



MANUAL

TRIMBLE 4D CONTROL

Web Interface

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1 Introduction

A monitoring installation lets you detect displacement or movement in natural and manmade structures. It provides the data you need to understand the speed, direction and magnitude of any motion. The T4D Control suite is the core of your monitoring project. It controls the measurements, manages and analyzes the data, and provides decision support.

Getting started is easy with scalable monitoring solutions from Trimble. Trimble 4D Control provides analysis and management tools to help you start small and grow. As your expertise in monitoring increases, you can easily expand from post-processed deformation monitoring campaigns all the way to real-time systems that manage your projects and alert the operator of significant motion events.

Typical applications includes

- **Mining** – Trimble monitoring solutions can be used in open pit and underground mines for monitoring highwalls, tunnels, subsidence and stockpiles.
- **Construction** – Monitor motion in buildings and structures adjacent to construction sites. You can monitor cut and fill slopes and incomplete structures.
- **Engineering** – Track the motion of dams, bridges, buildings and other man-made structures.
- **Transportation** – Monitor transportation structures, cut and fill slopes and railways. You can also monitor structures close to transportation corridors during construction and operation.
- **Utilities** – Monitor pipelines, transmission structures, production and storage facilities.
- **Tunneling** – Monitor new and existing tunnels for deformation. Monitor for surface subsidence above tunneling projects.
- **Geotechnical** – Monitor dams and levees, landslides, landfills, subsidence, faults and natural structures.

This document represents a support manual for the web interface of the T4D Control suite.









1.1 TARGET USERS

The majority of users will most likely not have permissions to access all areas of the web interface and therefore not need all the information explained in this manual. As user permissions (to be explained in Section 18.3 on page 127) are completely customizable on this system, there is unfortunately no set manual for only certain types of users, as these can differ from one installation to another. Therefore this manual contain all the support material a user with full admin access will have.

Note: There is still no security risk in providing it to users with limited permissions, and it can therefore freely be distributed as required.

1.2 MODULES AVAILABLE IN T4D

Different modules may be installed on different installations. The next page contains a list of all modules available in the T4D Control suite.

 <p>Sensors</p>	<p>Sensors Configure sensor data to be displayed in the web interface, view sensor properties, latest sensor readings and current sensor state.</p>	 <p>Sensor Groups</p>	<p>Sensor Groups Create sensor groups to refer to groups of sensors, or to define representative calculation sensors.</p>
 <p>Map</p>	<p>Map View sensor location, data and state on an interactive map.</p>	 <p>Custom Views</p>	<p>Custom Views View sensor location, data and state on user supplied images, with data updates at specified time intervals.</p>
 <p>Webcams</p>	<p>Webcams View webcams linked to the project.</p>	 <p>3D Scenes</p>	<p>3D Scenes Create, maintain and view 3D Scenes representing your monitoring project.</p>
 <p>Charts</p>	<p>Charts View the selected data series of a single sensor in a simple chart.</p>	 <p>Scatter Plot</p>	<p>Scatter Plot Visualize and animate positional displacement over time for a particular sensor within to different planes.</p>
 <p>Analysis</p>	<p>Analysis View selected data series of multiple sensors in a complex chart to graphically analyse the structural behaviour.</p>	 <p>Composite Views</p>	<p>Composite Views Create, maintain and view composite views by combining plan views, scatter plots and multiple analyses.</p>
 <p>Alarms</p>	<p>Alarms Create Warning and Alarm Conditions against which the data series are monitored, with notifications being issued in the event that Warning or Alarm Conditions is met.</p>	 <p>Logs</p>	<p>Logs Record activities and items of interest either manually or automatically, append comments, group by Log Type and search by criteria.</p>
 <p>Highrise</p>	<p>Highrise Manage Highrise construction sessions.</p>	 <p>System Status</p>	<p>System Status Monitor the system health by analysing sensor data delivery and alarm events. View either the current state or historic behaviour. Create scheduled system status reports that can be circulated to multiple users on a regular basis.</p>
 <p>Framed Pages</p>	<p>Framed Pages Make external web sites or web pages available within T4D Control Web.</p>	 <p>Account Settings</p>	<p>Account Settings Create, manage and remove users of the web facility.</p>
 <p>Mobile View</p>	<p>Mobile View Switch to the mobile friendly view.</p>		









2 Navigation

When you log into The Trimble 4D Control Web Interface, the first page you start at, is the **Home Page**.

The Trimble 4D Control Web Interface can be navigated either via the icons with pictures on the Home Page or via the main horizontal menu at the top of the pages.

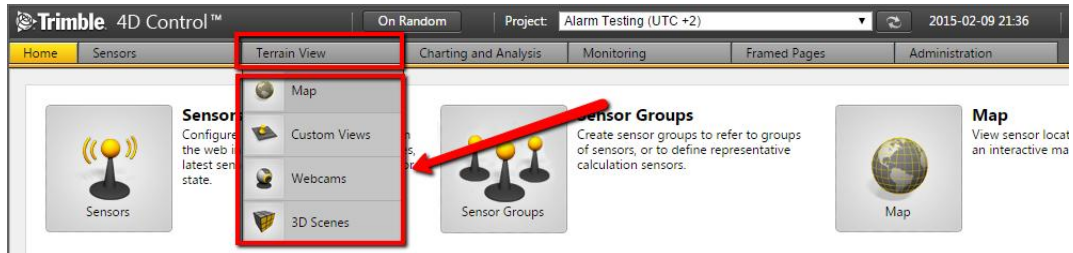
2.1 HOME PAGE

Here you will see icons which navigate you through the rest of the site pages; each with a short description of the purpose of the pages.

 <p>Sensors</p>	Sensors Configure sensor data to be displayed in the web interface, view sensor properties, latest sensor readings and current sensor state.	 <p>Sensor Groups</p>	Sensor Groups Create sensor groups to refer to groups of sensors, or to define representative calculation sensors.
 <p>Map</p>	Map View sensor location, data and state on an interactive map.	 <p>Custom Views</p>	Custom Views View sensor location, data and state on user supplied images, with data updates at specified time intervals.
 <p>Webcams</p>	Webcams View webcams linked to the project.	 <p>3D Scenes</p>	3D Scenes Create, maintain and view 3D Scenes representing your monitoring project.
 <p>Charts</p>	Charts View the selected data series of a single sensor in a simple chart.	 <p>Scatter Plot</p>	Scatter Plot Visualize and animate positional displacement over time for a particular sensor within to different planes.

2.2 MAIN MENU

The Trimble 4D Control Web Interface can also be navigated via the main horizontal menu at the top of the **Page**.



Some items in the menu have drop downs.

If the browser window is too small to display all the menu options at once, then menu navigation arrow buttons will become visible. The left and right arrows will become enabled and disabled based on whether or not there are unseen menu options available towards the left and the right.



Navigation arrow to right enabled, when viewed in a smaller window display



Navigation arrow to left enabled, when viewed in a smaller window display

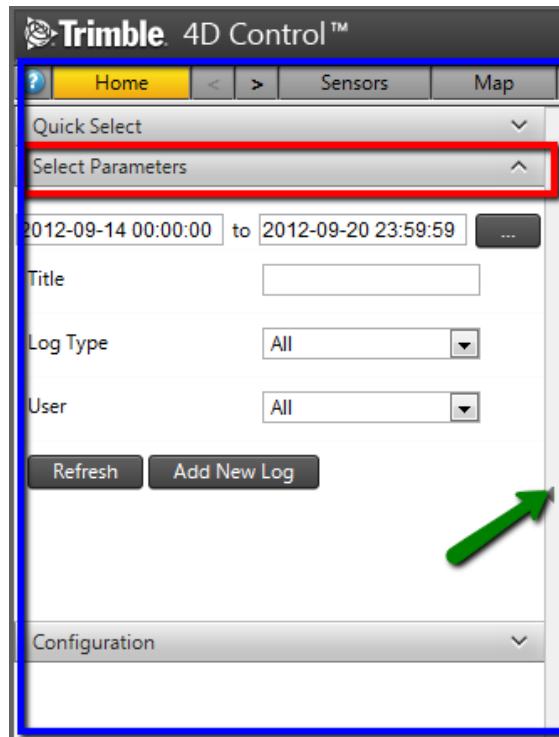


Navigation arrows will not be visible in a larger viewed window display

2.3 PAGE CONTROL PANEL

Every Trimble 4D Control Web Interface page has a **Control Panel** in a left panel.

Let us consider for example the Logs Page Control Panel in the figure below. In the **Control Panel** there are bar tabs with additional options (red). These bar tabs may differ from **Page** to Page. The **Panel** can be hidden by clicking the panel collapse arrow (green).

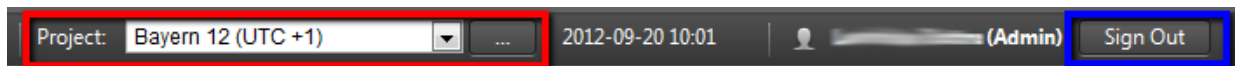


NB: If you are having trouble viewing all tabs in the Navigation Bar or Control Panel, be advised that it is dependent on the role of the User logged in. Administrators have more options available than Analysts etc. In other words if you do not see all the options, it is most likely because the logged in User does not have access to it.

2.4 SELECT A PROJECT

To select a project, use the dropdown menu (red) found above the main menu to the right hand side of the **Page**.

To Sign Out of the Trimble 4D Control Web Interface, click the sign out button (blue) in the top right corner of the Page.

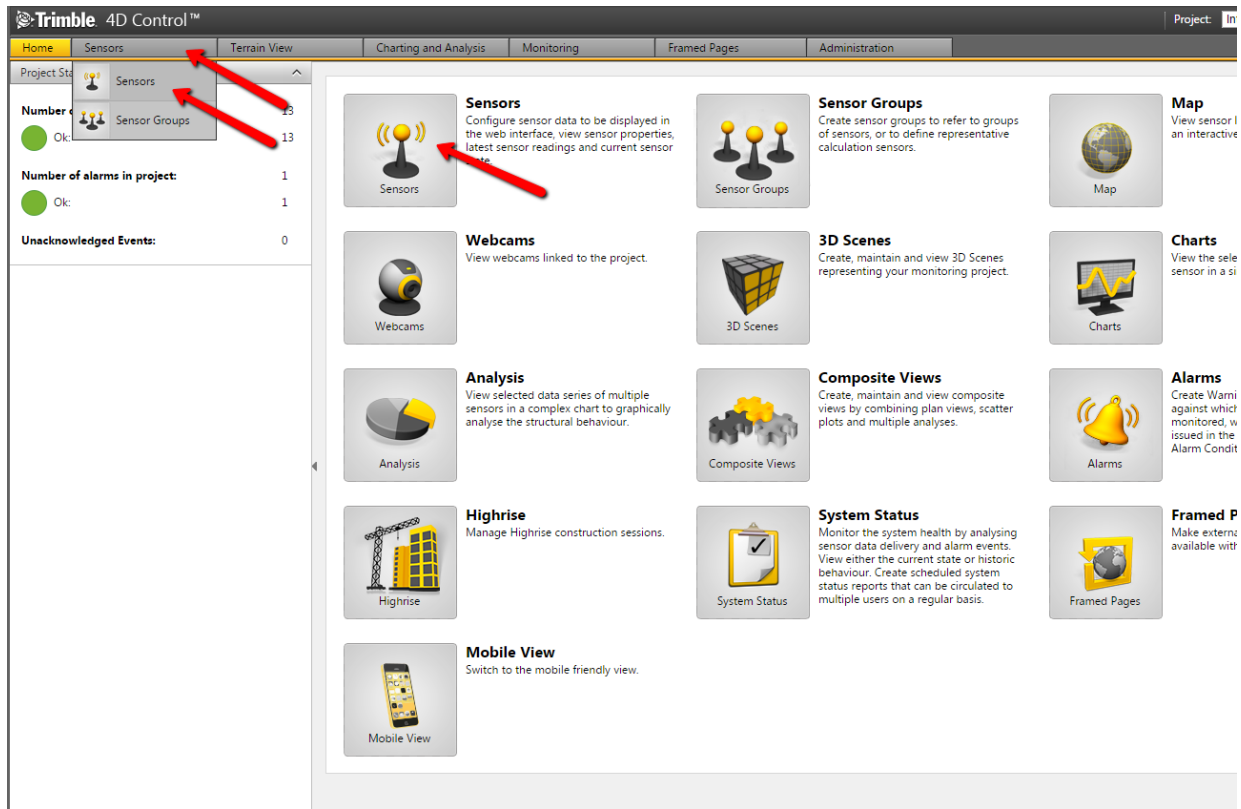


The time displayed adjacent to the project is the Project Local Time. This is the time at the physical site being monitored. Please note this does not take daylight savings into account.

3 Sensors

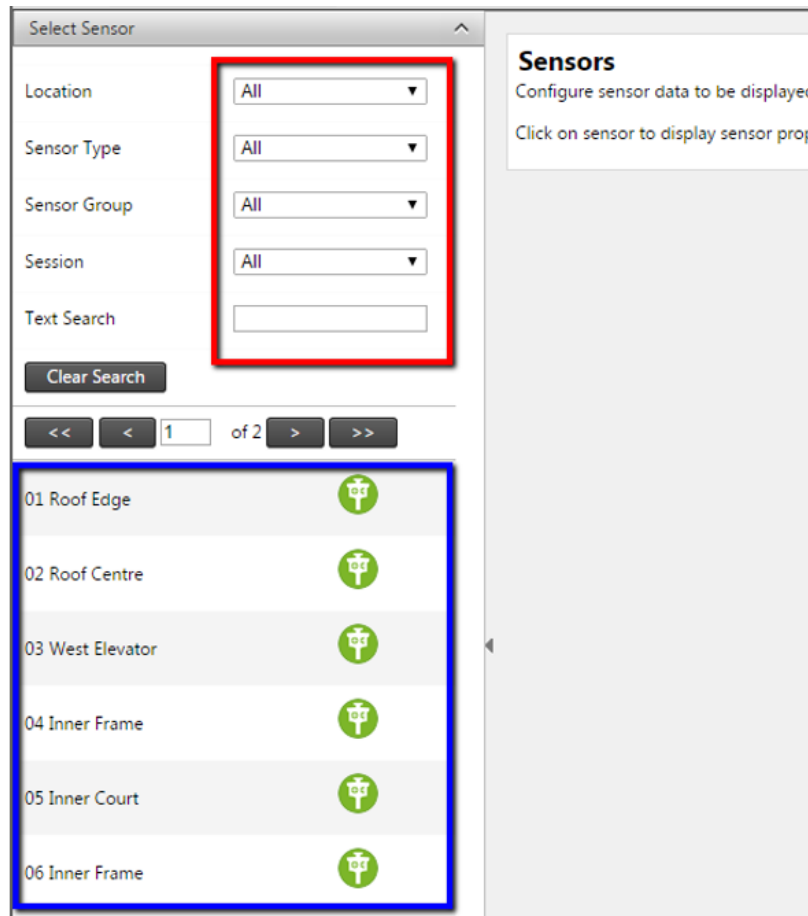
3.1 HOW TO DISPLAY SENSOR PROPERTIES AND LATEST READINGS

Step 1: Navigate to the Sensors Page by clicking Sensors Icon on the Home Page or by hovering the mouse over the Sensors top menu item and then clicking Sensors in the dropdown menu (as illustrated).



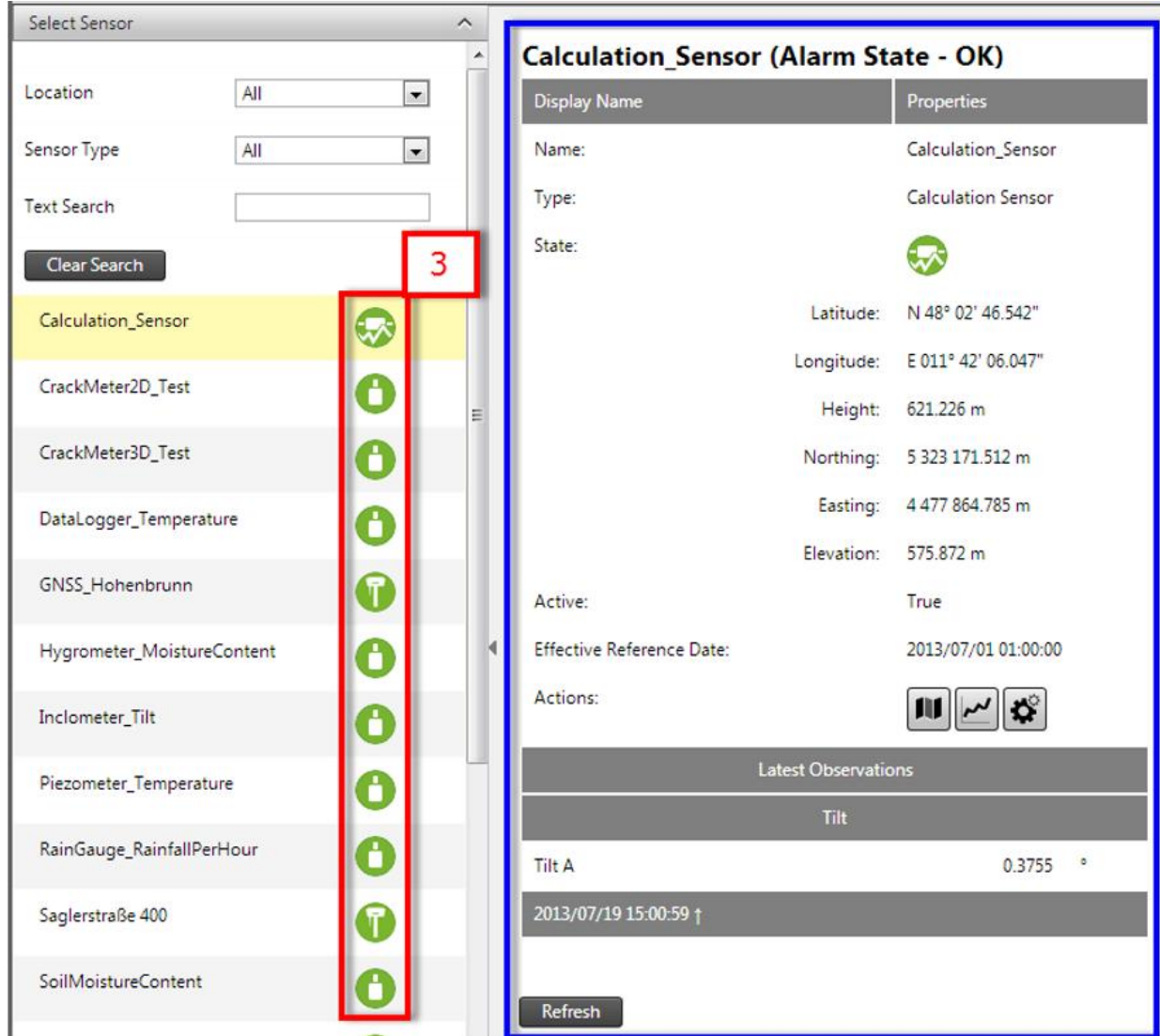
Step 2: Choose your sensor. The available sensors are listed in the area indicated in blue. If there are multiple sensors, the sensors can be filtered by any of the options indicated in the red area. Options are as follows:

- Sensor location: The physical location of the sensor.
- Sensor type: The type the sensor is associated with, e.g. Total Station.
- Sensor group: The group you have allocated the sensor to belong to (To be discussed in Sensor Groups on page 19).
- Sensor session: The specific session linked to the sensor (only applicable if the Highrise module is installed).
- Text search: Any text to filter out non-matching sensors. (E.g. a partial word in the name of the sensor.)







The screenshot shows the 'Select Sensor' interface. On the left, there are filter options: Location (All), Sensor Type (All), Sensor Group (All), Session (All), and Text Search (empty). A 'Clear Search' button is below these filters. Below the filters is a pagination control showing '1 of 2'. A list of sensors is displayed, including '01 Roof Edge', '02 Roof Centre', '03 West Elevator', '04 Inner Frame', '05 Inner Court', and '06 Inner Frame', each with a green sensor icon. A red box highlights the filter dropdowns, and a blue box highlights the sensor list.

Step 3: Click on any Sensor icon (3) for information about the Sensor to be displayed. (Blue)



The screenshot shows the 'Select Sensor' panel on the left and the 'Calculation_Sensor (Alarm State - OK)' details panel on the right. The 'Select Sensor' panel includes filters for Location (All), Sensor Type (All), and a Text Search field. A red box highlights the sensor icons, with a '3' indicating the third icon from the top. The details panel shows the following information:

Display Name	Properties
Name:	Calculation_Sensor
Type:	Calculation Sensor
State:	
Latitude:	N 48° 02' 46.542"
Longitude:	E 011° 42' 06.047"
Height:	621.226 m
Northing:	5 323 171.512 m
Easting:	4 477 864.785 m
Elevation:	575.872 m
Active:	True
Effective Reference Date:	2013/07/01 01:00:00
Actions:	  

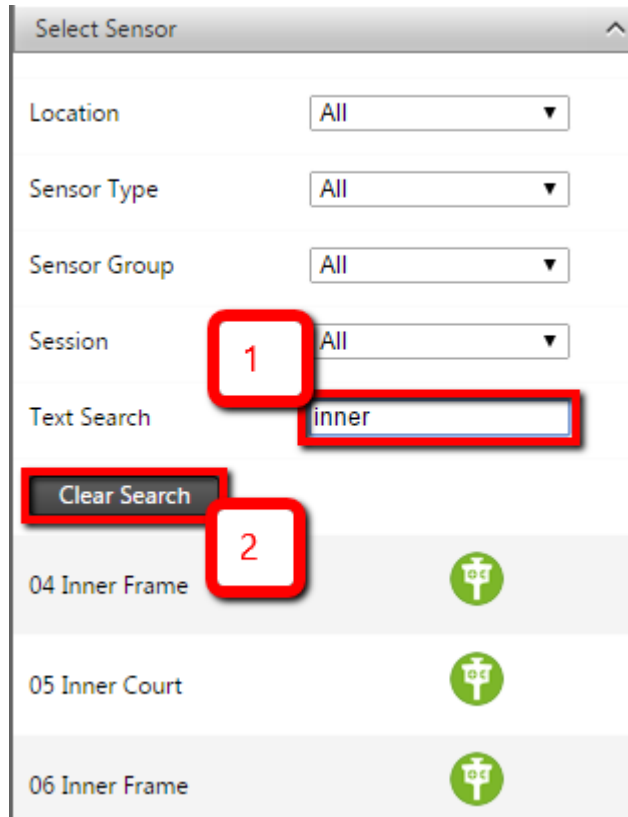
Latest Observations

Tilt	
Tilt A	0.3755 °
2013/07/19 15:00:59 ↑	

Refresh

Your Sensor information will be displayed in the Display Window to the right.

Step 4: Alternatively, you can search for your sensor by using a text search (1) in the search box. You can clear all search criteria by clicking the Clear Search button (2).



The screenshot shows a 'Select Sensor' dialog box with the following elements:






- Location:** All
- Sensor Type:** All
- Sensor Group:** All
- Session:** All
- Text Search:** inner
- Clear Search:** A button highlighted with a red box and labeled '2'.
- Results:** A list of sensors with green icons:
 - 04 Inner Frame
 - 05 Inner Court
 - 06 Inner Frame

3.2 SENSOR PROPERTIES

On the Sensor properties page you can navigate to other sensor informational pages by clicking on any of the buttons (in red).

To view a Map of the selected sensor, select Map View button (1). To view a chart, select the Chart button (2). To view the Scatter Plot, select the dotted button (3). Lastly to configure the reference date, select the Configuration button (4). The buttons available on the sensor properties page may depend on the Sensor Type of the sensor.

01 Roof Edge (Alarm State - OK)

Display Name	Properties
Name:	01 Roof Edge
Type:	Target Position
State:	
Location:	01 Roof Edge
	Latitude: N 50° 00' 57.441"
	Longitude: E 008° 27' 37.888"
	Height: 150.701 m
	Northing: 3 487.057 m
	Easting: 4 493.589 m
	Elevation: 90.183 m
Active:	True
Effective Reference Date:	Oldest Available Observation
Actions:	   

1, 2, 3 & 4

Latest Observations

Position GNSS Integrated Survey

dH	-3.8 mm	($\sigma = 13.5$ mm)
d2D	5.5 mm	

2015/02/11 21:33:45 ↑

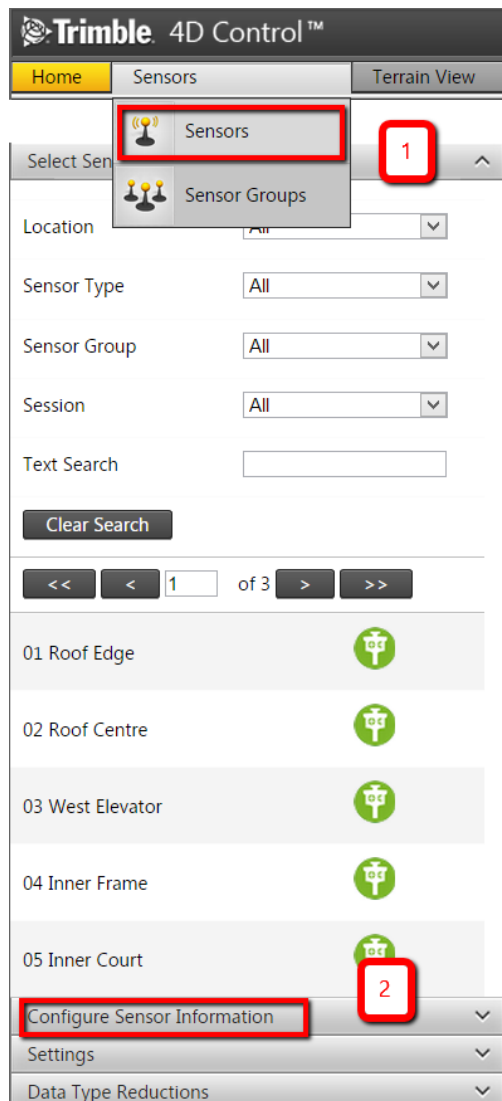
Refresh

3.3 CONFIGURING SENSOR INFORMATION

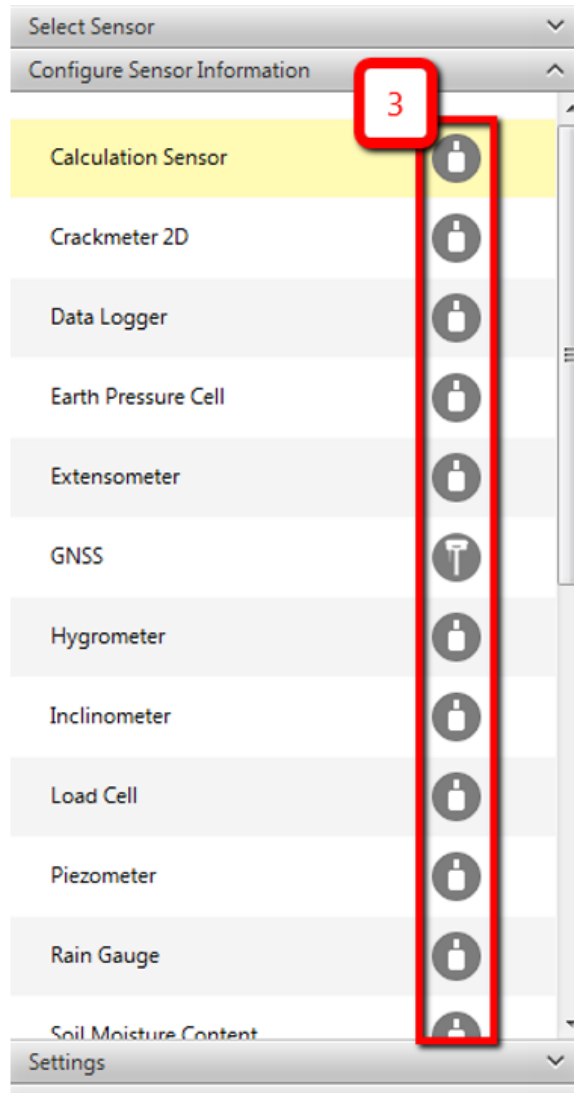
The information displayed by Sensors, Map, Custom Views and Chart pages are controlled by the configuration settings under the Configure Sensor Information section. Here the display settings are configured per Sensor Type.

To configure your Sensor information, follow these steps:

Step 1: Navigate to the Sensors Page via the Sensors Menu (1) or Sensors Button on the Home Page. In the left window, select the Configure Sensor Information bar. (2).



Step 2: Select the Sensor Type you wish to configure by clicking on its name or its Icon (3). On the Display on the right side of the page you can select specific information to be displayed about your selected Sensor Type (4).



Display Column Configuration - Calculation Sensor

Notes:

The following settings configures how sensors are displayed on the Sensor Details, Maps, Custom Views and Charts pages.

4

Pressure					
Name	Show	Unit	Decimals	Absolute / Relative	
Pressure	<input checked="" type="checkbox"/>	PSI (psi)	3	Absolute Measurement	
Circle Readings					
Name	Show	Unit	Decimals	Absolute / Relative	
HA	<input checked="" type="checkbox"/>	Second (sec)	4	Absolute Measurement	
VA	<input checked="" type="checkbox"/>	Second (sec)	4	Absolute Measurement	
Temperature					
Name	Show	Unit	Decimals	Absolute / Relative	
Temperature	<input checked="" type="checkbox"/>	Celsius (°C)	3	Absolute Measurement	
Length					
Name	Show	Unit	Decimals	Absolute / Relative	
Length	<input checked="" type="checkbox"/>	Meter (m)	3	Absolute Measurement	
Rainfall Per Hour					
Name	Show	Unit	Decimals	Absolute / Relative	
Rainfall Per Hour	<input checked="" type="checkbox"/>	Meter (m/hour)	3	Absolute Measurement	

Clicking a Row will allow you to change Sensor Information.

Unit Column: The available Units will depend on the Project Unit Settings configured in the T4D Desktop Application.

Absolute/Relative Column: “Absolute Reading” will show the actual value measured. A “Relative Reading” will be denoted by a small delta (Δ) and depicts the change or difference between the actual reading and a reference reading.


Display Column Configuration - Calculation Sensor

Notes:
The following settings configures how sensors are displayed on the Sensor Details, Maps, Custom Views and Charts pages.

Pressure				
Name	Show	Unit	Decimals	Absolute / Relative
Pressure	<input checked="" type="checkbox"/>	PSI (psi)	3	Absolute Measuremen

Circle Readings

3.4 SENSOR SETTINGS



Home Sensors Terrain View

Select Sensor

Configure Sensor Information

Settings

Relative measurement reference date

Coordinate system display settings

Data Type Reductions

Under Sensor settings you can change the way the Reference Date is used in Relative Measurements or change the way the Coordinate System Display for the current monitoring project.

3.4.1 Relative Measurement Reference Date Settings

Select your Reference Date Mode from the 3 possible options:

- Oldest Available Observation,
- Specific Date and
- Rolling Offset Days.

Project Default

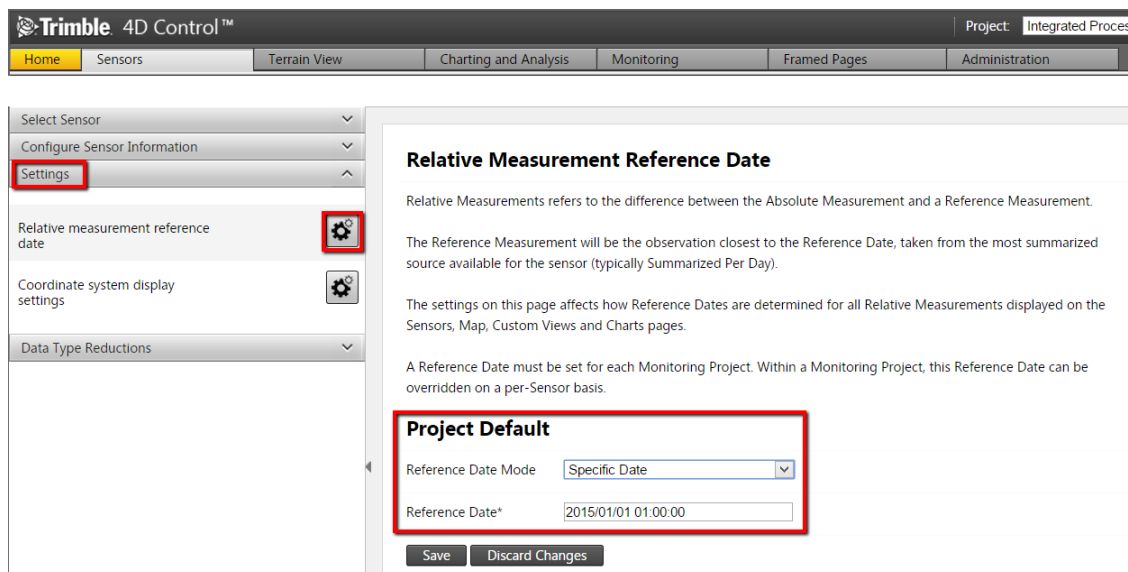
Reference Date Mode	<div style="border: 1px solid gray; padding: 2px;"> Specific Date <div style="float: right;">▼</div> </div>
Reference Date*	<div style="border: 1px solid gray; padding: 2px;"> Oldest Available Observation <div style="float: right;">▼</div> </div>

NB: Relative Measurements refers to the difference between the Absolute Measurement and a Reference Measurement.

The *Reference Measurement* will be the observation closest to the *Reference Date*, taken from the **most summarized source** available for the sensor (typically *Summarized per Day*).

The settings on this page affects how *Reference Dates* are determined for all *Relative Measurements* displayed on the Sensor Details, Maps, Custom Views and Charts pages.

A Reference Date must be set for each Monitoring Project. Within a Monitoring Project, this Reference Date can be overridden on a per-Sensor basis.



3.4.1.1 Sensor Reference Date Overrides

Below the Project Default Reference Date you can specify Reference Dates for specific sensors that will override the previous setting, but only for that specific sensor.

1. Text Search:

User can filter the list of sensors by typing the name of the sensor they are looking for.

2. Sensor Type:

User can filter the list of sensors by selecting a specific sensor type.

3. Location:





User can filter the list of sensors by a specifying the location in the monitoring project.

4. Calculation Sensor Button:

Click on the button to override the reference date mode for the Calculation Sensor.

Sensor Overrides

Clear all Overrides


Text Search	Sensor Type	Location	
01 Roof Edge	All	All	Use Project Default 
02 Roof Centre			Use Project Default 
03 West Elevator			Use Project Default 
04 Inner Frame			Use Project Default 


3.4.2 Coordinate System Display Settings

Select Sensor

Configure Sensor Information

Settings

Relative measurement reference date 

Coordinate system display settings 

Data Type Reductions

Use the coordinate system display settings for the current monitoring project.

Coordinate System Display Settings

On this page you can customize the display settings for dN and dE values. The configuration settings applied here affects all pages where positional data is displayed.

Northing	Easting	Height
Rename Northing Axis <input type="button" value="1"/>	Rename Easting Axis <input type="button" value="2"/>	Rename Height Axis <input type="button" value="3"/>
<input type="text" value="No"/>	<input type="text" value="No"/>	<input type="text" value="No"/>
Northing Display Name dN	Easting Display Name dE	Height Display Name dH
Negate Northing Values <input type="button" value="4"/>	Negate Easting Values <input type="button" value="5"/>	Negate Height Values <input type="button" value="6"/>
<input type="text" value="No"/>	<input type="text" value="No"/>	<input type="text" value="No"/>
<input type="button" value="Restore Defaults"/>		

1. Specify if the Northing Axis should be renamed.

2. Specify if the Easting Axis should be renamed.

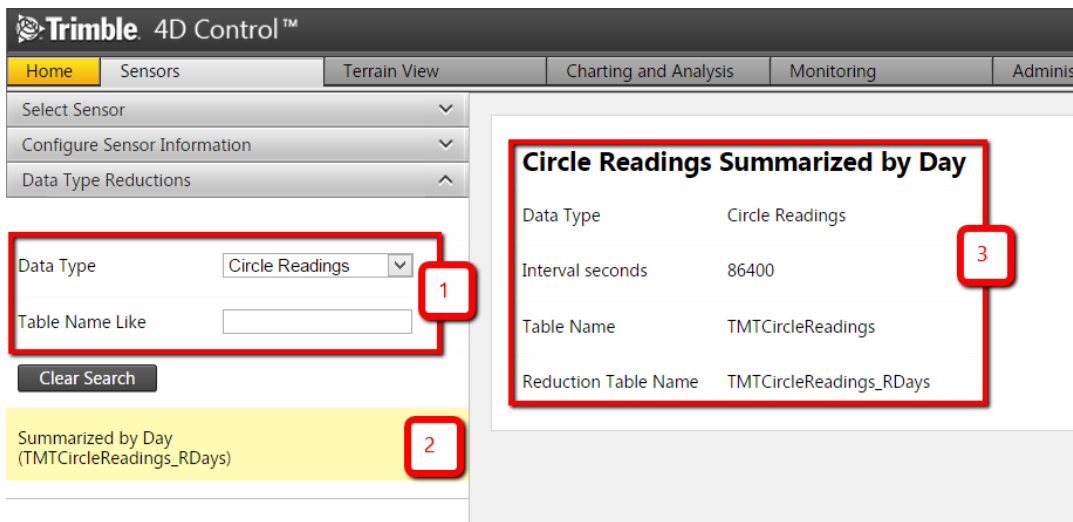
3. Specify if the Height of the Axis should be renamed
4. Specify whether the Northing measurement values should be multiplied by minus one.
5. Specify whether the Easting measurement values should be multiplied by minus one.
6. Specify whether the Height measurement values should be multiplied by minus one.

3.5 DATA TYPE REDUCTIONS

Open this section to view the different reduction or summary sets that are available for the various data types in the system. Please note this is a read-only section and therefore only provide information.

You can filter the list of available reductions or summary sets by either selecting a data type or by typing the name of reduction table (1).

Then click on any of the items (2) in the list to view the corresponding information (3).



The screenshot shows the Trimble 4D Control web interface. The navigation menu includes Home, Sensors, Terrain View, Charting and Analysis, Monitoring, and Admin. The 'Data Type Reductions' section is active, showing search filters for 'Data Type' (set to 'Circle Readings') and 'Table Name Like'. A 'Clear Search' button is present. Below the filters, a list of reduction sets is shown, with one item highlighted in yellow: 'Summarized by Day (TMTCircleReadings_RDays)'. To the right, a detailed view for 'Circle Readings Summarized by Day' is displayed, showing the following information:

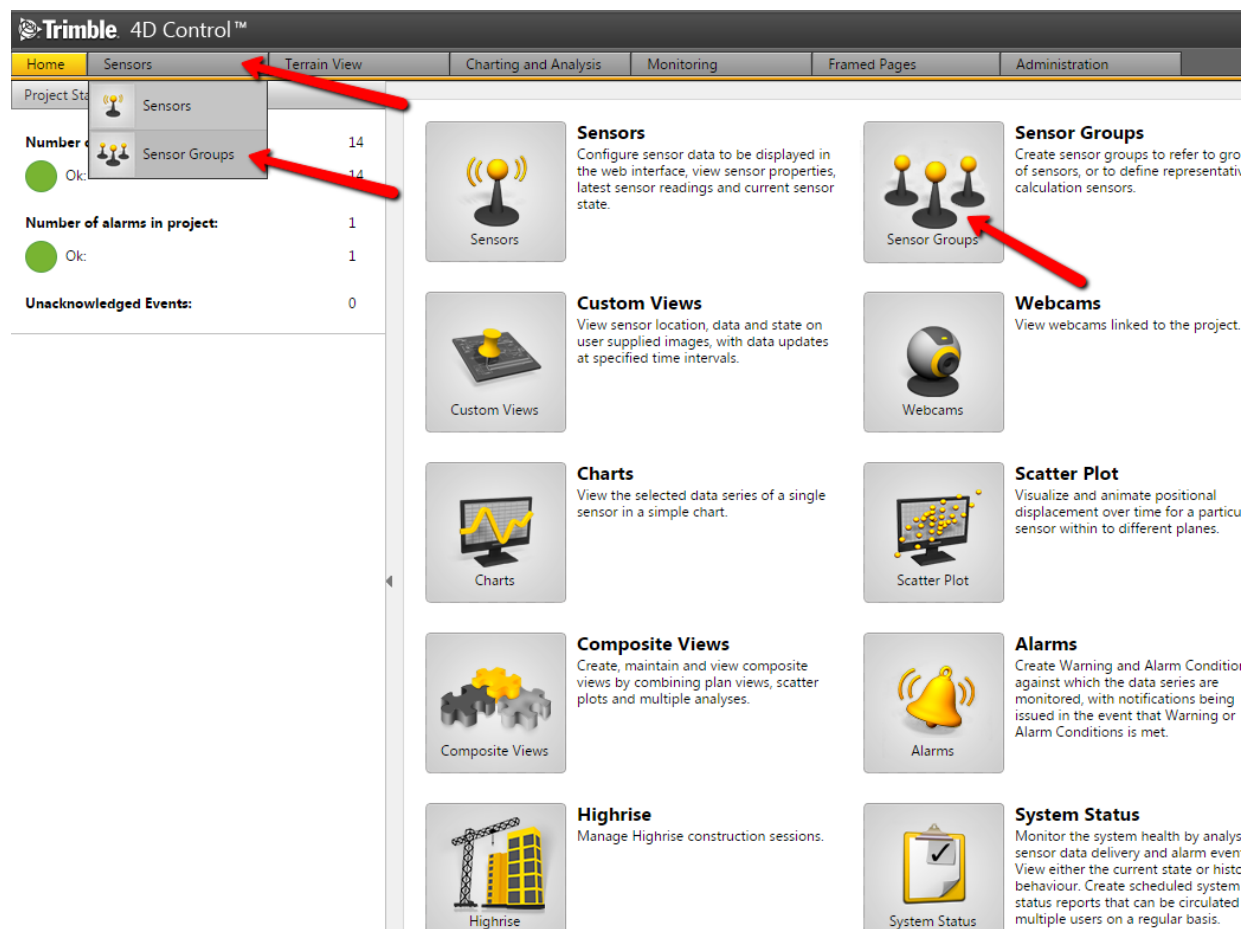
Data Type	Circle Readings
Interval seconds	86400
Table Name	TMTCircleReadings
Reduction Table Name	TMTCircleReadings_RDays

4 Sensor Groups

Sensor groups are useful to refer to groups of sensors and/or to define a representative sensor for example for mapping, charting or analysis purposes.

