

*For the Most Demanding cGLP/GMP Laboratories*

# The DDM 2911 Automatic Density Meter

United States Department of Commerce  
National Institute of Standards and Technology



NVLAP LAB CODE: 200898-0  
Accreditation to ISO/IEC 17025:2005



**Density Meter** 09-Jul-2012 02:04:57 **HELP**

**RUDOLPH RESEARCH ANALYTICAL**

**Density** 1.03102 g/cm<sup>3</sup>

MEASURING 3 of 5  
Mean:1.03102; Max:1.03102; Min:1.03102; SD:0.00000, n:2

**Specific Gravity** 1.0329  
Mean:1.0329; Max:1.0329; Min:1.0329; SD:0.00000, n:2

**Normality** 1.8751 N  
Mean:1.8751; Max:1.8751; Min:1.8750; SD:0.00001, n:2

**Hydrochloric Acid** 6.66 % by wt  
Mean:6.66; Max:6.66; Min:6.66; SD:0.000, n:2

**Baume** 4.62 Deg Be  
Mean:4.62; Max:4.62; Min:4.62; SD:0.000, n:2

**Method Information**

Method Name	HCl
Measurement Mode	Multiple [5]
Measurement Criteria	NORMAL

**Sample**

Sample ID	Tank # H14
Lot ID	JMP030712

**Temperature Deg C**

Set	20.00
Sample	20.00

**STOP**  
**VIDEO**

**MENU** **METHOD** **PRINT** **EXPORT** **AIR PUMP** **ACCESSORIES**



# Densitometry

## Applications

The DDM 2911 Density Meter, with high precision Peltier temperature control of sample, has the features to meet the needs of today's industries.



### PETROLEUM

- Measure API, Density and Specific Gravity values in accordance with ASTM D1250, ASTM D4052, ASTM D4806, ASTM D5002, ASTM D5931, ISO 12185 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<sup>3</sup>, g/cm<sup>3</sup>, 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 2,3,4 or more multiple measurements with standard deviation, mean, 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 beverage with easy bubble detection using VideoView™ as per AOAC, OIML, NBS, NTS, ABNT, OIV, TTB
- Direct and accurate means of °Brix determination, °Plato, °Balling, % Solids
- Use apparent density function for proper filling volume monitoring

## Flexible Method Management

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

Method Management		
NAME	TYPE	
AOAC Ethanol	Factory	ADD
Brix	Factory	EDIT
Crude Oil	Factory	RENAME
Density	Factory	DELETE
Density Continuous	Factory	VIEW
Density through Temperature	Factory	RESULTS
Density VC	Factory	PRINT CONFIGURATION
Factory QC Testing	Factory	CLOSE
Fuel Oil	Factory	
HCl	Custom	
Lubricants	Factory	
OIML Ethanol	Factory	

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:

- Concentration D<sub>2</sub>O – Heavy Water
- Mole Fraction of Methanol
- Baumé of Hydrochloric Acid
- % HNO<sub>3</sub>
- Normality of Sulfuric Acid
- Monomer Solutions
- Density of Gasses and Aerosols
- Potassium Permanganate
- Drug to Propellant Ratio
- Hydrogen Peroxide
- Lead Content
- Molar Solutions of EDTA
- ppm Gold in Acid
- SG of Urine
- % Toluene in Heptane
- Sweeteners
- Fat in Lubricant
- Sodium Hydroxide

Setting up your custom method is as simple as filling out a few screens like the one below.

Method Settings [Density]	
Measurement Mode	Single 1
Measurement Stability Criteria	FULL (+ or - 0.0000150 g/cm <sup>3</sup> for 30 secs with 5 decimals)
Temperature Stability Criteria	+/- 0.03 deg for 20 secs
Temperature	20.00 Deg C HEATED INTERFACE
Air Pump Switch off mode	Auto DEFAULT AUTO DRY Manual Timeout 0 secs
Density Input	Density NC
Sample Details	Sample Lot ID RESET
Product	YES
MEASUREMENT PARAMETERS DISPLAY PARAMETERS DISPLAY SETTINGS SAVE CANCEL	

# Full cGMP/GLP Compliance



## Versatile Communication Capability

The DDM 2911's standard communication package includes:

- Ethernet Port for Network Cable Connection
- 5 USB ports
- 2 RS 232 ports

Allowing the capability to:

- Export measurement results to a thumb drive, store it locally on the C:\ drive, or easily send data to any external PC, LIMS, SAP, etc.
- Print measurement results to any local or networked printer. Most all printers are supported by Windows 7(R) but if required the driver may be added
- Save measurement data direct to your Network/Server



## cGMP/GLP Printing

Sample measurement reports are edited quickly and easily. Just import your logo to the DDM 2911 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 2911 touch screen**

