



GEOM20015
Sensing and Measurement

Leica TS10 – Feature Survey

Assignment 3 supplementary material

25 August 2023



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Introduction

This is a supplementary material for Assignment 3. It is designed to help you find the total station Leica TS10 functions you will need to complete the assignment.

Electronic bubble

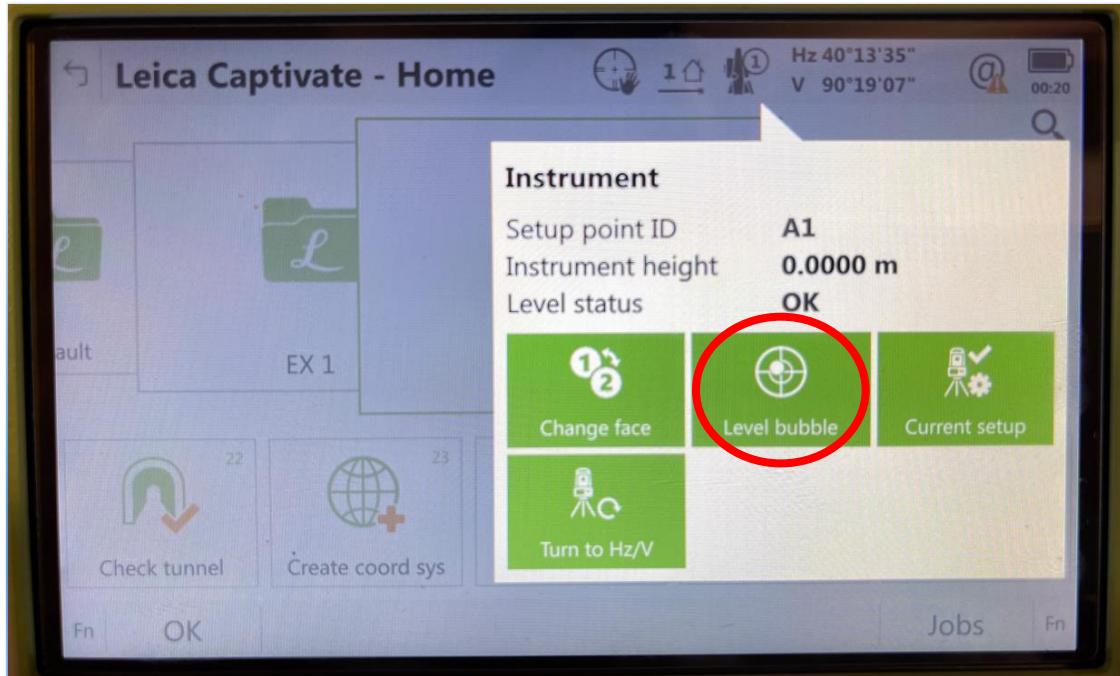


Figure 1. Accessing the electronic bubble.

Job set up

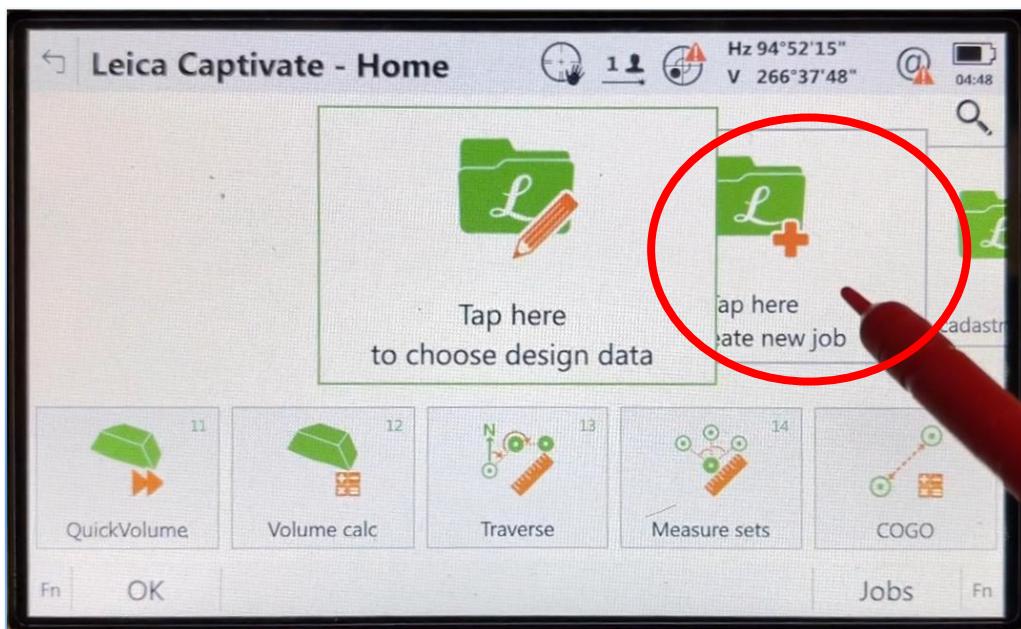


Figure 2. Creating a new job from the Home menu.

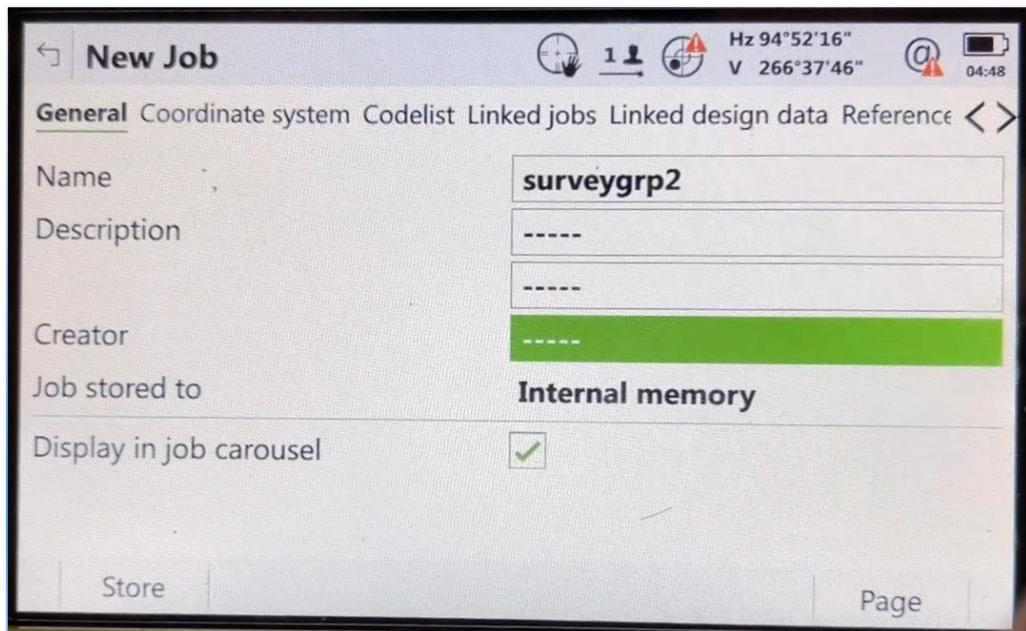


Figure 3. Job description – enter fields as necessary.

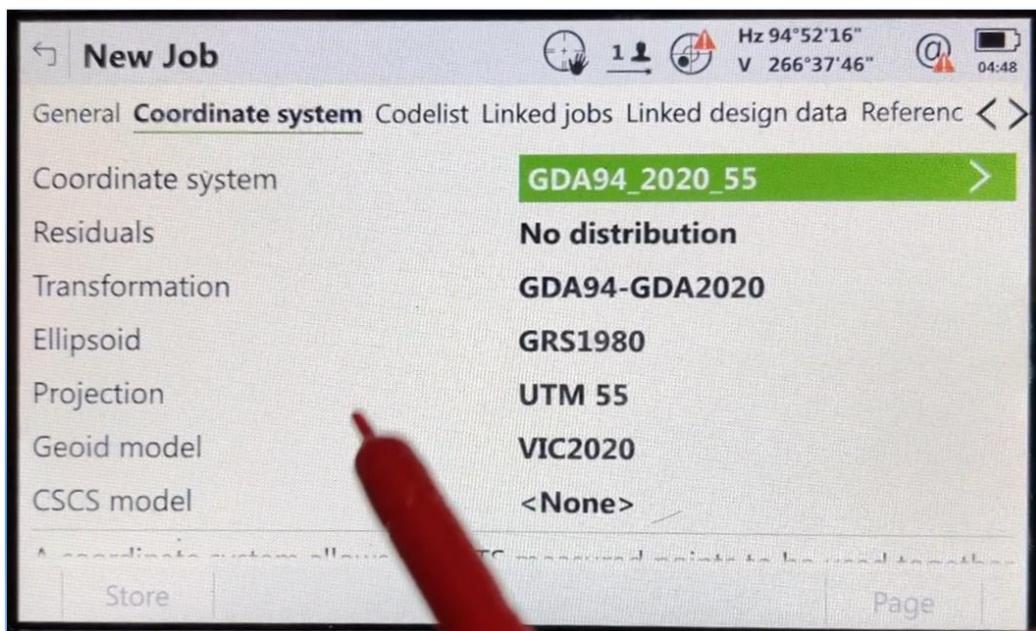


Figure 4. Job coordinate system – select as shown

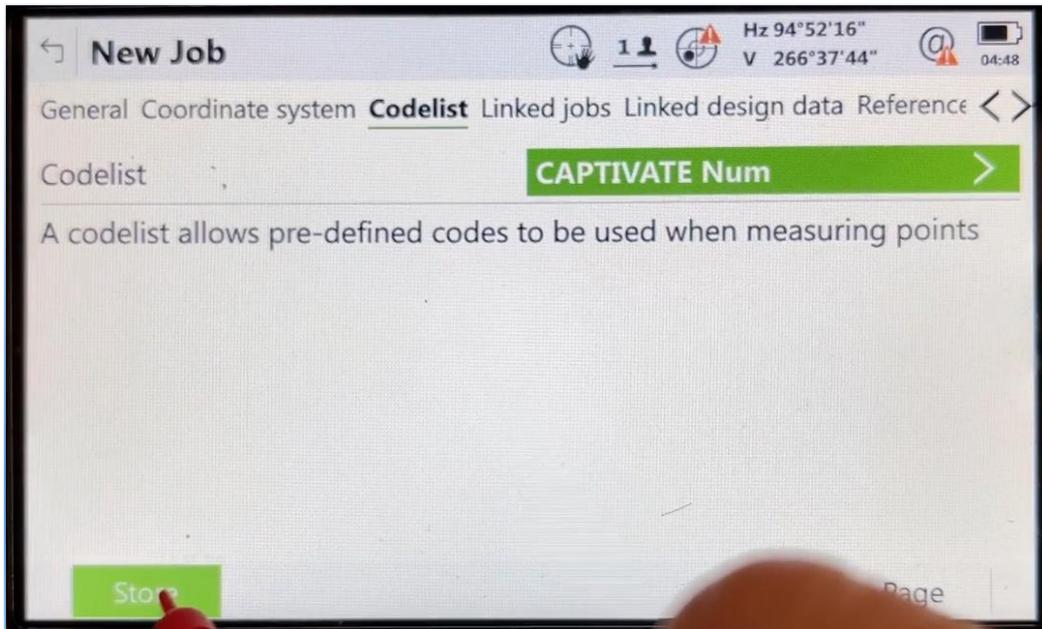


Figure 5. Job codelist – select as shown. Press “Store” to finish setting up the job.

