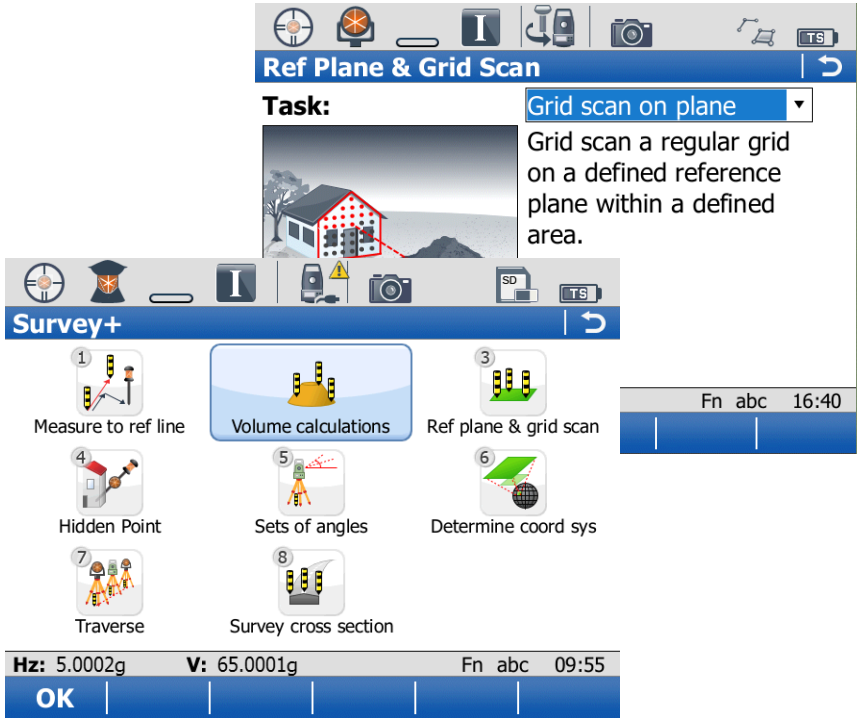
Leica Viva

SmartWorx Viva on TS

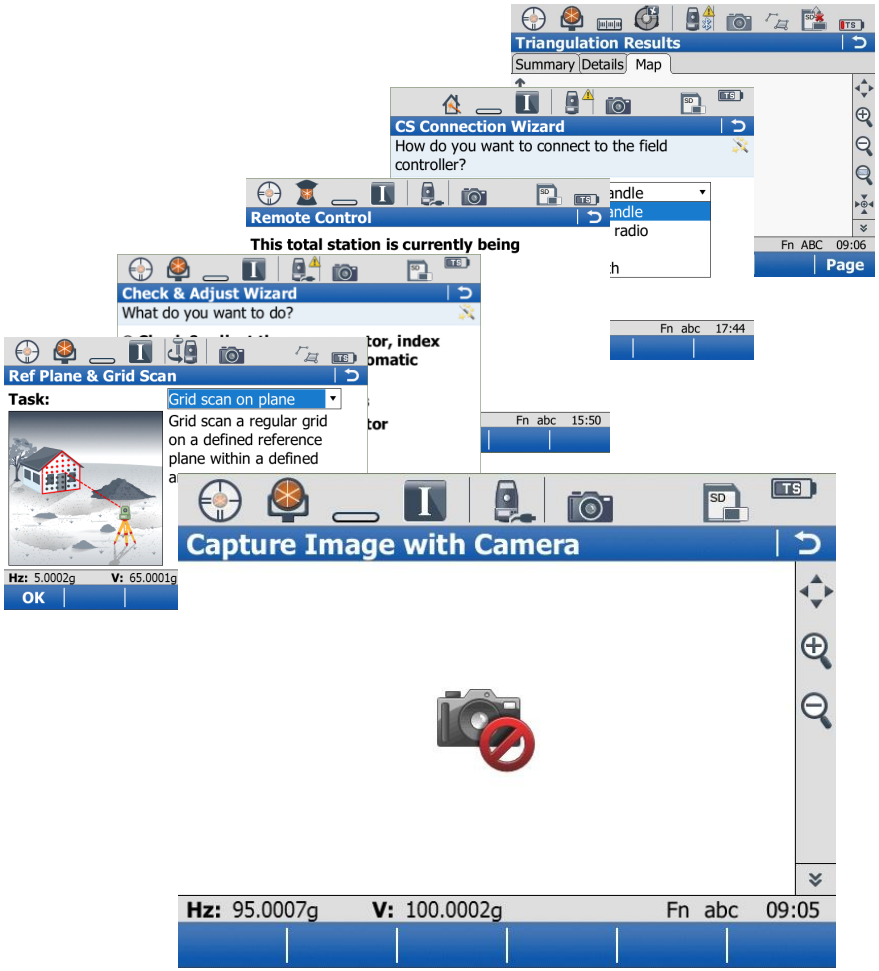


- when it has to be **right**

Leica Geosystems

SmartWorx Viva on TS
Contents

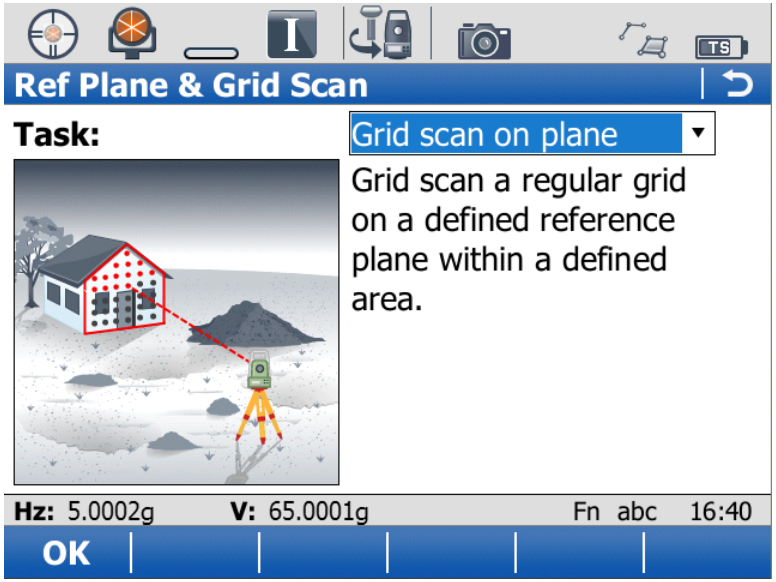
1. Ref. Plane and Grid Scan
2. Volumes
3. Check & Adjust
4. CS Connection Wizard
5. Robotic Screen
6. Summary



- when it has to be **right**

Leica Geosystems

SmartWorx Viva on TS
Contents



Ref plane & grid scan

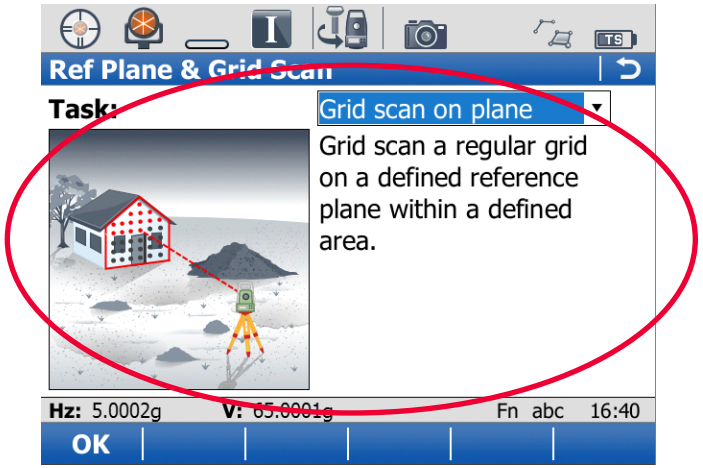
- when it has to be **right**

Leica Geosystems

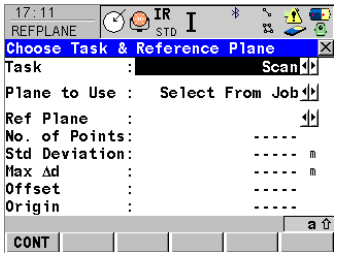
SmartWorx Viva on TS
1. Ref. Plane and Grid Scan

What is the “Reference Plane and Grid Scan” application?

- New application to measure true regular grids on a plane or any surface
- Application replaces the “old” Reference Plane application
- 3 main tasks (sub-applications) available:
  - “Measure to plane”: Measure distances to a reference plane
  -  “Grid scan on plane”: Scan a true regular grid on a plane object
  -  “Grid scan on surface”: Scan an angular based grid on any surface
- New workflow with Task/Method explanations on a graphical selection panel
- Fast measurement mode for TS15 available:
  - Standard (range and accuracy optimized)
  - Fast (speed and performance optimized)



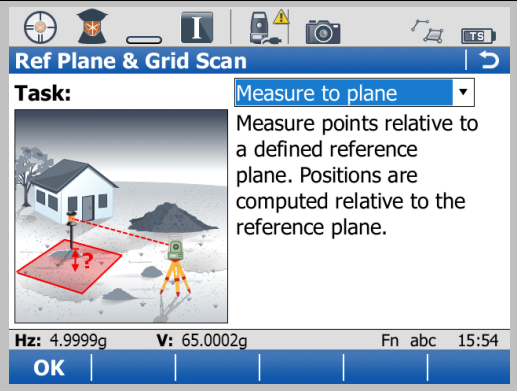
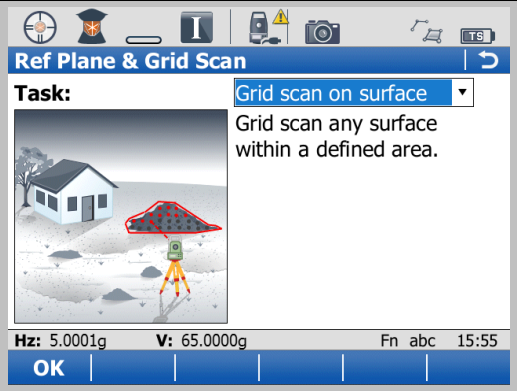
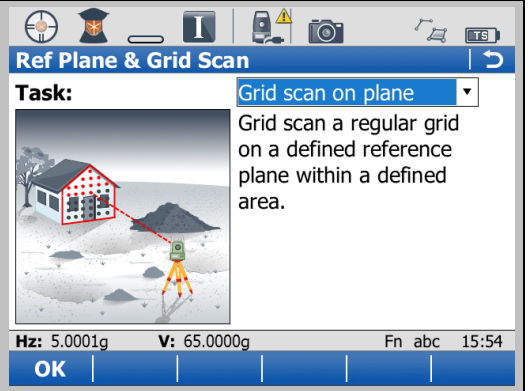
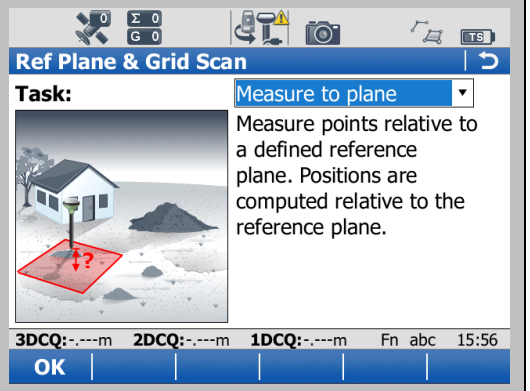
Old System1200 style



