

# microFET 2™



microFET2 User Guide

Congratulations on becoming the proud owner of the new microFET2 with wireless technology, Hoggan Scientific LLC highly renowned handheld digital muscle tester. The microFET2 is the cornerstone of Hoggan's highly functional and innovative medical products group, and is the most widely recognized muscle tester on the market today. The new microFET2 wireless allows muscle testing to be done FREE of cords in conjunction with microFET clinical patient software. This provides freedom and ease of use performing muscle tests.

Hoggan has been creating innovative solutions for accurate, objective measurement since 1984, with the introduction of the original FET muscle tester. Over the past 20 + years, our product line has expanded to include inclinometers, grip and pinch gauges, and innovative ergonomic measurement instruments.

During that time, Hoggan's products have developed reputation for innovation, excellent quality, ease of use, and long lasting accuracy and reliability. Our highly satisfied customers include hospitals, universities, clinics and research institutions worldwide. The microFET products have been used by organizations as diverse as NASA, the Shands Institute, the US Olympics and professional sports teams.

At Hoggan, we are constantly improving our products to better meet your needs. Besides the addition of the new wireless technology incorporated into the microFET line of products, we've added some important new features to the microFET2. You can now measure forces up to 300 lbs and select the unit of measure to read out in lbs, Newtons, or KGF.

We understand the value of customer feedback. Our customers provide us with many of our best product improvement ideas, as well as interesting new measurement applications. As you have comments and suggestions, we'd love to hear from you. Please e-mail us at [contact@hogganhealth.net](mailto:contact@hogganhealth.net).

In the meantime, we hope you enjoy using your microFET2 with new wireless technology immediately, and for many years to come. For more information on all of our innovative medical, ergonomic and fitness products, please visit us at [www.hogganhealth.net](http://www.hogganhealth.net).

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## **microFET2 Wireless Overview**

The microFET2 is an accurate, portable Force Evaluation and Testing (FET) dynamometer, designed specifically for taking objective, reliable, and quantifiable muscle testing measurements. Modern adaptation of the time tested art of "hands on" manual muscle testing, the microFET2 aids in diagnosis, prognosis and treatment of neuromuscular and musculoskeletal disorders.

The newly updated microFET2 Wireless with radio frequency technology provides convenience for both you and your patients. The wireless microFET2, when used with HOGGAN microFET clinical software, alleviates the inconvenience of being wired to the computer and provides easier interaction with patients. A wireless instrument allows greater freedom in the exam room or testing area, and eliminates dictating the location of the computer and length of instrument cable so you can move freely during testing.

This unique, handheld device is battery operated, weighs less than 1 pound, and is ergonomically designed to fit comfortably in the palm of your hand. microFET2 uses sophisticated digital technology to achieve its high degree of accuracy and reliability. Strain gauge elements within the transducer react independently to measure external forces from multiple angles. This system enables the gauge to detect even subtle changes in force, regardless of the direction that the force is applied.

Information from the gauge is displayed in two LCD windows, Peak Force, and Duration/Sec. During the test, the Peak Force LCD shows the force being applied against the transducer pad, and at the conclusion of the test, the LCD displays the maximum force reached. Duration/Secs shows the elapsed time of the test from the time the testing threshold was crossed until the test was concluded.

The microFET2 was designed to be a standalone gauge for capturing individual force measurements for any muscle test. However, the gauge can also be attached to Hoggan Scientifics muscle testing software to increase your evaluation and documentation capability.

## What is Included:

- . microFET2 wireless digital dynamometer
- . Flat Transducer pad
- . Large Curved Transducer pad
- . Digit Transducer pad
- . Muscle Testing Positions wall chart
- . Upper Body test recording tablet
- . Lower Body test recording tablet
- . User Guide
- . Product/Warranty card
- . Calibration certificate
- . Carrying Case
- . LI-ion Batteries, Charger included
- . Optional – Bluetooth / FET Stick (Included with software when software ordered)

## Specifications:

- . Weight: 1 lb.
- . Power Source: 3.7V - 1/2AA LI-ion batteries
- . Controls: On/Off, Reset, Threshold
- . Operating Temperature: 52 92 (11 33 C)
- . Humidity: 60/80% non-condensing
- . Capacity: 300 lbs (660 Newtons)
- . Test Range:
  - Low Threshold 0.8 lbs to 300 lbs in 0.1 lb increments Metric Newtons: 3.6N 1320N in 0.4N increments KGF (kilograms force): 0.4kgf to 135kgf in .1kgf increments
  - High Threshold 3.0 lbs to 300 lbs in 0.1 lb increments Metric Newtons: 12.1N to 1320N in 0.4N increments KGF: 0.4kgf to 135kgf in 0.1 increments
- . Accuracy: Within 1%
- . Data Storage Stores 30 most recent tests.



