

# Vibration Type Liquid Density Meter DM8



## ***DM8***

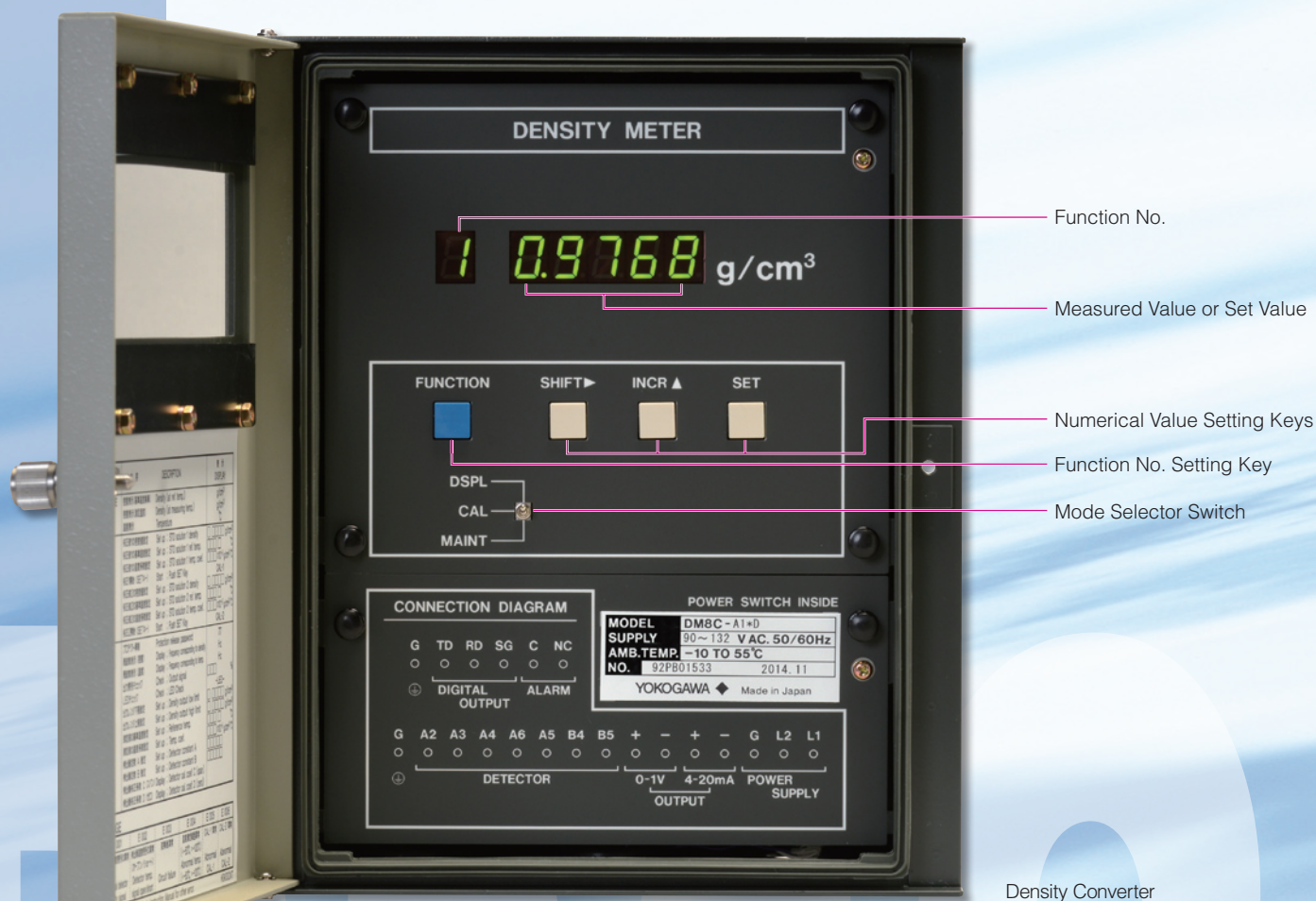
*Vibration Type Liquid Density Meter*

Bulletin 12T03A01-01E

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# Easier to Use Density Meter With a Built-in Microprocessor and Featuring Direct Digital Conversion to Density.



