Model 88C Resistivity Meter

Instruction Manual

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Fann Instrument Company

Model 88C Resistivity Meter Instruction Manual

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Table of Contents

List of Figures

List of Tables

1 Introduction

The Model 88C Resistivity Meter measures the resistivity of fluids, slurries, and semisolids according to API recommended practice. Field and laboratory personnel rely on this instrument to evaluate formation characteristics from electric logs. Resistivity is the ability of a material to resist conduction; conductivity is the reciprocal of resistivity.

1.1 Document Conventions

The following icons are used as necessary in this instruction manual.

NOTE. Notes emphasize additional information that may be useful to the reader.

CAUTION. Describes a situation or practice that requires operator awareness or action in order to avoid undesirable consequences.

MANDATORY ACTION. Gives directions that, if not observed, could result in loss of data or in damage to equipment.

WARNING! Describes an unsafe condition or practice that if not corrected, could result in personal injury or threat to health.

ELECTRICITY WARNING! Alerts the operator that there is risk of electric shock.

HOT SURFACE! Alerts the operator that there is a hot surface and that there is risk of getting burned if the surface is touched.

EXPLOSION RISK! Alerts the operator that there is risk of explosion.

2 Safety

Safe laboratory practices and procedures should be observed while operating and maintaining the Model 88C.

2.1 Battery Safety

On nine volt batteries, the positive and negative terminals are on the same end, next to each other. If these terminals touch anything metal, such as steel wool, coins, or a paper clip, a short circuit could occur, creating heat, sparks, a fire, or an explosion.

Nine volt batteries can explode if they are stored in a hot location, charged improperly, or if the terminals contact metal, creating a short circuit.

Some batteries contain toxic or corrosive material, which can leak if the battery is damaged.

- Store unused 9-volt batteries in their original packaging, a sealed plastic container, or securely cover both terminals to prevent short circuits.
- Do not charge rechargeable batteries before storing them.
- Store batteries at or below 70°F (21°C).

3 Features and Specifications

The Model 88C can measure resistivity in three ranges – 0.01 to 2, 0.1 to 20, and 1.0 to 200 ohm meters. The ohm-meter reading can be converted into parts per million sodium chloride (or equivalent calcium chloride, potassium chloride or other carbonate or hydroxyl salts) using the resistivity chart (Figure 4-1). This instrument can be operated by its own batteries or by a battery eliminator (P/N 101710234).

The Model 88C has these features:

- Direct digital readout in ohm-meters
- Built-in temperature probe
- Low battery indicator
- Test Button for calibration

Table 3-1 Resistivity Meter, Model 88C Specifications

Category	Specification
Meter Range	0.01 to 200 ohm-meters
Meter Dimensions (Height x Width x Length)	2.8 x 5.1 x 8.3 inches 7.1 x 13 x 21 centimeters
Carrying Case Dimensions (Height x Width x Length)	9 x 3.5 x 7.9 inches 22.9 x 8.9 x 20.1 centimeters
Weight	4 lb (1.8 kg)
Power Supply	4 x 9V alkaline batteries

Table 3-2 Range of Environmental Conditions

Maximum Altitude	6562 ft (2000 m)
Temperature Range	41°F to 104°F (5°C to 40°C)
Maximum Relative Humidity (RH)	80% RH at 87.8°F (31°C) or less 50% RH at 104°F (40°C)