## Care and Cleaning

Your microFET2 is built to provide long lasting, reliable service. As with any precision instrument, it should be used with care. It should not be dropped, banged against hard surfaces, or used as scale.

The microFET2's exterior surface can be cleaned with damp soft cloth. Small amount of household spray cleaner can be used. Any cleaner residue should be removed with soft cloth dampened with clean water. We recommend that you periodically inspect your unit for wear, and proper functioning.

## Calibration

The microFET2 comes with calibration certificate, ensuring that the unit was properly calibrated at the time of shipment. To ensure continued accuracy and reliability your microFET2 unit should be recalibrated annually, by properly authorized service technician.

## Transporting microFET2

Hoggan Scientific strongly recommends that you store and transport the microFET2 in the hard sided protective carrying case provided.

## Operating Features

### On/Off Switch

The On/Off switch slides left and right to turn the unit on and off. Even though the microFET2 is equipped with Sleep Mode battery saver feature, we recommend that the unit be turned off when not in use. Refer to Image A for Power On/Off Switch.

### Sleep Mode

If your unit is left on for approximately 3 minutes or more, your unit will go into Sleep Mode to preserve battery life. To take the unit out of Sleep Mode, it can be awakened by turning the power off for at least five minutes, or by pressing the Reset button.

### Reset Button

The reset button activates the microFET2. It can also be used to clear the displays and to reinitialize the unit. Reset may be necessary to wake up the gauge from sleep mode, or to clear occasional stray readings caused by static discharge. Refer to Image A for location of Reset Button.

It is not necessary to press reset after each test. The microFET2 automatically begins recording new data when the force threshold is crossed.



Image A

## Threshold Button

Threshold refers to the amount of force required before the microFET2 begins recording test data. The threshold level can be set to either High or Low setting, and is displayed in the duration/force window. Refer to Image A for Threshold Button location.

### High Threshold

The High Threshold is most commonly used. In the High setting, three pounds of force must be exerted before microFET2 begins recording test data. The High threshold allows for easier placement of the unit, and reduces false starts. High threshold displays force in 0.1 lb increments (.44N) during testing. Begins recording test data at 3.0 lbs force (12.1N) Records data in 0.1 lb increments up to 300 lbs (.44N increments to 1320N) Pressing Reset does not change the threshold setting

### Low Threshold

The Low threshold setting is designed for more sensitive, lower force readings such as when testing finger and hand muscle weakness. Greater care must be used when positioning the unit while in the Low setting, as the threshold of 0.8 lbs (3.6 N) is easily crossed. Begins recording test data at 0.8 lbs (3.6N) Records data in 0.1 lb increments up to 300 lbs (0.44 increments to 1320N) Pressing Reset does not change the threshold setting.

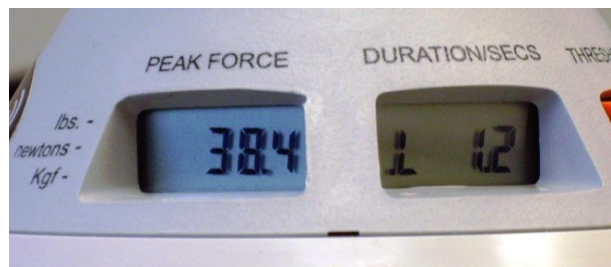
## LCD Windows

### Peak Force

During testing, the Peak Force LCD displays the actual force being applied to the transducer pad. At test completion, the maximum force value (peak force) is displayed. Refer to Image B.

### Duration/Sec.

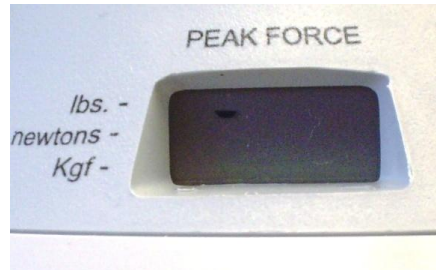
The Duration/Sec. LCD window shows the elapsed time (in tenths of second) from the time the force threshold was crossed until pressure was released. Monitoring test duration is an important element in maintaining consistency between tests. Also displayed in the Duration/Sec. window is the threshold setting (Low or High). Refer to Image B.