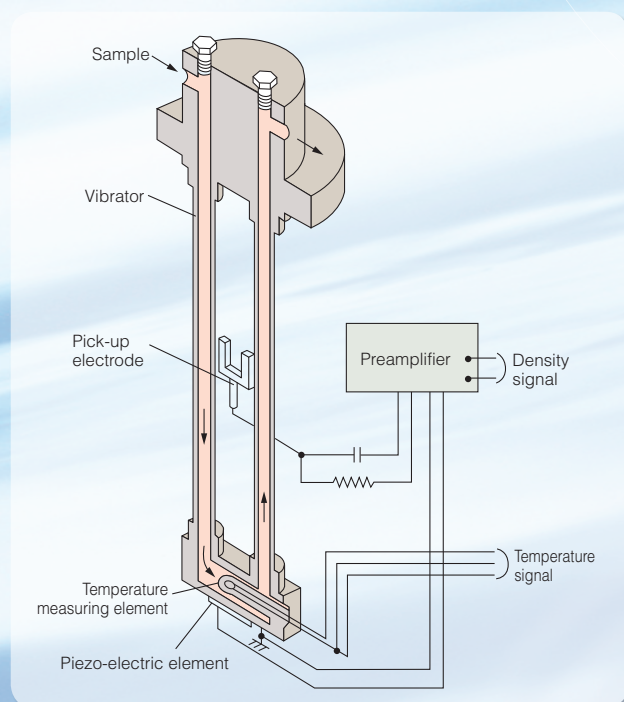
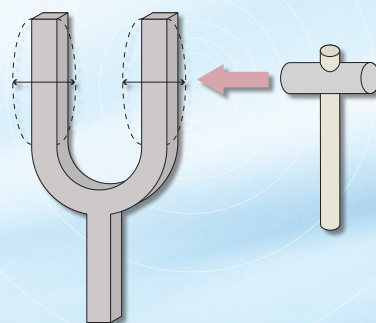
Density Converter

Density is one of the fundamental physical quantities required when the property or composition of a liquid sample is being determined in industrial processes. Operation of plants which previously had to depend on human perception for density measurement due to a lack of appropriate online density meters, can be automated with the advent of YOKOGAWA's Model VD6 Vibration Type Density Meter in 1967. Developed in response to user requirements, the Model VD6 put an emphasis on saving labor, resources, energy and better and more stable quality. As part of its policy of continuing development, YOKOGAWA has launched the Model DM8 Vibration Type Density Meter. Highly reliable and advantage of the experience accumulated by the well reputed Model VD6 to produce density meters of high sensitivity and stability. Its converter incorporates a microprocessor to directly convert frequency signals from the sensor into density values and display them. The density meter is also provided with a variety of functions such as one-touch calibration, self diagnosis, digital output (RS-232C). etc.



## High Sensitivity and Stability based on the Principle of the Tuning Fork

The natural frequency of a tuning fork is determined by its shape and material. If the tuning fork is hollowed out and filled with a liquid, the vibrating frequency is determined by the liquid's density. This is the operating principle of the Model DM8 vibration type liquid density meter.



Vibrator cross sectional view



Density Detector

## Features

### High Sensitivity and Stability

Stable measurement can be performed in spite of high detecting sensitivity. The density meter is not affected by viscosity or flow.

### One Touch Calibration with a Standard Calibrating Solution

Calibration work has been simplified to enable quick calibration by anyone. If the densities and temperature coefficients of zero and span standard calibrating solutions are set in advance, actual calibration can be performed by only pressing a Key after filling the meter with the standard calibrating solutions.

### Digital Output (via RS-232C interface)

The meter can readily be connected to a supervisory computer since it is provided with digital (via RS-232C interface) as well as analog output (4 to 20 mA DC and 0 to 1 VDC).

