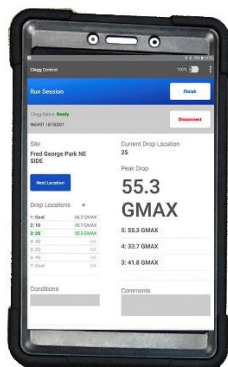


Clegg Impact Soil Tester 0.5 kg - 0-500 g unit **with Clegg Control App for Android** **Setup and Instruction Manual**

V-8.0



Now with Bluetooth connection capability to the FieldScout TDR350 for natural grass surfaces



Now with Bluetooth connection capability to the Mascaro Infill and Cleat Depth Tester for synthetic turf surfaces



1471 Capital Circle NW, Ste # 13
Tallahassee, FL. 32303 USA

Order Line (800) 258-7477 - Phone (850) 580-4026 - Fax (850) 580-4027

Website: www.turf-tec.com

Table of Contents

Hardware	Page #
System Description	3
Device Parts	3
Specifications	3
Precautions	4
Control: Power	5
Control: Hammer Connection	5
Control: Operational Check	6
Hammer Drop Procedure	7
Performing a Clegg Impact Test	7
Impact Control	7
Custom Protocols	7
Testing Procedure	8
Standard Drop Height	8-9
ASTM and Australian Standards	9
Hardware Warranty	9
Clegg Control App	
Clegg Impact Soil Tester with Clegg Control App	10
What is New?	10
Getting Started	11
Connect a Device	11
Connect a FieldScout TDR350 Moisture Sensor	12
Support	12
Drop Modes	12
Quick Testing Mode	12
Setting Up a Quick Test	12
Create a Session	12
Performing a Drop	12
Adding a Drop Location	12
Advanced Testing Mode	13
What is a Drop Site?	14
What is a Drop Location?	14
Setting up an Advanced Test	14
Create a Session	15
Selecting a Drop Location	16
Performing a Drop	16
Golf Greens – Connecting a TDR350 Moisture Sensor	16
Deleting Unwanted Readings	17
Viewing results	17
Exporting Data	18
Database Manager	19
Returns	19
Example of Clegg Drop Points on Golf Greens	20

Hardware

System Description

Dr. Baden Clegg developed the Clegg Impact Soil Tester while working for the Department of Civil Engineering at the University of Western Australia in the 1970's. The Clegg Hammer is an easy-to-use device consisting of two basic components: a flat ended cylindrical mass (the hammer) and a guide tube. When the hammer strikes the soil surface, a precision accelerometer mounted on the hammer feeds its output to a Control Unit, which sends a digital readout to a handheld tablet. A drop or sequence of drops of the hammer constitutes one test called a Clegg Impact Value (CIV).



The Clegg offers a rapid, simple, and relatively inexpensive assessment of the strength and stiffness properties of a variety of soils, aggregates, and synthetic materials. The impact test result reflects and responds to characteristics that influence strength. Such influences include material type, grading, layer thickness, density, moisture condition, and possibly the condition of the underlying layer. With all things being equal regarding material type and layer thickness and the nature of the support base, the primary influences are the density and/or moisture condition of the material. The CIV may be used to observe changes in strength/stiffness for a material with the changes in compactive effort, density, and moisture content.



Device Parts

UNIT

- 0.5 kg Hammer
- Guide Tube
- Control Unit
- BNC Coaxial Cable
- 12x12 inch Foam Calibration Pad
- Handle
- Charger
- Tablet with Clegg Control App (available in the Google Play store)
- Hard Case (Choose Turf-Tec or Factory Hard Case)

Specifications

- Battery Life: 12 Hours
- 3.7V/1.75Ah Lithium Ion Battery
- Complete Charge in 3 hours
- Results Displayed/Stored on Tablet-Based App

Model	0.5 kg Unit	Maximum Gravities (g)	Maximum CIV's	Maximum F355 Equivalent
PNCLEGG-S-0.5	0-150 g	500	50.0	650

Precautions

The Clegg Impact Soil Tester has been designed to be easy-to-use and provide years of service. Though primarily used outdoors in many types of situations, it is a scientific instrument incorporating specialized electronic components meaning that due care is necessary to ensure trouble-free performance and avoid costly repairs. To prolong the use of the device, observe the following precautions.

AVOID PROLONGED EXPOSURE TO EXTREME HEAT AND COLD

Do not leave the instrument in full sun or freezing temperatures when not in use. In conditions of extreme temperature, the control unit may not activate. If this is suspected, allow the control unit to cool (or warm) before use.

EXTERNAL SIGNAL CABLE

The cable can be damaged by being pinched, pulled, worn, or cut. Ensure that the connectors are not strained, bent out of round or broken, and that the plugs and sockets are kept clean.

KEEP CLEAN AND DRY

Keep all components clean and dry, not only for correct test operation but also for the sake of protecting the instrument. When testing, do not allow material build-up inside the guide tube or on the hammer. Any build-up could prevent an accurate free fall of the hammer. Ensure that the hammer strike face is clear of any material build-up before starting each test. When transporting or storing the instrument, wipe down the hammer and guide tube, etc., so that all is dry and relatively clean. Never apply water under pressure when cleaning.

HAMMER AND CONTROL UNIT ARE NOT WATERPROOF

Do not expose the hammer or control unit to rain. If moisture enters either the hammer or control unit, damage may result. If moisture does enter the control unit, remove the rechargeable battery immediately and allow the circuitry to dry. Contact Lafayette Instrument for repair.

DO NOT EXCEED MAXIMUM LIMITS

Overloading may cause permanent damage to the accelerometer. To best protect the Clegg, do not operate in such a manner that values regularly exceed the device's stated maximum limits. *Maximum limits can be found in the Specifications Table on page 3 of this manual.*

If the hardness of the material to be tested is uncertain, start with drops from a very low height, progressively getting higher until it is determined that it is safe to drop from the standard drop height. If it is determined that the standard drop height is too high, make note of what is considered to be a safe drop height for the particular situation and develop criteria for such materials based on this lower drop height. Be aware that this output is not directly proportional to the output obtained from using the standard drop-height so any correlation with other outputs or test properties will need to be re-determined or recalculated.