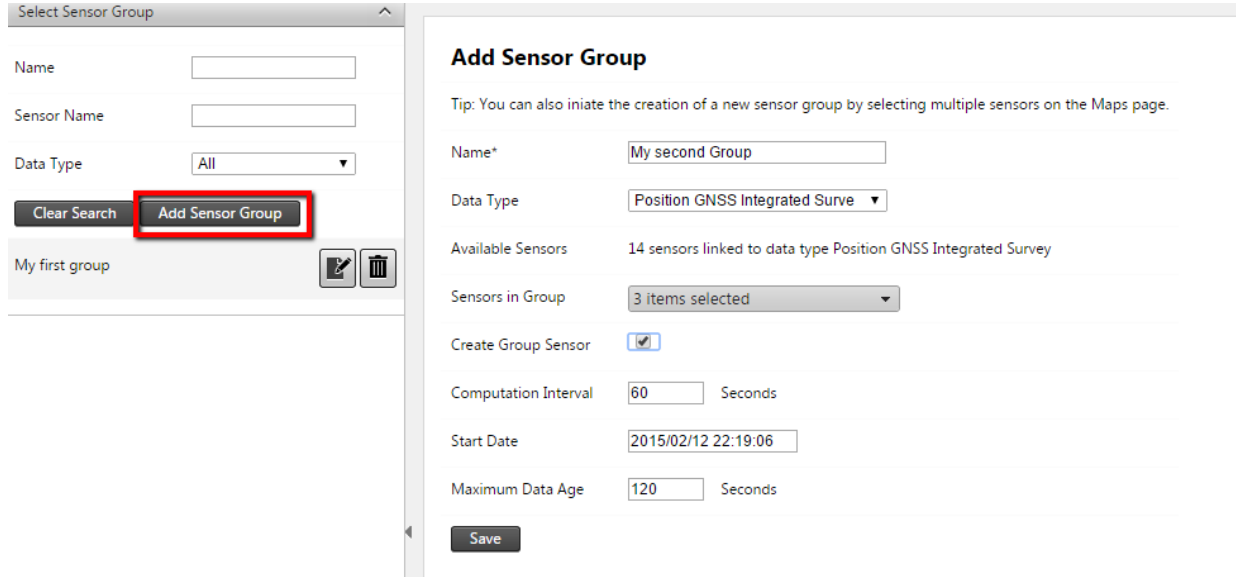
4.1 CREATE A SENSOR GROUP

Step 1: Navigate to the Sensor Groups Page by clicking Sensor Groups Icon on the Home Page or by hovering the mouse over the Sensors top menu item and then clicking Sensor Groups in the dropdown menu (as illustrated).



The screenshot displays the Trimble 4D Control web interface. The top navigation bar includes 'Home', 'Sensors', 'Terrain View', 'Charting and Analysis', 'Monitoring', 'Framed Pages', and 'Administration'. The 'Sensors' menu is open, showing 'Sensors' and 'Sensor Groups' options. A dropdown menu on the left shows 'Number of sensors in project: 14' and 'Number of alarms in project: 1'. The main dashboard grid contains icons for 'Sensors', 'Sensor Groups', 'Custom Views', 'Webcams', 'Charts', 'Scatter Plot', 'Composite Views', 'Alarms', and 'Highrise'. Red arrows indicate the navigation path from the 'Sensors' menu to the 'Sensor Groups' icon.

Step 2: Click on Add Sensor Group



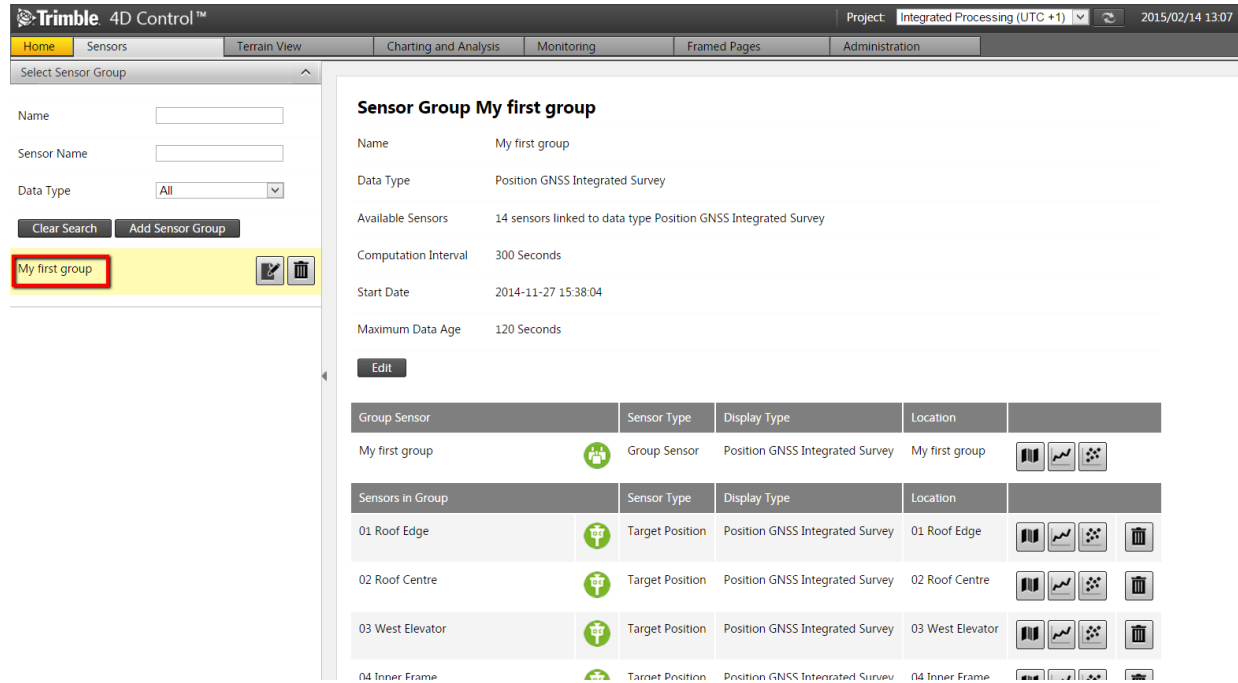
Step 3: Complete information on the right. The fields are as follows:

- Name: Any name by which to identify the group.
- Data Type: The type of data all the sensors are associated with, e.g. Pressure. The number of sensors in the Project with the selected Data Type will automatically be shown on the next line.
- Sensors in group: Simply click on the downwards arrow to open the list. Here you can add or remove the sensors chosen to be in the group. After opening the list simple drag items across, or select a sensor and click on the plusses (+) to add sensors, or minuses (-) to remove sensors.
- Create a group sensor: A group sensor can be created with calculated observations that represents all the sensors in the sensor group. Check this box to create a group sensor or to keep an existing group sensor linked to this sensor group. Uncheck this box to delete an existing group sensor and not have a group sensor linked to this sensor group. **Note that this option is only available for sensor groups with a positional Data Type.** Provided this option is selected, also complete the following three fields.
- Computational Interval: Specify an interval at which observations for the group sensor is sampled from the sensors in the sensor group.
- Start Date: Specify a start date from when observations for the group sensor should be calculated.
- Maximum Data Age: Specify the maximum age of observations to be included in calculations for the group sensor.

Click the Save button to create the Group and it will be added to the list of Sensor Groups.

4.2 MANAGE A SENSOR GROUP

The sensor group can be viewed by simply clicking on its name in the list of sensor groups in the left panel.



Sensor Group My first group

Name: My first group

Data Type: Position GNSS Integrated Survey

























Available Sensors: 14 sensors linked to data type Position GNSS Integrated Survey

Computation Interval: 300 Seconds

Start Date: 2014-11-27 15:38:04

Maximum Data Age: 120 Seconds

[Edit](#)

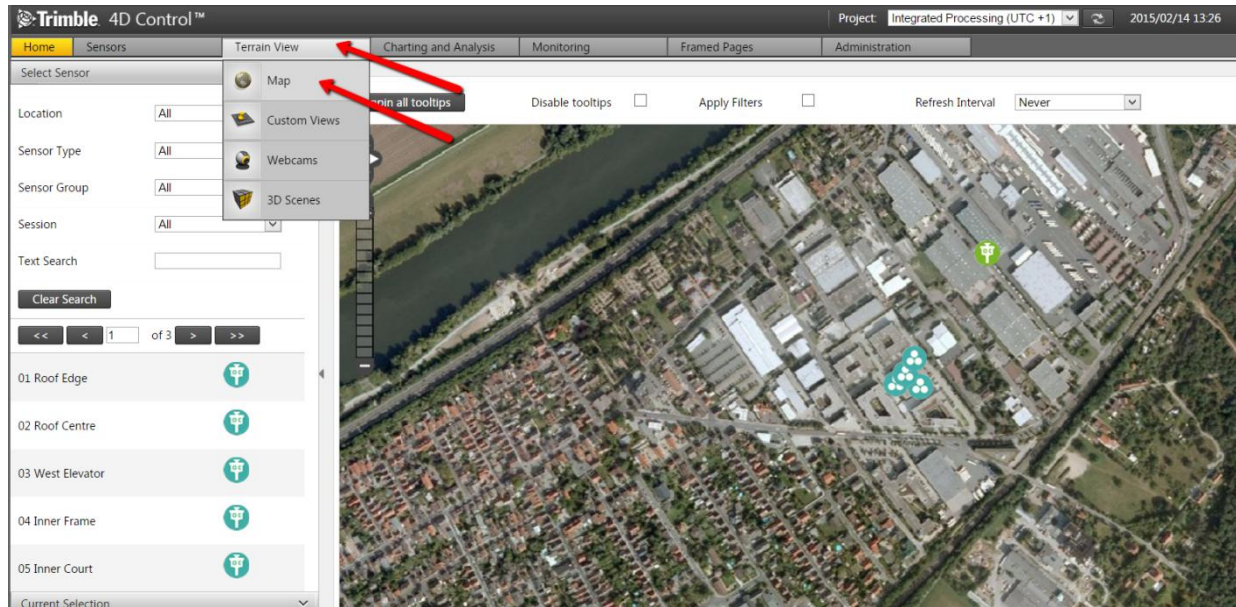
Group Sensor	Sensor Type	Display Type	Location	
My first group	 Group Sensor	Position GNSS Integrated Survey	My first group	  
Sensors in Group	Sensor Type	Display Type	Location	
01 Roof Edge	 Target Position	Position GNSS Integrated Survey	01 Roof Edge	   
02 Roof Centre	 Target Position	Position GNSS Integrated Survey	02 Roof Centre	   
03 West Elevator	 Target Position	Position GNSS Integrated Survey	03 West Elevator	   
04 Inner Frame	 Target Position	Position GNSS Integrated Survey	04 Inner Frame	   

The sensor group view shows the configuration of the sensor group. Simply click the Edit button to modify and/or maintain some of these fields. From here you can also navigate to informational pages for the sensors in the sensor group or remove sensors from the Sensor Group.

The Sensor Group can be deleted by clicking on the trash can icon in the list of the left hand pane.

5 Maps

Navigate to the Maps Page by hovering the mouse over the Terrain View top menu item and then clicking on Maps in the dropdown menu (as illustrated). Alternatively simply click on Map Icon on the Home Page. **Note that the maps page is unavailable for Projects that are configured on a local coordinate system only.**



On the Maps Page you can click and drag on the map using the left mouse button to pan the map area in different directions. Use the mouse wheel to zoom in or out.

The settings at the top right of the map area can be used to hide and show available layers. (More discussed later)

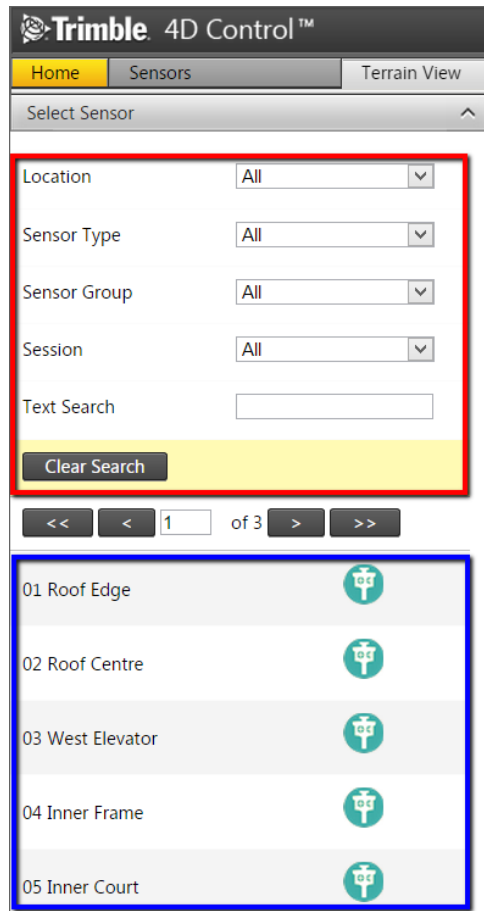


5.1 SELECT SENSORS

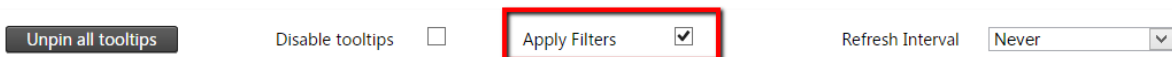
Upon opening the Map Page, all the available sensors on the map will be plotted by default. To select a sensor, click on any of the listed sensors (shown in the blue box). The map will navigate directly to the position of the sensor.

You can filter the sensors shown in the sensor list by using the options shown in the red area. These options are:

- Sensor location: sensors at a marked location.
- Sensor type: sensors of a specific Sensor Type, e.g. Total Station.
- Sensor group: sensors associated with a Sensor Group. (Was discussed in Sensor Groups on page 19.)
- Sensor session: sensors linked to a session (only related to the Highrise module).
- Text search: Any text to filter out non-matching sensors. (E.g. a partial word in the name of the sensor.)



The same filtering of sensors can also be applied to the sensors shown on the map by clicking the “Apply Filters” box above the map area. This is useful if you wish to view only a particular subset of sensors on the map.



5.2 SENSOR NODES

To display more information about any of the sensor nodes on the map, simply hover the cursor over the node on the map.



Sensors that are clumped up too close to each other (depending on how far the map is zoomed out) are collectively shown by a special icon as illustrated below.



To keep the tooltip (pop-up) information visible, click on the node instead of just hovering over it. An anchor will appear next to the node to show that it will not disappear when the mouse is taken away.

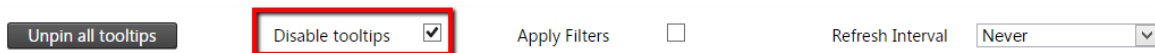


Simply click on the node again (or on the anchor) to minimize it again.

To quickly clear all “anchored” pop-ups, click the Unpin all tooltips button.



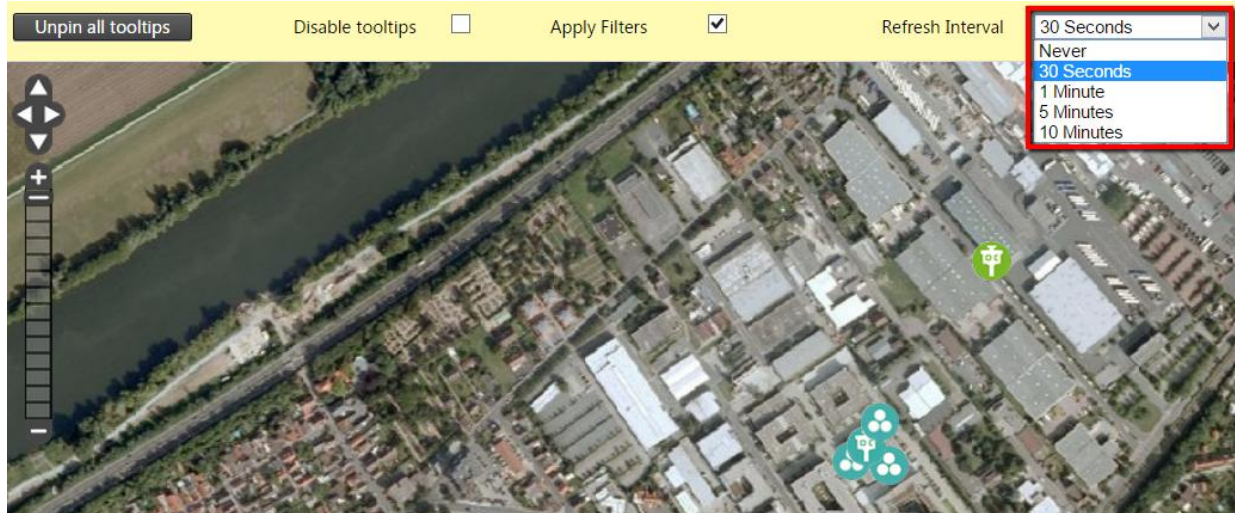
In order to disable the auto tooltips (pop-ups) simply check the Disable tooltips box at the area above the map. Clicking on a node will still provide the tooltip but hovering over nodes will not show any tooltip, which would be useful if there are many icons on the screen causing too many pop-ups.



5.3 MAP REFRESH TIMER

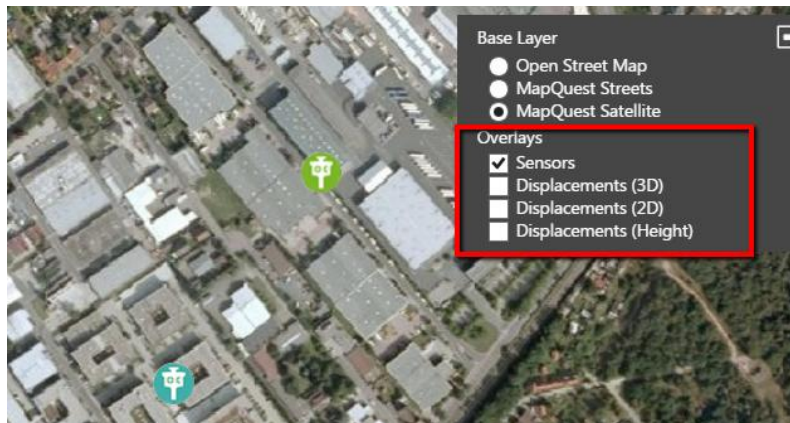
Select a time interval from the dropdown menu to refresh die map view.

The time selected will cause the map to refresh, for example every 30 seconds.



5.4 MAP OVERLAYS

On the right hand side of the map there are four options of overlays to enable on the map.



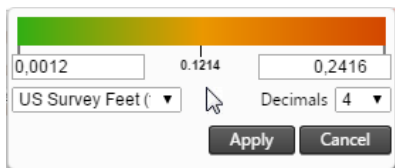
The first option (which is enabled by default) is displaying the icons of the sensors which was illustrated in earlier examples.

The other three overlays show displacements measured on the sensors (or sensor groups). The displacement show is colour coded to indicate the severity of the displacement.

A legend of the colour code is also included to the left (which will only appear if a displacement overlay is enabled).



You can edit the displacement display parameters by hovering your mouse cursor over the legend:



You can edit any of the following display parameters on the legend:

- Minimum displacement threshold: any displacement below this threshold will not be shown.
- Maximum displacement threshold: any displacement above this threshold will appear in a red colour and be a maximum length/size.
- Unit of Measure: change your unit of measure (if multiple ones are available for the particular metric)
- Decimals: the number of decimals to be used when displacement values are displayed.

A sensor that measures Height (in the above map example the orange bar) shows the direction of the displacement by use of a bar pointing up or down and the severity of the displacement as the length and the colour of the bar.

A sensor that measures 2D (in the above map example the green arrow) shows the direction of the displacement by use of an arrow and the severity of the displacement as the length and colour of the arrow.

A sensor that measures 3D will use both the Height and 2D measurements to calculate a circle around the sensor and show the severity as the radius and colour of the circle. The direction of 3D displacements are not visualized here. The radius of the circle is equal to the 3D displacement vector length.



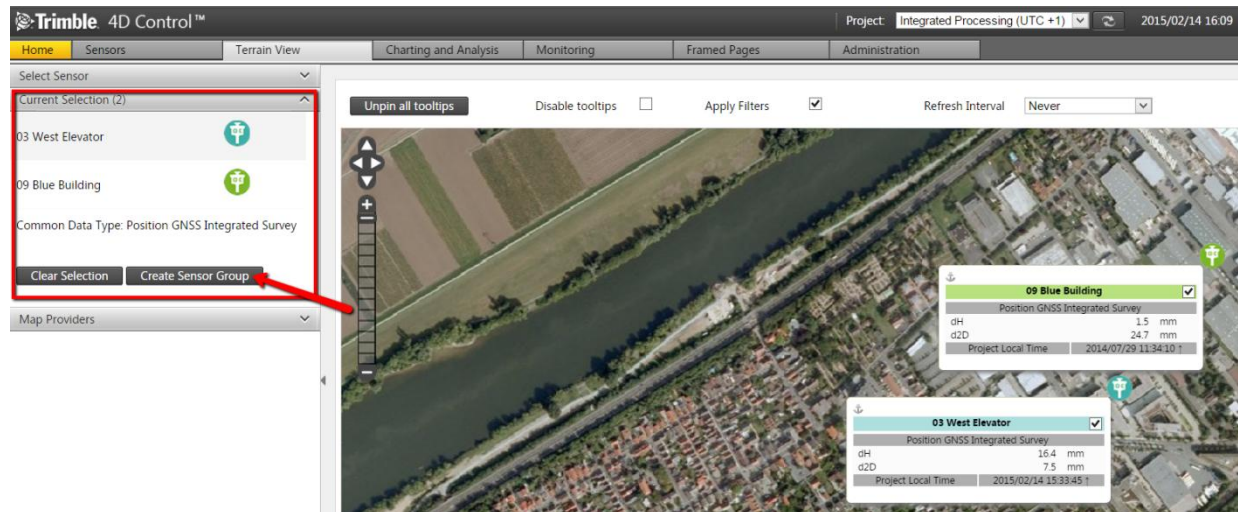
5.5 CREATE SENSOR GROUPS VIA MAP INTERFACE

You can also create Sensor Groups from the map interface.

Next to each sensor's name on the tooltip (pop-up) is an option to select that sensor.



When you select a Sensors, it will be added to the Current Selection section visible in the left hand pane.

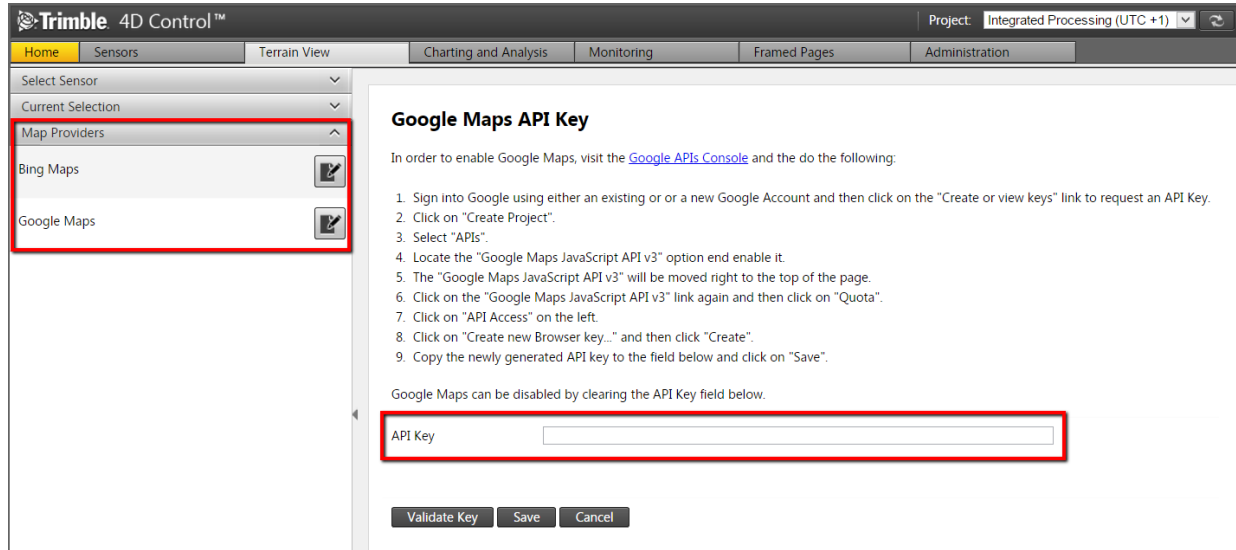


When all the sensors for the new group are selected, simply click on the Create Sensor Group button. Follow similar steps as discussed in Section 4.1, page 19 to complete the creation of the new Sensor Group.

At any stage the selection of sensors can be cleared by clicking on the Clear Selection button.

5.6 MAP PROVIDERS

When using maps from Google and/or Bing, T4D installations must register with Google and/or Bing. This registration is required in order to comply with the map licensing rules for these companies. Note: there are some free maps available in T4D by default. The free map providers however may not offer sufficient content.



To register an API for your T4D installation, simply click on the particular map provider on the left pane and follow the instructions on the right hand side. Register at the map provider and retrieve a key from them.

Enter the key in the indicated area and click the Validate Key button before saving it. You should now be able to use the new map data in the Maps section on your T4D installation.

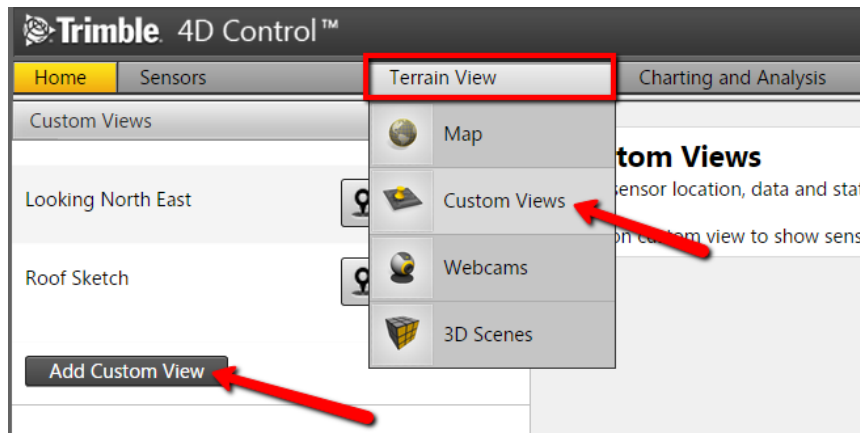
6 Custom Views

A Custom View allows sensors to be placed on a picture for context visualization. It can be a schematic plan (e.g. a blue-print) of a building/site/structure or even the actual photo of the location of the sensor or the sensor itself (as will be illustrated in the example later in this section).

The Custom Views also provides the ability to show a Chart or Scatterplot in a tooltip.

6.1 ADD A BASIC CUSTOM VIEW

Step 1: Navigate to Custom Views. To add a Custom View, first click on the “Add Custom View” button.



Step 2: Then enter a name. For now please ignore all the other options and click the Save button. (The other options are discussed in Section 6.2 on page 31)

Add Custom View

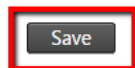
Display Settings

Name*

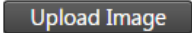
Refresh Interval

Rolling Window Width

Transparent Charts



Step 3: Click the Upload Image button



Step 4: Click the Add Files button, select a file from your computer and then click the Start Upload button.

Upload backdrop for the custom view Dam Wall.



Your Custom View will now be created and you can start adding sensor, which will be discussed in Section 6.3, page 32. First the previous Step 2 will be discussed in more detail.

6.2 A DETAILED CUSTOM VIEW

Follow the same steps as before, except with the previous Step 2 also provide the following information.

Display Settings:

- Refresh Interval: Specify the interval by which data should be refreshed. (Same effect as with Maps that are refreshed.)
- Rolling Window Width: Specify the time window which will determine the date range used by custom view charts. The effective date range will change on a continuous basis.
- Transparent Charts: Transparency allows tooltips to be both visible and not obscure the custom view background image.

Scatter Plot:

- Reference Observation: In T4D scatterplots always plot relative positions, which is the difference between and actual position and a reference position. You can either use the reference date of the selected sensor to obtain a reference position, use the first observation in the result set or use the average of the observation values within the result set.
- Scatterplot X Axis: Select the dimension to plot against the x axis of the scatterplot.
- Scatterplot Y Axis: Select the dimension to plot against the y axis of the scatterplot.
- Colour by Displacement: When this option is enabled, dots on the scatter plot will be colored green, yellow or red depending on the distance from the reference measurement. If this option is disabled, all dots will be blue.
- Shade by Data Age: When this option is enabled, a degree of transparency will be applied to each dot on the scatterplot. The latest observation will be solid and the oldest observation will be almost completely transparent. The use of this setting is only effective when you do not have multiple observations plotted on top of each other.
- Link Axis Scales: When this option is enabled, the two chart surfaces will be scaled identically. When this option is disabled, the scale of each chart surface will be optimized for the data that appears on that chart only.

Chart:

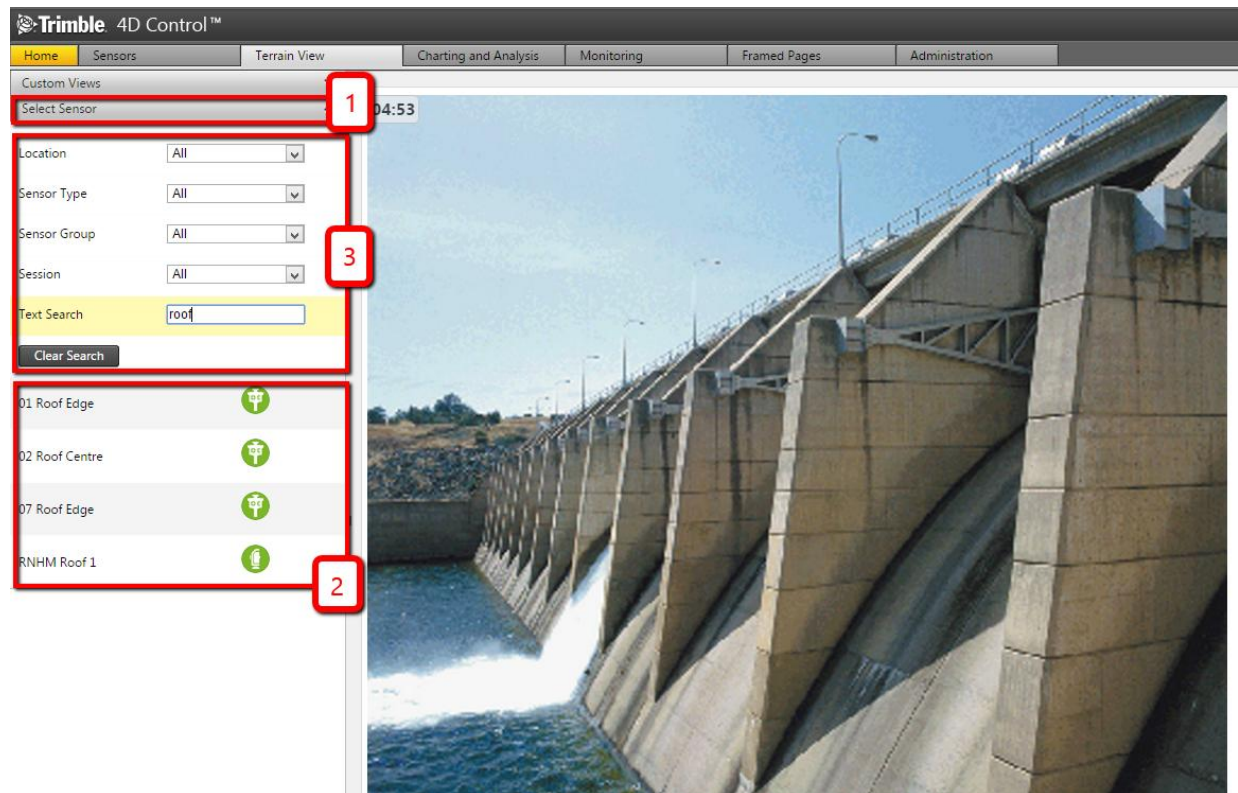
- Plot Summarized Values: This option has an effect on the time value (or x axis value) against which summarized values will be plotted. Each node in a summarized series typically reflect the average observation value over a period (such as 1 hour or 1 day). By adjusting this option, you can plot summarized values either at the beginning, in the middle or at the end of the time period over which the data was summarized.
- Line Type: This option controls how the data will be represented on the chart surface.

6.3 ADDING AND REMOVING SENSORS TO THE CUSTOM VIEW

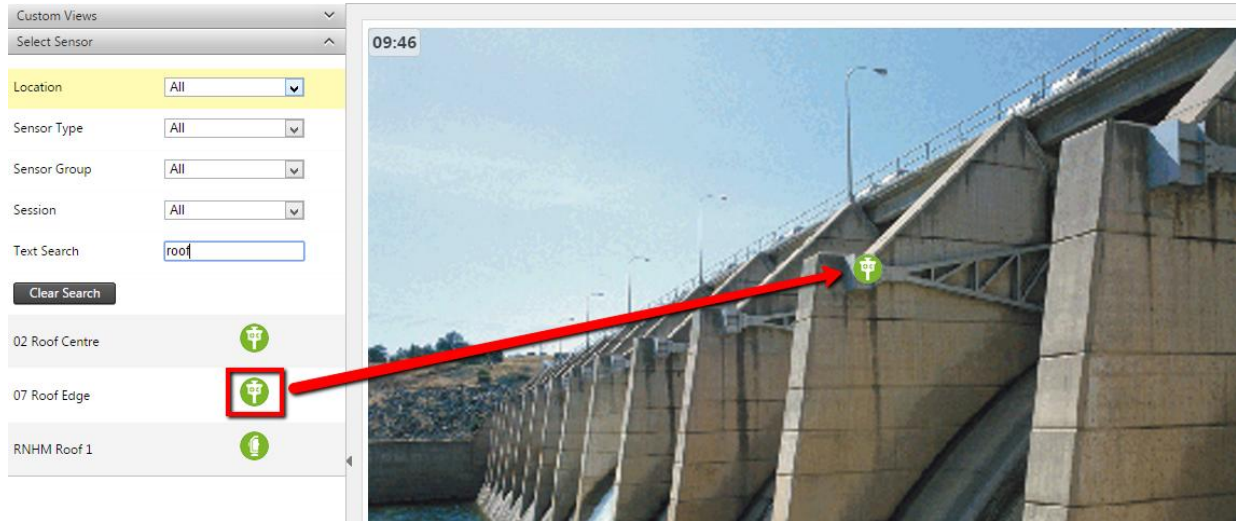
The following section will guide you through the process of adding and removing sensors to the view.

Important: This section does not explain how to create a new sensor that was handled in the section on Sensors.

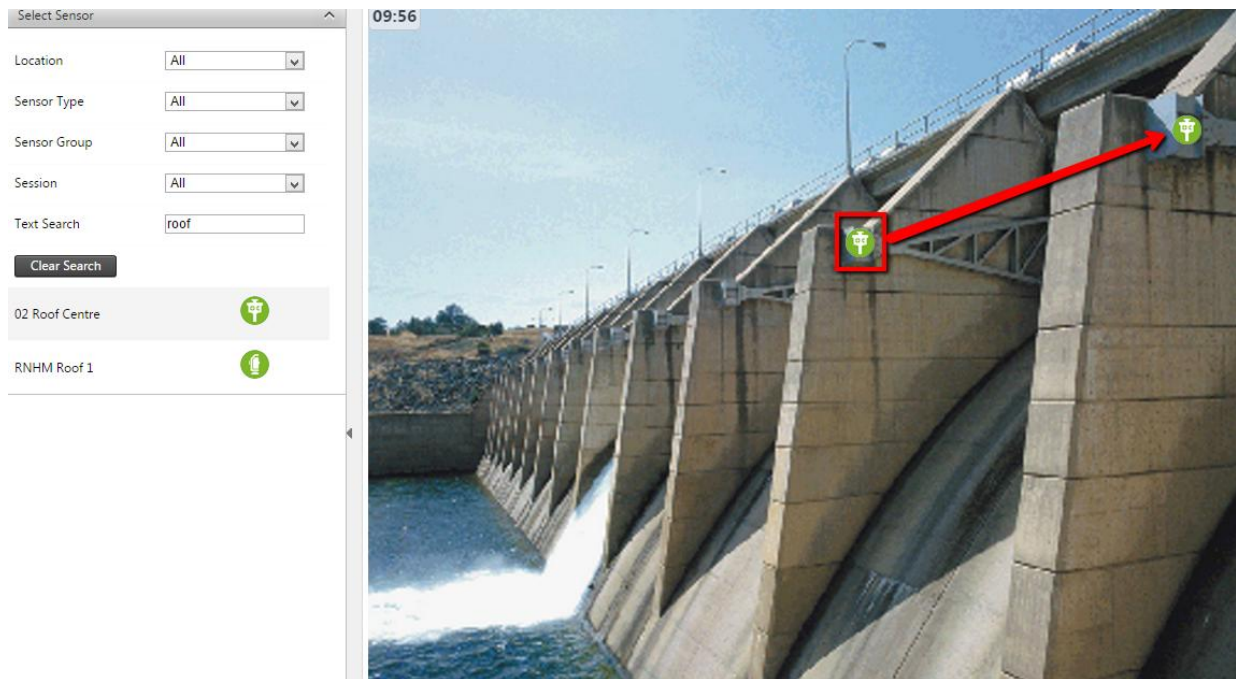
Step 1: Make sure you have selected the Custom View you want to work with and then click on the Select Sensor sub-section (1). Here (2) you can add any of the available sensors to the Custom View. As before if there are many sensors, you can make use of the filters (3) to show only specific sensors.



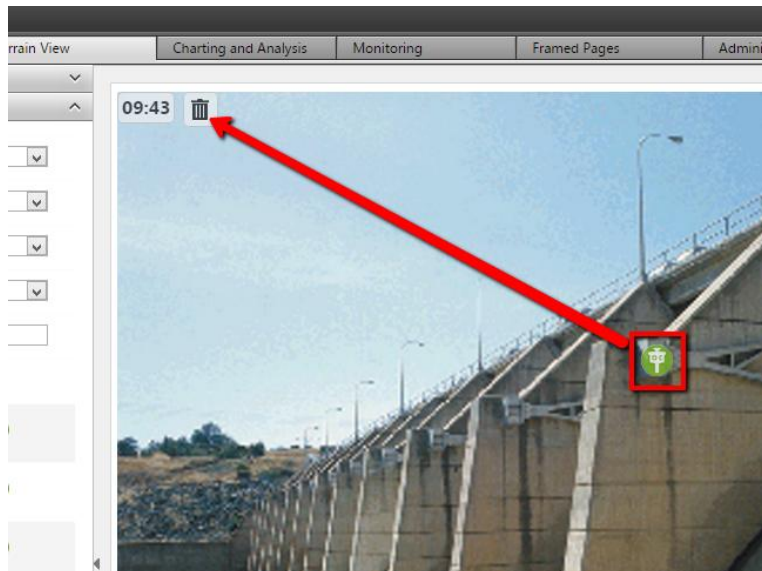
Step 2: To add a sensor, click on the sensor icon and without letting go of the mouse button, drag it onto the image.



Step 3: If you are not happy with the placement of the icon, simply drag it to a new location on the image.



Step 4: To remove a sensor from the view, click on the sensor on the image and without letting go of the mouse button, drag the sensor to the trash can icon that will appear in the upper left-hand corner of the Custom View backdrop.



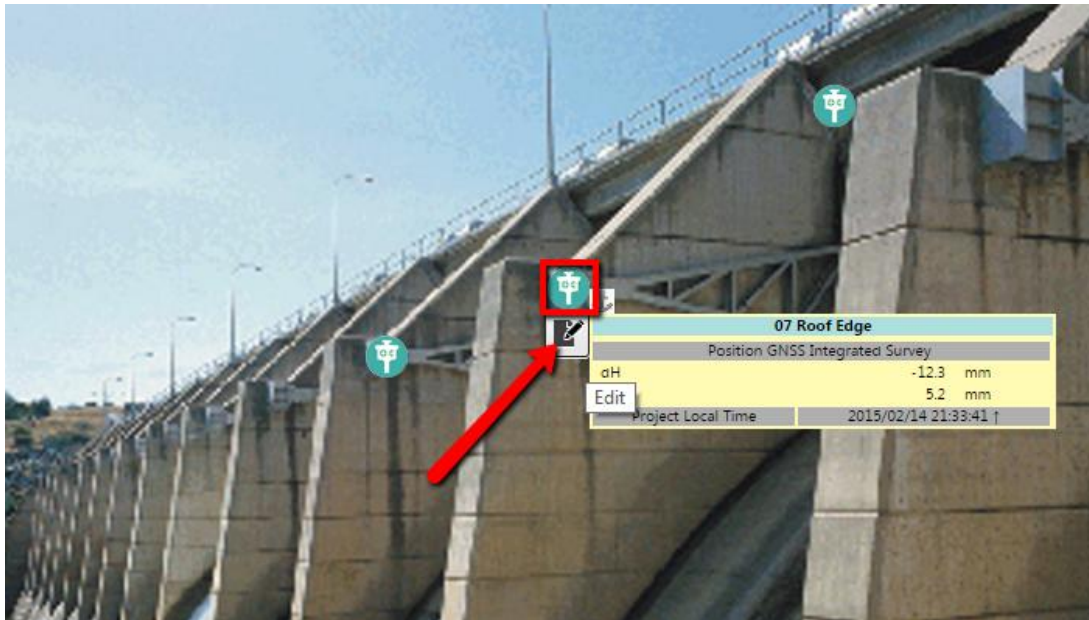
Please note that this will not delete the sensor, it will only remove the sensor from the current Custom View. To add the sensor to the Custom View again, simply drag it onto the image again.