### Free Setting of Measuring Range in the Field

Measuring range, reference temperature, and the temperature coefficient of the measuring liquid can be set in the field.

### Failure Alarm Display and Output

Failures in the converter and/or detector are automatically detected by the self diagnosis function. Each error's indication is obtained, and their relay contact outputs are delivered.

### Outdoor Installation of Converter

The converter can be installed outdoors since it is provided with a dust and drip-proof construction. (However, it must be used only in non-explosion protected areas.) This allows the converter to be placed near the detector and facilitates calibration, checking, and adjustment. The meter can be mounted with any method on panels, walls and pipes.



## Operation

Operations shown in the table to the right can be performed by selecting a mode with the mode selector switch and designating a Function No.

MODE SW	FUNCTION NO.	DESCRIPTION	DISPLAY
DSPL	NONE	Density (at ref. Temp.)	$\square.\square\square\square$ g/cm <sup>3</sup>
	1	Density (at measuring temp.)	$\square.\square\square\square$ g/cm <sup>3</sup>
	2	Temperature	$\square\square\square$ °C
CAL	3	Set up: STD solution 1 density	$\square.\square\square\square$ g/cm <sup>3</sup>
	4	Set up: STD solution 1 ref. Temp.	$\square\square\square$ °C
	5	Set up: STD solution 1 temp. coef.	$\square\square\square$ ×10 <sup>-5</sup> g/cm <sup>3</sup> /°C
	6	Start: Push SET Key	CAL-1
	7	Set up: STD solution 2 density	$\square.\square\square\square$ g/cm <sup>3</sup>
	8	Set up: STD solution 2 ref. Temp.	$\square\square\square$ °C
	9	Set up: STD solution 2 temp. coef.	$\square\square\square$ ×10 <sup>-5</sup> g/cm <sup>3</sup> /°C
	A	Start: Push SET Key	CAL-2
MAINT	1.	Protection release Password	77
	2.	Display: Frequency corresponding to density	$\square.\square\square\square$ Hz
	3.	Display: Frequency corresponding to temp.	$\square.\square\square\square$ Hz
	4.	Check: Output signal	$\square\square\square$ %
	5.	Check: LED Check	-LED-
	6.	Set up: Density output low limit	$\square.\square\square\square$ g/cm <sup>3</sup>
	7.	Set up: Density output high limit	$\square.\square\square\square$ g/cm <sup>3</sup>
	8.	Set up: Reference temp.	$\square\square\square$ °C
	9.	Set up: Temp. coef.	$\square\square\square$ ×10 <sup>-5</sup> g/cm <sup>3</sup> /°C
	A.	Set up: Detector constant A	$\square\square\square$
	b.	Set up: Detector constant B	$\square\square\square$
	C.	Display: Detector col. coef. C (span)	$\square\square\square$
	d.	Display: Detector col. coef. D (zero)	$\square\square\square$

## Standard Sampling System Supporting Correct Measurement

- An accurate sampling system is indispensable for correct density measurement.
- The Model VD6SM standard vibration type density meter sampling system is convenient for setting correct measuring conditions, being provided with instruments for monitoring temperature, pressure and flow in online sampling. In addition, each component is arranged to facilitate easy and accurate checking of the density meter, sample liquid calibration, measuring liquid calibration, or for maintenance.
- The user may simply adjust the sampling conditions as stated below.