The accelerometer generates a signal regardless of any other electronics or power supply; it is always "on" detecting vibrations. Protect the hammer from extreme shock even when the Control Unit is not switched on or connected.

Do not drop the hammer directly on concrete.



WARNING: Only authorized personnel should perform disassembly and calibration. Unauthorized disassembly or calibration will void any warranty.

Important – Perform Operational Check on test pad before first use of Clegg

EACH HAMMER AND CONTROL ARE CALIBRATED AS A SET

Do not swap out either the hammer or control unit. Mismatching of these parts will give inaccurate results as each Bluetooth controller and hammer are calibrated as a “set”.

NEVER PLACE HANDS OR FEET IN OR UNDER THE GUIDE TUBE

The hammer is made to move freely inside the guide tube and injury is possible if hands or feet are placed in the path of the hammer. Use special attention when lifting the Clegg as the hammer can slide.

Control: Power

To power on control unit, toggle the power switch to the ON position where illuminated side of switch is depressed against the panel.

When the control unit is powered on, the Power LED will flash to show the device is in an unconnected state. At this time, the unit is able to be paired/connected to the tablet. The control unit is paired through the Clegg Control app (available Google Play store). **Do not connect** the Clegg device through the tablet Bluetooth settings. Use the Clegg app as instructed in the CONNECT A DEVICE section. When the device is in a connected state, the Power LED on the Bluetooth controller will stay lit continuously.

If the device is left in an unconnected state for a period of 10 minutes, it will automatically shut down. In order to power on the device on after an automatic shutdown, do either of the following:

- Plug the device in to charge
- Toggle the power switch OFF, then back ON

BATTERY

The Control Unit contains a rechargeable battery. Recharge the battery using the included charging cable. The Clegg Control app additionally displays a battery icon to denote the charge of the Control Unit. **Do not replace the battery.** A mismatch in battery type can cause incorrect results or damage to the electronics and charger. Unauthorized disassembly will void any warranty. **Call Turf-Tec International if battery replacement is needed.**

Control unit can be charged by either a computer’s USB port or with the supplied wall adapter. Charging via the supplied wall adapter results in a faster charge rate. While unit is charging, the charge LED will be illuminated red. Once charging has completed, the LED will shut off.

Control: Hammer Connection

Use the supplied BNC coaxial cable to connect the hammer to the control unit. To connect a BNC plug to socket, line up the slots of the plug with the pins on the socket. Press the plug on and turn the plug clockwise until it locks. (Reverse steps to remove plug).

Control Unit



Important – Perform Operational Check on test pad before first use of Clegg

Control: Operational Check and to Verify Calibration

A 12x12 inch foam calibration pad is provided for the user to verify that the instrument is working properly. The operational check is carried out in a similar fashion as the standard test but always with the calibration pad in place on a smooth concrete surface. The pad is not used for normal testing but only when making an operational check.

It is suggested to make an operational check:

- Upon receipt of the instrument before any testing

Also, it is useful to make an operational check

- When results are not in accordance with expected results
- If the instrument has experienced some trauma



Calibration Pad

OPERATIONAL CHECK PROCEDURE

To determine the calibration pad value for the first time, carry out a modified Clegg Impact Test procedure to obtain six readings on a suitable surface, preferably one that is at an easily accessible “home” location. This same location should be used for all future operational checks.

For a home site, select a firm solid base such as a bare concrete slab floor. Be sure that the surface is smooth, dry and clean and that the surfaces of the calibration pad and hammer strike face are dry and free of any foreign material. Place the pad under the guide tube such that the hammer is centered on the pad. The pad must be between the hammer and floor. The hammer must fully strike the calibration pad and not the floor.

Take the average of the six drops in different areas on the test pad staying away from the edges to obtain the calibration value. Note this average in a logbook or in the app under “Advanced Testing” and call the test location “Test Pad”. You are looking for readings with the tolerance of +/- 1 CIT units or 5 G’s. **NOTE:** There are 10 Calibration pad G’s “gravities” per 1 CIT unit.

During future operational checks, make note of the value and tolerance on the calibration pad and compare with measurements. The average reading should agree to within 5% the original test pad logged value. Also mark or paint a line on the area of the concrete slab to show the area where the calibration check will be performed. This way, the same test area is used to ensure consistency.

CAUTION: Do not operate hammer on concrete without the calibration pad in place as damage to the instrument may result.

Hammer Drop Procedure

1. The 0.5 kg model hammer is dropped by raising the hammer to the top of the unit by the wire until it hits the top cap.
2. Ensure that the striking face of the hammer is free of foreign material and the inside of the guide tube is reasonably clean so that the hammer is able to fall freely.
3. Locate then select the appropriate Drop Location in the Clegg Control app and clear any loose surface material or foreign objects from the test spot that could produce a result not indicative of the material being tested.
4. Straighten out the Coaxial Cable as much as possible. (A curled-up cable can drag on the inside of the tube during testing and give inaccurate results).
5. For the standard drop height, raise the hammer until the hammer reaches the top cap of the guide tube stop. This will produce a drop height of 30 cm or 11 - 13/16 of an inch from the bottom of the hammer to the surface being tested.
6. Place device vertically in position and hold down guide tube with a foot on the base flange. Brace guide tube with leg and/or knee (if necessary) to hold tube steady and as close to vertical as possible using the level provided by Turf-Tec International.
7. Raise the hammer to top of the guide tube and release the cable to release the hammer and drop. This single drop represents the standard impact test protocol for golf greens and bunker sand. Depending on the surfaces/materials being tested, a custom protocol may be used. On golf greens, connecting the TDR350 Moisture Sensor by Bluetooth and getting moisture readings at the same time as the clegg readings is imperative for comparative testing.
8. Move to the next Drop Location and repeat steps 5 through 7.



Drop from tip of unit

Performing a Clegg Impact Test

IMPACT CONTROL – Testing Golf Greens and Bunkers

The suggested protocol for performing a Clegg Impact Test (CIT) for surfaces where gMax Readings are the goal is a one drop protocol. Impact Control is used in situations where soft surfaces and hard surfaces could result in the decline of performance. These surfaces are exposed to routine maintenance such as aerification, topdressing, mowing, rolling with the intent of producing a finished product which falls within a specific range or window of impact values (not too soft and not too hard).