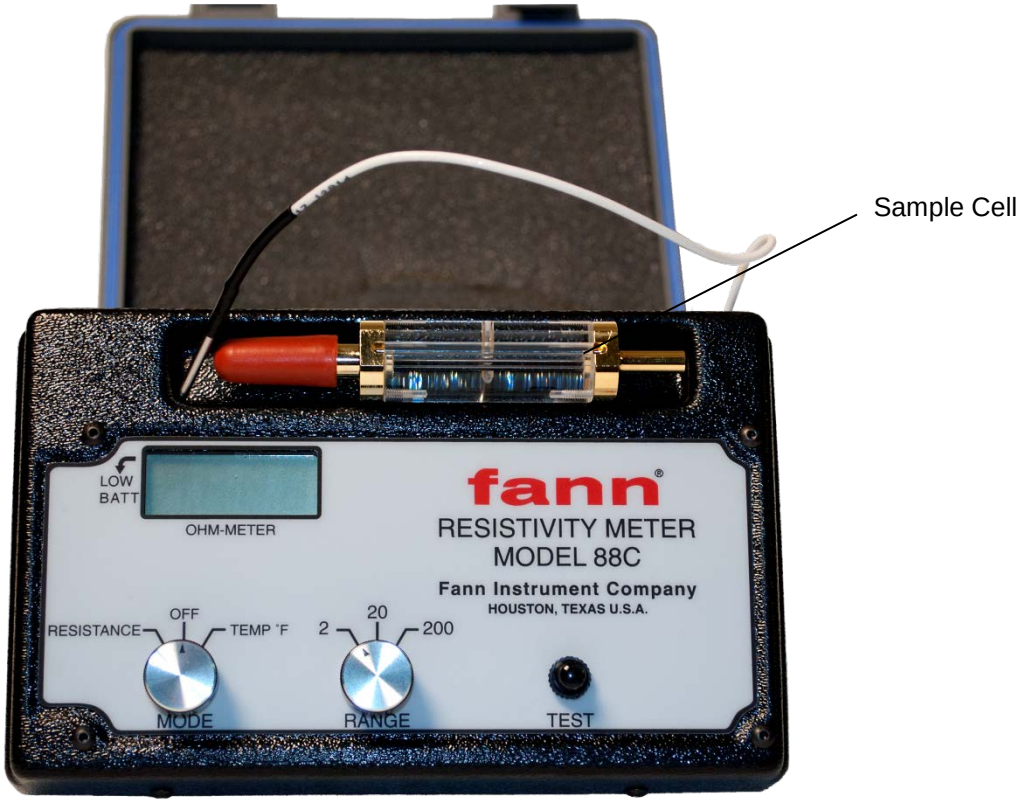

Figure 3-1 Resistivity Meter, Model 88C

4 Operation

The Model 88C Resistivity Meter can measure resistivity of fluid samples and semisolid samples (e.g., filter cakes or mud solids). Procedures for both types of samples are listed here.

The resistivity chart or nomograph (Figure 4-1) is used to determine the quantity of sodium chloride (in combination with distilled water or other salt-free aqueous medium) that is required to produce a solution with the same resistivity as the sample. The concentration for carbonate salts, calcium salts, and hydroxyl salts can be found in conductance tables for aqueous solutions.

4.1 Fluid Samples

This procedure explains how to measure resistivity of liquids, filtrates, and drilling fluids.

1. Remove the Sample Cell from the Resistivity Meter and fill it with the test sample. When filling the cell with filtrate, fill and discharge the sample several times before the final filling.

Make sure there are no bubbles in the sample.

2. Reattach the sample cell onto the pins on the meter.

3. Insert the temperature probe in the wall in the sample cell, set the MODE switch to TEMP and allow the temperature reading to stabilize. This will take at least three minutes if meter and sample are not at room temperature.

4. Set the MODE switch to RES, read and record the resistivity in ohmmeters.

5. Remove the sample cell and clean it with distilled water. If necessary, use a pipe cleaner and mild soap to clean the cell bore.

Do not use solvents to clean the cell.

6. Using the nomograph (Figure 4-1), convert the resistivity in ohm-meters to concentration of chlorides.

4.2 Semisolid Samples

This procedure explains how to measure resistivity of semisolid samples, such as filter cakes and mud solids.

1. Prepare samples of uniform moisture content.
2. Fill the slot on the outer surface of the cell completely with a semisolid sample.
3. Follow steps 2 through 6 from 4.1 Fluid Samples.