Inlet temperature (T<sub>in</sub>): 0 to 100°C

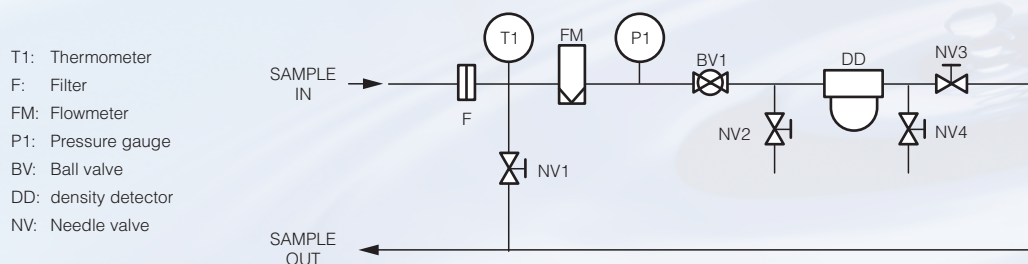
Inlet pressure (P<sub>in</sub>): 0 to 2MPa

Differential pressure between the inlet and outlet (P<sub>in</sub>-P<sub>out</sub>): 100kPa or more

Flowrate: 1 to 10 L/min

Note: This sampling system cannot be used for food-related applications. If such an application is desired, contact YOKOGAWA or its representatives.

Flow Diagram of Vibration Type Density Meter Standard Sampling System





## Application Examples .....

- Phosphor slurry for color TV (Electrical equipment manufactures, coating process)
- Silver chloride slurry (Photographic materials industry, coating process)
- Acetone solutions (Chemical industry, reaction process)
- Caustic soda (NaOH) solution (Chemical industry, reaction process) (Soda industry, product control)
- Ammonia water (Chemical industry, reaction process)
- Various alcohols such as methanol, vinyl alcohol, etc. (Chemical industry, reaction process)
- Sodium thiocyanate (NaSCN) solution (Chemical industry, reaction process)
- Vinyl acetate solution (Textile industry, reaction process)
- Naphtha (Petroleum refineries, rectification distillation process) (Petrochemical industry, reaction process)
- Crude oil, heavy oil, light oil, and kerosene (Petroleum refinery, rectification distillation process and product control)
- Whiskey, Sake, and ethanol (Food industry, water charging and distillation processes)
- Beer (wort) fermented liquid (Food industry, fermentation process)
- Liquor and isomerized liquor (Sugar industry, concentration process and product control)
- Concentrated and fermented milk (Food industry, manufacturing processes)
- Starch syrup (glucose) (Food industry, manufacturing process)
- Sodium sulfite and/or sodium bisulfite aqueous solutions (Paper and Pulp industry, desulfurization from flue gas)



Measuring Range: 0.5 to 2.0 g/cm<sup>3</sup>  
Signal Output span: 0.05 to 0.5 g/cm<sup>3</sup>  
Temperature Coefficient: 0 to 0.002 g/cm<sup>3</sup>/°C, (variable)  
Output Signal: Analog; 4 to 20 mA DC and 0 to 1 V DC  
Digital: via an RS-232C interface  
Repeatability (density): 5 X 10<sup>-4</sup> g/cm<sup>3</sup> (for digital output)

Measuring Liquid Temperature: -10 to 100°C  
Measuring Liquid Pressure: Up to 2MPaG or less  
Vibrator Material: Stainless steel (JIS SUS316) or nickel  
Ambient Temperature: -10 to 55°C  
Power Supply: 90 to 132 V AC or 180 to 264 V AC, 50/60 Hz

Unit: mm

**Detector (Model VD6D or VD6DF)**

Sample inlet Rc1/4  
(1/4NPT for VD6DF-□□\*B/FM)

Steam connection Rc1/4

Sample outlet Rc1/4

2-inch (50 mm) pipe  
(either horizontal or vertical)

Electrical wiring port G3/4  
(3/4NPSM for VD6DF-□□\*B/FM)

Purge air outlet  
(with seal sheet)

Mounting pipe  
(JIS 50A (2-inch))

Purge air inlet  
(Rc1/8 female)

Pipe mounting bracket

**Converter (Model DM8C)**

Mounting bracket (applicable with any mounting to panels, walls or pipes)

Mounting panel thickness  
Max 12mm

Wiring port holes  
(27 mm dia., 5 holes (with closing rubber sheets))

Panel cutout dimensions

Wall mounting hole drilling dimensions

9 mm dia., holes or MB (ISO) screws, two places

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