Typically, the 0.5 kg hammer models are used for Impact Control. Additionally, impact values noted in literature for golf greens is often displayed in gravities (G's). **NOTE:** There are 10 G's "gravities" per 1 CIT unit.

Set up appropriate Impact Control test parameters in Clegg Control app. See "Drop Modes" section on page 12 for more detailed app setup instructions.

CUSTOM PROTOCOLS

Based on an examination of literature, different protocols have been used to target different surface and subsurface characteristics. These custom protocols (different number of drops, variations in drop height, peak impact value, or average impact value) can be effective when consistently used across an area. If an area tested results in readings that are consistently close to the maximum reading values of the Clegg, a shorter drop height might be considered in order to get a more meaningful result. Be sure that if a modified drop height is used, the impact tester missile is marked with a line showing this drop height and each subsequent test in that area is performed from this new marked drop height or results will not be comparable.

In the case of Impact Control, there are no hard and fast rules because the results are dependent on soil type, organic matter, moisture content, and the influence of the turf grass and its root zone and the amount of infill in synthetic turf fields. The main thing you are looking for is consistency for all areas of the playing surface. It is recommended to run a few experiments to determine the protocol that works best for your application or use your experience which may be the best predictor of what range of impact values provide the desired results.

To determine another custom protocol, the initial step would be to collect or use historical data (Clegg Impact Values) on surfaces you want to monitor. Take experimental data when the surface is in a desired condition and an unacceptable condition.

With this data you can:

- Select an acceptable range of impact values for the surface
- Track the change in impact values as maintenance or modifications are made to the surface

TESTING PROCEDURE

Once the desired protocol has been chosen and set up in the Clegg Control app, follow this procedure to complete the testing process.

1. For standard testing of golf greens and bunkers, be sure that Display: PEAK is selected in the Clegg Control app settings.
2. Enter or select the appropriate drop site in the Clegg Control app. *For more information about Setting a Drop Site, read the Drop Site on page 14.*
3. Ensure that the cable between the control unit and hammer is properly connected. *For more information, read Control: Hammer Connection on page 5.*
4. Ensure that the striking face of the hammer is free of foreign material and the inside of the guide tube is reasonably clean so that the hammer is able to fall freely.
5. Locate then select the appropriate Drop Location in the Clegg Control app and clear any loose surface material or foreign objects from the test spot that could produce a result not indicative of the material being tested.
6. Place device vertically in position and hold down guide tube with a foot on the base flange. Brace guide tube with leg and/or knee (if necessary) to hold tube steady and as close to vertical as possible using the level provided by Turf-Tec International.
7. **For Impact Control** - Raise the hammer to top of the white line on the cable and drop. This single drop represents the standard impact test protocol. Depending on the surfaces/materials being tested, a custom protocol may be used.
8. Record the Moisture Sensor reading into the app.
9. Move to next Drop Location and repeat steps 3 through 8.

STANDARD DROP HEIGHT

Raise the hammer until the top of the hammer hits the top cap of the guide tube. Drops should be made within + 1.25 cm (1/2 inch) from the top of the guide tube's cap.

What to do if the hammer is dropped below the desired height?

- If the operator is recording Impact Values for each individual drop, the undesirable drop should be deleted.

What to do if the hammer is dropped above the desired height?	<ul style="list-style-type: none"> If the operator is recording Impact Values for each individual drop, the undesirable drop should be ignored.
What to do if the guide tube shifts off a test site?	<ul style="list-style-type: none"> If the hammer cannot be re-aligned with the test site, another set of drops should be performed in a location adjacent to the current location.
What to do if the hammer does not fall freely?	<ul style="list-style-type: none"> If the operator is recording Impact Values for each individual drop, the undesirable drop should be deleted.

ASTM and Australian Standards

ASTM D5874	Standard test method for determination of the impact value (IV) of a soil.
ASTM F355	Standard test method for shock absorbing properties of playing surface systems and materials. By putting your Clegg Impact Tester in the App setting menu under "drop units" to display F355. This will auto convert your readings to approximate (+/- 5%) of F355 test units.
ASTM F1702	Standard test method for measuring shock-attenuation characteristics of natural surface systems using lightweight portable apparatus (refers to 2.25 kg mass)
ASTM F1551	Standard test method for comprehensive characterization of synthetic turf playing surfaces and materials
AS 1289.6.9.1	Soil strength and consolidation test – Determination of stiffness of soil – Clegg impact value (CIV).

Hardware Warranty

Lafayette Instrument (The manufacturer) guarantees its instrumentation against all defects in materials and workmanship to the ORIGINAL PURCHASER for a period of one (1) year from the date of shipment, unless otherwise stated. During this period, Lafayette Instrument will repair or replace, at its option, any instrumentation found to be defective in materials or workmanship. If a problem arises, contact Turf-Tec International for prior authorization before returning the item. This warranty does not extend to damaged instrumentation resulting from alteration, misuse, negligence or abuse, normal wear or accident. In no event shall Lafayette Instrument be liable for incidental or consequential damages. There are no implied warranties or merchantability of fitness for a particular use, or of any other nature. Warranty period for repairs or used instrumentation is 90 days.

Lafayette Instrument Company offers the information in this manual in good faith as a guide to suggested operation and procedure. Actual operation of the instrument or reporting and interpretation of the test results are the sole responsibility of the user. Liability is not accepted for any inaccuracies this manual may contain or for any defects in the Clegg Soil Impact Tester. Furthermore, it is the responsibility of the user to establish appropriate safety and health practices.

LIMITED WARRANTY OF TURF-TEC INTERNATIONAL PRODUCTS

Turfgrass Products Corporation - dba - Turf-Tec International ("Seller") warrants to the final purchaser, that all Turf-Tec International tools will be free from defects in material or workmanship for a period of one year from the date of purchase. SELLER'S SOLE OBLIGATION AND YOUR EXCLUSIVE REMEDY under this Limited Warranty and, to the extent permitted by law, any warranty or condition implied by law, shall be the repair or replacement of parts, without charge, which are defective in material or workmanship, and which have not been misused, carelessly handled, or improperly repaired by persons other than Turf-Tec International. To make a claim under this Limited Warranty, you must return the complete tool, transportation prepaid, to Turf-Tec International after contacting Turf-Tec International and receiving a return authorization number. Please include a dated proof of purchase with your tool. ANY IMPLIED WARRANTIES SHALL BE LIMITED IN DURATION TO ONE YEAR FROM DATE OF PURCHASE. IN NO EVENT SHALL SELLER BE LIABLE FOR ANY

INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING BUT NOT LIMITED TO LIABILITY FOR LOSS OF PROFITS) ARISING FROM THE SALE OR USE OF THIS PRODUCT.

