# Leica Viva

## Image Assisted Surveying & Image Notes


- when it has to be **right**

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# Image Assisted Surveying & Image Notes
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2. Image Assisted Surveying
3. Image Notes
4. Availability
5. Summary



- when it has to be **right**

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# Image Assisted Surveying & Image Notes

## 1. Introduction

**Image Assisted Surveying**

Camera live view of what the total station sees

**Image Notes**

Captured images

# Image Assisted Surveying & Image Notes

## 1. Introduction


**Image Assisted Surveying**

Image assisted aiming, search

**Image Notes**

Image based documentation

# Image Assisted Surveying & Image Notes
## 1. Introduction

### What are Image Assisted Surveying & Image Notes?

- More than taking photos
- Assisted Surveying & Image Notes are not just a gimmick. They speed up the daily surveying process

- Benefits

- Image Assisted Surveying & Image Notes are part of the Viva family
- Imaging functionality is available (to a different extend) on all TS11, TS15 & CS10, CS15

# Image Assisted Surveying & Image Notes
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# Image Assisted Surveying & Image Notes

## 2. Image Assisted Surveying

### Traditional manual target aiming

- Use gun sight
- Make fine aiming by looking through telescope

| Coarse Aiming | Fine Aiming |
| --- | --- |
|  |  |
| Gun sight | Telescope |

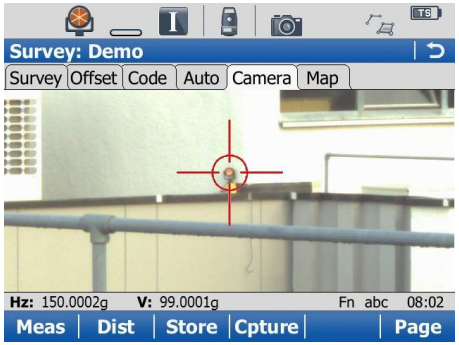
# Image Assisted Surveying & Image Notes

## 2. Image Assisted Surveying

### Manual image assisted target aiming

- Make coarse aiming via camera
- Make fine aiming by looking through telescope

### Coarse Aiming




Camera live view

### Fine Aiming

Telescope

- Faster, more accurate coarse aiming

- when it has to be **right**

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# Image Assisted Surveying & Image Notes

## 2. Image Assisted Surveying

### Access to the camera

- Camera icon in instrument icon tool bar

  (Accessible from every application)


- Camera tab within applications
  - Survey
  - Setup
  - Reference plane & grid scan

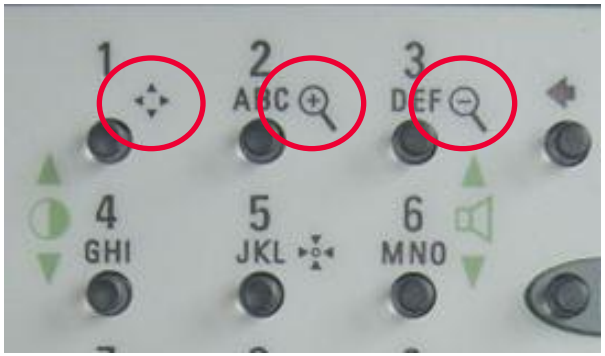
# Image Assisted Surveying & Image Notes

## 2. Image Assisted Surveying

### Zooming

- Supported zoom factors 1x, 2x, 4x
- Zooming can be made via tool bar or key board


Zoom extends | Zoom in | Zoom out



# Image Assisted Surveying & Image Notes

## 2. Image Assisted Surveying

### Zooming

- No quality degradation due to zooming, because real pixel information of camera sensor is shown on VGA display


Zoom 1x
(Zoom extends)

Zoom 2x

Zoom 4x

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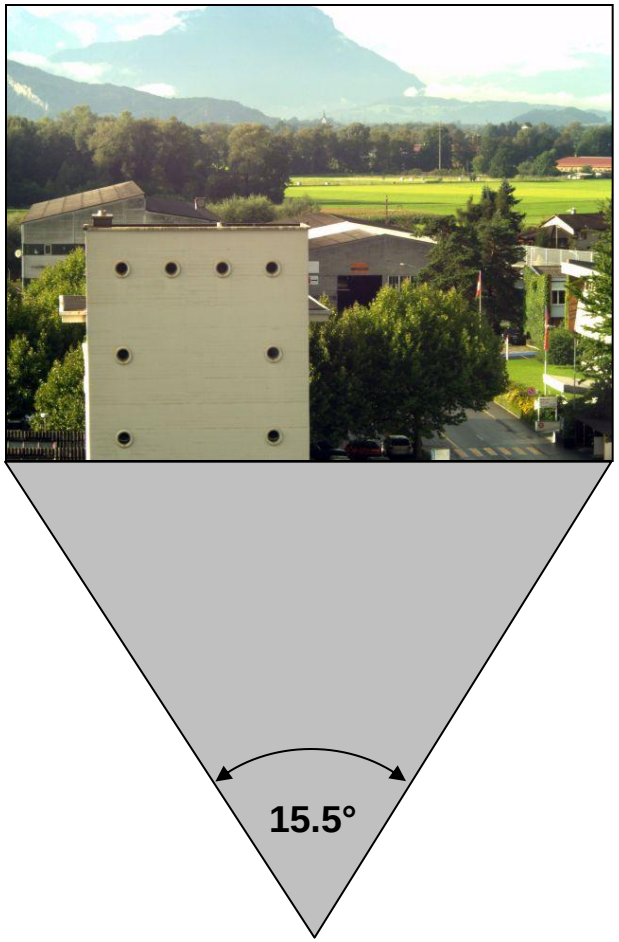
# Image Assisted Surveying & Image Notes

## 2. Image Assisted Surveying

### Zoom factor & field of view





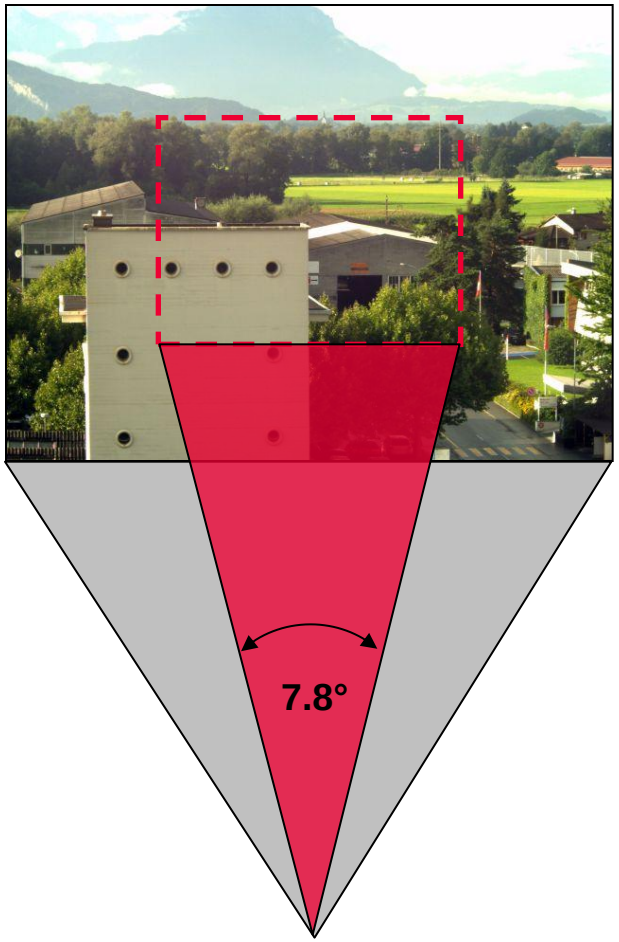
### Zoom factor 1x

- Field of view: 15.5° x 11.7°
- 1 pixel on screen ~ 4 mm in 10 m distance

# Image Assisted Surveying & Image Notes

## 2. Image Assisted Surveying

### Zoom factor & field of view





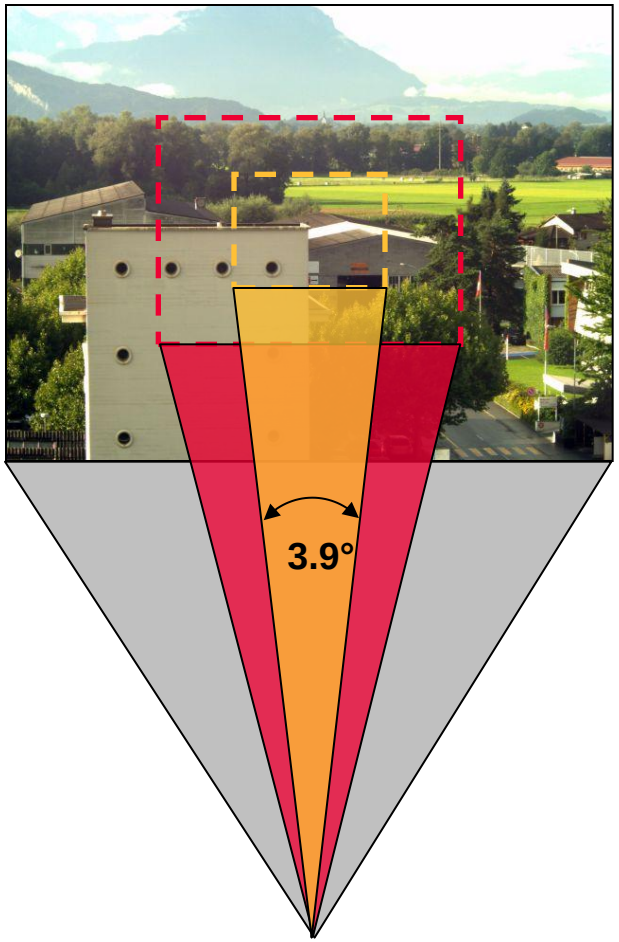
### Zoom factor 2x

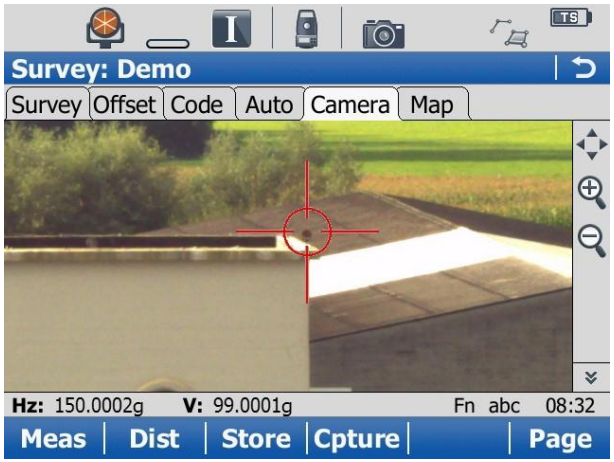
- Field of view: 7.8° x 5.9°
- 1 pixel on screen ~ 2 mm in 10 m distance

# Image Assisted Surveying & Image Notes

## 2. Image Assisted Surveying

### Zoom factor & field of view



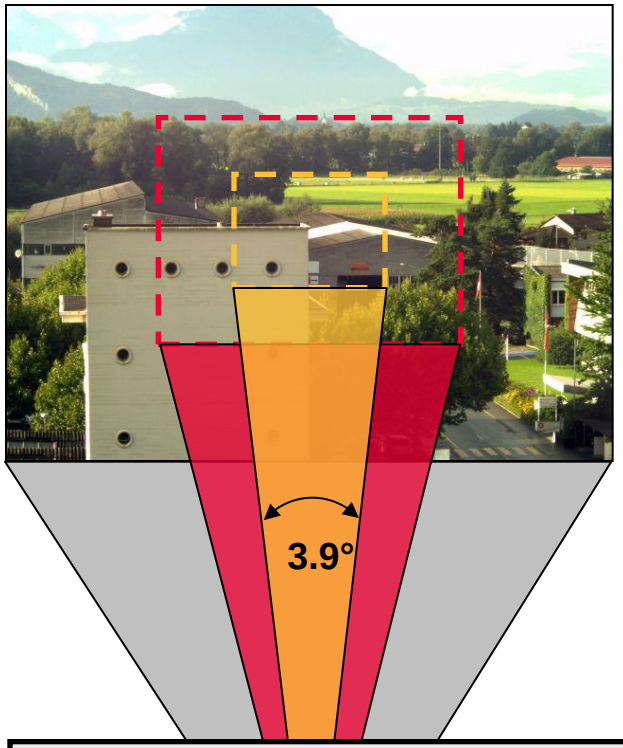

### Zoom factor 4x

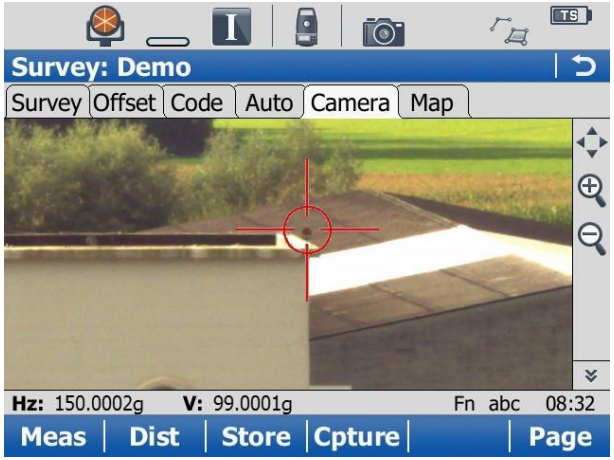
- Field of view: 3.9° x 2.9°
- 1 pixel on screen ~ 1 mm in 10 m distance

