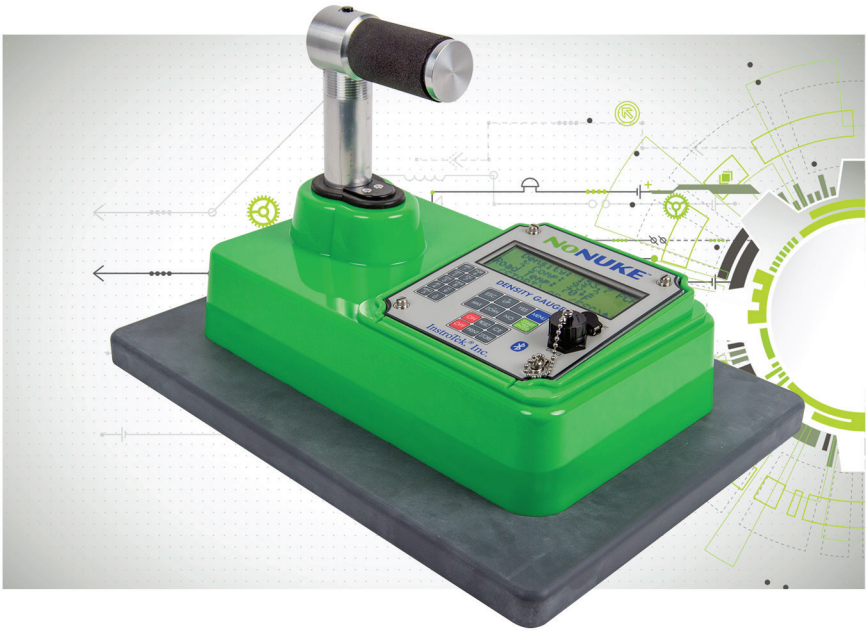
InstroTek® Inc.

innovators in instrumentation technology

NoNUKE™

Moisture / Density Gauge



OPERATING MANUAL

www.InstroTek.com

'This page may be removed from the manual to prevent the unauthorized access to the restricted menu functions of the InstroTek® NoNuke™.'

Restricted Menu Function

Access Code:

5557

NoNuke Density Gauge

Operation Manual Version 1.4

09.23.2020

1. Table of Contents

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1. Introduction

Thank you for your purchase of the InstroTek NoNuke, the most advanced non-nuclear asphalt density gauge. InstroTek has led the industry in Innovation and development of advanced instrumentation technologies since 1997. InstroTek designs and manufactures gauges used in a variety of applications, such as construction, agriculture and irrigation control, coal density and many different moisture measurement technologies, including moisture measurement in pipe insulation at chemical plants.

The NoNuke gauge was designed to meet the demands of the construction market with reliability and accuracy. The NoNuke density gauge utilizes state of the art technology to reduce the uncertainty inherent in electric density measurements, providing enhanced reliability and improved density resolution in the rugged construction environment. Its primary features are:

- No license or radioactive certification required
- Faster and easier to use
- Lightweight
- Capable of storing large amounts of data
- Automatic bad contact and excessive moisture alerts
- Data download via USB
- Meets and exceeds the requirement of ASTM D7113 and AASHTO T343

The software features are easy to follow. The four-line display provides large characters and intuitive instructions to help the operators navigate through the different functions. The diagnostics features allow diagnoses of gauge problems in the field, increasing productivity.

Our technical staff includes some of the most experienced density gauge developers and engineers in the world with over 100 years of combined experience. We believe you will be impressed with the NoNuke's quality and functionality.

Our promise with each delivery is a superior gauge, unmatched expertise and exceptional service.

Gauge Technology

The NoNuke gauge uses Electrical Capacitance to measure permittivity properties of pavement. NoNuke's internal software automatically corrects for temperature. In addition, it will alert the user to high surface moisture and poor contact conditions. The sensitivity of the sensors allows this device to measure accurate density results. The NoNuke provides density, % compaction and pavement temperature as output in various units of measure. The gauge can be used for:

- Pavement density and % compaction measurements
- Optimum Rolling pattern and Pavement quality control
- Segregation

Safety

The NoNuke gauge is a safe, reliable, non-nuclear device. Thus, it does not require any special handling, monitoring badges, license, special storage or have any special

transportation requirements.

Please follow the important steps below regarding use, safety and maintenance, as well as any other internal company/agency specific use or safety procedures to prevent injury and obtain accurate results:

- Only use Acetone to clean bottom sensor surface. Do not use WD-40 or any solvent that do not evaporate.
- Do not use the unit near exposed electrical wiring due to potential shock hazard.
- Do not use or place gauge at proximity of high electro-static fields.
- Unauthorized disassembly of the unit voids the warranty
- Turn the gauge off during transportation or when it is unused.
- Do not leave the case lid open and unattended to avoid moisture and debris from getting inside the case.
- Avoid exposing gauge to moisture.
- Clean the bottom plate of the gauge periodically to remove debris. This will improve the quality of the readings and reduces potential maintenance problems.

Model NoNuke and Standard Accessories

Fig 1.1 NoNuke Gauge & Accessories

Model NoNuke

1. **NoNuke**
2. **AC, DC charger, and flash drive, one each**
3. **Gauge Case**
4. **Manual of operation and gauge paperwork**

2. Charging the Batteries

When the gauge is powered on, check for the low battery warning ("Low Battery" displayed). If the low battery warning does not appear on the display, the gauge is ready for use and does not require additional charge.

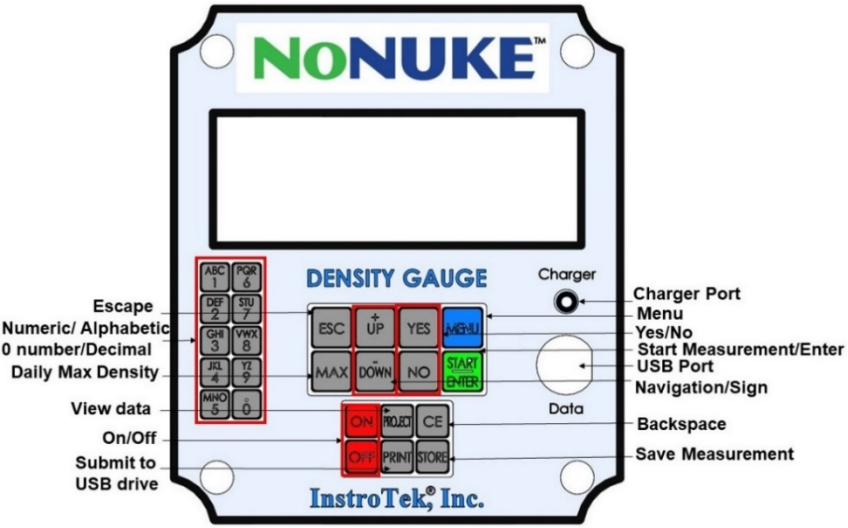
The NoNuke contains a pack of six AA size Rechargeable Nickel Metal Hydride batteries. The batteries are charged at the factory prior to shipment. Life of rechargeable batteries depends on the number of charge/discharges cycles. The gauge will display a "Low Battery" on the display when the battery is getting low.