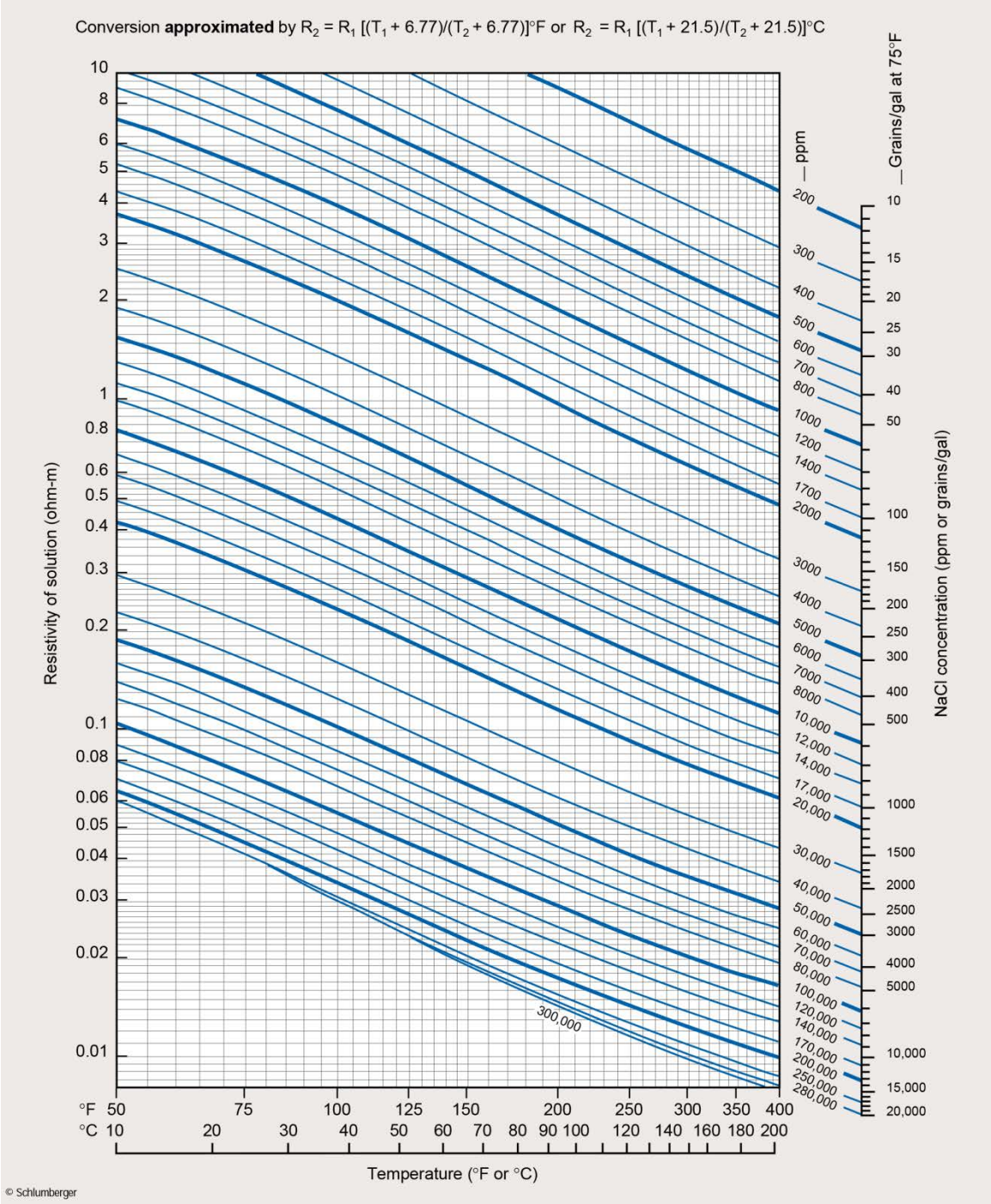

Figure 4-1 Resistivity Chart for NaCl Solutions

5 Troubleshooting and Maintenance

Calibration and regular maintenance procedures are described in this section. If more extensive maintenance or service of the instrument is required, please contact Fann Instrument Company.

5.1 Calibration

This procedure is a simple method for checking the instrument. A thorough calibration requires a calibration kit.

A calibration kit (P/N 210179) is available as a separate purchase. See the parts list for details.