Features codelist

The selected list of codes in the total station is similar to the *Suggested Feature Codes.pdf* on Canvas and is part of the industry standard. It is a good idea to print or keep a digital copy of the codelist PDF file with you during the feature survey so you can have a quick reference when entering feature codes.

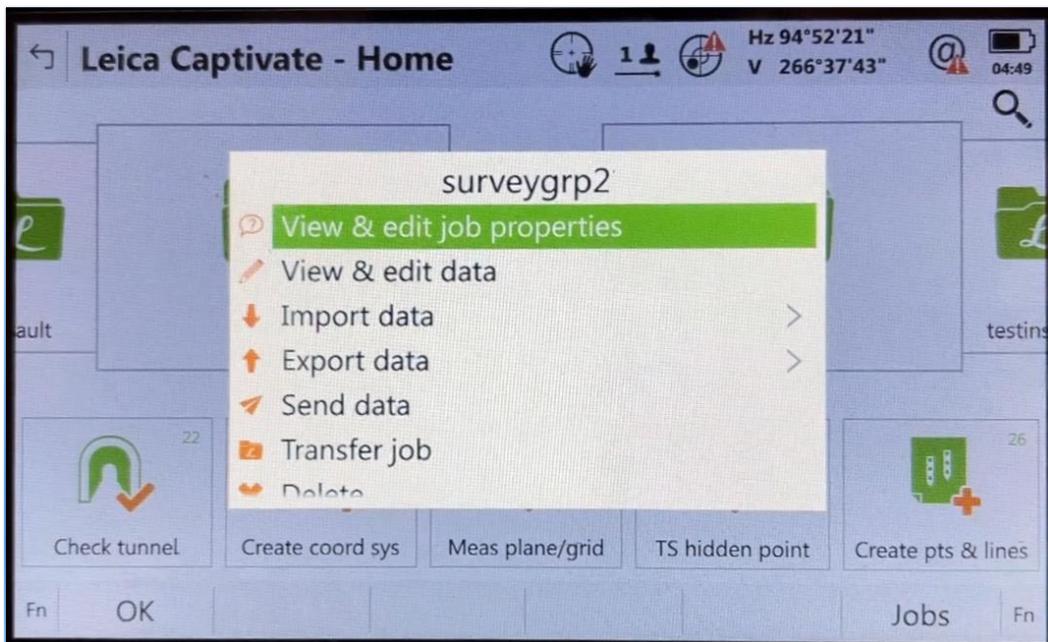


Figure 6. You can check the imported codelist from the Job icon in the home menu -> “View & edit job properties”.

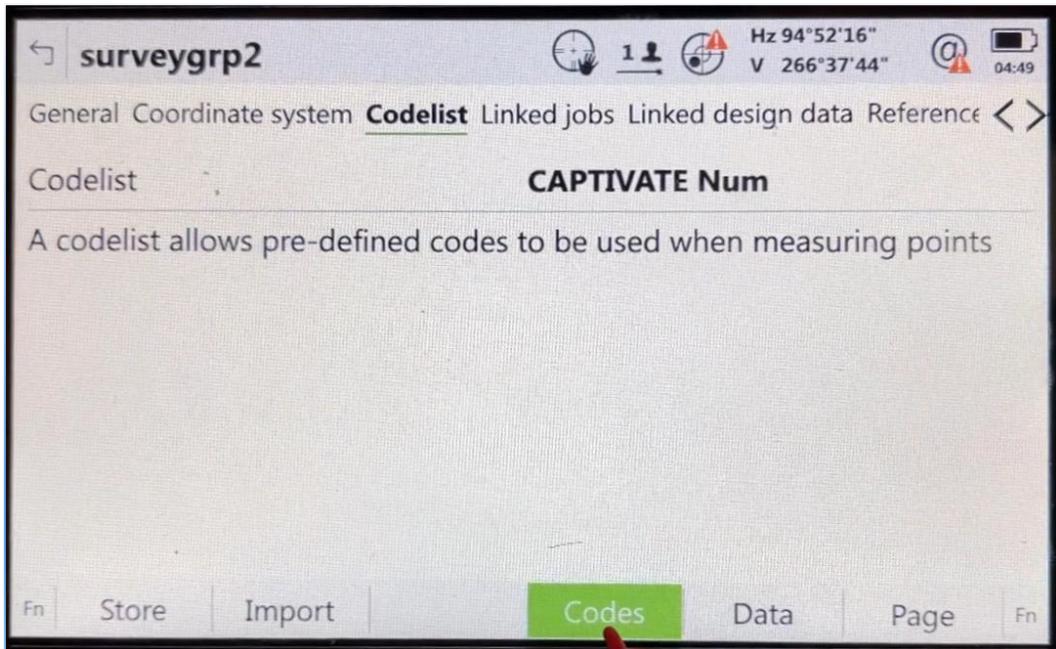


Figure 7. Select “Codes” in “Codelist”.

Job Codes			
Code desc	Code group	Survey	
001 Permanent Survey			Linework No Quickcode -----
002 Bench Mark			Linework No Quickcode -----
003 Title Peg			Linework No Quickcode -----
005 Survey Mark			Linework No Quickcode -----
006 Photo Control Pt			Linework No Quickcode -----
008			Linework No

Figure 8. Feature codes list.

Importing control points

You will need a USB to import the Control Points into a total station. You should first prepare the Control Points file for importing into the total station:

1. Download *ControlPoints.txt* from the Assignment 3 page on Canvas, which contains the permanent Control Points.
2. Add your temporary Control Points to this file with the horizontal and vertical coordinates established in A1 and A2.
3. On a USB, create a folder named “Data” and save the .txt file within this folder

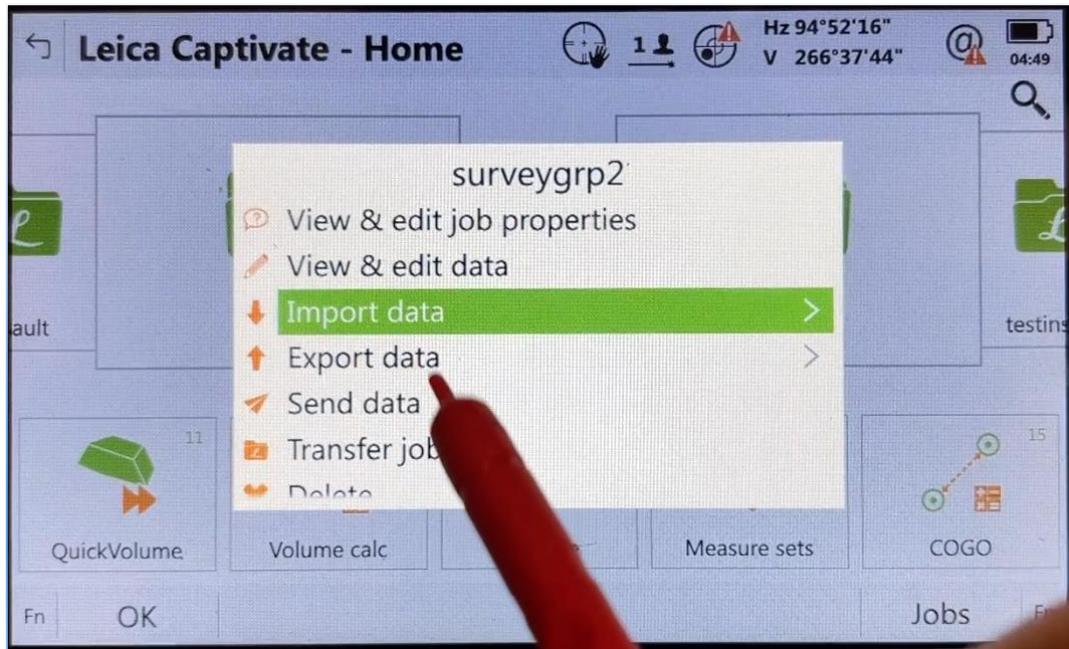


Figure 9. Job icon in the home menu -> "Import data".

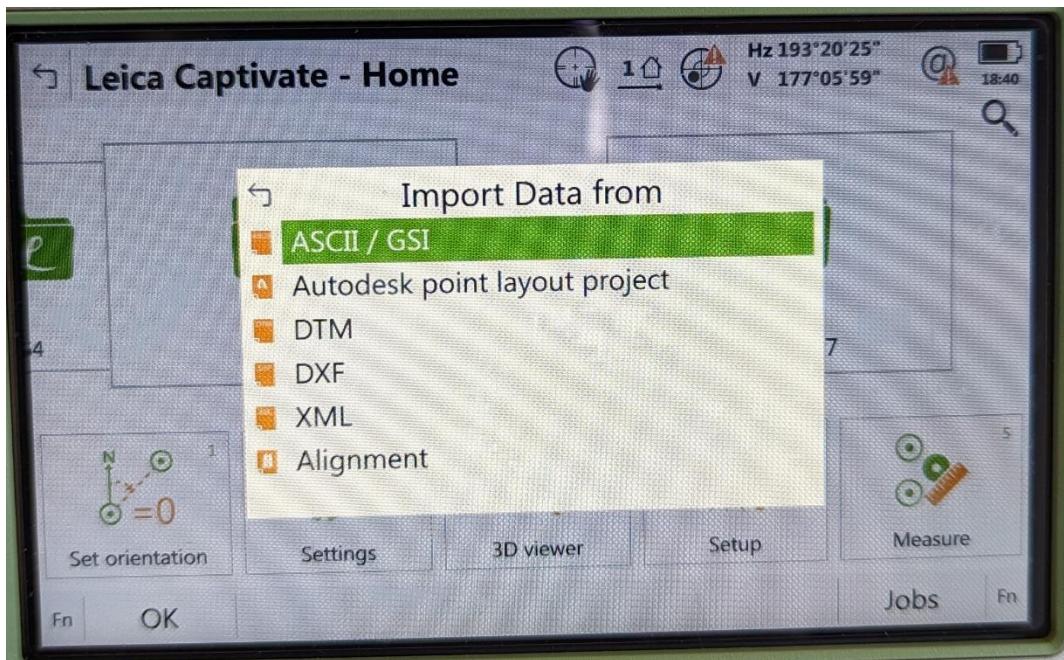


Figure 10. Select "ASCII / GSI".