The provided 12VDC car charger can be used for emergency charging in the field. Plug this charger into your vehicle charger outlet and charge the gauge for 30 minutes. This should provide enough battery power to your gauge to complete your testing for the day. Charge the gauge using your AC charger, after using the car charger to obtain a full charge.

During a charging session a "C" will appear in the upper right-hand corner of the display

It will take about 3 hours to charge an empty battery pack using either the AC or 12 VDC charger. The internal charge circuitry continuously monitors the battery voltage, and it stops the charging when the batteries are full. The batteries can be charged daily or when the low battery indicator appears on the screen.

3. Keypad



Note: Press each alphabetic key repeatedly to select a desired letter.

Note:
The minus key <-> is also the <DOWN> key.
The decimal point is entered by holding the <0> key down for over one second. Decimal limited to use in setting offset value only.
To backup and change the offset, the Clear Entry key <CE> is used.

4. Menu Functions

Pressing the **MENU** button on the front panel will access the menu functions. Some of the menu functions require an access code; contact your supervisor to obtain this code.

The following list of functions are available under **MENU**:

1. **Verification** – Verifies gauge performance and operations.
2. **Density Offset –** Enable/Disable density offset.
3. **Reading Mode –** Sets the gauge to single or multiple reading modes.

4. **Set Units –** Change units of density, road temperature measurements, and maximum aggregate size.

5. **Set Time/Date –** Enables setting of time and date for each project and reading.

6. **LED Backlight –** Enables/Disables the LED backlight display and keypad for easy viewing during night work.

7. **Keypad Sound –** Enables/Disables the buzzer/alarm function of the NoNuke.

8. **GPS –** Enables or disables the GPS module. Note, to preserve battery life, the GPS module is normally off. Enable the GPS by using this Menu option.

9. **Bluetooth –** Enables or disables the Bluetooth module.

10. **Diagnostics –** Allows checking of the SD storage test, USB test, GPS test, Battery Voltage, Temperature, Factory Calibration, Serial # details, Update Firmware, Memory Reset and Extended tests. Extended test module is provided for customized, extended additional tests and further diagnostics by trained technicians. Some of the items in this module require an access code.

11. **Mix Information –** Allows input of mix parameters for storage purposes. Includes the mat thickness and the maximum aggregate size.

5. *Getting Started*

Before using this gauge, it is recommended that the user read this manual and understand the operation of the gauge.

Operating the NoNuke

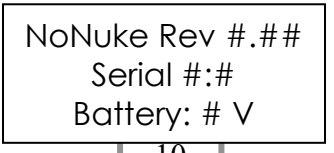
This chapter covers the initial set up and basic operation and procedures of your gauge from powering on to taking a measurement. The following initial steps are recommended to start taking measurements with the NoNuke.

1. Powering the gauge ON
2. Set Time/Date
3. Set Units
4. Input Max Density
5. Input Mix Information (mat thickness and max aggregate size)
6. Taking Measurements

1. Powering the Gauge ON

Press the **ON** key to power the gauge on. When the gauge is powered on the NoNuke will show:

After 3 seconds the serial # and battery voltage will be displayed:



After displaying this for 2 seconds the gauge will be ready to be used for testing.

Gauge Ready <Start> to Begin Date Time

Note: To preserve battery life for extended gauge operations, the gauge will go into a shutdown mode if no key is pressed for 10 minutes. Simply **press** the **ON** key when you are ready to restart again.

Note: The GPS on the NoNuke gauge will stay off until it is turned on though the menu function by the user. When the GPS is turned on, the battery consumption if increased and the gauge may have to charged more often.

Press the **OFF** key and hold for 3 seconds to turn the gauge off.

2. Setting Time/Date

To provide proper time and date for measurements, complete the following steps.

Press the **MENU**, the first screen will be:

-MENU- 1. Verification 2. Density Offset 3. Reading Mode

Press the **DOWN** key twice.

-MENU- 4. Set Units 5. Set Time/Date 6. LED Backlight

Press 5.

```
1.Change Time/Date
2.Change M/D Order
3. 24 Hour Time
 ESC to Exit
```

Press 1 to modify time/date

```
      Date     Time
Change Value?
Press YES or NO
ESC to Exit
```

If the Date and Time are correct, **press NO**, otherwise, **press YES to change**.

```
Enter Value for
Month: 1
   <ENTER> to Accept
      <ESC> to Exit
```

Proceed through the Month, Day, Year, Hour, and Minute screens to enter the data and time information. Select AM or PM for the last setting.

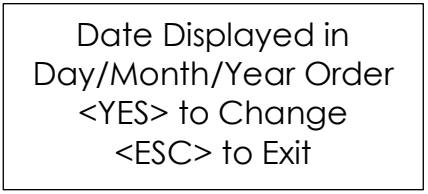
```
Select
   1.  AM
   2.  PM
```

After selecting the Date and Time, the NoNuke returns to the first menu screen.

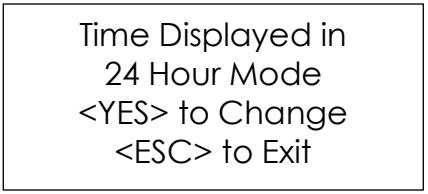
```
          -MENU-
1. Verification
2. Density Offset
3. Reading Mode
```

Press 5 to return to date/time screen

Press 2 to select between Month/Day/Year and Day/Month/Year. Select **Yes** to make changes.

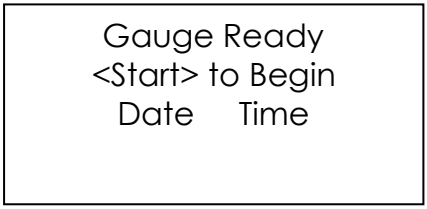


Return to the Date/Time menu and **press 3** to select between AM-PM or 24-hour display.



After selecting Yes, the NoNuke returns to the first menu screen.

Press ESC to return to the Gauge Ready screen:



3. Setting Units

The default for the gauge is in English units; lb/ft^3 (PCF). The units displayed can be (PCF/°F), (kg/m^3 / °C), or (g/cc / °C).

Press the **MENU**, the first screen will be:

```
-MENU-
1. Verification
2. Density Offset
3. Reading Mode
```

press the DOWN key once

```
-MENU-
4. Set Units
5. Set Time/Date
6. LED Backlight
```

Press 4**.**

```
1. Lb/ft3
2. kg/m3
3. G/CC
Select#, ESC Exit
```

Press 1 for (lb/ft3-inch-°F), **2** for (kg/m3-mm- °C), or **3** for (g/cc /mm/ °C).

After selecting the Unit of Measurement, the NoNuke returns to the first menu screen.

```
-MENU-
1. Verification
2. Density Offset
3. Reading Mode
```

Press ESC to return to the Gauge Ready Screen,

Gauge Ready <Start> to Begin Date Time

4. Input Max Density

NoNuke measures % compaction based on the MAX Density input by the operator. In NoNuke, you can easily change the MAX density value as needed to accurately measure % compaction. To set the daily MAX density value complete the following steps. If no max density is entered the gauge will use a default maximum density of 145 PCF (2323 kg/m3).