1. Set the MODE knob to RESISTANCE.
2. Set the RANGE knob to 2.
3. Push and hold the TEST button.
4. Observe the reading. The reading should stabilize at 1.800 ± 0.040 ohm-meters. If the reading is not correct, low batteries may be the cause. Replace the batteries and repeat the calibration. If the reading is still not correct, then return the instrument for recalibration.

5.2 Battery Replacement

When the battery is low, the digital display will show an arrow pointing to LOW BATT. When the LOW BATT arrow appears, replace the complete set of four 9-volt batteries.

Lift the battery tray (back of the instrument) at the slot and pull the battery tray out. When inserting new batteries, make sure the battery terminals are placed as shown on the diagram in the tray.

If batteries are inserted incorrectly, they will become damaged.

A battery eliminator (P/N 101710234) is available as a separate purchase. See the parts list for details.

5.3 Cleaning

Always clean the cell immediately after making a measurement.

Do not use solvents to clean the cell.

Avoid scratching the surface of the cell.

1. Purge the cell with distilled water until it is clean.
2. If additional cleaning is necessary, use a pipe cleaner and mild soap.
3. After extensive use, follow these steps to thoroughly clean the cell.
   a. Soak the cell bore in cleaning solution (P/N 210181) for 2 to 3 hours.
   b. Scrub it with a pipe cleaner.
   c. Rinse with distilled water.
   d. Dry the cell with a clean pipe cleaner.

6 Parts List

Table 6-1 Model 88 Resistivity Meter Included Parts

Part No.	Quantity	Description
201057	2	BATTERY HOLDER, 9 VOLT
203623	1	CARRYING CASE
205643	4	BATTERY 9 VOLT
206724	2	KNOB 3/4 DIA X 5/8 HEIGHT w/ 2 SET SCREWS
207262	1	SAMPLE CELL
207263	2	PIN CONTACT MODEL 88C RESISTIVITY METER
207962	1	OVERLAY 88C RESISTIVITY METER
208571	1	JACK POWER PANEL MOUNT
208806	1	CIRCUIT BOARD ASSEMBLY AMPLIFIER 88
208807	1	BOOT SWITCH
204156	1	RED RUBBER BULB, 2ML CAPACITY

Table 6-2 Optional Equipment

Part No.	Description
210441	PIPE CLEANERS, 20/PKG
210179	RESISTIVITY CALIBRATION KIT*
210181	CLEANING SOLUTION, 4 OZ.
210182	STANDARD RESISTIVITY SOLUTION, 4 0Z.
101710234	BATTERY ELIMINATOR, 115/230V

*Calibration Kit includes pipe cleaners, cleaning solution, and standard resistance solution.

7 Warranty and Returns

7.1 Warranty

Fann Instrument Company warrants only title to the equipment, products and materials supplied and that the same are free from defects in workmanship and materials for one year from date of delivery. THERE ARE NO WARRANTIES, EXPRESS OR IMPLIED OF MERCHANTABILITY, FITNESS OR OTHERWISE BEYOND THOSE STATED IN THE IMMEDIATELY PRECEDING SENTENCE. Fann's sole liability and Customer's exclusive remedy in any cause of action (whether in contract, tort, breach of warranty or otherwise) arising out of the sale, lease or use of any equipment, products or materials is expressly limited to the replacement of such on their return to Fann or, at Fann's option, to the allowance to Customer of credit for the cost of such items. In no event shall Fann be liable for special, incidental, indirect, consequential or punitive damages. Notwithstanding any specification or description in its catalogs, literature or brochures of materials used in the manufacture of its products, Fann reserves the right to substitute other materials without notice. Fann does not warrant in any way equipment, products, and material not manufactured by Fann, and such will be sold only with the warranties, if any, that are given by the manufacturer thereof. Fann will only pass through to Customer the warranty granted to it by the manufacturer of such items.

7.2 Returns

For your protection, items being returned must be carefully packed to prevent damage in shipment and insured against possible damage or loss. Fann will not be responsible for damage resulting from careless or insufficient packing.

Before returning items for any reason, authorization must be obtained from Fann Instrument Company. When applying for authorization, please include information regarding the reason the items are to be returned.

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