



Advanced Digital Wettability Tester

#120-95

Instruction Manual

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Ver. 2

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Intro

Non-aqueous drilling fluids (NADF) leave an oil-wet residue on the formation that prevents cement from bonding. Spacers are often used to clean the formation surface before a cementing operation begins. Evaluating a spacer's ability to convert an oil-wet surface to water wet is necessary to ensure proper cement bonding.

The Advanced Digital Wettability Tester uses electrical resistance to determine the effects of adding water-wet spacers to oil-wet NADF. An overhead mixing blade stirs the fluid while electrodes measure resistance and temperature. As spacer is added, the change in resistance is graphed and recorded. This allows the user to compare the effectiveness of different spacers with different NADF.

Specifications

- Maximum Mixing Speed: 4000 rpm
- Maximum Temperature: 200°F (93°C)
- Input Voltage: 115/230 VAC, 50/60 Hz
- Size: 26" × 10.5" × 9" (66 × 27 × 23 cm)
- Weight: Approximately 30 lb (13.6 kg)

Components

#122-073-1 Fuse, 3 Amp, 5 mm × 20 mm

Testing



Tip

1. Mix the spacer you want to test.
2. Pour the spacer into the cup, making sure the contacts are fully submerged.
3. Place the cup onto the Wettability Tester, making sure the blade is fully submerged.
4. Connect the cup to the port on the side of the Wettability Tester.
5. On the touchscreen, enter temperature and motor setpoints.

If you are replicating a previous test, set the motor speed to the same speed as the previous test. Otherwise, set it high enough to maintain a small vortex.

6. Touch the Start Heating and Start Motor buttons.
7. Allow the temperature and mixing vortex to stabilize.
8. Touch the Tare button.
9. Touch the Stop Heating and Stop Motor buttons.
10. Remove the cup and pour the spacer into a suitable container.
11. Place the container on a heated stir plate to maintain temperature and mix.
12. Thoroughly clean the cup, blade, and shaft.
13. Mix an oil-based drilling fluid and measure 250 to 300 mL into a graduated cylinder.
14. Pour the drilling fluid into the cup. Make a note of the volume you added to the cup.
15. Place the cup onto the Wettability Tester, making sure the blade is fully submerged.
16. Connect the cup to the port on the side of the Wettability Tester.

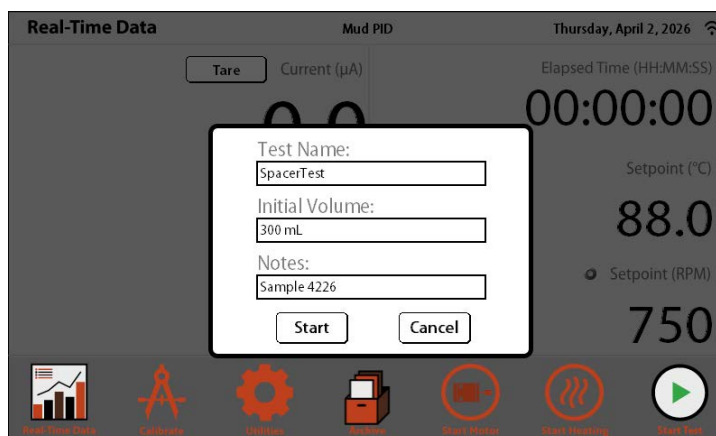


Note

17. Touch the Start Test button.

18. Enter a name for your test, the initial volume of drilling fluids, and any additional notes.

If you enter the initial volume, the software will use it to calculate the efficiency of the spacer.



19. Touch Start to start the test.



Note

At this point, the Current should be zero because oil-based drilling fluids do not conduct electricity.

20. Allow the temperature and mixing vortex to stabilize.

21. Using a large syringe, add a measured amount of spacer to the cup.

22. Touch the Add button.

23. Enter the volume of spacer you added and touch OK.



Note



Tip

After entering the volume of spacer added, the timers will control the mixing blade (see page 8) and the software will record a data point.