Hold Harmless Agreement

The seller shall protect, defend, indemnify and hold the purchaser and their respective assigns and their attorneys, accountants, employees, officers and directors harmless from and against all losses, costs, liabilities, claims, damages and expenses of every kind and character, as incurred, resulting from or relating to or arising out of the inaccuracy of results, injury of user, injury of sports participant, turfgrass loss, warranty, covenant or any agreement made by the seller in this agreement.

Clegg Control App



Clegg Impact Soil Tester with Clegg Control App

For convenience of portability and simplicity of updating, the most up-to-date Clegg Impact Soil Tester and Clegg Control app manual is readily available via the Clegg Control app. This version is gold course specific and is available from Turf-Tec International www.turf-tec.com with the purchase of a Clegg Impact Tester from Turf-Tec International or one of our distributors.

What is New?

The Clegg Control app replaces the previously available Clegg Control hardware with an app and a tablet. The app is more user-friendly and contains many more advanced features. The app further improves the Clegg test process by allowing users to preset specific testing locations and save readings based on previously tested locations.

The new version also allows you to connect by Bluetooth a FieldScout TDR350 Moisture Sensor. The Clegg Control app is installed on the provided tablet and can be accessed by tapping the appropriate icon. It also allows GPS mapping data and GPS Coordinates to be stored and all data acquired during testing to be exported to a .CVS file and emailed directly from the app.

The new app also contains a Database Manager that is used to import/export the Clegg Control App database with a selected Google Drive.

Follow these instructions to view the manual

1. Open Clegg Control app
2. Tap the hamburger-style button (3 vertical dots) on the upper right of the screen
3. Tap SHOW MANUAL from the menu to display manual

Getting Started

CONNECT A CLEGG DEVICE

In order to connect the Clegg Control app to a Clegg device, be sure that the tablet with the Clegg Control app has Bluetooth enabled; the Clegg Control unit uses Bluetooth to communicate with the tablet. If a situation arises where the app is started without Bluetooth enabled, the app will display a warning allowing the user to enable Bluetooth.

Note: Do not connect the Clegg Bluetooth device through the tablet's Bluetooth settings. Instead, connect the device through the Clegg app.

1. Enable Bluetooth via tablet settings.
2. Open the Clegg Control App.
3. Click on Advanced test – Begin Testing.
4. Tap the menu (hamburger-style) button (3 vertical dots) on the upper right of the screen.
5. Tap "SELECT CLEGG" from the new window.

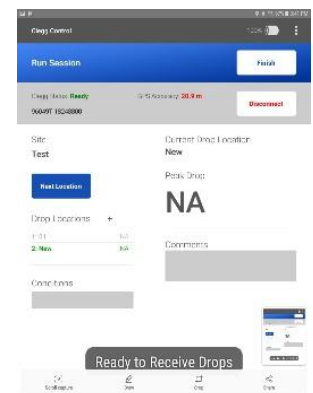
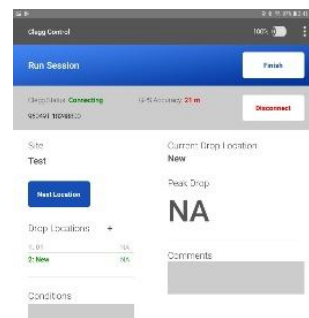
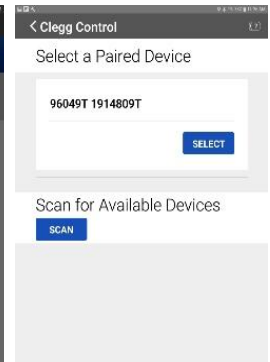
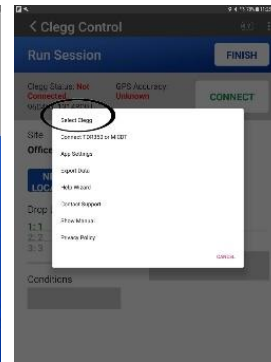
For a new app installation

Tap the SCAN button under the Scan for Available Devices area.

For an existing app installation

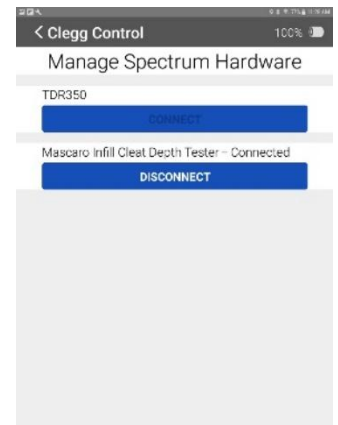
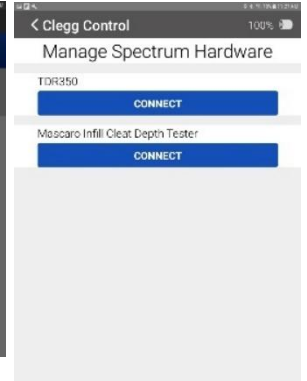
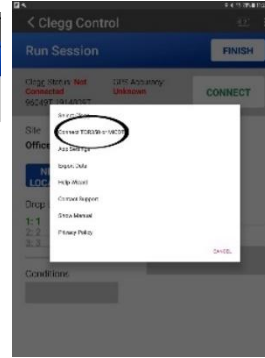
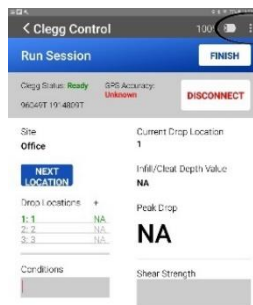
A list of previously connected devices is available. The devices are listed by serial number. The device serial number is available via the silver tag on the Control unit. Tap the SELECT button for the device to which you wish to connect.