# Image Assisted Surveying & Image Notes

## 2. Image Assisted Surveying

### Zoom factor & field of view




### Zoom factor 4x

- Field of view: 3.9° x 2.9°
- 1 pixel on screen ~ 1 mm in 10 m distance

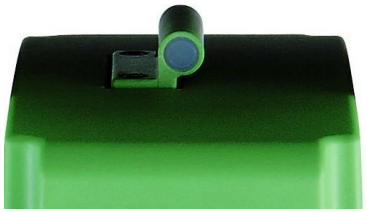
- Camera live view can also be used for fine aiming (at short distances)
- No need to focus telescope

# Image Assisted Surveying & Image Notes

## 2. Image Assisted Surveying

### Traditional motorized target aiming

- Use gun sight + look trough telescope for coarse aiming
- Make fine aiming with automated target aiming (ATR)

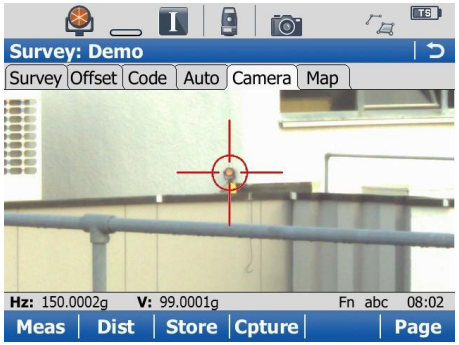
| Coarse Aiming | Coarse Aiming | Fine Aiming |
|---|---|---|
|  |  |  |
| Gun sight | Telescope | ATR |

# Image Assisted Surveying & Image Notes
## 2. Image Assisted Surveying

### Motorized image assisted target aiming

- Make coarse aiming via camera
- Make fine aiming with automated target aiming (ATR)

### Coarse Aiming




Camera live view

### Fine Aiming

ATR

# Image Assisted Surveying & Image Notes

## 2. Image Assisted Surveying

### Workflow

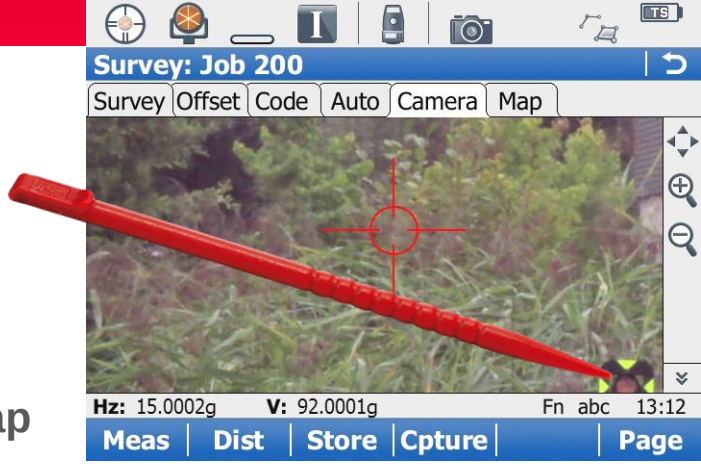
- Coarse Aiming with Wide-angle Camera in every application
- Tap on the screen and the instrument will automatically turn to the target
- Fine aiming with automated target aiming (ATR)

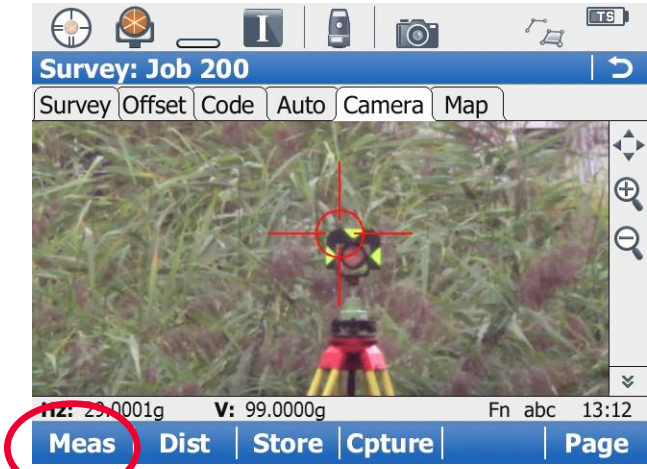
1) Tap

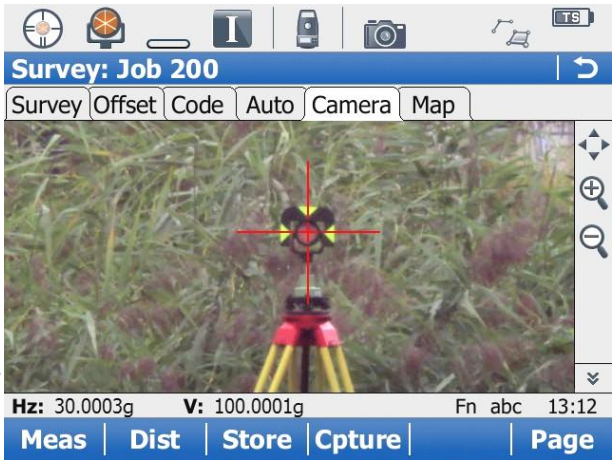
2) Turn

3) Measure

4) Done



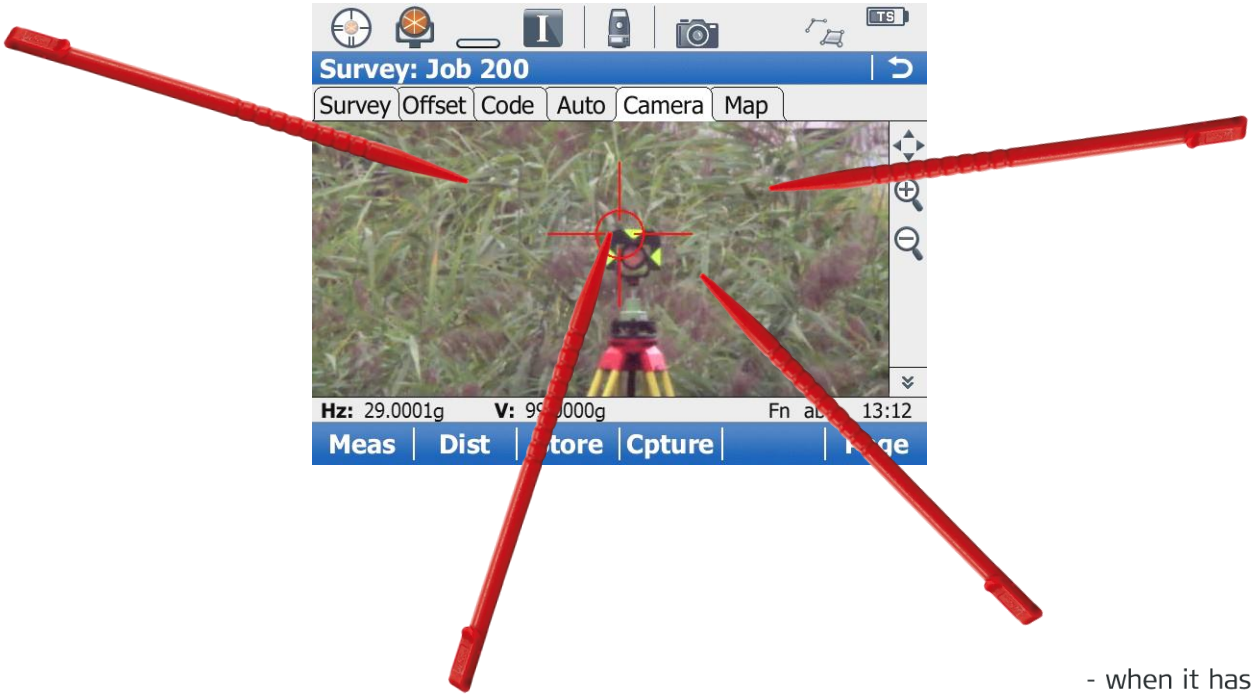

- Faster & more convenient aiming
  - No need to use gun sight
  - No need to look through & focus telescope

# Image Assisted Surveying & Image Notes

## 2. Image Assisted Surveying

### Tap & turn

- The instrument turns to the location where the screen is tapped
- The turning direction can be changed at any time




- when it has to be **right**

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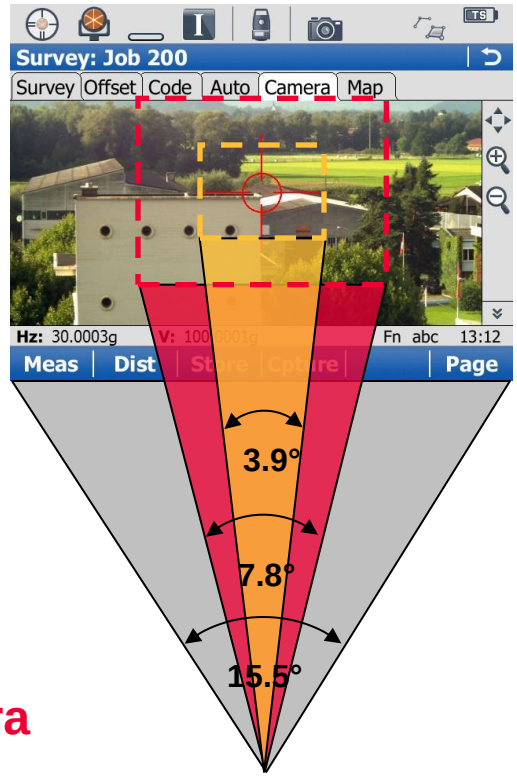
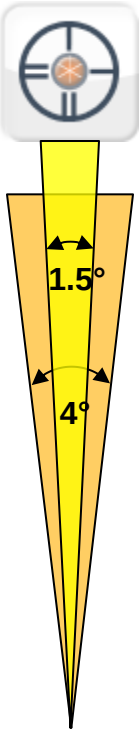
# Image Assisted Surveying & Image Notes

## 2. Image Assisted Surveying




### Camera

- Field of view from 15.5° (zoom 1x) down to 3.9° (zoom 4x)




### ATR

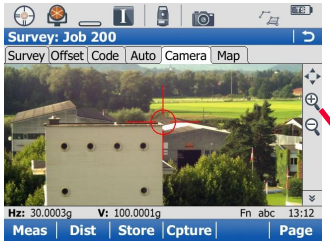
- Field of view: 1.5°
- Standard search window: 4°

- In zoom 1x: When the target is in the central image area the ATR will find the prism

# Image Assisted Surveying & Image Notes

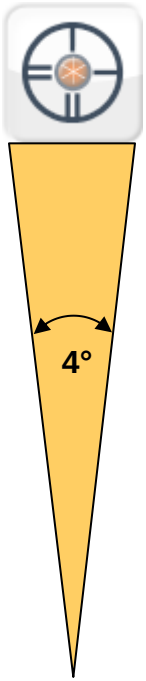
## 2. Image Assisted Surveying

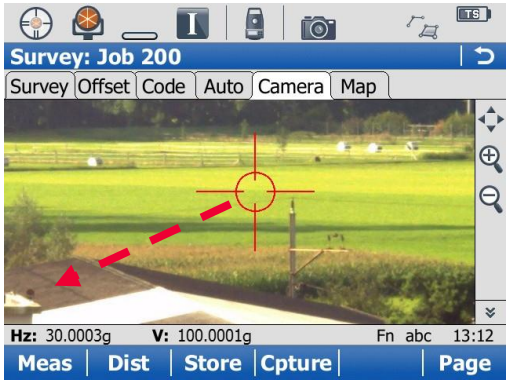
### Coarse Aiming

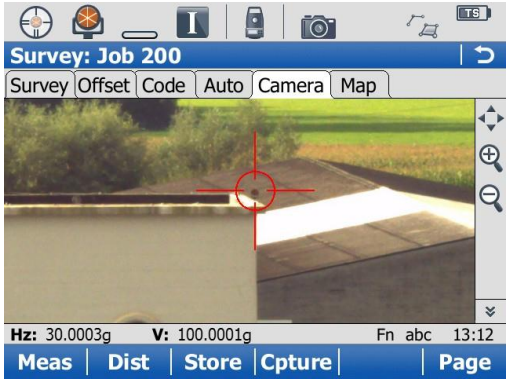



Zoom


### Fine Aiming




### Camera

- Field of view from 15.5° (zoom 1x) down to 3.9° (zoom 4x)