You can record a data point at any time by touching the Add button and entering zero for the volume added.

24. Observe the Current value.

25. Repeat steps 21 through 24 until the Current reaches the target for the test.

26. Once the test is finished, touch the Stop Test button. This will stop the heater and the motor.

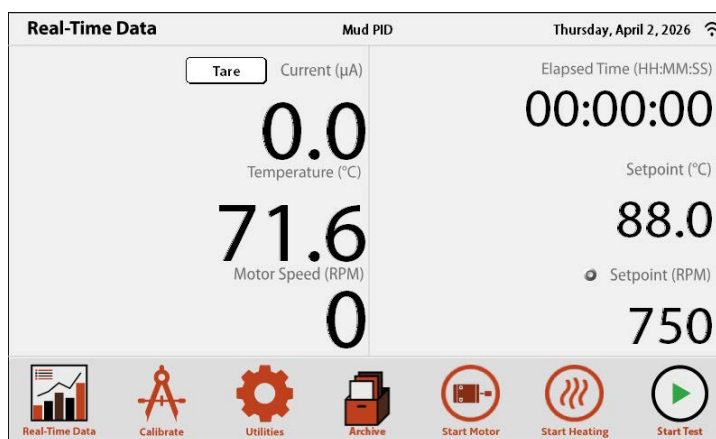
27. Remove the cup, pour out the fluid, and clean the cup, blade, and shaft.

Onboard Display

The Advanced Digital Wettability Tester features an onboard display. It provides access to test configuration and control, monitoring, data acquisition, and calibration. The display can be operated either as a touchscreen or with the control wheel.

To operate the display with the Control Wheel:

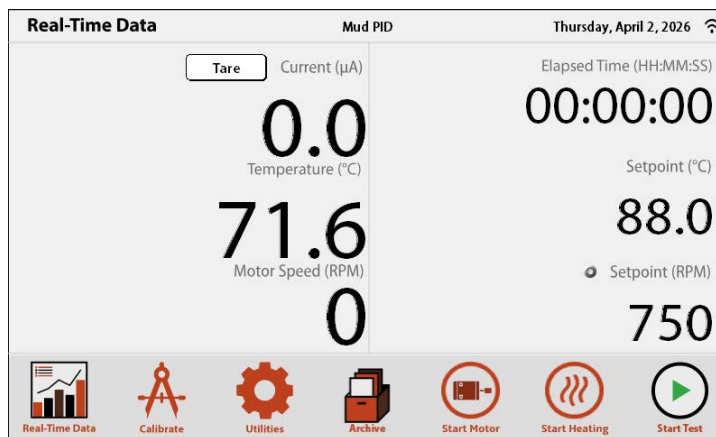
1. Turn the Control Wheel to scroll through the available parameters.
2. Press the Control Wheel to select a parameter.
3. Turn the Control Wheel to scroll through available values for the parameter.
4. Press the Control Wheel to select a value.



Onboard Display

Real-Time Data

The Real-Time Data screen is the default screen. Here you can see the current test parameters. At the bottom of the screen is a series of buttons that you can drag to scroll left or right.



The **Real-Time Data** button returns you to the main screen, which shows the Temperature, Temperature Setpoint, elapsed time, motor speed, and conductivity current.

The **Calibrate** button takes you to the Calibration screen where you can calibrate the instrument. See page 10 for more information.

The **Utilities** button takes you to the Utilities screen where you can set the date and time and configure the Wi-Fi and email functions.

The **Start Motor** button starts the motor. Press the **Stop Motor** button to stop the motor.

The **Start Heating** button starts heating the sample. Press **Stop Heating** to turn off the heaters.

The **Start Test** button starts a test. The system will start the heaters and motor and start recording data.

The **Graphs** screen shows you a graph of Current vs. either Volume (mL) or % Spacer.

