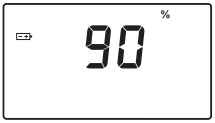
Required Reagents

Code	Description	Quantity/test
Mi551A-0	Copper Reagent A	5 mL
Mi551B-0	Copper Reagent B	5 mL
Mi551C-0	Copper Reagent C	2 x 4 spoons
Mi551D-0	Copper Reagent D	2 x 4 spoons

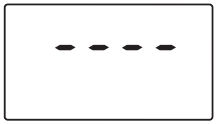
This instrument is in compliance with CE Directives.

GUIDE TO DISPLAY CODES

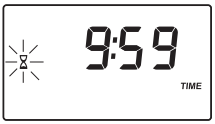
This prompt appears for a few seconds each time the instrument is turned ON.



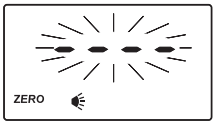
This prompt indicates the battery capacity value.



Indicates that the instrument is in a ready state and waiting for the next command (Timer or Zero).

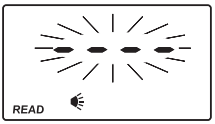


After Timer is pressed, a blinking hourglass icon appears and the display shows a 10 minutes coundown. At the end of the countdown an acoustic signal alerts the user that the timer is finished.



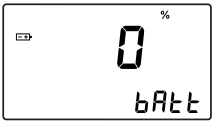
Indicates that the meter is performing a zero measurement. The light intensity is automatically re-adjusted (auto-calibration features) if necessary.

The instrument is zeroed and a measurement can be made.



Indicates that the meter is making a measurement.

Batteries voltage is getting low and the batteries need to be replaced.

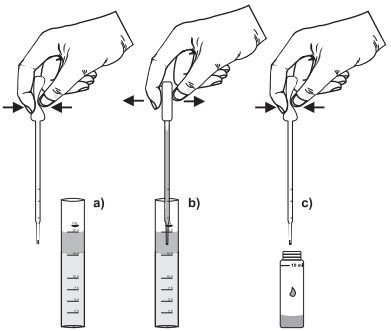


Indicates that the batteries are dead and must be replaced. After this message appears, the instrument is switched off. Change the batteries and restart the meter.

GENERAL TIPS FOR AN ACCURATE MEASUREMENT

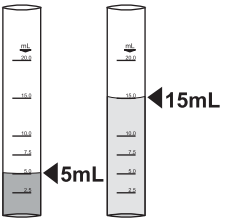
The instructions listed below should be carefully followed during testing to ensure best accuracy.

- Use the supplied plastic pipette for adding the exact amount of wine sample (15 mL) or reagents A or B (up to the 20 mL mark) to the graduated glass vials. The liquid in the vial forms a convexity on the top; the bottom of this convexity must be at the same level of the mark.
- To transfer the supernatant organic solvent from the vials to the cuvets use two different clean 1 mL pipettes, one for the zero and one for the sample.
  a) squeeze the bulb of the pipette;
  b) insert the plastic pipette into the supernatant organic solvent and release the bulb slowly, paying attention not to transfer the wine sample too;
  c) fill a cuvet with organic solvent by squeezing the bulb of the pipette.



Repeat step a), b) and c) until all the organic solvent is transferred. Ensure that at least 1/3 of the cuvet is filled with organic solvent, otherwise erroneous results will be obtained.
Notes:
- If some wine sample is transferred too, this does not interferes with the method.
- Try to avoid transferring suspended solids that might be present.
- If necessary, air bubbles can be removed tapping the vials gently on the table.

- Diluting procedure of the wine sample in case the "L Lo" (Low Light) message appears: use the pipette to fill the glass vials with 5 mL of wine sample, then fill the vials up to the 15 mL mark with **Mi550S1-0**. This is the diluted wine sample. The final reading must be multiplied by 3 to compensate for dilution.



- In order to avoid reagent leaking and to obtain more accurate measurements, it is recommended to close the cuvet first with the supplied HDPE plastic stopper and then with the black cap.

- Whenever the cuvet is placed into the measurement cell, it must be dry outside, and completely free of fingerprints, oil or dirt. Wipe it thoroughly with **Mi0004** (tissue for wiping cuvets, see chapter ACCESSORIES) or a lint-free cloth prior to insertion.