Note: The max density is used to calculate percent compaction. For accurate measurements the gauge it is necessary to establish an offset for a specific mix.

From the main screen (Gauge Ready Screen),

Gauge Ready <Start> to Begin Date Time

PRESS MAX key on the keypad.

MAX: # PCF Change Value? <YES> or <NO> <ESC> to Exit

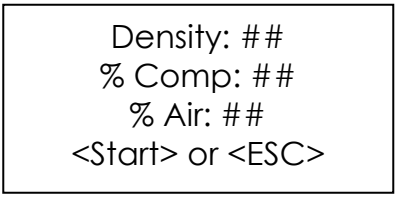
PRESS YES or **NO** to change the value or confirm the current value. This value is provided by the lab and can be changed as needed to account for daily production variations. **Press YES** to

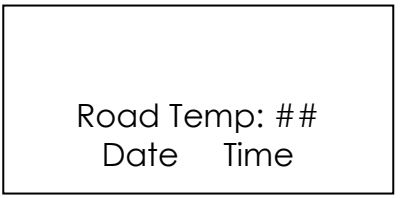
change the displayed value, **NO** to use the displayed value, or **ESC** to exit.

5. Take a Measurement

To assure a good measurement, the gauge should be placed on the pavement making sure there is proper contact between the gauge bottom surface and the pavement. Avoid wet areas for best accuracy. Then from the main screen,

Press START on the keypad or **push** the **quick button** on the handle, which will measure density, % compaction, air void, road temperature and further information of GPS and project if applicable. To view GPS and project information **scroll UP/DOWN**.





The gauge results can be compared to cores, used to setup an optimum rolling patten or as quality checks during pavement construction.

6. Verification

If there are questions about gauge operations, you can always perform a gauge verification. To ensure proper gauge operation, you can use the following procedure to verify the gauge. First clean the bottom surface of the gauge. Debris and residue attached on the bottom surface may negatively affect the verification measurements.

Then, place the gauges on top of the carrying case. Turn it on and access the Menu screen.

```
-MENU-
1. Verification
2. Density Offset
3. Reading Mode
```

Press 1 (verification).

```
Place Gauge on Lip
of Open Case

<ENTER> to Continue
```

Make sure gauge is placed correctly on the lip of the open case (see picture). Press the remote button on the gauge handle, and the gauge will measure the standard electrical properties of air. This will take about 10 seconds. Do not touch the gauge during the measurement. The gauge will beep when done.

The gauge will take a measurement and indicate a pass or fail result. In case of a failure repeat this measurement. If it fails again, contact your InstroTek representative, and give them the R value. R is the ratio between the factory and field measured electrical property of air.

If the unit fails, try the following:

- Recheck the bottom sensor surface, be sure it is clean, and nothing is adhered to it.
- Shut off other electronics and devices that may emit a magnetic field that is within 15 ft of the gauge.
- Only use Acetone to clean the bottom surface. Do not use WD-40 or any solvent that do not evaporate.

7. Reading Modes

NoNuke has two reading modes: **Single Reading** and **Multiple Readings**. To select or change the reading mode complete the following steps. When comparing your results to cores or to obtain the best results for each measurement spot, the Multiple Reading Mode is recommended.

You can use the single reading mode for controlling the rolling pattern on new pavements. Place the gauge on the mat after each roller pass until no more gain in density is observed with increased number of roller passes. Note, on some projects you may see a rise in density and then a drop at the end or on the next pass. This may indicate a break in the rolling density profile, indicating max compaction has been achieved.

Press the **MENU**; the first screen will be:

```
-MENU-
1. Verification
2. Density Offset
3. Reading Mode
```

Press 3.

```
1. Single Reading
2. Multiple Readings
3. Reading Number
Select #, ESC Exit
```

Press 1 to choose single reading mode and **press 2** to choose multiple reading mode, which automatically outputs the average of the total number of readings selected. A minimum of five readings are recommended when using the multiple readings mode to obtain the best results for measurement of a particular measurement location or comparison to cores. To customize number of readings to be averaged, **press 3**.

```
Reading number:  5
     Change Value?
  <YES> to Change
    <ESC> to Exit
```

Select new number of readings and **press Yes**, otherwise, **press ESC**.

For the multiple reading mode, we recommend 5 reading spots as illustrated in Figure 6.1. Make sure the areas you want to measure are flat and dry. Place the NoNuke on the pavement and move between reading. Figure 6.1 illustrates a 5-point reading setup. Move the gauge 3 to 4 inches from center of first

position up, right, down and left respectively, in order to collect data from positions 2, 3, 4 and 5.

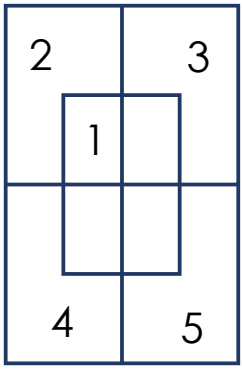


Fig 6.1 5 readings for multiple reading mode.

8. Daily MAX Density Value

NoNuke measures % compaction based on the MAX Density input by the operator. In NoNuke you can easily change this value to measure accurate % compaction. To set Daily MAX density value complete the following steps.

From the main screen,

Gauge Ready <Start> to Begin Date Time

Press MAX button on the keypad,

MAX: # PCF Change Value? <YES> or <NO> <ESC> to Exit

PRESS YES or **NO** to change the value or confirm the current number. This value is provided by the lab and can be changed based on daily production variations. **Press YES** to change the displayed value, **NO** to use the displayed value or **ESC** to exit. If no other max density values are entered, the default value used by the gauge is 145 pcf (2323 kg/m3)

9. Input Mix Information

The NoNuke has provision for the storage of important mix parameters. The information that may be stored are the mat thickness and the maximum aggregate size.

Press the **MENU**; the first screen will be:

```
-MENU-
1. Verification
2. Density Offset
3. Reading Mode
```

Scroll down the **MENU** to menu item 11 and enter that menu number. The 4th option erase is not shown.

```
Mix Information □□
1. Select
2. Review
3. New
```

A mix may be selected, reviewed, or erased. Select either 1., 2., or 4 and a list of mixes will come up. Press the number corresponding to that mix to select.

New mix select item 3, New.

```
Max Size: 0.98 – 1.22 in
<Yes> to Change
<Enter> to Continue
<Esc> to Save
```

Selecting Yes brings up the screen below allows the user to change the parameter listed. Select the appropriate number.

```
-Select Agg. Size: □□ -
1.  0.12 – 0.39 inch
2.  0.43 – 0.59 inch
3.  0.63 – 0.91 inch
```

Pressing Enter moves the screen to the next parameter as shown below.

```
Max Den. : 145 PCF
<Yes> to Change
<Enter> to Continue
<Esc> to Save
```

Selecting Yes allows the user to change the Max Density as shown in the screen below. A blinking cursor will be on the first digit. Use the numeric keys to enter a value.

```
Enter Value for
Max: 145.0
<Enter> to Accept
<Esc> to Exit
```

Mat thickness (labeled Depth) is similar to entering the Max Density. Once the correct parameters have been entered and Esc is selected the following screen is displayed.

```
Enter Mix Name

<Yes> to Advance
<Enter> to Accept
```

Enter the mix name using the numeric keypad.