Once the device is connected, the bottom of the screen will show "Connected to 96049T + SN#" briefly then "Ready to receive drops". These indicators will disappear and a "Connected" indicator will appear in the upper left of the screen. The battery level of the Control Unit is also denoted by an icon in the top right of the screen.



CONNECT A FIELD SCOUT TDR350 MOISTURE SENSOR

1. When in the Run Session Screen, Click the hamburger menu in the upper righthand corner of the app.
2. Click: "Connect TDR350 or MICDT"
3. When the Manage Spectrum Hardware screen appears, be sure to have the TDR350 in Bluetooth range and powered on and select the connect button for that device. Note, you can only connect one device at the same time as the Clegg)
4. Once the device is discovered and connects properly, the other button's CONNECT wording will disappear and if connected to the TDR350, that devices serial number will appear after the word "Connected" and the option to Disconnect from the connected device will appear.
5. Click on the <Clegg Control back arrow to return to the testing screen.



SUPPORT

Should you have any issues with the Clegg Control app, a contact support form is available by selecting CONTACT SUPPORT or by calling Turf-Tec International.

Drop Modes

The Clegg Control app has 2 drop modes: Advanced and Quick Testing. Each time the application starts, the startup screen will have the user pick between Quick and Advanced Testing. From the Home page for each type of test, the user will be able to switch to the other test type using the menu button and selecting either QUICK TESTING or ADVANCED TESTING. Note – Advanced Testing is preferred as you can have more data access. It takes additional set up for the first time you test an area, but it is necessary for easier future data reference.

Quick Testing Mode

This mode allows a user to quickly make and store the readings for a series of drops from multiple locations. No settings are pre-loaded when performing a Quick Test. It is possible to add drops from multiple locations by tapping the NEW LOCATION button or configuring the app to automatically detect movement of the tablet. *See the Using New Application Threshold section on page 13 for more information about available settings.*



Setting up a Quick Test (For golf green testing, Advanced Testing mode is preferred. See “Advanced Testing Mode”)

CREATE A SESSION

A Quick test can be started by tapping BEGIN TESTING from the app startup screen then from the Manage Quick Test screen, click on “NEW TEST”. Note, this data is also saved in the app but has far less features compared to doing an Advanced Test.

Before beginning a test session be sure to have the necessary app settings selected via the App settings screen. Specific settings are detailed in the App settings area of this manual; the specific settings for standard procedures are available in the Testing procedure section.

1. Tap the NEW button on the Manage Quick Tests screen to display Quick Test Run session screen.
2. Connect the Clegg as shown in the CONNECT A DEVICE section.
 - A connected device will become disconnected after 30 minutes of downtime.
 - A disconnected device will power off after 10 minutes. *For more information about how to power up the device, see the Control: Power section on page 5.*
3. Connect the desired additional Bluetooth device (FieldScout TDR350) as shown in the CONNECT A FIELD SCOUT TDR350 MOISTURE SENSOR section.
4. Verify the on-screen details.
 - Serial number and status of Clegg device connection (at left)
 - Use the ADD LOCATION button as testing moves to different locations
 - Enter Test Description and Test Conditions in labeled locations.

ADDING A DROP LOCATION

There are multiple ways to add new Drop Locations for Quick Tests. Comments can be entered for each location in the box labeled Location Comments. Prior rainfall data is most relevant in this box.

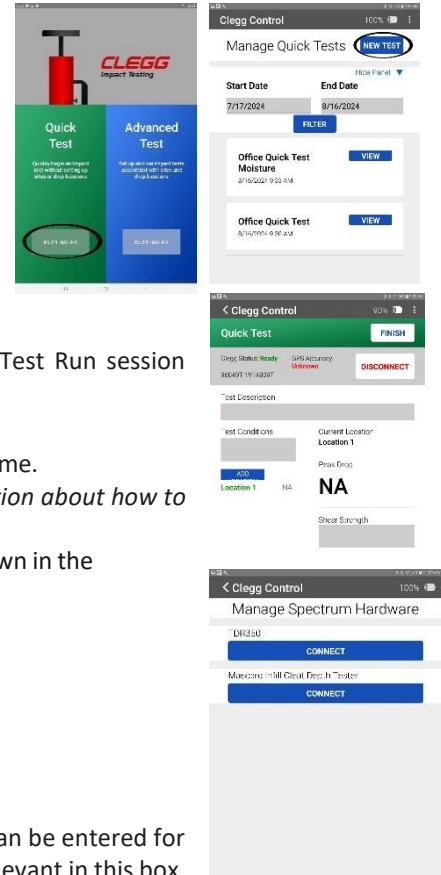
Tap on an existing location to go to that location.

- New Application Threshold can automatically prompt to add a new location when the GPS coordinates suggest the user has moved to a new location. Required distance can be set up via the App settings.
- Tap ADD LOCATION to create a new location.

Using New Application Threshold: During a Quick Test, the app compares the current Drop Location with the previous Drop Location and prompts the user about creating a new location if the distance between drops exceeds this threshold. The selection should be based on the GPS accuracy and the typical distance between Drop Locations for the user. If Disabled is selected, the App will not perform the comparison.

Advanced Testing Mode

Allows users to create specific locations to define and store testing readings. *For more information about creating an Advanced Drop Test, read the Setting Up an Advanced Test section on page 14.* The Clegg Control app uses the terms DROP SITE and DROP LOCATION to describe differing levels of location organization and cannot be used interchangeably.



WHAT IS A DROP SITE?

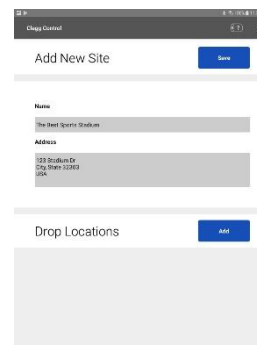
A Drop Site often describes the place where the testing is located (e.g., a park or sporting complex). A Drop Site must be entered in order to continue the Advanced Testing process. Drop Sites are defined using a name and optionally an address.

How do I add a Drop Site?

- A Drop Site is added by tapping the NEW SITE button on the Manage Sites screen
- Drop Locations can also be added in advance by tapping the ADD button in the Drop Locations area of the Drop Site screen.