6.4 CHARTS

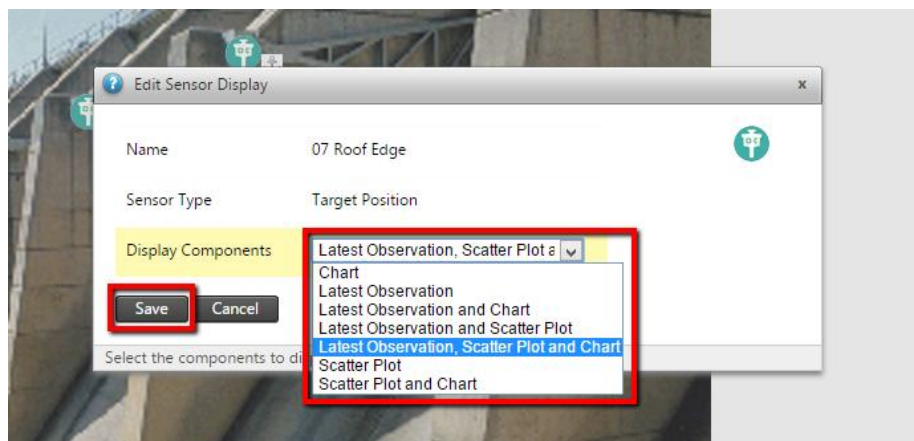
The tooltips (pop-ups) of sensors on Custom Views can provide up to three display components:

- Latest observations (same as in the Maps section)
- Chart
- Scatterplot

In order to enable these, simply click on the Edit icon that will appear of the mouse cursor hover over the sensor icon (as illustrated below):

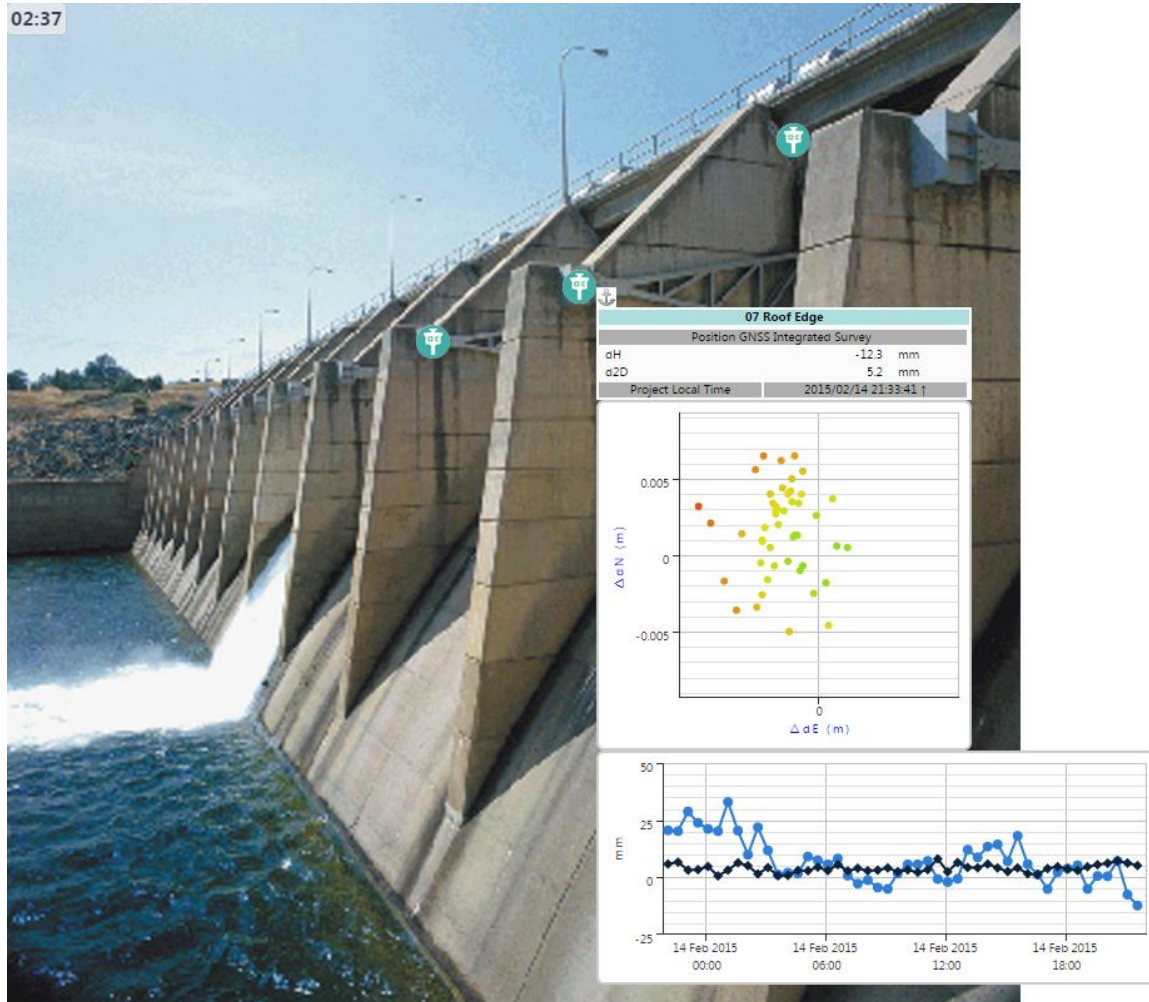


Select the specific option, or combination of options, or even all three options to be displayed in tooltip of the sensor on the on the Custom View.



The tooltip of a sensor will then display the configured components when shown. You can click on a sensor to anchor the tooltip to stay in place.

In the example below all three components were configured: latest observations, chart and scatterplot.

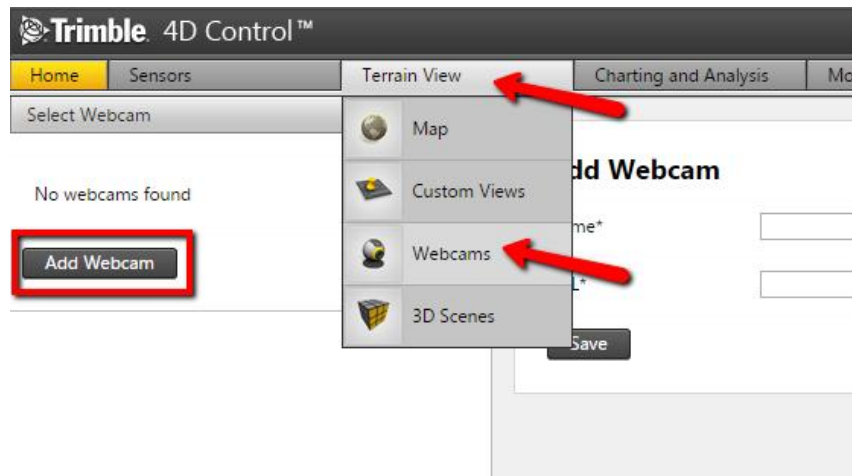


7 Webcams

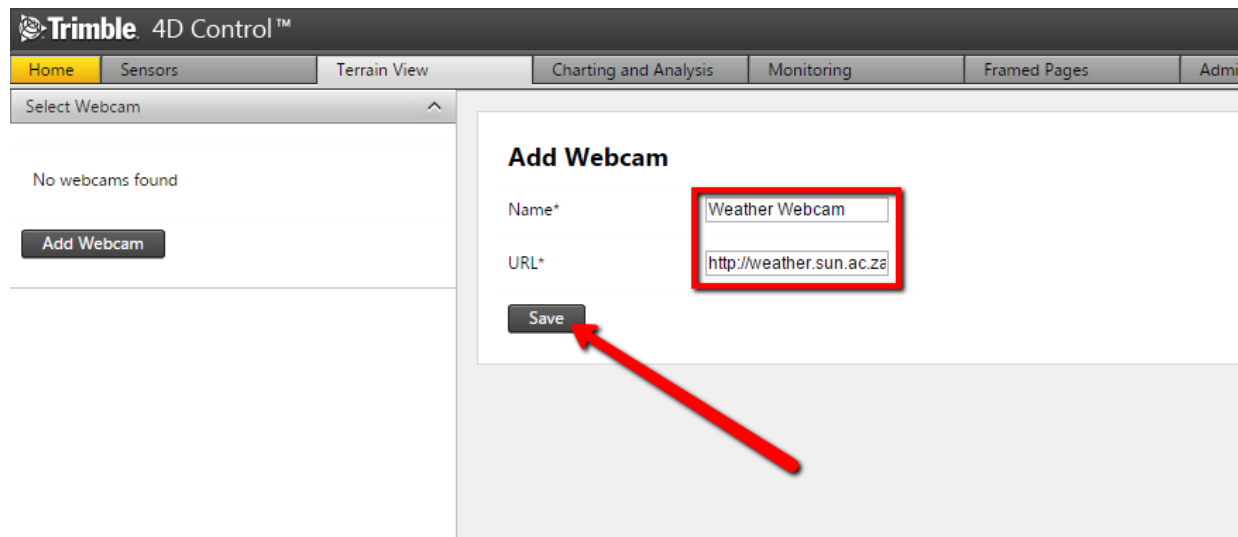
Some monitoring sites have cameras installed on site – e.g. for instance to monitor certain areas that are very remote. Some of these cameras support web cam technology, by outputting its video to an URL. The Webcam pages makes it useful to list such cameras in the T4D web interface.

7.1 ADD A WEBCAM

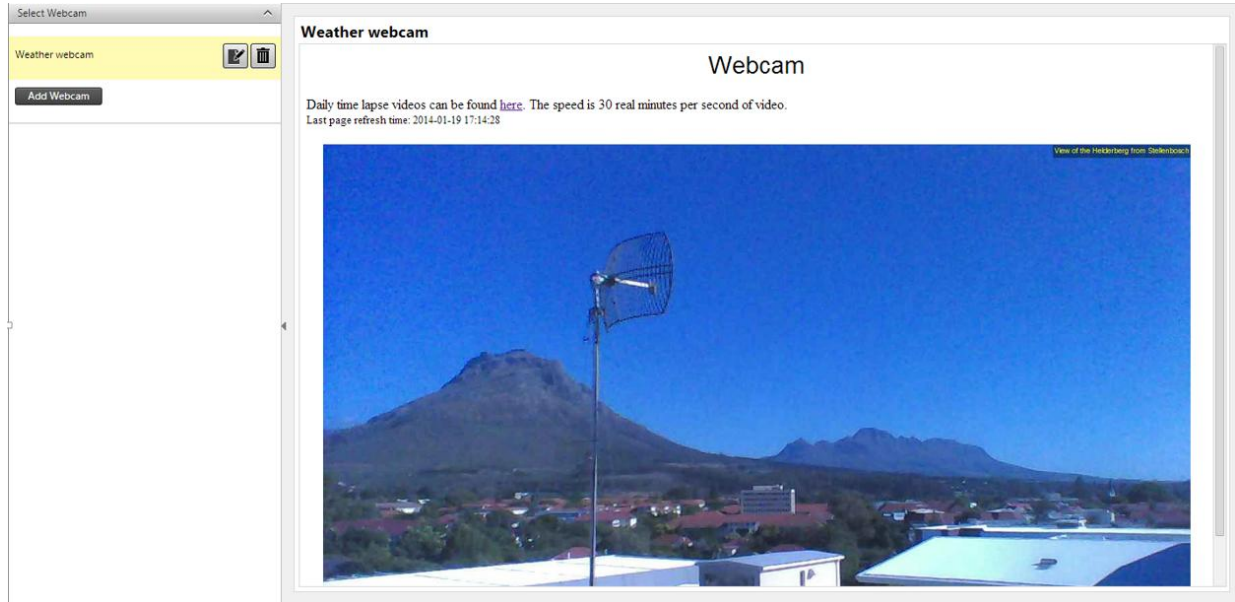
Step 1: Navigate to the Webcam Page via the Menu (or the dedicated home page shortcut icon). Click the Add Webcam button.



Step 2: Give your webcam a name and enter the URL, then click save.

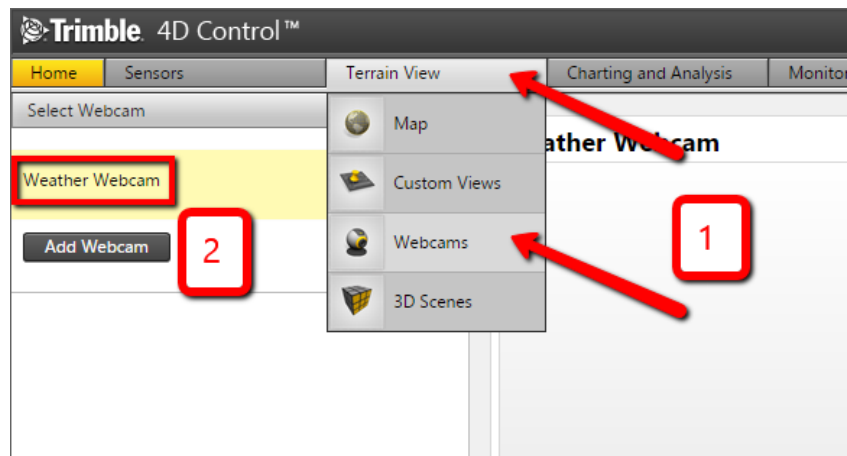


Step 3: The Webcam will load in the right-hand window pane of the Webcam Page.

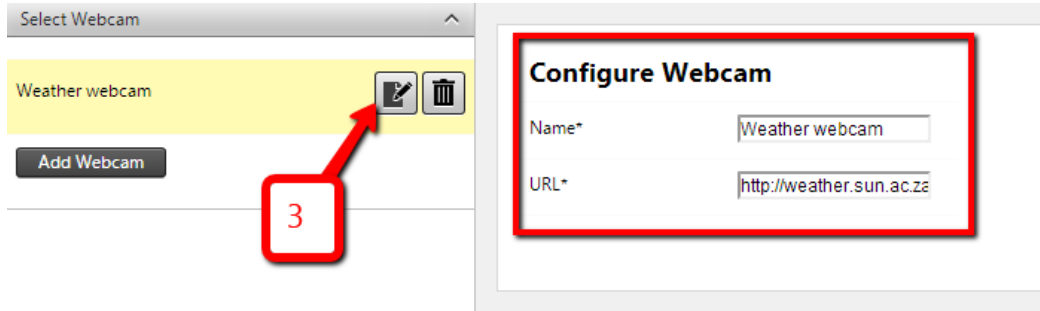


7.2 CONFIGURE A WEBCAM

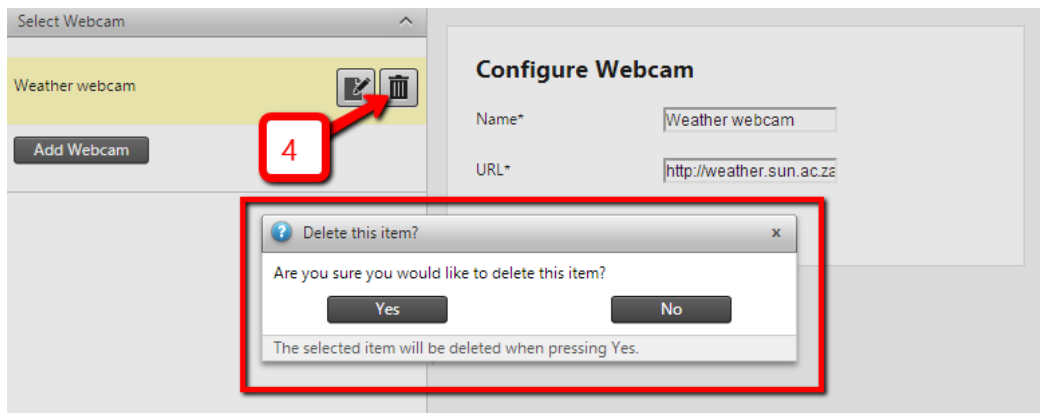
Step 1: Navigate to the Webcam Page (1). Click on the Webcam's name to view it (2).



Step 2: To modify the name or the webcam source URL, click the edit icon (3).



Step 3: To delete the Webcam click the trash can icon (4).

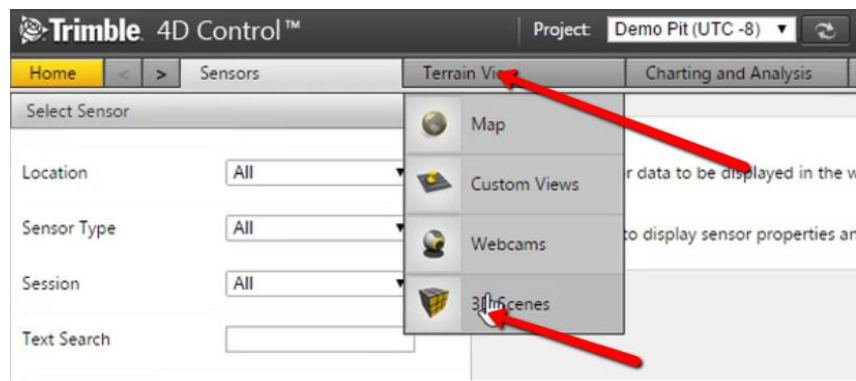


8 3D Scenes

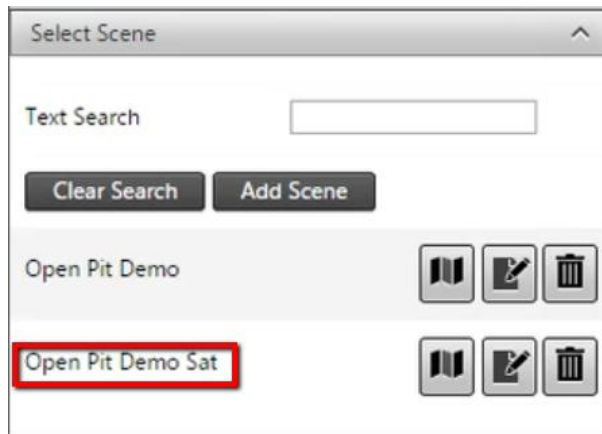
This section is used to create and view three dimensional scenes that represent real-world areas within your Monitoring Project. Depending on the quality of the input data, it can potentially render very impressive 3D scenes.

8.1 NAVIGATING A SCENE

Step 1: Navigate to the 3D Scenes Page via the Menu (or the dedicated home page shortcut icon).



A list of Scenes will be listed in the left hand pane. Simply click on the scene that should be displayed.



Step 2: The scene will open on the right hand side. In this example an open pit mine will be displayed.

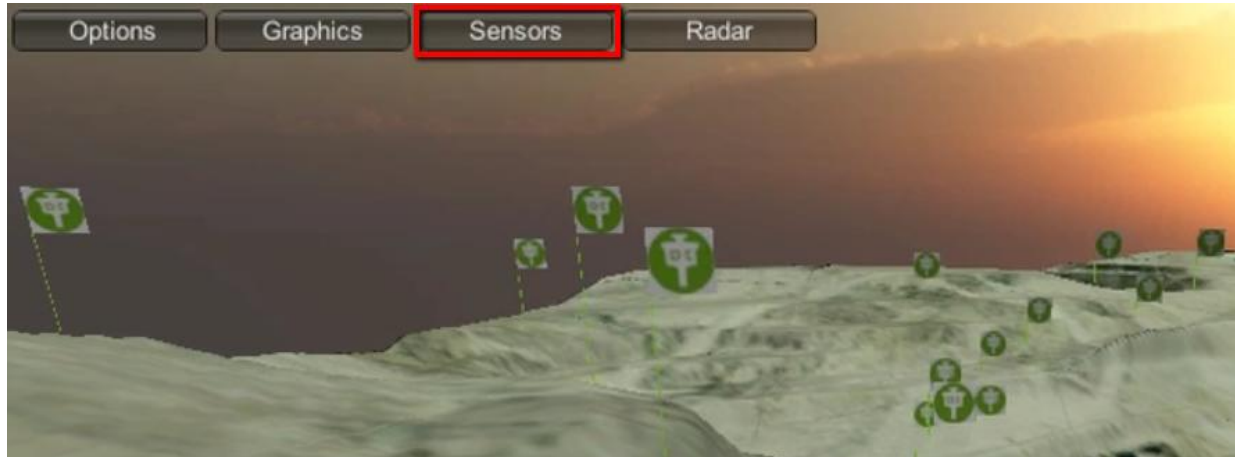
When opening the scene the camera position (that is your view) is by default across the horizon from a bird's eye perspective. To look downwards (towards the open pit mine) simply click anywhere in the scene, and without letting the mouse button go, push the mouse cursor downwards (or in any direction the camera should follow).



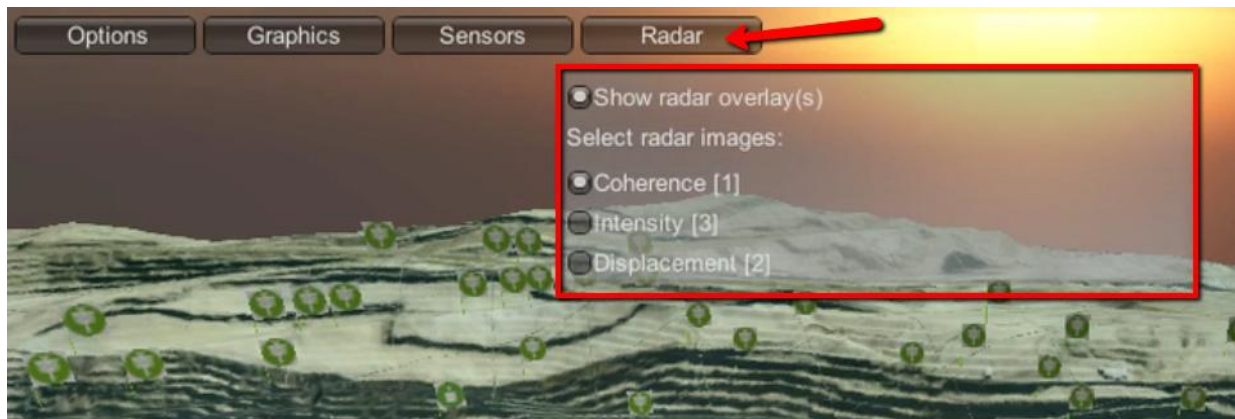
Use the mouse wheel to move the camera's position forward and backwards, relative to the current direction of viewing. This is useful for zooming the screen in and out, but can also be used to virtually move around in the 3D environment.



Step 3: Sensors' positioning flags on the site can be enabled/disabled by simply clicking on Sensors button in the top left corner of the scene and selecting or deselecting the Show sensor flags option.

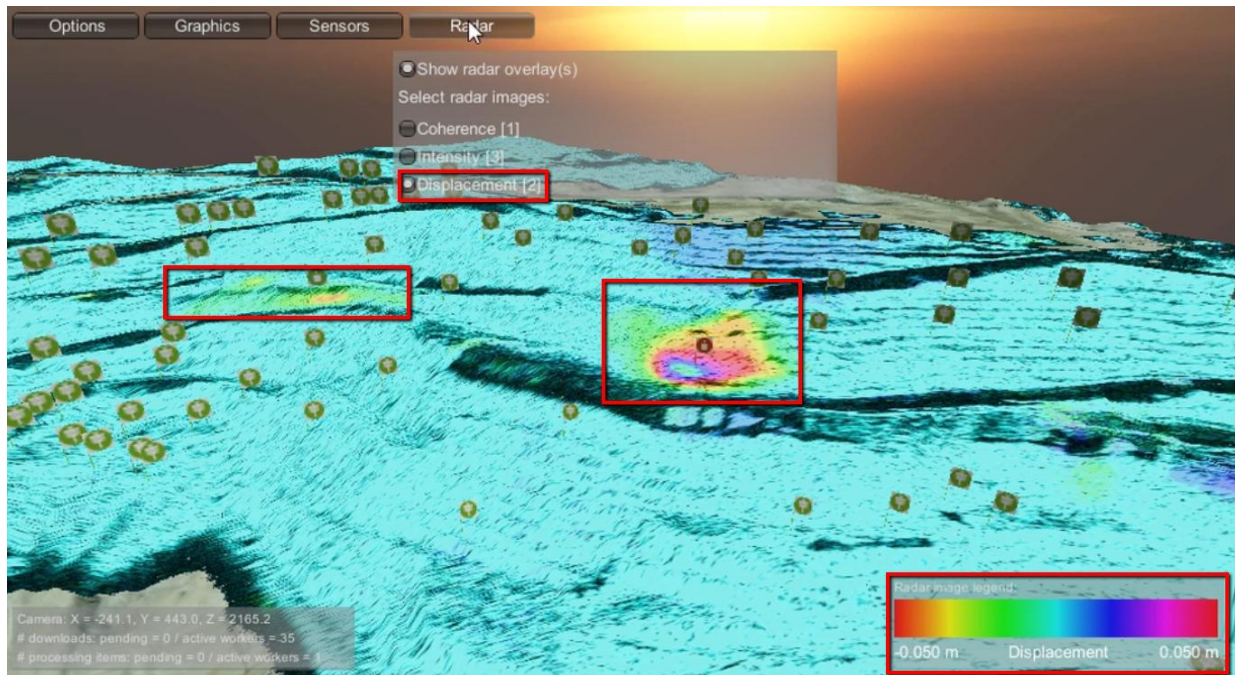


Step 4: Different overlays can also be enabled/disabled by clicking on the Radar button and selecting or deselecting the applicable options.



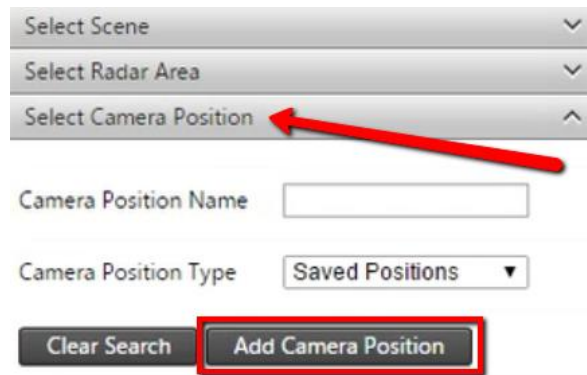
Step 5: For any overlay selected, a color coded legend will be added to the bottom right to indicate the severity of the measured overlay.

In the below example displacements are used as an overlay, and immediately two areas of interest can easily be noticed where slope failures (i.e. large displacements) occurred.



Note the displacements can be positive or negative, therefore the normal stationary point would be in the middle of the legend (indicated by the color of turquoise).

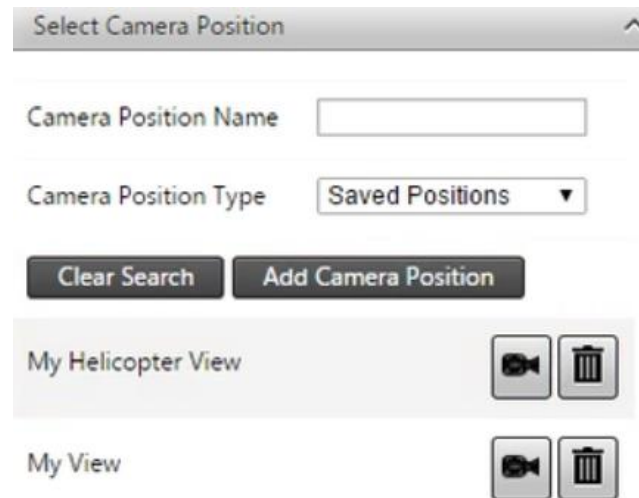
Step 6: In order to save the current camera position (and not have to virtually travel to the same position again), simply go to the Select Camera Position sub-section and click the Add Camera Position button.



Select a comfortable name to remember it by and click on the Save button.



The camera position will now be saved and you can simply click on it in the camera position list to immediately virtually teleport to the saved point of view. When there are many camera positions saved in the list, the filter can be used to quickly get to the specific item in the list.



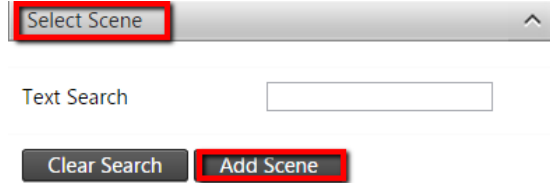
8.2 CREATING A NEW SCENE

In order to create a 3D scene you need to go through the following steps:

1. Define the scene name and extents
2. Define at least one "Height Map" (or DTM) asset
3. Define at least one "Overlay" asset

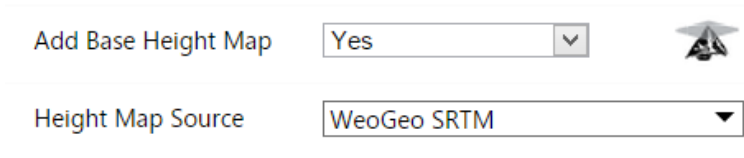
The scene and its assets will be submitted to the Scene Engine for processing. Asset processing may include file downloads as well as geo-referencing operations.

Step 1: In the Select Scene sub-section, click on the Add Scene button.



Step 2: Enter the scene property details.

- Scene Name: A convenient name for the scene.
- Add Base Height Map: Enable this option to add a base height map to the scene. (You can still upload additional height maps to the scene regardless of whether or not this option is enabled.)
 - o Height Map Source: Select the asset source that should serve as a base height map.



- Add Base Overlay: Enable this option to add a base overlay to the scene. (You can also still upload additional overlays regardless of whether or not this option is enabled.)
 - o Overlay Source: Select the asset source that should serve as a base overlay. Take care not to select a Zoom level that causes a file download of a size too large (see Estimated download size below).



Zoom level: 16
Estimated tile size: 24.122 Kilobytes
Number of tiles: 48
Estimated download size: 1.13 Megabytes

- Extents Entry Mode: Specify the preferred mode for entering the scene extents.
 - o **Note:** You can also specify the scene extents on the map surface below. Simply hold down the shift key and then click (1) and drag the mouse pointer over the area of interest to (2)

Extents Entry Mode

Top ° ' "

Bottom ° ' "

Left ° ' "

Right ° ' "



Click the Next button to go to the next step.

Step 3: Select the Height Map file to upload from your computer

Height Map 1

Source

Filename	Size	Status
<input type="button" value="Add Files"/>	0 b	0%

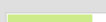
Allowed files: tif, tiff

After selection the file will automatically start uploading.

Height Map 1

Source

Filename	Size	Status
Round Mountain Pit.nodata.2.tif	2.1 mb	83%

Uploaded 0/1 files  2.1 mb 83%

Allowed files: tif, tiff

After upload the summary of the Height Map will be shown.

Height Map 1

Source

File*

Click on the Continue to the Overlay button to go to the next step.

Step 4: If a map provider was selected in Step 1, simply click on the Finish button. (Else a Height Map file simply needs to be uploaded.)

Overlay 1

Source

Filename	Size	Status
<input type="button" value="Add Files"/>	0 b	0%

Allowed files: tif, tiff

Step 5: The scene will now be build. All the images will now be processed and/or downloaded where applicable.

Usage	Source	Name	Processing Step	Processing Step Status	Extents	
	Height Map  GeoTiff	SceneAssetHeightMap--722408aa-a765-48e2-bed0-8e85e9ff137b-RoundMountainPit.nodata.2.tif	Normalizing 	In Progress 	N 00° 00' 00.000", E 000° 00' 00.000" N 00° 00' 00.000", E 000° 00' 00.000"	
	Height Map  WeoGeo SRTM	WeoGeo-SRTM-o1065463	Checking Order 	Waiting 	N 38° 42' 52.080", W 117° 05' 54.337" N 38° 41' 26.039", W 117° 03' 42.235"	
	Overlay  MapQuest Street		Geo-Referencing 	Waiting 	N 38° 42' 52.080", W 117° 05' 54.337" N 38° 41' 26.039", W 117° 03' 42.235"	

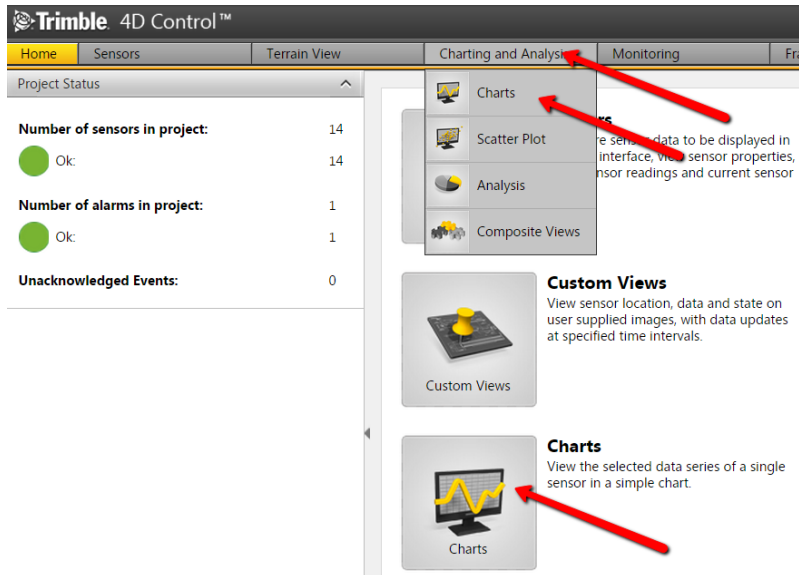
[Refresh](#) [Stop All Assets](#) [Pause All Assets](#)

After completion the scene will be available for viewing as discussed in section 8.1, page 40.

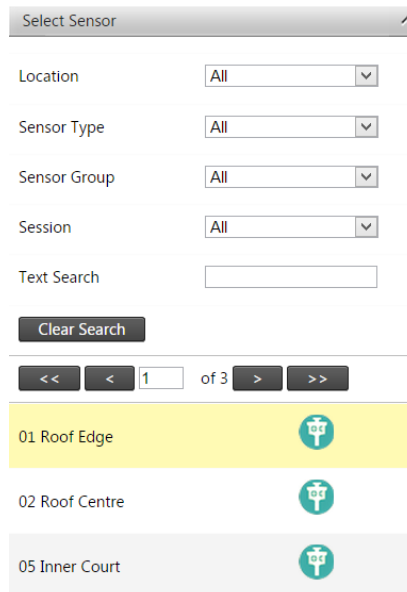
9 Charts

9.1 SIDEBAR NAVIGATION

Navigate to the Charts Page via the Menu (or the dedicated home page shortcut icon).



All sensors and sensor groups will automatically be listed in the left sidebar navigation. The sensors' charts can be accessed through the sidebar navigation on the left.



If too many sensors are present the sensors can be filtered via the filtering options.

Select Sensor
^

Location

Sensor Type





Sensor Group

Session

Text Search

- Location: Depending on the available list of sensors, this dropdown list will be pre-populated with the locations of those sensors. By clicking on the dropdown list and selecting a location, the available sensors at the bottom of the section will refresh. Note that when selecting an entry in the dropdown field, the charts in the main content section will not change until selecting a new sensor at the bottom of the sidebar navigation section.
- Sensor Type: The sensor type allows one to filter the map on the right hand side according to the sensor selected. Note that clicking on one of the sensors in the dropdown, filters the sensors to display only the available sensors of the chosen type.
- Sensor group: The group you have allocated the sensor to belong to. (Discussed in Sensor Groups on page 19.)
- Sensor session: The specific session linked to the sensor (only applicable if the Highrise module is installed).
- Text Search: By typing the name or partial name of the desired sensor into the field provided and pushing enter, the system will perform a real-time search of the available sensors by that name.

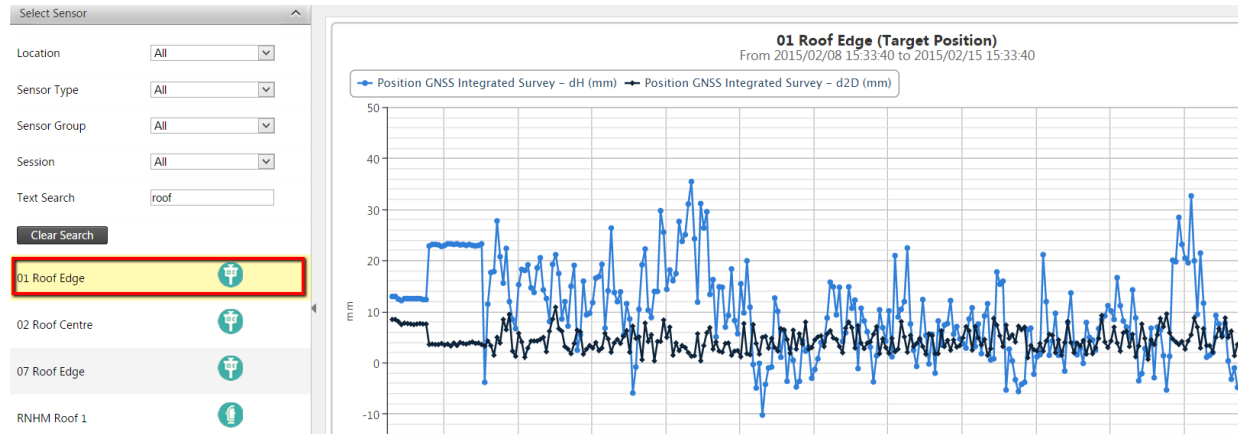
Text Search

01 Roof Edge	
02 Roof Centre	
07 Roof Edge	
RNHM Roof 1	

- Clearing Searches: Clicking the Clear Search button will clear all search fields, thus resetting the page to its base values.

By default, this list of sensors includes all of the available sensors and/or sensor groups before filters are applied. These sensors are automatically filtered as soon as any of the filtering options above are used.

By clicking on any one of these sensors, the sensor data is displayed in the main content section on the right.



9.2 CHARTS

This is the main content section where you can find a visual representation of the data collected for each sensor. By default, there are multiple parameters displayed on each chart (depending on the sensor selected). In this section, it is possible to:

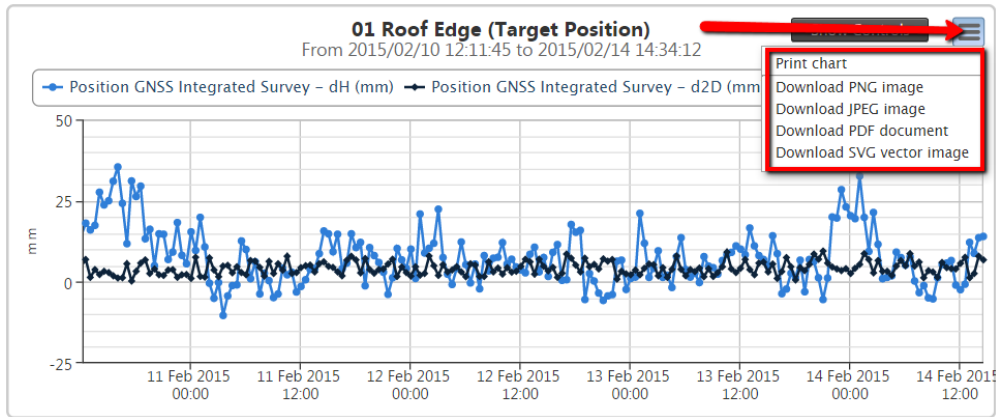
- Enable / Disable certain chart parameters
- Print the Selected Chart
- Save chart as an image (PNG, JPG, PDF, SVG)
- Change the heading / tagline of the chart
- Zoom / highlight a certain section of the timeframe
- Get detailed information on specific points in the charts

9.2.1 Manipulation

Clicking on the items in the legend of the chart, will enable/disable that section on the chart.



9.2.2 Print Chart

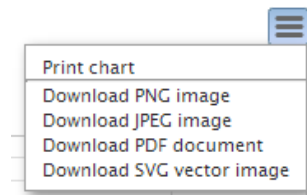


By clicking on the button in the top right-hand corner of the chart, the user is able to print the chart that is currently displayed on screen. Note that the printing result may vary between browsers / printers.

9.2.3 Save Chart Image

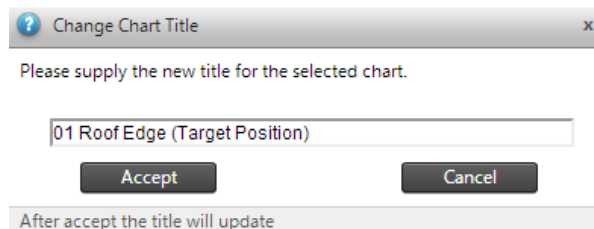
By clicking on the Button in the top right-hand corner of the chart (same as the print button), the chart can be downloaded in one of the following formats:

- JPG
- PNG
- PDF
- SVG



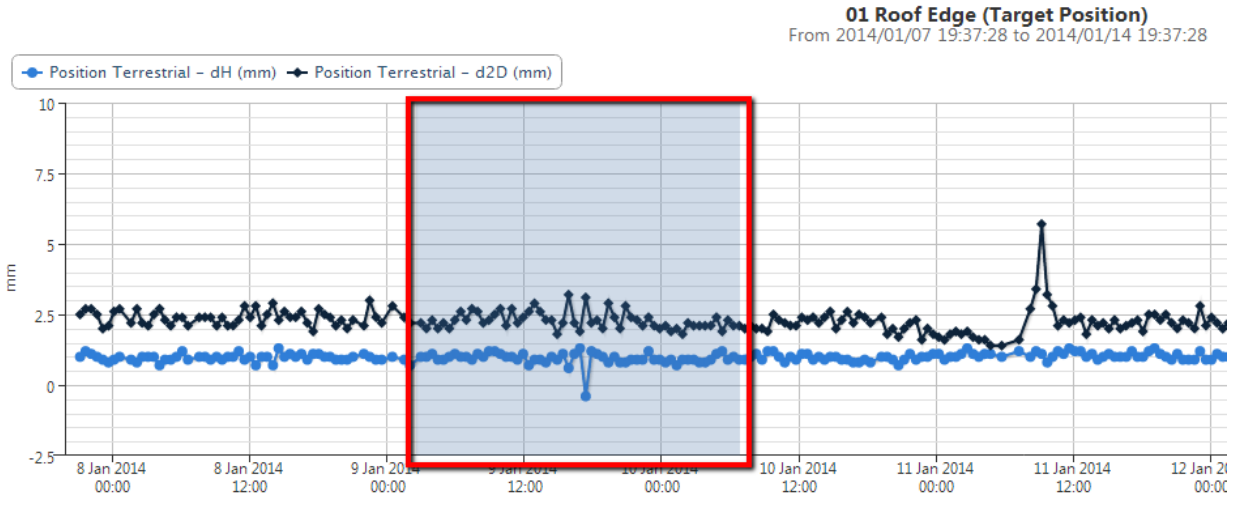
9.2.4 Change the heading / tagline of the chart

Simply click on the heading and a pop-up will appear making it possible to change it.



9.2.5 Zoom / highlight a certain section of the timeframe

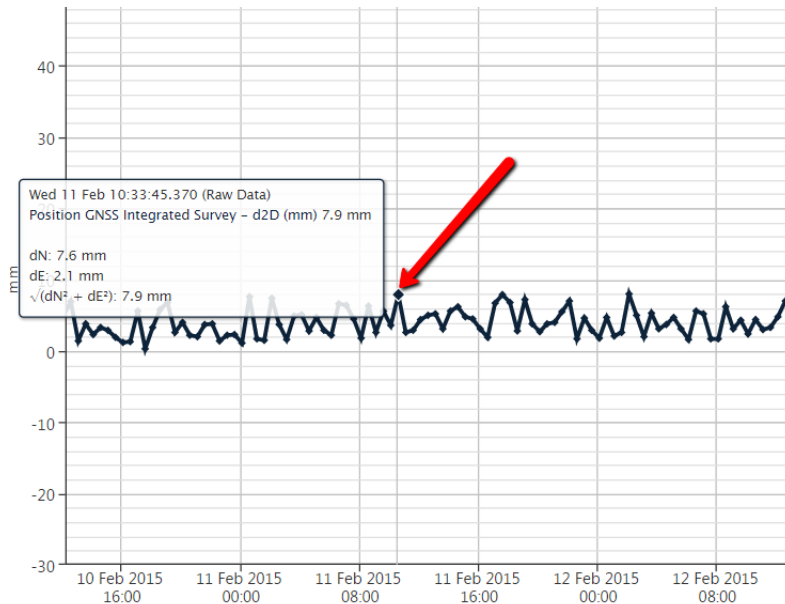
In order to zoom into a certain area, simply click on the chart and drag to the area which should be zoomed into (as indicated in the next figure).



