INSTRUCTION MANUAL

Milwaukee Wine Lab Photometer

Mi453
Reducing Sugars

CE

Milwaukee

www.milwaukeetesters.com

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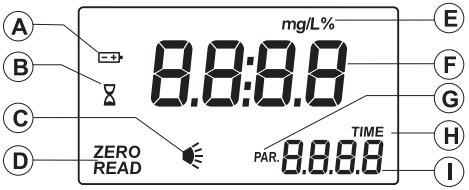
FUNCTIONAL DESCRIPTION

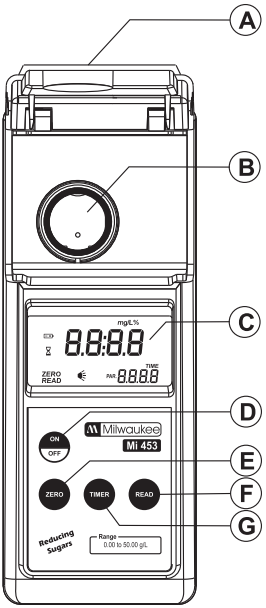
DISPLAY

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



GENERAL DESCRIPTION

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

Mi453 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

The determination of concentration of reducing sugars (RS) is one of the most important parameters that need to be measured during the wine making process.
Following the increase of RS during maturation of grapes can help to decide when to start harvest. Having the highest possible sugar content is important because this is the main parameter that defines the commercial value of grapes.
During the alcoholic fermentation instead, the decrease of sugars can be followed to decide when fermentation is completed, or allows making corrective actions if the content of RS is too low to obtain the desired alcohol degree or sweetness.

The predominant RS in grape products are glucose and fructose (hexoses). After reaction with excess alkaline cupric tartrate (Fehling reagents), the RS content can be determined colorimetricly. The Fehling method is not an exact determination but an index of the reducing sugar concentration, because the reaction depends upon the amount and kind of RS present. When the reducing sugar content is known at the beginning of fermentation, the potential alcohol degree can be estimated multiplying the sugar concentration (in g/L) by 0.06.
Phenols interfere in the Fehling reaction and therefore red wine must be decolorized prior to analysis. Wine also contains non-fermentable reducing sugars like pentose which will also be analysed by this method.

Typical content of reducing sugars in must and wine

Must	sweet must	20-25 %	200-250 g/L
	normal	10-20 %	100-200 g/L
	in fermentation	4-12.5 %	40-125 g/L
Wine	Sweet	2.5-12.5 %	25-125 g/L
	Semi sweet	0.8-2.5 %	8-25 g/L
	Almost dry	0.2-0.8 %	2-8 g/L
	Dry	0-0.2 %	0-2 g/L

This meter is supplied with:

- Four sample cuvets and caps
- Reagents for 20 tests (Mi553-0, Mi553A-0, Mi553B-0)
- One 200 µL automatic pipette with Instruction Sheet
- One 1000 µL automatic pipette with Instruction Sheet
- Two plastic tips for 200 µL automatic pipette
- Two plastic tips for 1000 µL automatic pipette
- One spoon
- One funnel
- Filter paper (25 pcs)
- Four 1.5V AA batteries
- Tissue for wiping cuvets
- Instruction Manual
- Instrument Quality Certificate

SPECIFICATIONS

Range	0.00 to 50.00 g/L
Resolution	0.25 g/L
Precision	±0.50 g/L @ 10.00 g/L
Light Source	Tungsten lamp
Light Detector	Silicon Photocell with narrow band interference filter @ 610 nm
Method	Fehling Method
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
Mi553A-0	RS reagent A	1 test tube
Mi553B-0	RS reagent B	1 ml

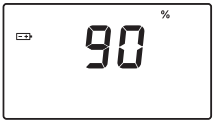
Optional Reagents

Code	Description	Quantity/test
Mi553-0	Charcoal	2 spoons

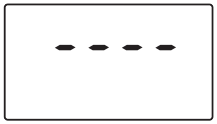
This instrument is in compliance with CE Directives.