How do I edit a Drop Site?

- Select a Drop Site by tapping the EDIT button on the Manage Sites screen.
- Site name and address as well as any available Drop Locations can be added or edited from the Edit Site screen

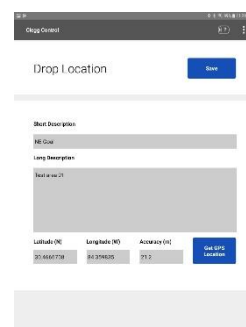


WHAT IS A DROP LOCATION?

A Drop Location describes the precise location of each testing drop within the Drop Site. Drop Locations can be defined using a name and optionally a description or GPS location. Stored locations can be optionally carried over into subsequent tests in order to make testing even simpler and more consistent.

How do I add a Drop Location?

- Locations can be set up in advance using the Add or Edit Drop Site screens.
 - Add a new Drop Site or select a Drop Site by tapping the EDIT button on the Manage Sites screen.
 - Add a Drop Location by tapping ADD button in the Drop Locations section.
- On-the-fly by tapping the “+” icon in the Drop Locations area of the Run session screen.



How do I edit a Drop Location?

- Select a Drop Site by tapping the EDIT button on the Manage Sites screen. On Golf Courses, each putting green number is usually entered here.
- Select a Drop Location by tapping the EDIT button corresponding to the Drop Location.
- Descriptions, GPS location and future usage can be edited.

Setting up an Advanced Test

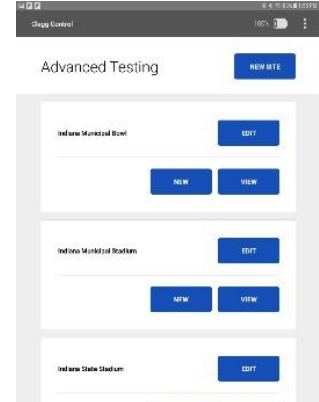
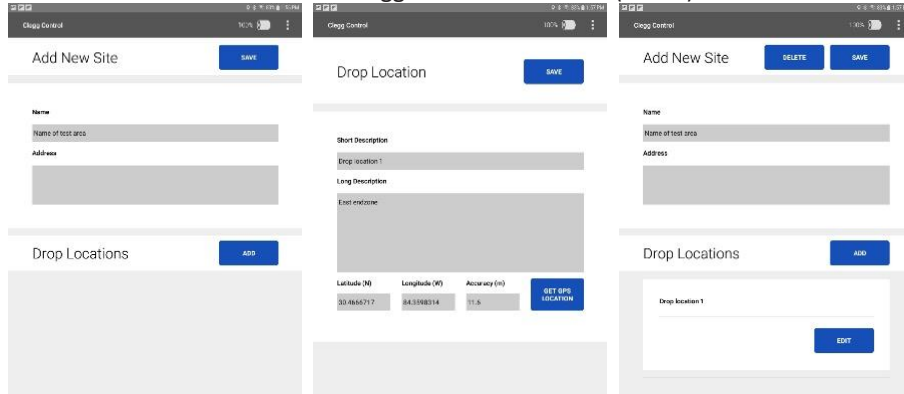
In order to run a Clegg Impact Test, be sure to first define a Drop Site. Drop Locations can be added in advance or on-the-fly via the Run test area. A short Help wizard is available by tapping the hamburger menu button (3 vertical dots) on the upper right of the screen and selecting HELP WIZARD.


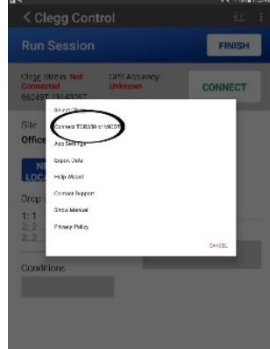
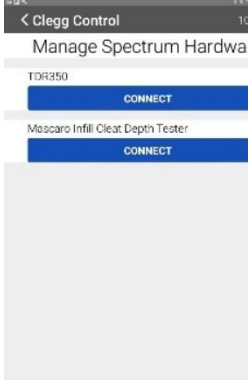

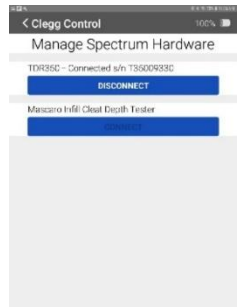


CREATE A SESSION

Before beginning a test session be sure to have the necessary app settings selected via the App settings screen. Specific settings are detailed in the App settings area of this manual; the specific settings for standard procedures are available in the Testing procedure section.

1. Tap the NEW button under a Drop Site to bring up the Run session screen.
2. Verify the on-screen details.
 - Drop Site location (at left)
 - Serial number and status of Clegg device connection (at left)



- Drop Locations, add additional locations by tapping “+” icon (at left)
 - Enter desired site conditions in available text area (at left)
 - Drop Type: PEAK (at right); controlled via App settings
3. Connect Clegg device by tapping CONNECT button, if necessary
 - A connected device will become disconnected after 30 minutes of downtime.
 - A disconnected device will power off after 10 minutes. *For more information about how to power up the device, see the Control: Power section on page 5.*
 4. When in the Run Session Screen, Click the hamburger menu in the upper righthand corner of the app.
 5. Click: “Connect TDR350 or MICDT”
 6. When the Manage Spectrum Hardware screen appears, be sure to have the TDR350 in Bluetooth range and powered on and select the connect button for that device. Note, you can only connect one device at the same time as the Clegg)
 

 7. Once the device is discovered and connects properly, the other button's CONNECT icon will disappear and if connected to the TDR350, that device's serial # will appear after the word “Connected” and the option to Disconnect from the connected device will appear.
 
 8. Click on the <Clegg Control back arrow to return to the testing screen.
 

 9. Follow the appropriate Testing procedures. *Standard testing procedures are available in the Performing a Clegg Impact Test section on page 7 and Advanced testing on page 13.*

SELECTING A DROP LOCATION

The listing of Drop Locations can be traversed in multiple ways. In order to go down the list in sequential order tap the NEXT LOCATION button above the Drop Location list. See map on page # 19 for suggested Drop Locations on a golf green. If you desire to move through the list in any order, tap a location name from the list. The currently selected Drop Location is highlighted in green.

