RUDOLPH RESEARCH ANALYTICAL

TECHNICAL BULLETIN 935

For the Most Demanding cGLP/GMP Laboratories

The DDM 2909 Automatic Density Meter

United States of America
National Institute of Standards and Technology

9001:2008 CERTIFIED ISO RUDOLPH RESEARCH

NVLAP®

NVLAP LAB CODE: 200898-0

17025:2005 CERTIFIED ISO RUDOLPH RESEARCH

Densitometry

Applications

The DDM 2909 Density Meter, with high precision Peltier temperature control of sample, has the features to meet the needs of today's industries.

PETROLEUM

- Measure API Values in accordance with ASTM D1250, ASTM D4052, ASTM D5002 and DIN 51757
- QC incoming raw materials
- Research new products and additives
- Withstands harsh and heavy use environments
- Calibrate using petroleum standards

CHEMICAL

- Measure in units of Kg/m³, g/cm³, g/mL, pounds/gallon, specific gravity, Baumé and more
- Determine concentrations in: %, molarity, normality, mole fraction, ppm, and more
- Check batch consistency and ensure proper blending ratios
- Wetted materials compatible with the most aggressive chemicals

PHARMACEUTICAL

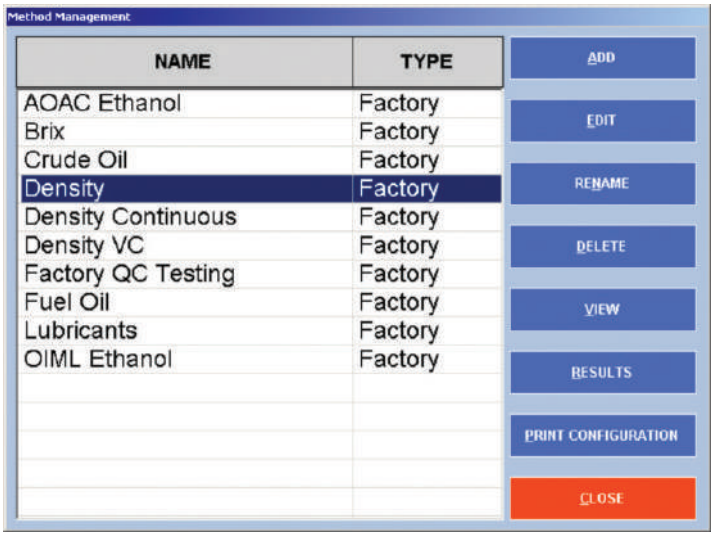
- Capable of multiple measurements with standard deviation, min and max reading for true cGLP/GMP compliance
- Complete IQ/OQ/PQ documentation
- Checking of raw materials and product release
- 21CFR11 Compliance; Electronic Signature and Secure Data Storage
- Compliant with USP 29<841>, JP, BP and EP

BEVERAGE

- Measure both alcoholic and non-alcoholic beverages with easy bubble detection using VideoView™
- Direct and accurate means of °Brix determination, °Plato, Extract, % Solids
- Use apparent density function for proper filling volume monitoring

Flexible Method Management

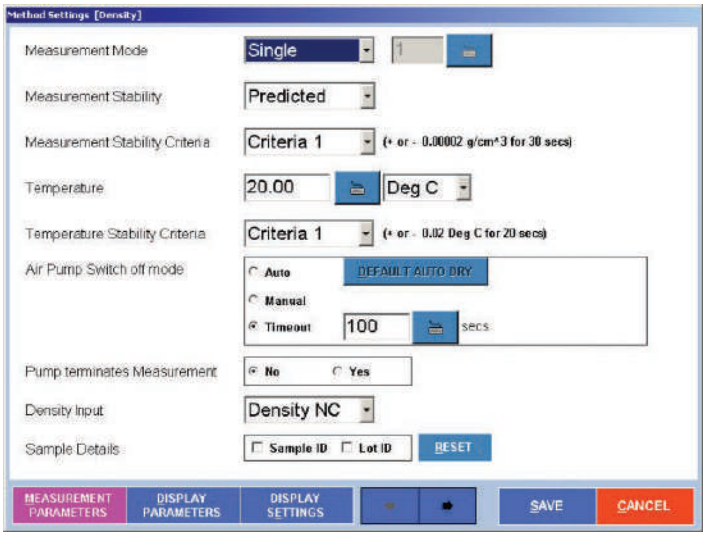
Factory installed density meter measurement methods allow for immediate selection of the correct method to match the most common applications.



