

# Alcohol Meter

## ALM-155



**KYEM**  
**KYOTO ELECTRONICS**  
MANUFACTURING CO., LTD.

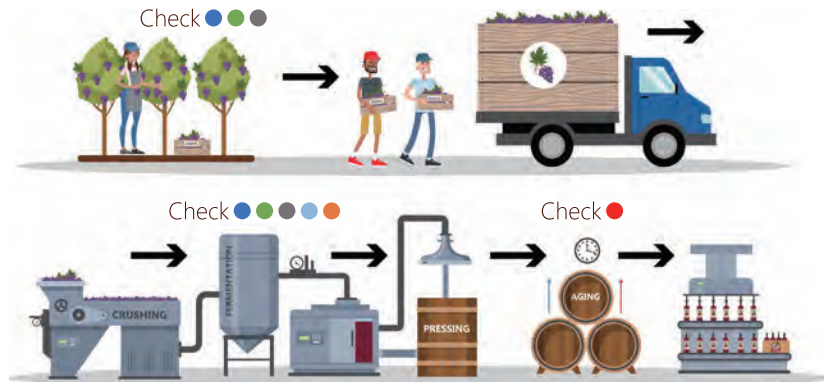
Kyoto Electronics Manufacturing Co., Ltd., has been developing and manufacturing oscillation type density instruments since 1978, giving them expertise in this technology. The technology behind the ALM-155 is based on that of our DA-155 Sake Alcohol Analyzer, an instrument popular in the Japanese domestic market. Even though most Sake breweries are small family businesses, their demand for reliable analytical instrumentation is very high, and knowing this, KEM has been providing them with easy to use, high performance analyzers at a reasonable price.

# Measurement Cycle

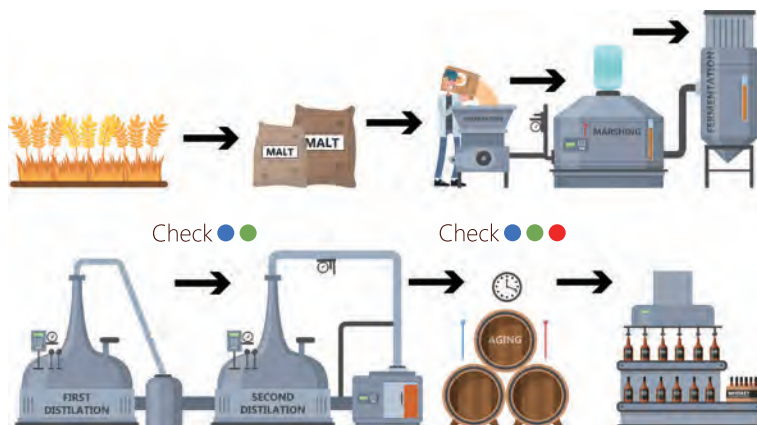
Alcohol and Specific Gravity / Density / Brix / Babo / Baume analysis is essential at many stages of the production process of alcoholic products.

Wine: stages of production where analysis is required

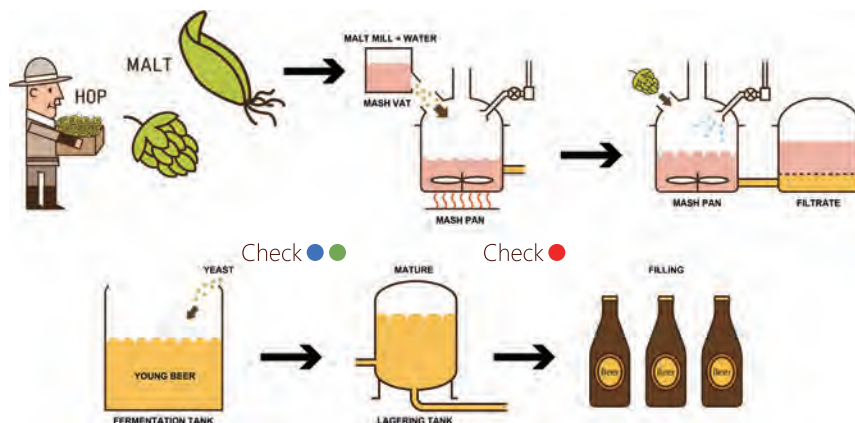
- Alcohol
- Specific Gravity
- Density
- Brix
- Babo
- Baume



Whiskey: stages of production where analysis is required



Beer: stages of production where analysis is required



\* Samples are required to be distilled before performing alcohol measurement.  
\* Please note that measurement requires both sampling by pump and the subsequent (human) operation of the ALM-155 Alcohol Meter. Automatic testing in an "inline" system is not supported.