SmartWorx Viva on TS

1. Ref. Plane and Grid Scan

3 Sub-Tasks

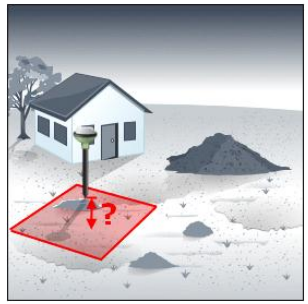
	Measure to plane (for TS and GS)	Grid scan on plane (for TS)	Grid scan on surface (for TS)
TS			
GS			

- when it has to be **right**

Leica Geosystems

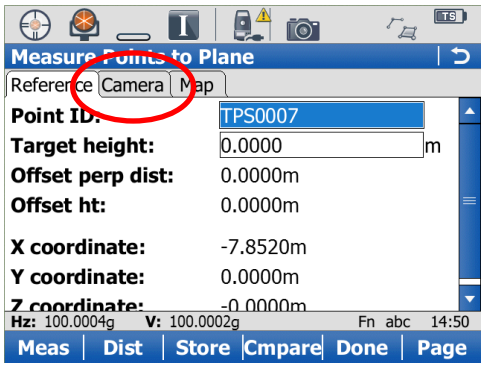
SmartWorx Viva on TS

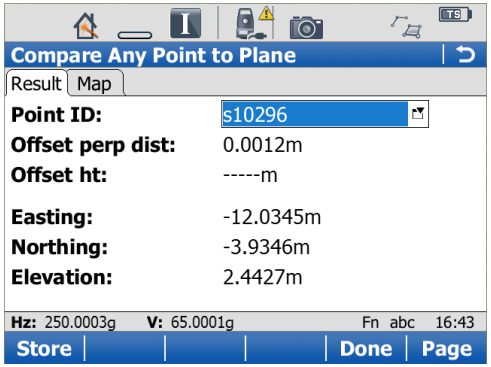
1. Ref. Plane and Grid Scan



Measure to Plane

- Same functionality as for SmartWorx Viva 2.1
- For checking the position of individual and specific points (already measured or to be measured) relative to a defined reference plane
- Reference plane required
- Available for TS and GS
- **NEW** Camera Tab in Measure Points to Plane





- when it has to be **right**

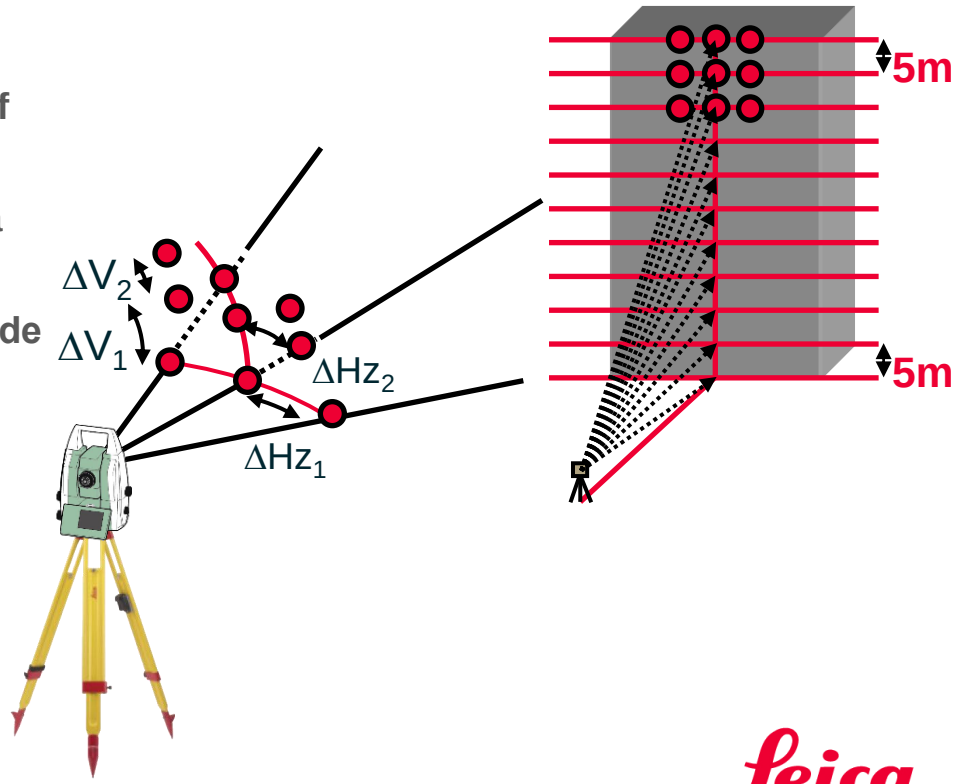
Leica Geosystems

SmartWorx Viva on TS

1. Ref. Plane and Grid Scan

Grid Scan on Plane

- Measuring a true regular grid with predefined grid size (e.g. 20cm by 20cm)
- Reference plane required
- Individual angle values for each points of the regular grid
- Rectangular or polygonal Grid Scan area definition
- “Standard” and “Fast” measurement mode for TS15
- Image assistance

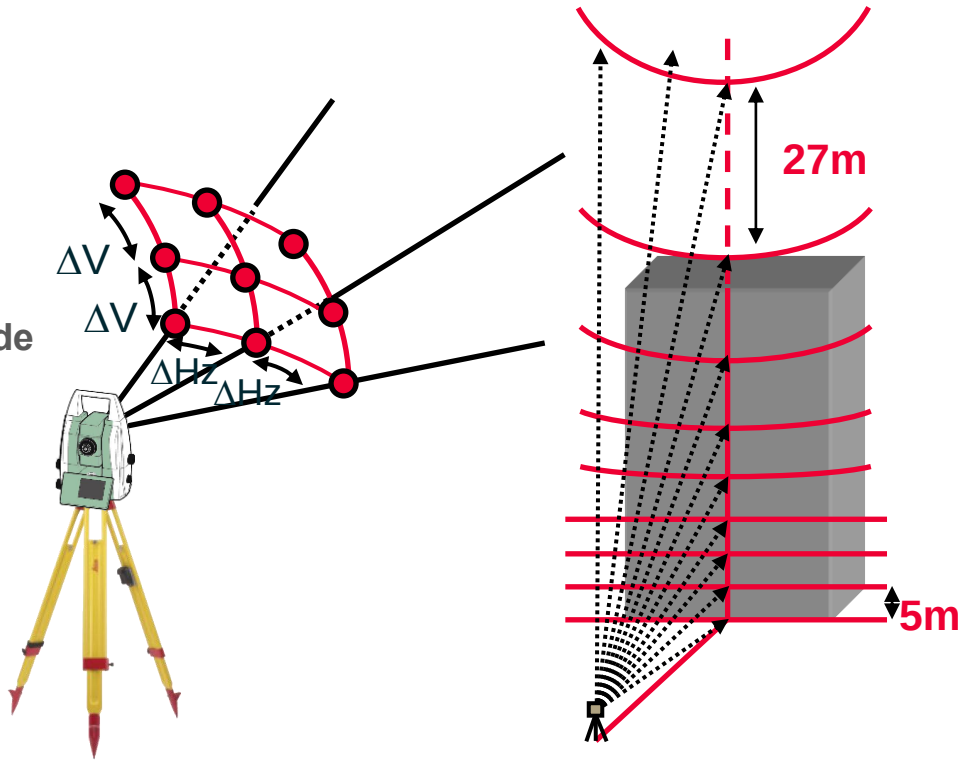


SmartWorx Viva on TS

1. Ref. Plane and Grid Scan

Grid Scan on Surface

- Measuring with fixed angle resolution (constant delta Hz and delta V)
- No reference plane required
- Any surface can be grid scanned
- Rectangular or polygonal Grid Scan area definition
- “Standard” and “Fast” measurement mode for TS15
- Image assistance



“Grid scan on surface” also accessible from the Volumes application (e.g. for grid scanning of a stockpile)

- when it has to be **right**

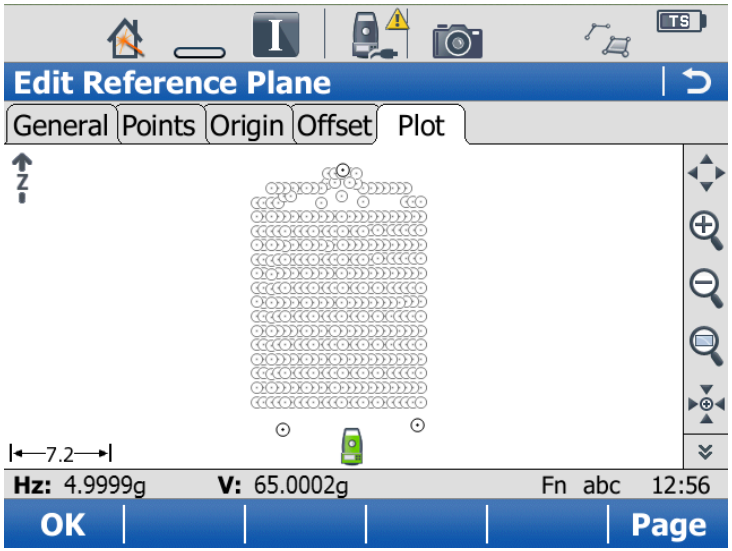
Leica Geosystems

SmartWorx Viva on TS

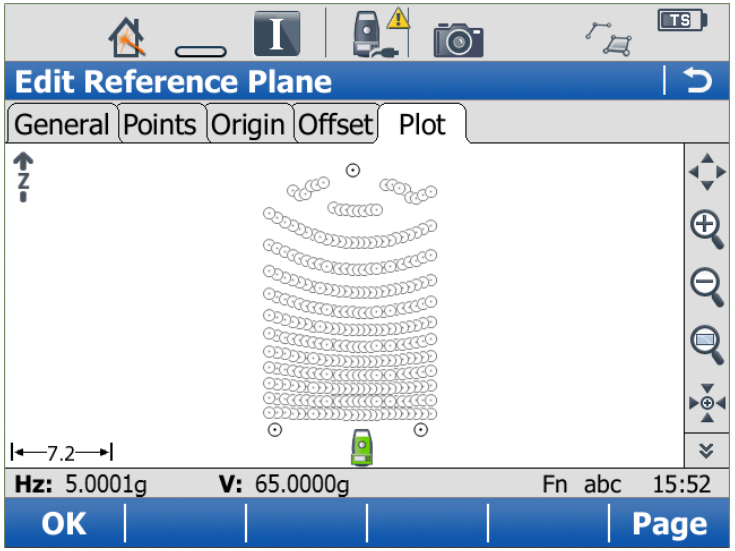
1. Ref. Plane and Grid Scan

Example for the difference between “Grid scan on plane” and “Grid scan on surface” with focus to the grid.