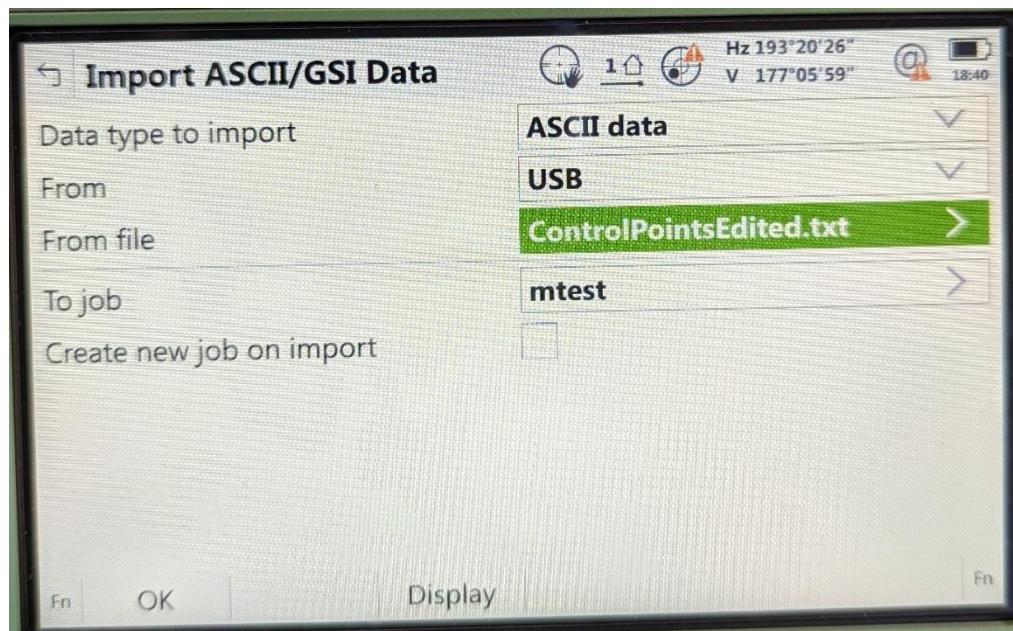


Figure 11. Check fields before importing.

The imported points have no code attached to them. Find their correct codes (*Suggested Feature Codes.pdf* on Canvas) and edit the imported points, as shown in the following section.

Viewing and editing points

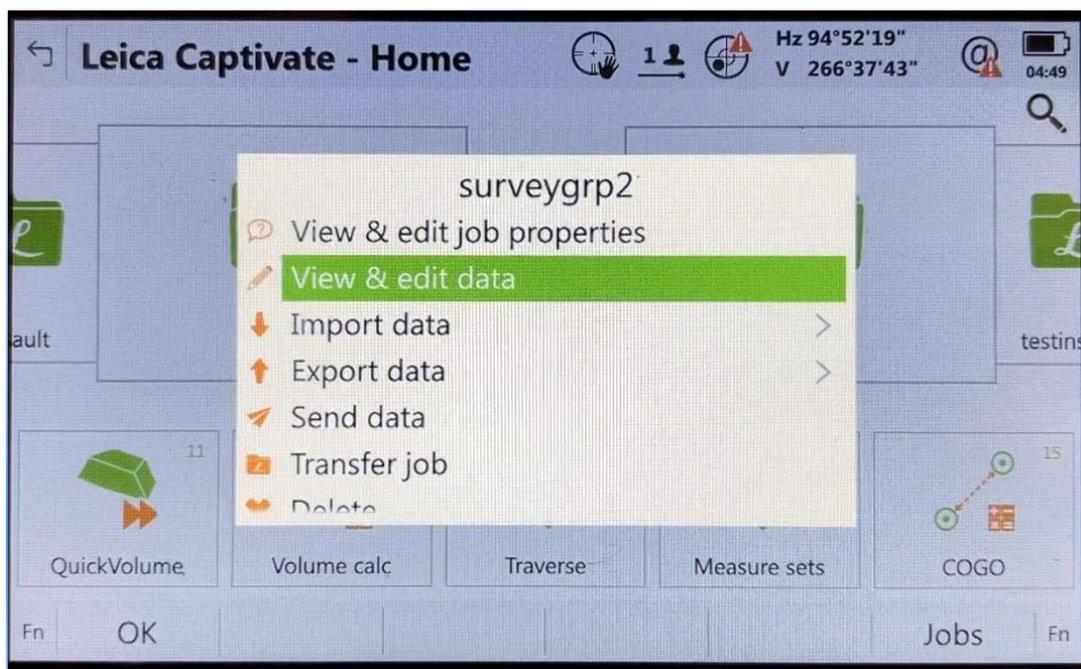


Figure 12. To view or edit points, select “View & edit data”. Press your job icon in the home menu to access this menu.

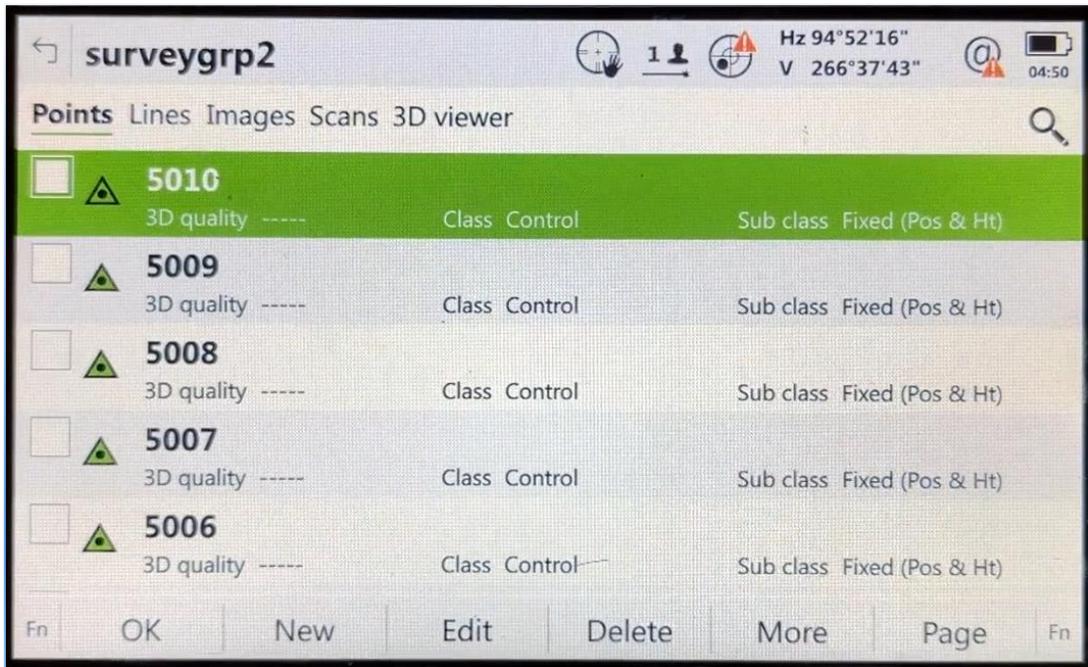


Figure 13. The list of points, which includes both the important and measured points. Points can be deleted or edited here.

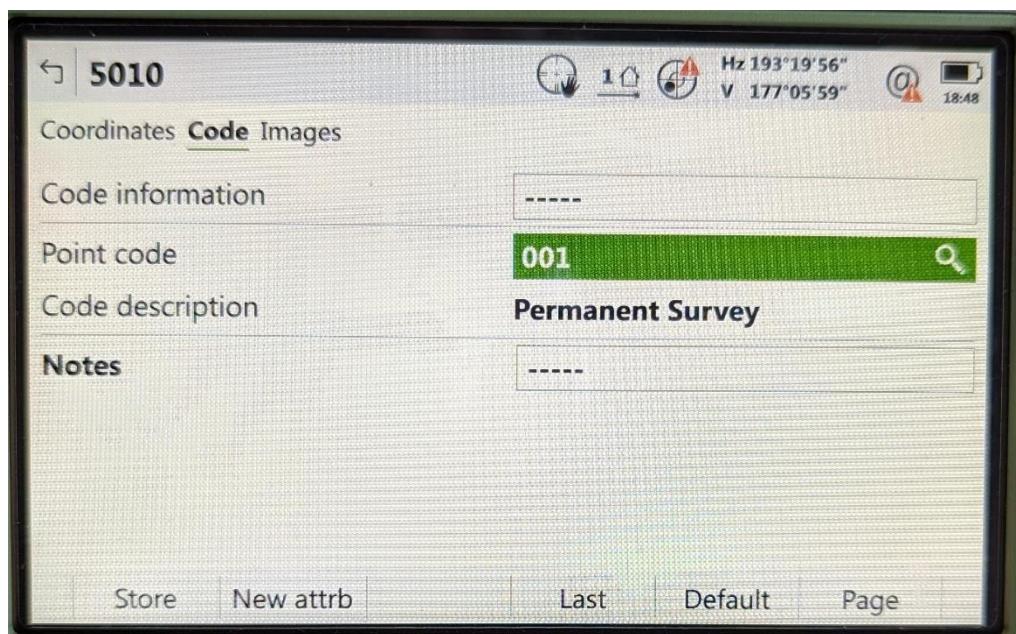


Figure 14. After pressing "Edit" in the previous figure, we can change edit the code or other parameters.

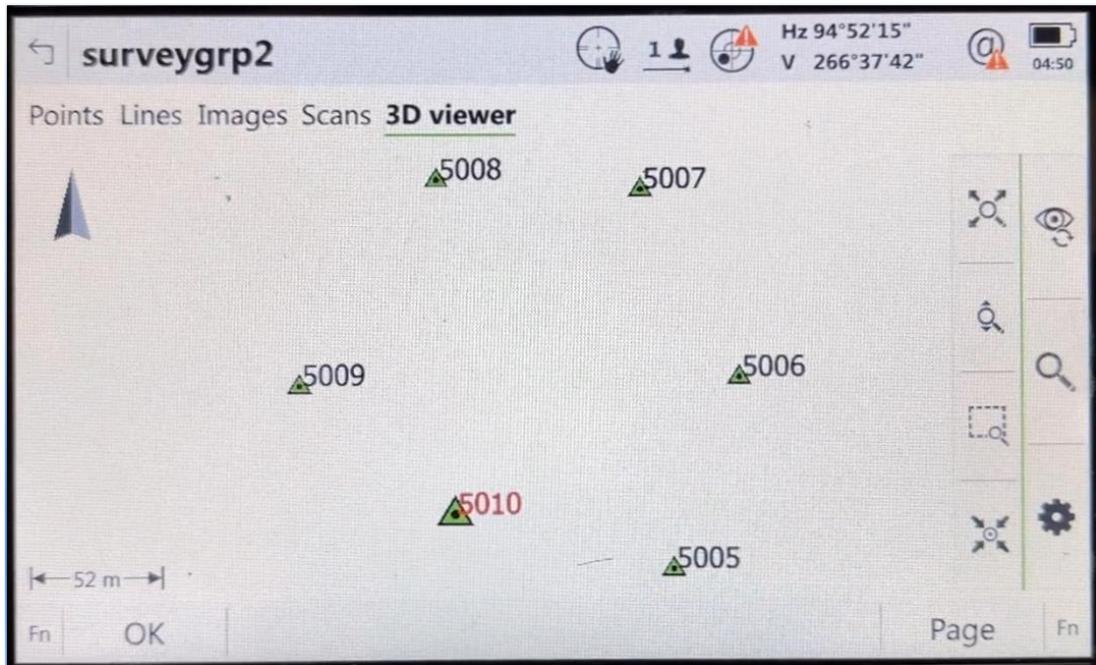


Figure 15. 3D viewer map – accessed by selecting the “3D viewer” tab in Figure 13. Make use of the viewing tools to zoom in/out/extent or pan around the map. This is very useful for visually checking for any erroneous points measured.