PERFORMING A DROP

When performing a drop, it is important to follow appropriate testing procedures. *Standard Testing procedures are available in the Performing a Clegg Impact Test section on page 7 and Advanced Testing Mode on page 13.* Each drop reading is listed in order and can have comments* added by tapping the drop value.

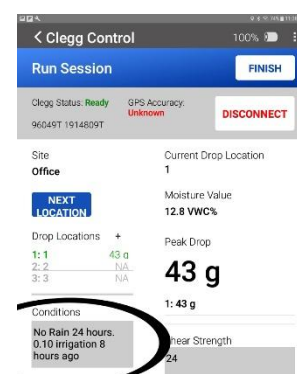
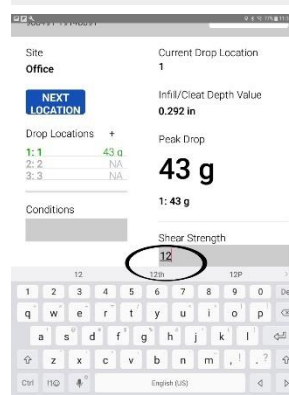
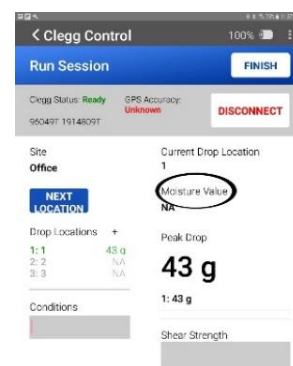
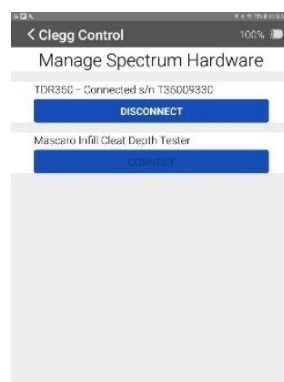
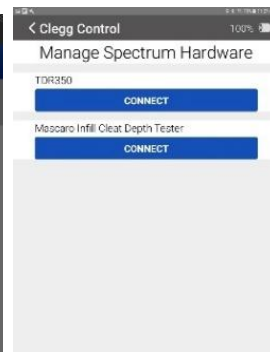
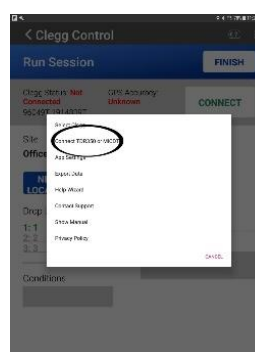
***The comments added to the drop reading should be as follows:**

Golf Greens – Connecting a TDR350 Moisture Sensor

After Connecting the Clegg in the app as instructed under the section entitled “CONNECT A DEVICE”.

Next connect the FieldScout TDR350 as follows:

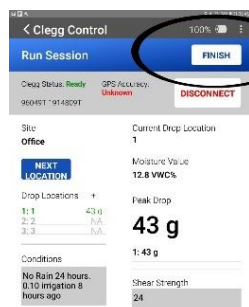
1. When in the Run Session Screen, Click the hamburger menu in the upper righthand corner of the app.
2. Click: “Connect TDR350 or MICDT”
3. When the “Manage Spectrum Hardware” screen appears, be sure to have the TDR350 in Bluetooth range and powered on and select the connect button for that device.
4. Once the device is discovered and connects properly, the Mascaro Infill and Cleat Depth Tester button’s CONNECT icon will disappear and the TDR350’s serial # will appear after the word “Connected” and the option to Disconnect from the TDR350 device will appear.
5. Click on the < Clegg Control back arrow to return to the testing screen.
6. On the Run Sessions screen, the Moisture Value wording will appear below the Current Drop Location wording.
7. Each time you take a Clegg gMax drop, also insert the TDR350 probes into that same area and press the “Read” button on the TDR350. The Moisture readings will be displayed on the Run Sessions screen along with the Clegg readings. (Note, the app is also capturing the additional data from the TDR like Surface temperature and EC readings. These can be viewed in the .CVS file in the Export Session function.
8. There is also a box provided for manual input of the Turf-Tec Shear Strength Readings. This data will also be exported into the .CVS file in the Export Session function.
9. Under Conditions manual entry box, rainfall and irrigation data should be entered here for future reference.



Note: When performing testing in the Run session screen and moving between test locations. Be sure to keep the Clegg, the tablet and the Field Scout TDR350 units near each other so that the Bluetooth connections will not be disconnected. If this occurs, you will need to reconnect the disconnected device before additional testing can be done.

DELETING UNWATED READINGS:

1. If a drop is recorded improperly, you can delete that reading by clicking on the incorrect reading on the left.
2. Next click on “Delete”
3. Verify the Delete function.

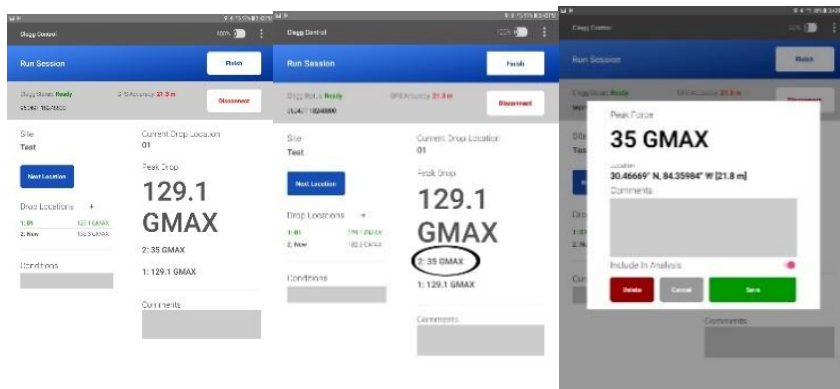


Viewing Results

One of the biggest improvements of the Clegg Control app is that previous readings are stored in the app database as well as readings from the TDR350 Moisture Sensor.

SAVING SESSION READINGS

The Clegg Control app saves the session after each drop is recorded. The current session can be exited by tapping the FINISH button in the upper right of the Run session screen. A finished session cannot have additional drops added or data modified.