Grid scan on plane



Grid scan on surface



- when it has to be **right**

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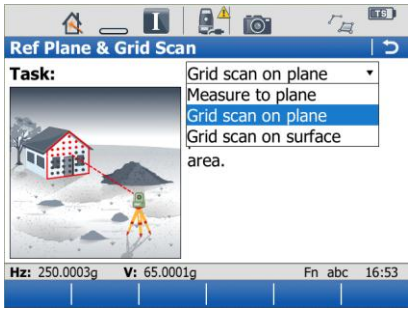
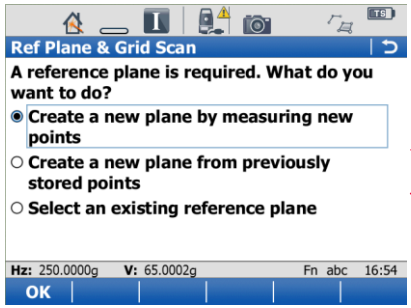
SmartWorx Viva on TS

1. Ref. Plane and Grid Scan

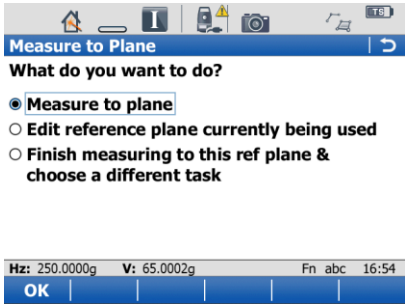
Workflow



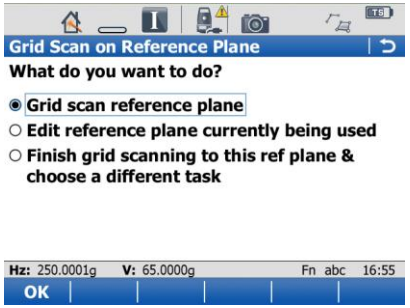
Select task



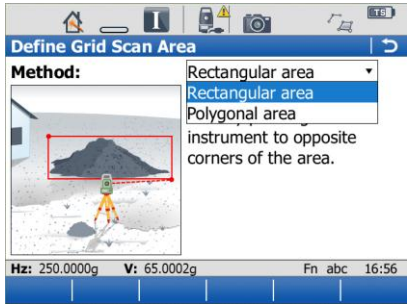
Define reference plane



Measure to plane



Grid scan on plane



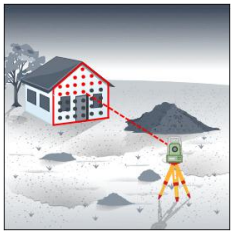
Grid scan on surface

- when it has to be **right**

Leica Geosystems

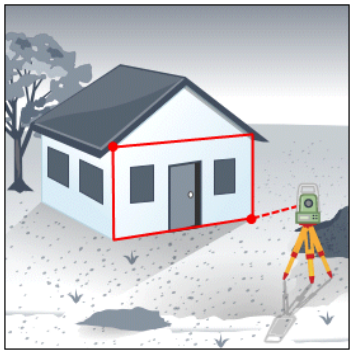
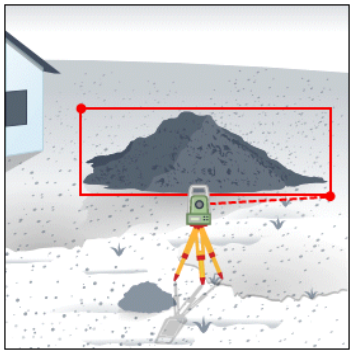
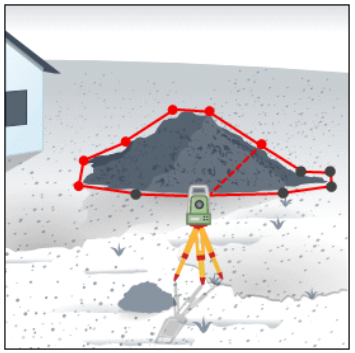
SmartWorx Viva on TS

1. Ref. Plane and Grid Scan



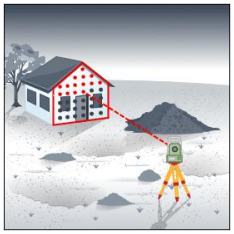
Grid Scan Area

Method selection for grid scan area definition

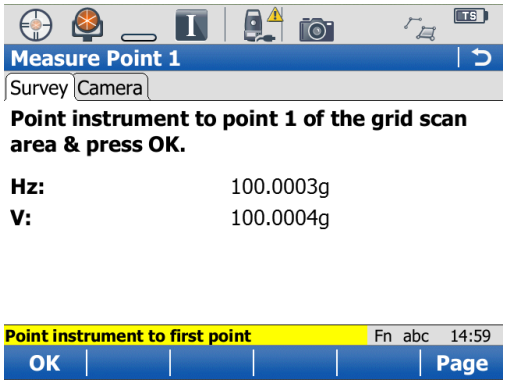
	Grid scan on plane	Grid scan on surface
Rectangular scan area		
Polygonal scan area		

SmartWorx Viva on TS

1. Ref. Plane and Grid Scan



Define Grid Scan Area



Point telescope to the boundary point of the rectangular/polygonal grid scan area

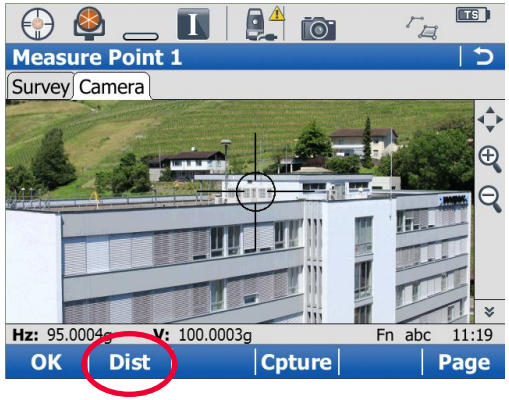


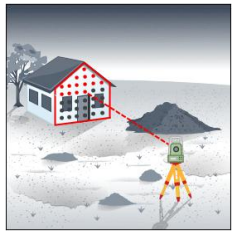
Image assisted boundary point definition

Dist: makes a distance measurement to switch the crosshair style to fine

Fine style crosshairs for accurate aiming of the telescope

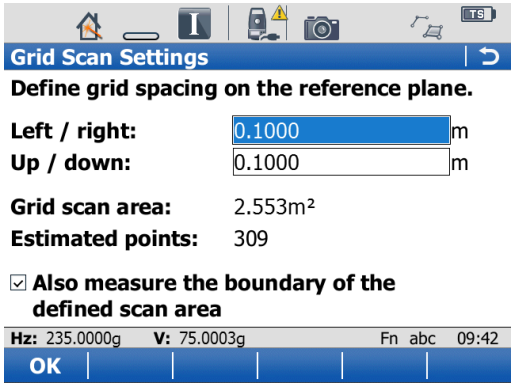
SmartWorx Viva on TS

1. Ref. Plane and Grid Scan

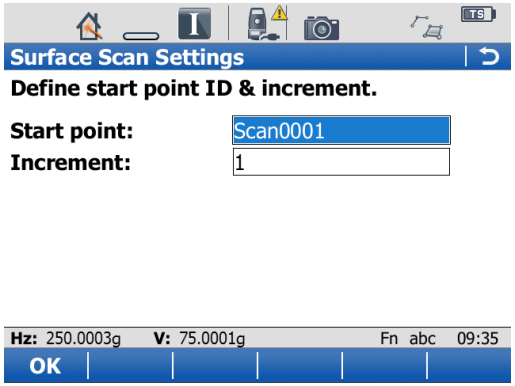


Grid Scan Settings – Grid scan on plane

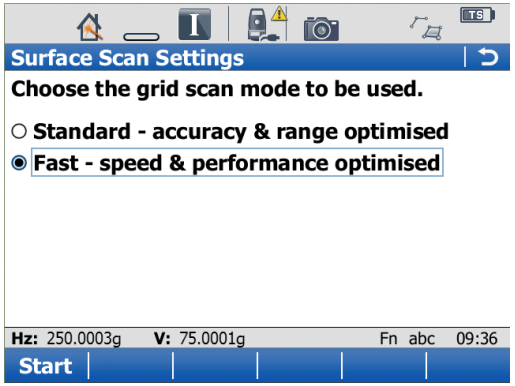
Resolution



Point increment



Grid scan mode



1. Regular grid on plane with user defined grid spacing

2. Boundary points are grid scanned in addition

Boundary points = intersection between grid and boundary polygon

For TS15 only →

"Standard": Standard reflectorless EDM mode, accurate positioning

"Fast": continuous EDM mode, fast positioning
→ possible due to new electronics and new software