For unique measurement applications, create a sample method using an unlimited number of Concentration Tables, Formulas, and Polynomials to match the measurement methods used in your laboratory. A few customized sample methods shown below:

- Baumé of Hydrochloric Acid
- Normality of Sulfuric Acid
- Density of Gasses and Aerosols
- Drug to Propellant Ratio
- Lead Content
- ppm Gold in Acid
- % Toluene in Heptane
- Fat in Lubricant
- Mole Fraction of Methanol
- % HNO_3
- Monomer Solutions
- Potassium Permanganate
- Hydrogen Peroxide
- Molar Solutions of EDTA
- SG of Urine
- Sweeteners
- Sodium Hydroxide

Setting up your custom method on your Density Meter is as simple as filling out a few screens like the one below:



Rudolph Research Analytical 55 Newburgh Road, Hackettstown, NJ 07840 USA ▪ Phone: 973-584-1558 ▪ Fax: 973-584-5440 ▪ E-mail: info@rudolphresearch.com ▪ Internet: www.rudolphresearch.com

The Simplicity of Touch Screen Measurement

Full Feature VideoView™

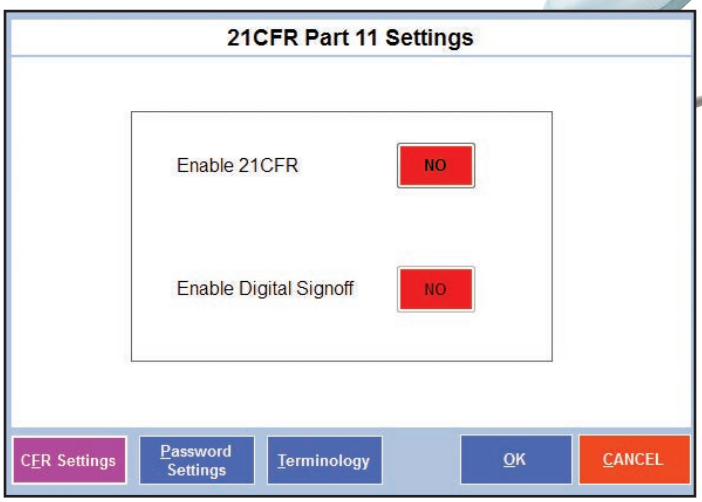
VideoView™ provides superior high resolution visual bubble detection within your samples with live on-screen video viewing. Rudolph's industry leading 10X magnification aids in identifying bubbles if present in the sample.

The video clarity, magnification, and resolution mean no more straining to see small difficult-to-detect air bubbles in your sample. Rudolph's exclusive VideoView™ is protected under Patent #7,437,909.

The Rudolph 2909 Density Meter offers 21CFR Part 11 Instrument Level Compliance

The DDM 2909's 21CFR Part 11 software module is easily enabled through the user friendly touch screen. This module gives you full compliance with:

- Electronic signature
- Access levels
- Internal write protected storage
- Unique passwords
- Write protected documents sent directly to server



Oscillating U-Tube with Viscosity Correction and Reference Oscillator

The DDM 2909 Density Meter's oscillating U-tube with full range viscosity correction and reference oscillator allows long term calibration stability and measurement at all temperatures with a single calibration.