# Introduction

The **ALM-155** is a dedicated, space-efficient and high-performance bench top density meter that uses oscillating capillary tube technology for the analysis of alcohol content in beer, wine and spirits. The ALM-155 makes the analysis of density and specific gravity in alcoholic beverages easier than it has ever been before, and it presents a very affordable solution for those looking for the convenience and reliability that it brings. The ALM-155 measures with high sensitivity, attaining results to the nearest 0.01% for alcohol content and 0.00001g/cm<sup>3</sup> for density. What's more, it employs a Peltier thermostat system, ensuring that the measurement temperature is fixed at exactly 20°C and 60°F.



## One button measurement, small sample volume

The ALM-155 is equipped with a peristaltic pump for automatic sampling. The sample volume required for measurement is only 8mL, and the same sample can be remeasured for repeatability testing with the automatic repeating function. The analysis of alcohol content (distilled sample) or density (pre-distilled sample) is performed at the touch of a single button, and results are achieved in two to four minutes. When working with viscous samples, an optional syringe can be used to inject sample into the measurement cell, making the ALM-155 even more versatile and suitable for the analysis of any alcoholic products.

## Simple calibration and maintenance

Calibration of the ALM-155 is a cinch, with pure water being the only standard liquid required. After use, the unit can be cleaned simply by washing the cell with pure water and kitchen detergent. Easy to obtain sample tubing is typically the only thing that needs to be periodically replaced. The daily performance check procedure is easy to perform and only requires pure water.

## Results data automatically saved

As result data is automatically saved, there is no need to record results by hand. An optional printer can be used to print results data. The ALM-155 can also store the data of 100 measurement instances, with this data being transferrable to a USB memory stick or to PC by using optional software and an RS-232C cable.



# ALM-155 is suitable for:

## Wineries

Alcohol content is an item of major legal/regulative importance; the declaration of incorrect values potentially leading to severe penalties for wine producers. For this reason, it is crucial that the determination of alcohol content be done in accordance with official analysis methods. It is very important to check the density, specific gravity and alcohol content of wine during fermentation to verify its progress and to provide notice if it stops prematurely.



## Must production

The density of grape juice prior to fermentation is very important to measure, as it indicates its sugar content and gives the producer an idea of the alcohol content that will be generated in the batch.



## Oenological labs

In addition to providing analytical support to wineries, these laboratories can release certificates of analysis with legal validity. Just like wineries, these laboratories have to perform analyses in accordance with official methodology in order to be sure that they are certifying products correctly.



## Distilleries and spirits

Companies producing spirits, such as distilleries, have products that are high in alcohol content. As the ALM-155 measures samples in the entire range of 0.00 - 100.00% alcohol, it is highly suitable for producers of spirits.



## Beer production

Monitoring density and specific gravity during the beer production process is very important for the quality of the final product. The ALM-155 is your solution for testing the alcohol content of beer post-distillation.



## Vinegar making

Vinegar is made through the oxidation of ethanol in fermented alcoholic beverages such as wine and cider, and also of raw ingredients such as malt, rice and raw and cooked fruit.

Monitoring the alcohol content of the product during the oxidation process is very important to understand the progress of the conversion of ethanol into acetic acid.



# Analysis procedure

Just four steps for measurement

Specific Gravity/ Density / Brix / Babo / Baume



Filtration and degassing



Sample loading and pressing start



Reading the result on the display or PC



Cleaning and onto the next sample!

