# RUDOLPH RESEARCH ANALYTICAL

*For the Most Demanding cGLP/GMP Laboratories*

# The DDM 2909
# Automatic Density Meter

ISO 9001:2008 CERTIFIED
RUDOLPH RESEARCH

NVLAP®
United States of America
National Institute of Standards and Technology
NVLAP LAB CODE: 200898-0
Accreditation to ISO/IEC 17025:2005

ISO 17025:2005 CERTIFIED
RUDOLPH RESEARCH

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12:57:16  HELP

30-Mar 2011
Method Information

Rudolph Research Analytical - Density Meter

Density   1.0980   g/cm ^3

MEASURING 3 OF 5

Mean: 1.0980, Max: 1.0980, Min 1.0980, SD: 0.0000, n=2

Specific Gravity   1.100

Mean: 1.1000, Max: 1.1000, Min: 1.1000, SD: 0.0000, n=2

Normality   6.009   N

Mean: 6.0092, Max: 6.0092, Min: 6.0092, SD: 0.0000, n=2

Hydrochloric Acid   19.95   % by wt

Mean: 19.95, Max: 19.95, Min: 19.95, SD: 0.00, n=2

Baume   12.94   Deg Be

Mean: 12.94, Max: 12.94, Min: 12.94, SD: 0.00, n=2

Method Name   HCl
Measurement Mode   Multiple (5)
Measurement Determination   Predicted

Sample
Sample ID   Tank #14
Lot ID   D/H TP

Temperature (Deg C)
Set   20.00
Sample   20.00

STOP
VIDEO

MENU   METHOD   PRINT   EXPORT   AIR PUMP   ACCESSORIES

# 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 $Kg/m^3$, $g/cm^3$, $g/mL$, 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.

| NAME | TYPE | |
|---|---|---|
| AOAC Ethanol | Factory | ADD |
| Brix | Factory | EDIT |
| Crude Oil | Factory | |
| Density | Factory | RENAME |
| Density Continuous | Factory | |
| Density VC | Factory | DELETE |
| Factory QC Testing | Factory | |
| Fuel Oil | Factory | VIEW |
| Lubricants | Factory | |
| OIML Ethanol | Factory | RESULTS |

**Method Management** — PRINT CONFIGURATION — CLOSE

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
- % HNO₃
- 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:
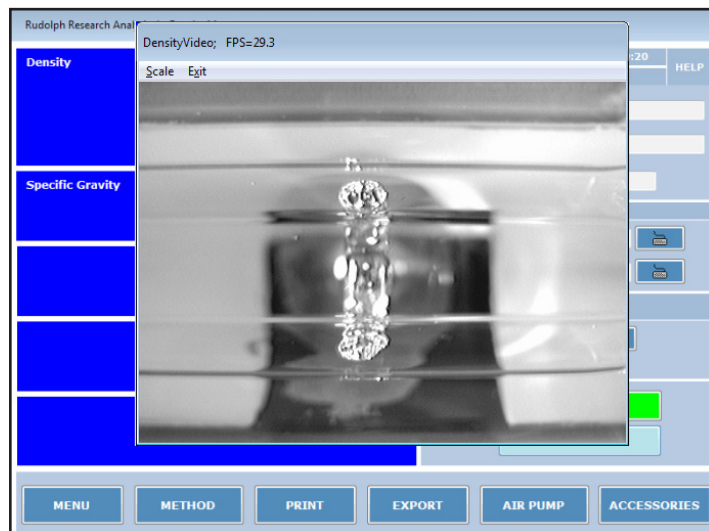
**Method Settings [Density]**

| | | |
|---|---|---|
| Measurement Mode | Single | 1 |
| Measurement Stability | Predicted | |
| Measurement Stability Criteria | Criteria 1 | (+ or - 0.00002 g/cm^3 for 30 secs) |
| Temperature | 20.00 | Deg C |
| Temperature Stability Criteria | Criteria 1 | (+ or - 0.02 Deg C for 20 secs) |
| Air Pump Switch off mode | ○ Auto DEFAULT AUTO DRY ○ Manual ◉ Timeout 100 secs | |
| Pump terminates Measurement | ◉ No ○ Yes | |
| Density Input | Density NC | |
| Sample Details | ☐ Sample ID ☐ Lot ID RESET | |

MEASUREMENT PARAMETERS — DISPLAY PARAMETERS — DISPLAY SETTINGS — SAVE — CANCEL

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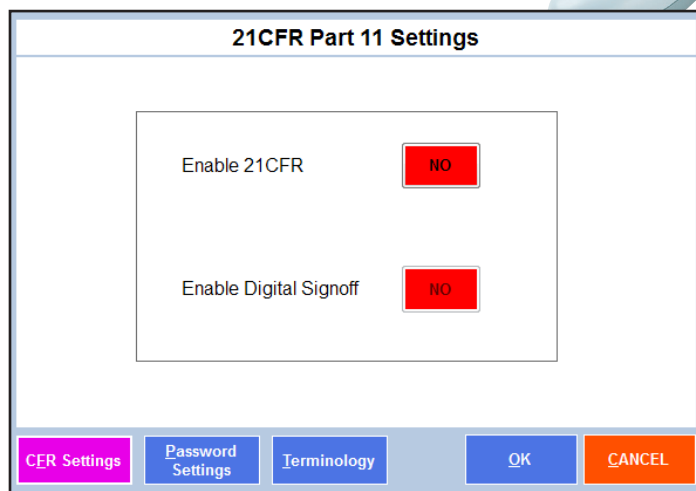
The video clarity, magnification, and resolution mean no more straining to see small difficult-to-detect air bubbles in your sample. Rudolph's exclusive VideoView™ is protected under Patent #7,437,909.