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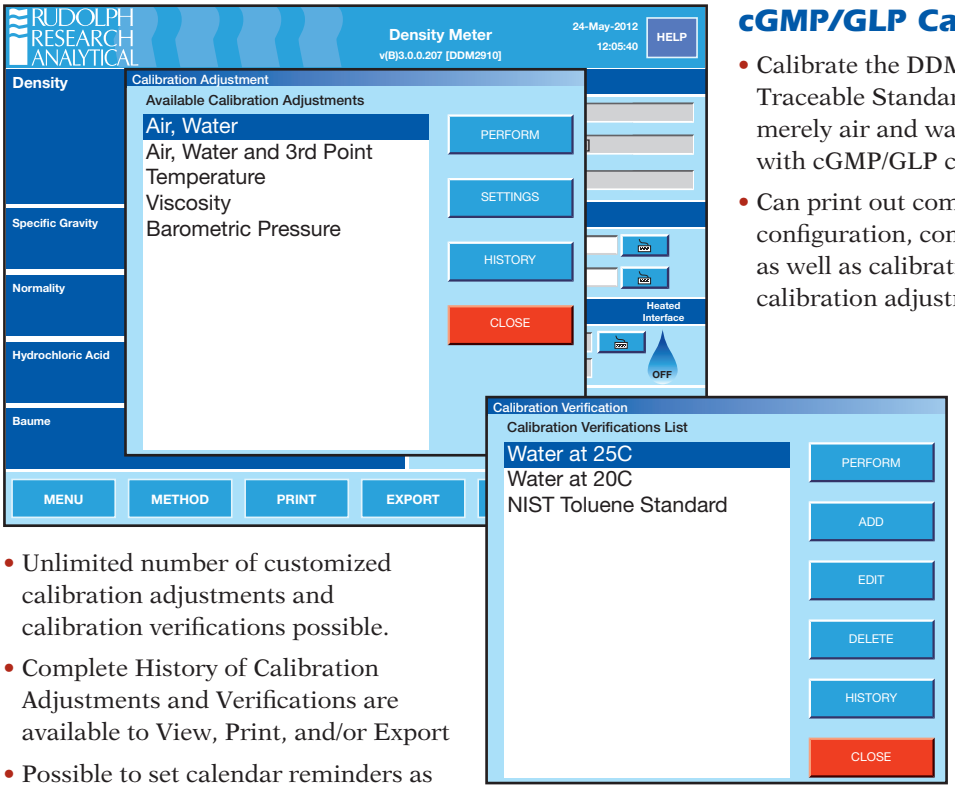
with the Flexibility of Embedded Windows® 7

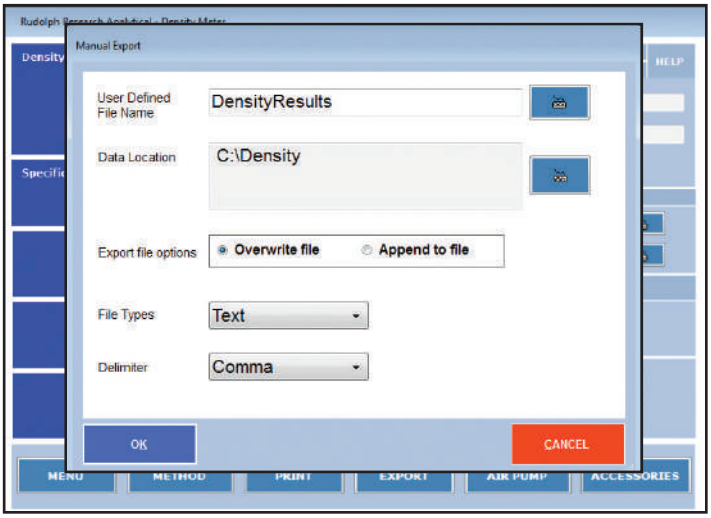


cGMP/GLP Calibration

- Calibrate the DDM 2909 with 2 or 3 Traceable Standards – calibrating with merely air and water appears inconsistent with cGMP/GLP compliance regulations.
- Can print out complete method configuration, communication settings, as well as calibration verification and calibration adjustment data/history.
- Measured values can be shown continuously as temperature stability is being reached or, at the discretion of the user, measured values will only be displayed once the final answer is reached and completely stable.
- Unlimited number of customized calibration adjustments and calibration verifications possible.
- Complete History of Calibration Adjustments and Verifications are available to View, Print, and/or Export
- Possible to set calendar reminders as to when Calibrations are due

Computer Windows Based Flexibility

- 2 gigabytes of internal Compact Flash Memory .
- The DDM 2909 Density Meter is network ready and data may also be saved directly to your server or to any directory desired.
- Internet access is possible directly from the DDM 2909's touch screen.
- Disk Protection feature protects the operating system against malware infections in networked environments.
- Windows based navigation architecture is so intuitive that most operators will never read the manual. But should you wish to reference the manual, it is stored right on the DDM 2909's internal memory
- Copy methods, transfer concentration tables, download data, etc., via the USB ports.
- Three USB ports allow for quick and easy connection to a mouse, keyboard, printer, bar code scanner, or memory stick.



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Full cGMP/GLP Compliance

cGMP/GLP Printing

Sample measurement reports are edited quickly and easily. Just import your logo to the DDM 2909 Density Meter and print your company's customized "C of A" directly.