### ATR

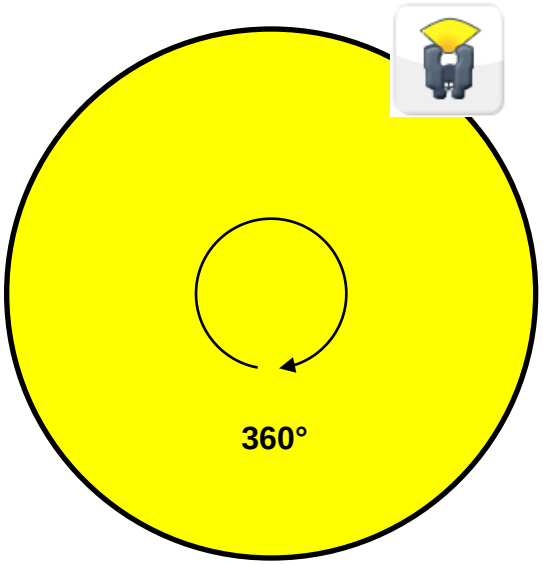
- Field of view: 1.5°
- Standard search window: 4°

- In zoom 4x: When you can see the prism in the camera view the ATR will find it

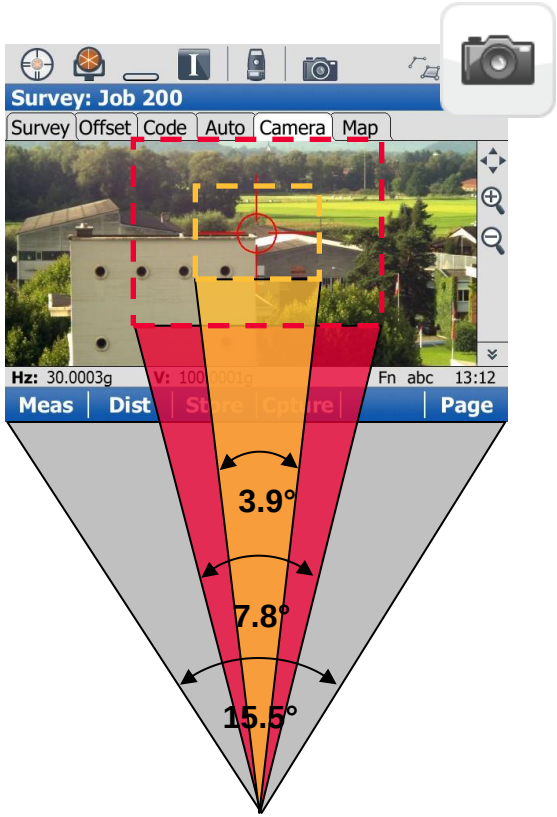
# Image Assisted Surveying & Image Notes

## 2. Image Assisted Surveying

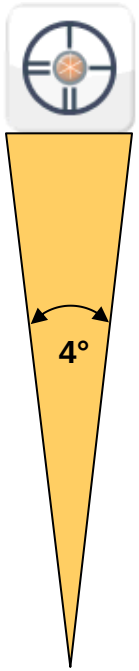
### Available search techniques & their search area




PowerSearch




Camera




ATR

- when it has to be **right**

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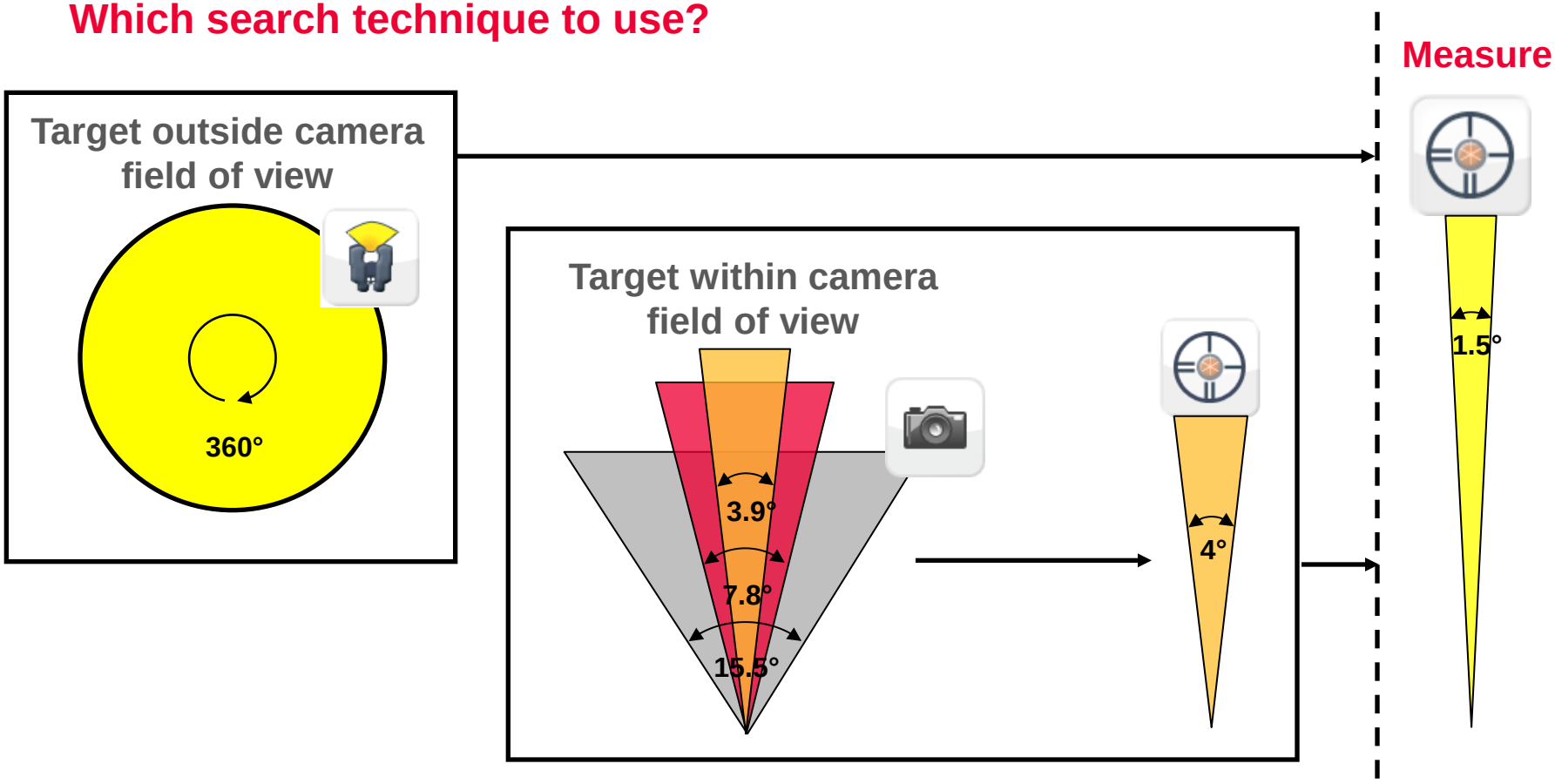
# Image Assisted Surveying & Image Notes

## 2. Image Assisted Surveying

### Which search technique to use?



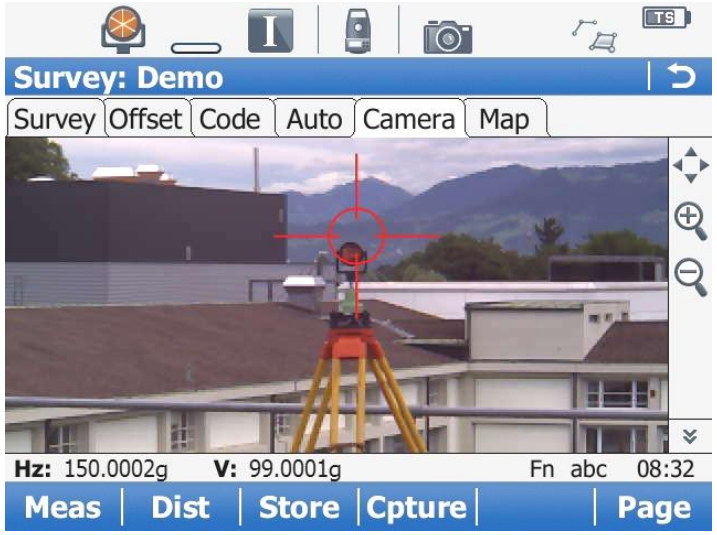

- The camera complements power search and is one more sensor for fast target aiming

# Image Assisted Surveying & Image Notes

## 2. Image Assisted Surveying

### The parallax

- The optical axis of the wide angle camera is parallel to the optical axis of the telescope but has an offset
- Due to this offset the centre of the camera is offset from the centre of the sighting axis



# Image Assisted Surveying & Image Notes

## 2. Image Assisted Surveying

### Calibration & correction

- The offset between camera and sighting axis is calibrated in all instruments
- When a distance measurement is made the parallax is being corrected and the true position of the sighting axis is shown in the camera live view

# Image Assisted Surveying & Image Notes

## 2. Image Assisted Surveying

### The crosshair shape

- When the parallax is not corrected the crosshair is shown in coarse style

- When the parallax is corrected the crosshair is shown in fine style

- When making continuous measurements the parallax is constantly corrected

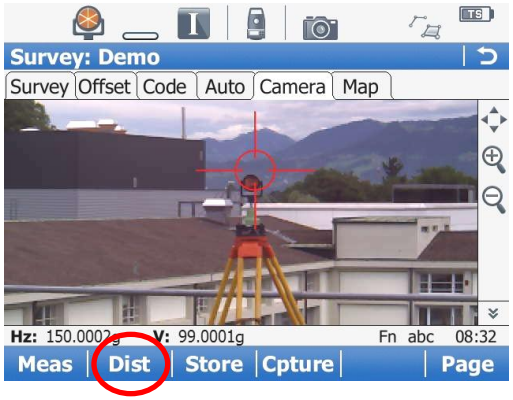
- You always know if the true position of the sighting axis is shown
- Accurate image based reflectorless measurements are possible

# Image Assisted Surveying & Image Notes

## 2. Image Assisted Surveying

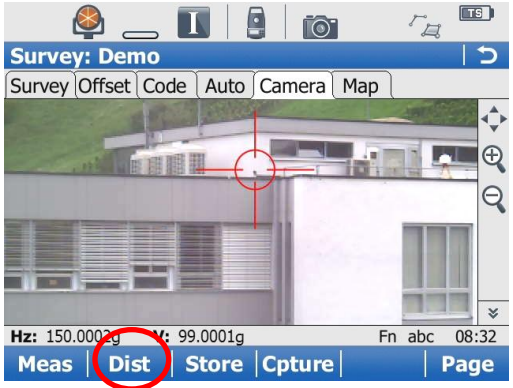
### The parallax

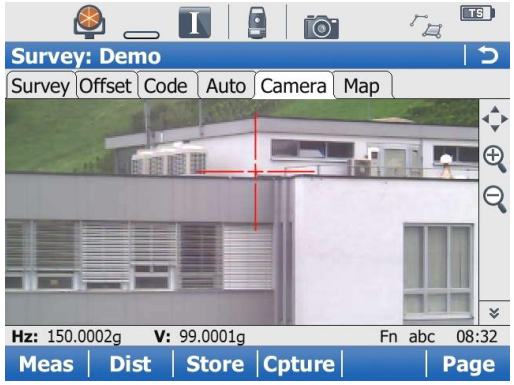
- The parallax correction is only relevant at short distances
- Depending on the distance and the zoom factor the impact of the parallax decreases significantly