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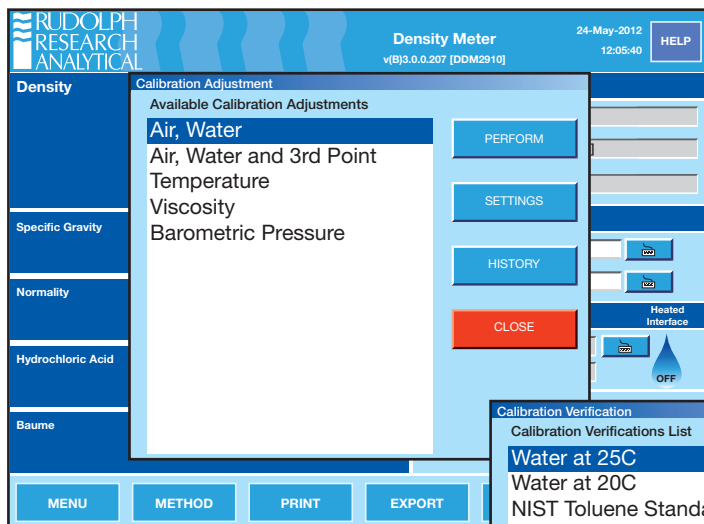
- Electronic signature
- Access levels
- Internal write protected storage
- Unique passwords
- Write protected documents sent directly to server

## 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.
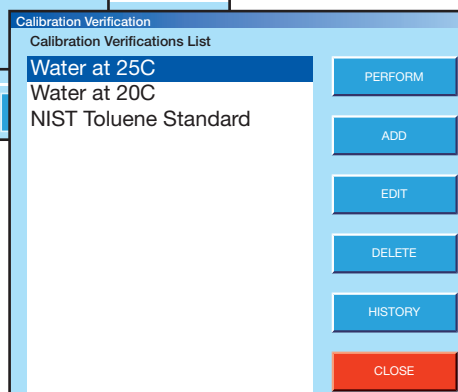
## cGMP/GLP Calibration

- 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.
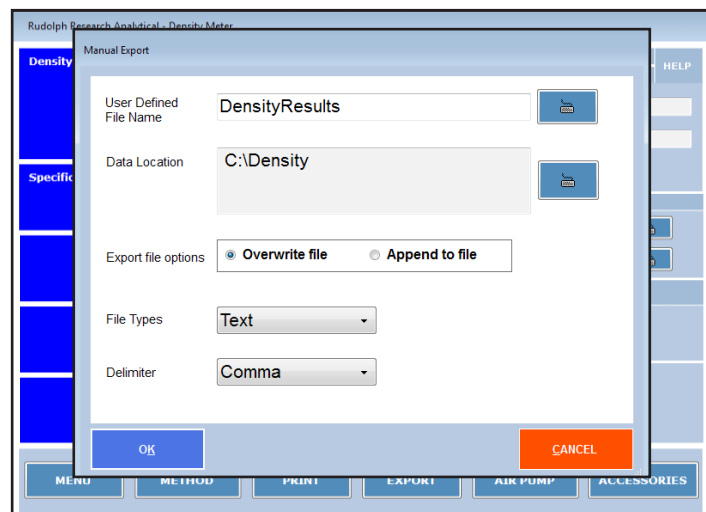
- Measured values can be shown continuously as temperature stability is being reached or, at the discretion of the user, measured values will only be displayed once the final answer is reached and completely stable.

- 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.

# 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.

## 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**

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

Rudolph Research Analytical
55 Newburg Road
Hackettstown, NJ 07840 USA

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**

## 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

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## 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/cm$^3$<br>**Temperature:** 15 °C to 30 °C (controlled via Peltier)<br>**Pressure:** 0 to 10 bars |
| **Measurement Modes:** | Continuous, Single, Multiple |
| **Measurement Technique:** | Mechanical Oscillator Method |
| **Accuracy:** | **Density:** 0.0003 g/cm$^3$ with a single calibration and measurement through multiple temperatures<br>**Density:** 0.0002 g/cm$^3$ with a single calibration at the measurement temperature<br>**Temperature:** 0.05 °C |
| **Repeatability:** | **Density:** 0.0001 g/cm$^3$<br>**Temperature:** 0.02°C |
| **Resolution:** | **Density:** 0.0001g/cm$^3$<br>**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<br>3 – USB Ports (2 Rear – 1 Front)<br>2 – RS232 Ports<br>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)<br>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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