The chart will now reload to zoom into the selected area. Please note it may load more data from the database. Also you can click the “Reset Y Axis Scaling” button below if the line becomes too flat (horizontally speaking), or additionally just unselect the checkbox before it to make this happen automatically.

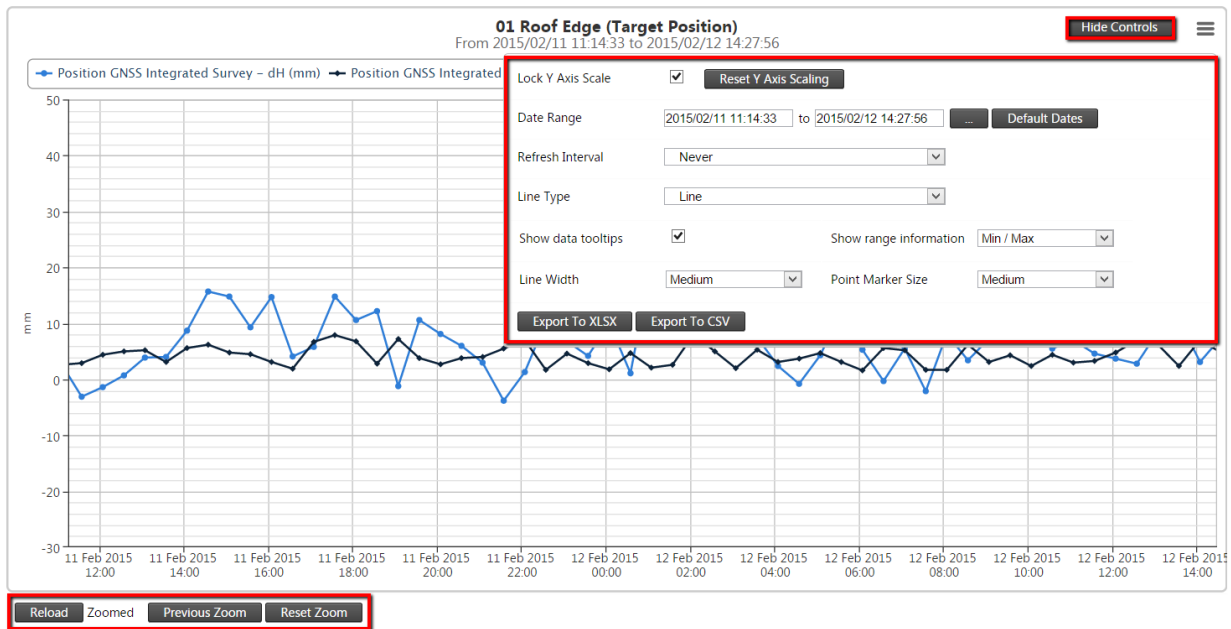
9.2.6 Get detailed information on specific points in the charts

Just move with your mouse over any part of the chart to get this information.



9.3 CHART SETTINGS

The Chart Settings is located in the top right part the chart, by clicking the Show Controls button (that will change to Hide Controls after clicked).



If the user selected a sensor to display, the content will contain the following configurable variables and/or actions:

- Lock Y Axis Scale
- Date Range
- Refresh Interval
- Line Type
- Show data tooltips
- Show range information
- Line Width
- Pointer Marker Size
- Export buttons

Additionally at the bottom left of the chart are two more control types:

- Reload
- Zoom Status

9.3.1 Zoom Status

The Zoom Status will update as you do zooming functions on the above chart. The status may vary between:

- Unzoomed - the default not zoomed chart.
- Zoomed - when zoomed in.
- Saturated – when zoomed in to such an extent that no additional data can be retrieved from the database.

9.3.2 Zooming

When you first run a chart, the status of the chart will be unzoomed. Each chart series may contain either “Raw Data” or “Summarized Data”, depending on the frequency of the sensor observation data and the selected date range.

You can click and drag on the chart surface to zoom. As you zoom in, the “Zoom Status” will change from “Unzoomed”, to “Zoomed”. You can use the “Previous Zoom” button to go to a previous zoom range, or you can click on the “Reset Zoom” button to zoom out completely.

The current zoom range as well as the stored “Previous Zoom” ranges are maintained when you select a different Sensor. Repeated Zooming, will lead to a “Zoom Status” that is “Saturated”. This status implies that the all series in the chart contain “Raw Data” and that further zooming will not reveal more detail. Attempts to Zoom via a click-and-drag under the “Saturated” Zoom Status, will lead to the chart being panned either left or right, without narrowing the date range.

9.3.3 Reload

If any changes has been made to the Chart settings, or simply if you expect the underlying sensor has suddenly received new significant data, simply click the Reload button in order to retrieve the latest data and update the Chart with the latest settings. Refreshing the page will also have the same effect.

9.3.4 Lock Y Axis Scale

The Lock Y Axis Scale can be used to re-calibrate the y axis scale based on the current chart. You can choose to check the box, when checked the y scale will retain between the zoom operations for the same sensor. When unchecked the y scale will recalibrate with each zoom operation.

9.3.5 Date Range

This setting adjusts the time frame of the chart displayed underneath. The default setting when loading a new sensor is data from the past week. If you want to change the time frame, click on the [...] button which will present a pop-up with various settings. Inside this pop-up, the settings include:

- Quick Selections (incl. today, yesterday, this week, last week, this month or last month).
- Custom Selection where the user can set custom time frames by clicking on the input fields.
- Session where a current session in the system can be selected if needed (only applicable if the Highrise module is installed).

Clicking on the “Default Dates” button will cause the chart to automatically select a date range, based on the most recent data available for the selected sensor. This action will clear all stored zoom range and reset the “Zoom Status” to “Unzoomed”.

If a custom time frame is selected, click on “Reload” to activate the changes.

Date Range to

Today	Last Week
Yesterday	This Month
This Week	Last Month

Scroll Date Range

Select by Session

9.3.6 Refresh Interval

It is possible to select the interval by which the data should be refreshed. This allows the system to periodically refresh the data displayed on the screen. In order to change the default refresh interval, click on the dropdown menu and select your desired interval.

Refresh Interval

You will notice a counter on the top left corner counting down the interval. After each “count down” the chart will reload automatically and the additional time period’s data will be added to the graph.

9.3.7 Line Type

The options to view the chart either by area, dots, lines, spline or area spline.

Line Type

9.3.8 Show data tooltips

Use this checkbox to enable / disable the pop-up data indicators if you move with your mouse over the data points in the graph.

9.3.9 Show Range Information

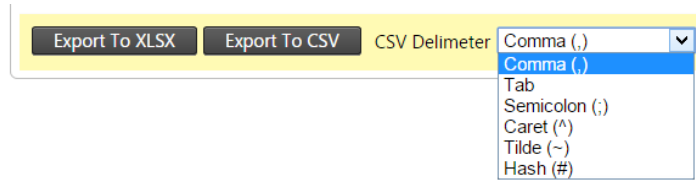
Some series have more data values that are available although only the moving averages are plotted in the graph. If these additional data are available this option can be used to plot certain range related information to get an idea of spread of the data. The options available are the standard deviation (1 sigma), more deviations (2 and 3 sigma) or the absolute minimum and maximum extreme points.

9.3.10 Line Width and Pointer Size

These options simply modify the graph line and data points’ size to be displayed.

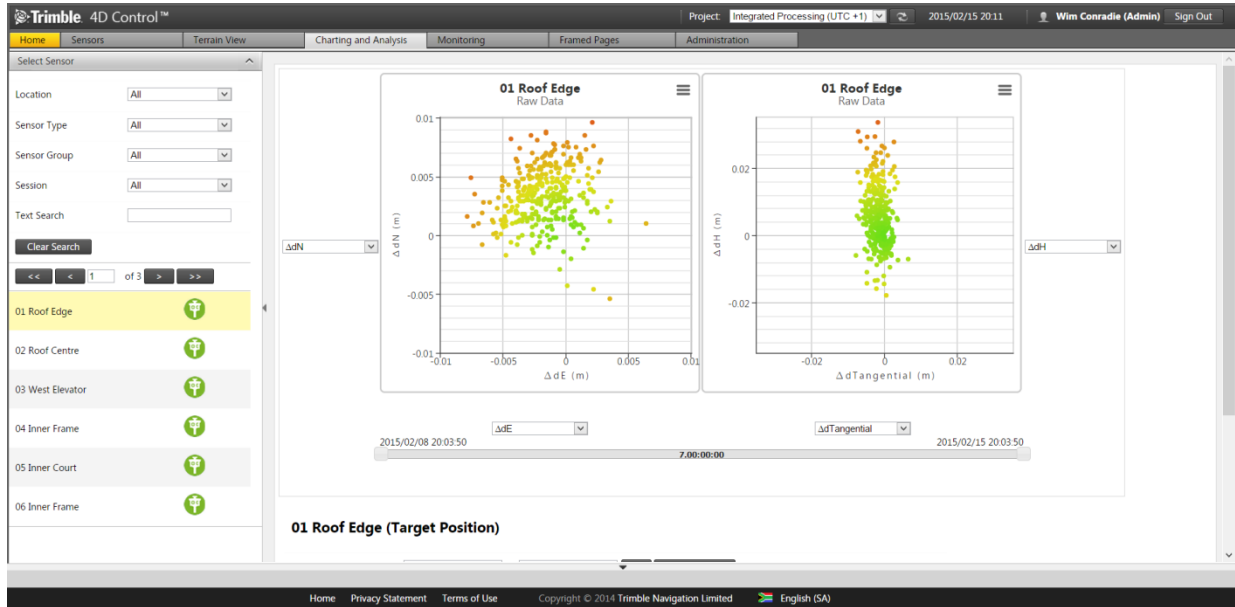
9.3.11 Export

To download the raw data of the chart, simply make use of the Export buttons.



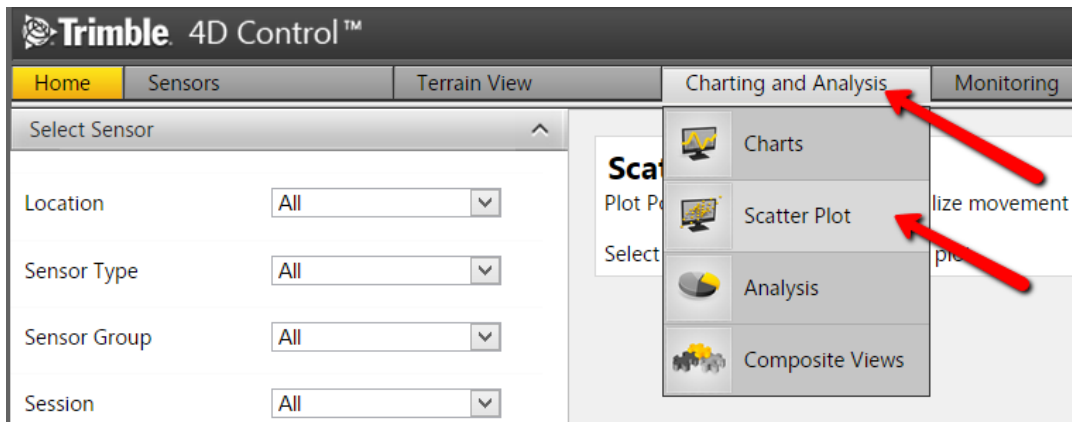
If you would like to make use of the CSV export, hover with your mouse over the button and then carefully move with the mouse to the right in order to select a specific delimiter such as a 'Comma'.

10 Scatter Plot



10.1 SIDEBAR NAVIGATION

Navigate to the Scatter Plot Page via the Menu (or the dedicated home page shortcut icon).



All sensors and sensor groups will automatically be listed in the left sidebar navigation. These sensors' charts can be accessed through the sidebar navigation on the left.

Select Sensor ^

Location

Sensor Type




Sensor Group

Session

Text Search

Clear Search

<< < 1 of 3 > >>

- 01 Roof Edge 
- 02 Roof Centre 
- 05 Inner Court 

If too many sensors are present the sensors can be filtered via the search options.

Select Sensor ^

Location

Sensor Type

Sensor Group

Session

Text Search





Clear Search

- Location: Depending on the available list of sensors, this dropdown list will be pre-populated with the locations of those sensors. By clicking on the dropdown list and selecting a location, the available sensors at the bottom of the section will refresh. Note that when selecting an entry in the dropdown field, the scatter plots in the main content section will not change until selecting a new sensor at the bottom of the sidebar navigation section.
- Sensor Type: The sensor type allows one to filter the map on the right hand side according to the sensor selected. Note that clicking on one of the sensors in the dropdown, filters the sensors to display only the available sensors of the chosen type.
- Sensor group: The group you have allocated the sensor to belong to. (Discussed in Sensor Groups on page 19.)

- Sensor session: The specific session linked to the sensor (only applicable if the Highrise module is installed).
- Text Search: By typing the name or partial name of the desired sensor into the field provided and pushing enter, the system will perform a real-time search of the available sensors by that name.

Text Search

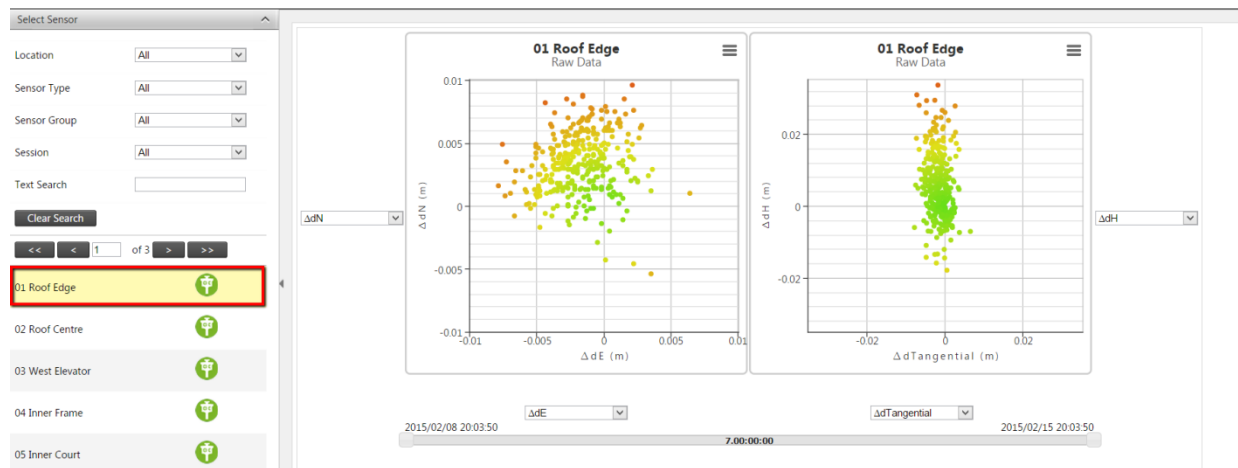
Clear Search

01 Roof Edge	
02 Roof Centre	
07 Roof Edge	
RNHM Roof 1	

- Clearing Searches: Clicking the Clear Search button will clear all search fields, thus resetting the page to its base values.

By default, this list of sensors includes all of the available sensors and/or sensor groups before filters are applied. These sensors are automatically filtered as soon as any of the filtering options above are used.

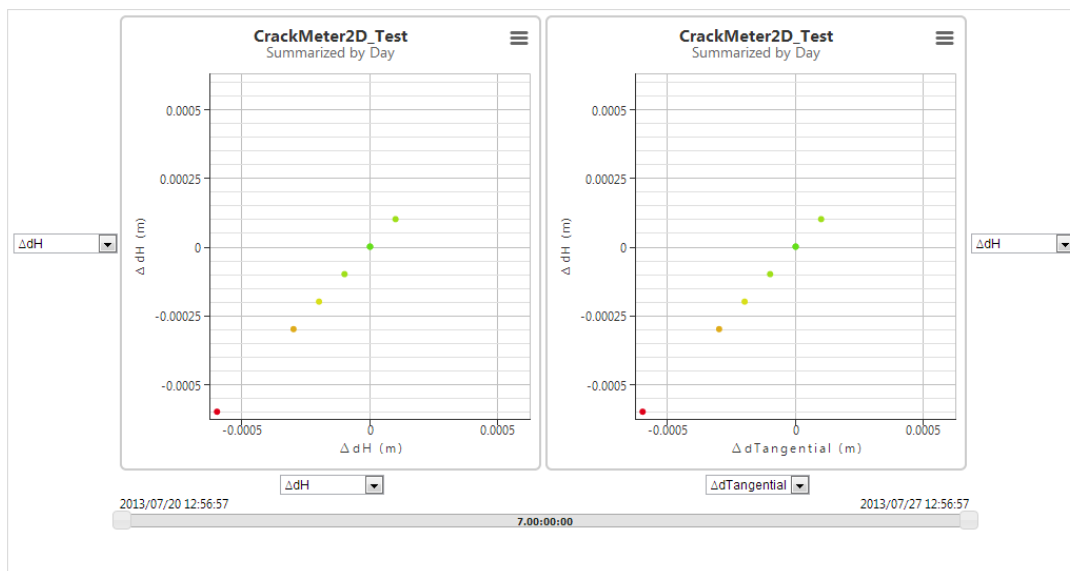
By clicking on any one of these sensors, the applicable scatter plot is displayed in the main content section on the right.



10.2 SCATTER PLOT CHART AREA

This is the main content section where you can find a visual representation of the scatter plot data collected for each sensor. By default, there are multiple parameters displayed on each chart (depending on the sensor selected). On the Scatter Plot, it is possible to:

- Print the a Chart
- Save chart as an image (PNG, JPG, PDF, SVG)
- Change the heading / tagline of the chart
- Zoom / highlight a certain section of the timeframe
- Get detailed information on specific points in the charts
- Change the source data for the X and Y axis selections
- Use selective time period via the Date range Slider



10.2.1 Print Chart

Refer to Section 9.2.2 on page 52.

10.2.2 Save Chart Image

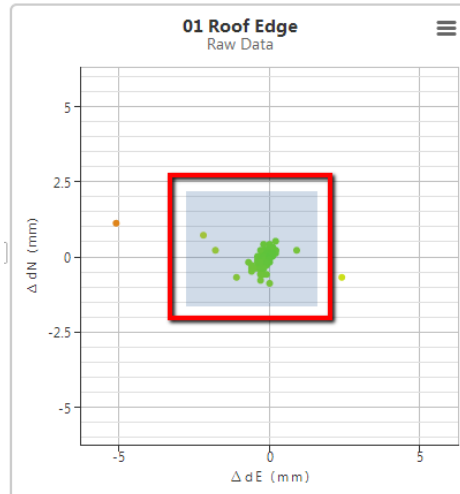
Refer to Section 9.2.3 on page 52.

10.2.3 Change the heading / tagline of the chart

Refer to Section 9.2.4 on page 52.

10.2.4 Zoom / highlight a certain section of the timeframe

In order to zoom into a certain area, simply click on the chart and drag to the area which should be zoomed into (as indicated in the next figure).



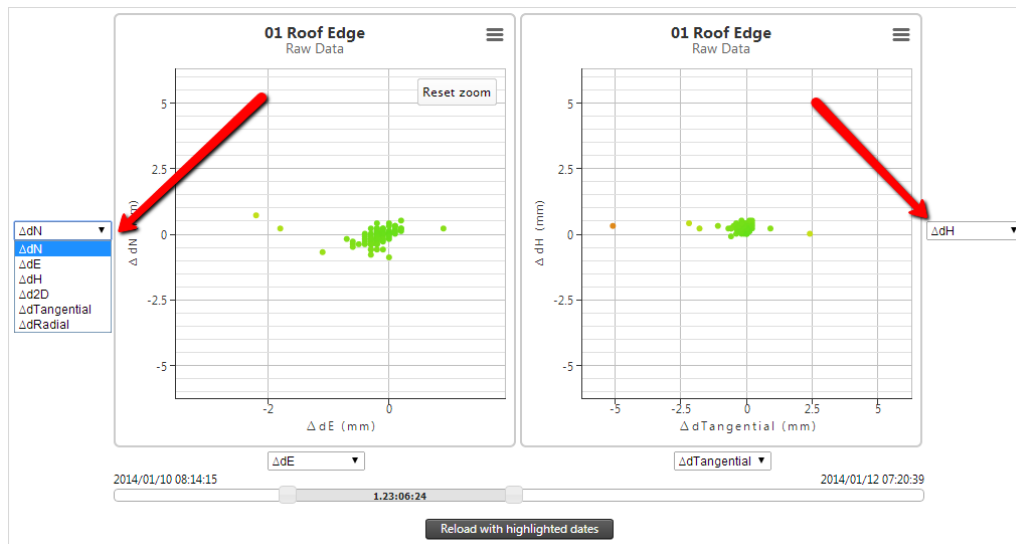
The chart will now reload to zoom into the selected area. On the top-right area of the chart there will appear a “Reset Zoom” button which you can simply click to go back again.

10.2.5 Get detailed information on specific points in the charts

Kindly refer to Section 9.2.6 on page 53.

10.2.6 Y Axis

Use the dropdown to select the dimension to plot against the Y axis on the charts.



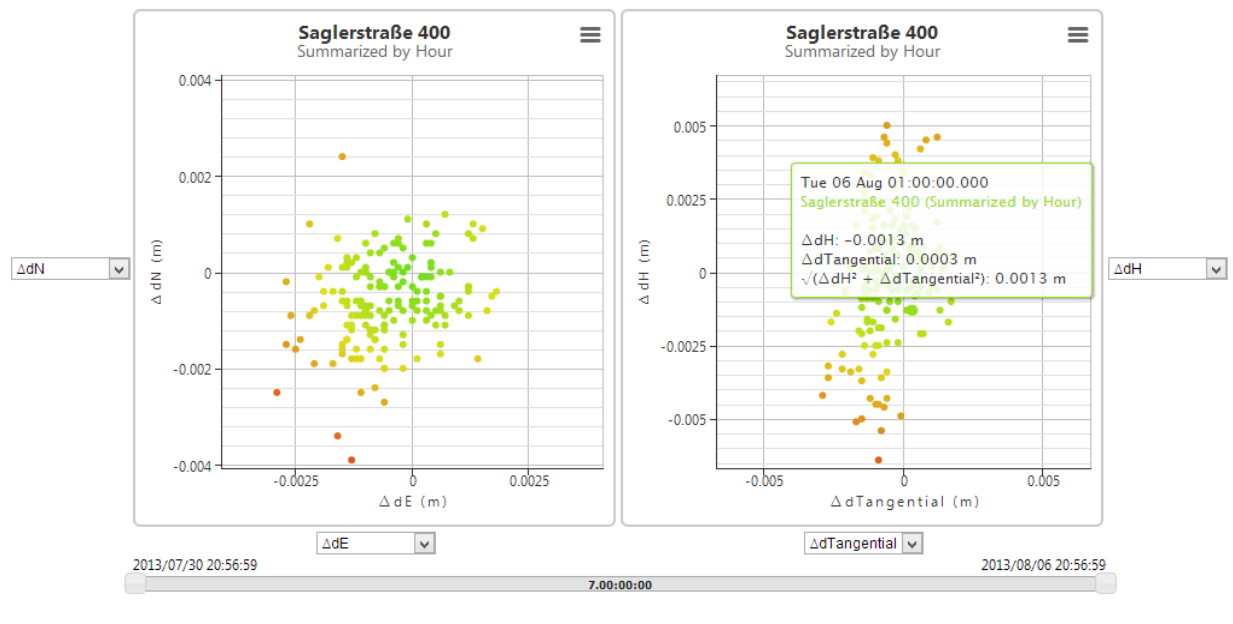
10.2.7 X Axis

Similarly as with the Y axis, simply use the dropdown to select the dimension to plot against the X axis on the charts.

10.2.8 Date Range Slider

The Date Range Slider is located directly below the x axis drop down lists.

The date range can be narrowed by dragging either of the handles at the start and end of the slider. The updated duration value will be displayed in the center of the slider.



10.3 SCATTER PLOT SETTINGS

The Scatter Plot Settings is located below the two charts, as display in the next figure.

CrackMeter2D_Test (Crackmeter 2D)

Date Range	<input type="text" value="2013/07/20 12:56:57"/>	to	<input type="text" value="2013/07/27 12:56:57"/>	<input type="button" value="..."/>	<input type="button" value="Default Dates"/>
Colour by Displacement	<input type="text" value="Yes"/>	Reference Observation	<input type="text" value="Sensor Reference Observation"/>	<input type="text" value="2013/07/01 01:00:00"/>	
Shade by Data Age	<input type="text" value="No"/>	Data Type	<input type="text" value="Crack Components"/>		
Link Axis Scales	<input type="text" value="No"/>	Unit	<input type="text" value="Meters (m)"/>		
Show data tooltips	<input checked="" type="checkbox"/>	Decimals	<input type="text" value="4"/>		
<input type="button" value="Reload"/> <input type="button" value="Export To XLSX"/> <input type="button" value="Export To CSV"/>					

If the user selected a sensor to display, the Settings will contain the following configurable variables and/or actions:

- Date Range
- Color by displacement
- Shade by Data Age
- Link Axis Scales
- Show data tooltips
- Reference Observation
- Data Type
- Unit
- Decimals
- Reload and Export buttons

10.3.1 Date Range

Kindly refer to Section 9.3.5 on page 55.

10.3.2 Color by Displacement

When enabled, dots on scatter plot will be colored on a gradient scale from green to yellow to red depending on the distance measured (in order to reflect severity of the displacement). If disabled all dots will be blue.

10.3.3 Shade by Data Age

When enabled, a degree of transparency will be applied to each dot. The latest observation will be solid and the oldest completely transparent. This setting is only effective if you do not have multiple observations plotted on top of each other.

10.3.4 Link Axis Scales

When enabled, the two chart surface will scale identically. When disabled, the scale of each surface will optimize for the data that appears on the chart only.

10.3.5 Show data Tooltips

Use this checkbox to enable / disable the tooltip (pop-up) data indicators if you move with your mouse over the chart.

10.3.6 Reference Observation

Scatter plots always plots relative positions, this differs between actual and reference positions. User can either use reference dates of the selected sensor to obtain a reference position or simply use the first observation.

10.3.7 Data Type

If the selected sensor is linked to more than one positional data type, then the user will be able to select any of these data types from the dropdown.

10.3.8 Unit

This dropdown should be used for display purposes.

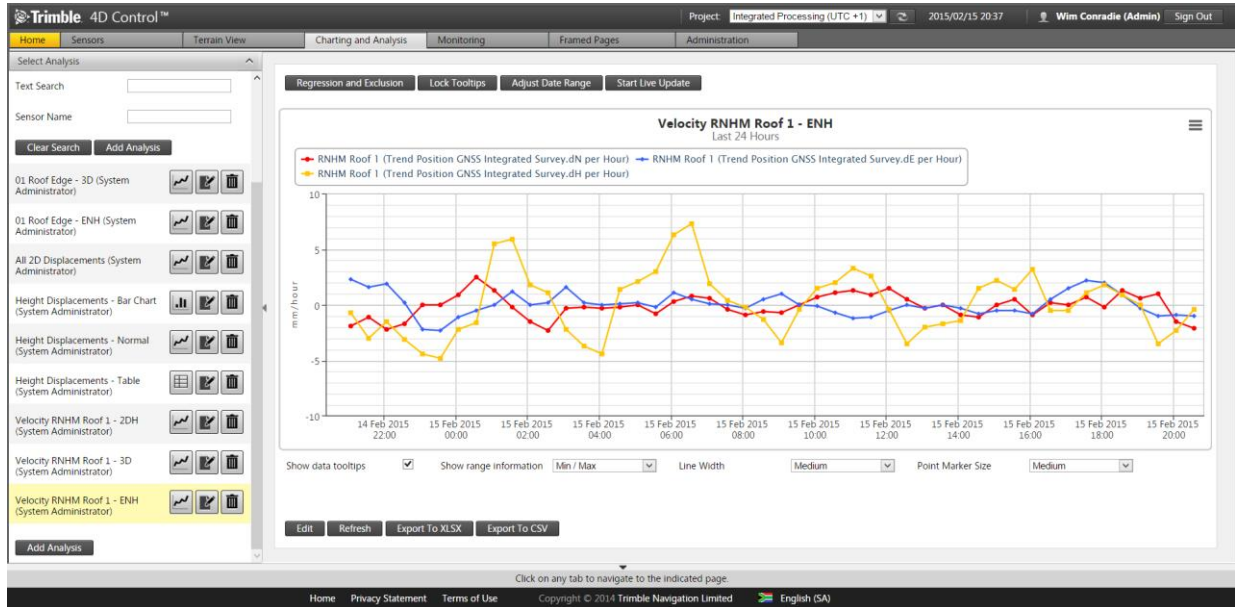
10.3.9 Decimals

This specifies the number of decimals that should be used.

10.3.10 Reload and Export buttons

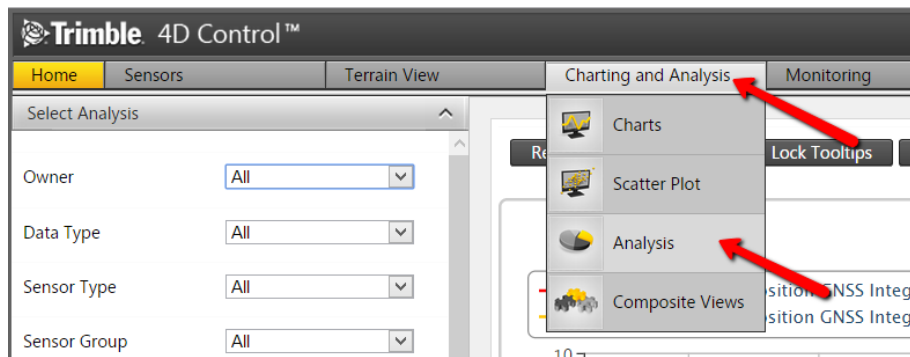
Kindly refer to Sections 9.3.11 on page 56.

11 Analysis



11.1 ACCESS ANALYSIS

Navigate to the Analysis section via the Menu or the dedicated home page shortcut icon.



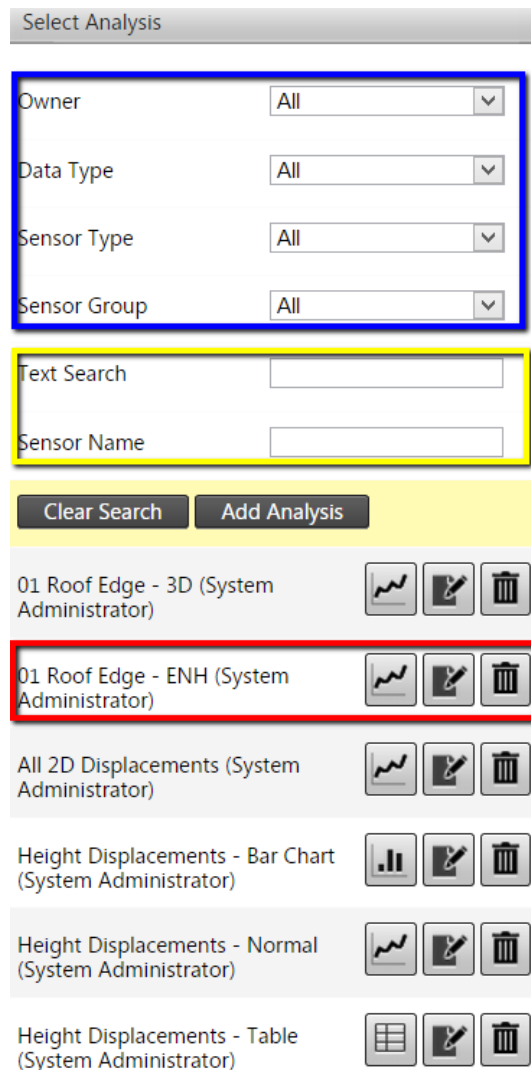
11.2 TO VIEW AN EXISTING ANALYSIS

Step 1: If too many analyses are present the analyses can be filtered by filling out the drop-down boxes (indicated in blue in the next figure).

Step 2: You can also do a text search (indicated in yellow).

Step 3: Alternatively you may look for your analysis in the list below the search field (in red). This is also where your search results will appear.

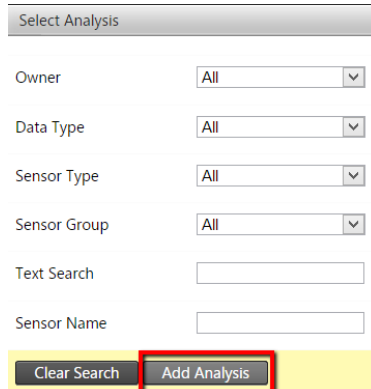
Step 4: Once you have selected your analysis (by clicking either on its name or the pie chart icon next to its name), you can view it on the right-hand pane of the analysis page.



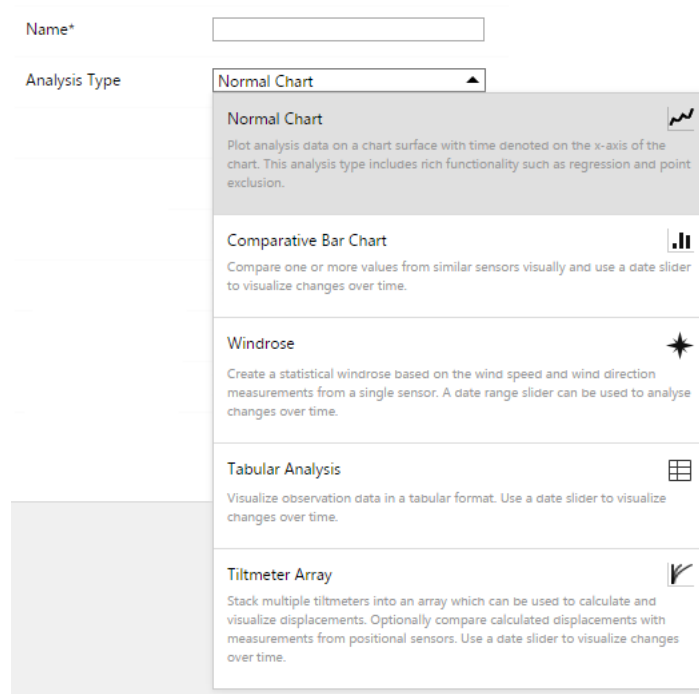
The screenshot shows the 'Select Analysis' interface. At the top is a dropdown menu labeled 'Select Analysis'. Below it are four filter dropdown menus: 'Owner' (All), 'Data Type' (All), 'Sensor Type' (All), and 'Sensor Group' (All), all highlighted with a blue border. Below these are two text search fields: 'Text Search' and 'Sensor Name', highlighted with a yellow border. Below the search fields are two buttons: 'Clear Search' and 'Add Analysis'. Below the buttons is a list of analyses, each with a name, a role, and three icons (a pie chart, a pencil, and a trash can). The second item in the list, '01 Roof Edge - ENH (System Administrator)', is highlighted with a red border. The other items in the list are: '01 Roof Edge - 3D (System Administrator)', 'All 2D Displacements (System Administrator)', 'Height Displacements - Bar Chart (System Administrator)', 'Height Displacements - Normal (System Administrator)', and 'Height Displacements - Table (System Administrator)'.

11.3 TO ADD AN ANALYSIS

Step 1: Under the Select Analysis sub-section you may add a new Analysis by clicking the Add Analysis button.



Step 2: Fill out the necessary information:



- Name: Specify a name for the analysis. Analysis names must be unique within a monitoring project.
- Analysis Types
 - o Normal Chart: Plot analysis data on a chart surface with time denoted on the x-axis of the chart. This analysis type includes rich functionality such as regression and point exclusion.

- Comparative Bar Chart: Compare one or more values from similar sensors visually and use a date slider to visualize changes overtime.
- Windrose: Visualize the change in wind direction and speed.
- Tabular Analysis: Visualize observation data in a tabular format. Use a date slider to visualize changes over time.
- Tiltmeter Array: Visualize the cumulative tilt as measured by an array of tilt meters.

Reference Date*	<input type="text" value="2015/02/08 00:00:00"/>
Show Log	<input checked="" type="checkbox"/>

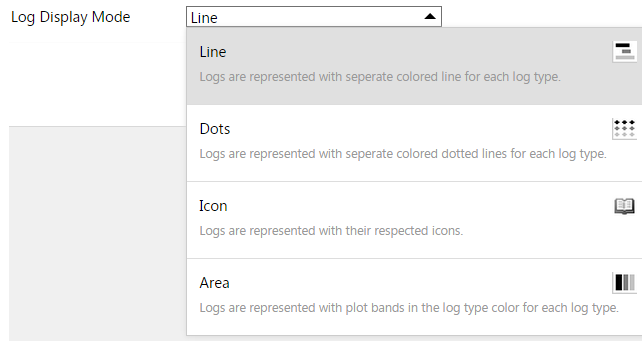
- Reference Date: This date is used to determine reference measurements for series configured to display relative measurements. Note that this date is in terms of project local time.
- Show log: Log entries that fall within the analysis date range can be visualized on the analysis charts surface by enabling this option.

Scope	<input type="text" value="Private"/>
Date Range Mode	<input type="text" value="Fixed Date Range"/>
Date Range	<input type="text" value="2015/02/08 00:00:00"/> to <input type="text" value="2015/02/15 23:59:59"/> <input type="button" value="..."/>
Plot Summarized Values	<input type="text" value="At the End of the Summarized Period"/>

- Scope: You can make the analysis visible to other users by marking it as public. A private analysis can only be accessed by the user that created it.
- Date Range Mode: The date range of an analysis can be determined either by specifying a start and an end date, or by specifying the rolling time window width.
 - Fixed date range: Use these date and time inputs to specify the analysis date range in terms or project local time.
 - Rolling Window: Specify the time window which will determine the analysis date range. The effective analysis date range will change on a continuous basis. Note: Window widths of less than 1 minute may be affected by data latency.
- Plot Summarized Values: This option has an effect on the time value (or x axis value) against which summarized values will be plotted. Each node in a summarized series typically reflect the average observation value over a period (such as 1 hour or 1 day). By adjusting this option, you can plot summarized values either at the beginning, in the middle or at the end of the time period over which the data was summarized.

Log Type Link Mode	<input type="text" value="All"/>
Alarm Definition Link Mode	<input type="text" value="All"/>

- Log Type Link Mode: Specify the log type link mode.
- Alarm Definition Link Mode: Specify the alarm definition link mode.



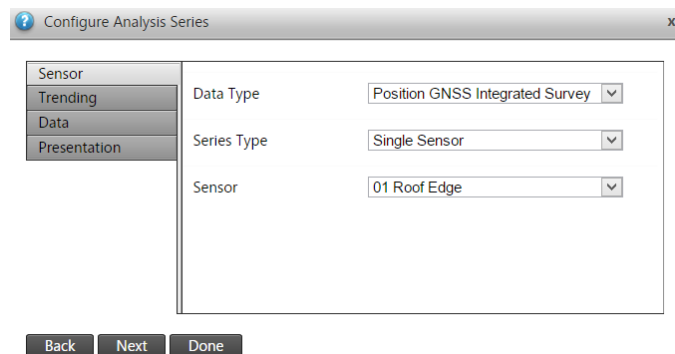
- Log Display Mode: Choose how logs are displayed on the chart.
 - o Line: Logs are represented with separate coloured line for each log type.
 - o Dots: Logs are represented with separate coloured dotted lines for each log type.
 - o Icon: Logs are represented with their respected icons.
 - o Area: Logs are represented with plot bands in the log type colour for each log type.

Step 3: Save your analysis by clicking the Save button.

Step 4: Once an Analysis had been created you, it's time to add some data to it, else there is nothing to display. Click the Add button to add data sources (called "Series") to the analysis chart.

Note: this can be repeated multiple times in order add more graphs to the same chart.

Step 5: Once you click Add, a Configure Analysis Series pop-up window will appear where you can select and customize your data source (as indicated in the next figure).





Switch via the tabs on the left (Sensor, Trending, Data & Presentation) or by clicking via the Next and Back buttons.

If you did not want to add a data source, you can cancel this step by closing the pop-up via the X in the top right corner.


Else, when done configuring the data series, click on the Done button to have it added to the Analysis. The data series will now be added to the list of data series for the Analysis.

Series

Series	Display Type	Sensor	Column Name	Colour	Trend	Data Source	Chart Type	Unit	Decimals	Absolute / Relative	
1	Position GNSS Integrated Survey	01 Roof Edge	dN		Change per Hour	Raw Data	Line	Meters per Hour (m/hour)	3	Absolute Measurement	

To delete a Series, simply click the trash can button on the right of it.


Step 6: Plot bands can also be added, which is useful for certain type of graphs (causing a shaded backdrop in certain 'band' areas). To add a Plot Band click the Add button below the Plot Band section.

 Configure Analysis Plot Band x

Name*

From m/hour

To m/hour

Color 




Complete the required information:

- Name: Specify a name for the analysis plot band. This is the name that will be used.
- From and To: Specify the From and To values of the analysis plot band. This is the values from where to where the plot band will range.
- Colour: Specify a colour for the analysis plot band. This is the colour that will be used to render the plot band.

Click the Save button to store the plot band.

Step 7: Once at least one data Series was linked (added) to the analysis it can be viewed by clicking on its name or the chart icon in the list in the left hand pane of the screen. Note: the chart icon can be either a line chart icon (as below), a bar chart icon or a tabular icon depending on what type of analysis was specified.

Velocity RNHM Roof 1 - ENH
(System Administrator)



11.4 MANIPULATING THE ANALYSIS CHART

Depending on which Analysis type is shown (Normal Chart, Comparative Bar Chart or Tabular Analysis) on the top of the Chart area you will see four buttons:

- Regression and Exclusion
- Lock/Hide Tooltips
- Adjust Date Range
- Start Live Update

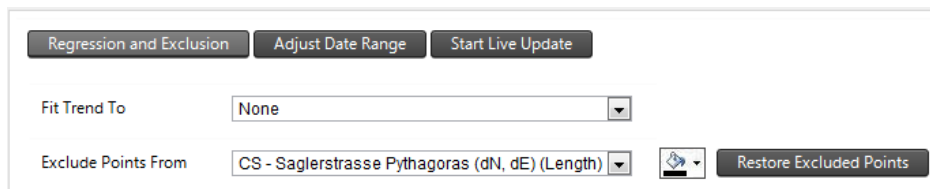
These will be discussed soon in the next section.

