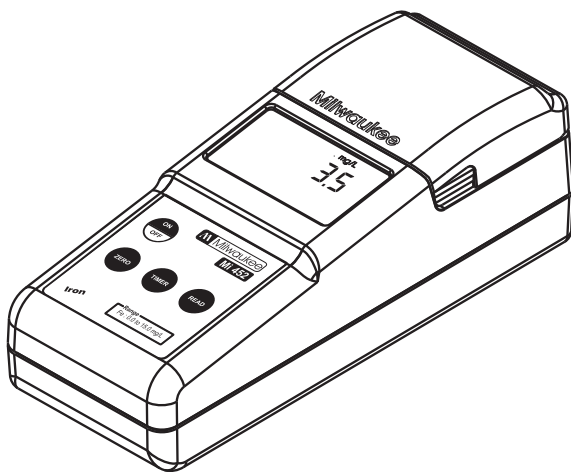


# INSTRUCTION MANUAL

## Milwaukee Wine Lab Photometer



### ■ Mi452 Iron



[www.milwaukeetesters.com](http://www.milwaukeetesters.com)

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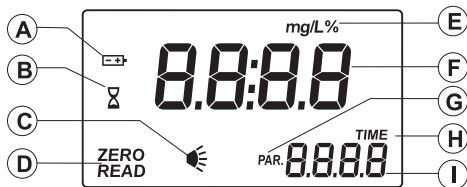
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## FUNCTIONAL DESCRIPTION

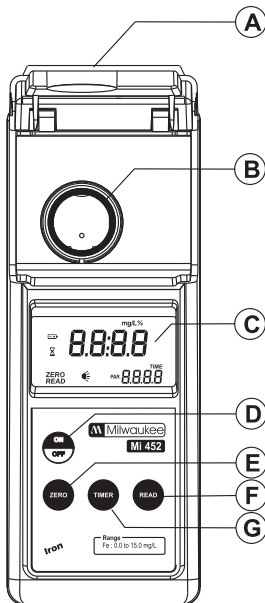
### DISPLAY

- A. BATTERY STATUS ICON
- B. HOURGLASS ICON
- C. LAMP STATUS INDICATOR
- D. MEASURE STATUS
- E. MEASUREMENT UNIT
- F. MAIN DISPLAY
- G. PARAMETER NUMBER INDICATOR
- H. TIMER MODE INDICATOR
- I. SECONDARY DISPLAY



### FRONT PANEL

- A. LID
- B. CUVET HOLDER
- C. LIQUID CRYSTAL DISPLAY (LCD)
- D. ON/OFF KEY, TO TURN THE METER ON AND OFF
- E. ZERO KEY, TO START THE ZERO MEASUREMENT
- F. READ KEY, TO START THE SAMPLE MEASUREMENT
- G. TIMER KEY, TO ACTIVATE THE COUNTDOWN MODE TIMER



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## **GENERAL DESCRIPTION**

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

**Mi452** 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**

Trace iron concentrations in wine are beneficial for enzyme activity, as stabilizer, and as a functional component for proteins.

At higher concentrations it alters the redox potential, in favouring oxidation, affecting sensory characteristics and participating in the formation of complexes with tannin and phosphates resulting in instabilities (casse). The most common iron case is 'white casse' (iron phosphate), it is initially seen as milky white cloud and later as a precipitate. The 'blue casse' (ferric tannate) that occurs less often can be observed in white wines for example after tannic acid additions.

Most of the iron present in wine is present in the ferrous Fe(II) state. The ratio of the Fe(II)/Fe(III) depends on the oxidation state of the wine. If Fe(III) is formed, it can bind with phosphates that are normally present in wine.

Since iron strongly binds with several organic acids, some wine makers add citric acid to the wine to complex free iron if the concentration exceeds 5 mg/L.

If no contamination occurs the normal iron concentrations in must range from 1 to 5 ppm. The most important source of iron in wine is contact with iron containing alloys during processing. During fermentation a part of the iron is absorbed by yeast and thus removed from the wine during filtration.

Casse formation depends on: iron concentration, pH, ORP, phosphate, content and the type of wine.