GUIDE TO DISPLAY CODES

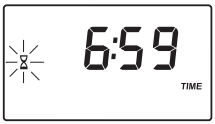
This prompt appears for a few seconds each time the instrument is turned ON.



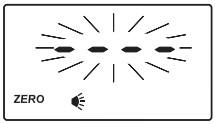
This prompt indicates the battery capacity value.



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

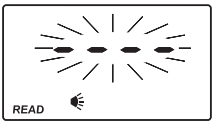


After Timer is pressed, a blinking hourglass icon appears and the display shows a 7 minutes coundown. At the end of the countdown an acoustic signal alerts the user that the timer is finished.



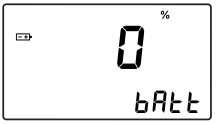
Indicates that the meter is performing a zero measurement. The light intensity is automatically re-adjusted (auto-calibration features) if necessary.

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.

- For dosing the wine sample and the reagent, we recommend to use the supplied Milwaukee automatic pipettes **Mi0026** (200 µL) and **Mi0024** (1000 µL).

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

Milwaukee automatic pipette

- 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).

USING VIALS

- Never insert hot vials into the instrument, or the cuvet holder may be damaged.
- In order to avoid reagent leaking and to obtain most accurate results, it is recommended to close the vial tightly with the supplied cap after addition of reagents or sample.
- 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.

DIGESTION

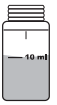
- At the end of the digestion period, the vials are still hot: allow the vials to cool to room temperature.

MEASUREMENT PROCEDURE

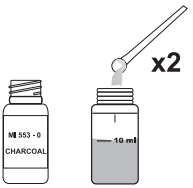
SAMPLE PREPARATION FOR RED WINE

To remove interference of phenols, samples of Red Wine must be treated with activated carbon.

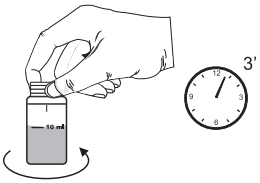
- Fill one cuvet with 10 mL of Red Wine.



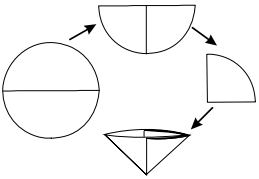
- Add 2 spoons of **Mi553-0** Charcoal to the cuvet.



- Cap the cuvet and mix vigorously for 2 minutes. Then wait for 3 minutes.



- Fold a filter disc twice as shown in the figure. Separate one side from the other three to form a cone. Insert the folded filter disc in the funnel.



- Filter the treated wine into an empty cuvet. This is the **wine sample**.
  Note: if the filtered wine is still red, repeat the above procedure.

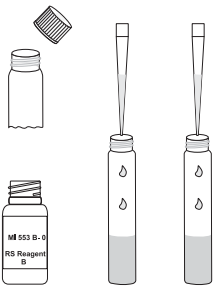
MEASUREMENT

Note: A single blank vial may be used more than once; the blank vial is stable **up to one week** if stored in a dark place at room temperature. Always use the same lot of reagents for blank and samples. For most accurate measurement run a blank for each set of mesurement.

Note: If the expected RS concentration is above 50.00 g/L (for example for must analysis), it is recommended to dilute the sample 4 or 5 times with water.

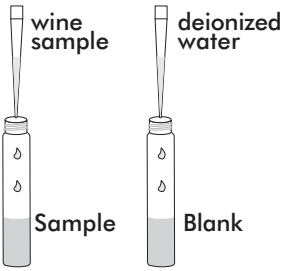
- Preheat the reactor to 105 °C (221°F). For a correct use of the reactor follow the Reactor Instruction Manual.
  Do not use an oven or microwave.

- Remove the cap from two vials **Mi553A-0** RS reagent A.

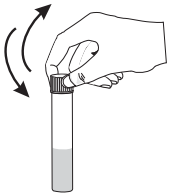


- Use the **Mi0024** 1000 µL automatic pipette to add exactly 1 mL of **Mi553B-0** RS reagent B to each vial.
  For a correct use of the automatic pipette please follow the related Instruction Sheet.