**Image B**

## Force Measurement Settings

You may choose the unit of measure, (lbs, Newtons, KGF) by putting the microFET2 in the Force Measurement mode press and hold the Threshold button for five seconds, the display will go blank only showing hash mark for the unit of measurement currently chosen. Press the Threshold button to toggle through options. Press the Reset button to return to test mode. Refer to Image C.



**Image C**

## Wireless Mode - Power On/Off

To turn on or set the microFET2 to RF mode for use with software:

1. Hold the threshold button down for 5 seconds for the force measurement setting mode.
2. Continue to hold the threshold button down for another 5 seconds to turn on the wireless power.
3. The Peak Force display will show RF (wireless), and the Duration/Secs display will show On or Off.
4. Press the threshold button to toggle the RF (wireless) power on or off. Toggle on for use with software.

Refer to Image D for RF and On/Off display for wireless mode.



**Image D**



### Bluetooth / FET Stick

Included with your microFET2 is a Bluetooth / FET Stick . Refer to Image F. The FET stick is needed when the microFET2 is used with software for testing. The FET stick is included when a software CD disk ordered. Instructions for using the FET stick are included with your software purchase.

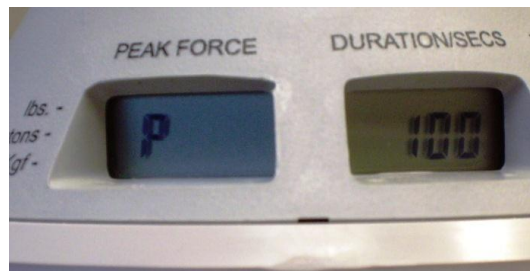


**Image F**

### Battery Check

The microFET2 batteries are rated for 300 hours of operating use. The life of the batteries may vary depending on your usage pattern. To help you identify when the batteries will need replacement, microFET2 is equipped with "power check" feature to allow you to see remaining battery power. To conduct power check, follow these four steps.

1. Put the unit into data retrieval mode, hold down the Threshold Button then click the reset button.
2. Press on the Threshold Button for five seconds. The unit will then display in the peak force LCD display indicating Power Check, and number from 1 to 100 in the Duration/Secs LCD display indicating the percent of power remaining in the batteries. Refer to Image G.



**Image G**

3. The unit will return to data retrieval mode after five seconds. To access again, press the threshold button again for five seconds.
4. To return to test mode, press the reset button.

## **Battery Saver/Sleep Mode**

The microFET2's self activating 'sleep' mode is designed to extend battery life. The microFET2 goes to sleep when the unit has not received any input for three minutes. The unit can be 'awakened' from sleep mode by: Pressing the Reset button, or Turning the unit off for five minutes or more.

NOTE: When using microFET2 RF with FET stick and software: if the microFET2 has not received any input for three minutes or crossed the threshold setting, "sleep" mode will activate and signal transmission will stop. Simply press the reset button and the signal will start transmitting again.

The microFET2 batteries are designed to provide constant power throughout the battery life. As result, performance declines rapidly in the last few percent of battery life. To avoid any interruption of testing capability, due to low battery power, Hoggan Scientific recommends you re-charge batteries when the power check reading reaches approximately 15%. Replacement batteries can be ordered through Hoggan Scientific customer service department at 800-678-7888, or you may order online at [www.hogganhealth.net](http://www.hogganhealth.net)

## **microFET2 Muscle Testing**

Muscle testing was designed to identify and objectively document muscle weakness, or impairment, rather than muscle strength. The major advantages of muscle testing using handheld dynamometers compared to the traditional method are the objectivity of the measurements and the consistency of results as measured by both single testers over multiple tests, and across multiple testers.

During manual muscle testing the clinician normally assigns value to the test result (without the microFET2), such as 15, or good fair poor, depending on how much force the clinician estimated that the patient exerted. Problems arise however, in attempting to assign consistent scores based on feel, especially when the patient is retested at later date.

The microFET2 was developed to eliminate the subjective nature of testing by giving clear, accurate, objective, quantified force measurements. The microFET2 increases testing reliability and accuracy. As result, microFET2 makes manual muscle testing more reliable diagnostic tool.

The microFET2 is designed to be used with either the "make" or the "break" form of manual muscle testing.