Measurements settings

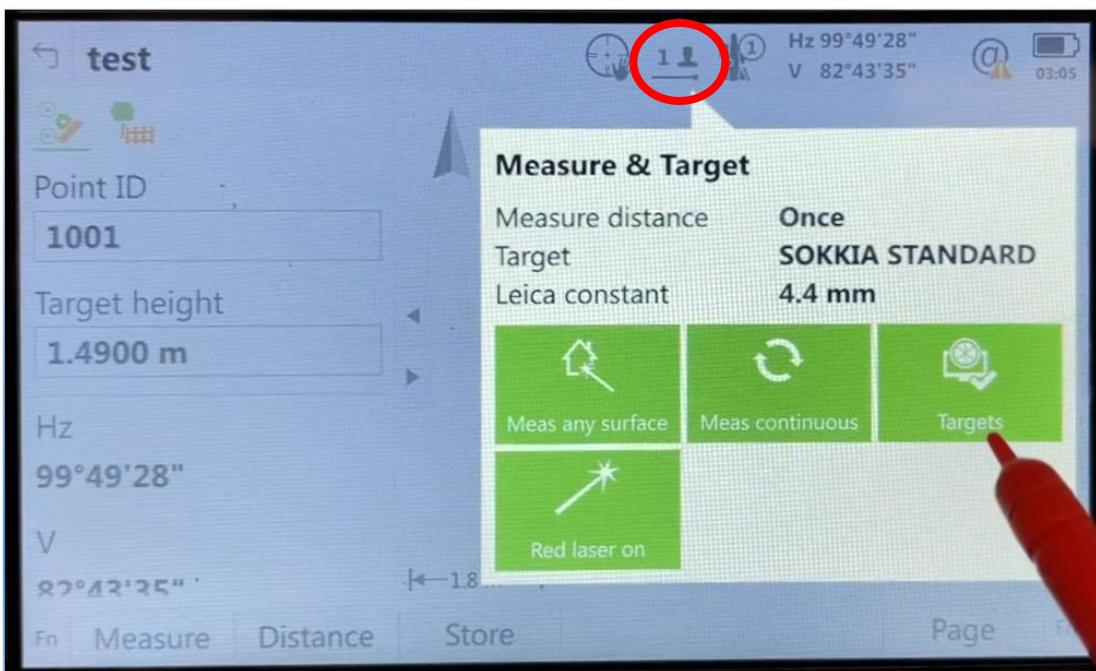


Figure 16. “Measure & Target” settings are used to set the measurement type (prism or no prism), number of repetitions, and the target prism.

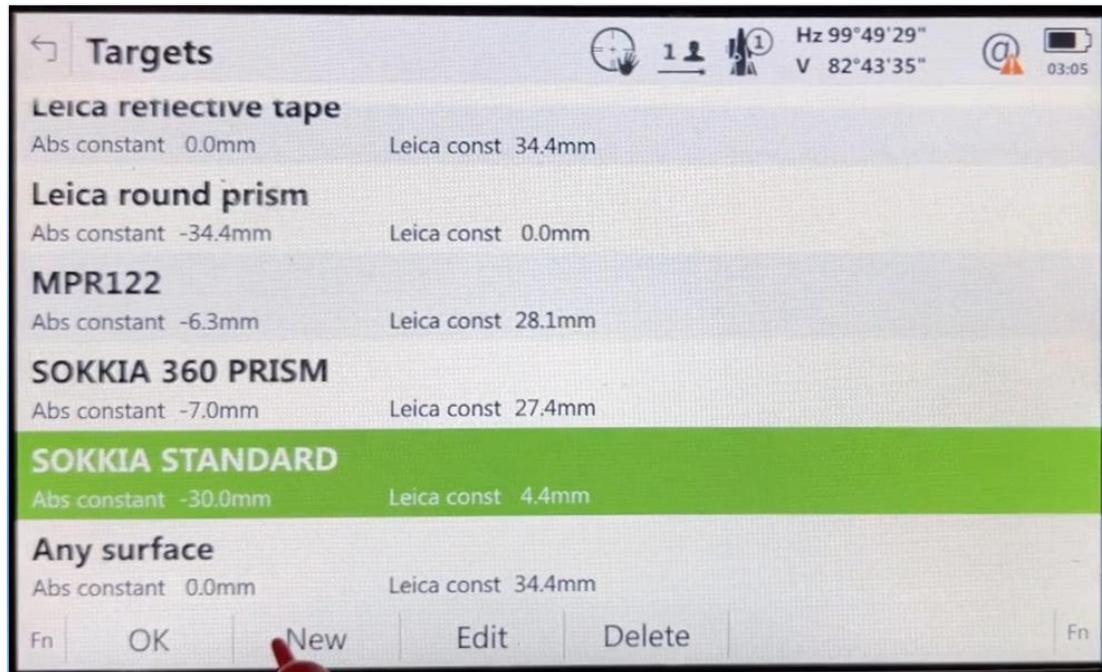


Figure 17. Target selection – choose the prism you are using.

Backsight – setting orientation

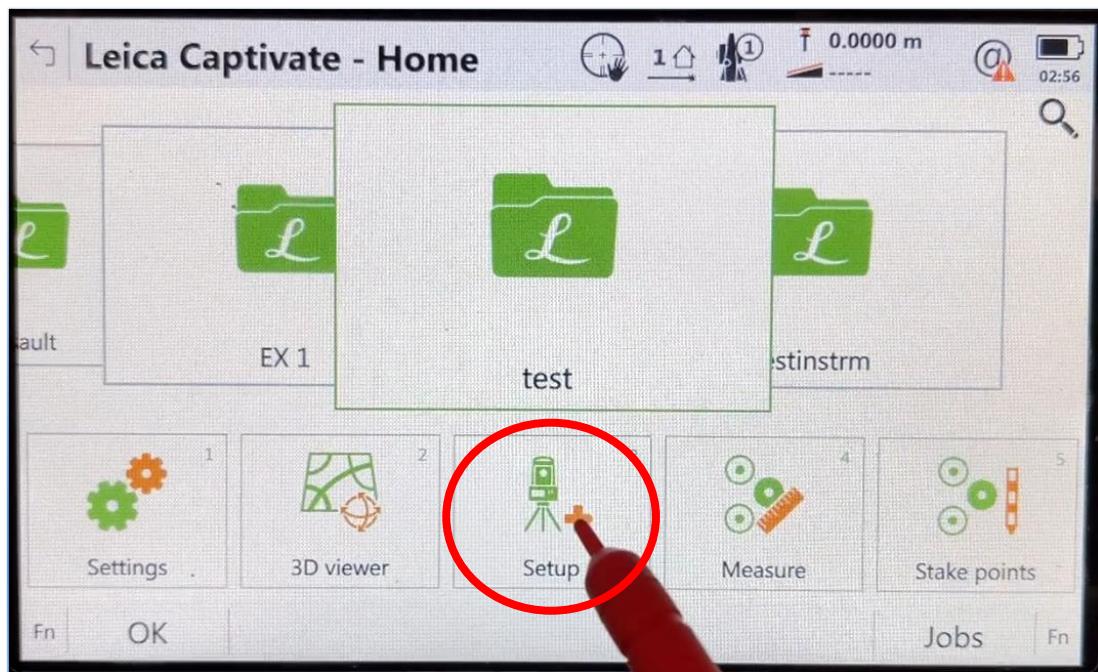


Figure 18. Select "Setup".

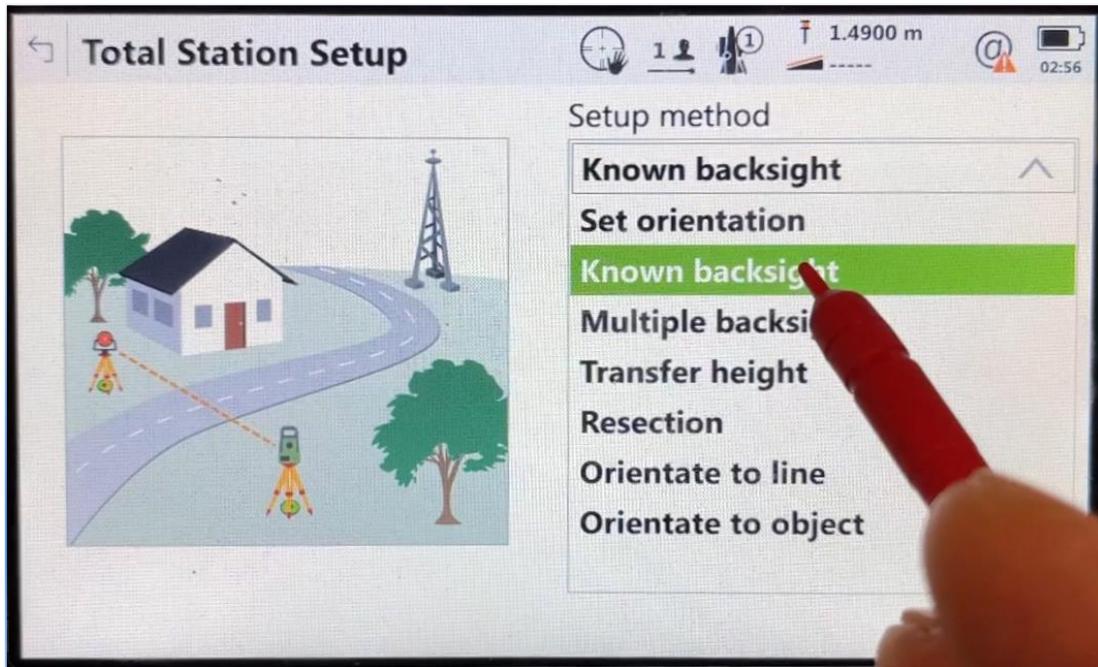


Figure 19. Select "Known backsight".