Rudolph Research Analytical  
55 Newburgh Road  
Hackettstown, NJ 07840 USA

Date: February 19, 2011

This sample was measured on DDM 2911 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	1.09803	1.1000	6.0092	19.95	12.94	14:20:50 PM
1	8421	1.09803	1.1000	6.0092	19.95	12.94	14:21:40 PM
1	8421	1.09803	1.1000	6.0092	19.95	12.94	14:22:30 PM
1	8421	1.09803	1.1000	6.0092	19.95	12.94	14:23:20 PM
1	8421	1.09803	1.1000	6.0092	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**

## NIST Traceable Calibration Standards

Rudolph knows how important it is to calibrate with Traceable Standards and therefore, we include either a NIST or UKAS standard in the accessories provided with your density meter. The DDM 2911 standard accessories include:

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

# The Simplicity of Touch Screen Measure

## Full Feature VideoView™ with Automatic Scanning of Entire U-Tube

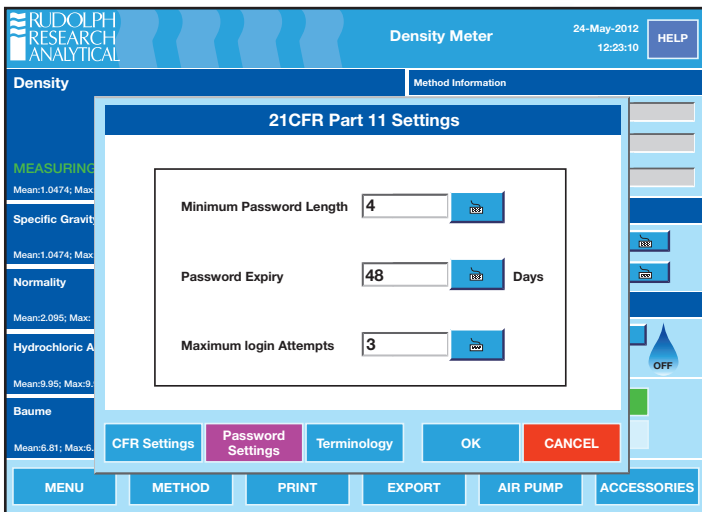
VideoView™ provides superior high resolution visual bubble detection within your samples with live on-screen video viewing. A full view of the entire U-tube is possible without any obstruction and provides a 10X magnification of bubbles if present in the sample. Automatic scanning of the entire length of the U-tube is possible as well as manually controlled viewing positions. The video clarity, magnification, and resolution is the very best available. Rudolph's exclusive VideoView™ is protected under Patent #7,437,909.



## Full 21CFR Part 11 Instrument Level Compliance

The DDM 2911's 21CFR Part 11 software module is easily enabled through the user friendly touch screen. This module gives you full compliance with:

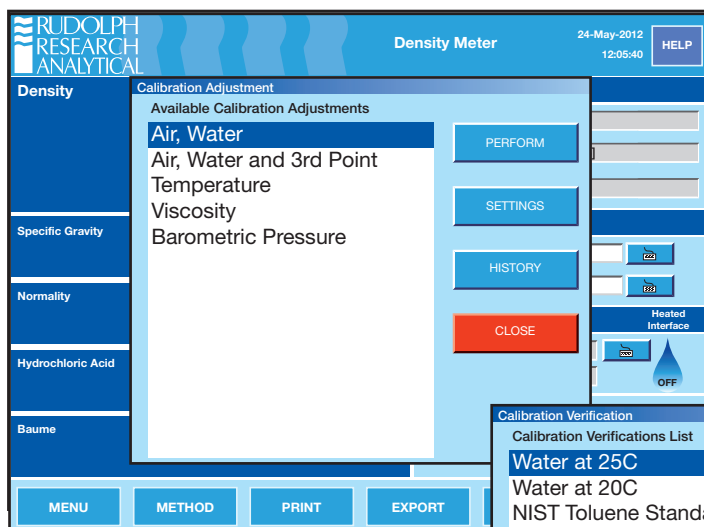
- Electronic signature
- Access levels
- Internal write protected storage
- Unique passwords
- Write protected documents sent directly to server



## Oscillating U-Tube with Viscosity Correction and Reference Oscillator (Patent # 7,735,353)

The DDM 2911'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.

# Compliance with the Flexibility of Windows®

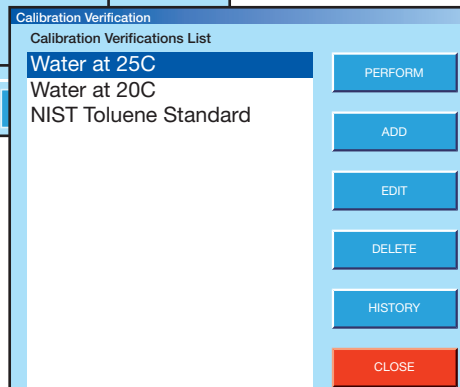


## cGMP/GLP Calibration

- Calibrate the DDM 2911 with 2 NIST 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 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 Calibration Verifications are due.