**8 m**




**60 m**

- when it has to be **right**

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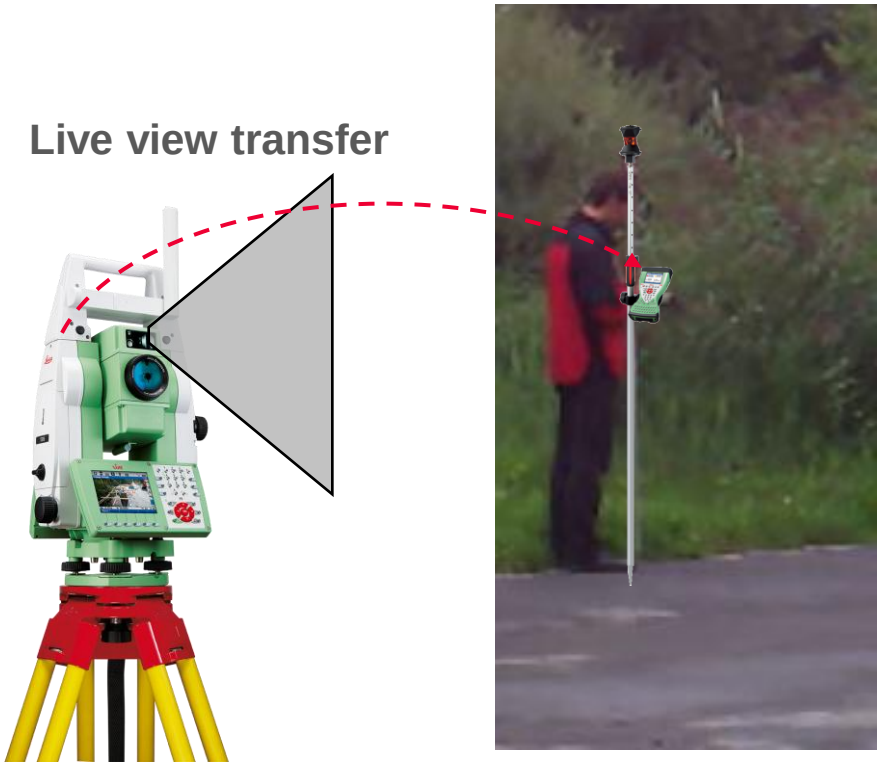
# Image Assisted Surveying & Image Notes

## 2. Image Assisted Surveying

### Remote operation

- Total station live view visible on CS controller



# Image Assisted Surveying & Image Notes

## 2. Image Assisted Surveying

### Workflow in remote use case

- See on the controller what the total station sees
- Tap on the controller screen and the instrument will automatically turn to the target
- Lock onto target

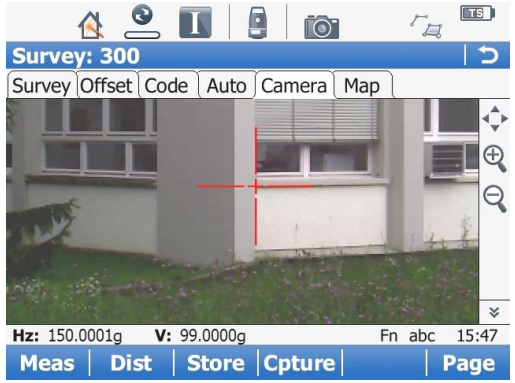
# Image Assisted Surveying & Image Notes

## 2. Image Assisted Surveying

### Workflow in remote use case

- See on the controller what the total station sees
- Tap on the controller screen and the instrument will automatically turn to the target
- Lock onto target

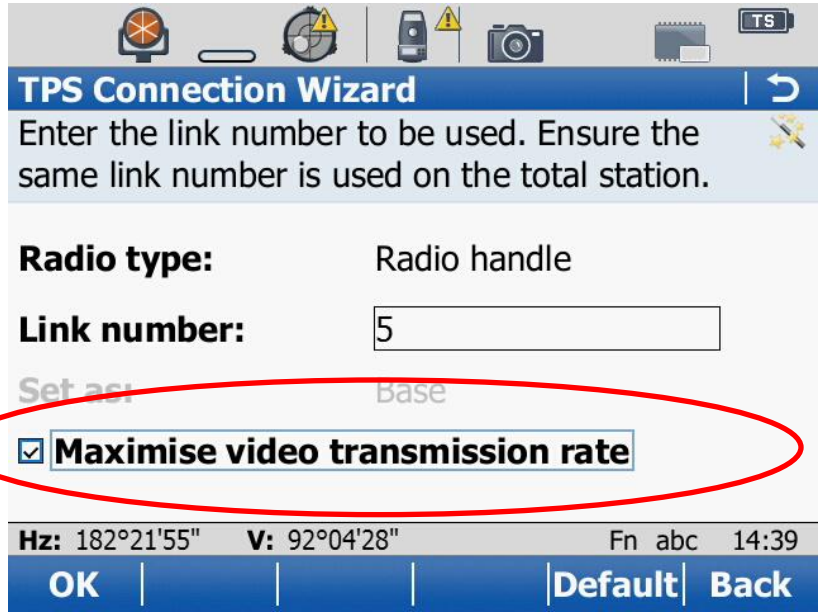

- Fast visual target identification & lock onto prism
- Constant check of lock
- Remote reflectorless measurements are possible



# Image Assisted Surveying & Image Notes

## 2. Image Assisted Surveying

### Remote operation: How to setup?


**Higher transfer rate for optimized remote live view performance**

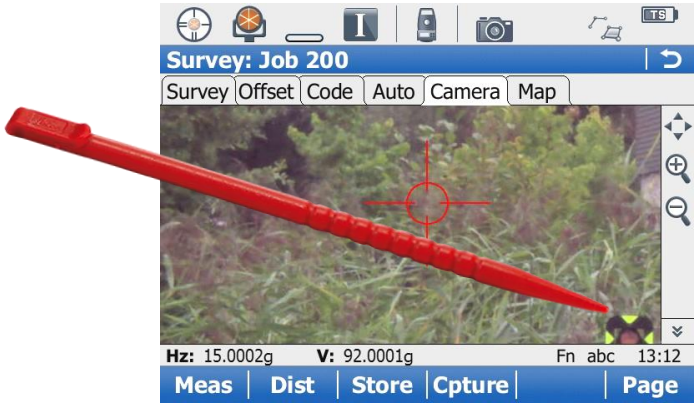
- Use this setting for a radio connection to a CS10/CS15
- Untick the setting when connected to a PC with an external TCPS radio (limitation is the RS232 speed on PC)

# Image Assisted Surveying & Image Notes

## 2. Image Assisted Surveying

### Remote operation with the camera: How to steer?

- Tap & turn




Use arrow buttons (like in joy stick mode)

- one button press (new) **Super slow** speed for remote fine aiming
- two button presses: **Slow** speed
- three button presses: **Medium** speed
- four button presses: **High** speed
- **OK** button press: **Stop**

# Image Assisted Surveying & Image Notes

## 2. Image Assisted Surveying

### Optimize live view

- Crosshair colour → Camera live view settings
- Brightness → 2nd level toolbar
- White balance → TPS Camera settings
- Maximize view → Camera live view settings + SWx screen settings

# Image Assisted Surveying & Image Notes

## 2. Image Assisted Surveying

### Camera live view settings

- 2nd level tool bar



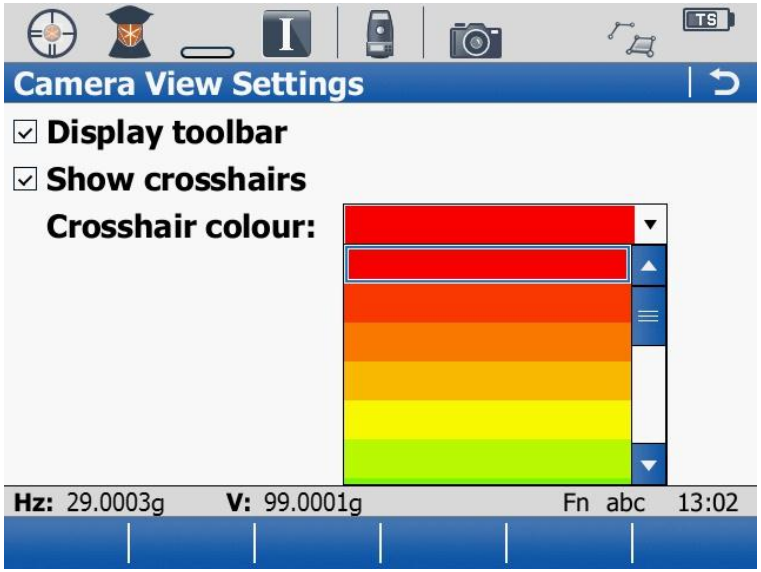
- Fn + Config

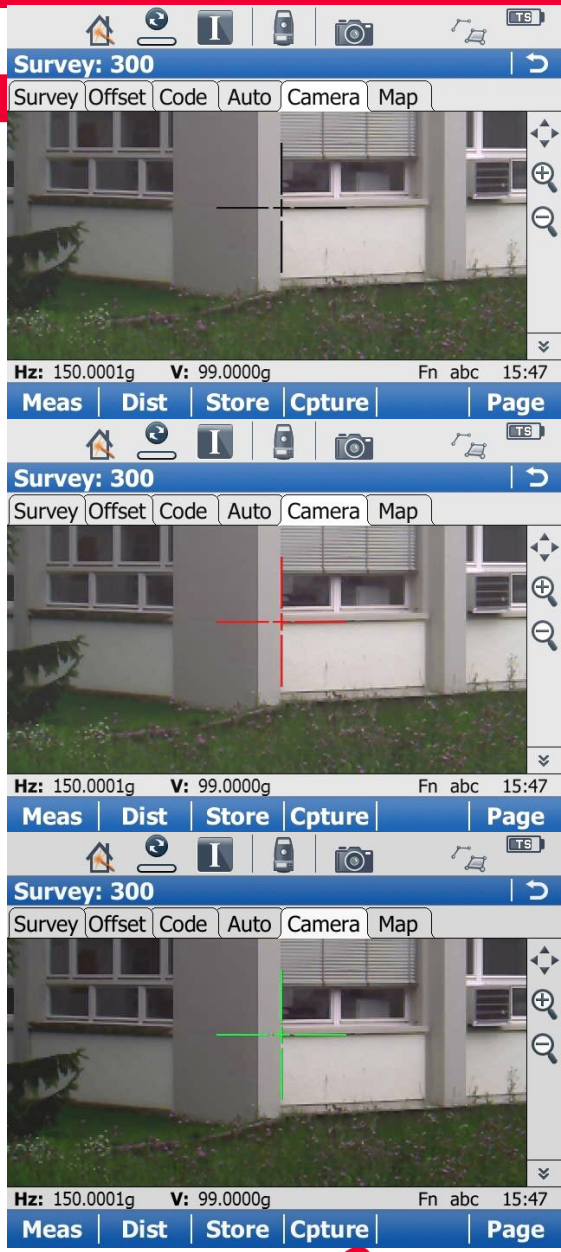

# Image Assisted Surveying & Image N

## 2. Image Assisted Surveying

### Crosshair colour

- Choose any colour




- Clearly visible crosshair on every object

# Image Assisted Surveying & Image Notes

## 2. Image Assisted Surveying

### Brightness

- 2nd level tool bar



### Automated brightness

- Automated brightness optimizes the brightness for the whole image

### Manual modification

- Manual modification is possible in case target has different light conditions (e.g. target in shadow)