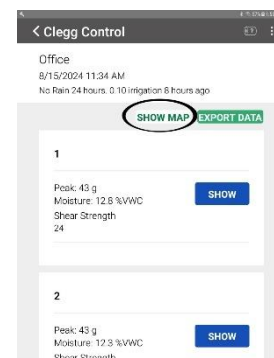


VIEWING PREVIOUS READINGS

1. Because of the difference in record keeping, each testing type follows specific methods to view readings.
 - Quick test: Enter Start and End dates and tap FILTER
 - Advanced: Tap VIEW on the desired Drop Site
2. Previous sessions are listed by date and time. Select a session (date/time) by tapping the VIEW button for the desired session.
3. Drop Locations are listed with the gMax reading as well as the TDR350 Moisture or Mascaro Infill and Cleat Depth Tester data that was recorded during testing as well as any conditions or comments concerning that specific location.
4. All drop readings for a specific location are available by tapping the SHOW button (at right). After showing the readings, tapping the HIDE button will hide the readings.
 - Drops are listed by number and contain a reading as well as the additional data and any comments concerning that specific drop.
 - Units shown are based on the current app settings. *Details for the app settings are available in the Getting Started section on page 11.*
 - Each drop can optionally have comments recorded by tapping the value and entering them into the provided text box as shown under “Performing a Drop” on Page 16.

SHOW MAP

The SHOW MAP button appears when viewing results for either a Quick Test or Advanced Test session after the tablet is connected to Wi-Fi. It displays a map with markers at all Drop Locations for which GPS coordinates were obtained. Tapping on a marker brings up details about the drop including the result, time, and GPS accuracy for the drop. A button in the lower right corner allows switching between a “Satellite” or “Street” view for the map. Screen shots of these maps can be taken for insertion into reports if desired.



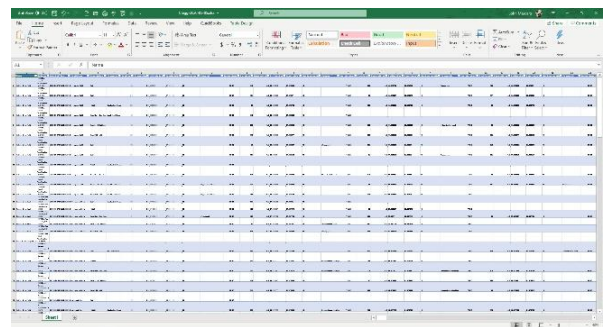
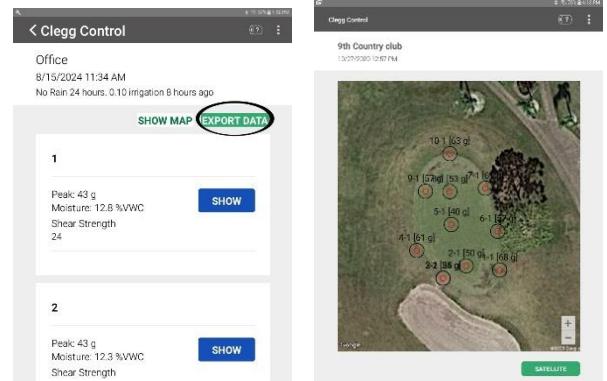
EXPORTING DATA

Two distinct ways to export data are available:

- Selecting EXPORT DATA from the menu exports **all stored results** in XML format.
- Tapping the EXPORT DATA button when viewing results for a Quick or Advanced Test session exports data for the **current session** in CSV format. App Settings contains the setting Export Preference for selecting whether to include all drops or only the peak value in the CSV file.

NOTE: The default application for handling exported files can be selected by following the instructions for updating default applications for your operating system.

****Important**** It is important to export data to a CVS file in the event that the tablet is damaged or lost, or the app becomes corrupted. Backing up data to a CVS file and saving it to a computer will insure against data loss.



DATABASE MANAGER

Accessing the Database Manager

The Database Manager is available via the main navigation found by tapping the three vertical dots at the top of the app and selecting Database Manager.

Using the Database Manager

The Database Manager is used to import/export the Clegg Control App database with a selected Google Drive. An active Google account with appropriate permission is required to utilize Google Drive. Lafayette Instrument does not receive Google account information, and the Clegg Control App can only access data stored via the app.

Google Account Sign In and Permissions

Each time a database is imported, exported, or viewed from Google Drive requires renewed access permissions.

Once a Google Account has been selected, the Clegg Control App will request permissions from that account. All requested Google Drive permissions are displayed. Required permissions include "see, edit, create, and delete only the specified Google Drive files you use with this app". Only once appropriate permission has been given, can the app be connected to Google Drive. The Clegg Control App does not store any Google account information.

Exporting a Database

The Clegg Control App database can be exported by tapping Export Database. Google Drive can store multiple copies of the Clegg Control App database. Once a database has completed export, the Database Manager status will change to "File Sent".

Importing a Database

Databases available for import are listed onscreen - database date and time are determined when the database was exported to Google Drive. The Available Databases list can be refreshed by tapping Update.

To continue, tap the desired database and tap Import. Only one database can be selected/imported to the app at a time. Importing a database will replace the database currently stored in the app. Once Import is tapped, an alert appears asking what should be done with the current app database.

Selecting "Export to Google Drive" will export a copy of the database to Google Drive prior to overwriting the database ensuring your current data is safely stored. The Database Manager status is changed to "File Sent & Imported" once the process is complete. Tapping the app's Back button will reset the app and apply the new database.

Selecting "Permanently Delete" will overwrite the app database without making a backup copy - this action cannot be undone. The Database Manager status is changed to "file Imported" once the process is complete. Tapping the app's Back button will reset the app and apply the new database.

Under most circumstances, we suggest exporting a copy of the current database before beginning the import process.

RETURNS

Equipment may not be returned without first receiving a Return Goods Authorization Number (RGA).

Example of Clegg Drop Points for gMax Readings on Golf Greens



- The Clegg 0.5 kg reading should be the ***first drop*** of the hammer.
- Total of enough test areas to give an entire representation of the golf green's surface.
- You are looking for uniformity of readings, not a specific number.
- Test soil moisture in each area and the app will automatically record these readings.
- Soil moisture will affect Clegg readings, so it is important to document these numbers.