10. Density Offset

Accuracy can be improved by measuring the pavement density using core(s) and adjusting the density measured by the gauge, i.e. to offset the calibration of the gauge.

To use the density offset, select a specific mix or simply the factory calibration, and choose the multiple reading mode.

The density offset value is equal to the average difference between the NoNuke measured density values and average density values obtained by analyzing core(s). For best results, it

is recommended that five core locations are tested with the gauge and compared to the results from the core analysis (AASHTO T343). For offset calibration, set the reading mode to **Multiple Readings** using 5 readings at each core location.

Make sure the area you want to use for calibration is flat and dry. Place the NoNuke on the pavement and move after each reading in a pattern similar to figure 6.1 to get a representative measurement of the spot by moving the gauge to locations 2,3,4 and 5, just move gauge 3 to 4 inch from center of first position up, right, down and left respectively.

Gauge will display the average density. Record the average reading for each core spot from the NoNuke gauge.

Compare the average gauge readings for all locations to the average of all core density values for the same locations. The difference between these results is what should be used for Density Offset. The difference can be positive or negative.
If gauge readings are higher than the core readings, the offset will be negative. If gauge readings are lower than the core results, the offset will be positive. To add an offset, go to **Menu.**

Then, **Press 2**.

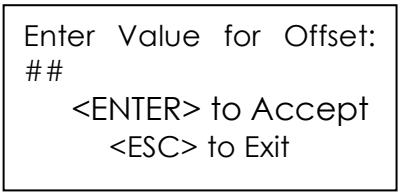
```
1. ON/OFF
2. Offset Value

      <ESC> to Exit
```

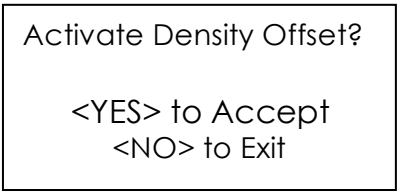
Press 1 To enable the offset mode. Then **Press 2.**

```
Density Offset:
## PCF
   <YES> to Change
     <ESC> to Exit
```

Press YES to change the offset value.



Input the calculated offset value and **press ENTER** to procced.



Note: The minus key **<->** is also the **<DOWN>** key. The decimal point is entered by holding the **<0>** key down for over one second. To backup and change the offset, the Clear Entry key **<CE>** is used.

After changing the offset value, you are asked whether Density Offset should be activated or not. **Press YES** to activate or **NO** to exit. To avoid using the wrong offset value on another project, when gauge is moved between sites, Gauge Offset is disabled after using the OFF key to turn the gauge off. This will ensure the incorrect offset is not inadvertently used on a project.

11. Project Storage and Printing

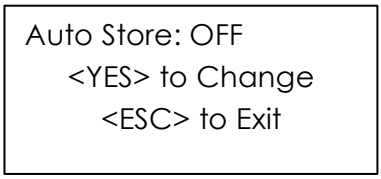
The NoNuke is equipped with data storage capability. Up to 25 Projects and more than 100 stations (readings) per project can be stored in the NoNuke. The stored data can be printed or transferred into a USB external drive located on the front panel.

Project Storage

There are several ways to store data in the NoNuke, You can enable Auto Store by pressing the Project key and selecting or creating a new project name. Once you turn the Auto Store on and select a project, the gauge will automatically store each reading under the selected project and each reading will be sequentially numbered. The second way to store data is to select a project or create a new project and press the store key after each reading. This will allow you to store the data you want to store and report. The gauge will also allow you to store data at any point during the project by simply pressing the Store key.

To access this feature and start a new project **press** the **Project** key:

Select 1 to enable/disable auto storage.



Press YES to change or **ESC** to exit. Choose **Auto Store: ON** to enable once you enable Auto Store, setup a new project or select a project that has already been setup. This will allow the gauge to store the data under a desired project name. Here you can also choose the starting station number. The gauge will increase the station number by one automatically as you continue taking readings, when Auto Store is turned on.

To store data manually, make sure the Auto Store feature is turned off. Press the Project key and enter a new project name or select one that has already been created. After completing a test, **press** the **STORE** key. The gauge will promote you to enter a station number. After you enter a station number, the gauge saves the data for future review and reporting.

Note: the design of the project and data storage in NoNUke is similar to setting up folders and file names in our PC. Project name is the same as setting up a folder and station number is the same as saving a file name.

To manually store data, press **PROJECT**:

```
1. Auto Store
2. Start New Project
   UP/DOWN for Next
      <ESC> to Exit
```

Select 2 to start a new project.

```
Enter Project
Name:
    <YES> to Accept
      <ESC> to Exit
```

Press each alphanumeric key repeatedly to select a desired letter. Advance to next letter by pressing another alphanumeric key or the **YES** key. Press **ENTER** to accept the Project name. For example, Project name can be Name of project, Project location, Project Date, Company…etc.

Once you have setup a new project, you can select to have the station number increase sequentially after each reading or you can enter the station number manually before you start each reading. If you select the Auto (Sequential) you can also select the starting station number.

```
Station Name Mode
1. Auto (sequential)
2. Manual Entry
    Select #, ESC Exit
```

Select 1 to automatically increment station numbers within the project.

```
Starting Station
Number: ##
  <ENTER> to Accept
    <ESC> to Exit
```

Input the desired starting station number and **press ENTER**. When Auto is selected, the station numbers will increment to the next higher number from the starting station number.

Select 2 to manually enter the station Identification. For example, core location, Time, Station #, Material… etc.

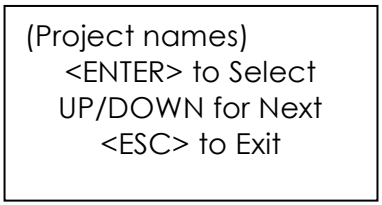
```
Auto Store: OFF
   <YES> to Change
     <ESC> to Exit
```

To use an existing Project, **press 3 in the PROJECT Screen**.

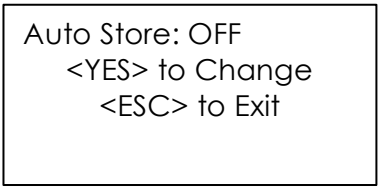
```
1. Auto Store
2. Start New Project
  UP/DOWN for Next
     <ESC> to Exit
Select #, ESC Exit
```

Scroll DOWN 1 screen.

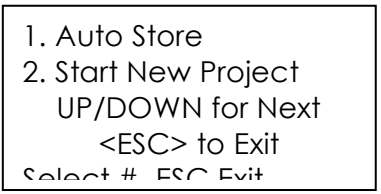
```
3. Sel. Stored Proj.
4. Review Project
  UP/DOWN for Next
     <ESC> to Exit
Select #, ESC Exit
```

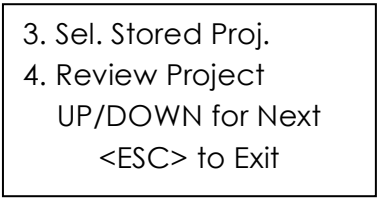


Select a stored project from the list by **scrolling UP/DOWN** through the choices and then **press ENTER**. After selecting the stored project, NoNuke will allow you to either enable or disable auto storage for this project.