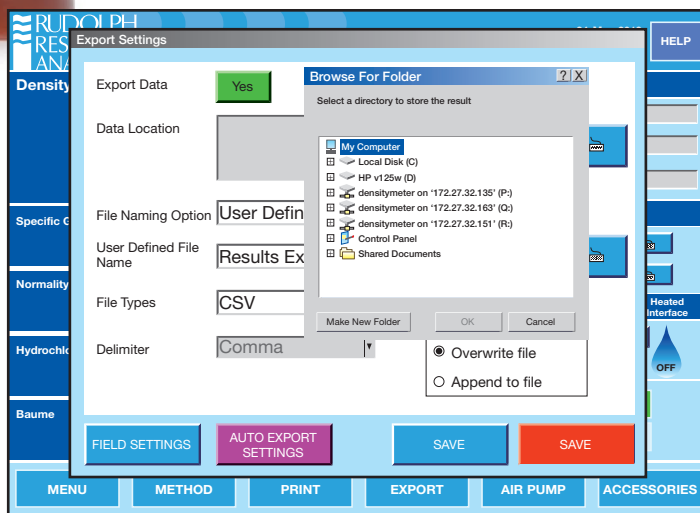


## Computer Windows Based Flexibility

- 8 gigabytes of internal memory allow almost unlimited capacity for saving measurement data. The DDM 2911 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 2911'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 2911's internal memory.

- Copy methods, transfer concentration tables, download data, etc., via the USB ports on the front of unit.
- Five USB ports allow for quick and easy connection to a mouse, keyboard, printer, bar code scanner, or memory stick.



## Automation Flexibility

- Rudolph's AutoSampler can be loaded with up to 240 samples
- Combine density and specific gravity measurements with a polarimeter, refractometer, pH meter and colorimeter for simultaneous measurements of:
  - Density, Specific Gravity
  - Optical Rotation / Specific Rotation
  - Refractive Index, Brix
  - pH
  - Color
- Up to three different rinse solvents available for use; fully programmable
- Two sample loading modes; pressurized and suction; for optimized 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.



# Specifications of the DDM 2911

<b>Measurement Ranges:</b>	<b>Density:</b> 0 to 3 g/cm <sup>3</sup> <b>Temperature:</b> 0 °C to 90 °C (controlled via Peltier) <b>Pressure:</b> 0 to 10 bars	<b>Display:</b>	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
<b>Measurement Modes:</b>	Continuous, Single, Multiple	<b>Communication Interface:</b>	Touch Screen User Interface, 5 – USB Ports, 2 – RS232 Ports, Ethernet Port for Network Connection, Keyboard Bar Code Scanner, Mouse, Network Capabilities
<b>Measurement Technique:</b>	Mechanical Oscillator Method	<b>Video Scanning &amp; Magnification:</b>	Video assisted view of entire cell, capable of 10X magnification with scanning camera
<b>Accuracy:</b>	<b>Density:</b> 0.00005 g/cm <sup>3</sup> <b>Temperature:</b> 0.03 °C	<b>Internal Memory:</b>	8 GB Non-removable Compact Flash
<b>Repeatability:</b>	<b>Density:</b> 0.00001 g/cm <sup>3</sup> <b>Temperature:</b> 0.01 °C	<b>Operating Dimensions:</b>	18.36" (L) x 11.80" (W) x 13.90" (H) 46.61 cm (L) x 29.97 cm (W) x 35.30 cm (H)
<b>Resolution:</b>	<b>Density:</b> 0.00001 g/cm <sup>3</sup> <b>Temperature:</b> 0.01 °C	<b>Shipping Dimensions:</b>	24.5" (L) x 17.5" (W) x 22" (H) 62cm (L) x 44cm (W) x 56cm (H)
<b>Minimum Sample Volume:</b>	Less than 1mL	<b>Shipping Weight:</b>	50 lbs. (23kg)
<b>Wetted Materials:</b>	Borosilicate glass, Teflon (PTFE, ECTFE)	<b>Power Supply:</b>	85 to 260 VAC; 48 to 62 Hz
<b>Operating System:</b>	Windows 7® Embedded; embedded software safe from malware and viruses	<b>Power Consumption:</b>	140 Watts at peak
		<b>Measurement Time:</b>	30 - 60 seconds
		<b>Origin of Manufacture and Design:</b>	USA