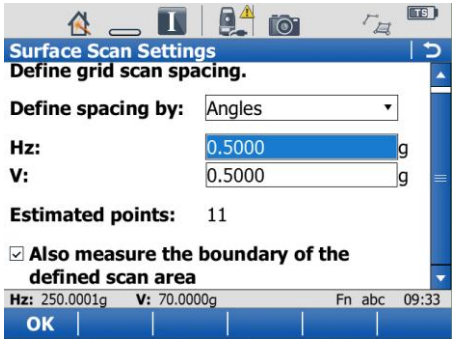
SmartWorx Viva on TS

1. Ref. Plane and Grid Scan

Grid Scan Settings – Grid scan on surface

Resolution

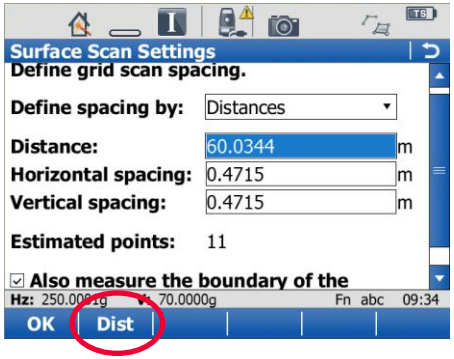
Angles defined



Regular delta Hz and delta V values

Different values for delta Hz and delta V possible

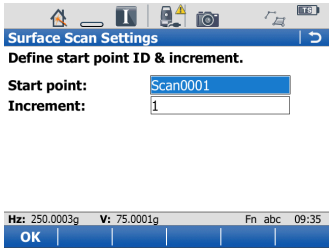
Distances defined



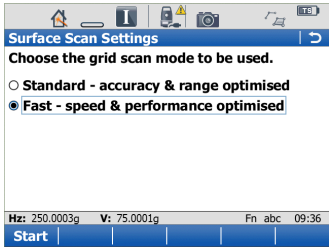
Grid spacing defined by a horizontal and vertical spacing at a certain distance

Dist: probe distance to object for grid spacing definition

Point increment



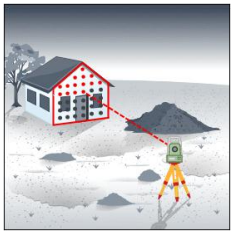
Grid scan mode



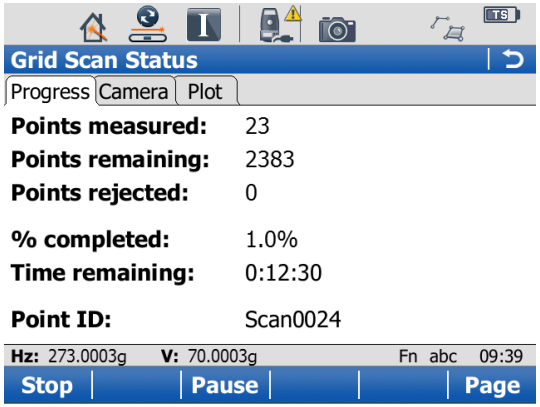
Similar to settings for “Grid scan on plane”

SmartWorx Viva on TS

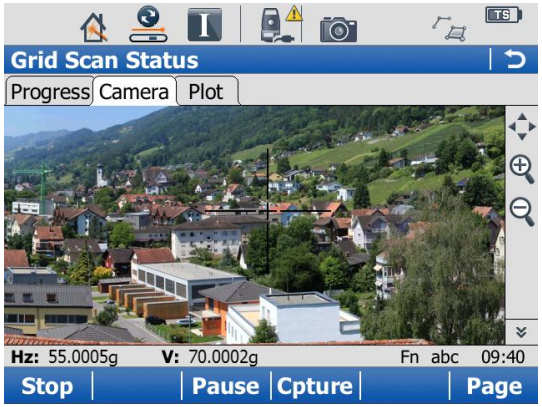
1. Ref. Plane and Grid Scan



Grid Scan Status

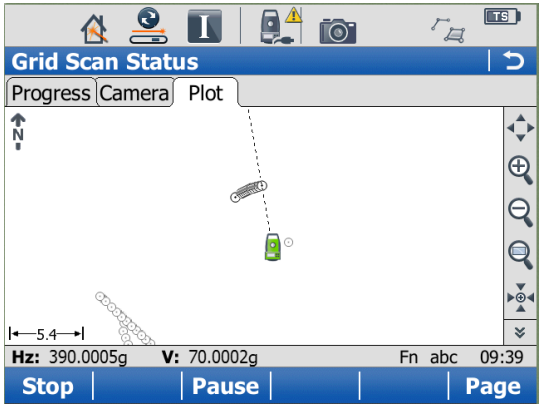


Real-time update of grid scan statistics



Live View during grid scan process

Possible to take images during scan process

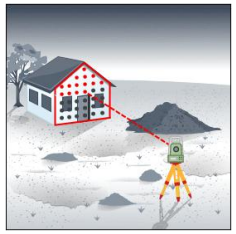


Real-time update of Plot view

- when it has to be **right**

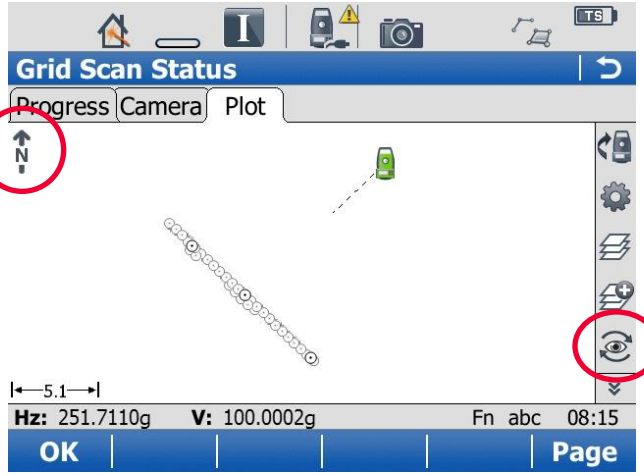
Leica Geosystems

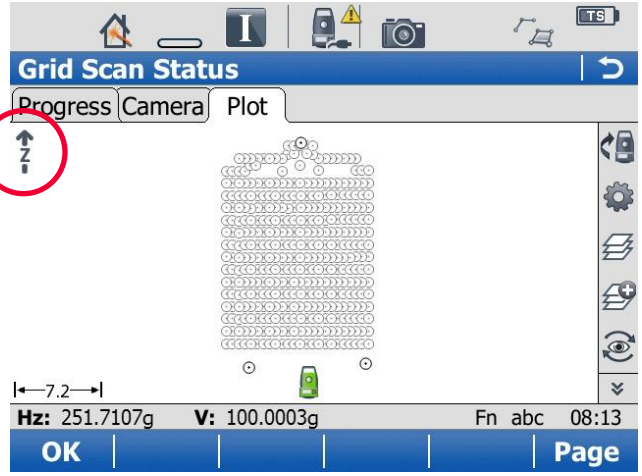
SmartWorx Viva on TS
1. Ref. Plane and Grid Scan



Plot view in “Grid scan on plane”

- Switching between “normal” view and “plane” view
- Plane view only available for if Reference Plane is available → “Grid scan on plane”
- Icon to switch to “plane” view is on 2nd level of Plot toolbar





- when it has to be **right**

Leica Geosystems

SmartWorx Viva on TS

1. Ref. Plane and Grid Scan

Competition

Leica TS15

Trimble VX

Sokkia SRX5

Trimble S8
Video-Robotic

Topcon IS

SmartWorx Viva on TS

1. Ref. Plane and Grid Scan

Competition

	Leica TS15	Trimble		Topcon IS	Sokkia SRX5
		S8 Video-Robotic	VX		
Scanning a regular grid on plane: "Grid scan on plane"	✓	✓	⛔	(✓)	✓
Scanning any surface: "Grid scan on surface"	✓	✓	✓	✓	⛔

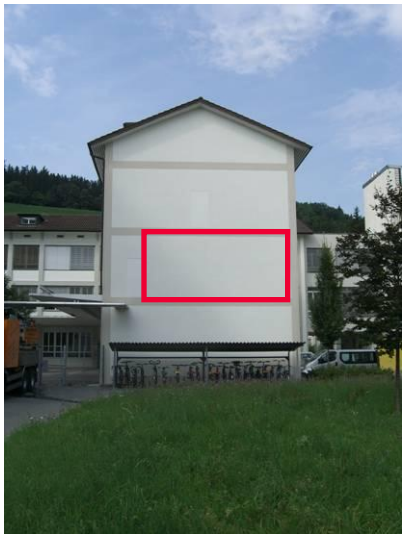
✓ Available

⛔ Not available

Only the number of horizontal and vertical points can be entered (SW v7.2.3)
→ Not possible to enter the true grid size!!!

SmartWorx Viva on TS

1. Ref. Plane and Grid Scan



Competition

Measurement frequency [Hz] 1)

		Leica TS15	Trimble		Topcon IS	Sokkia SRX5
			S8 Video-Robotic	VX		
Scanning a regular grid on plane	Standard	0.3	0.4	---	***) 0.5	*) 0.2
	fast (tracking)	**1.1**	1.0	---	****) 0.7	**) 0.2
	continuous	---	---	---	13.6	---
Scanning any surface	Standard	0.4	0.3	0.3	***) 0.6	---
	fast (tracking)	**1.2**	1.0	0.5	****) 0.7	---
	continuous	---	---	4.4	13.9	---

1) tested on surface @32m, spacing 0.4m x 0.4m

*) simple
**) fast
***) fine
****) coarse

1515 points measured, but resolution requires only 210 points
→ "real" measurement frequency is only 1.9 Hz