Onboard Display

Utilities



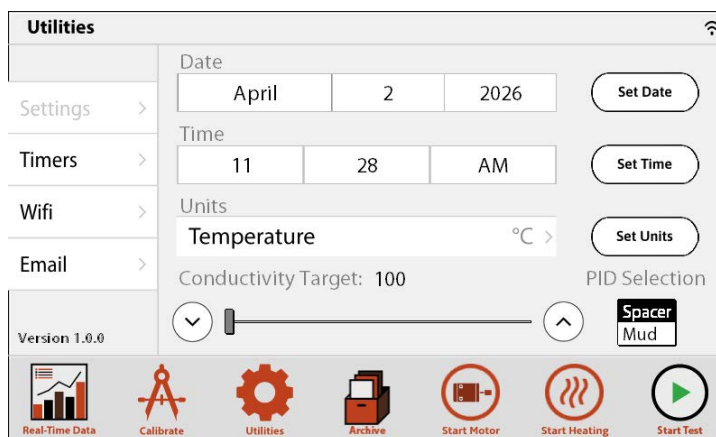
Note

In the Utilities screen you can configure basic settings, timers, Wi-Fi connectivity, and email notifications.

Settings

1. Touch the Month, Day, and Year to set the date. Then touch the Set Date button.
2. Touch the Hour, Minute, and AM/PM to set the time. Then touch the Set Time button.
3. Touch the temperature units to choose either °F or °C. Then touch the Set Units button.
4. Move the slider bar back and forth to set the Conductivity Target.

The Conductivity Target is an adjustable scale between zero and the tare point with the spacer.



Timers

The timers allow for a consistent conditioning sequence that is automatically run every time the “Add” button is pressed.

1. The system will not start graphing test data until all three timers are complete. Enter values for the following:
 - Initial Mix Time: Immediately after using the Add function, the motor will run for this duration.
 - Motor Pause Time: After the Initial Mix Time, the motor will stop for this duration.
 - Final Conditioning Time: After the Motor Pause Time, the motor will run for this duration. A data point will be recorded when this timer finishes.

These values can all be set to zero if your testing does not require automatic conditioning.

2. Touch the Save button.

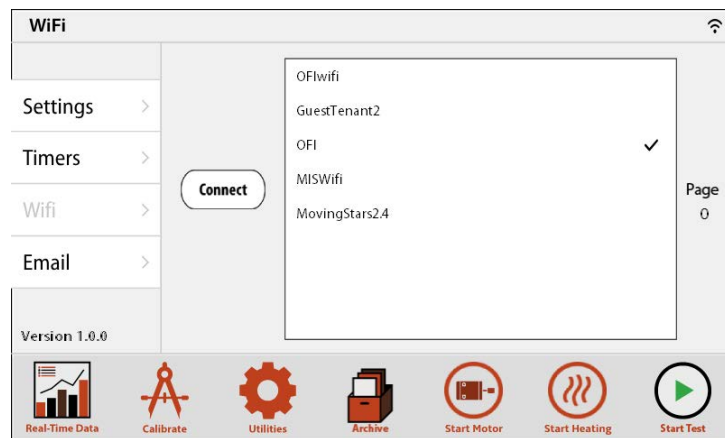
The screenshot displays the 'Timers' configuration window. On the left is a sidebar with 'Settings', 'Timers', 'Wifi', and 'Email' options, each with a right-pointing arrow. Below these is 'Version 1.0.0'. The main area contains three time settings, each with a text label and a numeric input field: 'Initial Mix Time' (00:30), 'Motor Pause Time' (00:30), and 'Final Conditioning Time' (00:30). A 'SAVE' button is positioned to the right of the 'Final Conditioning Time' input. At the bottom, a horizontal bar contains seven icons with labels: 'Real-Time Data' (bar chart), 'Calibrate' (compass), 'Utilities' (gear), 'Archive' (box), 'Start Motor' (motor icon), 'Start Heating' (flame icon), and 'Start Test' (play button icon).