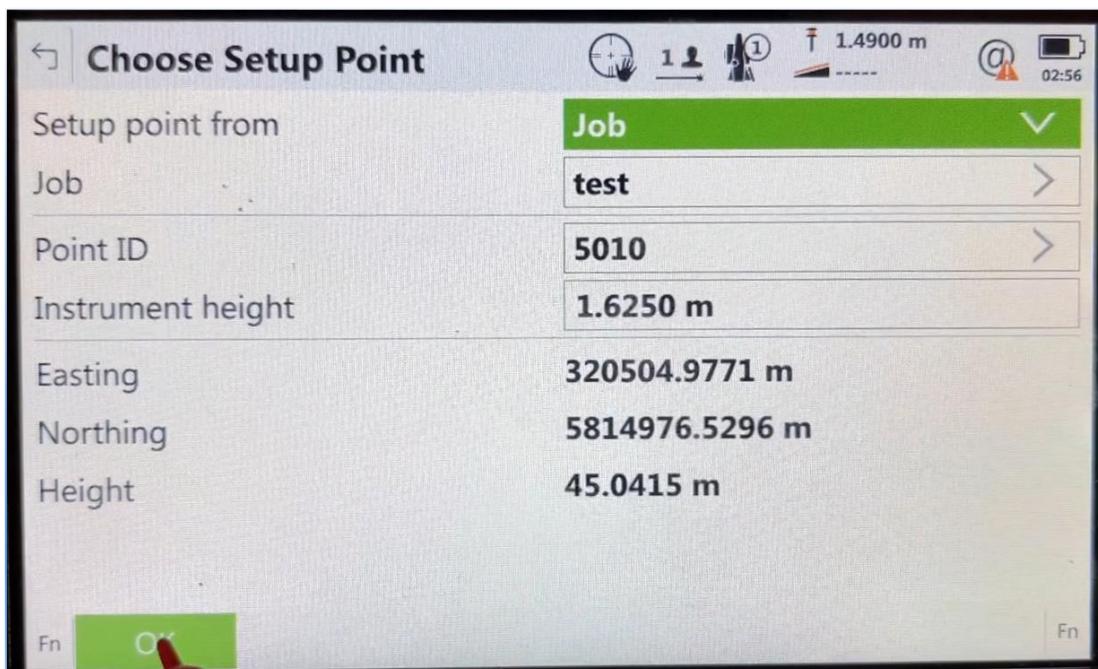


Figure 20. Measure and enter the total station height and check all other parameters are correct.

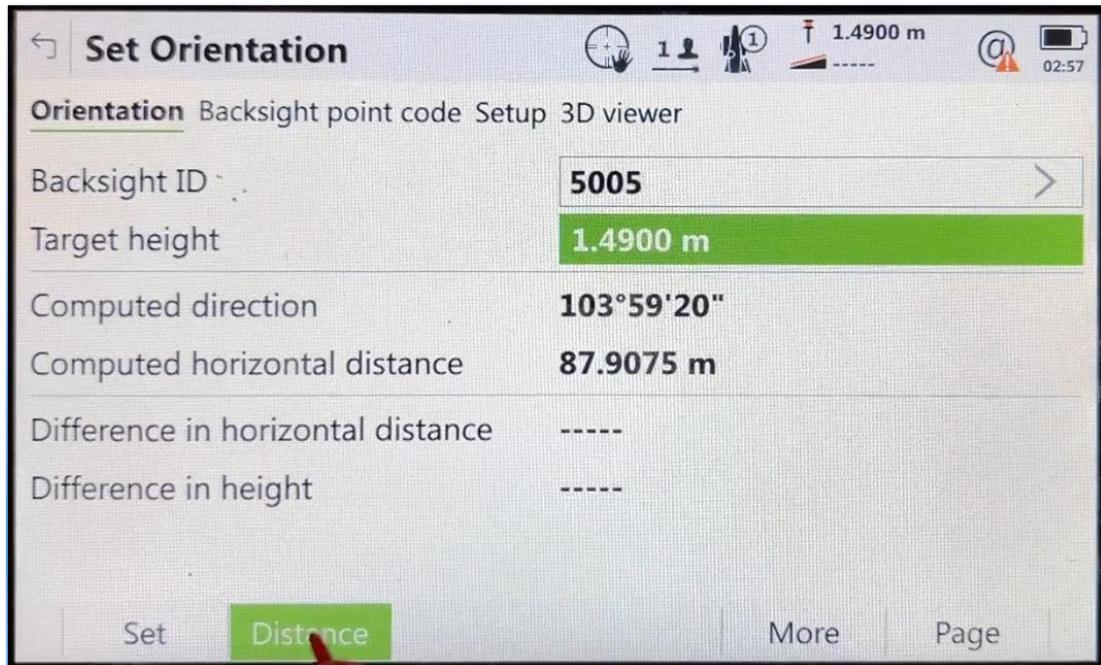


Figure 21. Measure and enter the target prism pole height and enter the point ID. Aim at the target prism. Selecting "Distance" will measure the distance and calculate the differences in horizontal distance and height between the measured values and the fixed ones from coordinates. Selecting "Set" will set the orientation.

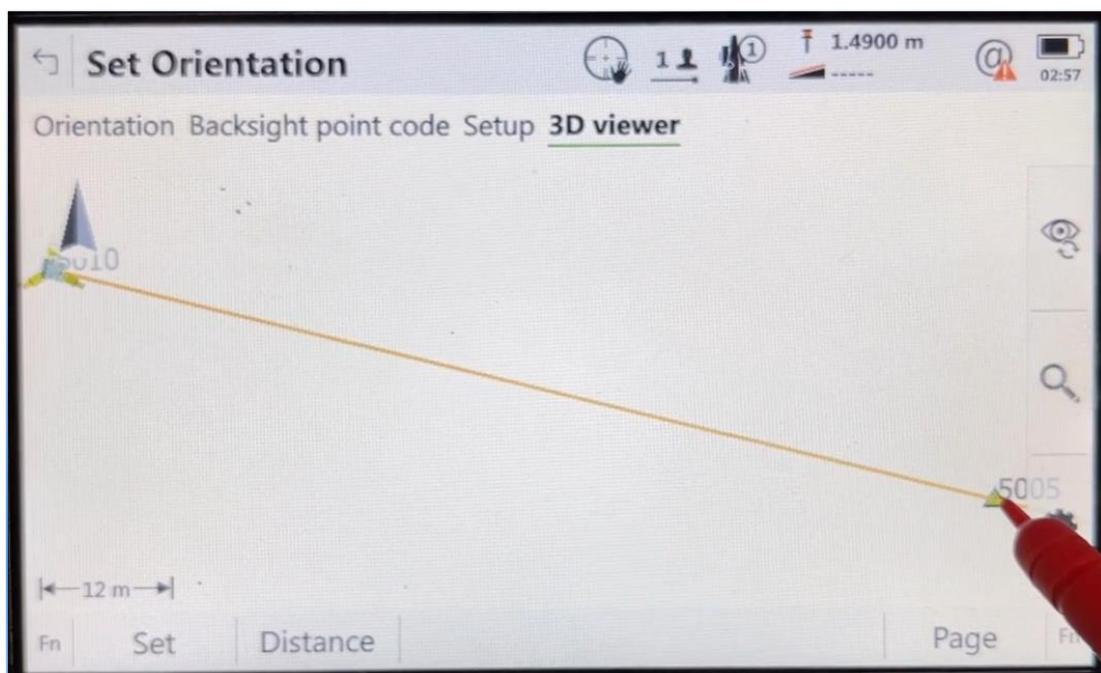


Figure 22. The established backsight can be checked in the 3D viewer.

Measurements overview

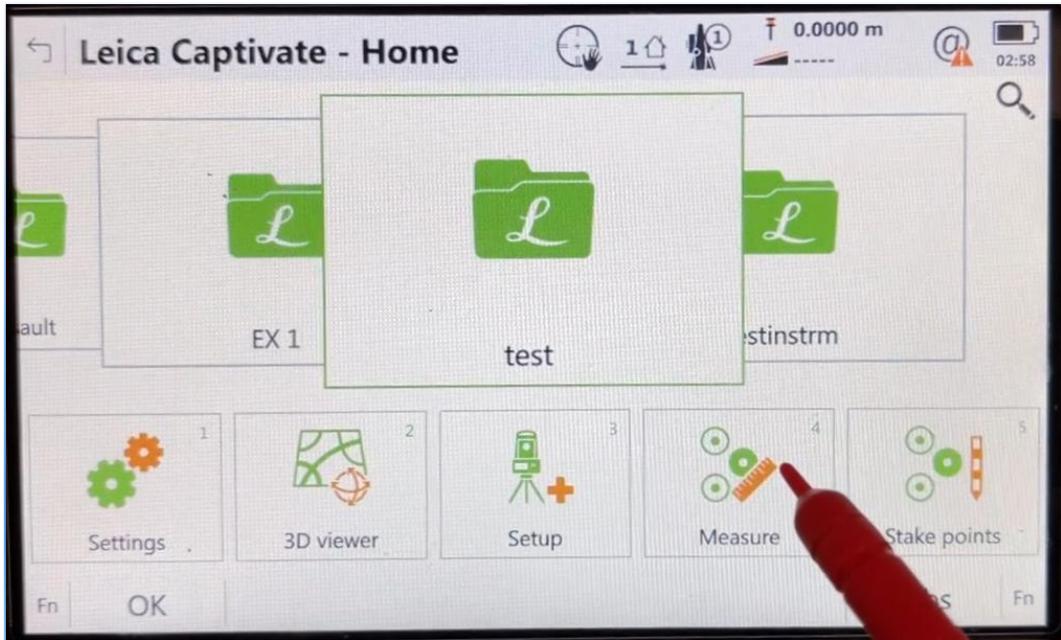


Figure 23. To begin recording points, select “Measure” below your job.