Print your customized Certificate of Analysis including your company logo directly from the DDM 2909 touch screen

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Date: 26-Jan-2007

This sample was measured on DDM 2909 serial number 20212, manufactured by Rudolph Research Analytical, Hackettstown, NJ, USA.

Lot ID 2019

Temperature: 20.0 Deg C

No	Sample ID	Density	Sp. Gravity	Normality	HCL % wt	° Baume	Time
1	8421	1.0980	1.1000	6.009	19.95	12.94	14:20:50 PM
1	8421	1.0980	1.1000	6.009	19.95	12.94	14:21:40 PM
1	8421	1.0980	1.1000	6.009	19.95	12.94	14:22:30 PM
1	8421	1.0980	1.1000	6.009	19.95	12.94	14:23:20 PM
1	8421	1.0980	1.1000	6.009	19.95	12.94	14:24:10 PM

Counts	:	5
Average	:	1.0980
SD	:	0.0000
Maximum	:	1.0980
Minimum	:	1.0980

Capable of making multiple measurements on a single sample and reporting complete statistical data and all measurement results

Versatile Communication Capability

The DDM 2909's standard communication package includes:

- Touch Screen User Interface
- 3 USB ports (2 Rear, 1 Front)
- 1 – Ethernet Cat 5 Port

Allowing the capability to:

- Connect Directly to Rudolph Service and Technical Support
- Connect to any Windows® based Printer via USB or direct to the server via Windows® Print Library
- Save measurement data locally and directly to your Network/Server.

NIST Standards Available

Standard Accessories

The DDM 2909 standard accessories include:

- Quick Start Guide
- Rinse/Sample Waste Container
- Filling Nozzles
- IQOQPQ Documentation
- Luer Syringes
- Connecting Fittings & Tubing
- Manual

Automation Flexibility

- Rudolph's AutoSampler can be loaded with up to 240 samples
- Combine density and specific gravity measurements with a polarimeter, refractometer, and colorimeter for simultaneous measurements of:
  – Density/Specific Gravity
  – Refractive Index
  – Color
  – Optical Rotation/Specific Rotation
- Up to three different rinse solvents available for use; fully programmable
- Two sample loading modes; pressurized and suction; for optimizing sample transfer and measurement
- Customer's unique sample bottles may be used to eliminate the need to transfer samples into special sized test tubes.
- Emergency samples measured at any time without stopping the AutoSampler or moving sample vials.
- Numerous configurations and solutions. Call us today for the solution that is right for your application.

Specifications of the DDM 2909

Measurement Ranges:	**Density:** 0 to 3 g/cm³ **Temperature:** 15 °C to 40 °C (controlled via Peltier) **Pressure:** 0 to 10 bars
Measurement Modes:	Continuous, Single, Multiple
Measurement Technique:	Mechanical Oscillator Method
Accuracy:	**Density:** 0.0003 g/cm³ with a single calibration and measurement through multiple temperatures **Density:** 0.0002 g/cm³ with a single calibration at the measurement temperature **Temperature:** 0.05 °C
Repeatability:	**Density:** 0.0001 g/cm³ **Temperature:** 0.02°C
Resolution:	**Density:** 0.0001g/cm³ **Temperature:** 0.01°C
Sample Volume:	Less than 1ml
Wetted Materials:	Borosilicate glass, Teflon (PTFE, ECTFE)
Operating System:	Embedded Windows; embedded software safe from malware and viruses
Display:	10.4 inch diagonal TFT type LCD with wide viewing angle, anti-glare flat panel touch screen, 300 nits brightness, 800 x 600 pixels, chemical and scratch resistant monitor, the industry's largest and most flexible interface
Communication Interface:	Touch Screen User Interface 3 – USB Ports (2 Rear – 1 Front) 2 – RS232 Ports Ethernet Port for Network Connection, Keyboard, Bar Code Scanner, Mouse, Network Capabilities
Video & Magnification:	Video assisted, capable of approximately 10X magnification
Internal Memory:	2GB Non-removable Compact Flash
Operating Dimensions:	18.00′ (L) 11.00′ (W) 21.00′ (H) 46cm (L) 28cm (W) 53cm (H)
Shipping Weight:	46 lbs. (22 Kg)
Power Supply:	85 to 260 VAC; 48 to 62 Hz
Power Consumption:	150-200 Watts

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