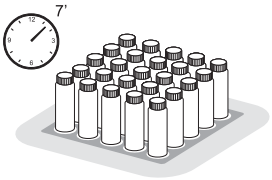
- Use the **Mi0026** 200 µL automatic pipette to add exactly 200 µl of wine sample to one vial (Sample) and 200 µL of deionized water to the other vial (Blank).



- Replace the cap and invert the vials several times to mix. Wipe the vials thoroughly with a lint-free cloth.

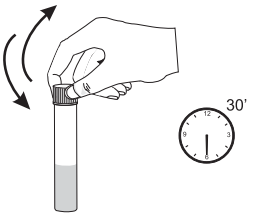


- Insert the vials into the reactor and heat them for 7 minutes at 105°C.
  Note: to obtain most accurate results, it is recommended to use the pre-programmed timer of the instrument, and remove the vials from the reactor after exactly 7 minutes.
  Turn the meter on by pressing **ON/OFF** and then press **TIMER** to activate a 7 minutes countdown.

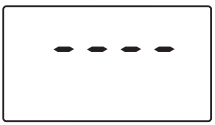


- At the end of the digestion period switch off the reactor, place the vials carefully in the test tube rack and wait for 10 minutes.
  Warning: as the vials are still hot, be careful in handling them.
  Note: If the sample vial appears brown/orange without blue hue, dilute the wine sample and repeat the procedure.

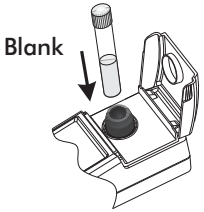
- Invert the vials two times to mix. Then wait for 30 minutes to allow the vials cool to room temperature.
  Note: This operation is necessary to recover the condensed water after heating.



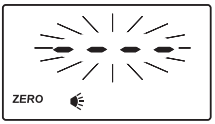
- Turn the instrument ON by pressing **ON/OFF**. When the LCD displays "---", it is ready.



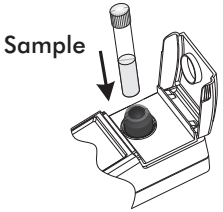
- Place the Blank Vial into the instrument.



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

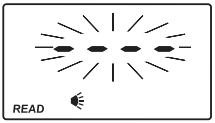


- After a few seconds the display will show "-0.0-". The meter is now zeroed and ready for measurement. Remove the Blank Vial.



- Insert the Sample Vial into the instrument.
  Note: Do not shake or invert the Sample Vial anymore otherwise the samples may become turbid.

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



- The instrument directly displays concentration in g/L (ppt) of Reducing Sugars on the Liquid Crystal Display.

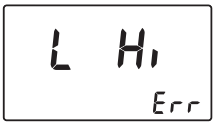
Note:
To convert the Reducing Sugars concentration from g/L to %, multiply the reading by 0.1.
e.g. 12.5 g/L x 0.1=1.25%.

When you analyse the must before alcoholic fermentation, to calculate the potential alcohol degree multiply the read sugar concentration (g/L) by 0.06.
e.g. 175 g/L x 0.06=10.5% vol (potential alcohol degree)
(potential alcohol degree)

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.

BATTERY REPLACEMENT

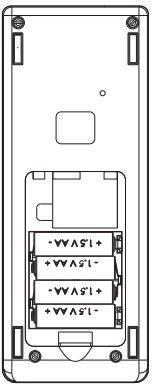
Battery replacement must only take place in a non-hazardous area.

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

Mi453KIT	Reducing sugars reagent set for wine (20 tests)

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)
Mi0024	1000 µL automatic pipette
Mi0025	Plastic tips for 1000 µL automatic pipette (25 pcs)
Mi0026	200 µL automatic pipette
Mi0027	Plastic tips for 200 µL automatic pipette (25 pcs)
Mi0008	Filter discs (100 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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