

## Densitetsmätare RBDM

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### Overview

**RBDM Insertion liquid Density Meter** is based on the proven tuning fork technology. It is an all-welded sensor that is designed for insertion into a pipeline, open tank, or closed tank.

Fluid density is determined directly from the resonant frequency of the tuning fork immersed in the fluid. A temperature sensor is also fitted within the transmitter to indicate the operating temperature.

### Principle of operation

**RBDM Insertion Density Meter** operates on the vibrating element principle, the element in this case being a tuning fork structure that is immersed in the liquid being measured. The tuning fork is excited into oscillation by a piezoelectric device internally, secured at the root of one tine. The frequency of vibration is detected by a second piezoelectric device, which is secured in the root of the other tine.

The meter sensor is maintained at its natural resonant frequency, as modified by the surrounding liquid, by an amplifier circuit located in the electronic housing. This frequency of vibration is a function of the overall mass of the tine element and the density of the liquid in contact with it. As the density of the liquid changes, the overall vibrating mass changes, and therefore the resonant frequency changes. By measuring this frequency and applying the following equation, the density of the liquid can be calculated.

$$\rho = K_0 + K_1\tau + K_2\tau^2$$

Where:

- $\rho$  = Fluid uncorrected density (kg/m<sup>3</sup>)
- $\tau$  = Time period of meter ( $\mu$ s)
- $K_0, K_1, K_2$  = meter calibration coefficients



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### FEATURES

**RBDM Insertion Density Meter** fully integrates digital density measurement for monitoring and control; Capable of direct insertion into large bore pipe work applications, substantially reducing the installation cost compared to flow through devices; Tolerant of applications where high fluid viscosity exists; Maintenance is minimal and reduces overall operating costs.

### Specifications

<b>Density range</b>	0.5 – 2.5 g /cc (500 – 2500 kg/m <sup>3</sup> )
<b>Calibration range</b>	0.8 – 1.2 g /cc (800 – 1200 kg/m <sup>3</sup> )
<b>Accuracy</b>	± 0.002 g /cc (± 2 kg/m <sup>3</sup> )
<b>Repeatability</b>	± 0.0002 g /cc (± 0.2 kg/m <sup>3</sup> )
<b>Temperature range (Process)</b>	-50°C ~ +200°C
<b>Pressure rating</b>	10MPa ~ 20MPa
<b>Viscosity range</b>	0 – 20000 cP
<b>Temperature effect</b>	> 0.1 kg/m <sup>3</sup> /°C (adjusted)
<b>Impact from pressure</b>	none
<b>Built-in temperature sensor</b>	PT100
<b>Wetted parts</b>	Stainless steel 316L, Hastelloy alloy
<b>Tine finish</b>	Standard, PFA coated, or Electro-polished
<b>Power supply</b>	24VDC, ≥50 mA
<b>Outputs</b>	4 -20 mA, 0-1000Hz, RS485 Modbus RTU
<b>Density accuracy - process(20°C)</b>	± 0.1% or ± 0.05% FS of indicated figures
<b>Repeatability - process(-40 ~ +85°C)</b>	± 0.05% FS
<b>Process connection</b>	ANSI 150 ~ 1500 RF DIN 50 PN16 DIN 50 PN40 IDF and RJT hygienic type
<b>defensibility</b>	IP65
<b>Outer covering</b>	Aluminum alloy



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## Model selection

Code	production							
CR	RBDM Insertion Insertion liquid density meter							
Code	material							
A	316 Stainless Steel Standard							
H	Hastelloy alloy Standard							
S	Requested preference: Please inform for particular requirement							
Code	Transmission output							
C	4-20mA 0-1000Hz RS485 Modbus RTU							
Code	Transmission device cover case							
B	Aluminum alloy							
Code	Connection process							
16	50mmGB/T 9123.1-2000 RF DN50/PN1.6							
40	50mmGB/T 9123.1-2000 RF DN50/PN4.0							
XX	Requested preference: Please inform for particular requirement							
Code	length							
150	Standard length 150mm							
XXX	User length							
Code	Marked edge							
A	inserted directly							
C	DN50 sloping attached pipe Standard							
E	DN50 sloping attached pipe Hygienic							
T	Please inform for particular requirement							
Code	Original setting							
G	Options for original setting							
CR	A	C	B	40	15	A	G	<b>Typical module selection</b>

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### Application

**RBDM Insertion Density Meter** is ideally suited to applications where continuous, real-time measurement of density is required. As an instance, it can be used in process control where density is the primary control parameter for the end product, or functioning as an indicator of some other quality control parameter such as percent solids, or percent concentration.

**RBDM Insertion Density Meter** can be applied widely in numerous industries, including brewing, end point detection in batch reactions, evaporator control, petroleum retail outlets, product mixing, slurries, tank and pipe applications, and solvent separation.