At the bottom (also dependent on the Analysis type), the following might be shown:

- Show data tooltips, Show range information, Line Width and Point Marker Size
 - o Please refer to discussions in sections 9.3.8 to 9.3.10 on page 56.
- Edit, Refresh, Export To XLSX and Export To CSV
 - o Discussed in section 9.3.11 on page 56.

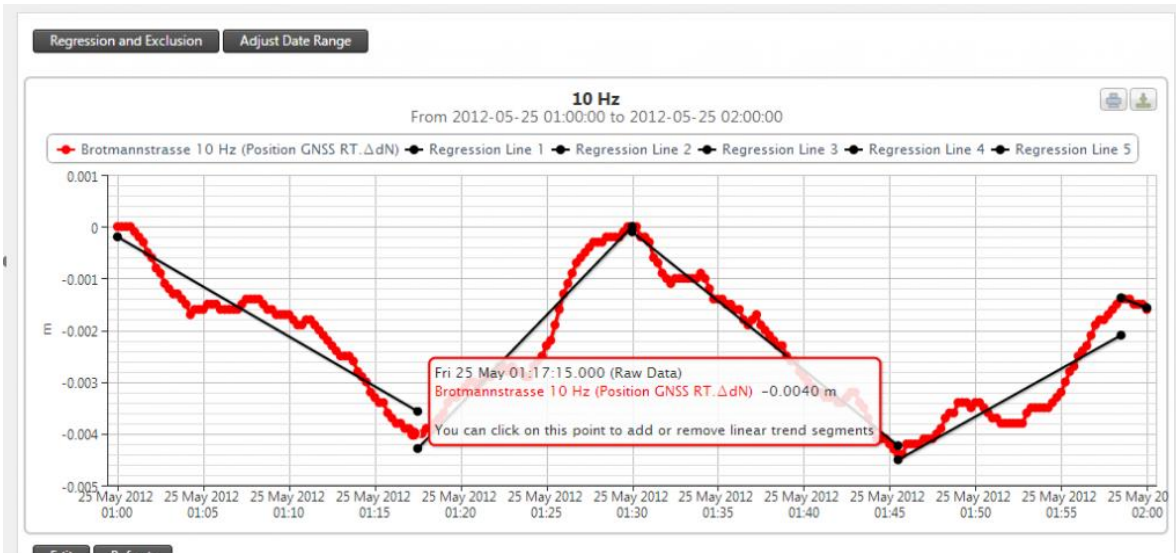
11.4.1 Regression and Exclusion

Clicking on this button will give you the two options illustrated in the next figure:



The screenshot shows a control panel with three buttons at the top: "Regression and Exclusion", "Adjust Date Range", and "Start Live Update". Below these buttons are two dropdown menus. The first is labeled "Fit Trend To" and is currently set to "None". The second is labeled "Exclude Points From" and is currently set to "CS - Saglerstrasse Pythagoras (dN, dE) (Length)". To the right of the second dropdown menu is a small icon of a hand with a cursor, and a "Restore Excluded Points" button.

Fit to Trend: You can select a series here to which you want to fit a trend using linear regression.

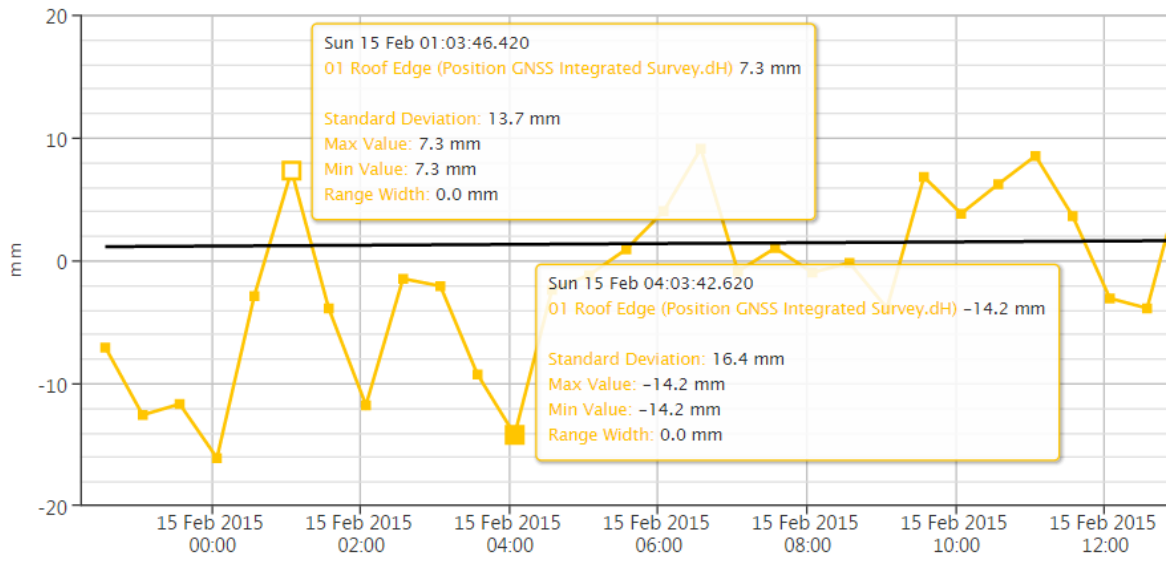


Note: In the event that some of the readings appear to be incorrect, you have the option of excluding these points from the analysis series. These points will no longer be displayed or taken into consideration when the regression line is fitted.

11.4.2 Lock/Hide Tooltips

Locking tooltips is useful to make certain specific tooltips (pop-ups) stationary, e.g. for presentation purposes.

When enabled, simply click on the data point that must be shown (illustrated below). Clicking on the same data point again will minimize the tooltip again. Alternatively click on the Clear Locked Tooltips button to minimize all locked tooltips again.



11.4.3 Adjust Date Range

This is another place to manipulate the same “Date Range Mode” that can be configured in the Analysis’ setting (discussed in section 11.3 near page 68, step 2).

Regression and Exclusion Lock Tooltips Hide Date Range Adjustment

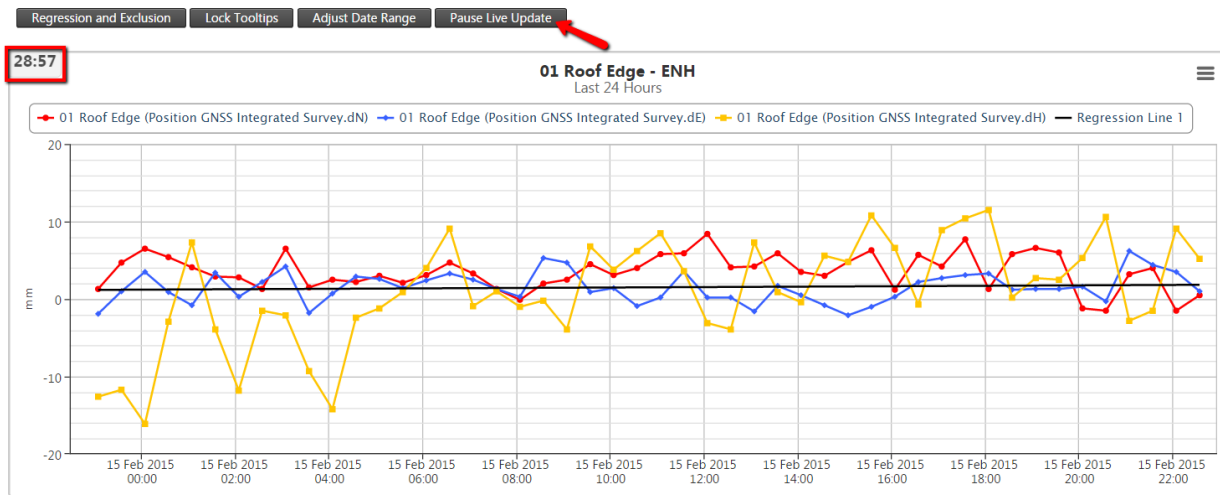
X

Date Range Mode: Fixed Date Range ▼

Date Range: 2014/05/08 00:00:00 to 2014/05/15 23:59:59 ... Apply Dates

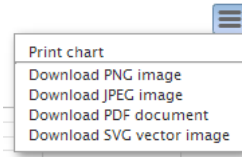
11.4.4 Start Live Update

1. If your analysis is configured to use data range mode of “Rolling Window”, or if the End Date you define lies in the future, then the “Live Update” feature will be enabled on the Analysis.
2. When you click on the “Start Live Update” button, you will be presented with a timer which will indicate when the next update will take place. The countdown period will be dependent on the frequency of the data within the analysis.



11.4.5 Print an export an Analysis

Any chart can be printed or exported.



If more detail needed, kindly refer to Sections 9.2.2 and 9.2.3 on page 52 where this was discussed.

11.5 MATCHED DATA SERIES

The Matched Data Series feature on the Normal Analysis type was specifically requested by the mining industry.

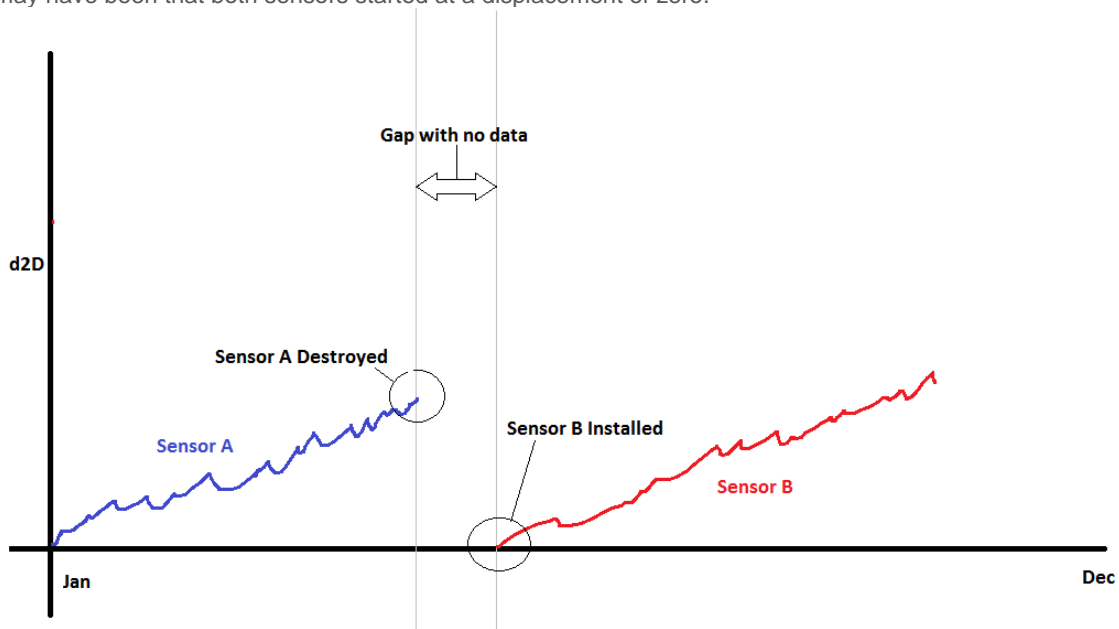
The reason for creating **matched series segments** is to fit a regression line and analyze the behaviour of a rock body over a period that is longer than the life of any particular sensor.

Of course this will only make sense if the different sensors are installed in roughly the same region. Below we explain the two typical use cases of this feature.

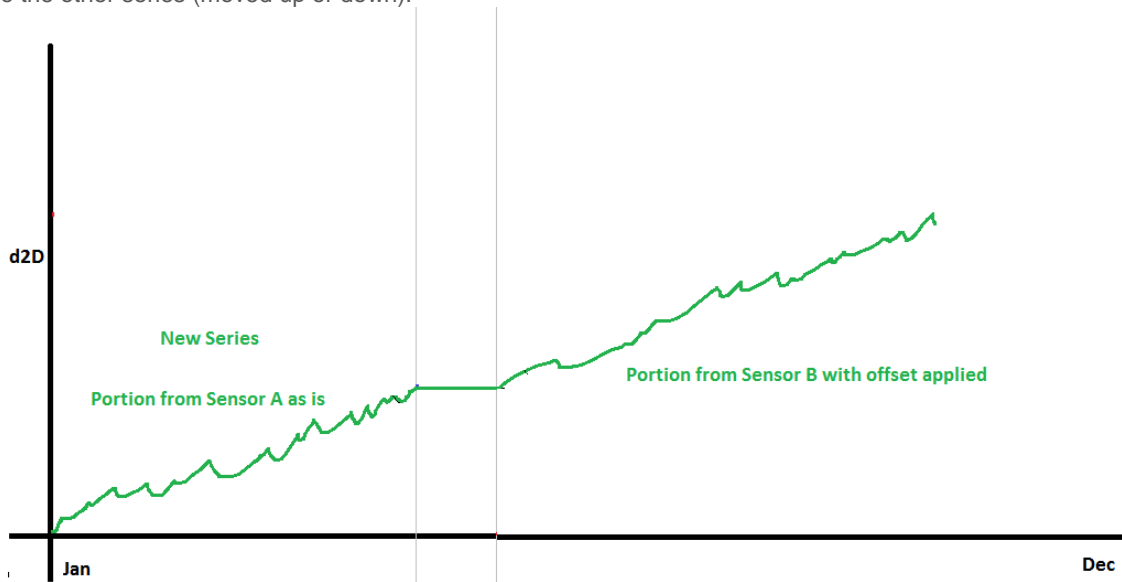
11.5.1 Typical use case 1

Sensor A and Sensor B were installed at approximately the same area, but not at the same time. The analyst wants to get an understanding of how the ground moved over the entire period, but the period in question is longer than the lifetime of either sensors.

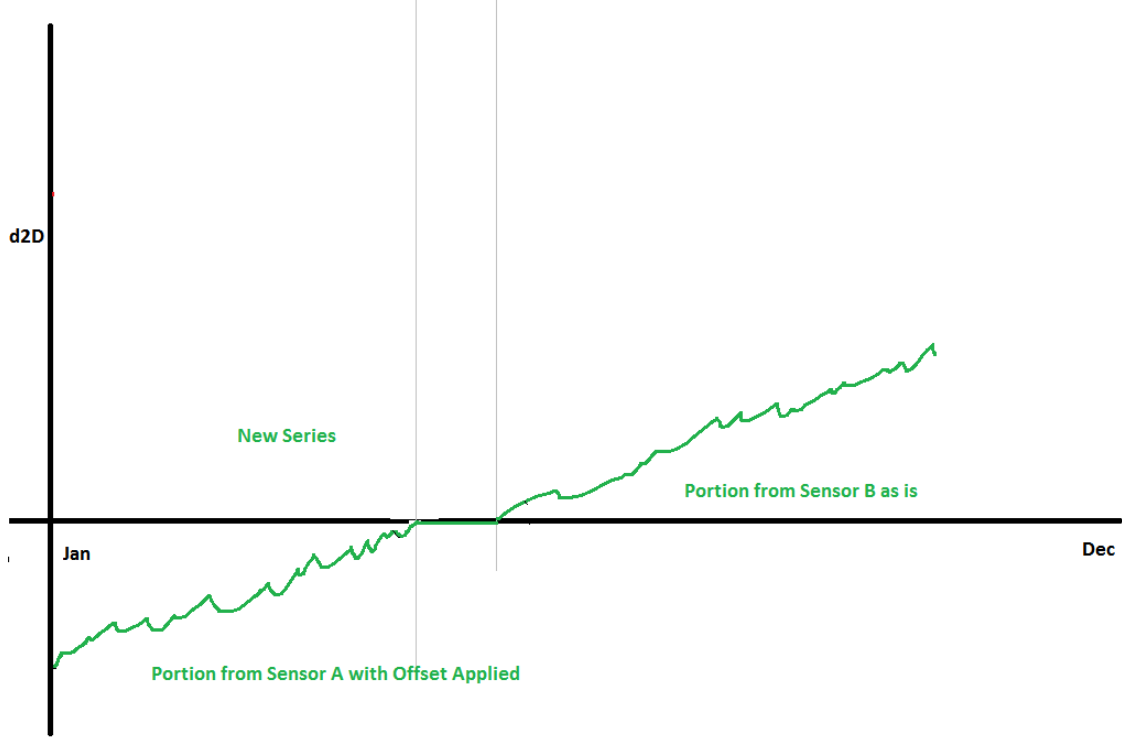
For setup reasons, Sensor A and B may have yielded displacement values that are not the same: for example it may have been that both sensors started at a displacement of zero.



The matched data series feature should enable the analyst to create a new series by joining the series of Sensor A and Sensor B together. In doing so, one of the two series will be kept fixed (not moved) and an offset will be applied to the other series (moved up or down).



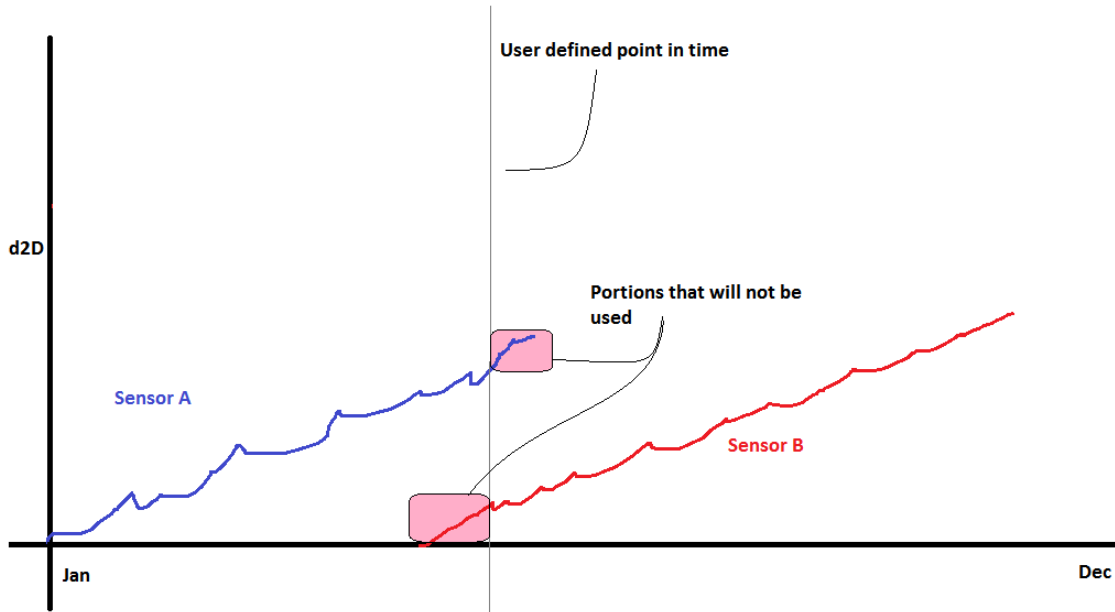
In the option above the series from Sensor A was fixed. A regression line can now be fixed to the new series.



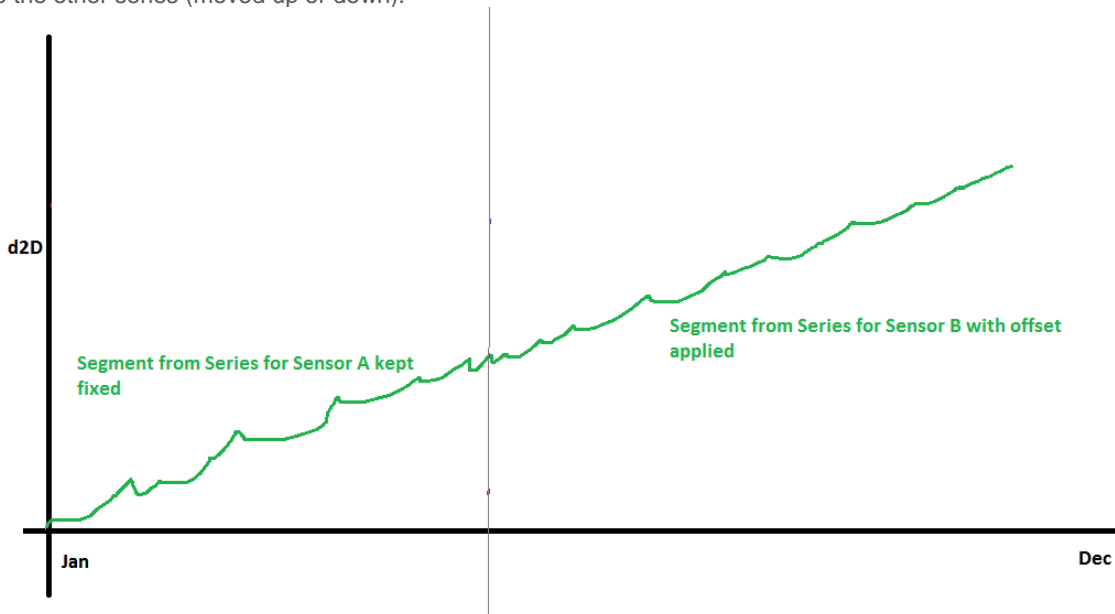
In the option above the series from Sensor B was fixed. A regression line can now be fixed to the new series.

11.5.2 Typical use case 2

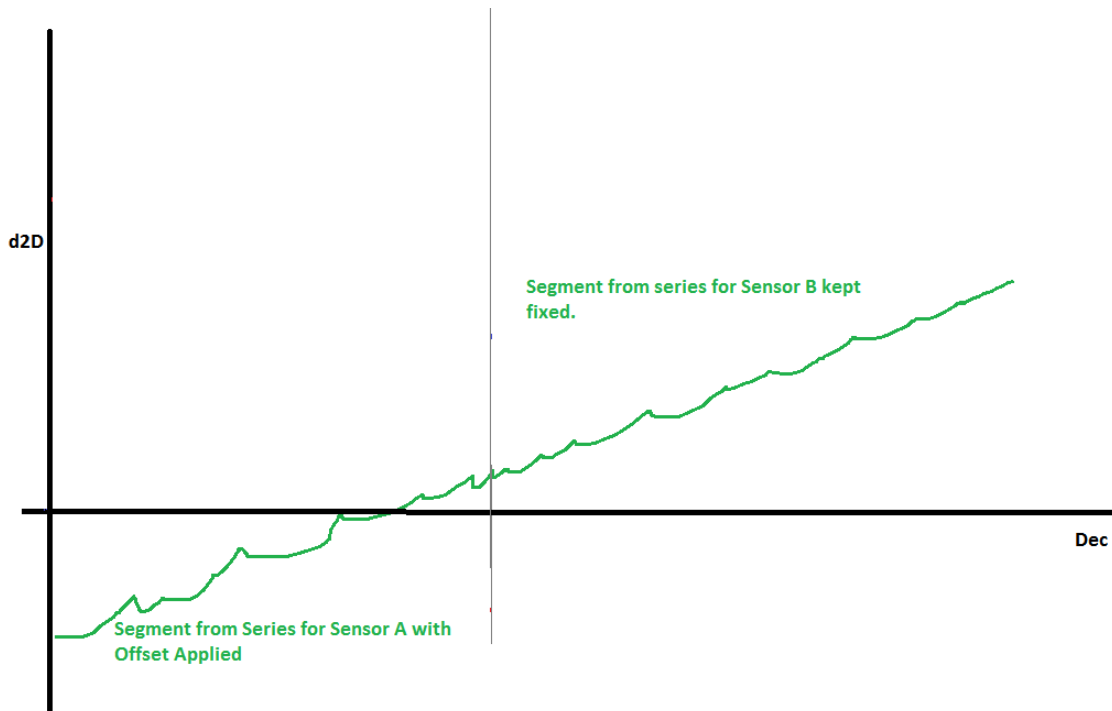
Sensor A and Sensor B are mounted on the same rock body, however Sensor A was installed before Sensor B and Sensor A may or may not have been destroyed at some point. The analyst want to merge these two series in order to fit a regression line and analyze the behaviour of the rock body. To do this, the user needs to specify the point in time that should be used for intersection purposes.



The matched data series feature should enable the analyst to create a new series by joining the series of Sensor A and Sensor B together. In doing so, one of the two series will be kept fixed (not moved) and an offset will be applied to the other series (moved up or down).



In the option above the series from Sensor A was fixed. A regression line can now be fixed to the new series.



In the option above the series from Sensor B was fixed. A regression line can now be fixed to the new series.

11.5.3 Prerequisites

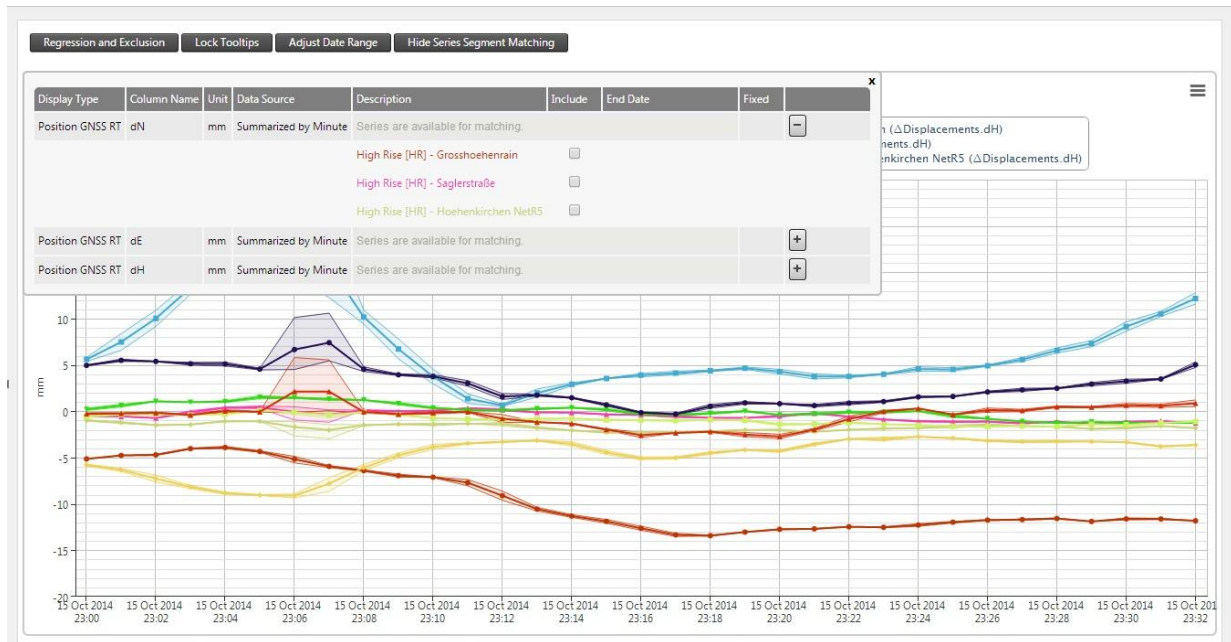
This functionality is seen as a historical analysis and is only available in **fixed date ranged mode**. Make sure your analysis is not configured to use a **rolling window** date range mode.

The functionality only becomes available if you have multiple series with the same Data Type, Value Column (or component) and Reduction. Typically you need to create an analysis with multiple Sensors of the same Sensor Type.

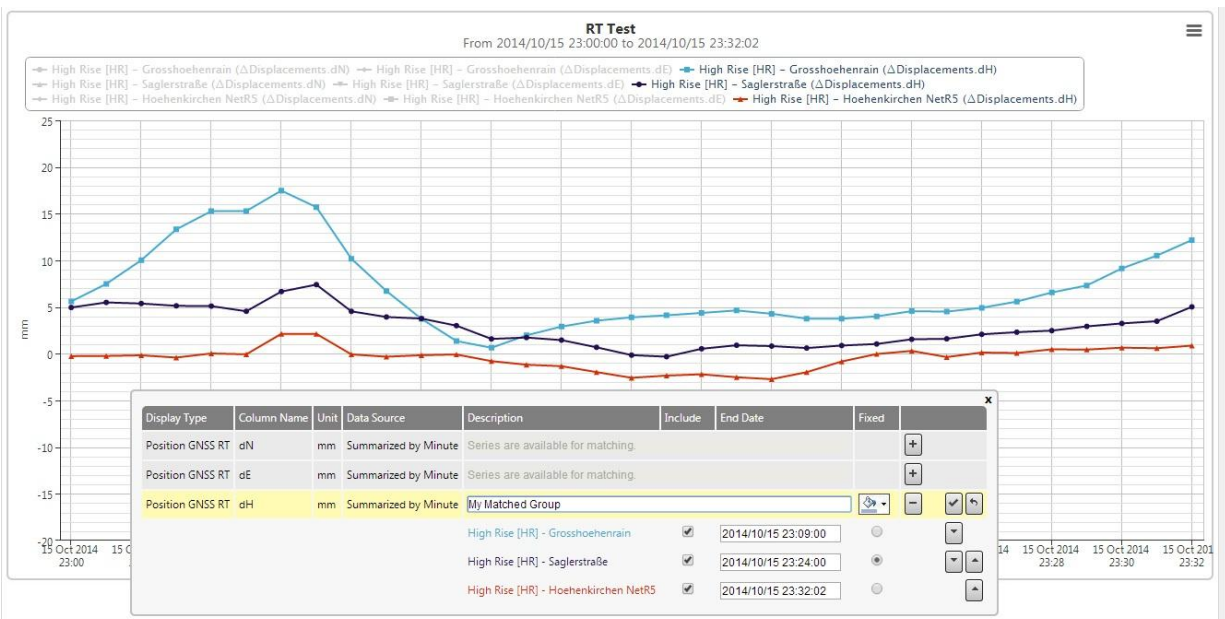
11.5.4 Example configuring of a matched data series

In this section we present an exhaustive example configuration of matching three series segments. Although in this example all three sensors have data over the entire period, the configuration can be applied in a similar fashion if some sensors only have partial data. The example configuration is more complicated than

Click on the **Show Series Segment Matching** button to expand the configuration grid.
Note that you can click and drag the expanded grid control in order to view the analysis chart area behind it.

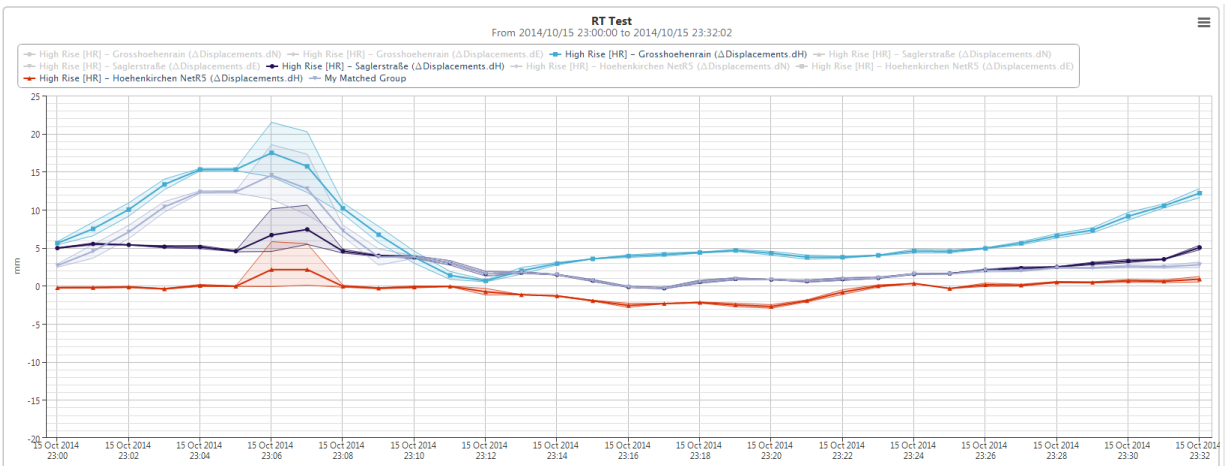


The grid will contain expandable groups. Each group contains series that could potentially be matched together. (You cannot merge dN with dE for instance).

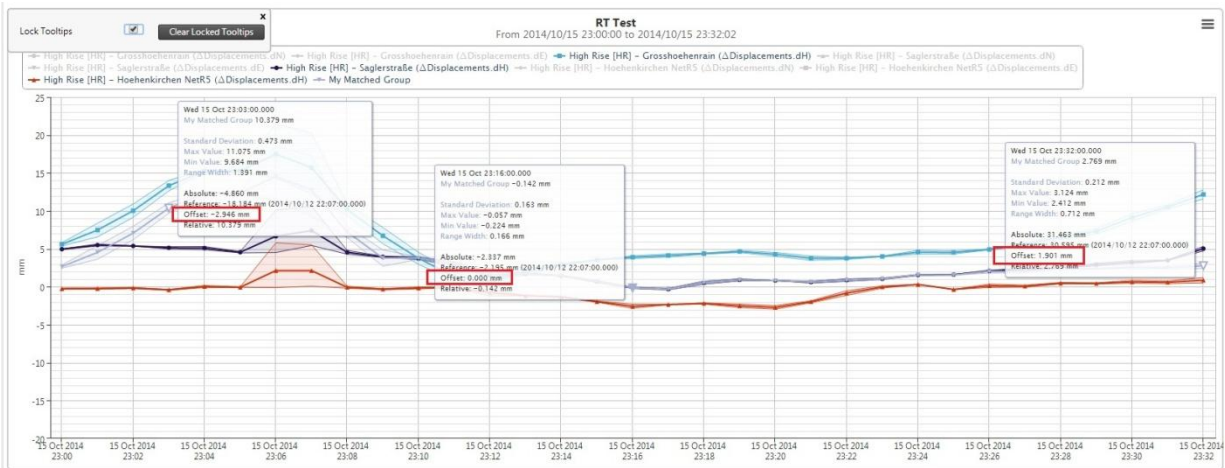


1. Expand the group you want to work with and pick two or more series. As soon as you pick the 2nd series, all other series which are not candidates to be matched will become temporarily hidden on the analysis chart area.

- You can now specify a new name for the calculated series, or simply use the suggested name. You can also specify a colour for the new series that will be created.
- Use the up and down arrows to indicate the order in which segments should be taken from each series. In our example above the order is the *light blue* series, *purple* series and *red* series.
- Indicate which one of the series should be fixed (the first segment will be fixed by default).
- For each series, indicate the end date for the segment. This is the point up to which data will be taken from that series to create a series segment. Normally this date would be the date of the last available observation in that series. You can do this by entering the date or by clicking on a particular point on the series on the chart surface. Note that the end date for the one segment also serves as the start date for the segment taken from the next series. When you are matching more than two series segments, then you need to ensure that the end dates for each segment is in the same sequence as the series themselves.
- For the series order in this example (*light blue* series, *purple* series and *red* series), we must ensure that the end date for the *light blue* series segment is before the end dates of the other series segments. We also need to ensure that the end date for the *purple* series is before the end date of the *red* series. You will be presented with a validation error message if this is not the case.
- You can now click on the button to save the newly created matched series group.



As seen above, the calculated series was added to the analysis.



Above we inspect the tooltips of the calculated series. You will note that an offset may be applicable. In our example the *purple* series was kept fixed and has an offset of zero. You can now fit a regression line to the calculated series, open the matched series configuration grid again to create other matched series segments (e.g. for dE or dN) or change the settings of an existing matched series.

It is important to note that if you edit the analysis and change certain aspects of either the analysis or the series (e.g. Data Type, Sensor, Reduction, Value Column etc) then the matched groups may be invalidated and deleted automatically.

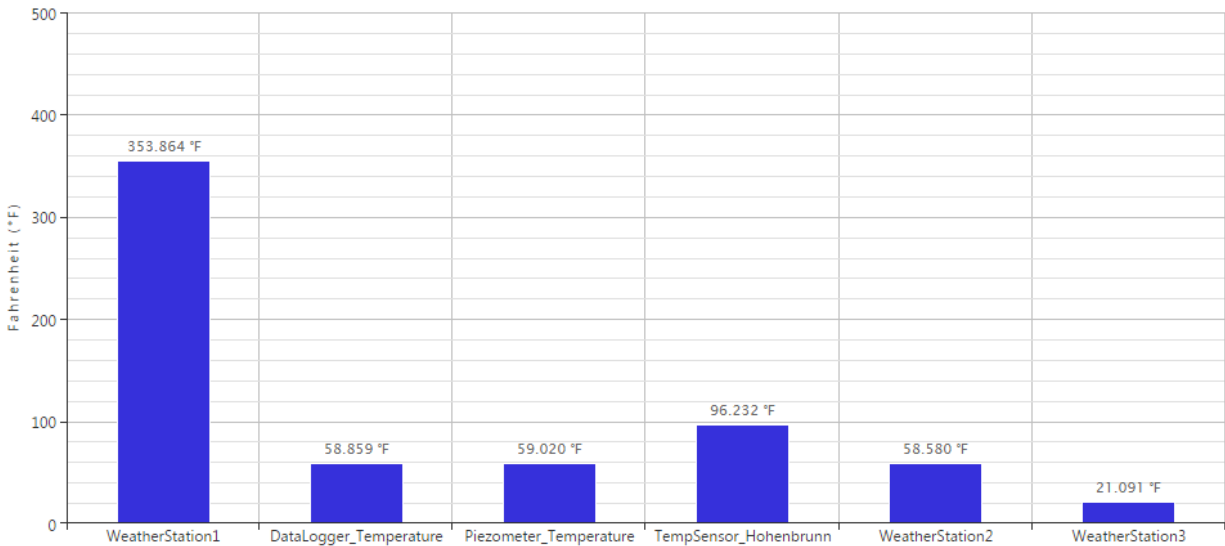
11.6 ANALYSIS TYPES

T4D Control have a variety of analysis types, some of these are designed to analyze specific sensor or data types. These specific analysis types will only become available for selection if you have a sensor in your project that satisfies the requirements for the analysis type.

Following are some examples of analysis types other than the Normal Analysis:

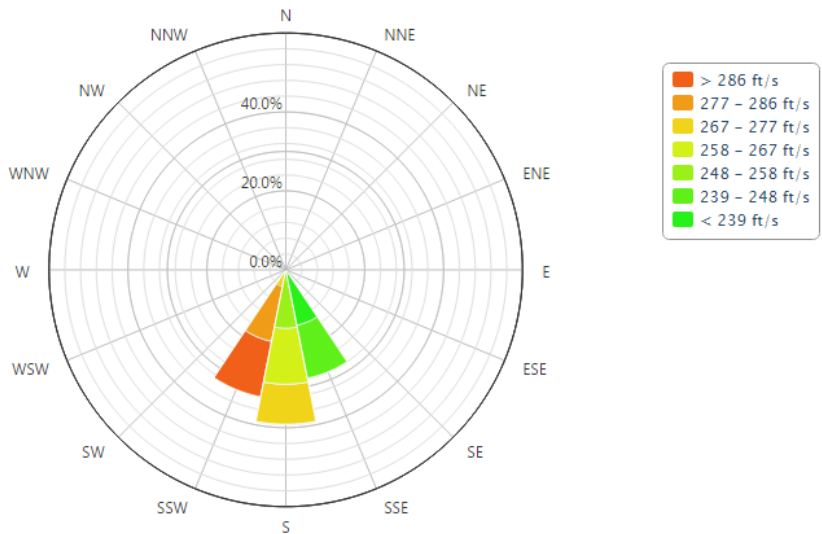
11.6.1 Comparative Bar

A Comparative Bar analysis shows a data type component from multiple sensors on a bar chart for comparison. You require sensors with a common data type component to be able to create a Comparative Bar analysis.



11.6.2 Windrose

A Windrose analysis shows a diagram depicting the wind direction and wind speed over a particular period of time. This is helpful to determine the predominant wind direction and speed over particular periods. You require at least one sensor with data types **Wind Direction** and **Wind Speed** to be able to create a Windrose analysis.



11.6.3 Tabular Analysis

A tabular analysis groups data type components of different sensors together in tables and shows the various measurements on a single page. This is helpful to correlate observations between different sensors.

You are provided with a slider bar to scroll through the observation time period to visualize the observation changes over time.

Temperature (Summarized by Hour)		Wind Direction (Summarized by Day)	
	Temperature		Wind Direction
DataLogger_Temperature	58.998 °F	Wind Direction 1	172.670 °
TempSensor_Hohenbrunn	71.627 °F		
WeatherStation1	349.993 °F		

Crack Components 2D (Summarized by Day)		Circle Readings (Raw Data)	
	dTangential		HA
CrackMeter2D_Test oliekkroknosterpikkelikedisbobbe jakkesandstruispumatokkievis	72.179 ft	XSTP Roof → XStack East	83.125 °

Temperature (Raw Data)		Position GNSS RT (Raw Data)	
	Temperature		Noord
WeatherStation1	339.136 °F	Saglerstraße 400	0.021 ft

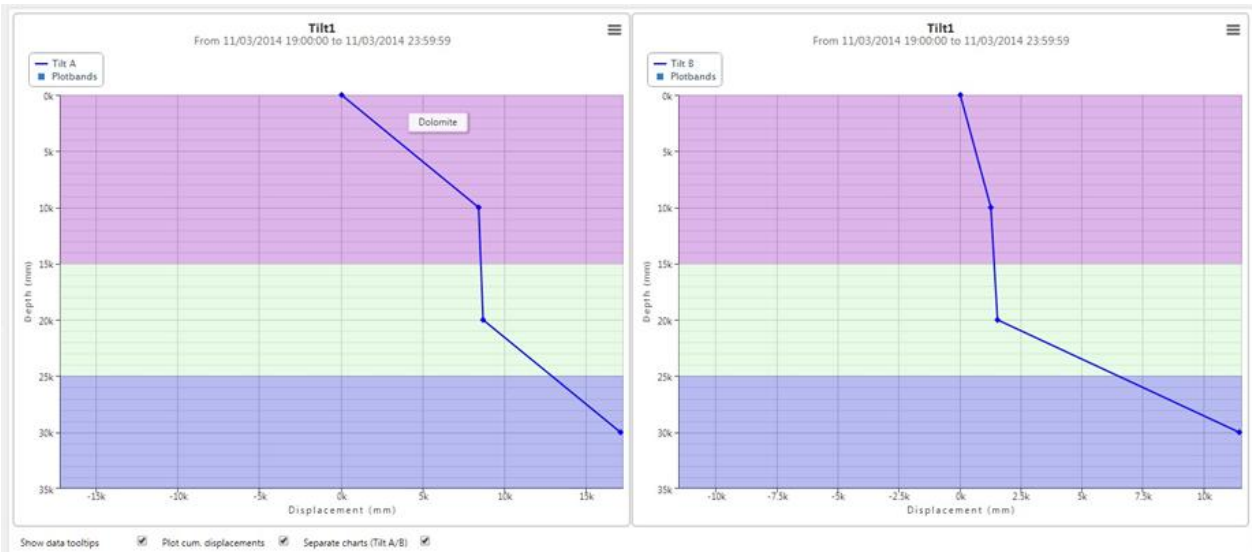
Show data tooltips

04/03/2015 00:51:28 04/03/2015 00:51:48

04/03/2015 00:51:36

11.6.4 Tiltmeter Array

Tiltmeter array visualizes the tilt measured by an array of tilt meters. You require at least one sensor with the **Tilt** Data Type to be able to create a Windrose analysis.