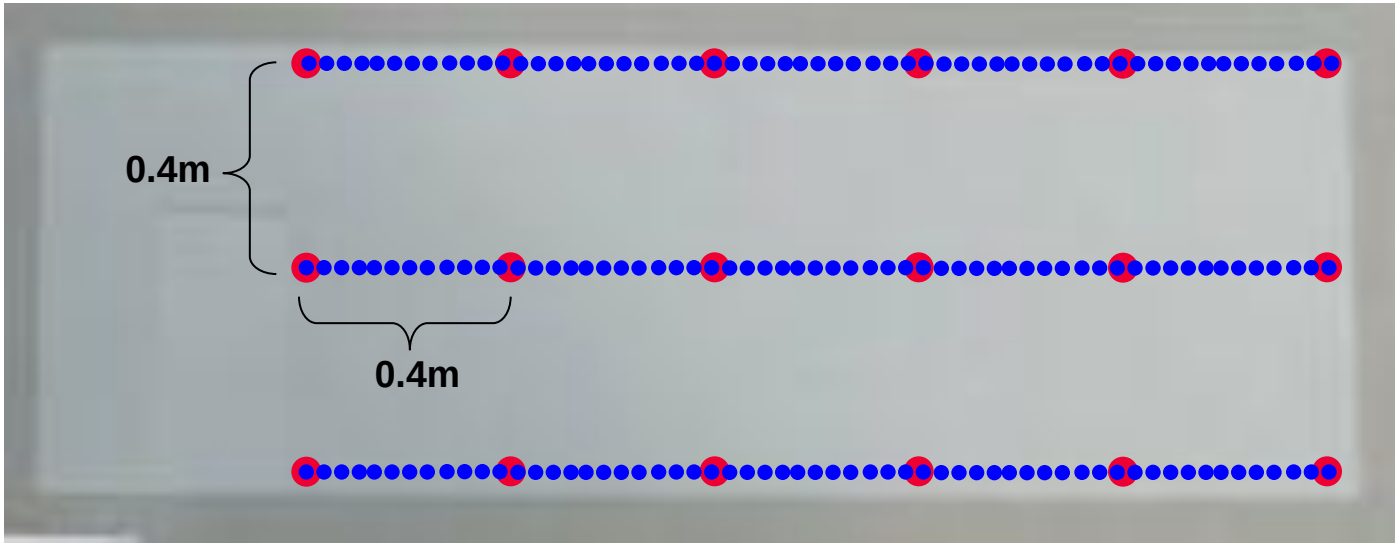
SmartWorx Viva on TS
1. Ref. Plane and Grid Scan

Topcon IS data sheet:

IMAGING	
Cameras	(2) 1.3mp
Image speed	1 - 10fps
Scanning	Max 20 pts/sec

Where does Topcon's high measurement frequency come from?

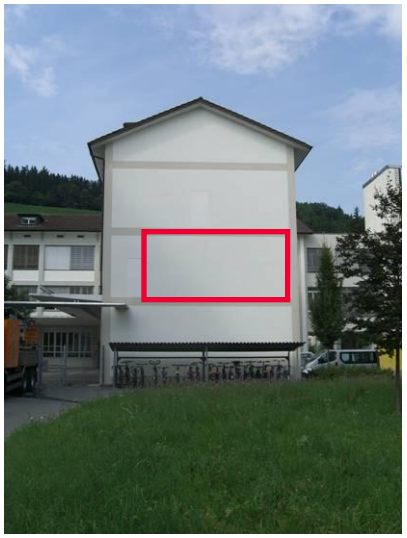
Required resolution: point spacing of 0.4m x 0.4m on a surface at a range of 32m



- **Leica's TS15 results in a true resolution of 210 points and a measurement frequency of 1.1Hz**
- **Topcon's resolution results in 1515 points and a measurement frequency of 13.6Hz**
  → most points are not needed!!!
  → "real" measurement frequency is 1.9 Hz!!!

SmartWorx Viva on TS

1. Ref. Plane and Grid Scan



Competition

Measurement frequency [Hz] 1)

TS15 has the fastest grid scanning functionality!!!

1) tested on surface @32m, spacing 0.4m x 0.4m

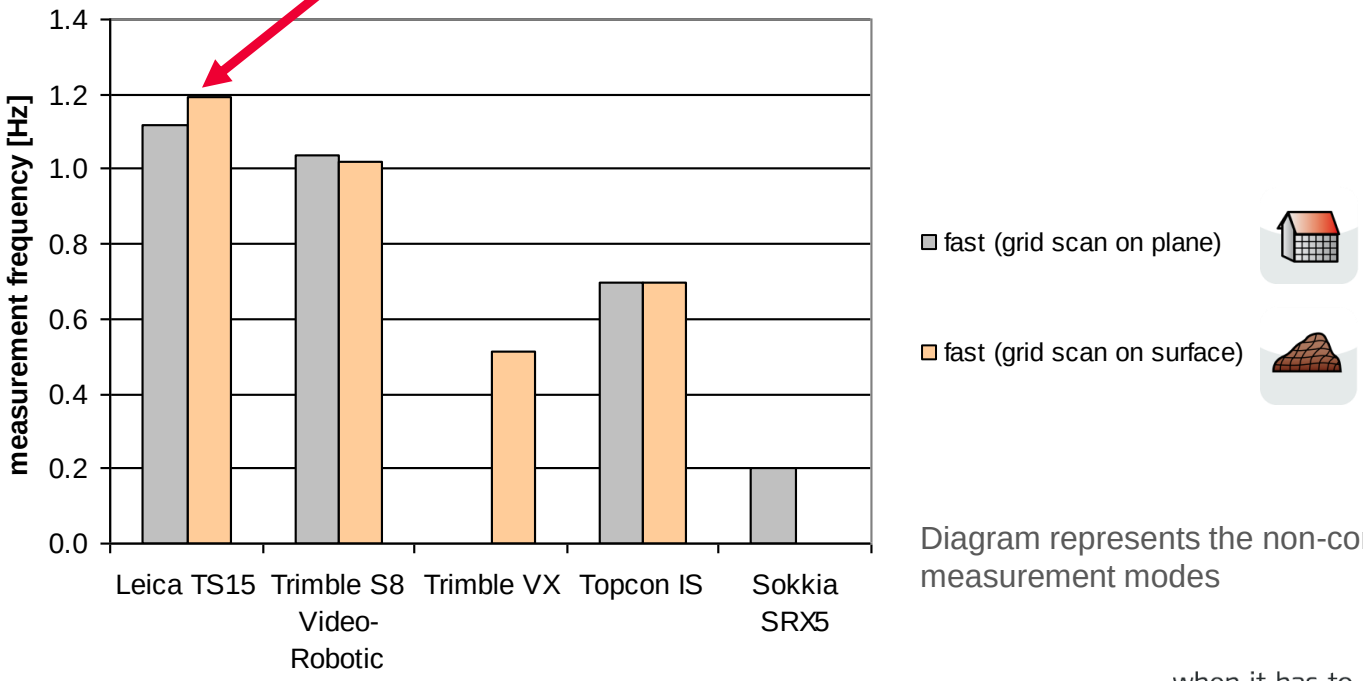
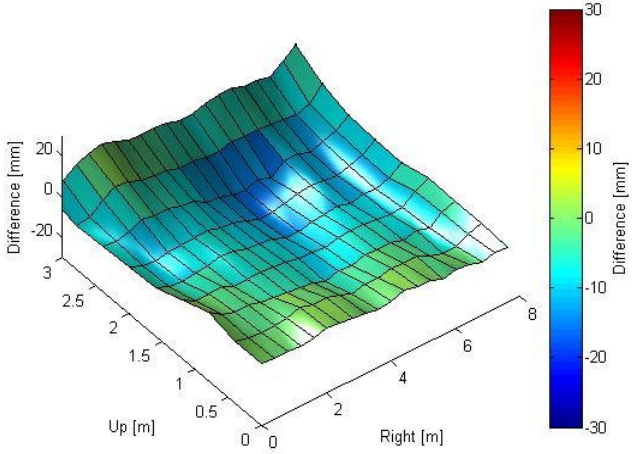


Diagram represents the non-continuous measurement modes

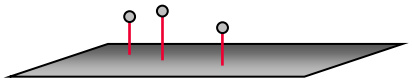
SmartWorx Viva on TS

1. Ref. Plane and Grid Scan



Competition

Standard deviation from plane [mm] 1)



		Leica TS15	Trimble S8 Video-Robotic	Trimble VX	Topcon IS	Sokkia SRX5
Scanning a regular grid on plane	Standard	5.1	6.3	---	***) 7.6	*) 7.1
	fast (tracking)	5.3	6.2	---	****) 6.8	**) 7.2
	continuous	---	---	---	8.6	---
Scanning any surface	Standard	5.2	6.3	5.6	***) 7.3	---
	fast (tracking)	5.3	6.2	5.5	****) 7.3	---
	continuous	---	---	5.4	9.5	---

1) **tested on surface @32m, spacing 0.4m x 0.4m**

*) simple
**) fast
***) fine
****) coarse

SmartWorx Viva on TS

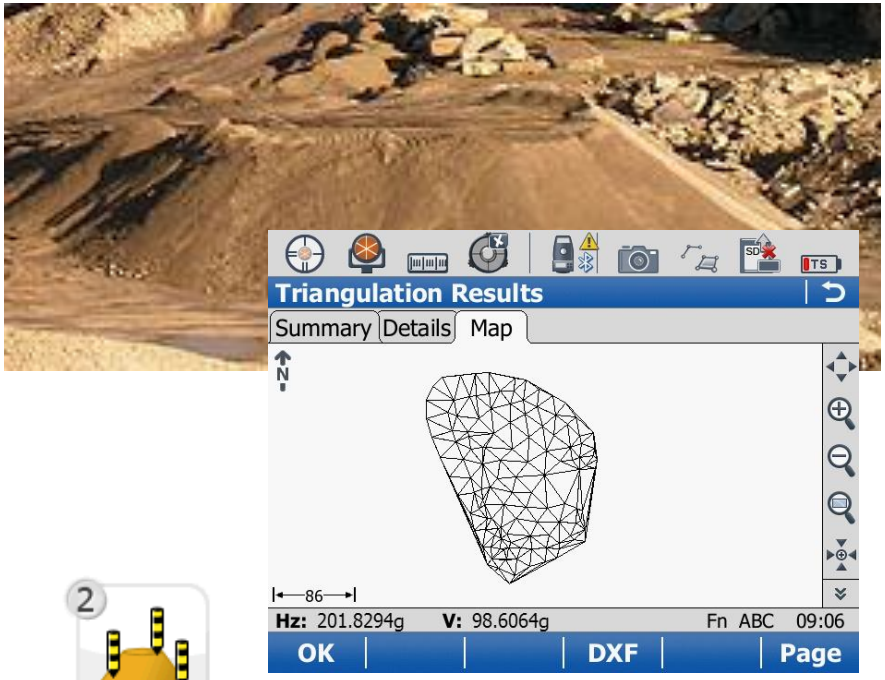
1. Ref. Plane and Grid Scan

General comments

- The TS15 has the most accurate and fastest Grid Scanning functionality to scan a true grid on a plane
- Any surface can be grid scanned now
- Polygonal Scan Area definition
  → increases efficiency “Only scan what you need”
- “Fast” measurement mode available only for TS15
  → optimized motorization for TS15
- “Ref. Plane and Grid Scan” for all reflectorless instruments available
  → for TS15/TS11 onboard and remote
  → other instruments (e.g. TS30, TPS1200+) only remote and connected to a CS
- “Ref. Plane and Grid Scan” application has the same functionality on TS and on CS (remote use case)