# Image Assisted Surveying & Image Notes

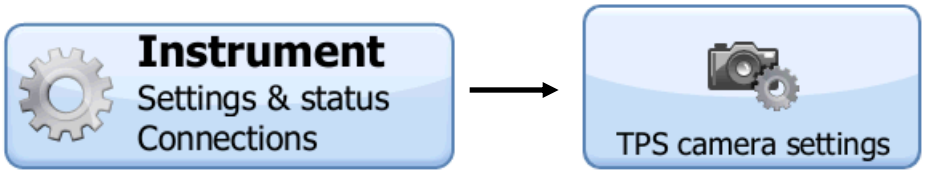
## 2. Image Assisted Surveying

### TPS Camera configuration

- 2nd level tool bar



- Instrument settings

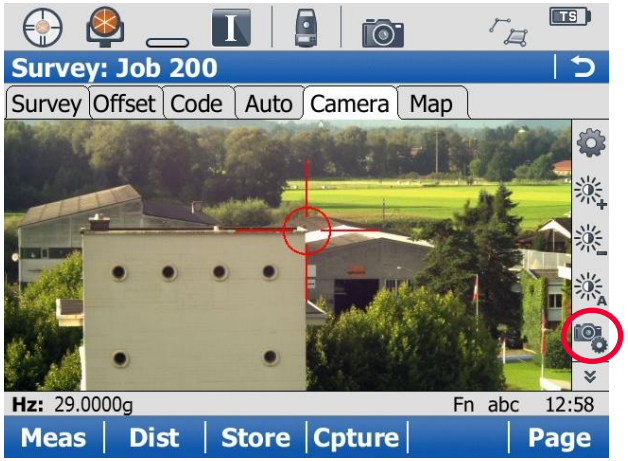


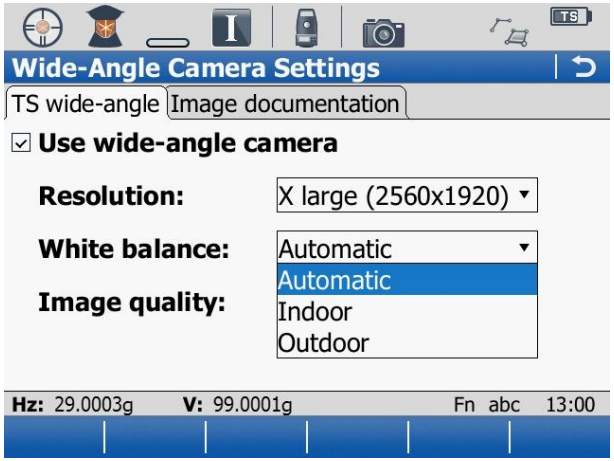
# Image Assisted Surveying & Image Notes

## 2. Image Assisted Surveying

### White balance

- White balance can be changed to fit current light source



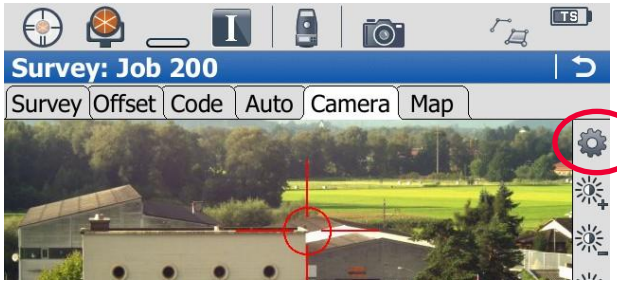

- True colour impression. White objects appear white on the image

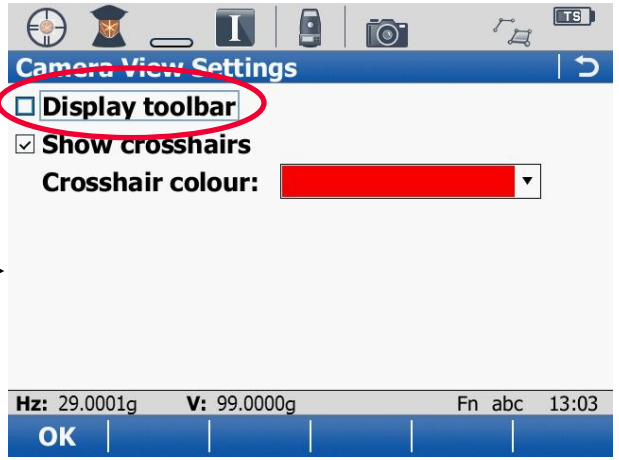
# Image Assisted Surveying & Image Notes

## 2. Image Assisted Surveying

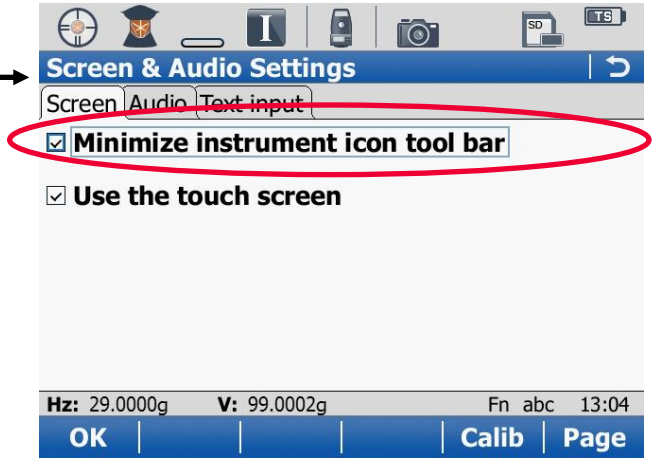
### Maximize viewing window

- Do not display tool bar




- Minimize instrument icon tool bar

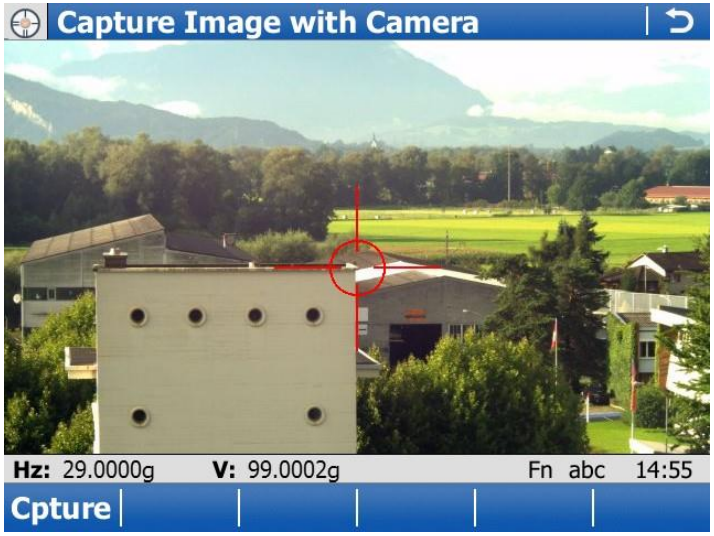



# Image Assisted Surveying & Image Notes

## 2. Image Assisted Surveying

### Maximize viewing window


Normal View




Maximized View

# Image Assisted Surveying & Image Notes
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1. Introduction
2. Image Assisted Surveying
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5. Summary



- when it has to be **right**

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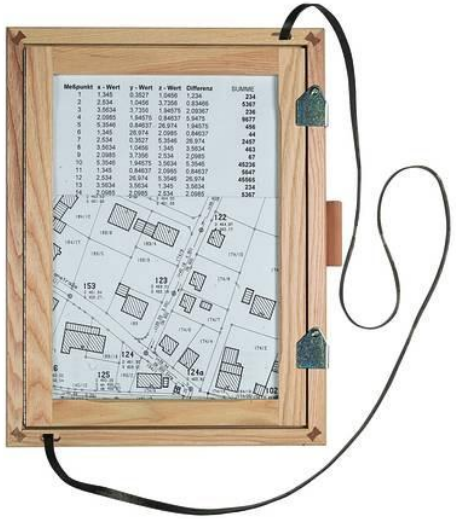
# Image Assisted Surveying & Image Notes

## 3. Image Notes

### Traditional way to document field situation

- Pictures taken with a digital camera
  - No link between pictures and measurements


- Manual field notes
  - Can easily be destroyed (get wet, lost, …)
  - Difficult to archive

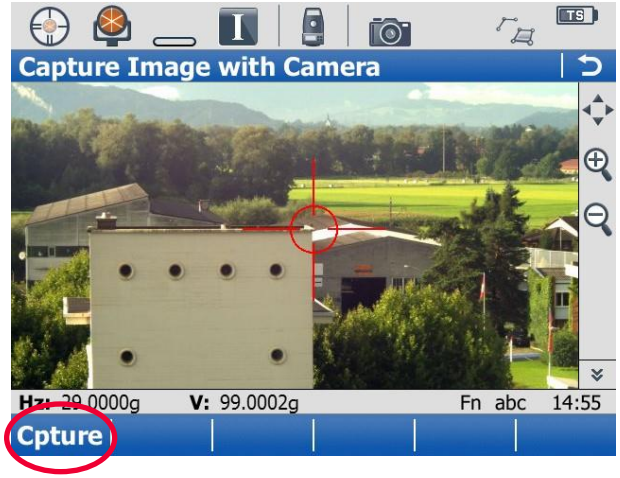


# Image Assisted Surveying & Image Notes

## 3. Image Notes

### Capturing images with the Wide-angle Camera

- Images can be captured at any time either from the camera application or in the camera tab

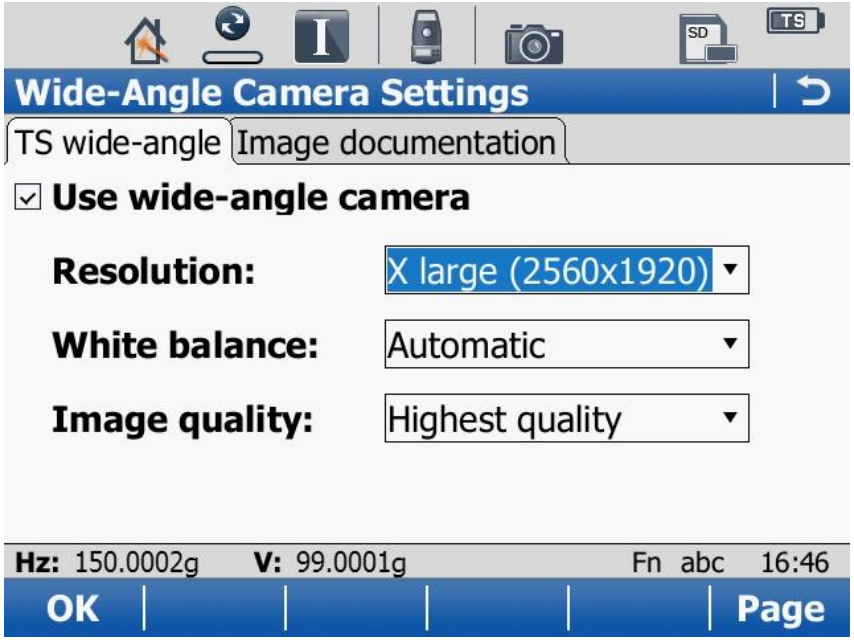



# Image Assisted Surveying & Image Notes

## 3. Image Notes

### Image resolution and quality

- Images are stored in JPG format
- Images can be stored as:
  - 5 Mpixel images
  - 1.3 Mixel images
  - VGA images
- Images quality defines the JPG compression. Possible settings:
  - Standard Quality
  - Highest Quality




- Typical file sizes range: 20 KB (VGA, standard quality) to 1.5 MB (5 Mpixel, highest quality)
- Optimal balance between image quality and file size can be set. Recommendation:
  - onboard: Large + standard quality (typ. 100 kB)
  - remote: Medium + standard quality (typ. 400 kB)

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# Image Assisted Surveying & Image Notes

## 3. Image Notes

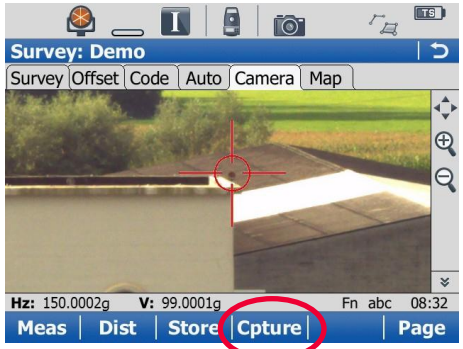
### Image capture and zooming

- Always the full field of view (zoom 1x) of the camera is captured, independent from the zooming factor of the live view