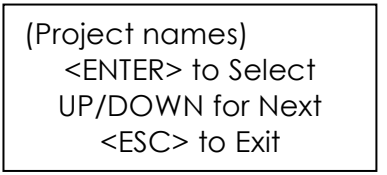


To review data for a project, **scroll DOWN** 1 screen **in the PROJECT Screen**.

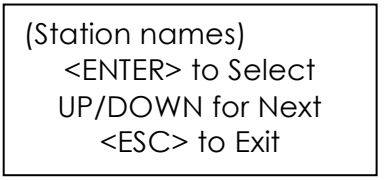




press 4:



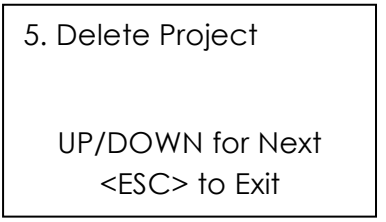
Scroll UP/DOWN and **select** the project to review.

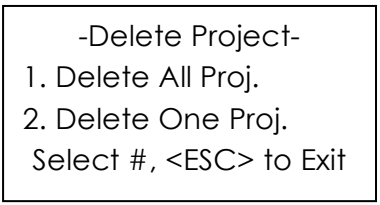


Scroll UP/DOWN and select the station to review. Then **press ENTER** and review the stored station data.

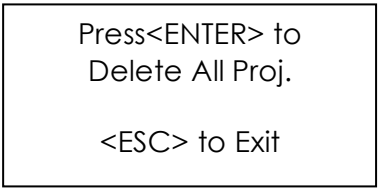
To delete data for a project, **scroll DOWN** 2 screens in the main Project screen and **press 5**:

:

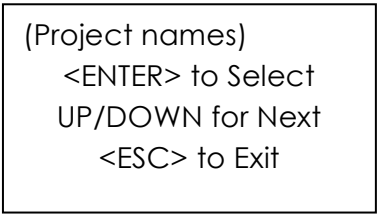




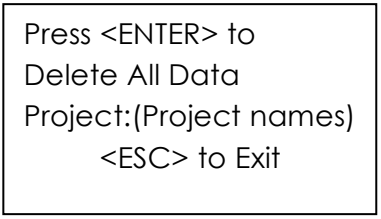
Press 1 to delete all Projects and data.



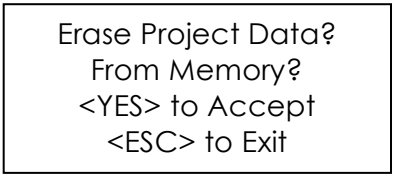
Press 2 to delete a specific project. **Scroll UP/DOWN** and select the project to review.



Select the project and **press ENTER**.

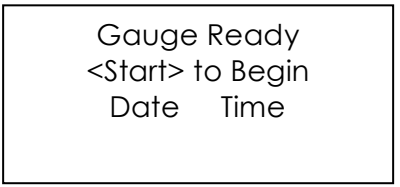


Press ENTER to delete the project. Finally, NoNuke asks for final confirmation to do the task.



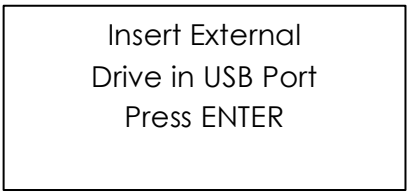
To store and Send Data to USB

Go the main Gauge Ready screen:



press the **PRINT** key.

To print all projects on a USB drive, **press 1**.



To print a specific project on a USB drive, **press 2**.

(Project names) <ENTER> to Select UP/DOWN for Next <ESC> to Exit

Scroll UP/DOWN and **select** which data you would like to save and **press ENTER**. **Insert** a USB drive and **press ENTER**.

12. GPS

To preserve battery life the GPS module is normally turned off. To turn the GPS module on or off complete the following steps.

Press the **MENU** button; the first screen will be:

-MENU- 1. Verification 2. Density Offset 3. Reading Mode

Scroll **DOWN** 3 screens.

-MENU- 10. GPS 11. Bluetooth 12. Diagnostics

Press 10.

GPS: OFF <YES> to Change <ESC> to Exit

To change, **press YES**, otherwise, **press ESC**. When the GPS is on, "N", "F", or "E" is shown on top the screen. "N" means the GPS is searching for satellites, "F" means that the position is fixed, and "E" means there is a communication error. If the "E" warning occurs, turn the gauge off and then on again. When the GPS module is enabled, longitude, latitude and altitude data is provided with every measurement and can be displayed and stored with density, % compaction and other mix information.

13. Keypad Sound

To turn the sound on or off complete the following steps.

Press the **MENU**; the first screen will be:

```
-MENU-
1. Verification
2. Density Offset
3. Reading Mode
```

Scroll DOWN 2 screens.

```
-MENU-
7. Set Time/Date
8. LED Backlight
9. Keypad Sound
```

Press 9.

```
Keypad Sound:  ON

<YES> to Change
<ESC> to Exit
```

To change, **press YES**; if not, **press ESC**.

14. LED Backlight

LED light can be turned on for ease of viewing at night. When LED light is on, the gauge display and keypad will light up. To turn LED backlight on or off complete the following steps.

Note: The batteries will consume 4 times more power when the LED backlight is on. The gauge will have to be charged more often when using the LED Backlight.

Press the **MENU**, the first screen will be:

```
-MENU-
1. Verification
2. Density Offset
3. Reading Mode
```

Scroll DOWN 2 screens.

```
-MENU-
7. Set Time/Date
8. LED Backlight
9. Keypad Buzzer
```

Press 8.

```
LED Backlight:  ON

<YES> to Change
<ESC> to Exit
```

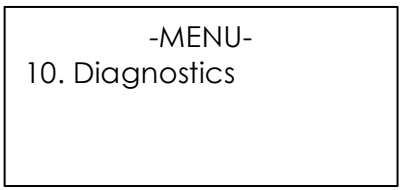
To change, **press YES**; otherwise, **press ESC**.

15. Diagnostics

This menu item allows checking of the sensors, capacitance readings, SD storage test, USB test, GPS test, Battery Voltage, Temperature, Factory Calibration, Serial # details, Update Firmware, memory reset, and extended tests. The extended test module is provided for customized extended additional tests and further diagnostics by trained technicians. Some of the items in this module requires an access code. Diagnostic functions that require an access code should be performed by a trained technician or under InstroTek's instructions. To access the diagnostics module complete following steps:

Press the **MENU**; the first screen will be:

Scroll DOWN 3 screens.



Press 10 to access the diagnostics functions of the gauge.

Below, each item in the Diagnostics module is described:

1. **SD Test:** The internal SD card is used for project storage. This function has various tests to test the SD card.