12 Composite Views

A Composite View provides multiple smaller “panes” on one page to view many of the different data visualization components previously discussed.

Two Panes - Horizontal	
Two Panes - Vertical	
Three Panes - Horizontal	
Three Panes - Vertical	
Four Panes	
Three Pane Combo	
Four Pane Combo	
Six Pane Combo	
Nine Panes	
Three Pane Combo	

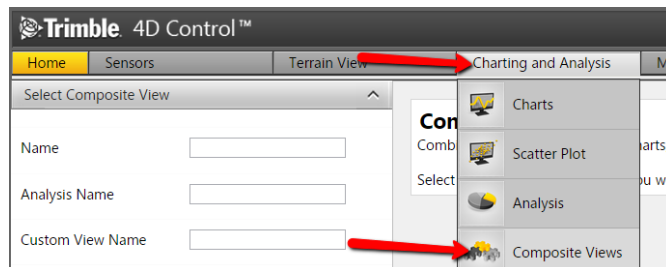
The following type of previously discussed information can be added in any of the smaller panes:

- Custom Views
- Charts
- Scatter Plots
- Analyses
 - Normal Chart
 - Comparative Bar Chart
 - Tabular Analysis

A Composite View is very useful in control room like environment where there are large monitors that requires multiple charts/analyses/etc. on a single monitor.

12.1 ACCESS COMPOSITE VIEWS

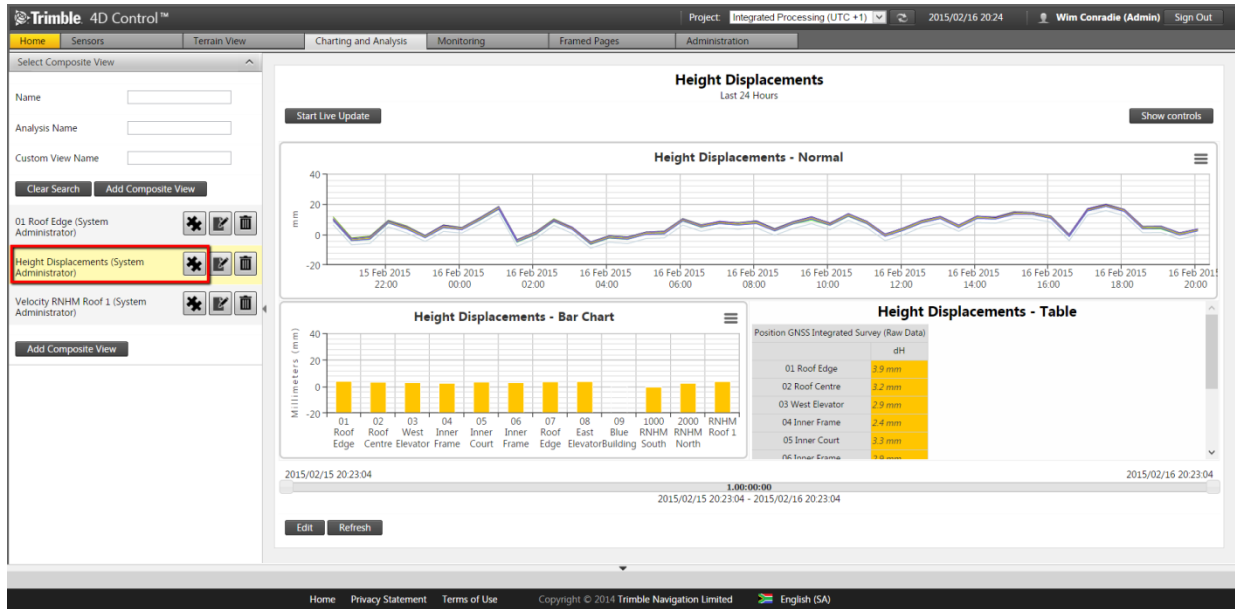
Navigate to the composite view section via the Menu or the dedicated home page shortcut icon.



12.2 TO VIEW A COMPOSITE VIEW

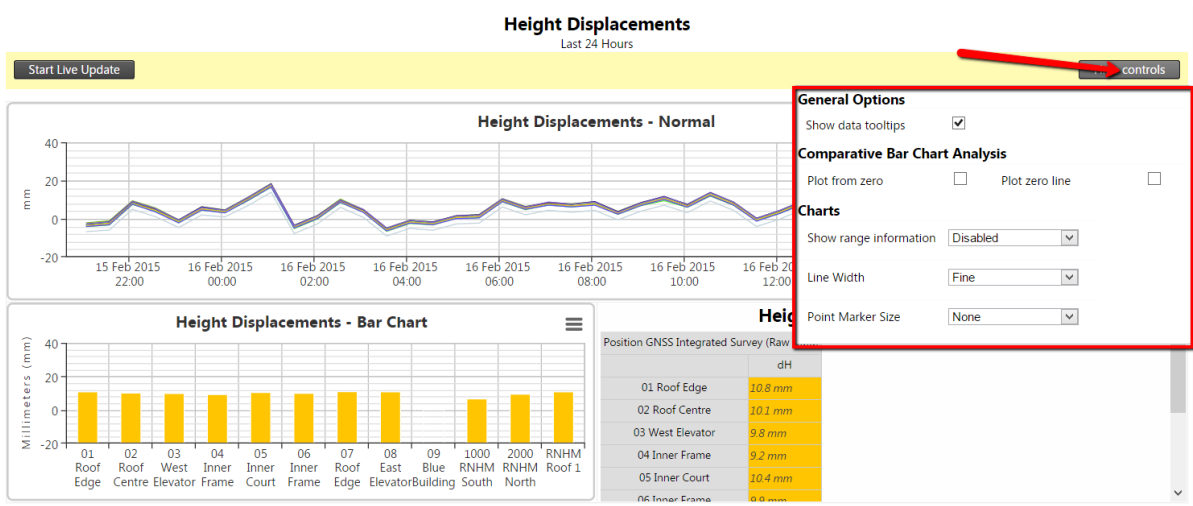
Composite views can be filtered by die options on the left hand side.

To view a composite view simply click on the composite view in any of the area illustrated below. The resulting view will be displayed on the right hand side main page.



As all the viewing options for all different types of views and graphs were already explained in previous sections it will not be repeated here. If needed, for each view or graph kindly refer to previous applicable section.

It must just be added that some controls that affect multiple graphs have been moved to the top right. Simple click the Show controls button to have it expanded.



12.3 CREATING A COMPOSITE VIEW

Step 1: Click on the Add Composite View button in the left hand side.

Select Composite View ^

Name

Analysis Name

Custom View Name

Clear Search
Add Composite View

Step 2: Complete the necessary information:











Add Composite View

Name* Date Range Mode Fixed Date Range v

Layout Type Four Panes v Date Range 2015/02/09 00:00:00 to 2015/02/16 23:59:59 ...

Save
View

- Name: Specify a name for the composite view. Names must be unique within a monitoring project.
- Layout Type: The number of panes and layout of these panes for the composite view.

Two Panes - Horizontal	
Two Panes - Vertical	
Three Panes - Horizontal	
Three Panes - Vertical	
Four Panes	
Three Pane Combo	
Four Pane Combo	
Six Pane Combo	
Nine Panes	
Three Pane Combo	

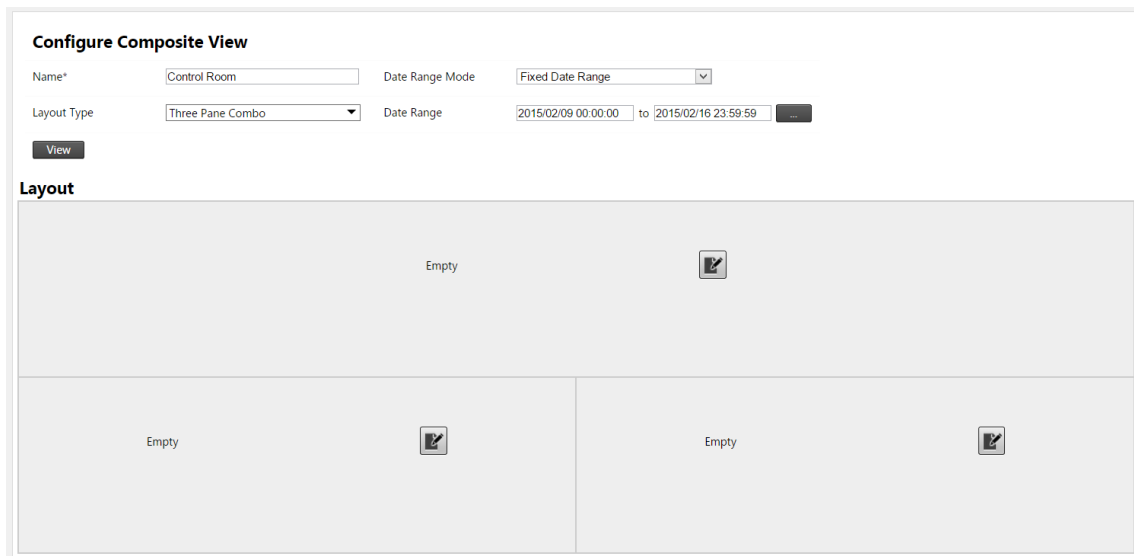
- Date Range Mode: The date range of an analysis can be determined either by specifying a start and an end date, or by specifying the rolling time window width.
 - o Fixed date range: Use these date and time inputs to specify the analysis date range in terms of project local time.
 - o Rolling Window: Specify the time window which will determine the analysis date range. The effective analysis date range will change on a continuous basis. Note: Window widths of less than 1 minute may be affected by data latency.

Date Range Mode

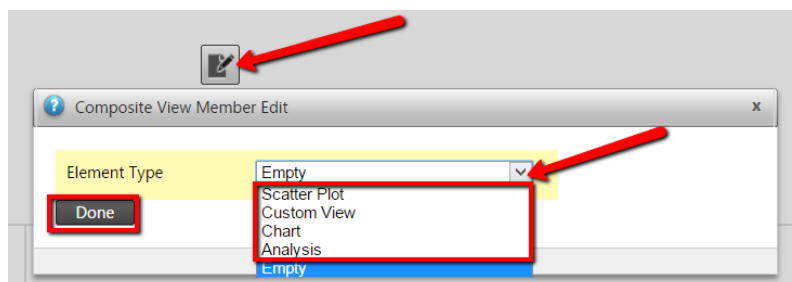
Rolling Window Width Warning: Window widths of less than 1 minute may be affected by data latency.

When all completed simply click the Save button.

Step 3: The composite view will now be created and the chosen layout will appear below.



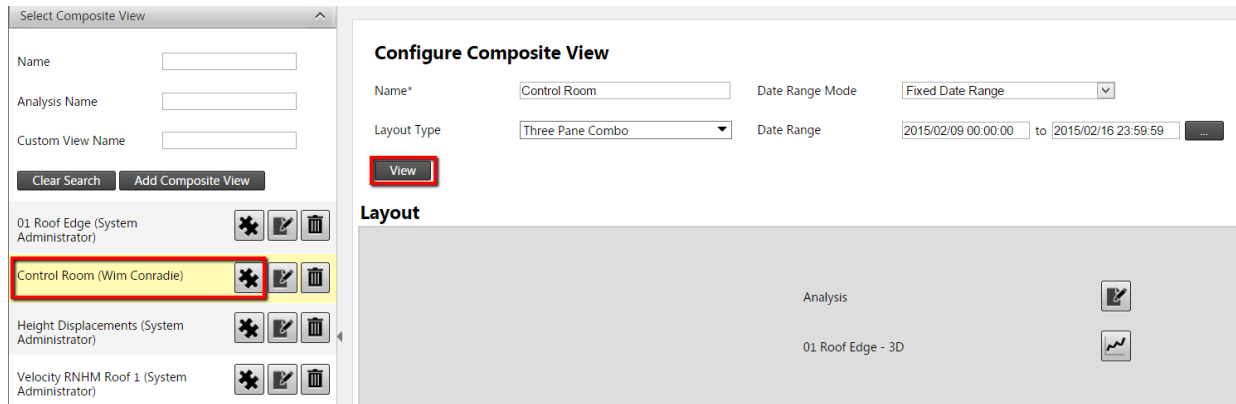
To add a view or graph to any pane, simply click the Edit icon on the specific pane and select an option from the dropdown list to display in the pane. Based on the option selected additional options will appear related to the specific view or graph. Kindly refer to the previous specific section in this manual about the view or graph for more detail about the options. Then simply click the Done button and the pane will be saved.



Step 4: Complete all the other panes in the composite view. (Note: Although of little practical use, it is not mandatory to fill all panes with information and therefore some panes can be left empty.)

Every time a pane is saved with content, a related icon to the view or graph will be displayed below the edit icon. Simply click on the icon to go directly to that individual view or graph.

Step 5: Once all required panes are completed, simply click the View button or the composite view in the left hand side list (as shown earlier).



The screenshot displays the 'Select Composite View' interface. On the left, a list of views is shown, with 'Control Room (Wim Conrade)' highlighted in yellow. The main area is titled 'Configure Composite View' and contains the following fields:

- Name: Control Room
- Date Range Mode: Fixed Date Range
- Layout Type: Three Pane Combo
- Date Range: 2015/02/09 00:00:00 to 2015/02/16 23:59:59

A 'View' button is highlighted with a red box. Below the configuration fields is the 'Layout' section, which contains two pane icons: 'Analysis' and '01 Roof Edge - 3D'.

13 Alarms

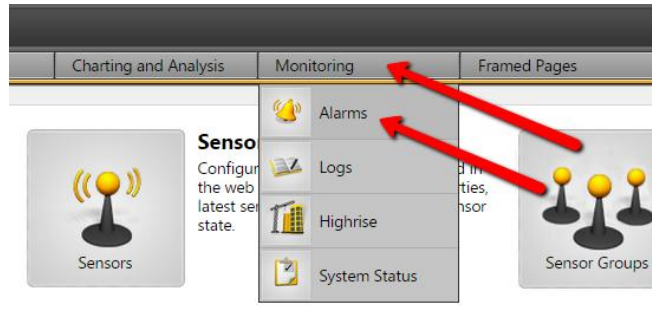
This section shows how to setup Alarms.

Alarm conditions are created against any data series that is monitored in the project.

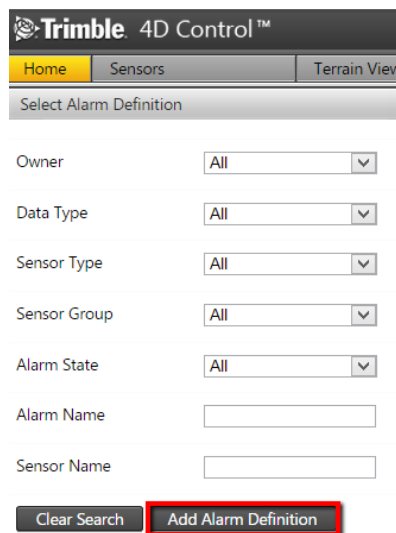
Notifications are being issued in the event that a warning or alarm conditions is met. Notifications can be escalated according to preset rules.

13.1 ACCESS ALARMS

Navigate to the alarms section via the Menu or the dedicated home page shortcut icon.



13.2 ADDING A NEW ALARM

A screenshot of the 'Add Alarm Definition' form in the Trimble 4D Control web interface. The form is titled 'Select Alarm Definition' and contains several dropdown menus and text input fields. The dropdown menus are for 'Owner', 'Data Type', 'Sensor Type', 'Sensor Group', and 'Alarm State', all currently set to 'All'. There are two text input fields for 'Alarm Name' and 'Sensor Name'. At the bottom, there are two buttons: 'Clear Search' and 'Add Alarm Definition', with the latter highlighted by a red box.

To add a new alarm, click on the Add Alarm Definition button and complete the “Add Alarm” form that appears on the right-hand side:

Add Alarm Definition

Name*	<input type="text" value="Demo Alarm"/>	Evaluation Frequency*	<input type="text" value="10"/> <input type="text" value="Minutes"/>
Revision	0	Condition Merge Order	<input type="text" value="And before Or"/>
Owner	Wim Conradie	Notification granularity	Alarm status changed
Description	<div style="border: 1px solid #ccc; height: 40px;"></div>	Customize messages	No
		Require Acknowledge	No

Below is a short elaboration of the fields shown in the above form:

- Name: The preferred name of the new alarm. This value serves as a logical identifier for the alarm definitions and must be unique within a monitoring project.
- Evaluation Frequency: The rate at which the alarm checks whether or not the conditions for the alarm are satisfied.
- Condition Merge Order: This option will determine how the statuses of individual alarm conditions belonging to this alarm definition are rolled up in order to determine a state for the alarm definition.
- Description: This field may contain descriptive information on the selected alarm definition.

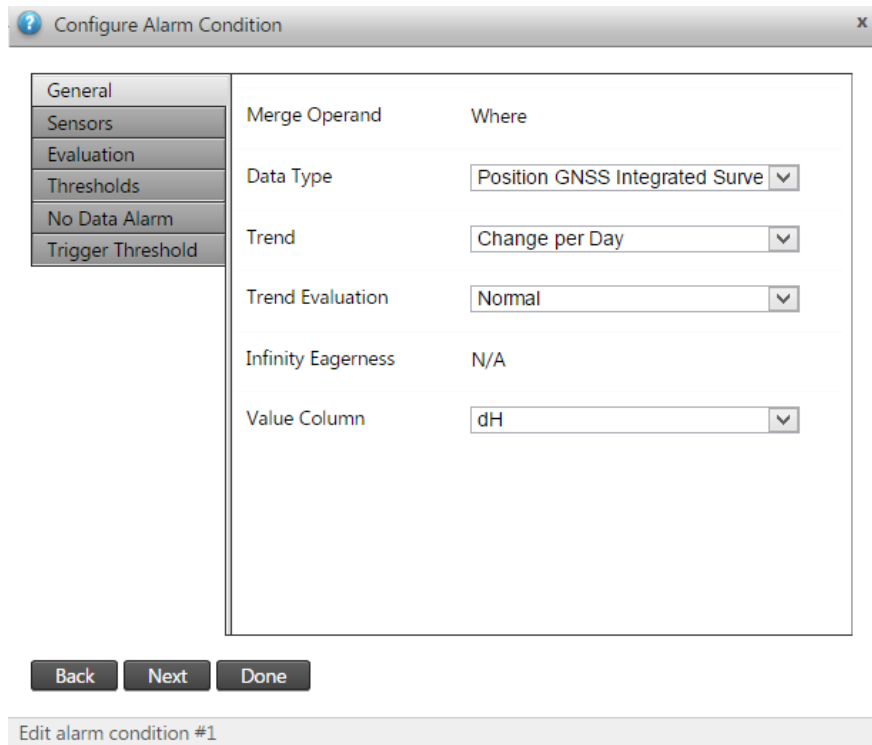
Click on the Save button and the basic alarm will be created. As no conditions for the alarm exist yet, click on the Add Condition button.

Configure Alarm Definition (Disabled) - OK

Name*	<input type="text" value="Demo Alarm"/>	Evaluation Frequency*	<input type="text" value="10"/> <input type="text" value="Minutes"/>
Revision	0	Condition Merge Order	<input type="text" value="And before Or"/>
Owner	Wim Conradie	Notification granularity	Alarm status changed
Description	<div style="border: 1px solid #ccc; height: 40px;"></div>	Customize messages	No
		Require Acknowledge	No

Condition Configuration (Alarm Disabled) - Current State (OK)

13.3 ADDING CONDITIONS



General	Merge Operand	Where
Sensors	Data Type	Position GNSS Integrated Survey
Evaluation	Trend	Change per Day
Thresholds	Trend Evaluation	Normal
No Data Alarm	Infinity Eagerness	N/A
Trigger Threshold	Value Column	dH

Back Next Done

Edit alarm condition #1

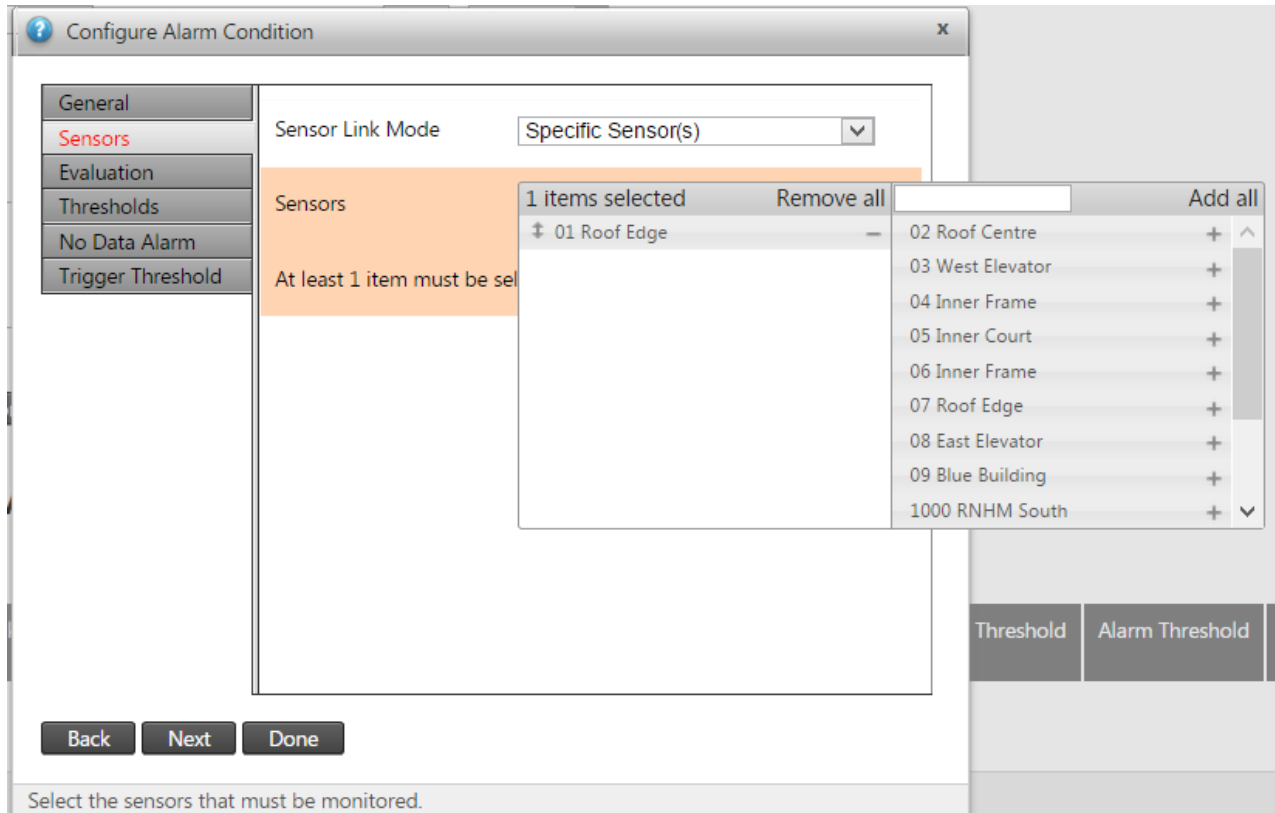
Step 1: When creating or editing an alarm condition a pop-up will appear.

Complete the necessary fields as required.

- Merge Operand: The merge operand controls how condition evaluation results will be rolled up to determine an alarm evaluation result. For the first condition it is not applicable but any additional conditions can be concatenated via the logical Boolean operators “AND” or “OR”.
- Data Type: The data type. For Positional Data Types, trending options will be available.
- Trend: Specify whether you want to monitor actual data or trended data.
- Trend Evaluation: When creating a Trend Alarm Condition, the trend can be evaluated as either “Normal” (distance per time unit) or “Inverter” (time per distance unit).
- Infinity Eagerness: When dealing with Inverted Trend Alarm Conditions, the user have to specify how soon infinity will be assumed when a very small value is inverted.
- Value Column: Select the value columns that should be monitored.

Step 2: Click the Next button to go the next screen and complete as required:

- Sensor Link Mode: The alarm condition can be configured to monitor specific sensor(s), all sensors of a specific sensor type, or a predefined sensor group (as discussed in section 4, page 19).
 - o For specific sensor(s): Simply choose/drag the sensor(s) that needs to be evaluated.



Configure Alarm Condition

General
Sensors
Evaluation
Thresholds
No Data Alarm
Trigger Threshold

Sensor Link Mode:

Sensors: At least 1 item must be selected

1 items selected Remove all

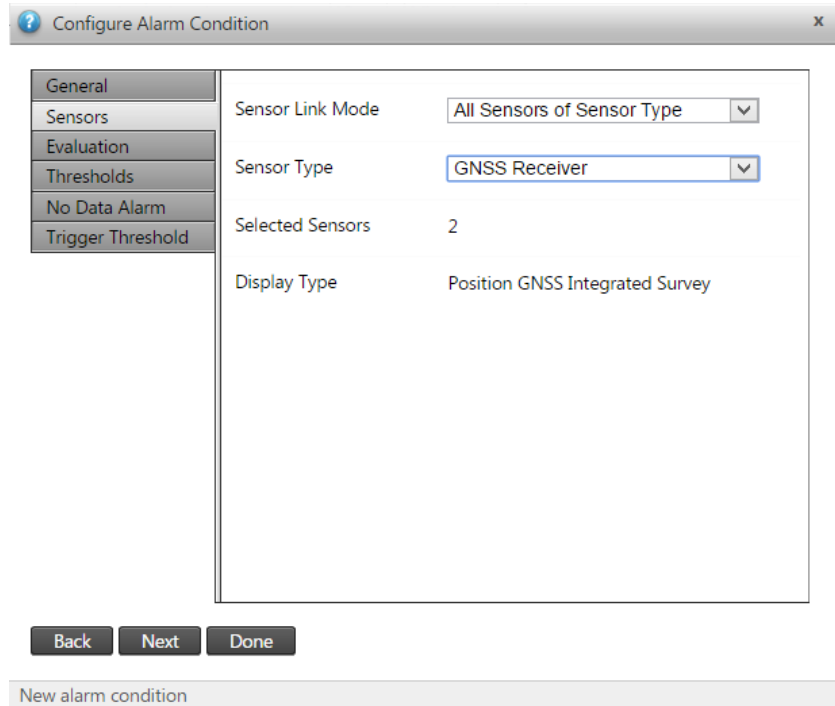
01 Roof Edge	-
02 Roof Centre	+ ^
03 West Elevator	+
04 Inner Frame	+
05 Inner Court	+
06 Inner Frame	+
07 Roof Edge	+
08 East Elevator	+
09 Blue Building	+
1000 RNHM South	+ v

Threshold Alarm Threshold

Back Next Done

Select the sensors that must be monitored.

- For specific sensor types: Simply choose the type of sensors that needs to be evaluated.

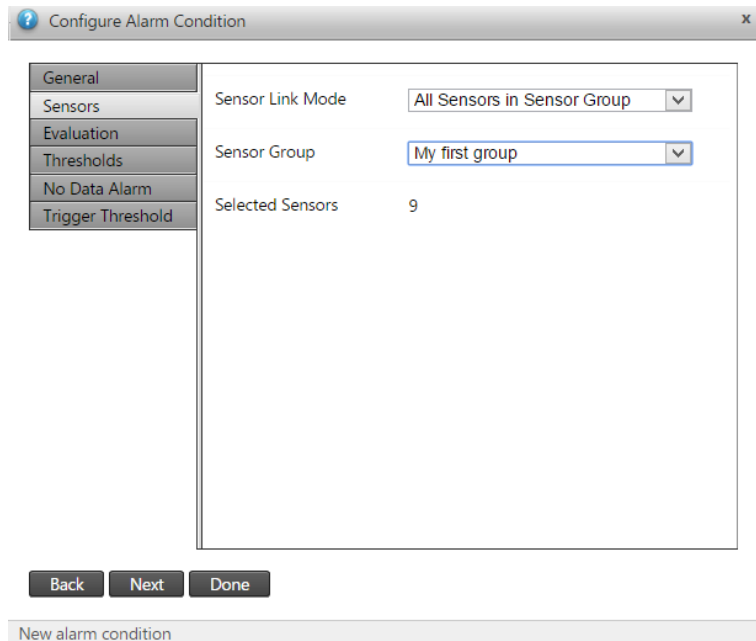


The screenshot shows a 'Configure Alarm Condition' dialog box with a sidebar on the left containing menu items: General, Sensors, Evaluation, Thresholds, No Data Alarm, and Trigger Threshold. The 'Sensors' menu item is selected. The main area contains the following fields:

Sensor Link Mode	All Sensors of Sensor Type
Sensor Type	GNSS Receiver
Selected Sensors	2
Display Type	Position GNSS Integrated Survey

At the bottom of the dialog are three buttons: Back, Next, and Done. Below the dialog is a status bar that reads 'New alarm condition'.

- For specific sensor groups: Simply choose the predefined sensor group.

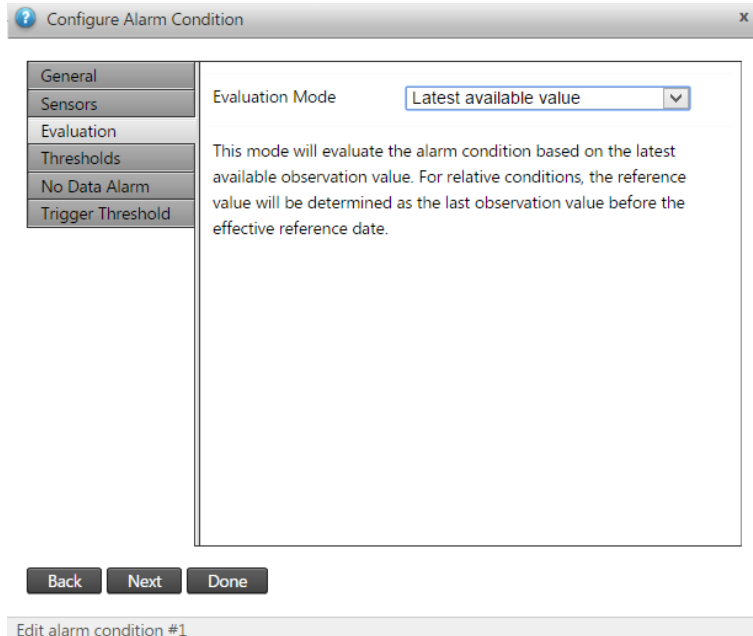


The screenshot shows a 'Configure Alarm Condition' dialog box with a sidebar on the left containing menu items: General, Sensors, Evaluation, Thresholds, No Data Alarm, and Trigger Threshold. The 'Sensors' menu item is selected. The main area contains the following fields:

Sensor Link Mode	All Sensors in Sensor Group
Sensor Group	My first group
Selected Sensors	9

At the bottom of the dialog are three buttons: Back, Next, and Done. Below the dialog is a status bar that reads 'New alarm condition'.

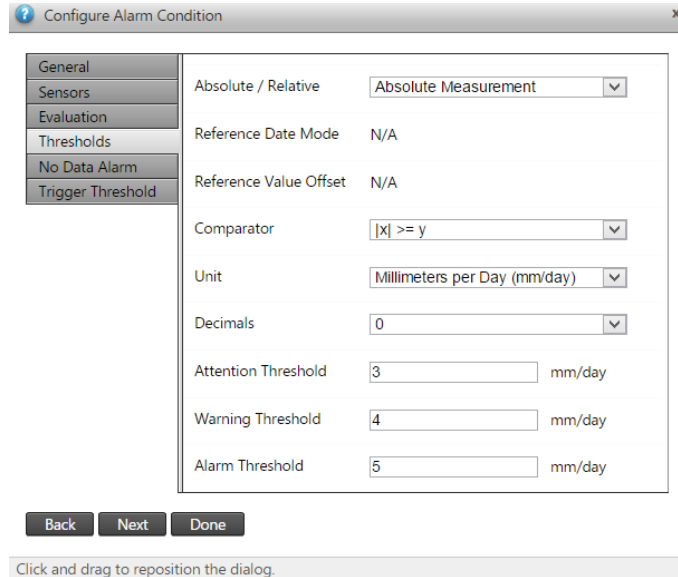
Step 3: Click the Next button to go the next screen and complete as required:



- Evaluation mode: This mode will evaluate the alarm condition based on the latest available observation value. For relative conditions, the reference value will be determined as the last observation value before the effective reference date. Else there are 4 other options that use a number of readings) to evaluate a better reading. There are:
 - o Average of X latest values: This mode will evaluate the alarm condition based on the average value of the last X number of observations. For relative conditions, the reference value will be determined as the average of the last X observation values before the effective reference date.
 - o Peak (any): This mode will evaluate the alarm condition based on the most severe peak value (high or low) that occurred since the previous evaluation. For relative conditions, the reference value will be determined as the average of the last X observation values before the effective reference date.
 - o Peak (local maximum): This mode will evaluate the alarm condition based on the highest value that occurred since the previous evaluation. For relative conditions, the reference value will be determined as the average of the last X observation values before the effective reference date.
 - o Peak (local minimum): This mode will evaluate the alarm condition based on the lowest value that occurred since the previous evaluation. For relative conditions, the reference value will be determined as the average of the last X observation values before the effective reference date.

For all of these last 4 options for relative conditions, the reference value will be determined as the average of the last X observation values before the effective reference date.

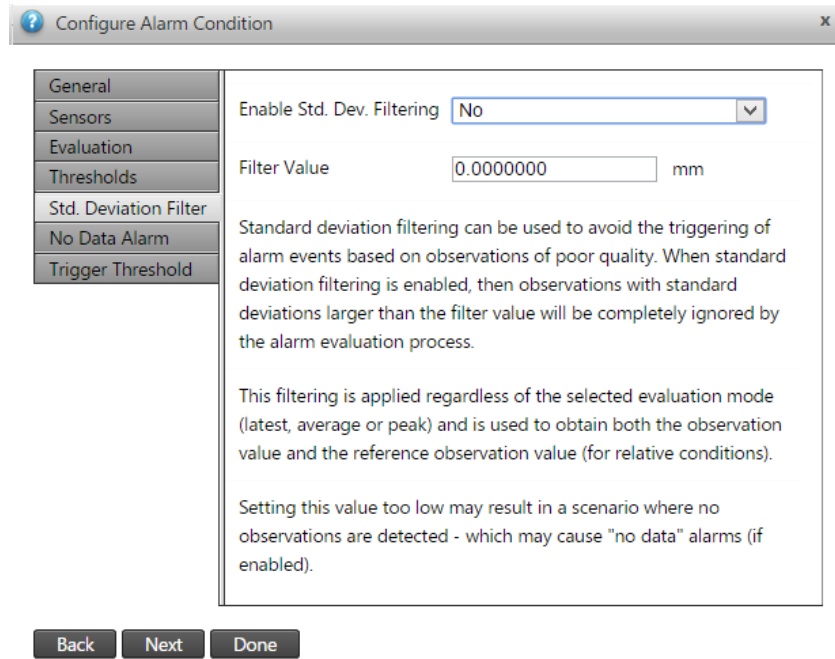
Step 4: Click the Next button to go the next screen and complete as required:



- Absolute / Relative: Indicate whether you want a monitor an absolute measurement or the change in measurement over time.
- Reference Date Mode: This option is enabled if a Relative measurement method was chosen. In that case simply specify the mode by which the reference date should be determined. This date will be used to obtain the reference measurement used to evaluate relative alarm conditions.
- Reference Value Offset or Date:
 - o If at the previous option Rolling Offset was chosen this value specify the amount of seconds, minutes, hours or days to get a time window to determine an average reference measurement.
 - o If at the previous option Specific Date was chosen this value specify the specific date that should be used to get a reference measurement.
- Comparator: Specify the comparator that should be used to evaluate the alarm condition. X would be the measurement that might trigger the alarm and Y would be the threshold or specific value with which X is being compared.
- Unit: The alarm condition will be evaluated in terms of this unit.
- Decimals: Specify the number of decimals by which measurements should be rounded before the thresholds are evaluated.
- Thresholds: These specify the three states that the condition can trigger, starting at Attention, then Warning and finally Alarm. Obviously the threshold values must be set to reflect this logic (e.g. not trigger an Alarm when an Attention or Warning will not also triggered).

Click the Next button to go the next screen.

Step 5: When no Trend is enabled (Step 1 under the General tab) the Standard deviation filtering tab will be available.



The screenshot shows a window titled "Configure Alarm Condition" with a close button (x) in the top right corner. On the left is a vertical navigation menu with the following items: General, Sensors, Evaluation, Thresholds, Std. Deviation Filter (highlighted), No Data Alarm, and Trigger Threshold. The main content area is for the "Std. Deviation Filter" tab and contains the following elements:

- "Enable Std. Dev. Filtering" with a dropdown menu set to "No".
- "Filter Value" with a text input field containing "0.0000000" and a unit label "mm".
- Two paragraphs of explanatory text:
 - "Standard deviation filtering can be used to avoid the triggering of alarm events based on observations of poor quality. When standard deviation filtering is enabled, then observations with standard deviations larger than the filter value will be completely ignored by the alarm evaluation process."
 - "This filtering is applied regardless of the selected evaluation mode (latest, average or peak) and is used to obtain both the observation value and the reference observation value (for relative conditions)."
- A third paragraph: "Setting this value too low may result in a scenario where no observations are detected - which may cause 'no data' alarms (if enabled)."

At the bottom of the dialog are three buttons: "Back", "Next", and "Done".

Standard deviation filtering can be used to avoid the triggering of alarm events based on observations of poor quality. When standard deviation filtering is enabled, then observations with standard deviations larger than the filter value will be completely ignored by the alarm evaluation process.

This filtering is applied regardless of the selected evaluation mode (latest, average or peak) and is used to obtain both the observation value and the reference observation value (for relative conditions).

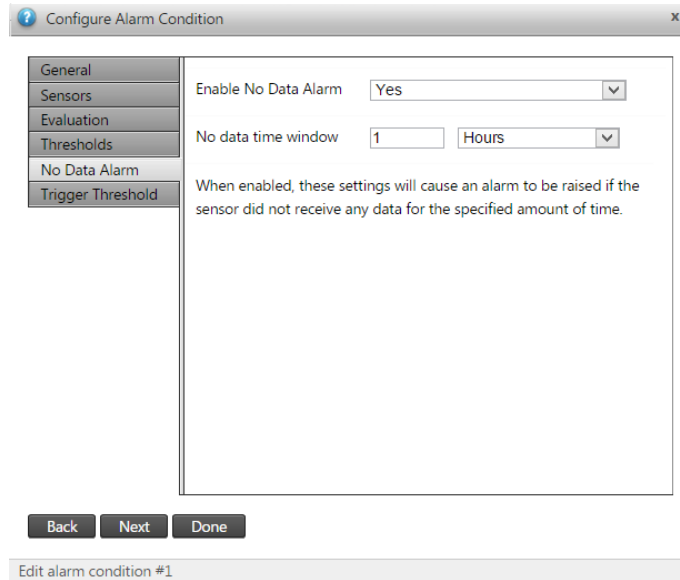
Setting this value too low may result in a scenario where no observations are detected - which may cause "no data" alarms if enabled (discussed in next Step 6).

Complete the necessary fields as required:

- Enable Std. Dev. Filtering: Specify whether standard deviation filtering should be enabled on this alarm condition.
- Filter Value: When standard deviation filtering is enabled this value serves as a "cut-off" filter. Observations with standard deviations larger than this value will be completely invisible to the alarm evaluation process.

Click the Next button to go the next screen.

Step 6: The no alarm when enabled, will cause an alarm to be raised if the sensor did not receive any data for the specified period of time. This useful to make sure the sensors is working. Complete the fields as required:



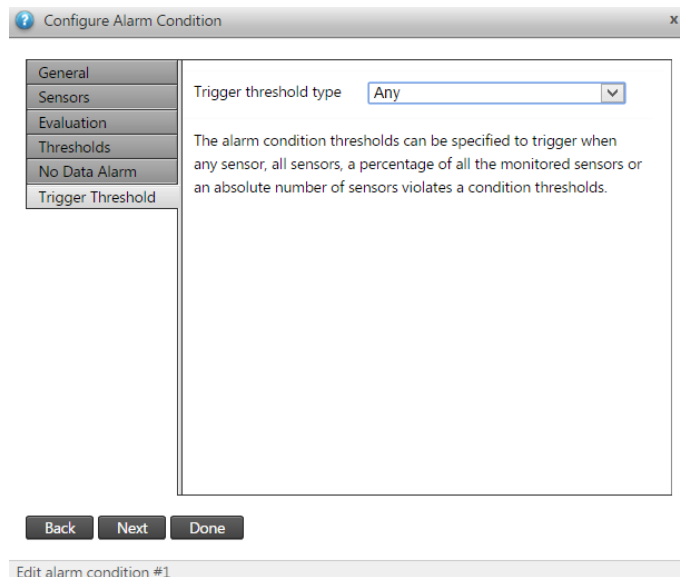
The screenshot shows a web-based configuration window titled "Configure Alarm Condition" with a close button (x) in the top right corner. On the left is a vertical navigation menu with tabs: "General", "Sensors", "Evaluation", "Thresholds", "No Data Alarm" (which is selected and highlighted), and "Trigger Threshold". The main content area contains the following settings:

- "Enable No Data Alarm" is set to "Yes" via a dropdown menu.
- "No data time window" is set to "1" in a text input field, followed by a dropdown menu set to "Hours".
- Below these settings is a descriptive text: "When enabled, these settings will cause an alarm to be raised if the sensor did not receive any data for the specified amount of time."

At the bottom of the main content area are three buttons: "Back", "Next", and "Done". Below the main content area is a footer bar that says "Edit alarm condition #1".

- Enable No Data Alarm: Raise an alarm if no data is received for the specified period of time.
- No data time window: Time quantity, measured in the configured time unit

Step 7: Click the Next button to go the final screen and select a trigger threshold if required.



The screenshot shows the same "Configure Alarm Condition" window, but with the "Trigger Threshold" tab selected in the left-hand menu. The main content area contains the following settings:

- "Trigger threshold type" is set to "Any" via a dropdown menu.
- Below this setting is a descriptive text: "The alarm condition thresholds can be specified to trigger when any sensor, all sensors, a percentage of all the monitored sensors or an absolute number of sensors violates a condition thresholds."