SmartWorx Viva on TS
Contents

1. Ref. Plane and Grid Scan
2. Volumes
3. Check & Adjust
4. CS Connection Wizard
5. Robotic Screen
6. Summary

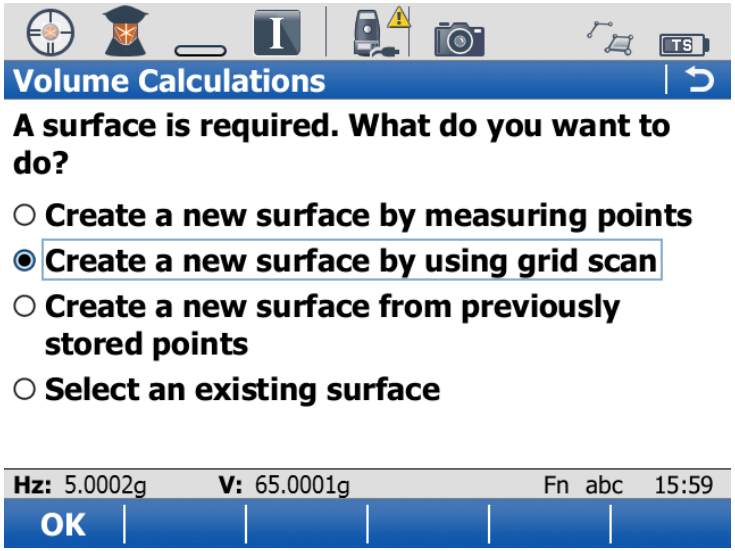


Volume calculations

SmartWorx Viva on TS
2. Volumes

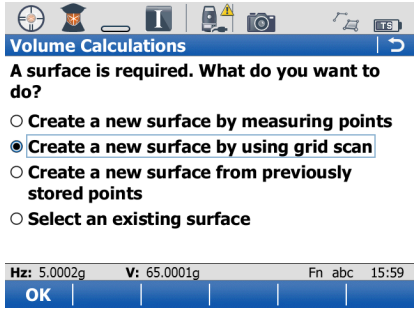
What is new in the "Volumes" application?

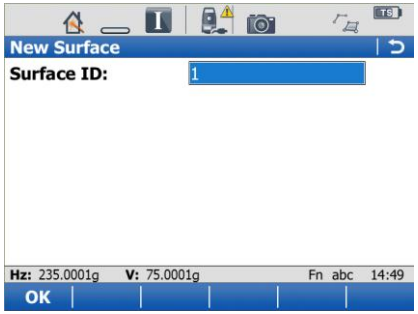
- Integration of grid scanning in the Volumes application
  → e.g. a stockpile can easily be grid scanned and the volume calculated afterwards
- A surface can be created by either measuring points or using the grid scan functionality
- "Grid scan on surface" is available in Volumes application if instrument is motorized and has a reflectorless EDM mode
- "Fast" measurement mode available only for TS15



SmartWorx Viva on TS
2. Volumes

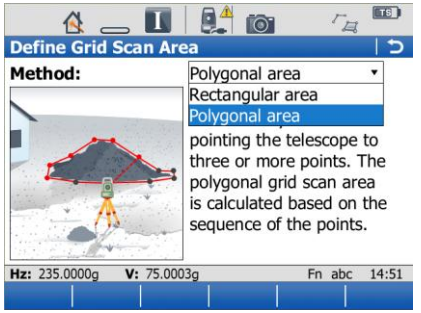
Workflow



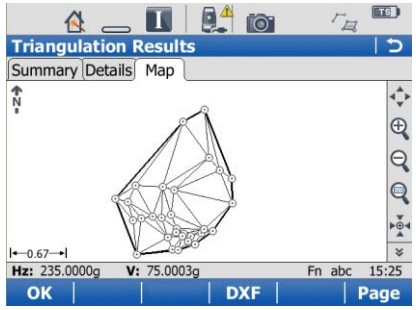


Create surface

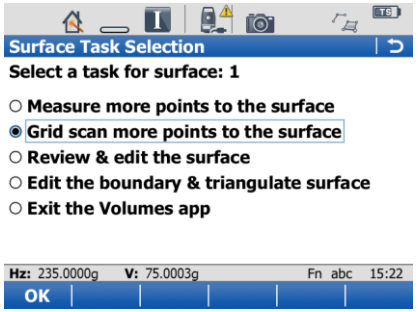
Grid scan on surface



Grid scan surface points



Results (triangulation, volume, etc.)



Verify grid scan and add more points to the surface by grid scanning

- when it has to be **right**

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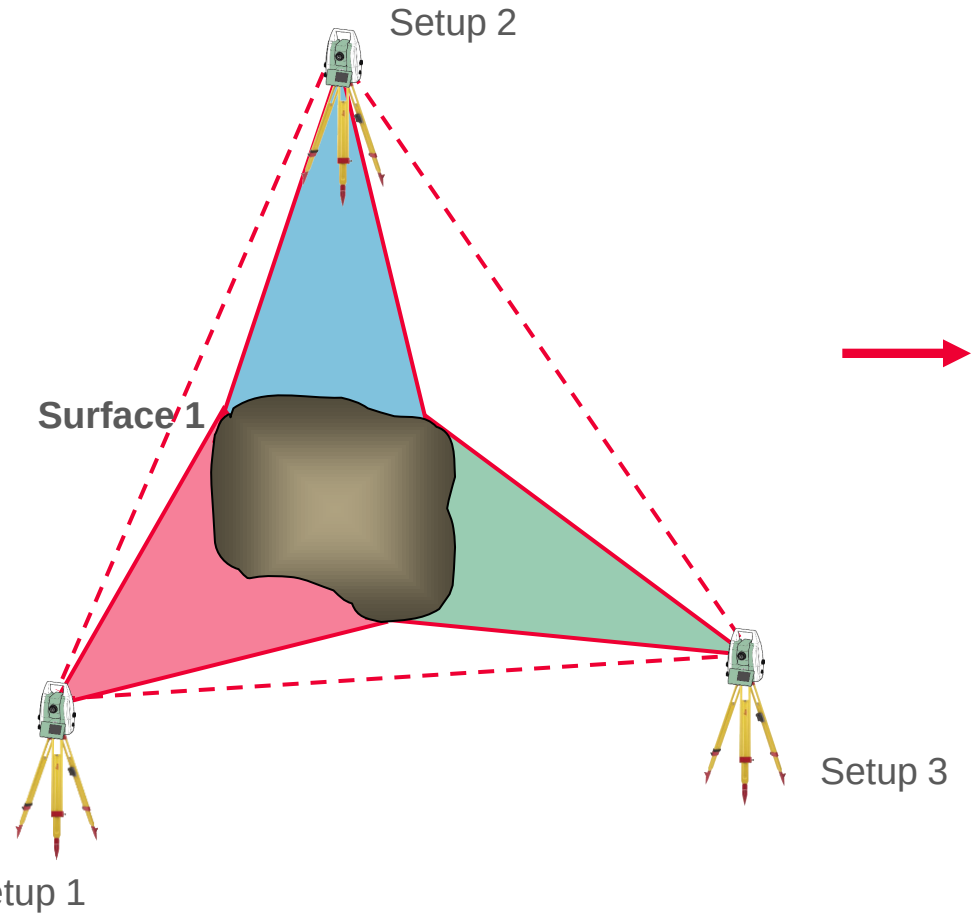
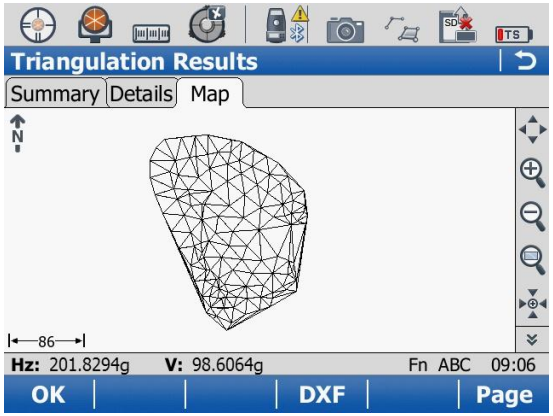
SmartWorx Viva on TS
2. Volumes

Scan object (surface) from different setups





Triangulation, Volumes calculations etc.

- when it has to be **right**

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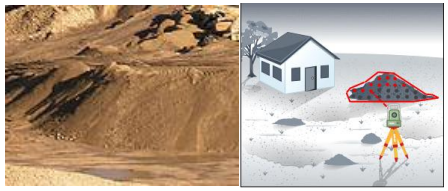
SmartWorx Viva on TS
2. Volumes

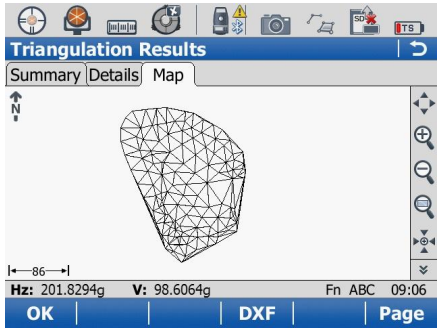
General Comments

- Dedicated applications to measure surfaces of an undefined shape (e.g. gravel hill)
- Integration of scanning data into the onboard application
- Volumes can be calculated directly in the field
- Minimum user input in the field
- Smooth workflow from “point cloud” to the triangulation and finally to a resulting number as e.g. the volume
- Fast surface measurements

