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Automatic Density Meter
Smart-D90 series

Product Introduction:

Shanghai Yuke. utilizes the internationally advanced U-tube oscillation principle for measurement, enabling rapid determination of liquid density and relative density. By injecting a small amount of sample (2–3 ml) into the oscillating U-tube, the system calculates the sample's density based on changes in the oscillation frequency and pre-calibrated data.

Compared to traditional methods—such as volumetric flasks, hydrometers, and balance-based density meters—the Smart-D90 series automatic density meters offer advantages including minimal sample consumption, precise temperature control, ease of use, high measurement accuracy, and excellent repeatability.

Integrating Peltier precision temperature control and high-definition video monitoring technologies, the Smart-D90 series provides accurate, stable, and reliable results while ensuring an efficient and convenient user experience; the high-definition video allows users to easily check for the presence of interfering air bubbles in the sample.

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Key Innovations:

- User Interface: Features a color Android touchscreen; high-definition video monitoring makes inspection more intuitive and convenient.
- Low Sample Volume: Requires only 2–3 ml of sample per measurement, conserving resources and reducing costs.
- Measurement Modes: Includes built-in modes for density, relative density, and specific applications such as general use, pharmaceuticals, chemicals, and petroleum.
- Temperature Control: Built-in Peltier precision temperature control system ensures accurate density measurement under controlled thermal conditions.
- Rapid Testing: Offers a choice between rapid real-time density mode and precision measurement mode for user convenience.
- Instrument Calibration: Simple error verification and calibration using only dry air and distilled water.
- Communication Interfaces: Built-in network module and LIMS interface; equipped with multiple communication ports for data storage, export, and printing.
- User Management: Four-level user access management; supports data reporting, 21 CFR Part 11 compliance, audit trails, pharmacopoeia standards, and electronic signatures.

Industry Applications:

1. **Brewing Industry:** Measurement of alcohol concentration in *baijiu* (Chinese spirits), yellow rice wine, red wine, beer, fruit wine, rice wine, etc.
2. **Flavors & Fragrances:** Quality verification of raw materials for food flavors, daily-use fragrances, tobacco flavors, and food additives.
3. **Pharmaceutical Industry:** Quality control of active pharmaceutical ingredients (APIs) and intermediates; determination of specific gravity and density of pharmaceutical preparations.
4. **Beverage Industry:** Measurement of sugar concentration; quality control for fruit juice, herbal tea, food additives, and soft drinks.
5. **Food Industry:** Quality control for grape juice, tomato juice, fruit syrups, vegetable oils, and canned food processing.
6. **Petrochemical Industry:** Crude oil API gravity; density testing for gasoline and diesel; monitoring of additive blending processes.
7. **Chemical Industry:** Concentration testing for urea, detergents, ethylene glycol, acids/alkalis, and aqueous ammonia.
8. **Machinery Manufacturing:** Testing of cleaning agents for metalworking, machinery manufacturing, the automotive industry, and electronics/electrical appliances.
9. **Testing Institutions:** Liquid density measurement for standard laboratories, statutory testing agencies, and third-party testing services.

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Relevant Standards:

- Food Industry: GB/T 5009.2-2024 "Determination of relative density of food"; GB/T 10345-2007 "Methods of analysis for *baijiu*"; GB/T 4928-2008 "Methods of analysis for beer"; GB/T 15038-2006 "General methods of analysis for wines and fruit wines"; GB/T 5009.225-2023 "Determination of ethanol concentration in alcoholic beverages."
- GB/T 29617-2013 Test method for density, relative density, and API gravity of liquids by digital density meter.
- GB/T 2013-2010 Determination of density for liquid petrochemical products (U-tube oscillation method).
- SH/T 0604-2000 Determination of density for crude oil and petroleum products (U-tube oscillation method).
- SN/T 2383-2009 Determination of density and relative density for liquid chemical products (Digital density meter method).
- DB/T 1231-2010 Methods for Determining the Density of Chemical Products: Digital Liquid Density Meter Method
- ASTM D4052-11 Standard Test Method for Density, Relative Density, and API Gravity of Liquids by Digital Density Meter
- ASTM D5002-13 Standard Test Method for Density and Relative Density of Crude Oils by Digital Density Analyzer
- ASTM D3505-12e1 Standard Test Method for Density or Relative Density of Pure Liquid Chemicals
- ISO 12185:1996 Crude petroleum and petroleum products—Determination of density—Oscillating U-tube method

Technical Specifications:

Parameter	Smart-D90A	Smart-D90B	Smart-D90C
Density Measurement Range (g/cm³)	0.00000 – 3.00000	0.00000 – 3.00000	0.00000 – 3.00000
Measurement Method	Built-in multiple density measurement methods for petrochemical, pharmaceutical, food, and concentration applications		
Measurement Mode	Precision Measurement / Real-time Measurement		
Custom Measurement Method	Yes		

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Parameter	Smart-D90A	Smart-D90B	Smart-D90C
User Management	Yes / Four-level permission management		
Electronic Signature	Yes		
Audit Trail	Yes		
Measurement Resolution (g/cm³)	0.0001	0.00001	0.00001
Measurement Accuracy (g/cm³)	±0.0005	±0.0002	±0.00005
Measurement Repeatability (g/cm³)	±0.0002	±0.0001	±0.00005
Temperature Resolution	0.01 ℃	0.01 ℃	0.01 ℃
Temperature Control Range	5 ℃ – 40 ℃	5 ℃ – 55 ℃	0 ℃ – 70 ℃
Temperature Control Precision	±0.03 ℃	±0.02 ℃	±0.02 ℃
Temperature Control Accuracy	±0.1 ℃	±0.05 ℃	±0.02 ℃
Automatic Viscosity Compensation	Built-in algorithm compensation		
Sample Injection Observation	HD camera with video observation (automatic sample injection)		
Calibration Method	Dry air / Standard water		
Data Storage	64 GB	128 GB	128 GB

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Common Configurations (all models)

Parameter	Specification
Display	10.1" color LCD touch screen
Operating System	Android
Communication Interfaces	1 × RS232, 3 × USB, 1 × RJ-45
Printer Type	Micro printer as option (dot-matrix, thermal), WiFi printer
Output Report	PDF / Excel / CSV
Power Supply	110 V – 240 V, 50 – 60 Hz, 140 W
Instrument Dimensions	452 × 329 × 227 mm (L × W × H)
Net Weight	13.0 kg

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