- Do not let the reacted sample stand too long after extraction, or accuracy will be lost.

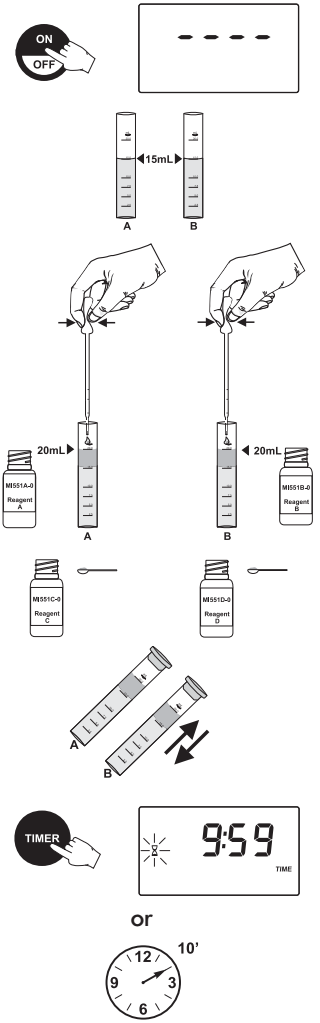
- It is possible to take multiple readings in a row, but it is important to take a new zero reading for each different wine-sample. Use always a fresh prepared zero for making the zero reading.

- After the reading it is important to discard immediately the sample, otherwise the glass might become permanently stained.

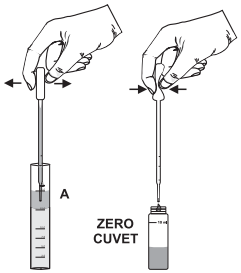
- All the reaction times reported in this manual are referred to 20°C (68°F). As a general rule of thumb, they should be doubled at 10°C (50°F) and halved at 30°C (86°F).

MEASUREMENT PROCEDURE

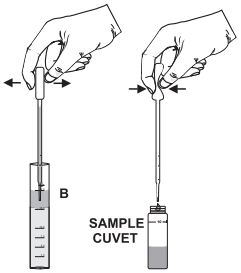
- Turn the instrument on by pressing **ON/OFF**.
- When the LCD displays "----", it is ready.
- Use the 3 mL plastic pipette to fill two glass vials with 15 mL of wine sample (up to the mark).
  Note: The liquid in the vial forms a convexity on the top; the bottom of this convexity must be at the same level of the mark.
- Use a clean 1 mL pipette to add 5 ml of Reagent **A (Mi551A-0)** to the first vial **(A)**.
- Use the second 1 mL pipette to add 5 ml of Reagent **B (Mi551B-0)** to the second vial **(B)**.
- Add 4 full spoons of reagent **C (Mi551C-0)** to each vial.
- Using the other supplied spoon, add 4 full spoons of Reagent **D (Mi551D-0)** to each vial.
- Close the glass vials tightly with their caps and shake both vials vigorously for 1 minute.
  Note: block the cap with a finger during shaking!
- Press **TIMER** and the instrument will show the countdown or, alternatively, wait for 10 minutes, leaving the vials capped and undisturbed.
  During this period the color of the upper layer (organic phase) in vial B will turn purple if copper is present.
  After 10 minutes the instrument gives an acoustic signal to alert the user that the countdown is finished.



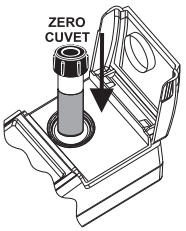
- Remove the cap of vial A. Use the 3 mL plastic pipette to transfer the upper layer (organic phase) into a cuvet.
  If some wine is transferred too, this does not interfere with the measurement.
  Cap the cuvet. This is the **zero cuvet (A)**.



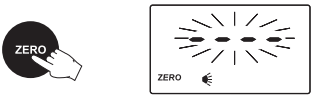
- Remove the cap of vial B. Use the 3 mL plastic pipette to transfer the upper layer (organic phase) into another empty cuvet.
  If some wine is transferred too, this does not interfere with the measurement.
  Cap the cuvet. This is the reacted **sample cuvet (B)**.