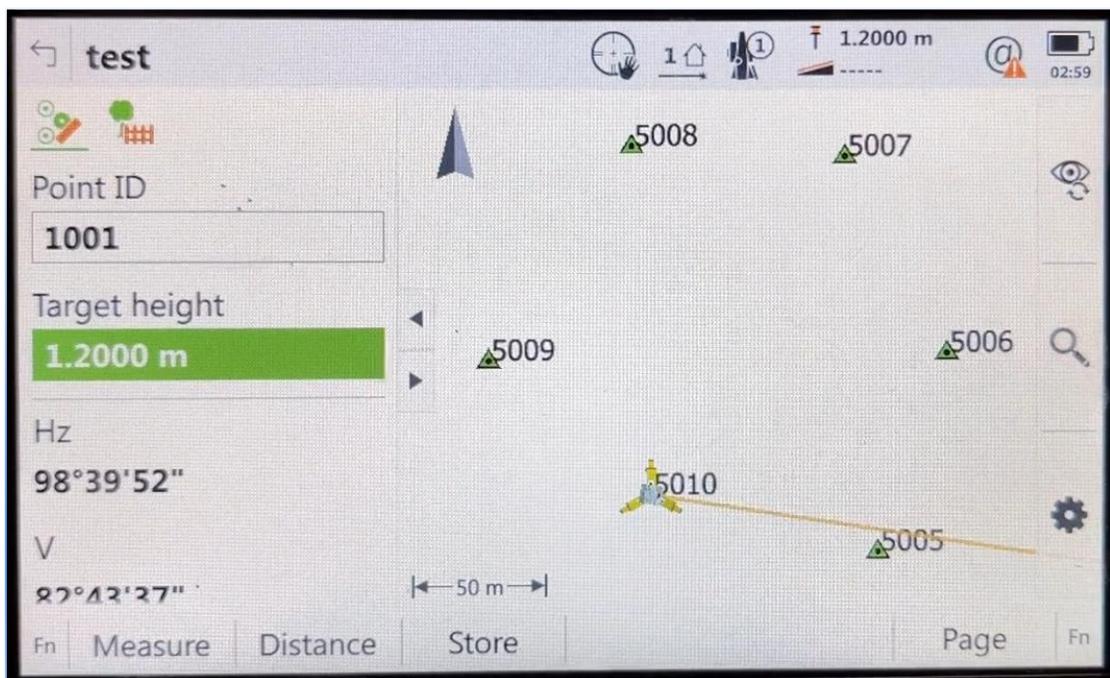


Figure 24. In the Measure tool, always make sure the Target height is up to date. Note that once the first Point ID is set, it will run in sequence after each point is measured and stored, until it is changed again and will then begin from the new number in sequence.

Selecting feature codes

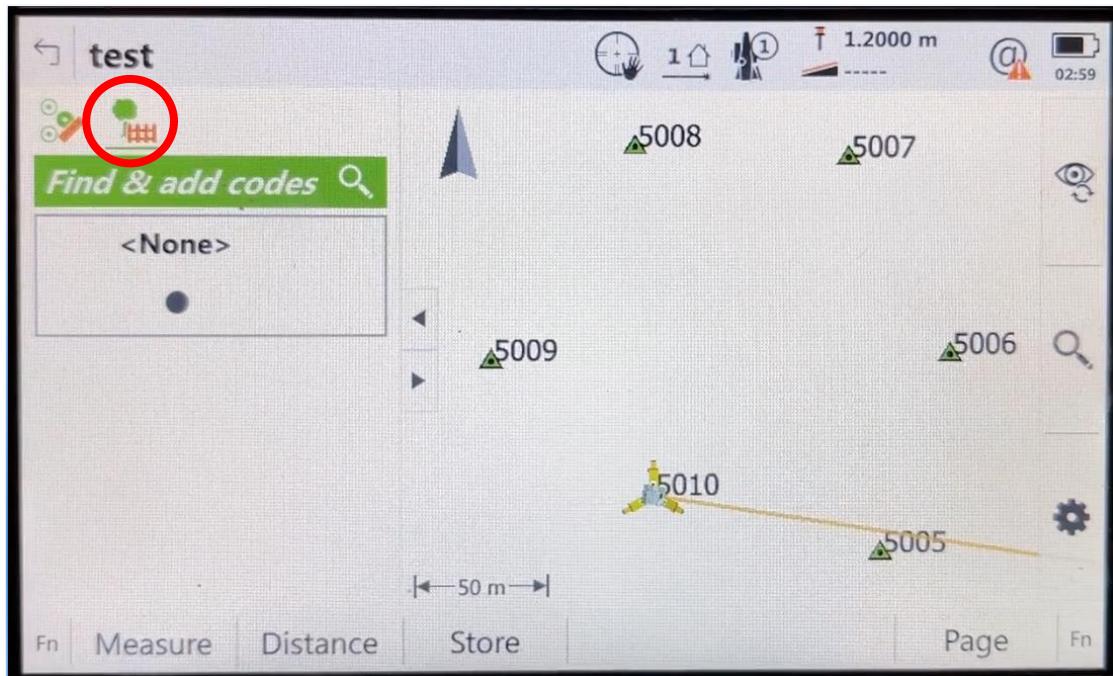


Figure 25. Select the Tree and fence icon to access and add feature codes.

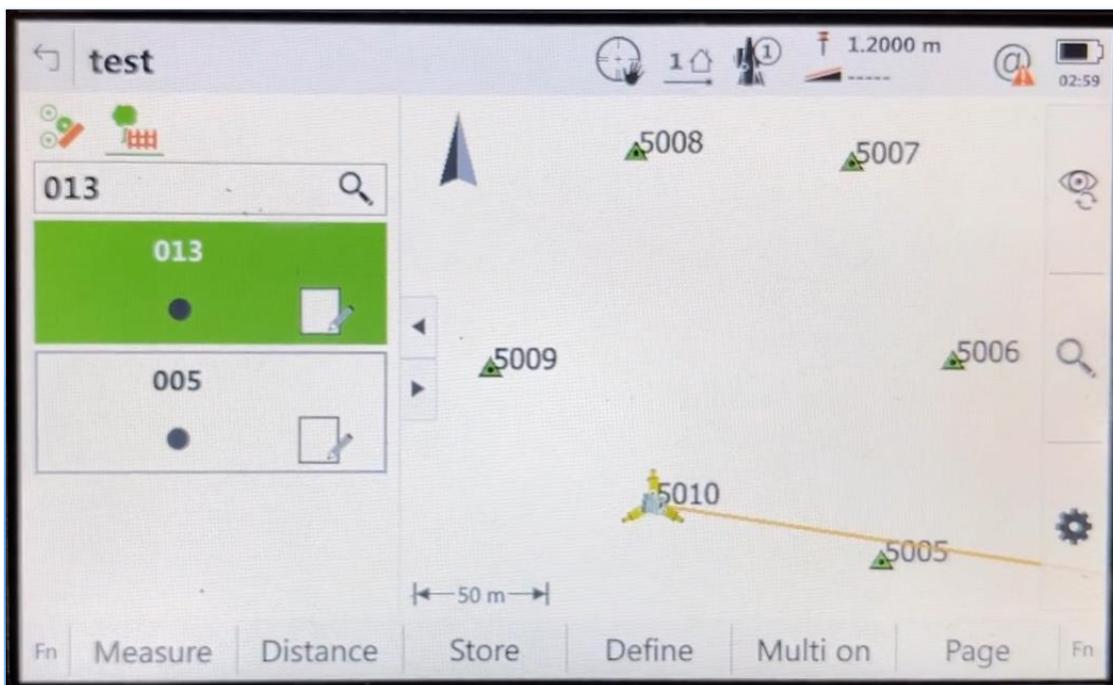


Figure 26. Enter the feature code. You can select it for more details.

Select Code		
1.2000 m 03:00		
Codes		
013	Code desc RM Rod	Code group Survey Linework No Quickcode -----
014	Code desc RM Pipe	Code group Survey Linework No Quickcode -----
015	Code desc RM RM2	Code group Survey Linework No Quickcode -----
016	Code desc Du	Code group Survey Linework No Quickcode -----
017	Code desc Nail.	Code group Survey Linework No Quickcode -----

Figure 27. Code description within selection.

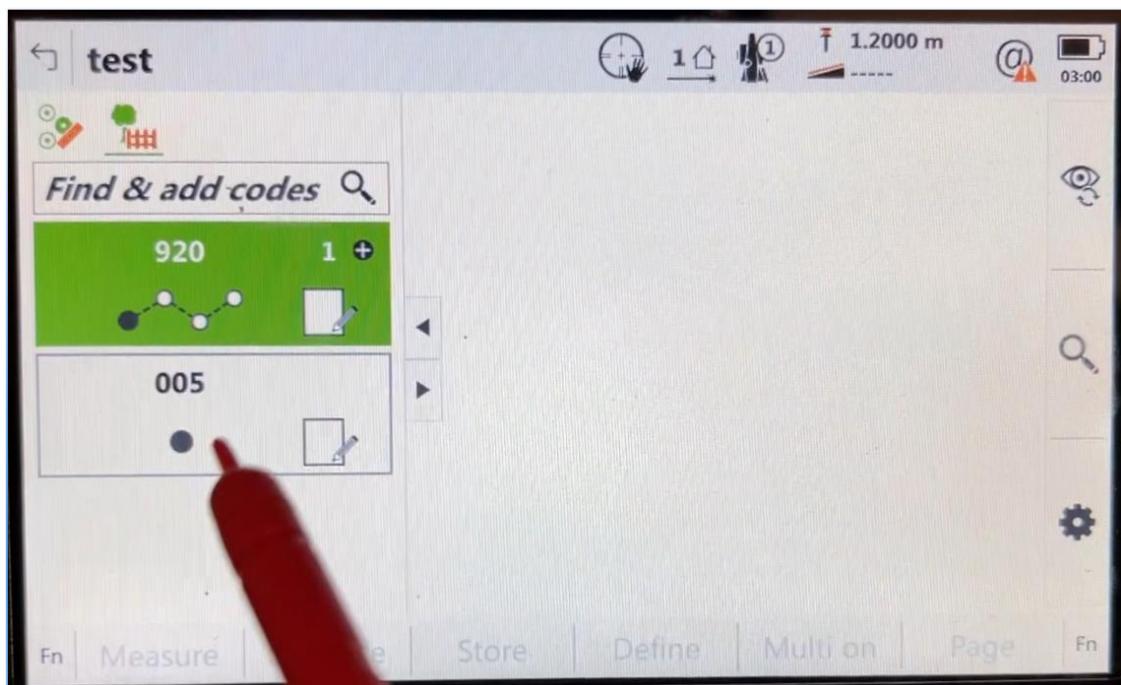


Figure 28. There are two types of feature codes, point features and line features. Line features can be connected using the same string ID. Points with the same feature code and string ID will be joined together in the sequence the measurements are made. Point features are represented by a single point and do not need a string ID.



Figure 29. The same line feature code with different string IDs will result in separate lines.