"Make" testing is performed by the clinician positioning the patient to isolate and contract the muscle, and by carefully placing the device in the proper position and angle to conduct the test. With the "Make" test, the clinician gets into "power position" a stable position that will provide the clinician the maximum ability to resist the force applied by the patient. The clinician instructs the patient to apply force against the device, while the clinician resists. The object of the test is for the patient to exert or "make" the maximum force he is capable of, using only the muscle being tested. "Make" tests typically run for seconds (slow count of 4). Many people find it helpful to start the test by announcing "go" and end the test by stating "relax".

"Break" testing is also performed by carefully positioning the patient and the device. The clinician stabilizes the patient in the isolated position, with one hand, while placing the microFET2 unit in position to exert force against the limb associated with the muscle. The test begins with the clinician gradually applying force and the patient trying to resist. The object of the test is for the clinician to overcome, or "break" the patient's resistance.

Multiple published studies have proven manual muscle testing to provide consistent, reliable results, both across multiple tests by single tester, and across multiple testers. The keys to achieving valid results are proper patient and device positioning, and consistency of the testing methodology used.



**Examples of Muscle Tests**

Several noted clinicians and researchers have attempted to document muscle testing norms for specific patient populations. For example, see: Bohannon, Richard W: Reference Values for Extremity Muscle Strength Obtained by HandHeld Dynamometry from Adults aged 20 to 79 Years. **Arch Phys Med Rehabil, Vol. 78, January 1997**). The general conclusion from these studies is that norms for healthy adult populations can be determined, within broad ranges, with gender, age, and weight being the strongest predictors of muscle strength. It is important to note, however, that norms are provided with fairly wide standard deviations. Only individuals whose muscle strength falls more than two standard deviations below the norm can conclusively be considered 'impaired'.

However, these conclusions cannot be extended beyond the youngest or oldest ranges of the adult populations tested. For example, research conducted on grade school children determined that developmental differences between individual children were much bigger factor in determining muscle strength than were age or size.

The most relevant norm for Muscle Testing measures is the patient himself; through his/her identification of change from what has been his personal norm, left/right comparisons, and progress tracking over time.

For best results, when using the microFET2, be sure to install the proper attachment for the area of the body being tested: large pad for flat surfaces, curved pad for rounded surfaces, and digit pad for fingers and toes. Check to ensure that the unit is properly positioned for maximum surface area contact and direct force application.

The microFET2 is ambidextrous. It can be held in either the left or right hand, or you may switch hands from test to test, depending on stabilization requirements.

For information on positions and manual muscle testing for main muscle groups, refer to the Manual Muscle Testing Positions Wall Chart included with your microFET2. For additional clarification or how to test for additional muscle test positions, refer to manuals such as Daniels and Worthingham



**Example of Muscle Test**

## Recording and Retrieving Test Data

The microFET2 is designed to store and retrieve results for the 30 most recent tests.

In test mode, results are displayed for the most recent test only. Results for each new test, peak force, and duration, will be displayed as soon as the test is completed, replacing results from the previous test.

1. To put the unit in data retrieval mode hold down the Threshold button and then click the Reset button once.

The unit will display peak force in the peak force LCD display. The number (representing the most recent test performed) on the left hand side of the duration/secs LCD display, and test duration in the right hand side of the duration/secs display. Refer to Image H.



**Image H**

In data retrieval mode, test duration displays in the following ways

1. A decimal point appears in the display for of .1 to 9.9 seconds (tenths of seconds).
2. No decimal point will appear for tests of 10 seconds to 99 seconds (whole seconds).

To scroll through test results, press the Threshold button. The unit will display new peak force, the number representing the 2nd most recent test, and test duration for the test displayed.

Each time you press the Threshold button, the unit will move backward to the previous test, up to total of 30 tests.

30 tests will be stored as long as the unit has battery power. Turning off the unit, or allowing the unit to go to sleep mode will not affect the stored results. However, the 31st test will bump the oldest test. At that point, the oldest test(s) will no longer be retrievable.

3. To return to test mode press the reset button the unit will display peak force of 0.0, L or H, indicating low or high threshold, and duration/secs of .0, you can enter data retrieval mode at any time, by holding down the Threshold button, and then pressing the Reset button. The unit will display the most recent test results.

Included with your microFET2 are (2) test record tablets. Sheets in the tablets provide space for identifying the muscle test performed, the peak force achieved, and the test duration. Additional tablets can be ordered through Hoggan Scientific LLC customer service at 800-678-7888.

The microFET2 was designed as standalone gauge for simple measurements. However, with newly incorporated wireless, the unit allows you the option to use microFET2, cord free, with Hoggan Scientific muscle testing software or research software. Using software will increase your evaluation, documentation and research capability.