**Zoom 1x**


**Zoom 2x**


**Zoom 4x**

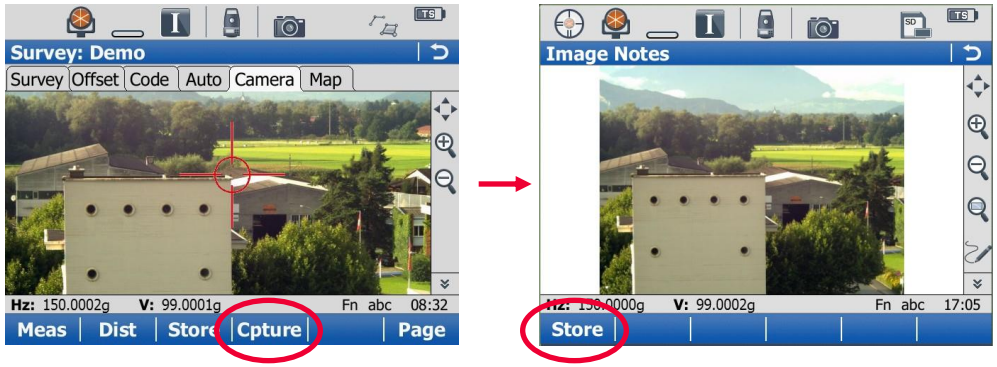



# Image Assisted Surveying & Image Notes

## 3. Image Notes

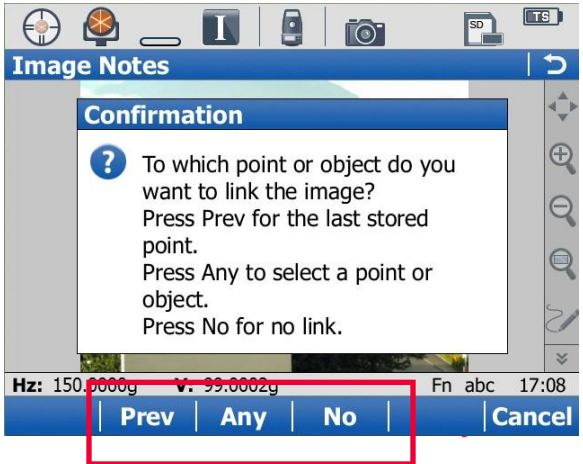
### Capture

- After capturing a preview of the image is shown
- The image can be stored or rejected




### Link

- The image can be linked
  - to the previously measured point
  - to any object (point, line area)
  - stored without linking

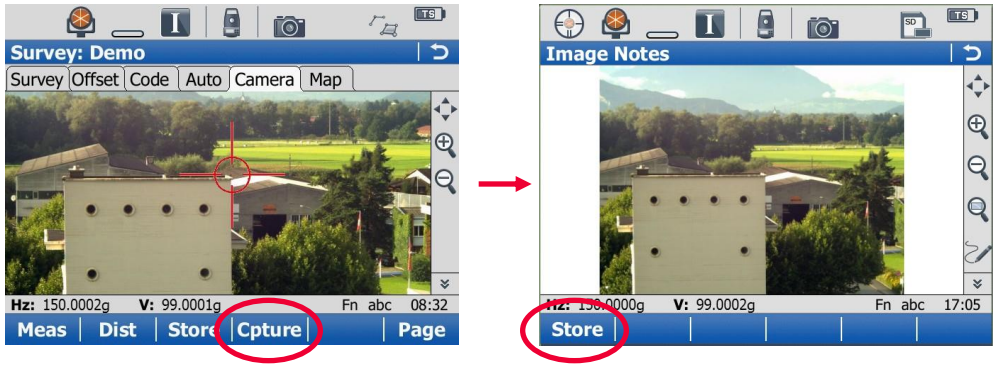


# Image Assisted Surveying & Image Notes

## 3. Image Notes

### Capture

- After capturing a preview of the image is shown
- The image can be stored or rejected




### Link

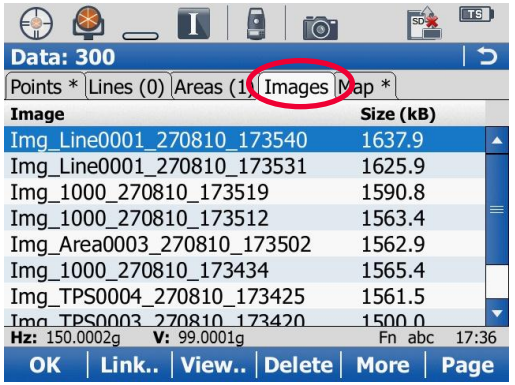
- Know exactly where images belong and archive them together with measurement data

# Image Assisted Surveying & Image Notes

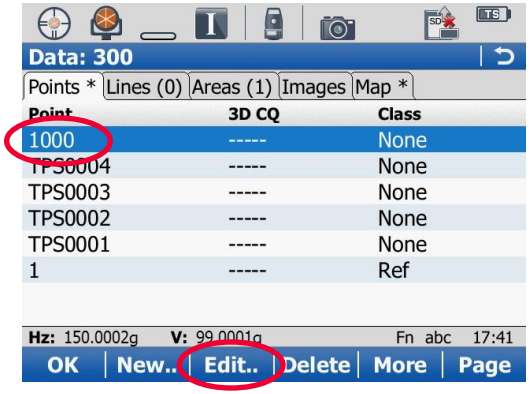
## 3. Image Notes

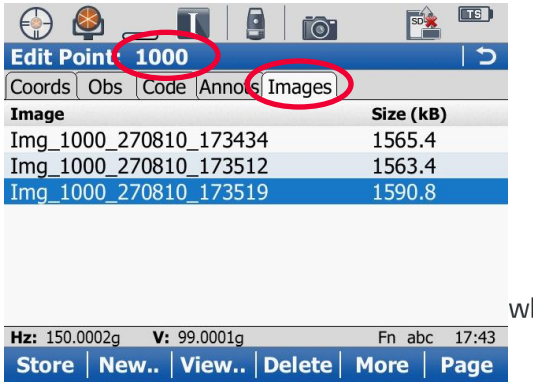
### Viewing stored images

- Images can be viewed in the data management
- The tab Images shows all images of the job


- Editing an object (e.g. point, line, areas) shows only images linked to this object




when it has to be **right**

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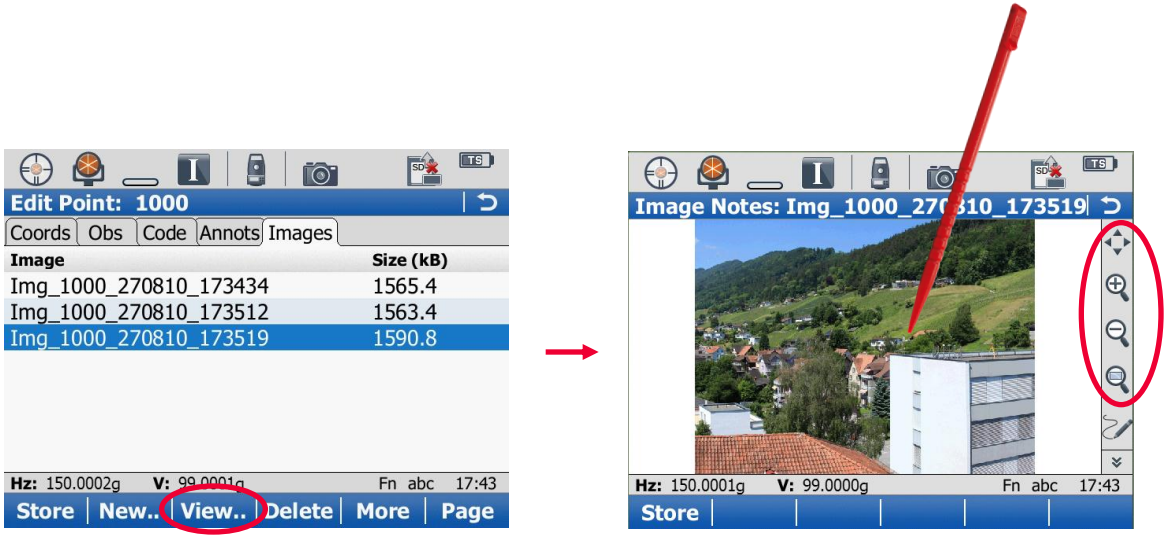
# Image Assisted Surveying & Image Notes

## 3. Image Notes

### Viewing stored images

- Stored images can be viewed by pressing View
- Zooming and panning is possible

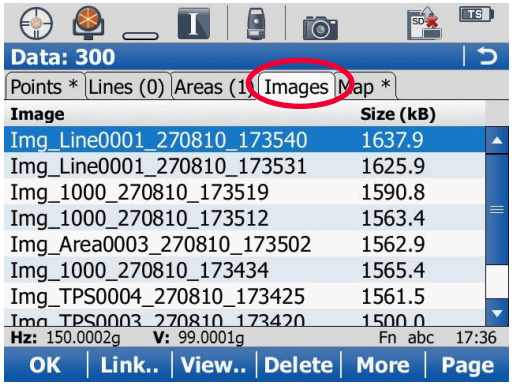


# Image Assisted Surveying & Image Notes

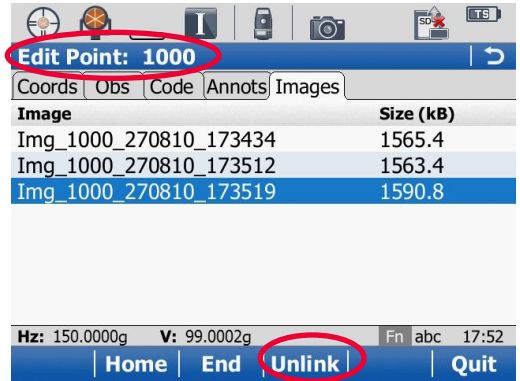
## 3. Image Notes

### Linking to more objects and unlinking

- After storing an images it is either linked to one or no object
- In the Image tab of the job it is possible to establish new links and therefore link one image to more than one object




- In the Image tab of one object it is possible to remove the image link to this object by pressing FN + Unlink

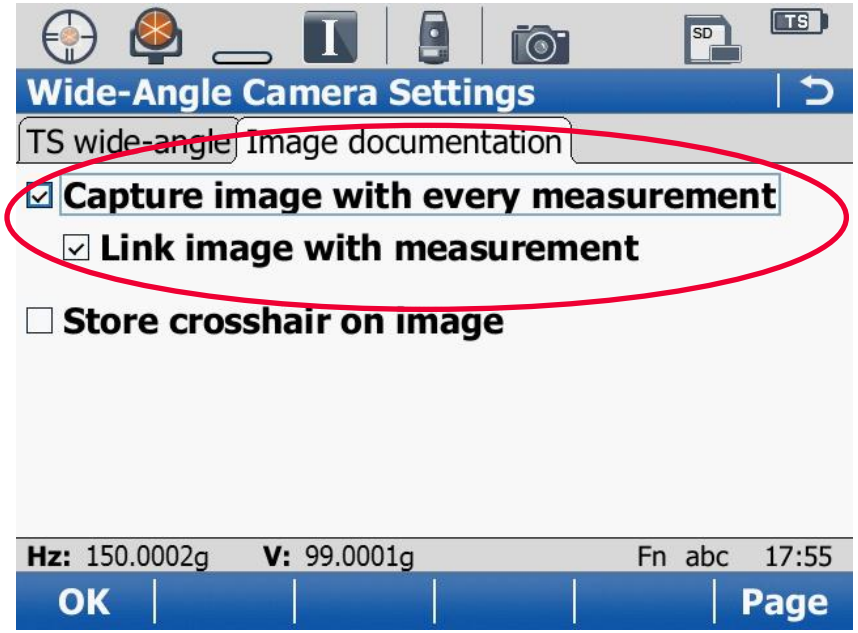


# Image Assisted Surveying & Image Notes

## 3. Image Notes

### Automated capturing of images

- Images can be automatically stored with every measurement and linked to it

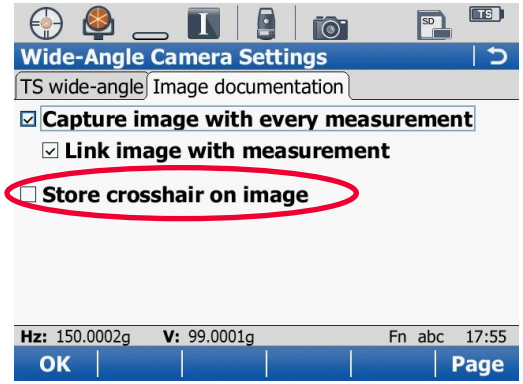



# Image Assisted Surveying & Image Notes

## 3. Image Notes

### Enhance image information

- In order to increase the meaning of images it is possible to store the crosshairs with the images

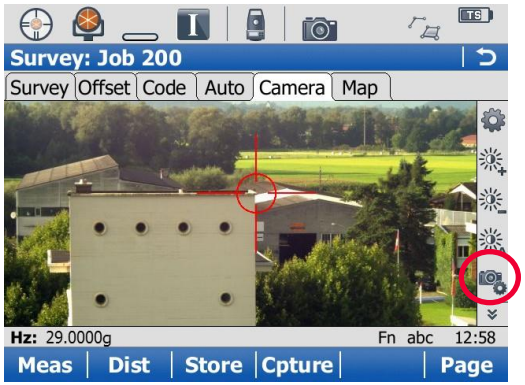



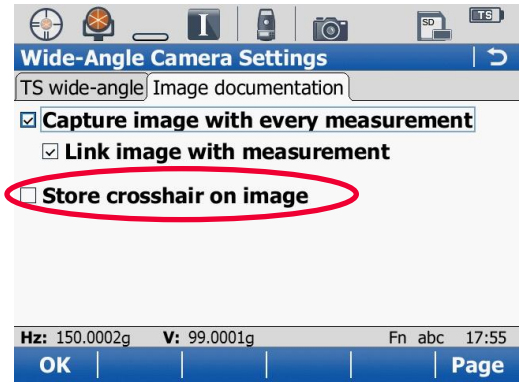

# Image Assisted Surveying & Image Notes

## 3. Image Notes

### Enhance image information

- In order to increase the meaning of images it is possible to store the crosshairs with the images