Wi-Fi

1. Give the system a few seconds to find all Wi-Fi networks in the area.
2. Touch the appropriate network and touch Connect.
3. Enter the password.

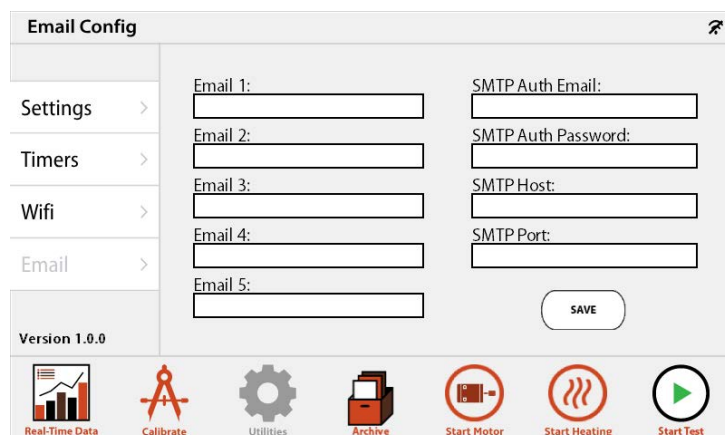
If you are connecting to an enterprise network, the screen will prompt you for the username and password. The username must include the domain. For example: DOMAIN\UserName. The username and password fields are case sensitive.



Email

The system can send you an email when a test is complete if you are connected to Wi-Fi and you have entered the information below.

1. Enter at least one (up to five) email addresses.
2. Enter the SMTP email address, password, host, and port. Contact your network administrator for this information.
3. Touch Save.



Calibration

On the Calibration screen you can verify the Temperature and Motor readings. A full calibration is not necessary unless part of the equipment (thermocouple or motor) is replaced. In that case, contact OFITE for assistance with calibration.

For reporting purposes, you can enter the actual values (either from the Reading field or from an external device, like a thermometer) in the fields next to each setpoint. Then touch the Save File then Email File buttons.

Temperature

1. Pour the water into the cup, making sure the contacts are fully submerged.
2. Place the cup onto the Wettability Tester, making sure the blade is fully submerged.
3. Connect the cup to the port on the side of the Wettability Tester.
4. Touch the Calibrate icon at the bottom of the screen.
5. Touch the Verification button.
6. Touch the Temperature tab on the left-hand side of the screen.

Calibration Verification	
Ambient	
Temperature >	72.3
Motor >	
Blade Weight >	
Save to File	
Email File	
140°F	Change SP
185°F	Change SP
Setpoint [F]	185
Reading [F]	185.3

7. Observe the value in the Reading field. This value should match the ambient temperature in the lab.
8. Touch the Change SP button next to the 140°F field. This will set the temperature setpoint to 140°F.
9. Wait for the temperature to stabilize.
10. Observe the reading. Confirm it matches the setpoint.
11. Repeat this process with the 185°F setpoint.

Motor

1. Touch the Calibrate icon at the bottom of the screen.
2. Touch the Verification button.
3. Touch the Motor tab on the left-hand side of the screen.
4. Touch each of the Change SP buttons, verifying that the Reading value matches the setpoint.

The screenshot shows the 'Calibration Verification' screen with the 'Motor' tab selected. On the left, there is a sidebar with 'Temperature', 'Motor', and 'Blade Weight' tabs, along with 'Save to File' and 'Email File' buttons. The main area displays three RPM settings: 500 RPM (value 501), 1000 RPM (value 1000), and 2000 RPM (value 1999). Each has a 'Change SP' button. On the right, there are fields for 'Setpoint [RPM]' (2000) and 'Reading [RPM]' (2002). The bottom navigation bar includes icons for Real-Time Data, Calibrate, Utilities, Archive, Start Motor, Start Heating, and Start Test.