2. **USB Test:** This function is used to test the data port and the compatibility of a USB storage device. Some USB drives (especially larger USB 3.0 drives) are not compatible with the USB controller in the NoNuke gauge.
3. **GPS Test:** This function displays the information received from the GPS module.
4. **Battery Volt.:** Measures the voltage of the rechargeable batteries.
5. **Temperature:** Measures the internal and external temperatures.
6. **Enter Serial #:** Sets the gauge serial number.
7. **Update Firmware:** If InstroTek releases a new firmware version, the gauge firmware can be updated using this function. Place the file NoNukeUpdate.cyacd (available from InstroTek) on a compatible USB drive. Insert the USB drive into the Data port and go to the Update Firmware menu. Follow the instructions to read the file from the USB drive and update the gauge's firmware.
8. **Reset Memory:** Resets the internal gauge memory to factory default values. This should only be done after consulting InstroTek service department.
9. **Extended Test:** Extended test module is provided for customized, extended additional tests and further diagnostics by trained technicians.
10. **Meas. Sys. Test:** Checks that the internal sensor electronics are working.

16. Bluetooth and Android Software

NoNuke Android software provides another platform for the operator to connect to NoNuke, to review and print project reports. To use the software, the NoNuke software must be downloaded and installed on a tablet. Bluetooth in the NoNuke must be turned on.

To turn the Bluetooth on or off complete the following steps:

Press the **MENU** button. The first screen will be:

```
-MENU-
1. Verification
2. Density Offset
3. Reading Mode
```

Scroll **DOWN** 3 screens.

```
-MENU-
10. GPS
11. Bluetooth
12. Diagnostics
```

Press 11.

```
Bluetooth:  OFF

<YES> to Change
<ESC> to Exit
```

To change, **press YES**, otherwise, **press ESC**. When the Bluetooth is on and the NoNuke is connected to a tablet, "B" is displayed on the top of the screen.

The next step is to install the NoNuke software on the tablet. The software is available for free on the Google Play store.

To install the App:

1. Open the Google Play app on your device.
2. Search for InstroTek.
3. Select the "InstroTek Inc. NoNuke" icon.
4. Follow the onscreen instructions.

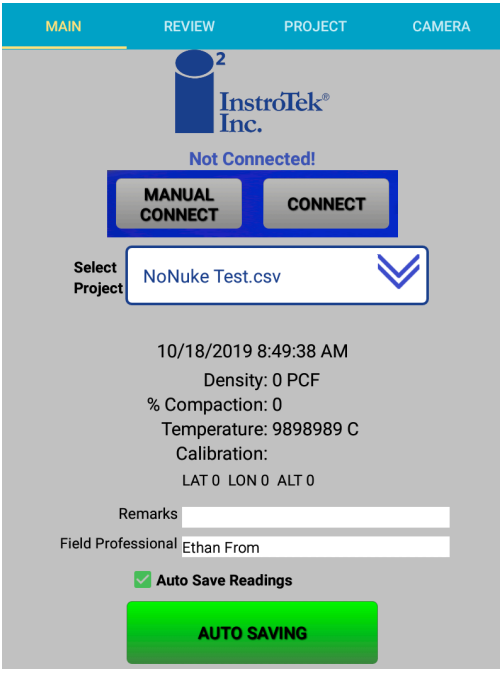
To open and start the software:

1. Follow your device's manual to access Apps on your device.
2. The software saves all the files in the "Documents" folder.
3. Tap the NoNuke Icon to start the application.

To connect to a NoNuke:

1. You must first pair with the device before you can receive any results. For this purpose, follow your device manual to pair with Bluetooth devices.
2. When the app has been installed and opened, the available NoNukes will be shown in the dropdown list. Select the one you wish to connect to and **press** the **CONNECT** button.

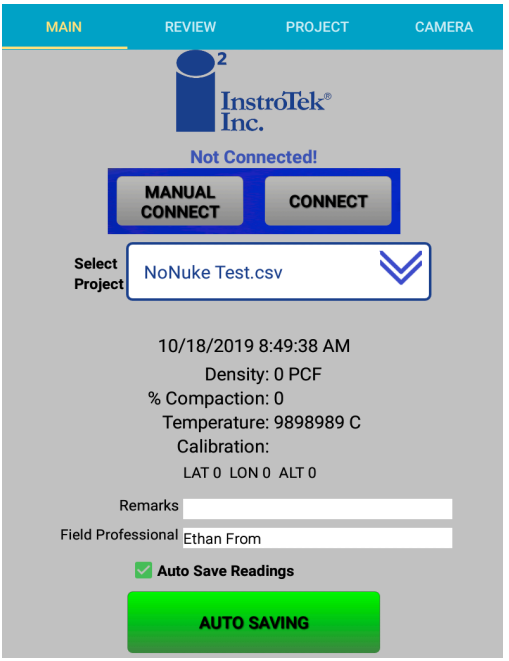
3. After you connected to a NoNuke, you will see following screen:



The next time you start the application, it will automatically connect to this NoNuke.

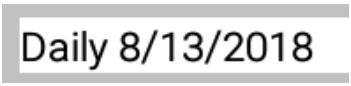
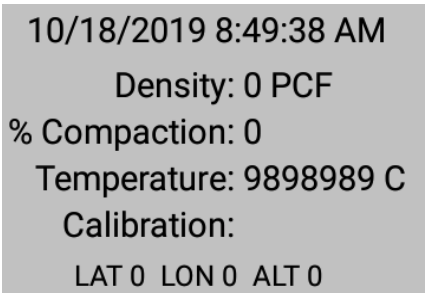
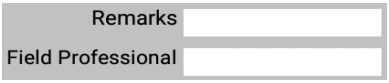
To use the application:

After connecting to a NoNuke the following screen will be shown:



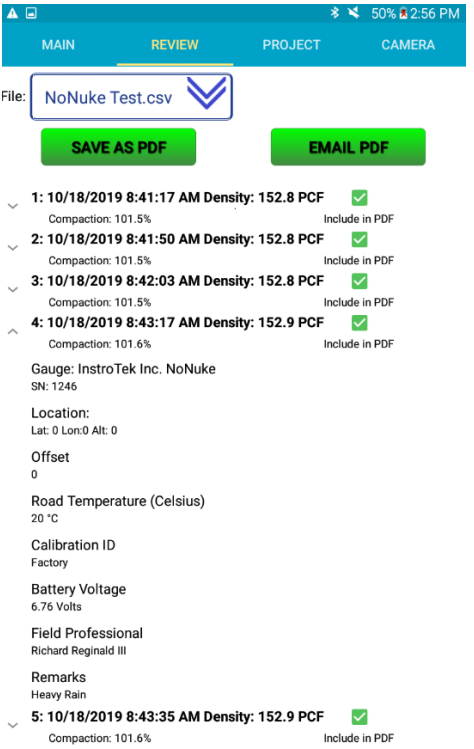
Across the top of the screen are 4 tabs. They are described below:

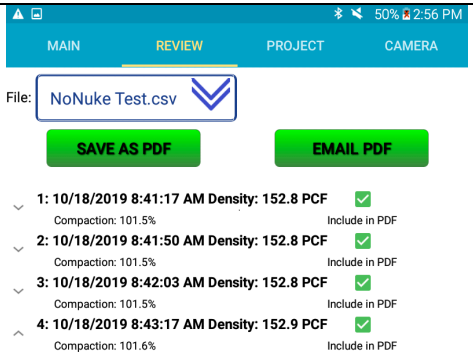
a) Main: This is the main application where the results of each test are displayed. You must **press** the **START** button on the gauge to take a test. When the test has finished, the results will be displayed on this screen.