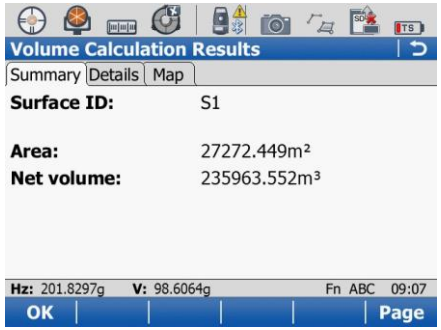
Grid Scan



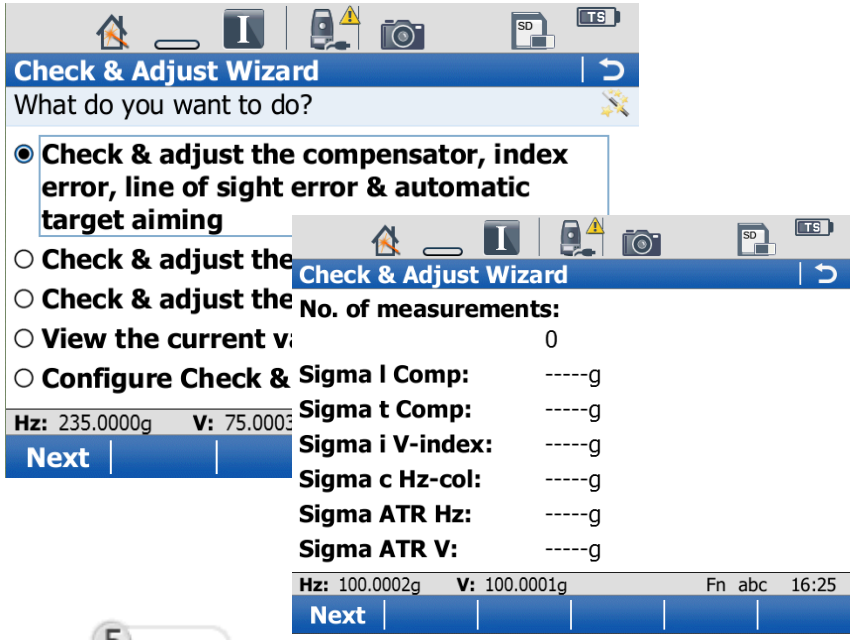
Triangulation



Volume calculation



SmartWorx Viva on TS
Contents



Check & Adjust

- when it has to be **right**

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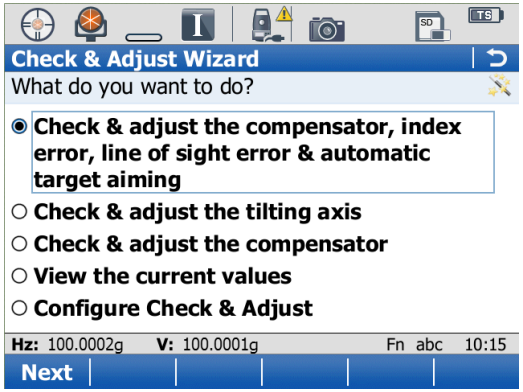
SmartWorx Viva on TS

3. Check & Adjust

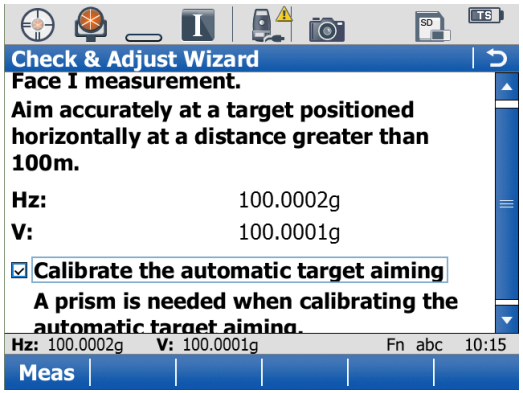
What is new in “Check & Adjust”?

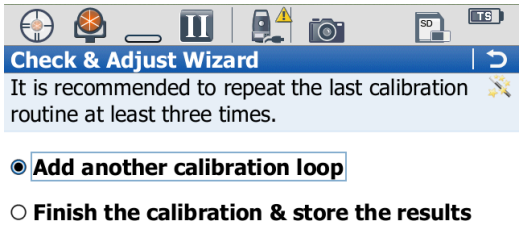
- New SmartWorx Viva style
- Wizard guided calibration of the TS
- User is asked to repeat the calibration routines
- Content of new “Check & Adjust” similar to the old “Check & Adjust”
- “Check&Adjust” is only available on TS → “Check & Adjust” can not be performed from CS

Main menu



Measurements





Repeat last measurements?

- when it has to be **right**

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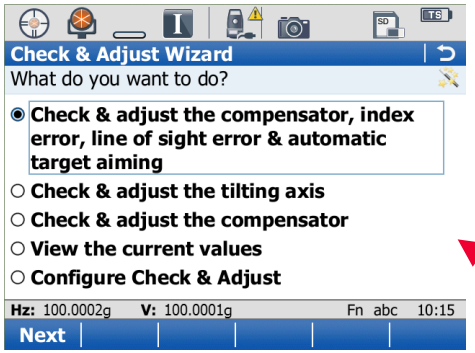
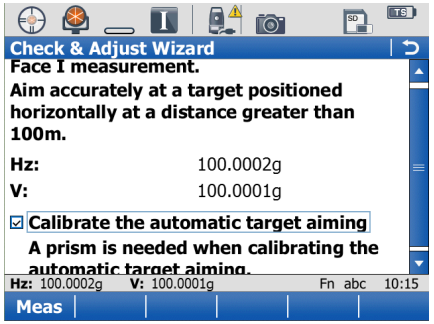
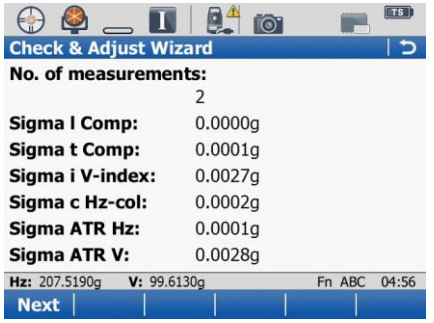
SmartWorx Viva on TS

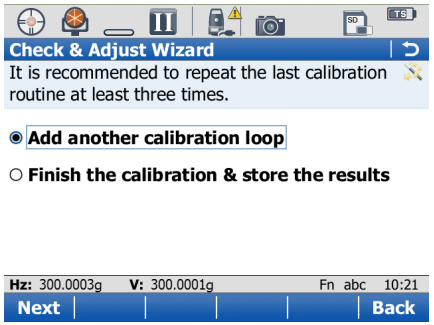
3. Check & Adjust

Check & Adjust the compensator, index error, line of sight & automatic target aiming









- when it has to be **right**

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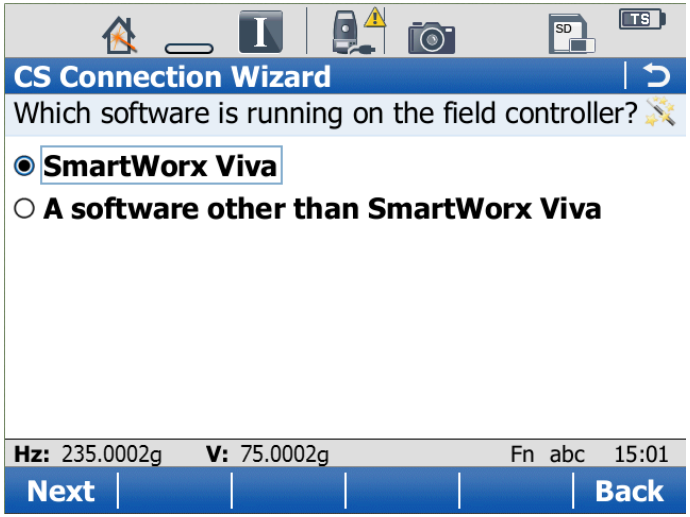
SmartWorx Viva on TS
Contents

CS connection wizard

SmartWorx Viva on TS
4. CS connection Wizard

What is the CS connection Wizard?

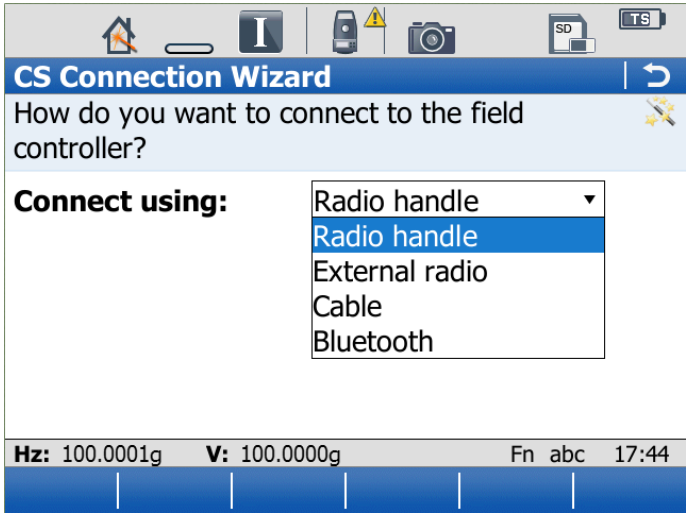
- CS connection wizard easily sets up the TS total station and defines how the CS controller will connect to the TS
- CS connection wizard also allows the setup of TS total station connection to a device on which other software than SmartWorx Viva runs
  → “A software other than SmartWorx Viva” sets the GeoCom interface
- CS connection wizard guides the user step by step through the connection process of TS and CS and/or other devices (e.g. computer)



SmartWorx Viva on TS
4. CS connection Wizard

A CS controller can be connected to remotely control a TS total station. This is possible in the following ways:

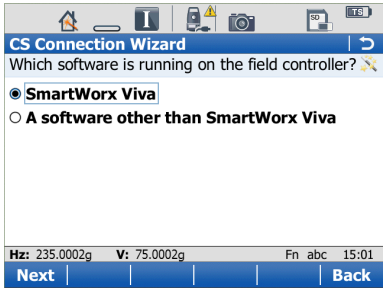
- Using a serial cable
- Using Bluetooth (all TS total stations are equipped with Bluetooth)
- A radio handle (both RH1200 and RH15 radio handles can be used)
- A radio connected to the TS total station by cable to port 1 of the TS total station (both TCPS27 and TCPS28 radios can be used)



SmartWorx Viva on TS

4. CS connection Wizard

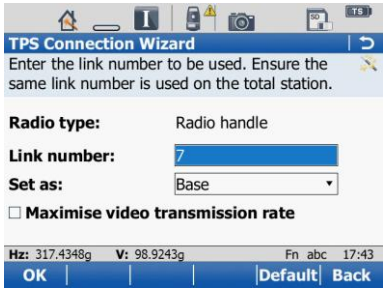
Workflow to connect the TS to a CS via radio handle

