

# Model GK-604D

## Digital Inclinometer System

### Quick Start Guide

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#### 1. INTRODUCTION

The GK-604D Digital Inclinometer System is made up of four components: An Inclinometer Probe, the Readout Unit, the Remote Module, and a Pulley Assembly (Figure 1).



**Figure 1:** Model GK-604D Digital Inclinometer System

GEOKON makes every effort to ensure that the GK-604D system is completely set up and working before it leaves the factory. If using an Android device that was not provided by GEOKON as the readout unit, refer to the GK-604D instruction manuals for information on how to install the GK-604D Reader Application and pair the device with the Remote Module.

For more detailed information than is provided in this Quick Start Guide, please refer to the Model GK-604D Instruction Manuals.

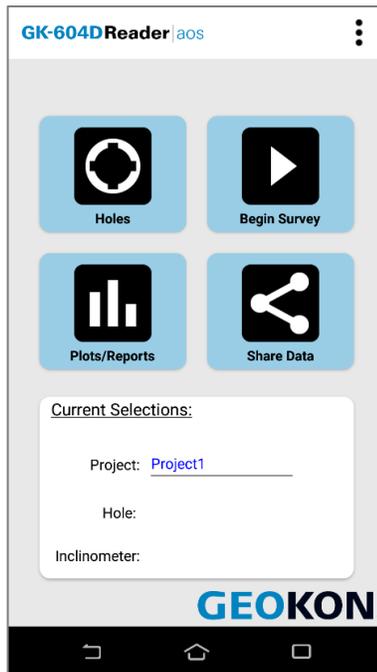
#### 2. STARTING THE GK-604D READER APP THE FIRST TIME

Begin by powering on the readout unit. The GK-604D readout software is launched by entering the Android *Apps drawer* and then selecting the GK-604D Reader icon (shown right).



When starting the application for the first time, the user will be prompted to grant certain permissions. Tap "ALLOW" to grant the permissions and open the application. (Tapping "DENY" will cause the application to close.)

After file access permission is granted, the Main Screen is shown (Figure 2).

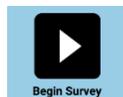


**Figure 2:** Main Screen

The GK-604D Reader Main Screen contains several “Button” and menu controls designed to make it easy to select features of the application. These controls are described in brief below.



The “Holes” button causes the “Holes” screen to be displayed. This screen allows holes to be created, selected, and edited. The process of creating a new hole is covered in Section 2.1.



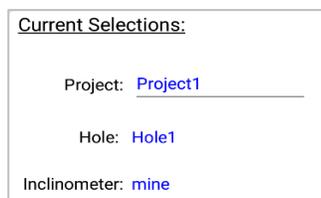
The “Begin Survey” button is used to connect the Remote Module to the Readout Unit (Section 2.2) and conduct a survey (Section 3).



Tapping the “Plots/Reports” button displays the “Plots/Reports” selection screen. See Section 4.



Tap the “Share Data” button to export survey data to a file or share it via email. See Section 5.



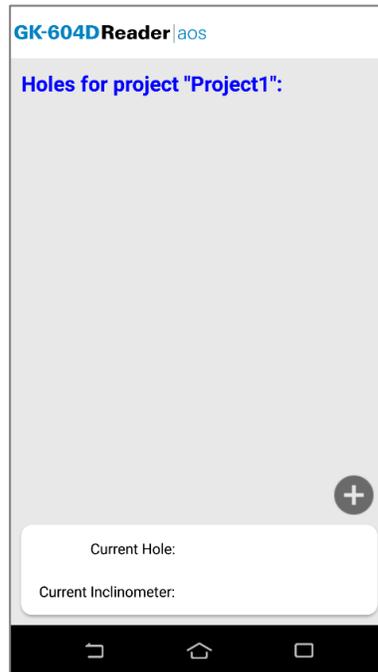
The “Status” pane of the Main Screen displays the currently selected elements of the Reader application, including the Project, Hole, and Inclinometer Probe. The project can be changed by tapping the project name. The user will then be prompted to select a different hole.

Additional functions are available from the Main Screen “kebab” menu. These items are described in the GK-604D Reader Application manual.