At the bottom of the main content area are three buttons: "Back", "Next", and "Done". Below the main content area is a footer bar that says "Edit alarm condition #1".

The alarm condition thresholds can be specified to trigger when any sensor, all sensors, a percentage of all the monitored sensors or an absolute number of sensors violates a condition thresholds. Click Done to save all changes.
Your first Condition is now created and you should see it immediately.

Configure Alarm Definition (Disabled) - Alarm

Name* Evaluation Frequency*

Revision Condition Merge Order

Owner Notification granularity



Description Customize messages

Require Acknowledge

- Notification Messages
- Notification Recipients
- Batch Files
- Delete
- History
- Enable Alarm

Condition Configuration (Alarm Disabled) - Current State (Alarm)

Add Condition

Merge Operand	Data Type	Sensor Link Mode	Evaluation	Condition Type	Reference Date	σ Filter	Attention Threshold	Warning Threshold	Alarm Threshold	No Data Threshold		
1	Where	Position GNSS Integrated Survey (Change per Hour)	Specific Sensor(s)	Latest Value	Absolute Measurement		Disabled	dH >= 3 mm/hour	dH >= 4 mm/hour	dH >= 5 mm/hour	6 Hours	 







Add Condition Enable Alarm

If needed you can add more conditions and concatenated the conditions together via logical Boolean operators “AND” or “OR”.

Any added conditions will add rows in table (as illustrated below). Note the Boolean operators (in grey) between the conditions.

Condition Configuration (Alarm Disabled) - Current State (Alarm)

Add Condition

Merge Operand	Data Type	Sensor Link Mode	Evaluation	Condition Type	Reference Date	σ Filter	Attention Threshold	Warning Threshold	Alarm Threshold	No Data Threshold		
1	Where	Position GNSS Integrated Survey (Change per Hour)	Specific Sensor(s)	Latest Value	Absolute Measurement		Disabled	dH >= 3 mm/hour	dH >= 4 mm/hour	dH >= 5 mm/hour	6 Hours	  
	Or											
2		Position GNSS Integrated Survey	Specific Sensor(s)	Latest Value	Relative Measurement (Δ)	7 Days	Disabled	ΔdH >= 3 mm	ΔdH >= 4 mm	ΔdH >= 5 mm	6 Hours	  

The colour of the conditions indicate the state of the condition.

- Green: All is well (state = OK)
- Blue: The first threshold has been triggered (state = Attention)
- Orange: The second threshold has been triggered (state = Warning)
- Red: The final and third threshold has been triggered (state = Alarm)









In the above example the first condition is in the OK state (green) and the second condition is in the Alarm state (red). Because the two conditions are joined with a logical OR, the alarm (existing out of two conditions) will be in the Alarm state.

13.4 CONFIGURING CONDITIONS

This “Condition Configuration” section is used to add and remove conditions, modify existing conditions and finally enable the alarm.

Condition Configuration (Alarm Disabled) - Current State (Alarm)

Add Condition

Merge Operand	Data Type	Sensor Link Mode	Evaluation	Condition Type	Reference Date	Filter	Attention Threshold	Warning Threshold	Alarm Threshold	No Data Threshold		
1	Where	Position GNSS Integrated Survey (Change per Hour)	Specific Sensor(s)	Latest Value	Absolute Measurement		Disabled	dH >= 3 mm/hour	dH >= 4 mm/hour	dH >= 5 mm/hour	6 Hours	 
<div style="border: 1px solid red; padding: 2px;"> 01 Roof Edge (Position GNSS Integrated Survey)  -1 mm/hour (2015/02/21 09:03:46) </div> <div style="border: 1px solid red; padding: 2px;"> 02 Roof Centre (Position GNSS Integrated Survey)  -1 mm/hour (2015/02/21 09:03:46) </div>												
Or												
2		Position GNSS Integrated Survey	Specific Sensor(s)	Latest Value	Relative Measurement (Δ)	7 Days	Disabled	ΔdH >= 3 mm	ΔdH >= 4 mm	ΔdH >= 5 mm	6 Hours	 
<div style="border: 1px solid red; padding: 2px;"> 01 Roof Edge (Position GNSS Integrated Survey)  17 mm (2015/02/21 09:03:46) -5 mm (2015/02/14 09:03:41) </div> <div style="border: 1px solid red; padding: 2px;"> 02 Roof Centre (Position GNSS Integrated Survey)  16 mm (2015/02/21 09:03:46) -6 mm (2015/02/14 09:03:41) </div>												

Thresholds for Condition 1: Attention: |dH| >= 3 mm/hour, Warning: |dH| >= 4 mm/hour, Alarm: |dH| >= 5 mm/hour, No Data: 6 Hours. Thresholds for Condition 2: Attention: |ΔdH| >= 3 mm, Warning: |ΔdH| >= 4 mm, Alarm: |ΔdH| >= 5 mm, No Data: 6 Hours.

Each alarm consist our of one or more “alarm condition(s)” (illustrated by 1), which are concatenated by AND or OR conditions (illustrated by 2). The “alarm conditions” are listed at the bottom right below the heading “Condition Configuration” on the right hand pane.

Each “alarm condition” can also consist out of one or more sensor reading conditions also (3), each with their own corresponding threshold conditions on the right (1). To collapse/expand these sensors simply click on the “i” button (4).

The “alarm conditions” can also be moved up and down (5) to order them, in order to build the required Boolean condition.

To edit and an “alarm condition”, simply click anywhere on it in the list where it is displayed. Or click on the “Add Condition” button to create a new one. (Note: the overall alarm needs be in a “disabled” mode to be able to edit its conditions).

In order to delete any “alarm condition”, simply click on the trash can icon on the far right of it.

13.5 CONFIGURING AN ALARM

When Condition(s) were added to the alarm more options (indicated below) will be enabled to configure. To modify, simply click on the option and a pop-up will appear.

Configure Alarm Definition (Disabled) - Alarm

Name*	<input type="text" value="Demo Alarm"/>	Evaluation Frequency*	<input type="text" value="10"/> <input type="text" value="Minutes"/>
Revision	<input type="text" value="0"/>	Condition Merge Order	<input type="text" value="And before Or"/>
Owner	<input type="text" value="Wim Conradie"/>	Notification granularity	<input type="text" value="Alarm status changed"/>
Description	<input type="text"/>	Customize messages	<input type="text" value="No"/>
		Require Acknowledge	<input type="text" value="No"/>

Step 1: Notification granularity

This setting controls the granularity at which changes in alarm states are sent.

Notification Message Settings

General Options	Notification granularity <input type="text" value="Alarm status changed"/>
Alarm Level	Customize messages <input type="text" value="Yes"/>
Condition Level	
Sensor Level	

The application automatically builds up detailed log entries and emails when notifications for alarm related events are sent.

You can customize the message content by switching on the above option. Message customization takes place at three levels: "Alarm Definition Level", "Alarm Condition Level" and "Sensor Level".

At each level, different "tags" are available. These tags can be used to embed contextual data into the custom message.

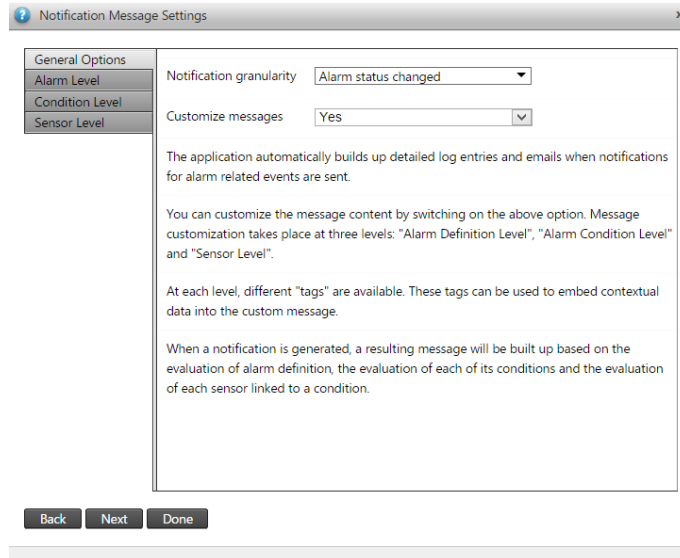
When a notification is generated, a resulting message will be built up based on the evaluation of alarm definition, the evaluation of each of its conditions and the evaluation of each sensor linked to a condition.

The application automatically builds up detailed log entries and emails when notifications for alarm related events are sent.

You can customize the message content by switching on the above option. Message customization takes place at three levels: "Alarm Definition Level", "Alarm Condition Level" and "Sensor Level". At each level, different "tags" are available. These tags can be used to embed contextual data into the custom message. When a notification is generated, a resulting message will be built up based on the evaluation of alarm definition, the evaluation of each of its conditions and the evaluation of each sensor linked to a condition.

Step 2: Customize messages

This setting determines whether standard notifications messages or custom notification messages will be used in log entries, SMS notifications and emails.

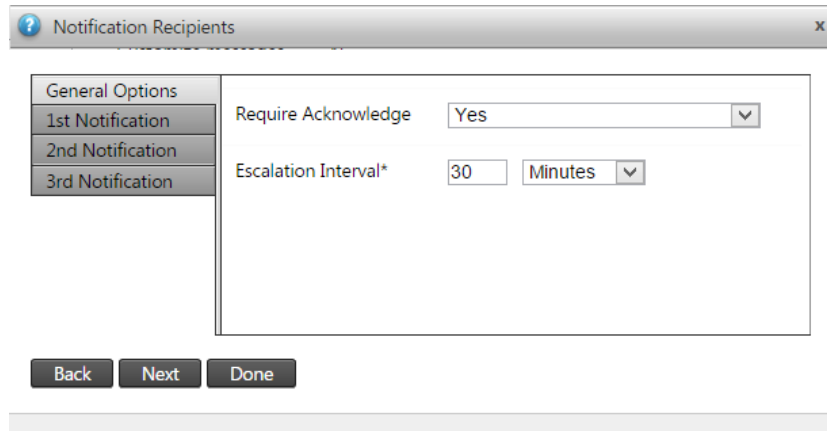


The application automatically builds up detailed log entries and emails when notifications for alarm related events are sent. You can customize the message content by switching on the above option. Message customization takes place at three levels: "Alarm Definition Level", "Alarm Condition Level" and "Sensor Level".

At each level, different "tags" are available. These tags can be used to embed contextual data into the custom message. When a notification is generated, a resulting message will be built up based on the evaluation of alarm definition, the evaluation of each of its conditions and the evaluation of each sensor linked to a condition.

Step 3: Require Acknowledge

Alarm Notifications requires acknowledgement. If set to true 1st, 2nd and 3rd notifications will be sent out depending on whether the preceding notification has been acknowledged or not.



13.6 ENABLE & DISABLE ALARMS

Finally after all conditions and settings have been configured, the alarm can be enabled (or disabled later again).

When enabling an alarm, you will be given the option to update the alarm revision.

The alarm revision is mentioned in automated log entries and auto-generated emails.

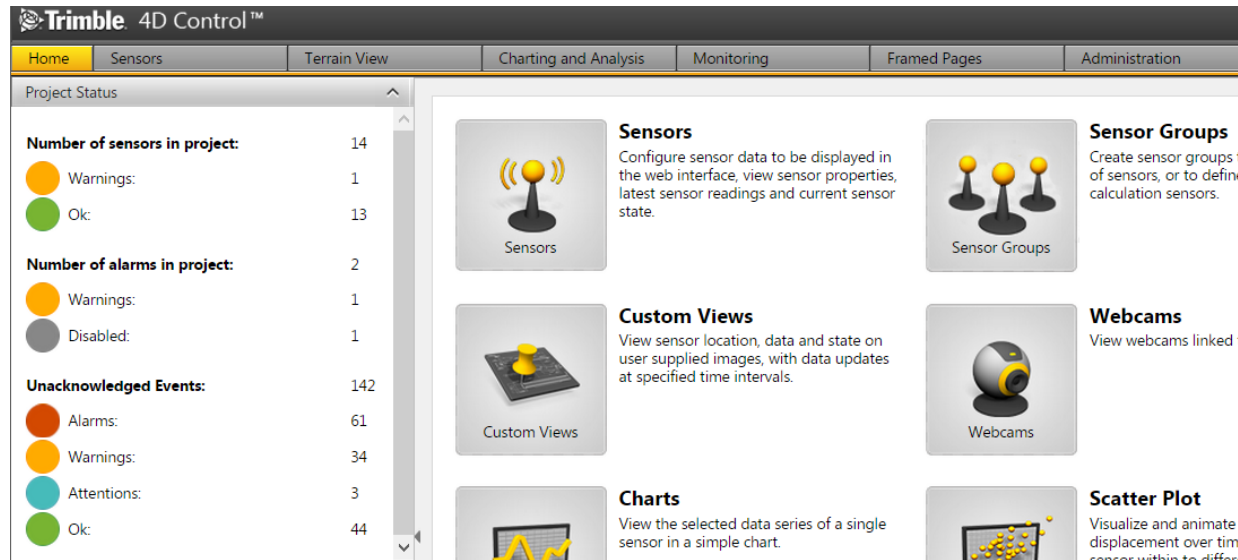


The user can disable the alarm by either clicking on the bell or on the disable for edit button.



13.7 EVALUATING ALARM & CONDITION STATUSES

When alarms are activated a summary will also be displayed on the Home landing page of the system after successful log in.



A well maintained project should have many unacknowledged events

Project Status ^

Number of sensors in project: 14

- Attentions: 10
- Ok: 4

Number of alarms in project: 3

- Attentions: 1
- Disabled: 2

Unacknowledged Events: 0

By simply clicking on any of these will navigate the user to the Alarm Status page

Alarms Status

Number of alarms in project: 2 Unacknowledged Events: 142

- Warnings: 1 ● Alarms: 61
- Disabled: 1 ● Warnings: 34
- Attentions: 3
- Ok: 44

Unacknowledged Events

[Refresh](#) [Acknowledge All](#)

<< < 1 of 24 > >>

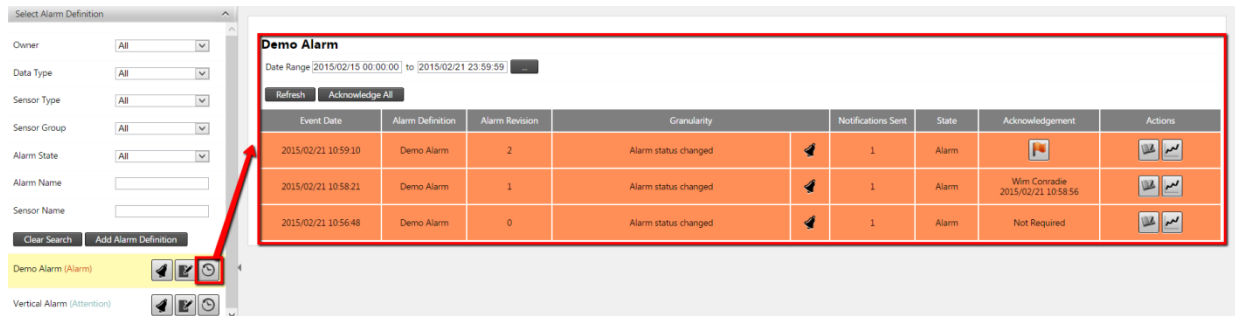
Event Date	Alarm Definition	Alarm Revision	Granularity	Notifications Sent	State	Acknowledgement	Actions
2015/01/20 14:27:45	Test withoutTrend	4	Alarm status changed		3	Warning	
2015/01/20 13:57:45	Test withoutTrend	4	Alarm status changed		3	Attention	
2015/01/20 13:52:45	Test withoutTrend	4	Alarm status changed		3	Alarm	
2015/01/20 11:53:45	test TREND	9	Alarm status changed		3	Alarm	
2015/01/20 11:53:45	Test withoutTrend	4	Alarm status changed		3	Warning	
2015/01/20 11:27:45	test TREND	9	Alarm status changed		3	Warning	

If you are in charge of responding to alarms that trigger, you can simply click on the flag to acknowledge that you have responded to the alert and resolved it or provided a reason. Reasons will be discussed in Logs (Section 14, page 106). All acknowledgements will also be added to the logs.

By acknowledging any alarm it will disappear from the list. If you want to review past (including active) events for a certain alarm, simply click on the History link next to the alarm in the left hand pane where alarms are listed by default (indicated by a clock icon).

Demo Alarm (Alarm)




Vertical Alarm (Attention)






Select Alarm Definition








Owner: All
 Data Type: All
 Sensor Type: All
 Sensor Group: All
 Alarm State: All
 Alarm Name:
 Sensor Name:

Clear Search Add Alarm Definition

Demo Alarm (Alarm)   

Vertical Alarm (Attention)   

Demo Alarm
 Date Range: 2015/02/15 00:00:00 to 2015/02/21 23:59:59
 Refresh Acknowledge All

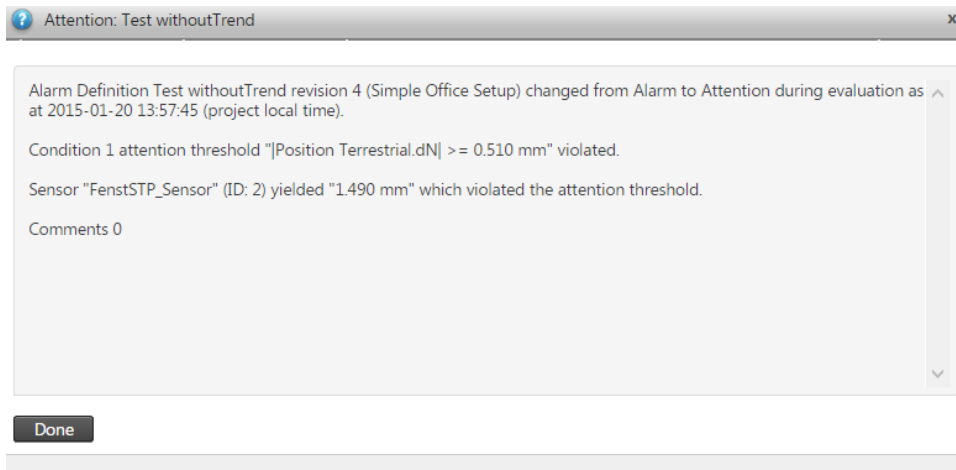
Event Date	Alarm Definition	Alarm Revision	Granularity	Notifications Sent	State	Acknowledgement	Actions
2015/02/21 10:59:10	Demo Alarm	2	Alarm status changed	1	Alarm		 
2015/02/21 10:58:21	Demo Alarm	1	Alarm status changed	1	Alarm	Wim Conradie 2015/02/21 10:58:56	 
2015/02/21 10:56:48	Demo Alarm	0	Alarm status changed	1	Alarm	Not Required	 

Using the buttons in the far right column (below the Actions heading) you can view more information about alarm events.

To view a text description click on the Log link (indicated by a log book icon)



A pop-up will show with the details about the event. If notifications settings were activated, you should also have received and email or SMS with this text.



Attention: Test withoutTrend [X]

Alarm Definition Test withoutTrend revision 4 (Simple Office Setup) changed from Alarm to Attention during evaluation as at 2015-01-20 13:57:45 (project local time).

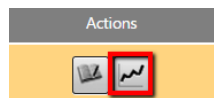
Condition 1 attention threshold "|Position Terrestrial.dN| >= 0.510 mm" violated.

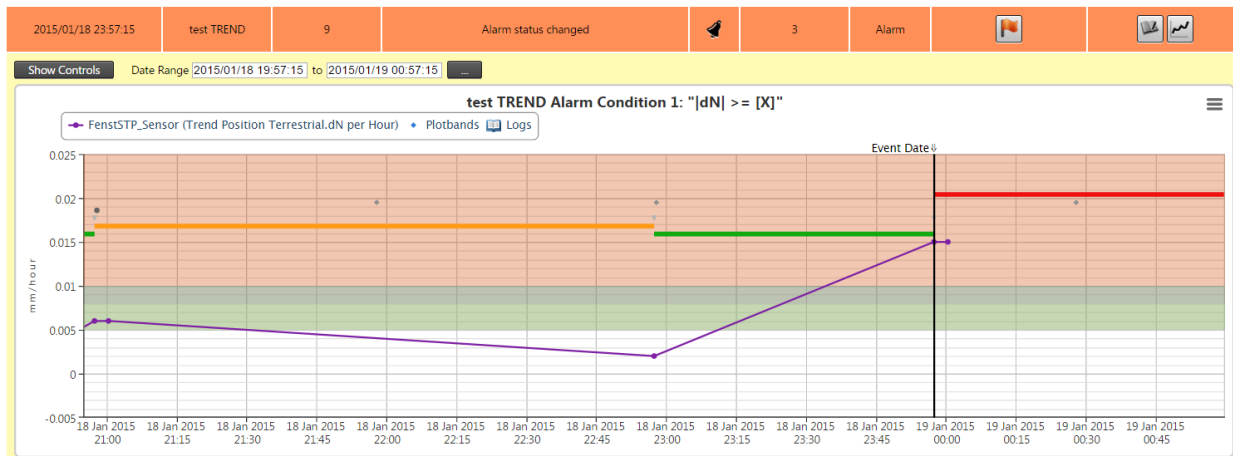
Sensor "FenstSTP_Sensor" (ID: 2) yielded "1.490 mm" which violated the attention threshold.

Comments 0

Done

For more detailed analysis it might be necessary to review the graphs that led to the trigger of the event. To do this simply click on the graph icon.





The purple line in the graph above indicates the effective sensor readings.

The vertical black line indicates when the event has happened.

The horizontal lines (orange => green =>red) indicate the change in alarm states. Normally it should be all green (which is the OK state), but for this example we used very sensitive (low) thresholds to trigger the states.

The starting point of each line is where the event happened that triggered the state. Note that the red line starts from the vertical black line, which is the time where the event happened that we are inspecting.

The dots on the graph at the event changes indicate the first, second and final notifications that were sent out (depending on the configuration and/or escalations that happened). By moving the mouse cursor over it more detail will be shown via pop-ups.

The white area on the graph indicates the OK state for the effective sensor(s) readings. The other three colored areas (plotbands) on the graph indicate the different threshold areas that will change the alarm states (Attention => Warning=> Alarm). To hide it, simply click on it on the graph legend.

This should provide insightful information about the event that happened. We will next discuss the other details that also appear in the log section.

13.8 SCHEDULED ALARM REPORT

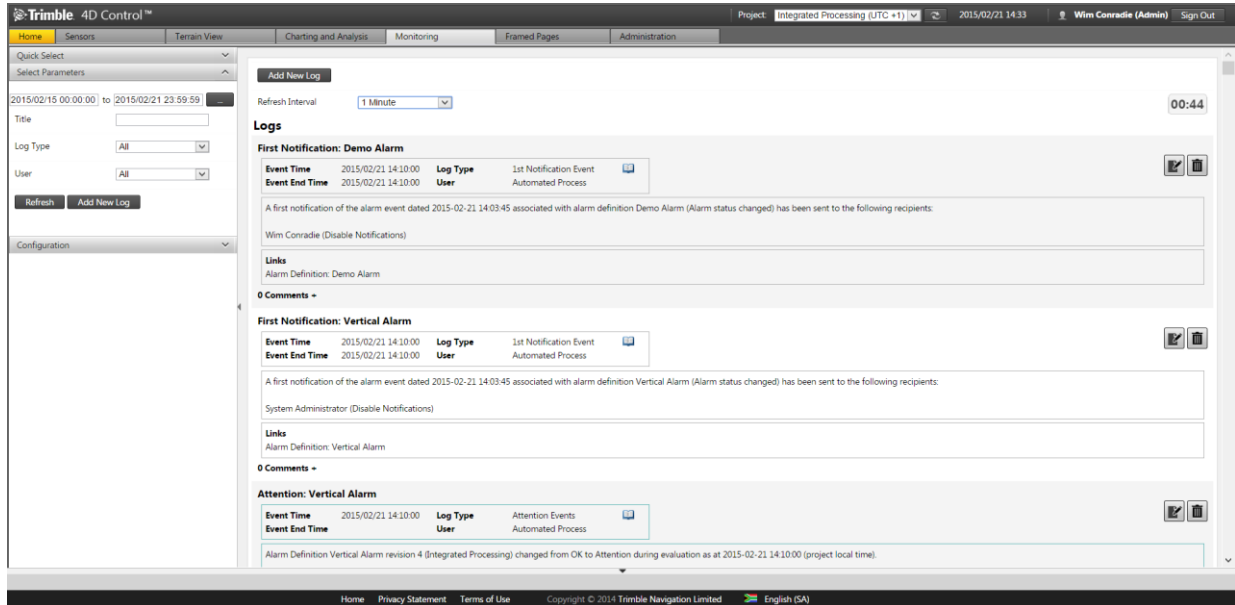
A scheduled alarm report shows the current alarm states of the sensors in a project. This report can be schedule to generate and emailed periodically directly to a number of users (via PDF attachment in the email).

To create and preview a first report schedule simply:

- 1) Click on the Add Report Schedule button
- 2) Enter a Name for your report
- 3) Click the Save Button
- 4) Click the Preview Button

Your report will be generated and downloaded as a PDF. Simply click the edit button (pen and paper icon) on the left hand pane next to your report to further customize it. In order to delete the report schedule, simply click the trash can icon.

14 Logs



The screenshot displays the Trimble 4D Control web interface. The top navigation bar includes 'Home', 'Sensors', 'Terrain View', 'Charting and Analysis', 'Monitoring', 'Framed Pages', and 'Administration'. The main content area is titled 'Logs' and features a 'Refresh Interval' set to '1 Minute' and a '00:44' timer. The logs are organized into three sections:

- First Notification: Demo Alarm**

Event Time	Event End Time	User	Log Type
2015/02/21 14:10:00	2015/02/21 14:10:00	Wim Conradie	1st Notification Event

A first notification of the alarm event dated 2015-02-21 14:03:45 associated with alarm definition Demo Alarm (Alarm status changed) has been sent to the following recipients:
Wim Conradie (Disable Notifications)

Links
Alarm Definition: Demo Alarm

0 Comments
- First Notification: Vertical Alarm**

Event Time	Event End Time	User	Log Type
2015/02/21 14:10:00	2015/02/21 14:10:00	System Administrator	1st Notification Event

A first notification of the alarm event dated 2015-02-21 14:03:45 associated with alarm definition Vertical Alarm (Alarm status changed) has been sent to the following recipients:
System Administrator (Disable Notifications)

Links
Alarm Definition: Vertical Alarm

0 Comments
- Attention: Vertical Alarm**

Event Time	Event End Time	User	Log Type
2015/02/21 14:10:00	2015/02/21 14:10:00	Automated Process	Attention Events

Alarm Definition Vertical Alarm revision 4 (Integrated Processing) changed from OK to Attention during evaluation as at 2015-02-21 14:10:00 (project local time).

The Logs section shows information on events (or log entries), such as alarms, projects, hardware events, seismic events, accident events and blasting events.

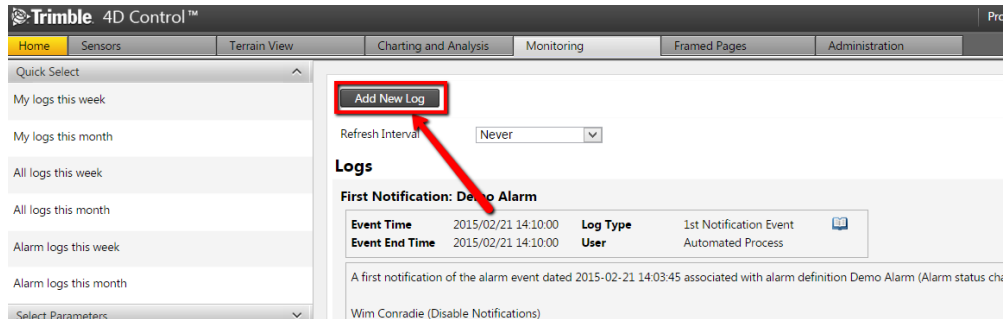
Alarm events (that was discussed in section 13 on page 89) are automatically inserted into the log entries. Other events are manually entered into the system and can be discussed by the users on the system.

When opening the logs section for the first time no log entries will be displayed on the right-hand side.

14.1 ADDING A NEW LOG ENTRY

Step 1: Navigate to the default log landing page.

Step 2: Click the Add New Log button.



Step 3: The following pop-up window will appear.

The 'Add New Log' pop-up window contains the following fields and controls:

- Title***: A text input field.
- Log Type***: A dropdown menu with 'Accident Events' selected.
- Event Time**: A text input field containing '2015/02/21 14:37:47'.
- Event End Time**: A text input field with a 'Clear' button to its right.
- Description***: A large text area for entering details.
- Save** and **Cancel** buttons at the bottom.

Complete the necessary fields as required.

- Title: Name of the event.
- Log Types: The type of event. You can configure the available “Log Types” if the best describing Type is not available (to be discussed in section 0 on page 109).
- Event Time: The date and time the event happened.
- Event End Time: The date and time it ended for the log entry.
- Description: An explanation of what happened.

Click the Save button when completed.

Step 4: The log entry will appear in the log. We will discuss how to view the log entry in the next section.



14.2 ADDING COMMENTS TO LOG ENTRIES

Multiple comments can be added to a Log entry.

Simply click on the Comments link below each log entry to read or add comments to the entry

Logs

First Notification: Demo Alarm


Event Time	2015/02/21 14:40:00	Log Type	1st Notification Event	
Event End Time	2015/02/21 14:40:00	User	Automated Process	

A first notification of the alarm event dated 2015-02-21 14:33:42 associated with alarm definition Demo Alarm (Alarm status changed) has been sent to the following recipients:

Wim Conradie (Disable Notifications)

Links
Alarm Definition: Demo Alarm

1 Comments -



2015/02/21 14:54:11 Wim Conradie
This event was just a test to demonstrate alarm functionality 

Comments (as well as log entries) can be deleted again if it was logged in error; that is provided the user has the required permissions to do so.

To delete a comment or entry, simply click on the trash can icon on the right of it.

Logs

First Notification: Demo Alarm


Event Time	2015/02/21 14:40:00	Log Type	1st Notification Event	
Event End Time	2015/02/21 14:40:00	User	Automated Process	

A first notification of the alarm event dated 2015-02-21 14:33:42 associated with alarm definition Demo Alarm (Alarm status changed) has been sent to the following recipients:

Wim Conradie (Disable Notifications)

Links
Alarm Definition: Demo Alarm

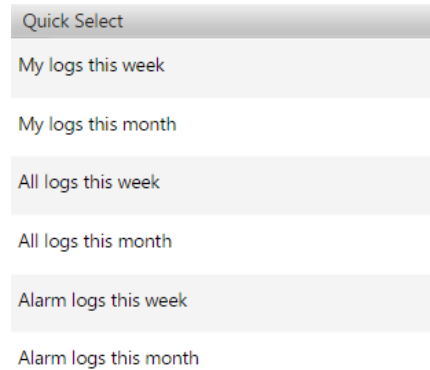
1 Comments -

2015/02/21 14:54:11 Wim Conradie
This event was just a test to demonstrate alarm functionality 

14.3 VIEW LOG ENTRIES

Step 1: Navigate to the default log landing page.

Step 2: Select the “Quick Select” bar. Find the logs you wish to view by selecting the timeframe the log would have been created.



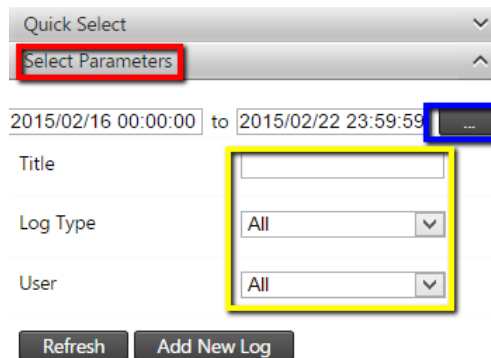
ALTERNATIVELY to find a specific log:

Step 1: Select the Select Parameters bar in the left pane (illustrated in red in the next figure).

Step 2: Select the timeframe of the log event you wish to view (illustrated in blue).

And / Or

Step 3: Enter information you have about the log in the given fields (in yellow).



Step 4: Finally click the Refresh button to update the log entries on the right.

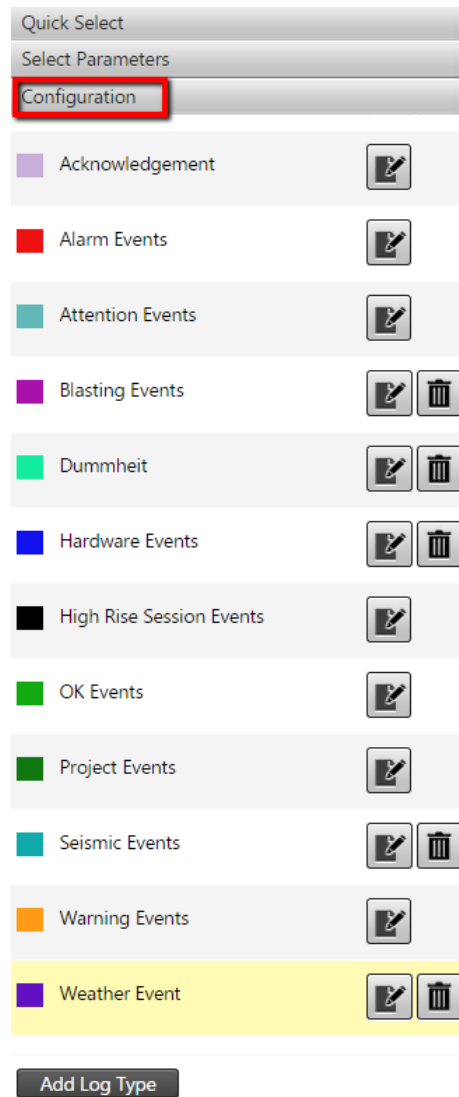
Note: The Add New Log button here does the same as the Add New Log button on the Default Log landing page in the main right hand side area.

14.4 LOG TYPES

14.4.1 Configure Log Types

Step 1: Select the Configuration bar in the left pane.

Step 2: A list of Log Types will be displayed.



Step 3: Select the appropriate option to view the log type details. You can click on the paper-pen icon to edit the log type or the trash can icon to delete the log type. Only certain log types can be configured.

Step 4: If the edit icon was clicked. The details will be displayed on the right hand side area.

Edit Log Type

Name*	<input type="text" value="Weather Event"/>
Description*	<input type="text" value="All weather conditions which affect the project."/>
Project Link Mode	<input type="text" value="All"/>
Color	<input type="text" value=""/>
Start Icon	<input type="text" value=""/> <input type="button" value="Upload Icon"/> <input type="button" value="Remove Icon"/>
End Icon	<input type="text" value=""/> <input type="button" value="Upload Icon"/> <input type="button" value="Remove Icon"/>

Update the necessary fields as required.

- Name: The display name for the log type.
- Description: Specify a description for the log type.
- Project Link Mode: The default option is all projects, but you can also specify here which projects this log type may only be available for if it should not be available for all projects.
- Color: The log type colour that will be used to represent the log on analysis charts.
- Start Icon: The log type icon that will be used to represent the start of a log on analysis charts.
- End Icon: The log type icon that will be used to represent the end of a log on analysis charts.

In order to save any changes that were made, click the Save button (that will appear after any changes were made). **Note that some log types offer only limited editing options.**

14.4.2 Add a new Log Type

Step 1: Click the Add Log Type button at the top (as illustrated) or bottom of the log type list.

Quick Select	
Select Parameters	
Configuration	
Project Filter	<input type="text" value="All"/>
Log Type Name	<input type="text"/>
<input type="button" value="Clear Search"/>	<input type="button" value="Add Log Type"/>

Step 2: Enter the necessary fields as required which would be the same as previously discussed. Click the Save button and your Log Type will be added to the list.

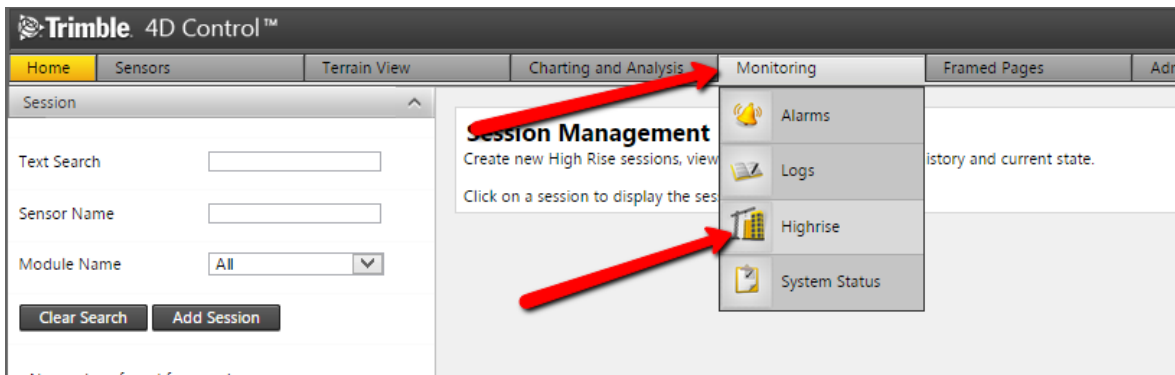
15 Highrise

Highrise is used to manage Highrise construction sessions.

It is a specialized module that if acquired will be accompanied by ample personal training.

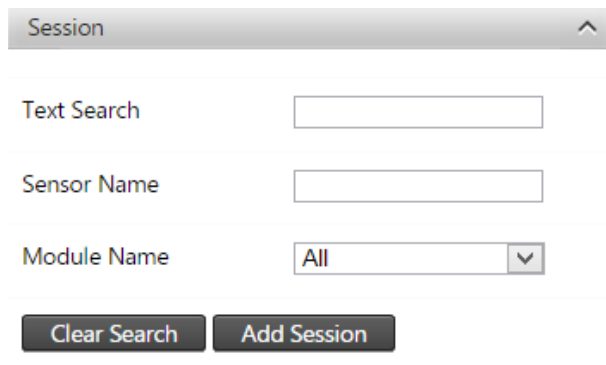
15.1 ACCESS COMPOSITE VIEWS

Navigate to the composite view section via the Menu or the dedicated home page shortcut icon.



15.2 NAVIGATION AND CREATION

Use the filters on the left hand side, to identify sessions



The screenshot shows the 'Session' filter panel. It includes a 'Text Search' input field, a 'Sensor Name' input field, and a 'Module Name' dropdown menu set to 'All'. Below the filters are 'Clear Search' and 'Add Session' buttons.

Step 1: To create a new session simply click on the Add Session button

Step 2: Provide a name for the session.

Start Session

Session*

Module

Step 3: Choose a module the session is linked to and click the Start button.

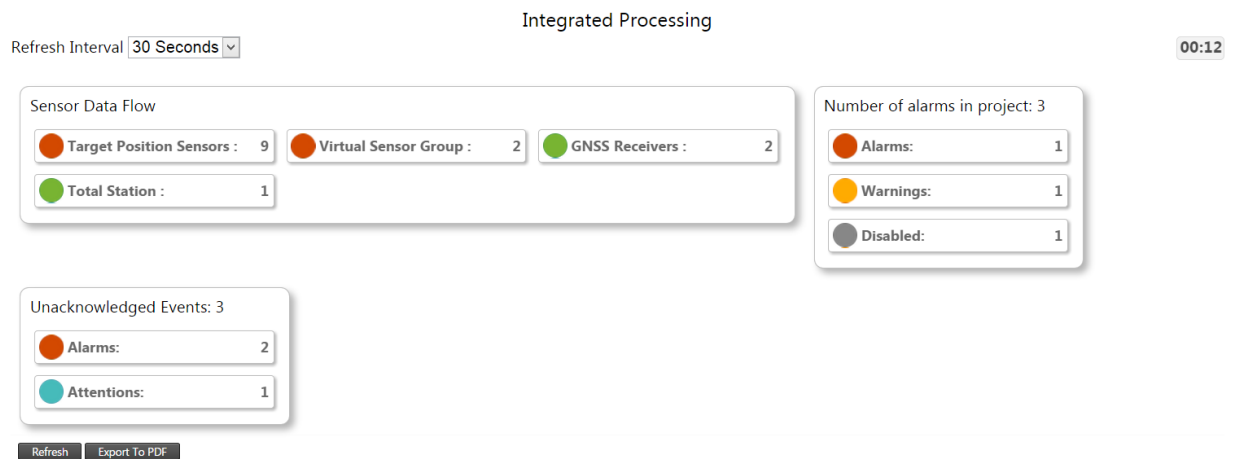
After the session was created it will be listed throughout the Charts, Analysis, Composite Views, etc. as an additional item with which to filter sensors.

16 System Status

The System Status section brings useful top level reporting within the T4D system together as well as provide means to link back to the respective sections in the system for more detailed drill down queries. It also provides the tools to generate detailed reports and notifications.

16.1 OVERVIEW

The overview displays a dashboard like page where one can get a general overview of the system.



The screenshot shows the 'Integrated Processing' dashboard. At the top, there is a 'Refresh Interval' dropdown set to '30 Seconds' and a '00:12' timer. The dashboard is divided into several sections:

- Sensor Data Flow:** Contains four items: Target Position Sensors (9), Virtual Sensor Group (2), GNSS Receivers (2), and Total Station (1).
- Number of alarms in project: 3:** Contains three items: Alarms (1), Warnings (1), and Disabled (1).
- Unacknowledged Events: 3:** Contains two items: Alarms (2) and Attentions (1).

At the bottom left, there are two buttons: 'Refresh' and 'Export To PDF'.

By clicking on any item will navigate you to respective section about it:

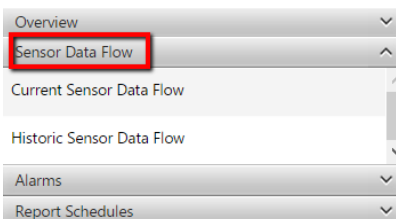
- Sensor Data Flow: Will be discussed in section 16.2, page 114.
- Number of alarms: Will be discussed in section 16.3, page 117.
- Unacknowledged Events: Was discussed in section 13.7, page 102.

The page can be auto refreshed by setting the Refresh Interval or manually by clicking the Refresh button.

The page can also be exported to a PDF file.

16.2 SENSOR DATA FLOW

















Sensor data flow is located in the left hand side subsection.



The screenshot shows a vertical navigation menu with the following items: Overview, Sensor Data Flow (highlighted with a red box), Current Sensor Data Flow, Historic Sensor Data Flow, Alarms, and Report Schedules. Each item has a small arrow icon next to it.