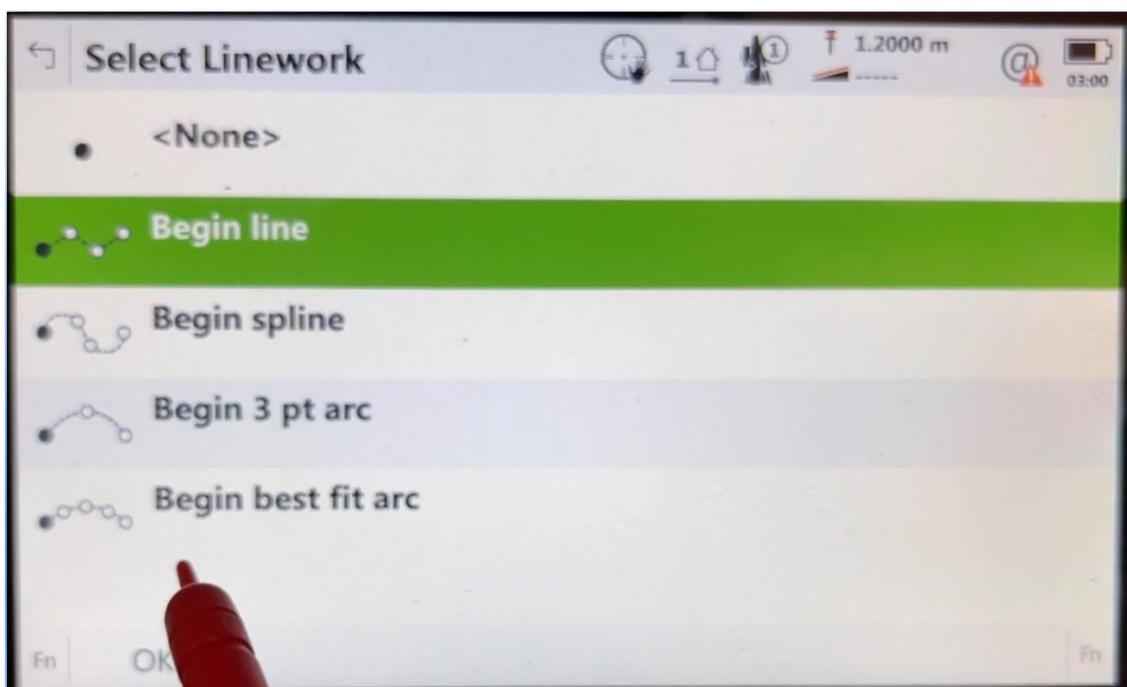


Figure 30. Choosing type of Linework.

Measuring and storing points

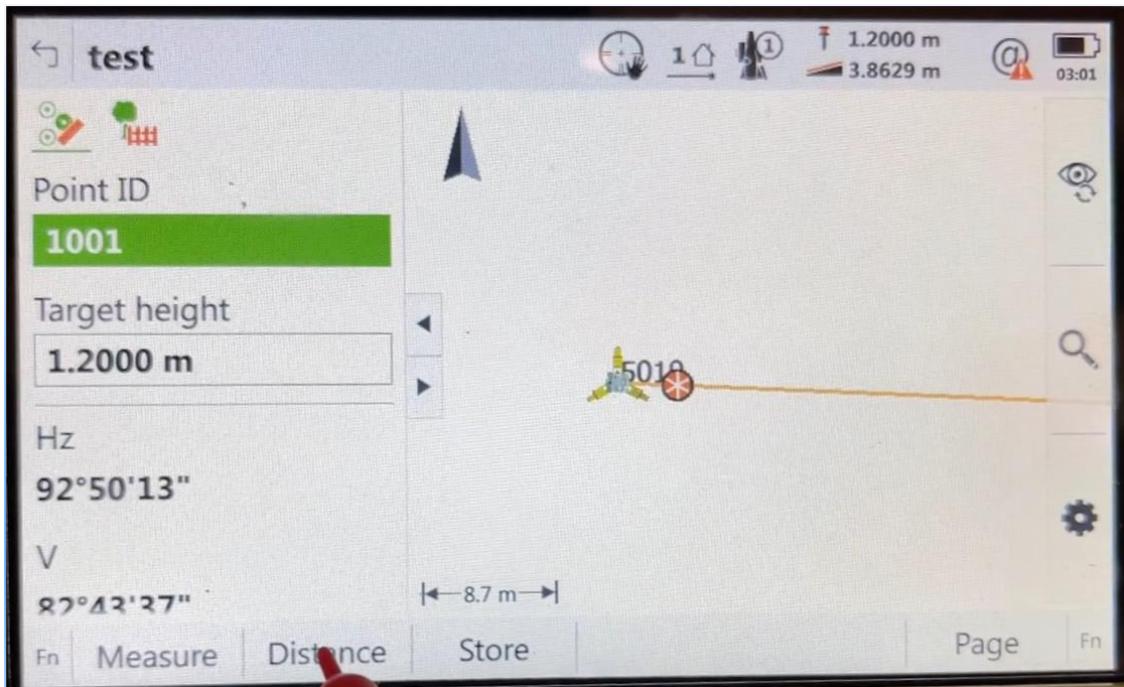


Figure 31. Once the Point ID, Target height, and feature code are checked, the feature can be measured. Aim at the centre of the prism. There are two options. Selecting "Distance" is like taking a test shot: it measures the point and puts it on the map but does not store it. You can then check the map and select "Store" to confirm and store the point. Selecting "Measure" is a quicker option that skips the test shot and immediately measures and stores the point. You can use it once you are confident of the process.

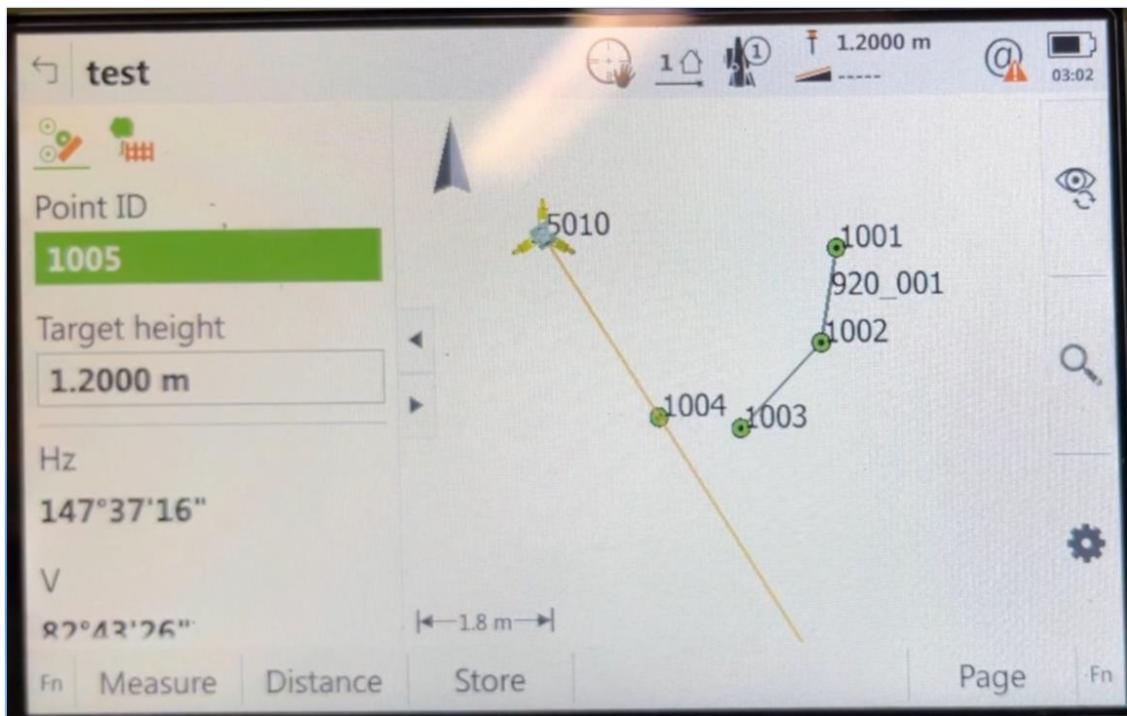


Figure 32. Recorded points.

Measuring points with offset

Offset can be used when the prism cannot be placed directly vertically above the desired spot. Most common example are circular objects, such as poles or tree trunks, where we want to measure their centre point but cannot place the prism there. In such cases we can use horizontal offset, where the point can be offset along the line connecting the total station and the prism (offset in/out) or perpendicularly to this line (offset left/right).

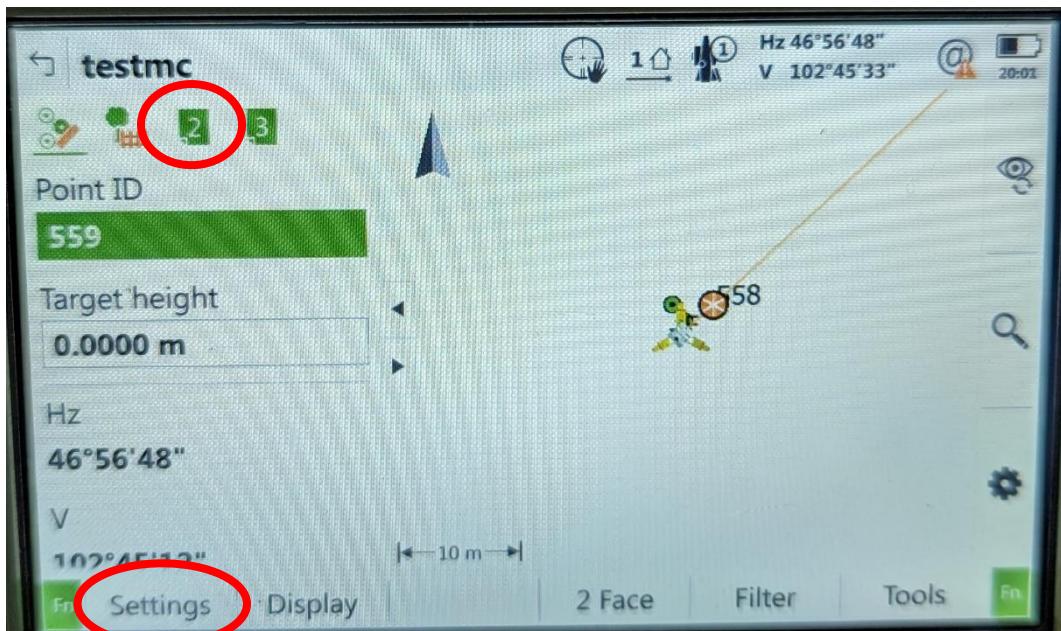


Figure 33. If you have the "2" tab available, skip to Figure 35. If not, select the "Fn" in one of the bottom corners and then "Settings".