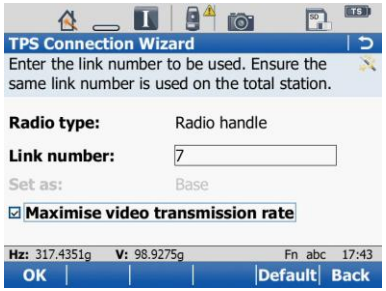


Select SmartWorx Viva

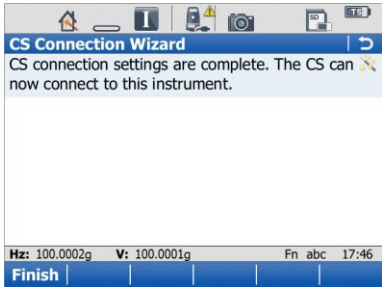
Choose Radio handle

SmartWorx verifies automatically if and which type of Radio handle is attached





Configure Radio handle settings



- when it has to be **right**

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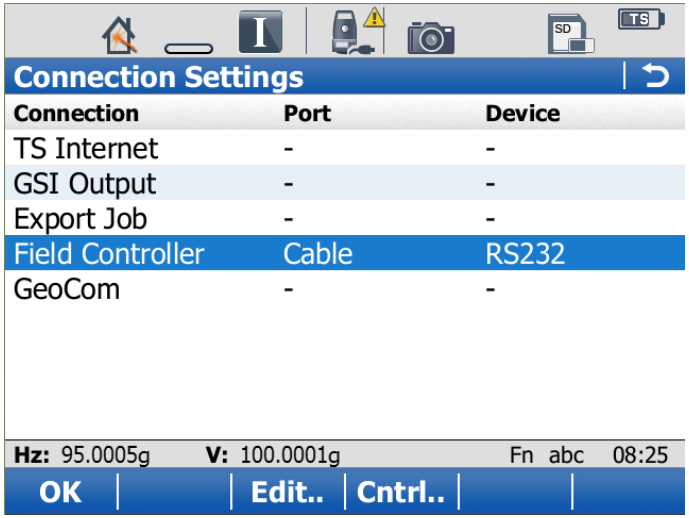
SmartWorx Viva on TS
4. CS connection Wizard

“Connection Settings” without using the CS connection wizard

- “Field Controller” for CS connection settings
- “GeoCom” for GeoCom interface settings

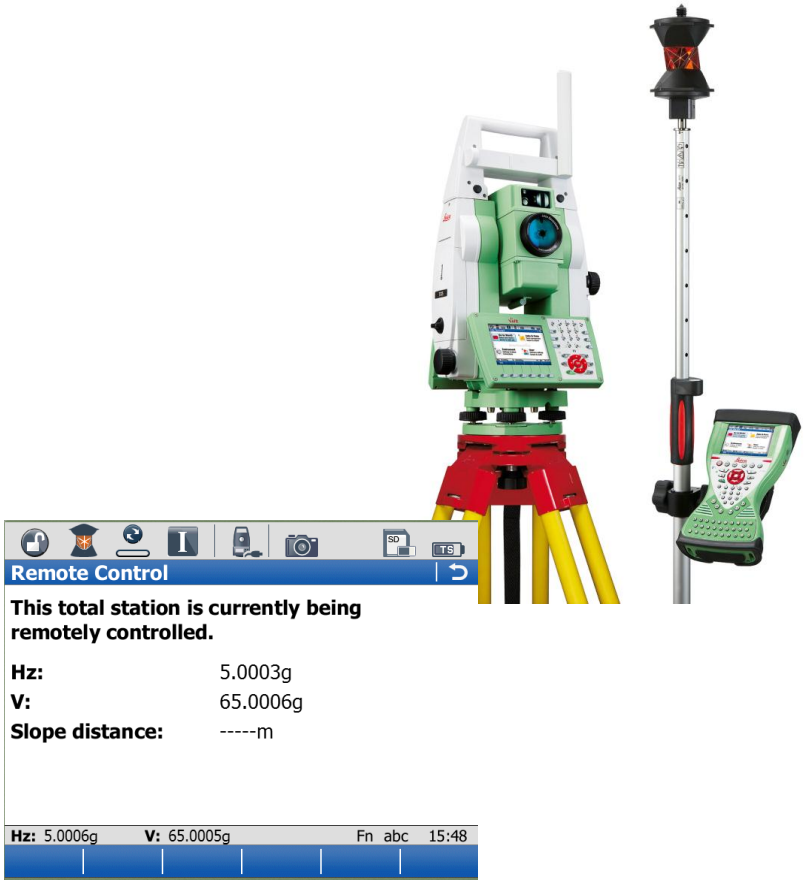


SmartWorx Viva on TS
4. CS connection Wizard

General Comments

- Easy and simple CS – TS connection
- Guides the user through the connection process of TS and CS and/or other devices (e.g. computer)
- RH1200 can be attached and used on a TS15
  → for connection to TCPS27 (not CS internal radio)

SmartWorx Viva on TS
Contents



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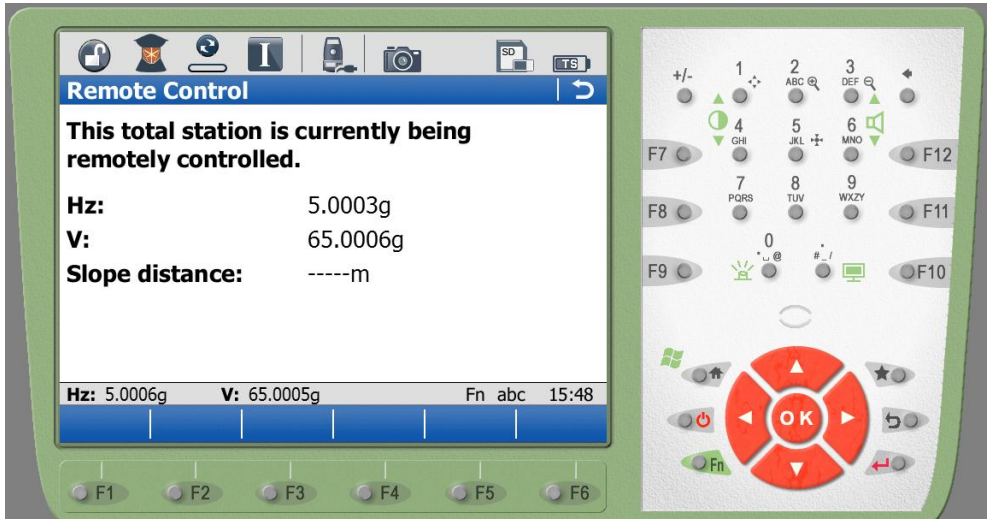
SmartWorx Viva on TS

5. Robotic Screen



- when it has to be **right**

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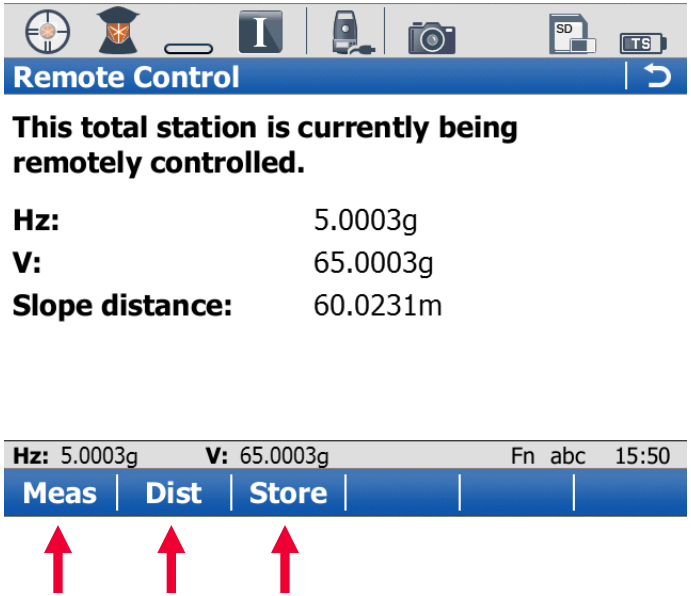
SmartWorx Viva on TS
5. Robotic Screen

What is the TS Robotic Screen?

- The Robotic Screen automatically appears on the TS as soon as the TS is connected to a CS.
- When the user is in a measurement panel on the CS, the F1 to F3 keys appear additionally on the TS.
  → Trigger measurements from the TS
- Measurement data, which are measured with the robotic screen, are transferred to the CS.
  → no SD card on the TS needed!



SmartWorx Viva on TS
5. Robotic Screen

General Comments

- Robotic Screen is extremely useful when using a CS controller to control the total station and the user has hooked the controller to the leg of the tripod of the total station because of:
  - maybe to make use of the QWERTY keypad on the CS controller
  - or maybe the user has returned to the total station to make some reflectorless measurements
- In the robotic case, the TS is just a sensor. The controlling of the TS, applications, data management and licensing are under the control of the CS.
- Terminal mode:
  With System1200 instruments there was a so-called Terminal Mode available. This basically meant it was possible to steer a TPS1200 total station from an RX controller and the data would be stored to the CF card of the total station. This is no longer possible with the TS total stations and CS controllers.

SmartWorx Viva on TS
Contents

- when it has to be **right**

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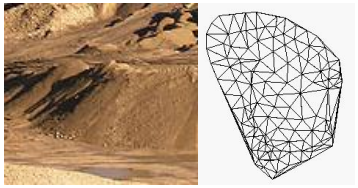
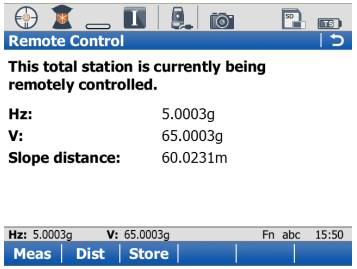
SmartWorx Viva on TS

6. Summary

- The TS15 has the most accurate and fastest Grid Scanning functionality to scan a true grid on a plane
- The TS15 has “grid scan on surface” which allows the scanning of any surface
- Improve efficiency with polygonal grid scan area definition: “Only scan what you need”



- The TS15 fully integrates scanning data into the onboard application
- Easy and simple CS-TS connection process
- Robotic screen on TS allows the triggering of measurements



- when it has to be right

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- when it has to be **right**

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