## **Low Batteries**

Fading LCD displays and unlit segments of the LCD are indications that the microFET2's battery power may be low. If LCD segments remain unlit after pressing Reset, the batteries should be changed.

To avoid testing interruptions due to low battery power, we recommend that you check remaining battery power regularly, and re-charge batteries when they reach approximately 15% power level. To check battery power, follow the battery check instructions on page 8.

## **Changing Batteries**

The microFET2 uses (2) 3.7V 1/2AA LI-ion batteries, (rechargeable) for compact placement, and long life. These batteries can be purchased from Hoggan Scientific LLC. To change the battery, remove the attachment from the main unit. Carefully remove the batteries from their holders. When installing new batteries, make sure the positive (+) posts align with the (+) marks on the microFET2 body. If segments do not light up after installing new batteries, please contact Hoggan Scientific LLC Customer Service Department at 800-678-7888.

## **Warranty**

### **Product Warranty Information**

The microFET2 is warranted for period of one year from the time of purchase. If the microFET2 fails to operate because of defect in materials or workmanship at any time within one year of the purchase date, it will be repaired or replaced free of charge by Hoggan Scientific LLC. Extended warranties (extra year or years) are available at an additional nominal fee.

If you wish to purchase and extended warranty after the purchase of your microFET2, there is a 30 grace period to purchase an extended warranty package. Contact Hoggan Scientific for more information.

### **Warranty Registration**

To ensure your warranty is in force, please complete and mail, or fax your warranty card to Hoggan Scientific LLC at 800-915-3439. Or visit [www.hogganhealth.net](http://www.hogganhealth.net) to register your warranty information online. Please save proof of your original purchase date, such as your sales slip, invoice, credit card voucher, or cancelled check to establish the warranty period.

### **Warranty Repairs**

Before deciding that your microFET2 is inoperable or defective, please review and follow the information in this instruction booklet.

In the unlikely event your microFET2 becomes inoperable, please contact Hoggan Scientific to arrange to have the equipment repaired or replaced. Hoggan reserves the right to repair or replace the unit with new or refurbished parts or equipment.

Hoggan's Customer Service Department can be contacted at 800-678-7888, or by email at [contact@hogganhealth.net](mailto:contact@hogganhealth.net).

When Hoggan Customer Service Representative authorizes return of the product, you will be given Return Merchandise Authorization (RMA) number. Please include the RMA number with your unit.

## **Warranty Exclusions and Limitations**

The microFET2 warranty does not cover damage by negligence, misuse, or accident. Damage or unit failure caused by modifications or repair other than by Hoggan or its authorized repair agent, or damage to equipment resulting from improper installation or operation is not covered. Any warning or instructional labels or decals must remain on the unit for the warranty to be valid.

This warranty applies to the original purchaser. Some states do not allow the exclusion or limitation of incidental or consequential damages, in which case the exclusions and limitations may not apply. This warranty gives specific legal rights, and may also have other rights, which vary from state to state. To determine the legal rights in your state, consult your local or state consumer affairs office or State Attorney General.

## **Customer Service Repairs**

Customer satisfaction is important to Hoggan. We are happy to assist with questions, problems or service issues on any Hoggan products you may own. Our business has grown on the basis of excellent product quality and customer satisfaction. Our fulltime customer service representatives are available from 7:00 am to 4:30 pm MST at 800-678-7888 to meet your needs. You can also contact Hoggan Scientific online regarding your customer service issue or calibration by e-mailing us at [contact@hogganhealth.net](mailto:contact@hogganhealth.net).

Any repairs to the microFET2 unit should be completed by qualified service technician.

## **Ordering Replacement Parts**

Hoggan Products are manufactured to exacting specifications. When replacing worn or damaged parts, use only original 'Hoggan' manufactured parts. The use of substitute or unauthorized parts will void your warranty and may increase the possibility of injury to the user, or cause additional damage to the unit.

When ordering Replacement Parts, please take the unit out of service, and complete the following:

1. Identify the brand, model, and serial number, and note the unit's function.
2. Identify and document the problem and the worn or missing parts.
3. Contact Hoggan Scientific LLC. Replacement parts (attachments) will be shipped directly from Hoggan.

All repair services will be performed at Hoggan Scientific LLC Manufacturing plant.

\*Except for replacing batteries, do not attempt to repair the unit on your own. This will void all warranties. microFET batteries, replacement parts and Preferred Service Contracts can be ordered either by calling Hoggan Scientific LLC or order online at [www.hogganhealth.net](http://www.hogganhealth.net).

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