## 2.1 CREATING A NEW “HOLE”

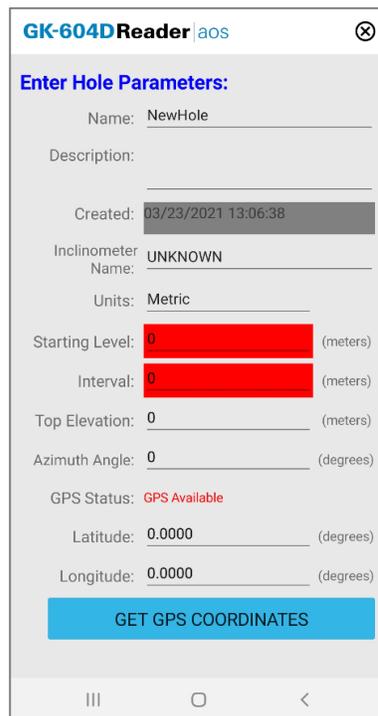


“Holes” are contained within “Projects”. A default project is created automatically when the app is first launched. Since most boreholes are unique, no default “Hole” is created. To create a new Hole, tap the Holes button on the Main Screen to open the “Holes” screen (Figure 3).

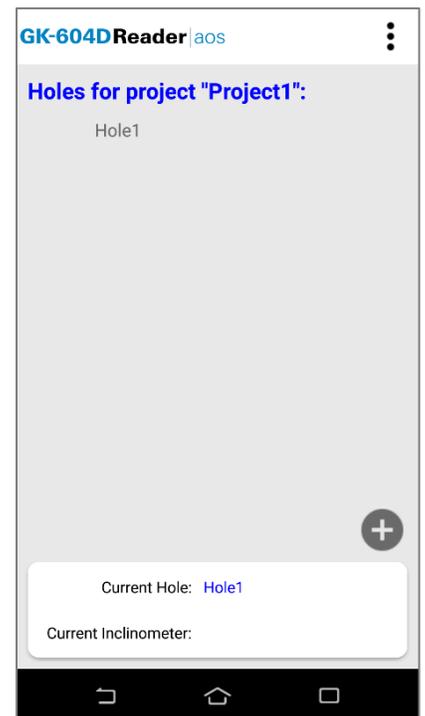


**Figure 3:** Holes Screen

Tap the **+** icon to open the Hole Editor screen (Figure 4). Enter a Name, Units, Starting Level, and Interval then tap the back button to save the Hole (Figure 5). Tap the back button again to return to the Main Screen.



**Figure 4:** Hole Editor Screen



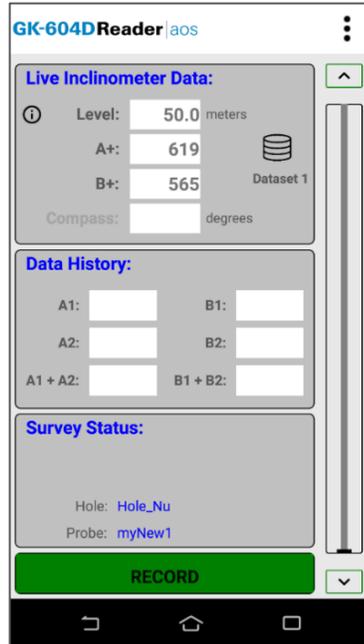
**Figure 5** Holes Screen (with new "Hole 1" shown)

## 2.2 CONNECTING TO THE REMOTE MODULE



Press the "Power On/Off" button on the Remote Module (cable reel). The blue light on the Remote Module will begin to blink. Next, tap the "Begin Survey" button on the Main Screen to initiate the Remote Module connection process.

After a successful connection, the blue light on the Remote Module will remain lit and the “Live Readings” screen (Figure 6) will be displayed on the Readout Unit.



**Figure 6:** Problem Connecting

### 2.3 ENABLE COMPASS SURVEY

All GEOKON Inclinometer probes manufactured after 2015 have a built-in compass. The compass sensor, coupled with two axes of MEMS, allows a compass survey of the selected hole to be performed at the same time as the inclinometer survey. For optimum accuracy, the digital inclinometer/compass probe should be calibrated for each survey site.

To access the compass calibration screen, tap the “kebab” menu button in the upper right corner of the Live Readings screen, then select “Calibrate Compass”. Follow the onscreen instructions to calibrate the compass. (Make sure to hold the probe in an upright position during the calibration.)

After completing the calibration, the Live Readings Screen will be displayed. Tap the “kebab” menu button and then select "Enable Compass Survey". With the compass enabled; an inclinometer survey will take approximately 30% longer and:

- A+ data is always in degrees.
- and B- are always zero (0)
- B+ data is always 90 degrees greater than A+

**Note:** The compass is very sensitive to nearby ferrous metals. Any section of the well that contains a metal casing will not yield accurate compass headings.