**white casse formation**

iron concentration > 7 ppm  
high redox potential (Fe<sup>3+</sup> present)  
pH 2.9-3.6

**white casse inhibition**

iron concentration < 5 ppm  
clarification with bentonite  
citric acid addition 12-24 g/hL

This meter is supplied with:

- Two sample cuvetts and caps
- Reagents for 20 tests (Mi550S1-0, Mi552A-0, Mi552B-0)
- One 1000 µL automatic pipette with Instruction Sheet
- Two plastic tips for 1000 µL automatic pipette
- One 1 mL plastic pipette
- Four 1.5V AA batteries
- Tissue for wiping cuvetts
- Instruction Manual
- Instrument Quality Certificate

## **SPECIFICATIONS**

Range	0.0 to 15.0 mg/L
Resolution	0.1 mg/L
Precision	SD±0.4 mg/L @ 4.0 mg/L
Light Source	Tungsten lamp
Light Detector	Silicon Photocell with narrow band interference filter @ 560 nm
Method	The reaction between Iron 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 <i>measurement mode</i> .
Dimensions	225 x 85 x 80 mm (8.7 x 3.3 x 3.1")
Weight	500 g (17,6 oz.).

### **Required Reagents**

<u>Code</u>	<u>Description</u>	<u>Quantity/test</u>
Mi550S1-0	Wine Solvent 1	9 mL
Mi552A-0	Iron Reagent A	1 dose of powder reagent
Mi552B-0	Iron Reagent B	1 dose of powder reagent

This instrument is in compliance with CE Directives.

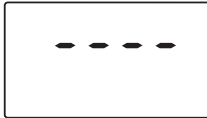
## GUIDE TO DISPLAY CODES



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



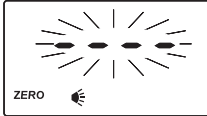
This prompt indicates the battery capacity value.



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



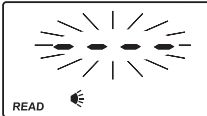
After Timer is pressed, a blinking hourglass icon appears and the display shows a 2 minutes countdown. At the end of the countdown an acoustic signal alerts the user that the timer is finished.



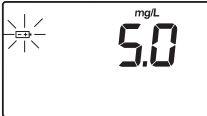
Indicates that the meter is performing a zero measurement. The light intensity is automatically re-adjusted (auto-calibration features) if necessary.



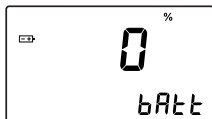
The instrument is zeroed and a measurement can be made.



Indicates that the meter is making a measurement.



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

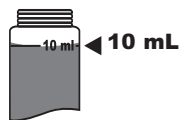


Indicates that the batteries are dead and must be replaced. After this message appears, the instrument is switched off. Change the batteries and restart the meter.

## GENERAL TIPS FOR AN ACCURATE MEASUREMENT

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

- For a correct filling of the cuvet: the liquid in the cuvet forms a convexity on the top; the bottom of this convexity must be at the same level of the 10 mL mark.
- For dosing the wine sample, we recommend to use the supplied Milwaukee **Mi0024** automatic pipette.

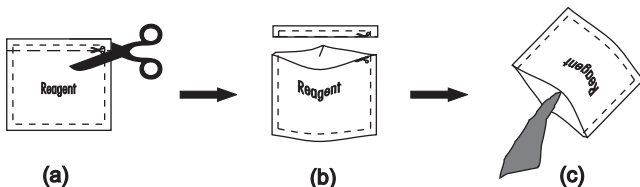


Milwaukee  
automatic pipette




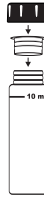
For a correct use of the Milwaukee automatic pipette, please follow the related Instruction Sheet.

- Proper use of the powder reagent packet:
  - (a) use scissors to open the powder packet;
  - (b) push the edges of the packet to form a spout;
  - (c) pour out the content of the packet.

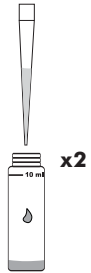




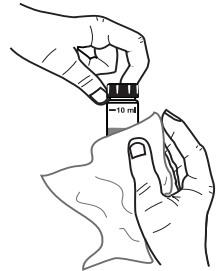
- In order to avoid reagent leaking and to obtain more accurate measurements, it is recommended to close the cuvet first with the supplied HDPE plastic stopper  and then with the black cap.



- Diluting procedure: Use the 1000  $\mu\text{L}$  automatic pipette to add twice exactly 1 mL of sample to an empty cuvet. Then fill the cuvet up to the mark with iron-free deionized water. Close the cap and invert the cuvet several times. This is the diluted sample. Follow the measurement procedure. The final reading must be multiplied by 5 to compensate for dilution.