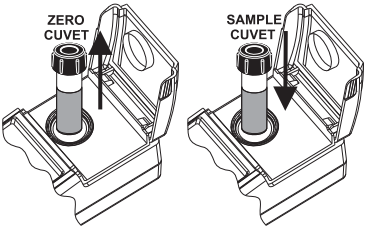
- Insert the zero cuvet into the holder and close the lid.



- Press **ZERO** and "----" will blink on the display.

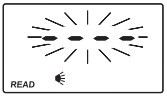


- After a few seconds the display will show "-0.0-". The meter is now zeroed and ready for measurement.
  Note: If the "L Lo" (Low Light) message appears, the sample must be diluted. See "General tips for an accurate measurement".



- Remove the cuvet from the instrument.

- Insert the reacted sample cuvet into the holder and close the lid.



- Press **READ** and the display will show "----" during measurement.

- The instrument directly displays concentration in mg/L (ppm) of copper on the Liquid Crystal Display.

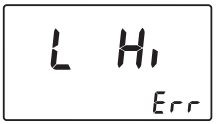
  Note

  If the copper concentration exceeds 1.50 ppm or if the sample is very turbid or dark red colored, it is recommended to dilute the sample 10 times with **Mi550S1-0** Wine Solvent-1 and repeat the complete measurement procedure starting from the beginning, taking 15 mL of diluted wine sample in vial A for zero-sampling and 15 mL in vial B for reading. In this case the displayed value needs to be multiplied by 10 to compensate for dilution.

ERROR MESSAGES

The meter has lost its configuration. Contact your dealer or the nearest Milwaukee Instruments Customer Service Center.

on zero reading:



"Light high": there is too much light to perform a measurement. Please check the preparation of the zero cuvet.

"Light low": there is not enough light to perform a measurement. Dilute the sample. See "General tips for an accurate measurement".

"No Light": the instrument cannot adjust the light level. Please check that the sample does not contain any debris.

on sample reading:

"Inverted": the sample and the zero cuvet are inverted.

The sample absorbs less light than the zero reference. Check the procedure and make sure you use the same cuvet for reference (zero) and measurement.

A flashing value of the maximum concentration indicates an over range condition. The concentration of the sample is beyond the programmed range: dilute the sample and measure again.

BATTERY REPLACEMENT

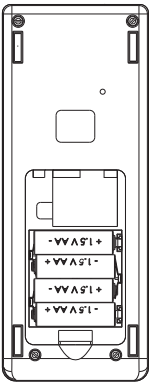
Battery replacement must only take place in a non-hazardous area.

The blinking "⊟" will appear when the batteries power gets low.

When batteries are completely discharged, "0% bAtt" will appear and after two seconds the instrument is switched off.

Remove the battery cover from the bottom of the instrument and change the old batteries with 4 fresh 1.5V batteries, paying attention to the correct polarity.

Replace the cover.



ACCESSORIES

Reagent sets

Mi451KIT	Copper reagent set for wine (20 tests)
Mi550S1-0	Color Reagent Set for wine (Wine Solvent-1)

OTHER ACCESSORIES

Mi0006	1.5V AA batteries (4 pcs)
Mi0004	Tissue for wiping cuvets (4 pcs)
Mi0011	10 mL glass cuvets (2 pcs)
Mi0014	Caps for cuvets (2 pcs)
Mi0007	20 mL glass cylinder with caps (2 pcs)

For your Safety don't use or store the instrument in hazardous environments. To avoid damages or burns, do not perform any measurement in microwave ovens.

WARRANTY

This instrument is warranted against defects in materials and manufacturing for a period of 2 years from the date of purchase. Electrodes are warranted for 6 months.
If during this period the repair or replacement of parts is required, where the damage is not due to negligence or erroneous operation by the user, please return the intrument, electrode and probe to either distributor or our office and the repair will be effected free of charge.
Damage due to accidents, misuse, tampering or lack of prescribed maintenance is not covered by the warranty.

Milwaukee/Martini instruments reserves the right to make improvements in design, construction and appearance of its products without advance notice.

THANK YOU FOR CHOOSING

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