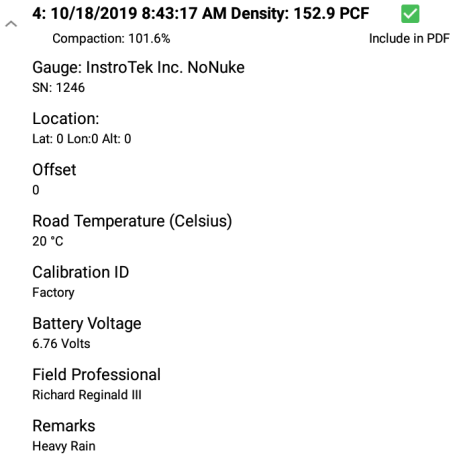
The "Recall" button will recall the results of the last test from the gauge. The "Disconnect" button will allow you to disconnect from the gauge, permitting you to connect to a different gauge.	
This is the projects name. Any subsequent tests will be saved under this name in the download folder of your device.	
This section displays the test results. All the values are calculated in the App from information collected in the gauge. Notice the battery voltages on the top line.	
These 2 fields are for user data entry. Enter your name in the "Field Professional" box. The information in these fields will be stored with each subsequent test taken.	

Check the box to automatically save the test	
Press the button to save the currently displayed results to the project. Pressing this button with "Auto Save" checked will save a duplicate reading.	

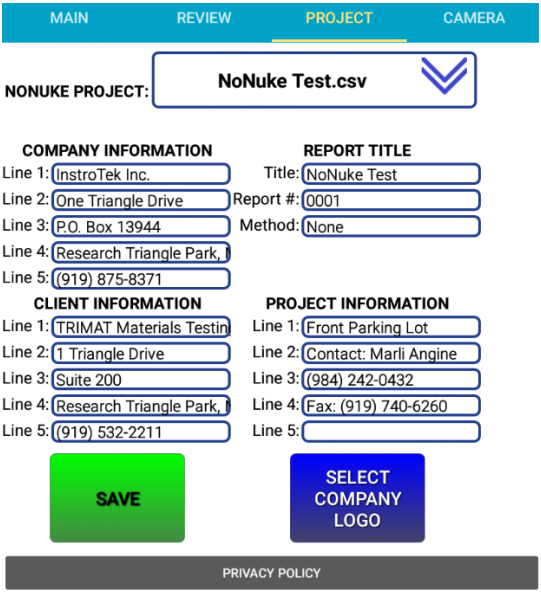
b) Review:



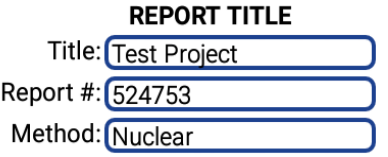
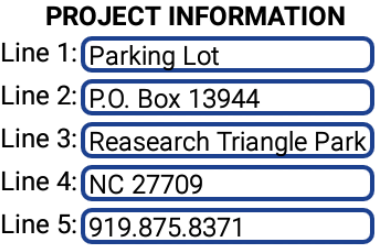
You can review all the projects stored on your device from this page.	
Select the file you wish to view from this dropdown list.	
Pressing this button will save the currently selected project as a PDF in the download folder of your device.	
Pressing this button will open the default EMAIL application on your device. You will have to navigate to your download folder and manually attach the PDF to the email you want to send to any receipient.	
Each test result displays the date, time, density and %compaction. To the right of this is a	

checkbox. Check it to include the result in the PDF and uncheck it to exclude it from the PDF.	
Clicking the arrow to the left of the entry will show additional details of the result.	

c) Project Information: On this page, you can enter pertinent information for the current project.

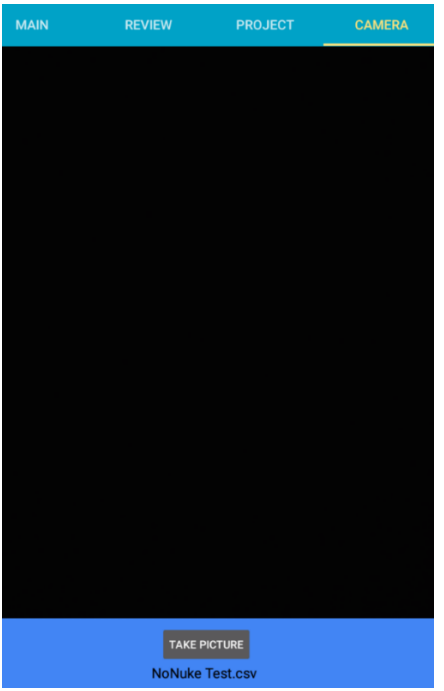


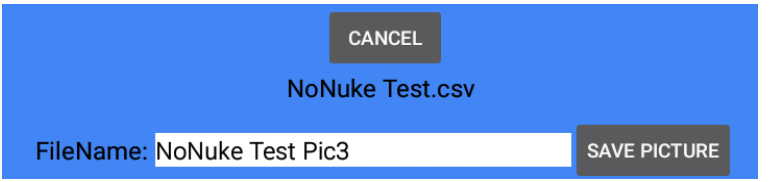
Use these fields to enter your company's information. This will be displayed on the PDF.	**COMPANY INFORMATION** Line 1: InstroTek Inc. Line 2: One Triangle Drive Line 3: P.O Box 13944 Line 4: Reasearch Triangle Park Line 5: 919.875.8371

Use these fields to enter your client's information. This will be displayed on the PDF.	
Use these fields to enter your report information. This will be displayed on the PDF.	
Use these fields to enter your project information. This will be displayed on the PDF.	
Press this button to save the above data.	

Press this button to load a company logo that will appear on the PDF. It should be a bitmap with the dimensions: width=131 pixels and height=71 pixels.	

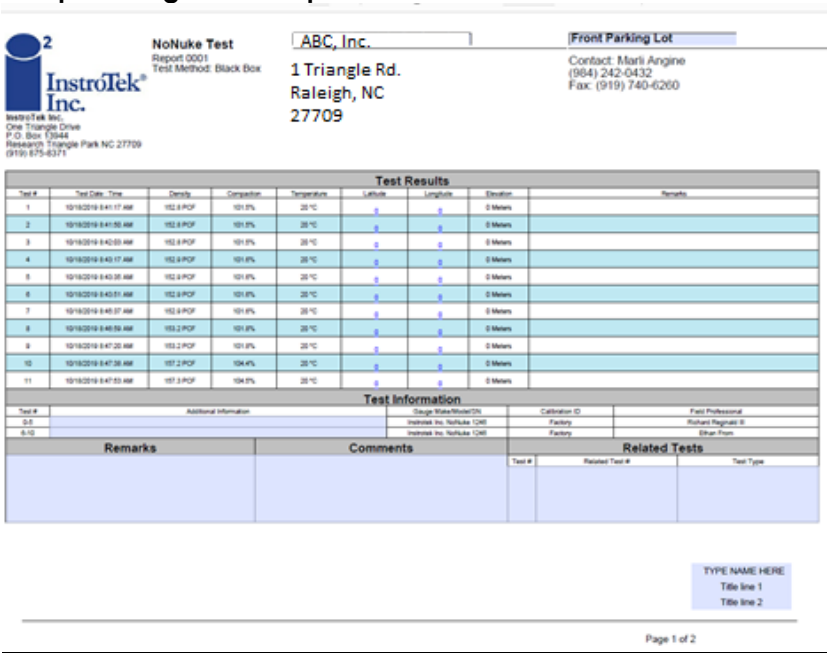
d) Camera: On this page, you can take a picture of the area you are testing for the current project. Press the button to take a picture.