- 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.
- 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

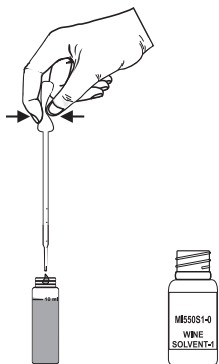
- Turn the instrument on by pressing **ON/OFF**.
- When the LCD displays "----", it is ready.



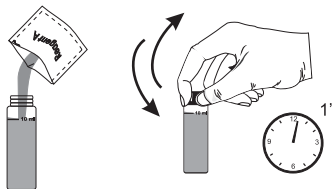
- Use the 1000  $\mu\text{L}$  automatic pipette to add exactly 1 mL of wine sample to an empty cuvet.  
For a correct use of the automatic pipette please follow the related Instruction Sheet.



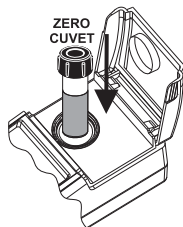
- Use the plastic dropper pipette to fill the cuvet up to the 10 mL mark with Wine Solvent 1 (Mi550S1-0).



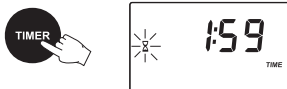
- Add the content of one powder packet of Iron Reagent A (Mi552A-0) reagent. Replace the cap and shake gently for 1 minute to dissolve the reagent.



- Place the cuvet into the holder and close the lid.



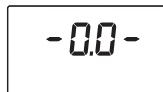
- Press **TIMER** and the instrument will show the countdown or, alternatively, wait for 2 minutes. The instrument gives an acoustic signal to alert the user that the countdown is finished.



or  
2'



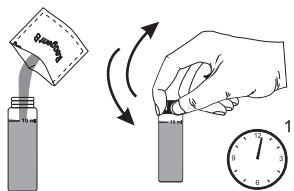
- Press **ZERO** and "----" will blink on the display.
- After a few seconds the display will show "-0.0-". The meter is now zeroed and ready for measurement.



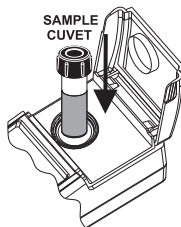
Note: If the "L Lo" (Low Light) message appears, the sample must be diluted (see "General tips for an accurate measurement", page 8).

- Remove the cuvet from the instrument and open the cap.

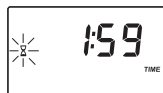
- Add the content of one powder packet of Iron Reagent B (**Mi552B-0**). Replace the cap and shake gently for 1 minute to dissolve the reagent.



- Reinsert the cuvet into the instrument and close the lid.



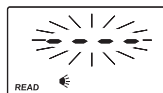
- Press **TIMER** and the instrument will show the countdown or, alternatively, wait for 2 minutes. The instrument gives an acoustic signal to alert the user that the countdown is finished.



or 2'



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



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

### Note

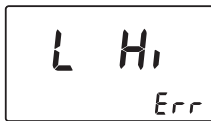
If the iron concentration exceeds 15.0 ppm or if the sample is very turbid, it is recommended to dilute the sample 5 times (see "General tips for an accurate measurement", page 8) and repeat the measurement procedure. In this case the displayed value needs to be multiplied by 5 to compensate for dilution.

## ERROR MESSAGES

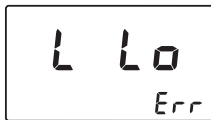


The meter has lost its configuration. Contact your dealer or the nearest Milwaukee Instruments Customer Service Center.

### 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. Please dilute the sample five times (see "General tips for an accurate measurement", page 8).

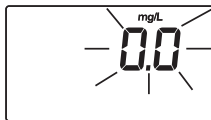


"No Light": the instrument cannot adjust the light level. Please check that the sample does not contain any debris.

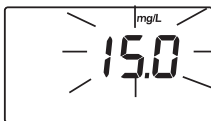
### on sample reading:



"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.

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## **BATTERY REPLACEMENT**

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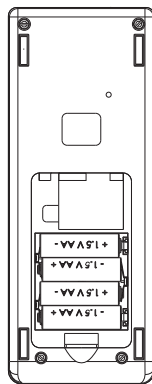
Battery replacement must only take place in a non-hazardous area.

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.



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## **ACCESSORIES**

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### **Reagent sets**

- Mi452KIT Iron 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 cuvetts (4 pcs)  
Mi0011 10 mL glass cuvetts (2 pcs)  
Mi0014 Caps for cuvetts (2 pcs)  
Mi0024 1000  $\mu$ L automatic pipette  
Mi0025 Plastic tips for 1000  $\mu$ L automatic pipette (25 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 instrument, 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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