Alcohol



Prepare a distilled sample for analysis



Sample loading and pressing start



Reading the result on the display or PC

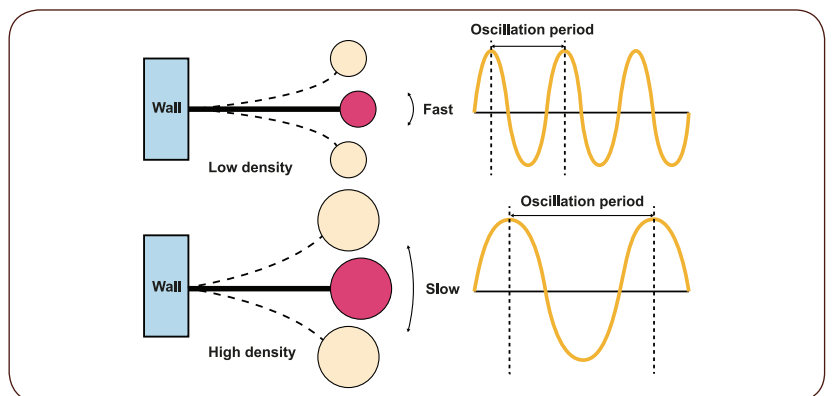


Cleaning and onto the next sample!

## Principle




### Measurement Principle of KEM Density/Specific Gravity Meters

Picture the model shown on the right, where a weight is attached to the end of a flexible strip of metal. If you flick the weight with your finger, it begins to oscillate. You can see that it oscillates slower when the weight is increased, and faster when the weight is decreased. This is because the weight will vibrate on the oscillation period specific to a substance in proportion to the mass of the weight.



This means that one can determine the density of a substance by measuring its oscillation period, since density becomes proportional to the mass when the volume is constant, i.e. a fixed tube.

# Specifications

Model		ALM-155 Alcohol Meter		
Measurement Range	Alcohol content	0.00~100.00 vol%		
	Density	0.69937~1.24887 g/cm³		
	Specific Gravity (20/20)	0.70000~1.25000		
	Brix	0.0~50.0		
	Babo	0.0~45.0		
	Baume	0.0~25.0		
Resolution	Alcohol content	0.01 vol%		
	Density	0.00001 g/cm³		
	Specific Gravity	0.00001		
	Brix	0.02		
	Babo	0.02		
	Baume	0.01		
Repeatability	Alcohol content	SD:0.05 vol%		
	Density	SD:0.00005 g/cm³		
	Specific Gravity	SD:0.00005		
	Brix	SD 0.002		
	Babo	SD 0.002		
	Baume	SD 0.001		
Measurement Temperature		20°C / 60°F		
Alcohol Table		OIML (vol%/wt%) / AOAC / HMCE / G225 (At 20°C) AOAC / NIST (At 60°F)		
Measurement Time		2 to 4 min. (with the peristaltic pump)		
Min. Volume Required for Auto Sampling		ca. 8mL (for 10 seconds of sampling time)		
Display	Display Type	LCD (with a backlight)		
	Displayed Items	Item	5-2 mode	4-1 mode
		Density	x.xxxxx	x.xxxx
		Specific Gravity	x.xxxxx	x.xxxx
		Alcohol content	x.xx	x.x
		Temperature	xx.xx	xx.xx
Sampling		1) Auto Sampling by Peristaltic Pump 2) Manual by optional syringe		
Auto Start function		Number of repeat measurements: 2-100		
Density-Concentration Conversion		Alcohol content Fixed (Stored as Standard)		
Calibration		Calibration: One point with pure water or two points with dry air and pure water (Note: dry air pump should be prepared locally for two points calibration)		
PC Software		SOFT-CAP (Data Acquisition Software)		
Interfaces		1) USB flash drive/keyboard 2) RS-232C: Dot Matrix Printer (COM1) , PC (COM2)		
Data I/O		CSV data saving to USB		
Operating Conditions		1) Temperature: 5 to 35°C 2) Humidity: Below 85%RH (no condensation)		
Power Supply		100 to 240 VAC±10%, 50/60Hz		
Power Consumption		Approx. 30W		
Dimensions		270 mm (W)×402 mm (D)×163 mm (H)		
Weight		Approx. 10 kg		
Conformity standard		CE marking EMC: EN61326-1 LVD: EN61010-1 / RoHS2 Directive		
Options		IDP-100 Printer 	Syringe 2mL (10pcs) 	Density Standard Liquid 



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