- Know exactly where the telescope was pointing to when image was captured

when it has to be **right**

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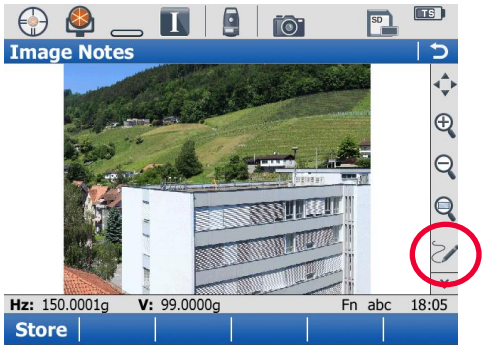
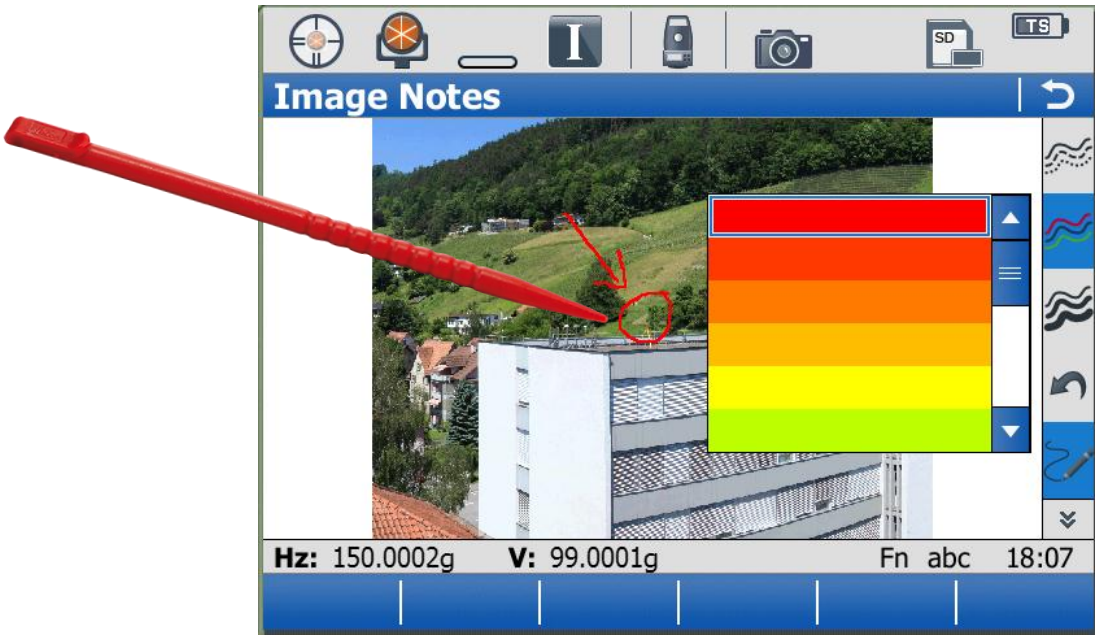
# Image Assisted Surveying & Image Notes

## 3. Image Notes

### Enhance image information through sketching

- Before storing an image it is possible to sketch on it




### Options

- Select line style
- Select line colour
- Select line width
- Undo individual drawing steps if necessary

# Image Assisted Surveying & Image Notes

## 3. Image Notes: TS camera

### Capture

Capture an image of what the total station sees with or without crosshair

### Sketch

Add information to the image through sketching with any color, line style and line width

### Link

Link the image to any object of interest (point, line or area)



- when it has to be **right**

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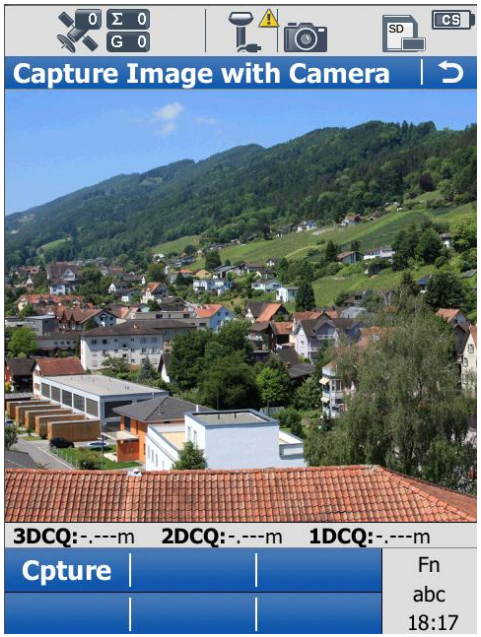
# Image Assisted Surveying & Image Notes

## 3. Image Notes: CS camera

### CS camera

- With SmartWorx 3.0 the CS camera is also fully supported in SmartWorx




- Capture an image with the CS camera and link it to a point measured by GPS or TPS

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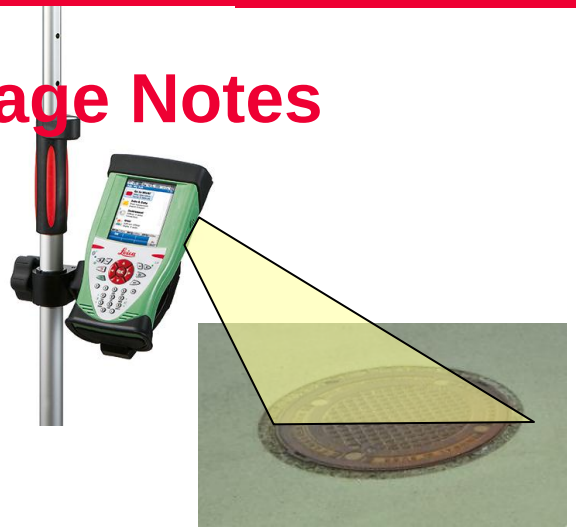
# Image Assisted Surveying & Image Notes

## 3. Image Notes: CS camera



### Capture

Capture an image with the controller camera

### Sketch

Add information to the image through sketching with any color, line style and line width

### Link

Link the image to any object of interest (point, line or area)

# Image Assisted Surveying & Image Notes

## 3. Image Notes: TS & CS camera

### Capture

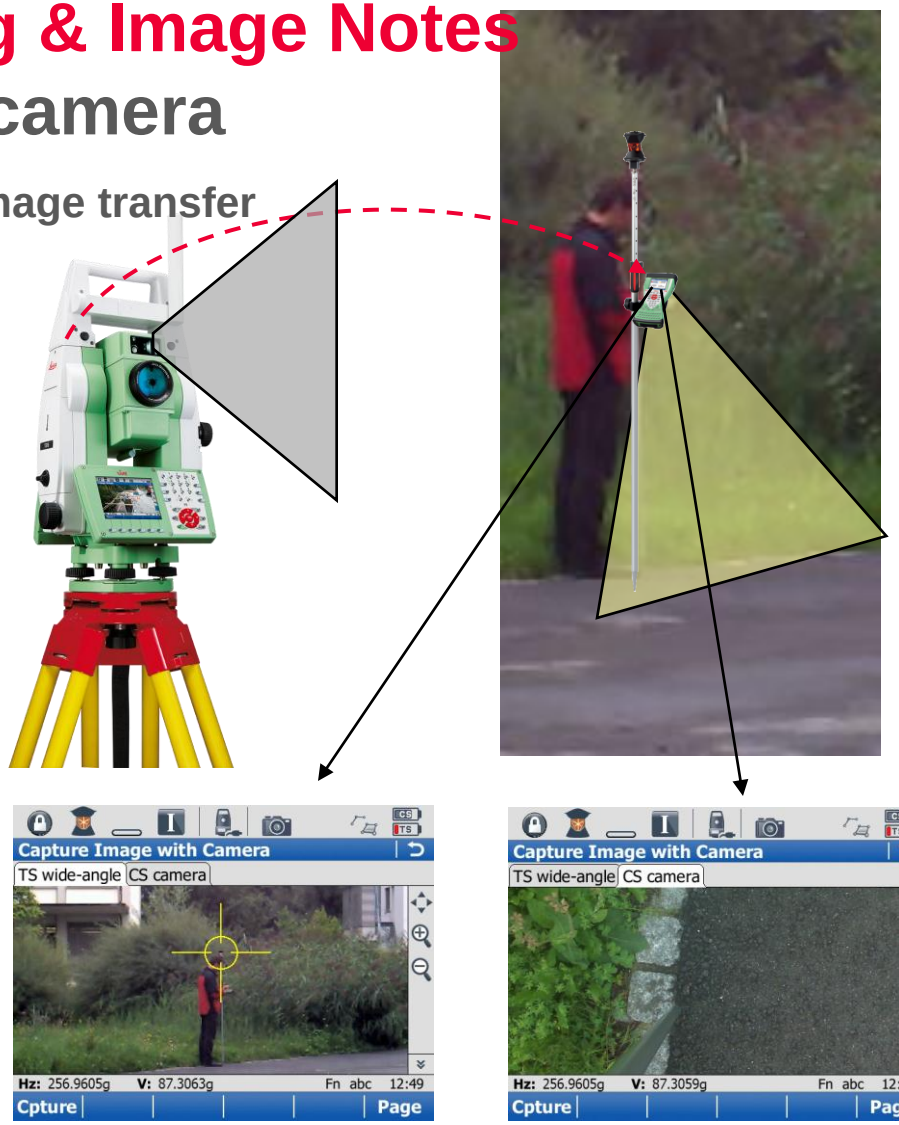
Capture images of what the total station sees with the wide-angle camera & images of the ground with the controller camera

### Sketch

Add information to the image through sketching with any color, line style and line width

### Link

Link the image to any object of interest (point, line or area)

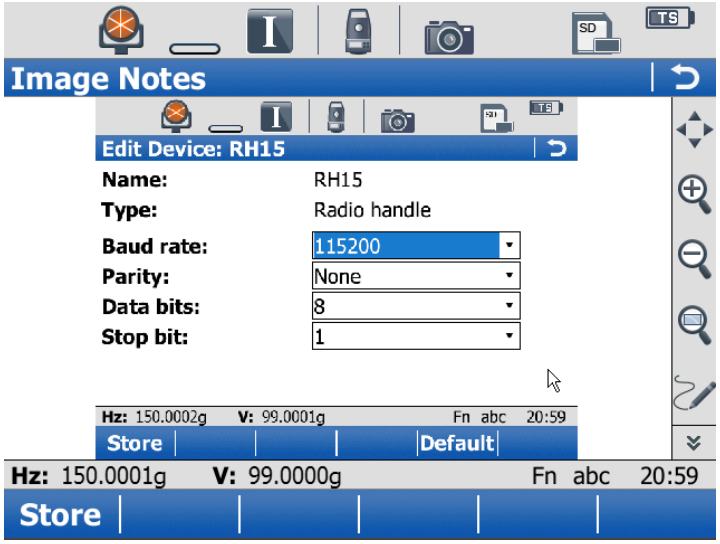


# Image Assisted Surveying & Image Notes

## 3. Image Notes: Screenshot

### Screenshot

- Pressing Fn + Screenshot will make a screenshot of any panel in SmartWorx
- The screenshot can be used in the same way as any other image (sketching, linking)

# Image Assisted Surveying & Image Notes

## 3. Image Notes: Screen Shot

### Capture

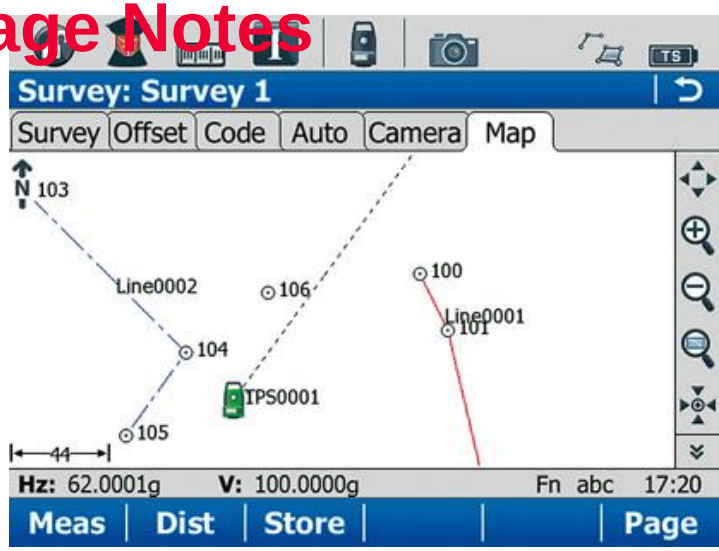
Capture a screenshot of any panel in SmartWorx