Blade Weight

1. Touch the Calibrate icon at the bottom of the screen.
2. Touch the Verification button.
3. Touch the Blade Weight button on the left-hand side of the screen.
4. If you are adding a new blade, enter the weight in the Initial Weight field and touch the Set Initial button.
5. If you are weighing an existing blade, enter the weight in the Current Weight field and touch the Set Current button.

The screenshot shows the 'Calibration Verification' screen with the 'Blade Weight' tab selected. The sidebar on the left remains the same. The main area features two columns: 'Initial Weight' and 'Current Weight', both with input fields set to '0.0'. Below each input field is a 'Date Set:' label with 'Not Set' underneath. At the bottom of each column are 'Set Initial' and 'Set Current' buttons respectively. The bottom navigation bar is identical to the previous screen.

Warranty and Return Policy

Warranty:

OFI Testing Equipment, Inc. (OFITE) warrants that the products shall be free from liens and defects in title, and shall conform in all respects to the terms of the sales order and the specifications applicable to the products. All products shall be furnished subject to OFITE's standard manufacturing variations and practices. Unless the warranty period is otherwise extended in writing, the following warranty shall apply: if, at any time prior to twelve (12) months from the date of invoice, the products, or any part thereof, do not conform to these warranties or to the specifications applicable thereto, and OFITE is so notified in writing upon discovery, OFITE shall promptly repair or replace the defective products. Notwithstanding the foregoing, OFITE's warranty obligations shall not extend to any use by the buyer of the products in conditions more severe than OFITE's recommendations, nor to any defects which were visually observable by the buyer but which are not promptly brought to OFITE's attention.

In the event that the buyer has purchased installation and commissioning services on applicable products, the above warranty shall extend for an additional period of twelve (12) months from the date of the original warranty expiration for such products.

In the event that OFITE is requested to provide customized research and development for the buyer, OFITE shall use its best efforts but makes no guarantees to the buyer that any products will be provided.

OFITE makes no other warranties or guarantees to the buyer, either express or implied, and the warranties provided in this clause shall be exclusive of any other warranties including ANY IMPLIED OR STATUTORY WARRANTIES OF FITNESS FOR PURPOSE, MERCHANTABILITY, AND OTHER STATUTORY REMEDIES WHICH ARE WAIVED.

This limited warranty does not cover any losses or damages that occur as a result of:

- Improper installation or maintenance of the products
- Misuse
- Neglect
- Adjustment by non-authorized sources
- Improper environment
- Excessive or inadequate heating or air conditioning or electrical power failures, surges, or other irregularities
- Equipment, products, or material not manufactured by OFITE
- Firmware or hardware that have been modified or altered by a third party
- Consumable parts (bearings, accessories, etc.)

Returns and Repairs:

Items being returned must be carefully packaged to prevent damage in shipment and insured against possible damage or loss. OFITE will not be responsible for equipment damaged due to insufficient packaging.

Any non-defective items returned to OFITE within ninety (90) days of invoice are subject to a 15% restocking fee. Items returned must be received by OFITE in original condition for it to be accepted. Reagents and special order items will not be accepted for return or refund.

OFITE employs experienced personnel to service and repair equipment manufactured by us, as well as other companies. To help expedite the repair process, please include a repair form with all equipment sent to OFITE for repair. Be sure to include your name, company name, phone number, email address, detailed description of work to be done, purchase order number, and a shipping address for returning the equipment. All repairs performed as "repair as needed" are subject to the ninety (90) day limited warranty. All "Certified Repairs" are subject to the twelve (12) month limited warranty.

Returns and potential warranty repairs require a Return Material Authorization (RMA) number. An RMA form is available from your sales or service representative.

Please ship all equipment (with the RMA number for returns or warranty repairs) to the following address:

OFI Testing Equipment, Inc.
Attn: Repair Department
11302 Steeplecrest Dr.
Houston, TX 77065
USA

OFITE also offers competitive service contracts for repairing and/or maintaining your lab equipment, including equipment from other manufacturers. For more information about our technical support and repair services, please contact techservice@ofite.com.