Press "Save Picture" to save it or "Cancel" to try again.

Sample Gauge Data Report:



InstroTek Inc.
One Triangle Drive
P.O. Box 13944
Research Triangle Park NC 27709
(919) 875-8371

NoNuke Test
Report 0001
Test Method: Black Box

ABC, Inc.
1 Triangle Rd.
Raleigh, NC
27709

Front Parking Lot
Contact: Marli Angine
(984) 242-0432
Fax: (919) 740-6260

Test Results

Test #	Test Date - Time	Density	Compaction	Temperature	Latitude	Longitude	Elevation	Remarks
1	10/18/2019 8:41:17 AM	152.8 PCF	101.5%	20 °C	0	0	0 Meters	
2	10/18/2019 8:41:50 AM	152.8 PCF	101.5%	20 °C	0	0	0 Meters	
3	10/18/2019 8:42:03 AM	152.8 PCF	101.5%	20 °C	0	0	0 Meters	
4	10/18/2019 8:43:17 AM	152.9 PCF	101.6%	20 °C	0	0	0 Meters	
5	10/18/2019 8:43:35 AM	152.9 PCF	101.6%	20 °C	0	0	0 Meters	
6	10/18/2019 8:43:51 AM	152.9 PCF	101.6%	20 °C	0	0	0 Meters	
7	10/18/2019 8:45:37 AM	152.9 PCF	101.6%	20 °C	0	0	0 Meters	
8	10/18/2019 8:46:59 AM	153.2 PCF	101.8%	20 °C	0	0	0 Meters	
9	10/18/2019 8:47:20 AM	153.2 PCF	101.8%	20 °C	0	0	0 Meters	
10	10/18/2019 8:47:39 AM	157.2 PCF	104.4%	20 °C	0	0	0 Meters	
11	10/18/2019 8:47:53 AM	157.3 PCF	104.5%	20 °C	0	0	0 Meters	

Test Information

Test #	Additional Information	Gauge Make/Model/SN	Calibration ID	Field Professional
0-5		Instrotek Inc. NoNuke 1240	Factory	Richard Reginald III
6-10		Instrotek Inc. NoNuke 1240	Factory	Ethan From

Remarks	Comments	Related Tests		
		Test #	Related Test #	Test Type

TYPE NAME HERE
Title line 1
Title line 2

Page 1 of 2

17. Specifications and Appendices

Specifications:

- Meets and exceeds the requirement of ASTM D7113 and AASHTO T343
- Gauge performance Verification
- Non optimum gauge contact to surface warning
- Download reports to external devices via USB or Bluetooth
- GPS for Precise Location Data
- Latest software updates via USB flash drive
- 2GB of internal storage for easily reviewing and managing project data in the gauge

- **LCD Display:** Easy to read 4x20 character LCD with backlight
- **Project Storage:** Stores up to 25 detailed mixes and projects
- **Data Logging:** Log data to USB storage
- **Reports:** Downloadable via USB or Bluetooth
- **Location:** GPS for precise location data
- **Remote Software Updates:** Quickly update software by USB, No need to send gauge back to manufacturer
- **File Storage:** 2GB of storage
- **Data Management:** Easy review, delete or download of projects
- **Time and Date:** Setup time and date
- **Units:** Density (gr/cm^3, kg/m^3, lb/ft^3)
  Temp (°C, °F)
  Aggregate Size (mm, in)
- **Verification:** functionality check of the gauge
- **Contact warning:**
  Non optimum gauge contact to surface warning
- **High Moisture presence warning:**
  Pavement moisture presence warning
- **Power:**
  6 AA Rechargeable Nickel Metal Hydride
- **Battery Life:**
  40 to 60 Hours, Depending on Usage
- **Reading Modes:**
  Single reading
  Multiple readings: Average of Five or more Readings to Ensure Highest Degree of Accuracy. Default average number is 5.
- **Displayed Parameters:**
  Density, % Compaction, Surface Temperature, and Project ID
  Offset value: Using cores to offset readings
- **Measurement Area:**
  13" diameter Sensor Size

- **Depth of Measurement:**
  Surface to 3 in. (75mm), over 97% from the top 1.5 inch (38 mm)
- **Quick Count Button:**
  Button on Handle to Take Count
- **ASTM:**
  D7113
- **AASHTO**
  T343
- **Weight:**
  20.75lbs (9.41kg)
- **Dimensions:**
  11in (28cm) H x 18in (46cm) L x 14in (3506cm) W
- **Shipping Weight in Case:**
  44.65lbs (20.25Kg)
- **Shipping Dimensions:**
  24.6in (62.5cm) x 19.7in (50cm) x 14.4in (36.6cm)

18. Index

19. Warranty

InstroTek extends a 1-year limited warranty on the NoNuke gauge to the original purchaser of this equipment. This warranty covers defects in material, workmanship, and operation under the conditions of normal use and proper maintenance. This warranty includes all components except for the normal wear components including all accessories, shipping case, seals, batteries, and Verification plate.

InstroTek will replace, free of charge, any part found to be defective within the warranty period.

This warranty is void if inspection shows evidence of abuse, misuse, or unauthorized repair.

This warranty covers replacement of defective materials and workmanship only. It does not cover shipping charges, duties, or taxes in the transport to and from the factory or authorized service center.

InstroTek's liability is in all cases limited to the replacement price of its products. InstroTek shall not be liable for any other damages, whether consequential, indirect, or incidental arising from use of its product.

If return of the product is necessary, please obtain a Return Authorization Number from InstroTek and include this number with your shipment.

Please call InstroTek, Inc. for shipping details at (919) 875-8371.

Contact Information

Contact us for top quality, best value and superior service!

email: **sales@instrotek.com** ✦ visit: **InstroTek.com**

CALL A LOCATION NEAR YOU:

Headquarters: **Research Triangle Park, NC** phone: **919.875.8371**

Bensalem, PA phone: **215.645.1064** ✦ **Grand Rapids, MI** phone: **616.726.5850**

Denver, CO phone: **303.955.5740** ✦ **Austin, TX** phone: **512.452.8848**

Las Vegas, NV phone: **702.270.3885** ✦ **Concord, CA** phone: **925.363.9770**