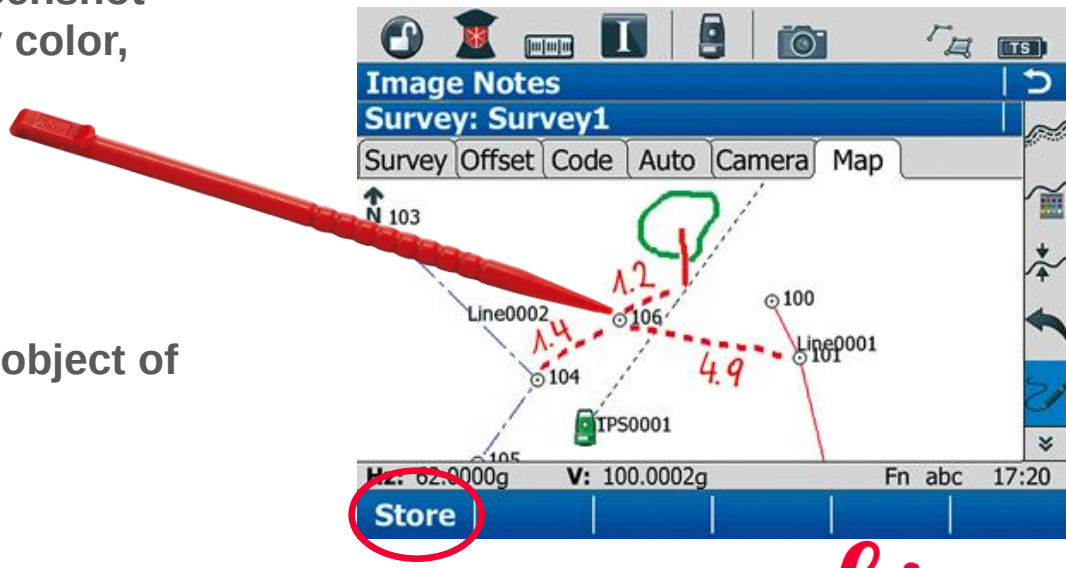
### Sketch

Add information to the screenshot through sketching with any color, line style and line width

### Link

Link the screenshot to any object of interest (point, line or area)




- when it has to be **right**

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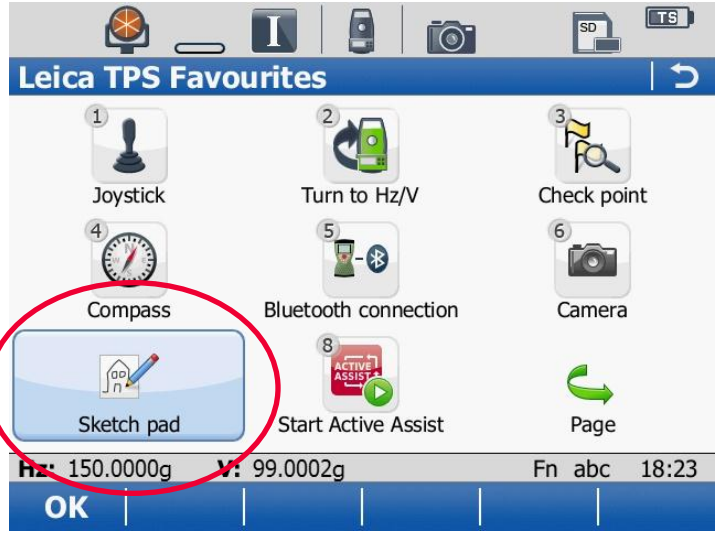
# Image Assisted Surveying & Image Notes

## 3. Image Notes: Sketch pad

### Sketch pad

- Using sketch pad a sketch on an empty image (= sheet of paper can be made)
- The sketch pad is accessible in the favourites menu

# Image Assisted Surveying & Image Notes

## 3. Image Notes: Sketch Pad

### Capture

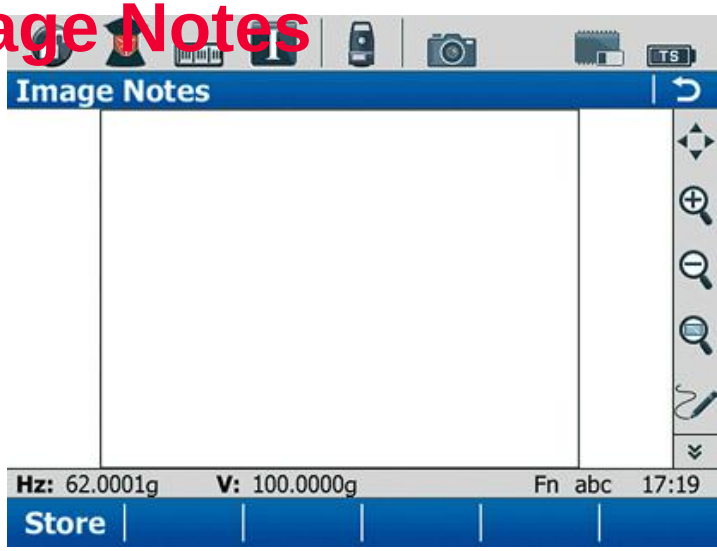
Open an empty image

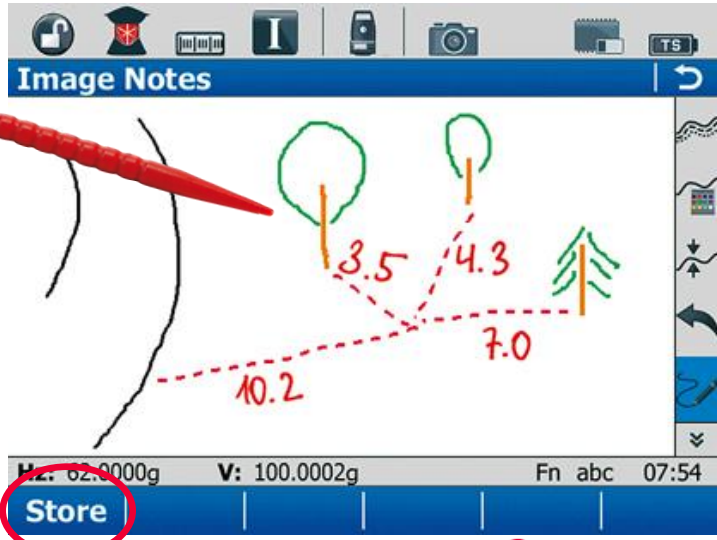
### Sketch

Make a sketch with any color, line style and line width

### Link

Link the image to any object of interest (point, line or area)




- when it has to be **right**

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# Image Assisted Surveying & Image Notes

## 3. Image Notes

**Capture**


**Sketch**

Sketch on image

**Link**

Just store and link to any object (Point, Line, Area)

# Image Assisted Surveying & Image Notes

## 3. Image Notes

| Instrument | | Image Source | | | |
|---|---|---|---|---|---|
| | | TS camera | CS camera | Screen shot | Sketch pad |
| Controller with SmartWorx Viva | CS10 / CS15 | ✓ * | ✓ | ✓ | ✓ |
| Non-motorized Viva TPS | TS11 | ⛔ | ⛔ | ✓ | ✓ |
| | TS11 I | ✓ | ⛔ | ✓ | ✓ |
| Motorized Viva TPS | TS15 (M, A, G, P) | ⛔ | ⛔ | ✓ | ✓ |
| | TS15 I | ✓ | ⛔ | ✓ | ✓ |

✓ Available

⛔ Not available

*** When connected to a TS11 I or TS15 I**

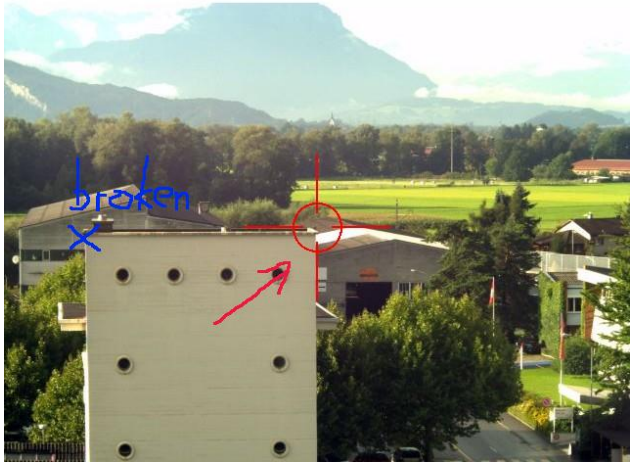
# Image Assisted Surveying & Image Notes

## 3. Image Notes

### Image naming & handling in the office

- Leica
  - Image are stored in a subfolder of the job
  - Images have a meaningful name
    - prefix Img_ + point number + date + time (e.g. Img_P250_280910_171225.jpg)
  - Stored images contain embedded information if selected
    - Crosshair is embedded in the image
    - Sketches are embedded in the image

| Name | Größe | Typ |
|---|---|---|
| Images | | File Folder |
| SETS01_9920_072... | 61.0 KB | X01 File |
| SETS01_9920_072... | 11.0 KB | X02 File |
| SETS01_9920_072... | 21.0 KB | X04 File |
| SETS01_9920_072... | 11.0 KB | X05 File |
| SETS01_9920_072... | 11.0 KB | X06 File |
| SETS01_9920_072... | 21.0 KB | X08 File |
| SETS01_9920_072... | 31.0 KB | X10 File |
| SETS01_9920_072... | 11.0 KB | X11 File |
| SETS01_9920_072... | 11.0 KB | X12 File |
| SETS01_9920_072... | 61.0 KB | X13 File |
| SETS01_9920_072... | 11.0 KB | X18 File |
| SETS01_9920_072... | 101 KB | X22 File |
| SETS01_9920_072... | 11.0 KB | X23 File |
| SETS01_9920_072... | 369 Bytes | XCF File |



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# Image Assisted Surveying & Image Notes

## 4. Availability

### Image Assisted Surveying

- Available on the Leica Imaging Total Stations TS11 I and TS15 I
- Available on the CS10, CS15 when connected to a Leica Imaging Total Station

### Image Notes

- Available on the all Leica Viva TS11 and TS15 total stations and on all CS10 and CS15 controllers

- when it has to be **right**

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# Image Assisted Surveying & Image Notes

## 4. Summary

**Image Assisted Surveying**

- Tap
- Turn
- Measure

**Image Notes**

- Capture
- Sketch
- Link

- when it has to be **right**

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# Image Assisted Surveying & Image Notes

## 4. Summary

### Image Assisted Surveying

- Features
  - High quality camera live view of wide angle camera available on total station and controller
  - Steering of total station via Tap & Turn
  - Automatic parallax correction
  - Possibility to adopt crosshair colour to surroundings
  - Remote reflectorless measurements are possible

- Faster aiming (no need to look through & focus telescope)
- Fast visual target identification & lock onto prism
- Constant check of lock is possible
- Steep sightings can be made without optical accessories
- Measure all points without returning to the total station

# Image Assisted Surveying & Image Notes

## 4. Summary

### Image Assisted Surveying

- Features
  - High quality camera live view of wide angle camer… total station and controller
  - Steering of total station via Tap & Turn
  - Automatic parallax correction
  - Possibility to adopt crosshair … oundings
  - Remote reflectorless me… possible

**Image Assisted Surveying secretly changes the way you work. After using it for some time you never want to go back**

- Faster ai… to look through & focus telescope)
- Fa… identification & lock onto prism
- …heck of lock is possible
- St… sightings can be made without optical accessories
- Measure all points without returning to the total station

# Image Assisted Surveying & Image Notes
## 4. Summary

### Image Notes

- Features
  - Capture: TS or CS camera image, Screenshot, Sketch Pad
  - Sketch: Add information to an image
  - Link: Link annotated image to any object in the database

- Optimized productivity with exact photo documentation of site conditions to complement paper field-notes & avoid costly revisits
- No struggling with drawing on wet paper or losing paper notes
- Know exactly where images belong and archive them together with measurement data