## 3. CONDUCTING A SURVEY

The following is a synopsis of the steps involved in taking a survey of the inclinometer casing:

1. Use a clean working surface. If necessary, create a clean surface by placing a tarp around the top of the inclinometer casing. This reduces potential for debris to be collected on the inclinometer equipment and transmitted into the casing.
2. Attach the cable to the probe making sure that the connector is clean and the O-ring undamaged. Replace the O-ring if damaged. Tighten the connector hand-tight to ensure that the O-ring is compressed and watertight.

3. Attach the pulley assembly to the top of the casing. If using a casing extension, attach the pulley assembly to the top of the extension. Use of the pulley assembly is highly recommended, as it reduces fatigue on the user during monitoring and it helps provide repeatable and consistent placement of the probe at each reading interval, which improves measurement accuracy.
4. Align the probe so that the uppermost wheel fits into the casing groove that faces the direction of the anticipated movement (in the case of a slope this would be downhill, or, in the case of a shoring wall, in the direction of the excavation).
5. Remove the wheel from the pulley assembly. Compress the probe's wheel assemblies as the probe is introduced into the casing and lower the inclinometer probe into the casing. Slowly lower the probe and cable down through the casing, exercising care not to let the probe strike against the bottom of the hole to reduce the potential for damage to the probe.
6. Place the wheel into the pulley assembly and lift the inclinometer until the first cable marker sits in the groove located in the metal plate on top of the pulley assembly (or sits in the cable hold if a cable hold is being used). Allow for at least 6 inches of clearance from the bottom of the probe to the bottom of the casing. If using telescoping sections in the casing, allow for an additional 6 inches of clearance for each telescoping section installed.
7. Allow the probe to rest in this position for about 10 minutes. This allows the electronics in the probe to acclimate to the temperature in the casing and will reduce the potential for bias-shift errors caused by thermal differences in the probe between the first and second pass.
8. During this 10-minute period, switch on the FPC-3 and then launch the GK-604D Reader | aos application. Follow the instructions for setting up a new "hole" casing as indicated in Section 2.1. For new casings, take note of the starting depth indicated on the cable (typically where the cable is supported) and the reading intervals (half-meter / two foot). End depth is zero by default.
9. If an existing "hole" casing has been previously saved in the GK-604D Reader | aos database, select it from the app in the "Holes" page. After the 10-minute "soak" period has expired, turn on the Remote Module (blue light blinking) and tap on the Begin Survey menu, then press "OK" at the prompt to display the Live Readings Page.

Make sure "Dataset 1" is shown in the upper right portion of the screen. If "Dataset 2" is displayed, tap the Dataset button to select "Dataset 1".

10. Take the first reading by tapping the "RECORD" button then pull up on the cable until the next cable marker sits in the groove located in the metal plate on top of the pulley assembly (or sits in the cable hold if a cable hold is being used). After the readings have stabilized, take another reading.

As the cable is being pulled up and out of the casing, place it on the tarp (or clean surface) to the side of the borehole. The cable should be collected in a figure eight-shaped arrangement on the ground (or tarp). This process will reduce the potential for damage to the cable. Do not wind the cable back onto the reel during this process, as repeated and continued winding of this cable in the same direction will cause the cable to spiral and lead to kinking or damage to the internal leads of the cable.

11. Continue in this way until the top marker is reached, then remove the wheel from the pulley assembly, and pull the inclinometer probe out of the hole.
12. Rotate the probe 180 degrees, so that the uppermost wheel is aligned with the grooves of the A- direction (opposite of the first pass). Carefully lower it to the bottom of the hole, and then pull the cable up to the first reading depth.

13. Allow for a few minutes (up to 5 minutes) for the probe to stabilize. The probe should be mostly acclimated to the temperature in the casing, unless the probe was out of the casing for an extended period following the first pass. Tap the Dataset button to select "Dataset 2".
14. Repeat steps 10 through 12.
15. Tap the back button to exit the Live Readings Page. A prompt will be displayed asking if the user would like to save the data. Tapping "Yes" will cause the reel to shut down and the main page to be displayed on the GK-604D Reader | aos app.
16. Disconnect the probe from the signal cable, wiping any moisture from both, then attach protective caps to the probe and the cable. Collect the pile of inclinometer cable and flip it over on the tarp. Retract the cable back onto the reel. If the cable is difficult to manage and get back on the reel without causing kinked sections, it is suggested to lower the cable (without probe and with end cap) back into the inclinometer casing to allow it to release some of the twist it may have developed, and then wind in up on the reel.
17. Wipe down the probe after each use. Spray a light lubricant (WD-40, or similar) on the springs, wheel assemblies, and yokes prior to placing in the protective carrying case. Do not apply this lubricant to the electrical connection end of the probe.

Please consult the GK-604D Instruction Manuals for more information on the GK-604D System and GK-604D Reader Application.