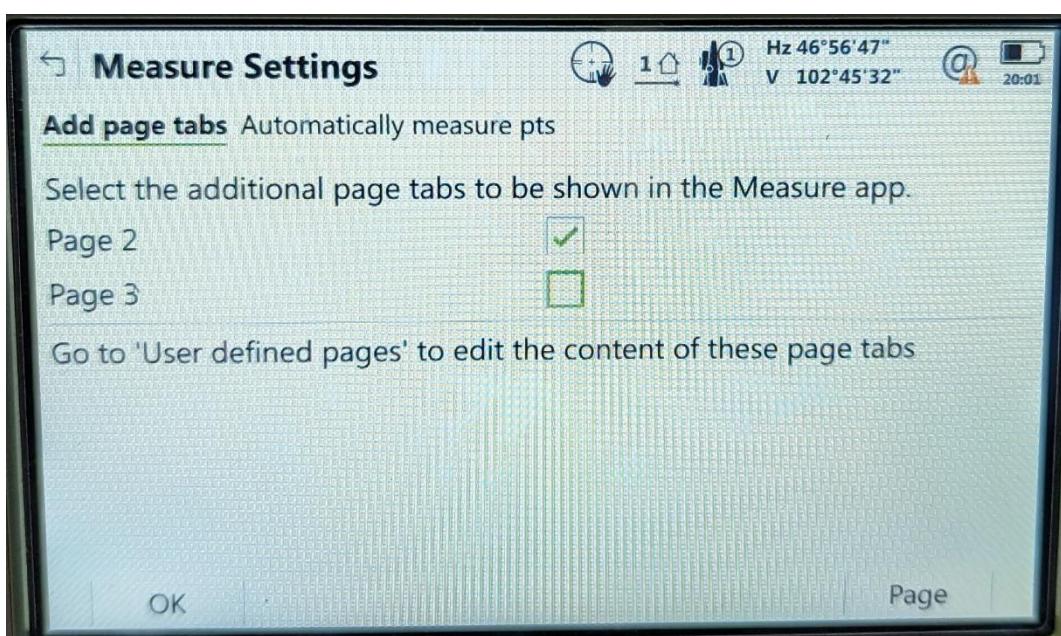


Figure 34. Check the Page 2 box.

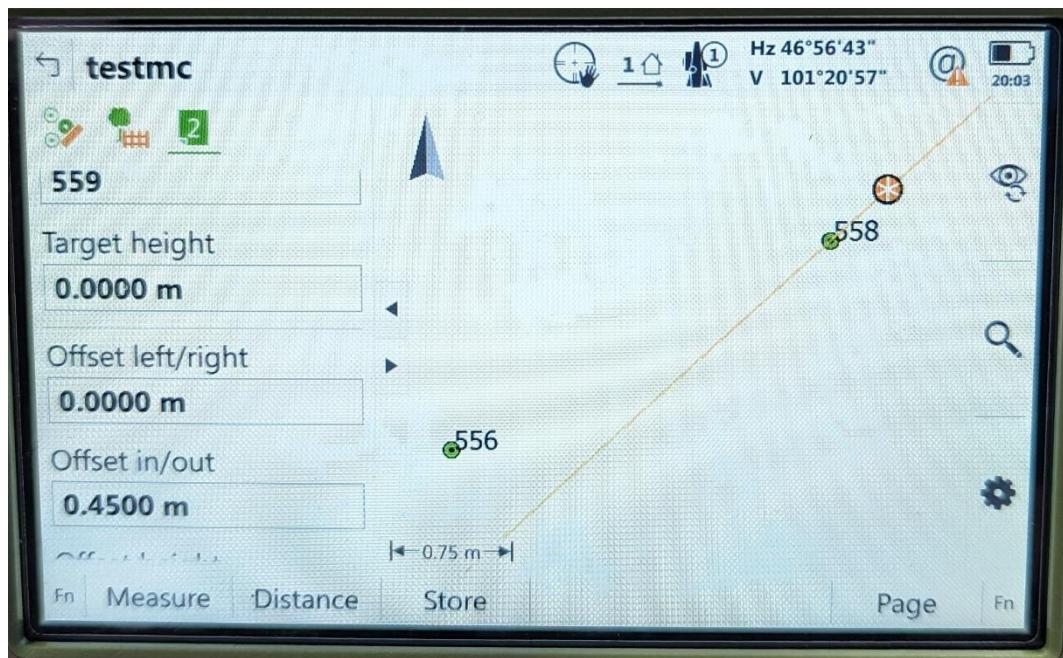


Figure 35. In the Page “2” tab, select Distance for the test shot and for the point to be placed on the map. Measure the offset distance with a tape and enter it in the “Offset left/right” or “Offset in/out” box, as needed. While entering the offset in the box, keep track of the point on the map and make sure it got moved into the correct direction. Store when finished.

Exporting survey data

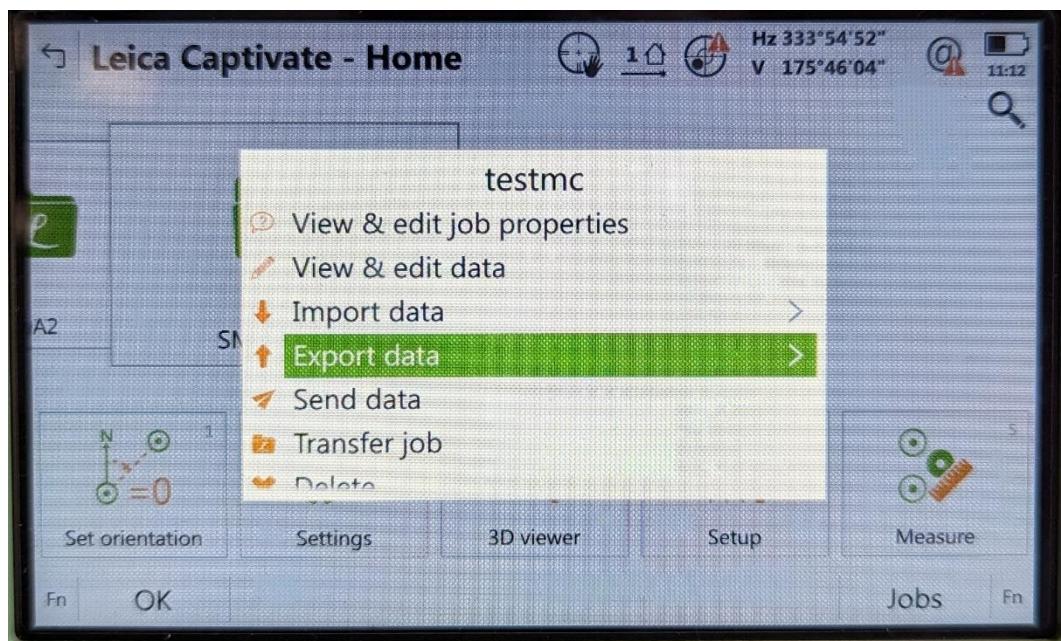


Figure 36. Job icon in the home menu -> “Export data”.

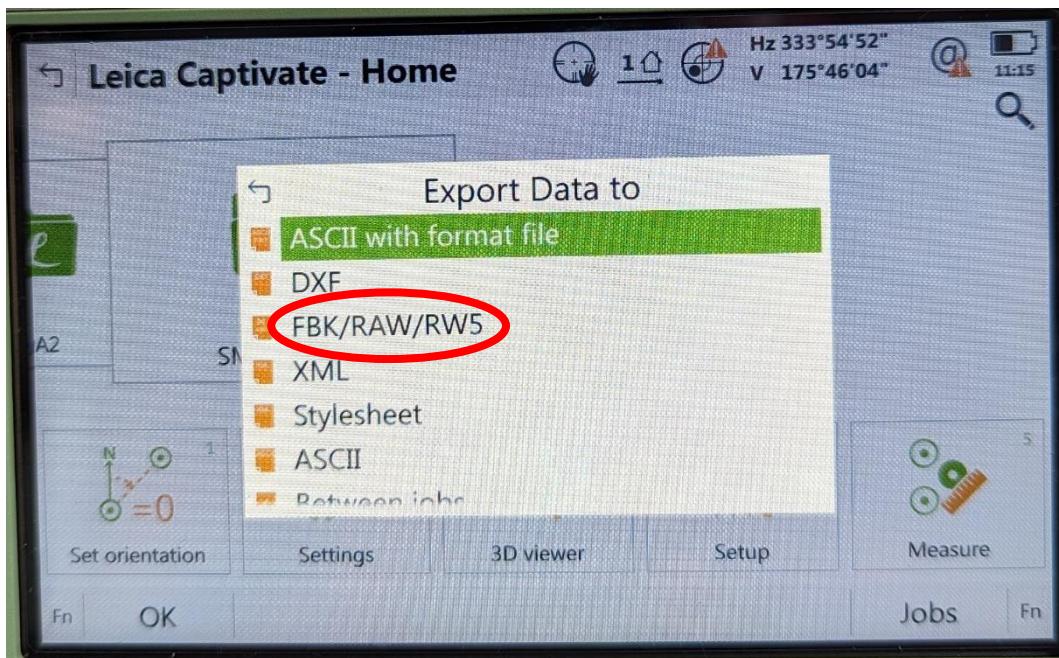


Figure 37. Select "FBK/RAW/RW5".

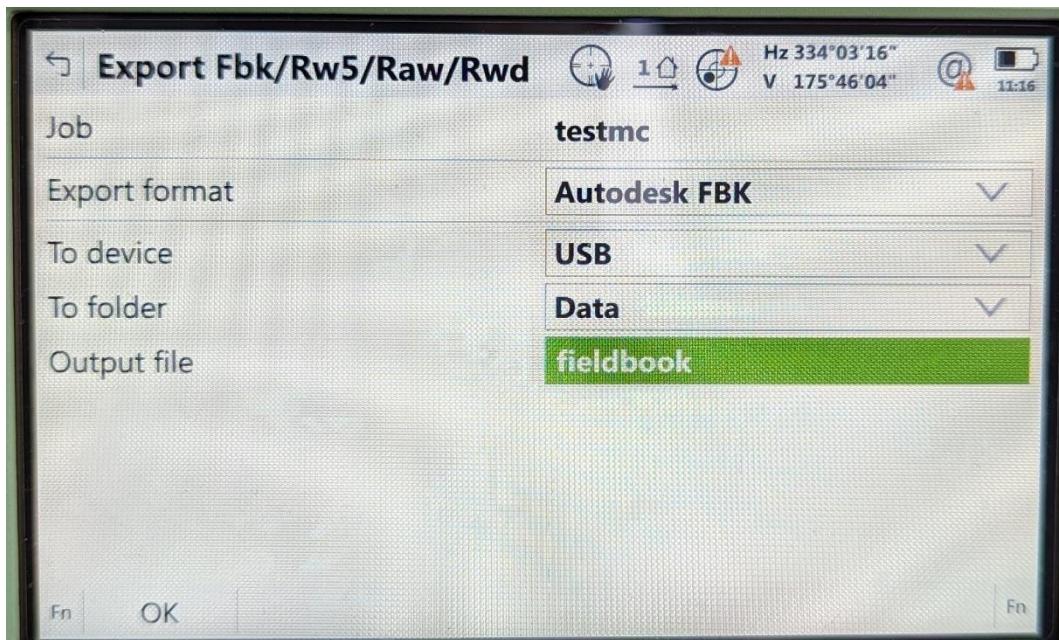


Figure 38. Select as shown.