The sensor data flow area is used to analyze the performance and age on the latest available observations for each sensor. This can be used to determine if data is currently being delivered for each sensor.

Current Sensor Data Flow

Text Search	Sensor Type	Data Type	Last Observation Date	Observation Age	Clear Search
<< < 1 of 2 > >>					
Blume_Down_Sensor	 Target Position	Position Terrestrial	2015/01/12 08:24:33	40d 07:59:27	
Blume_Down_Sensor_in_VCrack	 Virtual Crackmeter	Position Crackmeter	2015/01/12 08:24:33	40d 07:59:27	
FenstSTP_Sensor	 Target Position	Position Terrestrial	2015/01/20 16:56:25	31d 23:27:35	
CalculationSensor_deltaCombine...	 Calculation Sensor	Length	2015/01/20 16:56:25	31d 23:27:35	
FenstSTP → DR_Door	 Target Raw	Multiple (2)	2015/02/20 09:55:24	1d 06:28:36	
Q_RUN_ _MittNEU_STP → Alex_Wan...	 Target Raw	Multiple (3)	2015/02/20 16:26:19	23:57:42	
Q_RUN_ _MittNEU_STP → DoublePr...	 Target Raw	Multiple (3)	2015/02/20 16:26:19	23:57:42	
Q_RUN_ _MittNEU_STP → DR_Door_...	 Target Raw	Multiple (3)	2015/02/20 16:26:19	23:57:42	
Q_RUN_ _MittNEU_STP → FenstSTP...	 Target Raw	Multiple (3)	2015/02/20 16:26:19	23:57:42	
Q_RUN_ _MittNEU_STP → Paula_Wa...	 Target Raw	Multiple (3)	2015/02/20 16:26:19	23:57:42	

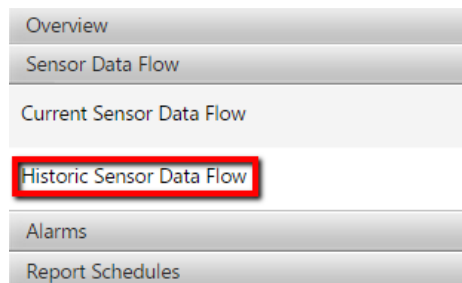
The following colour coded indications are provided:

- Green: Data delivery appears be healthy.
- Orange: Data delivery appears to be delayed.
- Red: Data delivery appears to have stopped.

As previously the page can be refreshed or exported to PDF.

At the top of the page is also filters to assist with quickly navigating to sensors in case the project has many sensors.

In order to look at past availability of data observations simply click on the History Sensor Data Flow option in the left hand pane.



In the example below the sensor history are displayed for the past 20 days. Each cell represents a specific day for a specific sensor and the total observations that day. As can be seen the healthy green cells have more readings than the orange cells, which again have more than the red cells provided no observations.

Historic Sensor Data Flow

Hide Parameters Clear Search

Text Search Time Window Width Days

Data Type Effective Date

<< < 2 of 3 > >>

Sensors	Data Type	2015/02/02	2015/02/03	2015/02/04	2015/02/05	2015/02/06	2015/02/07	2015/02/08	2015/02/09	2015/02/10	2015/02/11	2015/02/12	2015/02/13
07 Roof Edge	Position GNSS Integrated Surve...	48	50	34	17	48	48	48	48	48	48	48	48
08 East Elevator	Position GNSS Integrated Surve...	48	50	41	17	48	48	48	48	48	48	48	48
09 Blue Building	Position GNSS Integrated Surve...	0	0	0	0	0	0	0	0	0	0	0	0
1000 RNHM South	Position GNSS Integrated Surve...	48	51	48	17	48	48	48	48	48	48	48	48
2000 RNHM North	Position GNSS Integrated Surve...	48	51	48	17	48	48	48	48	48	48	48	48
My first group	Position GNSS Integrated Surve...	0	14	14	0	0	0	0	0	0	0	0	0

< Export To PDF Refresh >

There is a useful pin that can be toggled in the Data Type column’s heading to keep the Sensor details fixed if you would like to scroll to the right.

The “20 day” time window can easily be changed, let’s say for example to 7 months, as indicated below.

Historic Sensor Data Flow

Hide Parameters Clear Search

Text Search Time Window Width Months

Data Type Effective Date

<< < 2 of 3 > >>

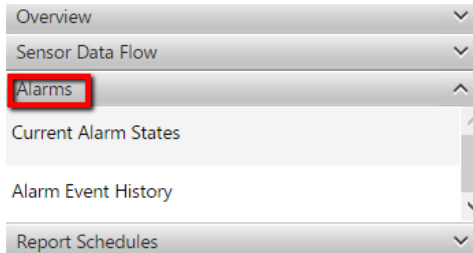
Sensors	Data Type	2014/08/01	2014/09/01	2014/10/01	2014/11/01	2014/12/01	2015/01/01	2015/02/01
07 Roof Edge	Position GNSS Integrated Surve...	1418	1354	1332	1965	1013	1204	958
08 East Elevator	Position GNSS Integrated Surve...	1492	1435	1455	2189	1071	1261	965
09 Blue Building	Position GNSS Integrated Surve...	0	0	0	0	0	0	0
1000 RNHM South	Position GNSS Integrated Surve...	1493	1435	1463	2191	1071	1272	973
2000 RNHM North	Position GNSS Integrated Surve...	1493	1435	1463	2191	1072	1272	973
My first group	Position GNSS Integrated Surve...	0	0	0	7	279	221	34

Sensor Name: Target Position, Data Type: Position GNSS

< Export To PDF Refresh >

16.3 ALARMS

Alarms data flow is located in the left hand side subsection.



As with sensor data flow, the Current Alarm States show active data.

Current Alarm States

Alarm Name	Alarm State	Last Ok Event	Last Attention Event	Last Warning Event	Last Alarm Event	Clear Search
Demo Alarm (Alarm)	All	Never	2015/02/21 14:03:45	Never	2015/02/21 14:33:42	
Vertical Alarm (OK)		2015/02/21 18:33:49	2015/02/21 17:03:47	2015/02/21 15:03:46	2015/02/20 20:03:44	

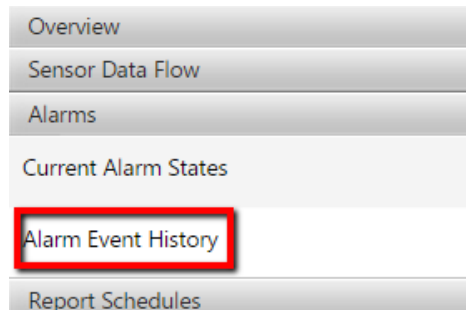
Export To PDF Refresh

The current state is showed in brackets next to the alarm’s name. To drill deeper you can click on the clock icon (to the right of the alarm name and current state) to go the alarm history as discussed in section 13.7 on page 102.

The other columns in the table indicate the last time was that the four different alarm states triggered.

The report can be exported to PDF as by click the Export to PDF button.

In order to look at past event history of data observations simply click on the History Sensor Data Flow option in the left hand pane.



Example alarm history for the past 10 weeks is displayed below.

As can be seen most of the alarms happened roughly in the time window of 5-6 weeks ago.

Alarm Event History

Hide Parameters Clear Search

Alarm Name Time Window Width 10 Weeks

Event Granularity All Event Levels Effective Date 2015/02/21

Search

Alarms	Alarm State	2014/12/14	2014/12/21	2014/12/28	2015/01/04	2015/01/11	2015/01/18	2015/01/25	2015/02/01	2015/02/08	2015/02/15
AlarmWithNoCondition2 (No Condition)	No Alarm Events	0	0	0	0	0	0	0	0	0	0
test TREND (Disabled)	Multiple (2) <i>i</i>	0	1	0	5	51	28	1	0	0	0
Test withoutTrend (Warning)	Multiple (3) <i>i</i>	0	1	0	0	6	4	0	0	0	0

Export To PDF Refresh

Only the worst state is listed per alarm. To view all states that triggered (in the below case), simply click on the respective "i" in the alarm to expand.

Alarms	Alarm State	2014/12/14	2014/12/21	2014/12/28	2015/01/04	2015/01/11	2015/01/18	2015/01/25	2015/02/01	2015/02/08	2015/02/15
AlarmWithNoCondition2 (No Condition)	No Alarm Events	0	0	0	0	0	0	0	0	0	0
test TREND (Disabled)	Multiple (2) <i>i</i>	0	1	0	5	51	28	1	0	0	0
Test withoutTrend (Warning)	<i>i</i> Attention	0	0	0	0	2	1	0	0	0	0
	Warning	0	0	0	0	2	2	0	0	0	0
	Alarm	0	1	0	0	2	1	0	0	0	0

As before to drill deeper you can click on the clock icon (to the right of the alarm name) to go the alarm history as discussed in section 13.7 on page 102. Just remember the time period you were evaluating before clicking on the icon, in order to specify it again in that section.

16.4 REPORT SCHEDULES

All the functionality in the previous section can be combined into a report schedule that will generate and email a report directly to a number of users (via PDF attachment in the email).

To create and preview a first report schedule simply:

- 1) Click on the Add Report Schedule button
- 2) Enter a Name for your report
- 3) Click the Save Button
- 4) Click the Preview Button

Your report will be generated and downloaded as a PDF. Simply click the edit button (pen and paper icon) on the left hand pane next to your report to further customize it. In order to delete the report schedule, simply click the trash can icon.

17 Framed Pages

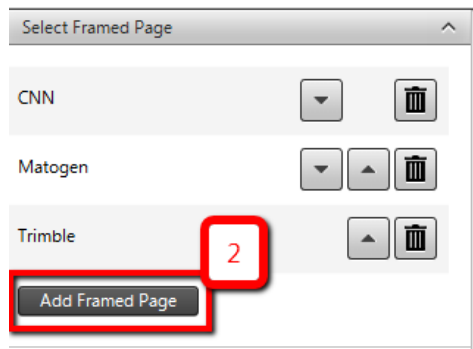
Framed pages offers functionality to show external websites inside T4D accessible via the main menu in T4D.

This is useful if certain internal web pages are important to the monitoring team using T4D.

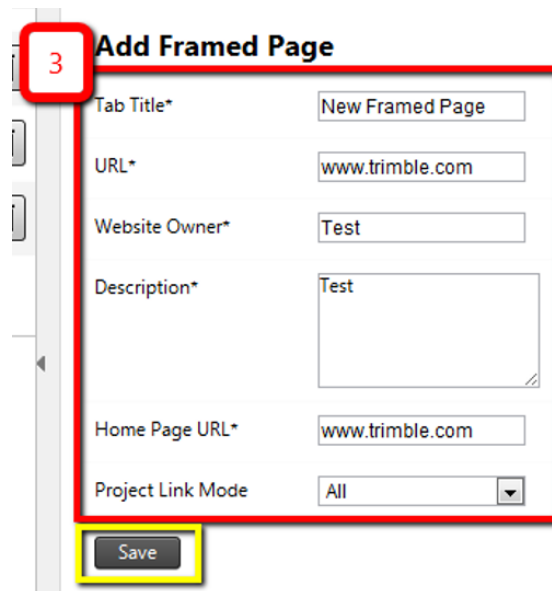
17.1 ADD A FRAMED PAGE

Step 1: Open the Framed Pages section from the top menu.

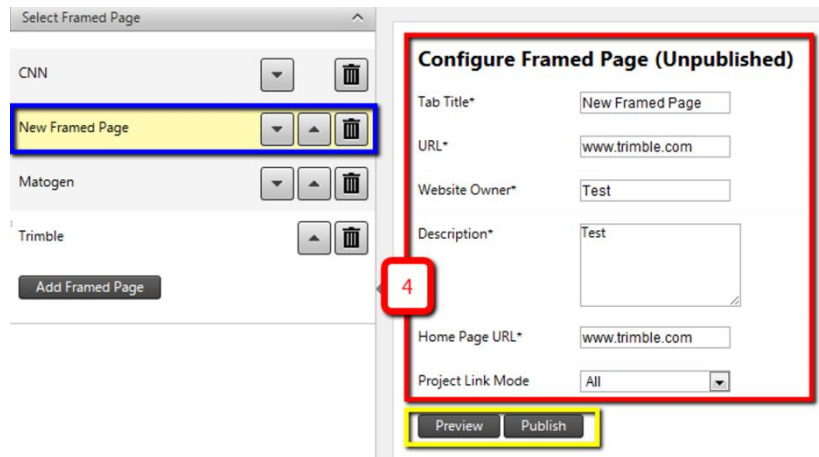
Step 2: Click on the 'Add Framed Page' button in the left hand side pane.



Step 3: Complete the form and select "Save" to save your new Framed Page.

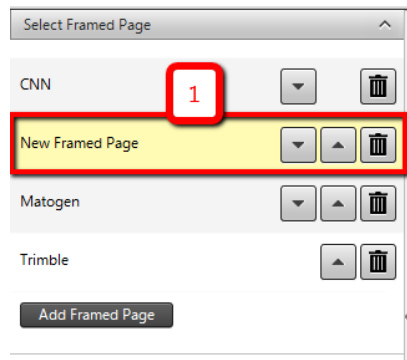


Step 4: Configure (red) or change the order in the main menu (blue) where your new Framed Page will be displayed before you preview and publish (yellow) it.

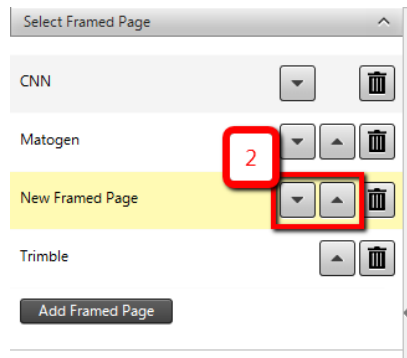


17.2 CONFIGURE A FRAMED PAGE

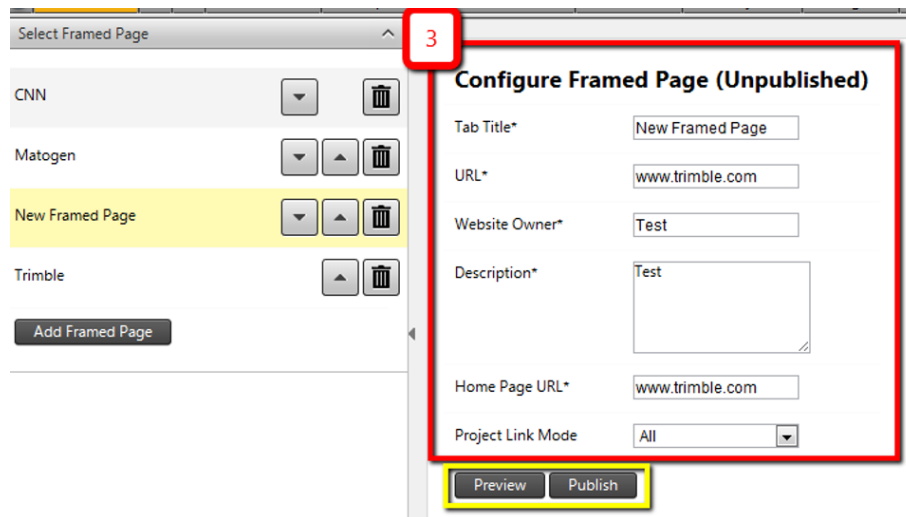
Step 1: Select the Framed page you want to configure (red).



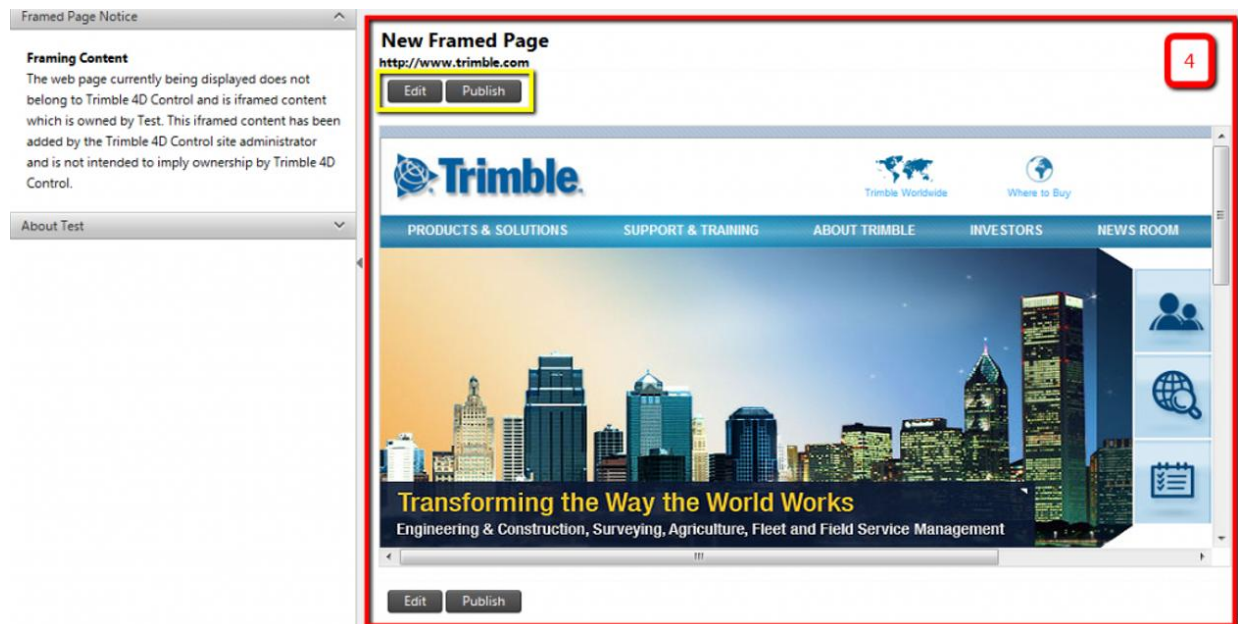
Step 2: Changing your Framed Page's page order (in the main menu) by using the arrow keys (red).



Step 3: Configure (red) or preview (yellow) your new Framed Page before you publish it (also Yellow).



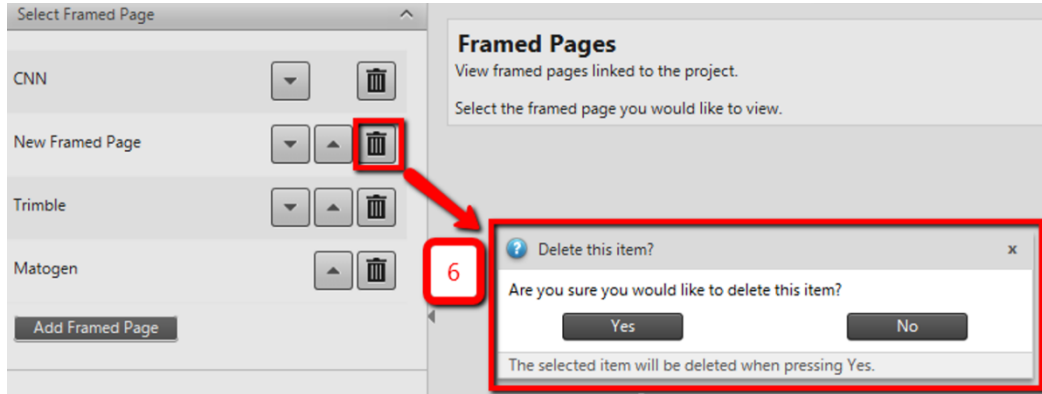
Step 4: Preview your page before Publishing and/or Edit (yellow) the Framed Page.



Step 5: Publish your Framed Page, it can now be viewed in the navigation bar.

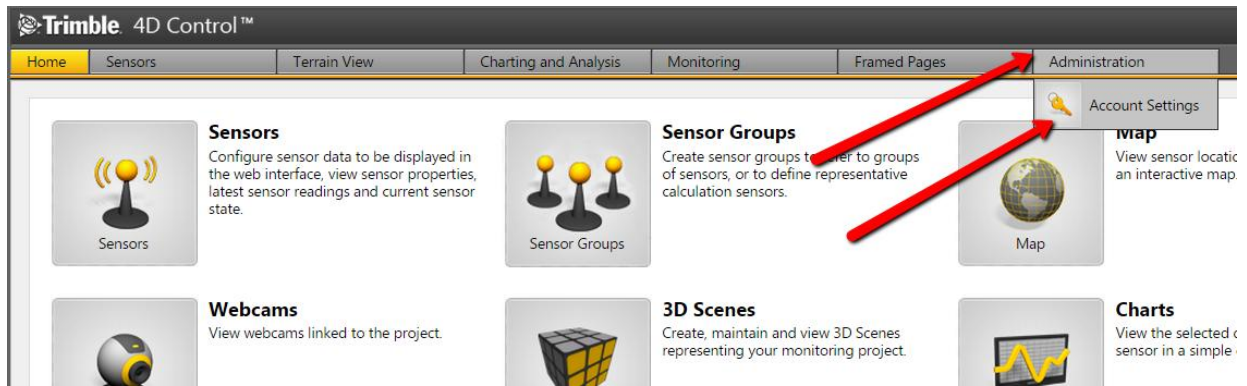
Note: The Edit and Publish buttons will only be visible to a user with the correct permissions. To other users this will look like a normal nicely integrated web page into the T4D Control web interface.

Step 6: Delete your Framed Page by clicking the trash can icon next to the name of your page.



18 Account Settings

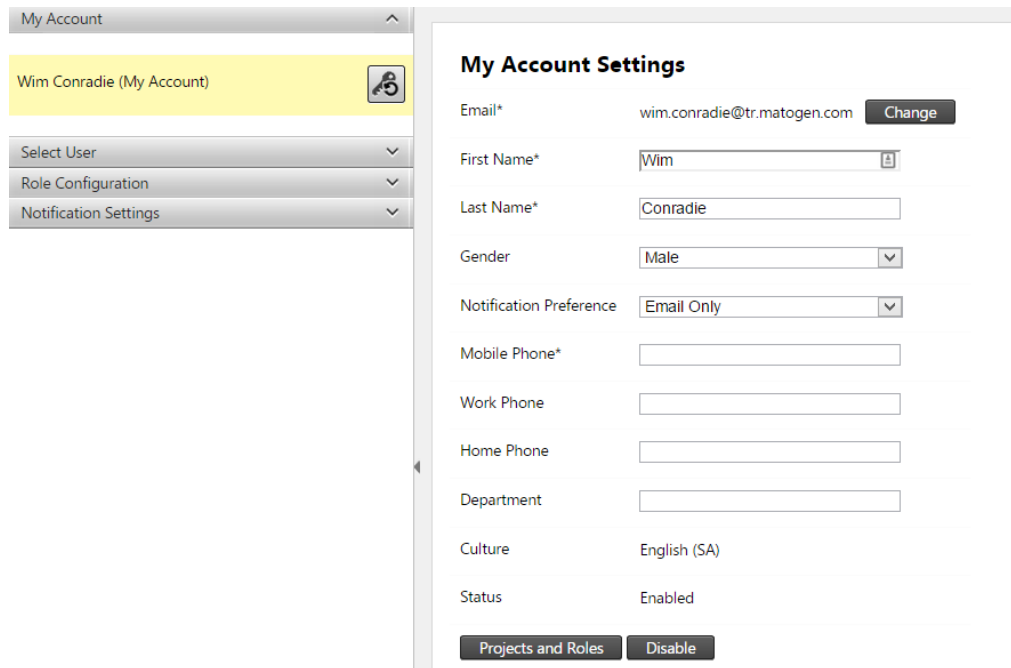
Account settings allows the user to change their account details. In addition, admin users can set user permissions, add, delete or change passwords for other user accounts.



18.1 MY ACCOUNT SETTINGS

In the 'My Account' tab on the left pane you can change your details or settings.

To change your settings, simply click on your name, to have your details be displayed on the right hand pane.



The screenshot shows the 'My Account Settings' form. On the left, a sidebar contains 'My Account' with a dropdown menu showing 'Wim Conradie (My Account)' (selected), 'Select User', 'Role Configuration', and 'Notification Settings'. The main form area is titled 'My Account Settings' and contains the following fields:

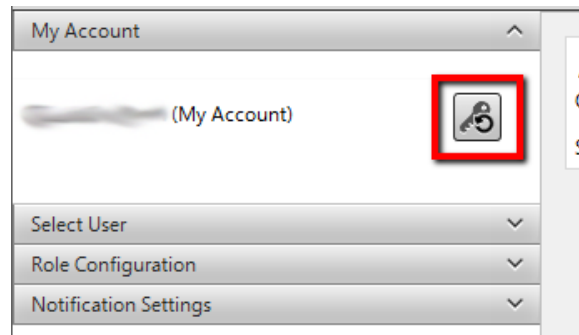
Email*	wim.conradie@tr.matogen.com	<input type="button" value="Change"/>
First Name*	<input type="text" value="Wim"/>	<input type="button" value="Reset"/>
Last Name*	<input type="text" value="Conradie"/>	
Gender	<input type="text" value="Male"/>	<input type="button" value="Reset"/>
Notification Preference	<input type="text" value="Email Only"/>	<input type="button" value="Reset"/>
Mobile Phone*	<input type="text"/>	
Work Phone	<input type="text"/>	
Home Phone	<input type="text"/>	
Department	<input type="text"/>	
Culture	English (SA)	
Status	Enabled	

At the bottom of the form, there are two buttons: 'Projects and Roles' and 'Disable'.

You can edit these and simply click on the "Save" button when done.

If you need to change your password, please follow these steps:

Step 1: Click on the Password button.



Step 2: You will be navigated away from the Account Settings dashboard to change your password.

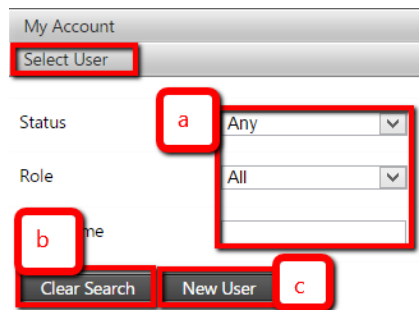


Simply enter the passwords and click the Apply button to complete this password update.

18.2 USERS

You can view another user's settings similar to your own in the My Account tab by selecting another user in the Select User tab. Please remember you have to have necessary privileges to be able to view and/or edit other users.

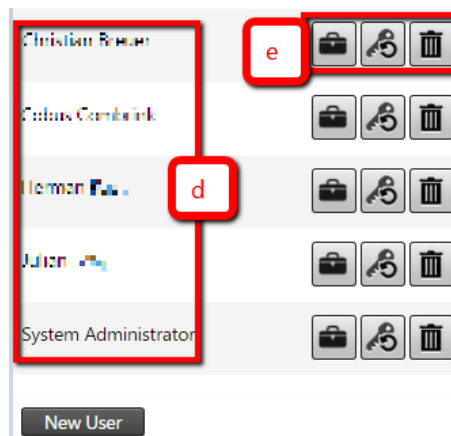
In order to navigate here, open the Select User tab.



Additional options are available:

- a. Search filters: Filter any of the users (shown in d. below) according to these filters.
- b. Clear your search filter again.
- c. Register a new user.

A list of users should be displayed below these options.

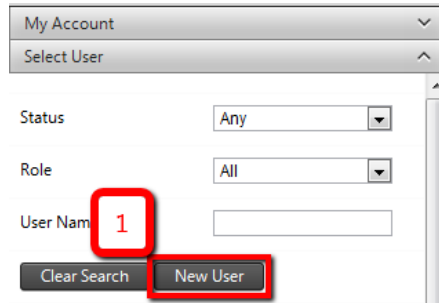


d. The users listed in your search filter (all of them if no filter is applied). You can click on anyone's name in order to view or edit their settings.

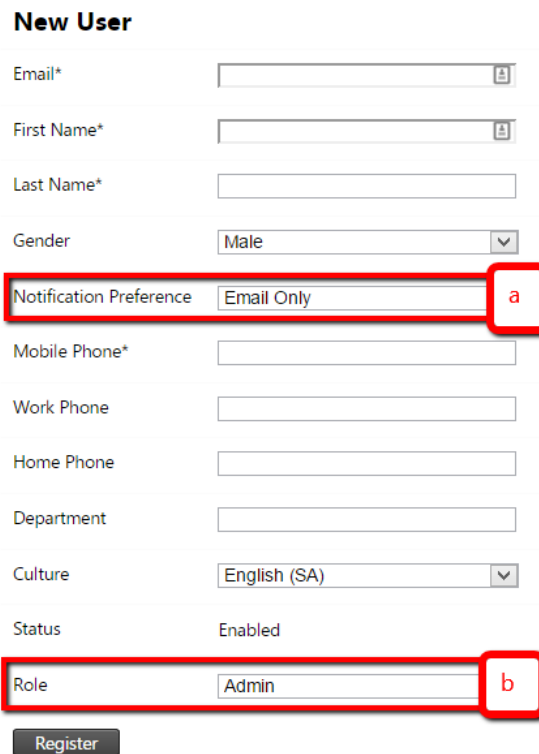
e. User controls (Project Access and Roles for user, Reset Password for user, Delete user) can also be clicked here.

18.2.1 Add, Edit or Delete Users

Step 1: Click on the “New User” button.



Step 2: Complete the form and click on the Register button.

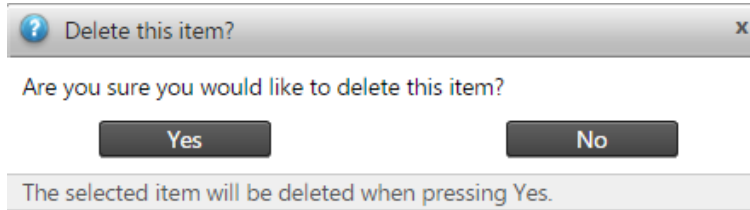


Take note of the following:

- a. Set the Notification type via Email and/or SMS or Disabled.
 - b. Be sure to choose the proper Role, e.g. do not assign Admin to somebody that should not have that privileges.
- Note: Roles will be discussed later in section 18.3 on page 127.

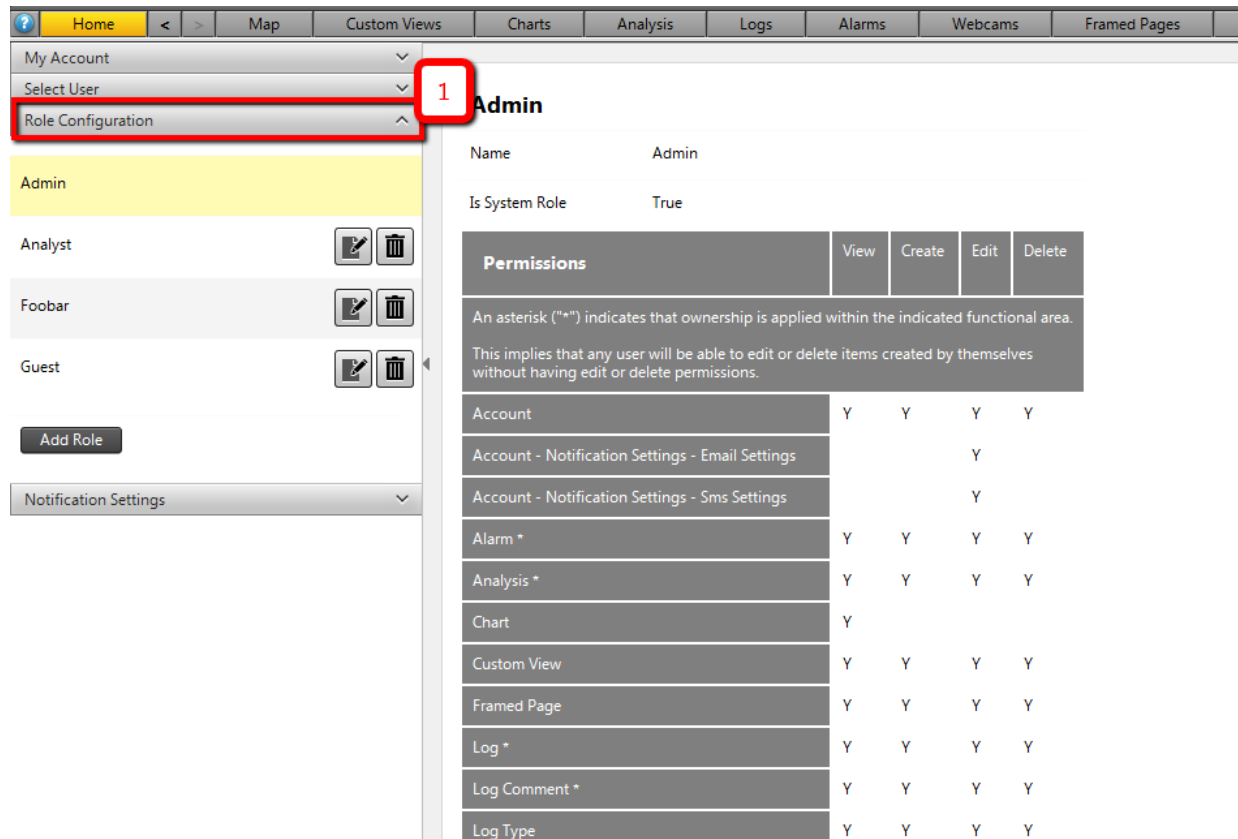
In order to edit a user’s settings, you must click on the user’s name. This will open a similar area as the previous registration pane where you can edit the user’s settings.

In order to delete a user, simply click on the trash can icon next to the user's name.



18.3 ROLE CONFIGURATION

Open the Role Configuration tab (1).



The screenshot shows the web application's navigation menu on the left and the main content area on the right. The "Role Configuration" option in the menu is highlighted with a red box and a red circle containing the number "1". The main content area displays the configuration for the "Admin" role.

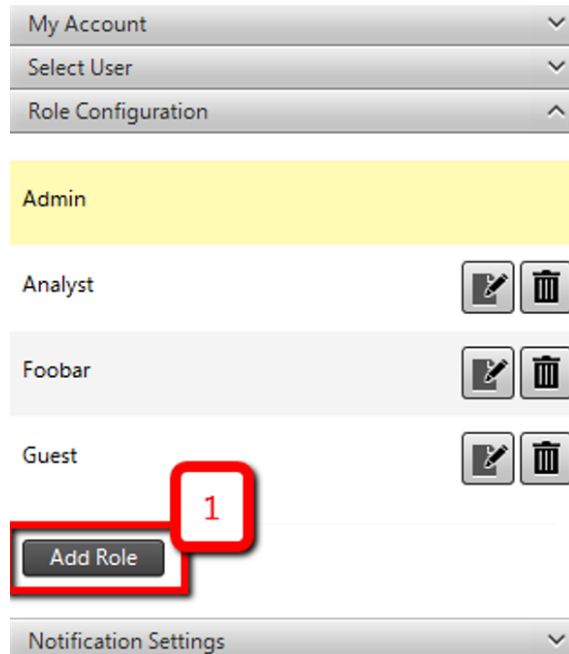
Admin

Name: Admin
Is System Role: True

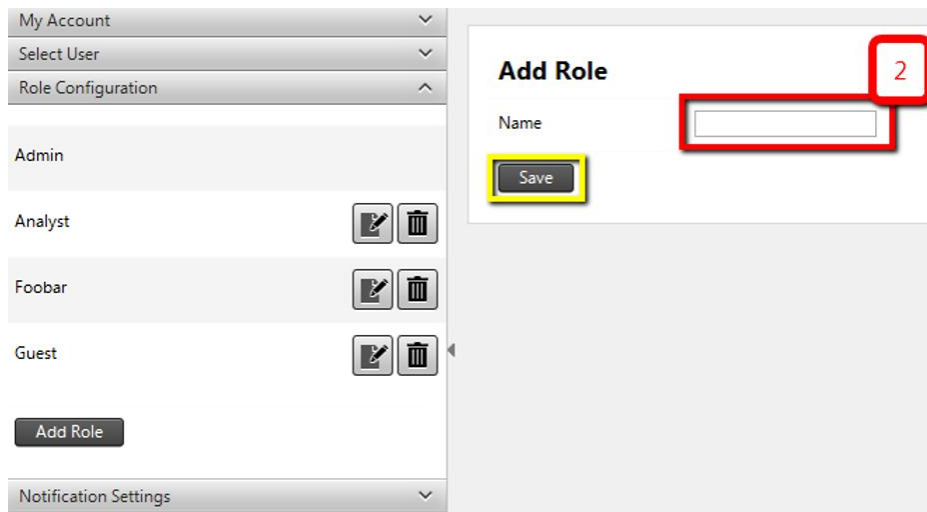
Permissions	View	Create	Edit	Delete
An asterisk ("*") indicates that ownership is applied within the indicated functional area. This implies that any user will be able to edit or delete items created by themselves without having edit or delete permissions.				
Account	Y	Y	Y	Y
Account - Notification Settings - Email Settings			Y	
Account - Notification Settings - Sms Settings			Y	
Alarm *	Y	Y	Y	Y
Analysis *	Y	Y	Y	Y
Chart	Y			
Custom View	Y	Y	Y	Y
Framed Page	Y	Y	Y	Y
Log *	Y	Y	Y	Y
Log Comment *	Y	Y	Y	Y
Log Type	Y	Y	Y	Y

18.3.1 Setting up a Role

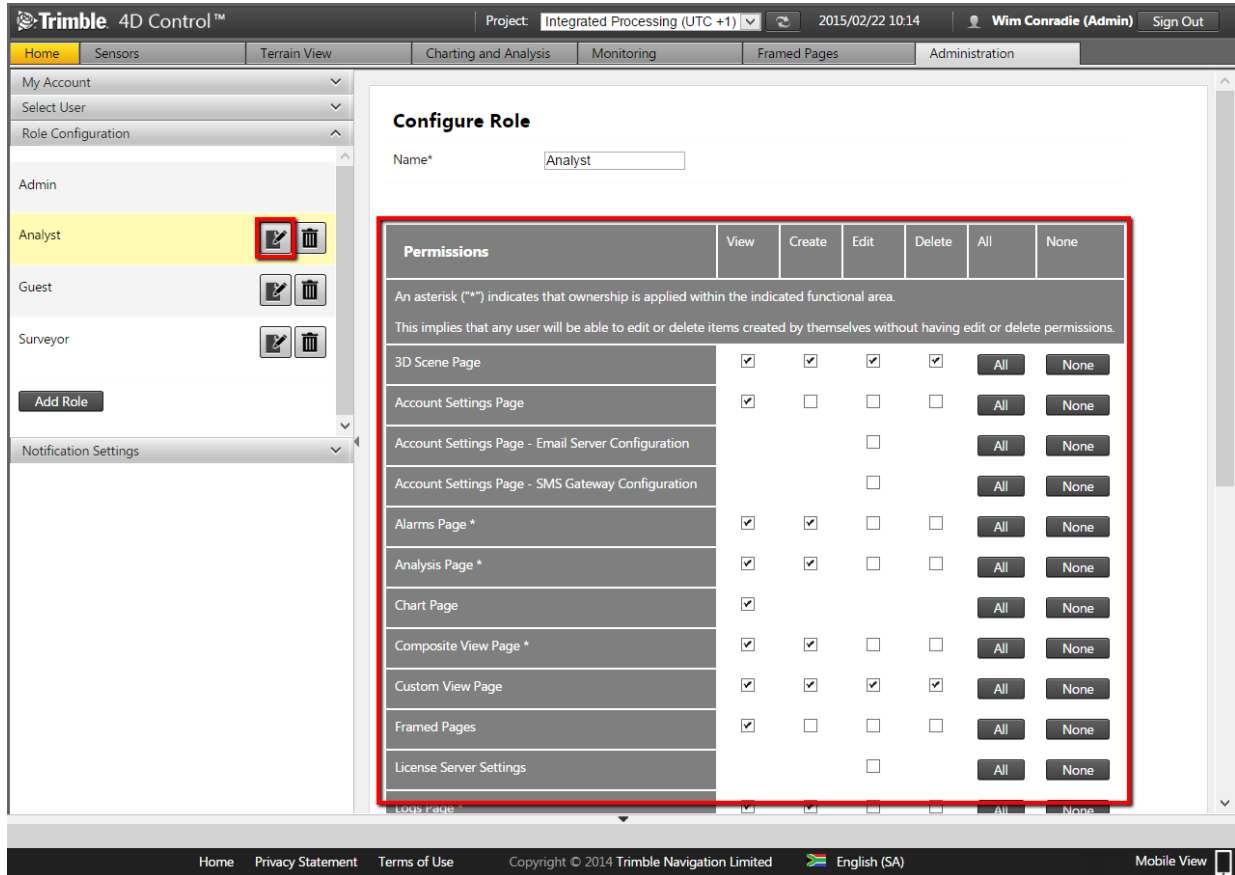
Step 1: Click on the Add Role button.



Step 2: Provide a descriptive name for the Role.



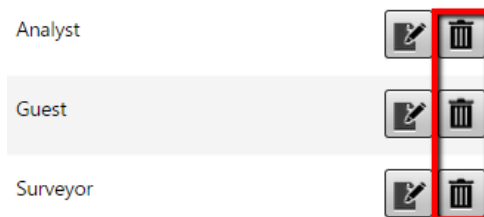
Step 3: Configure your Role by selecting the allowable permissions from the list available. You can later edit the Role's permissions again by clicking on the Edit button (pen and paper icon) next to the role's name in the left hand side pane.



If you make any changes a Save button will appear. Simply click on the Save button and all the permissions you changed will be implemented to the Role.

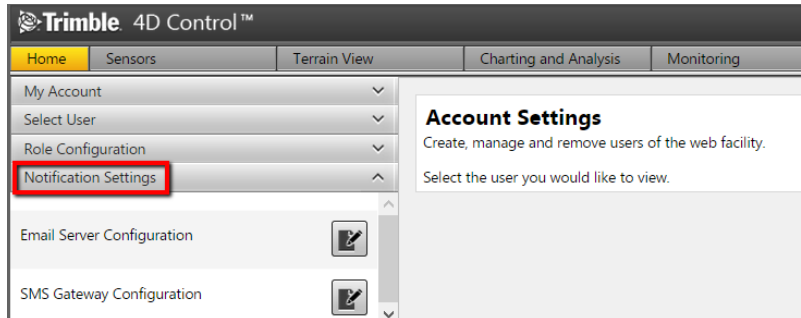
Your Role is now ready and you can assign it to users.

If you would like to delete a Role later, simply click on the respective trash can icon next to its name.



18.4 NOTIFICATION SETTINGS

Open the Notification Settings tab on the left hand side pane.



18.4.1 E-mail Notification Settings

The Trimble 4D Control Web application makes substantial use of Emails. More specifically, new users are invited to the system via email and Alarms/Reports in the system can be configured to notify specific users via Email.

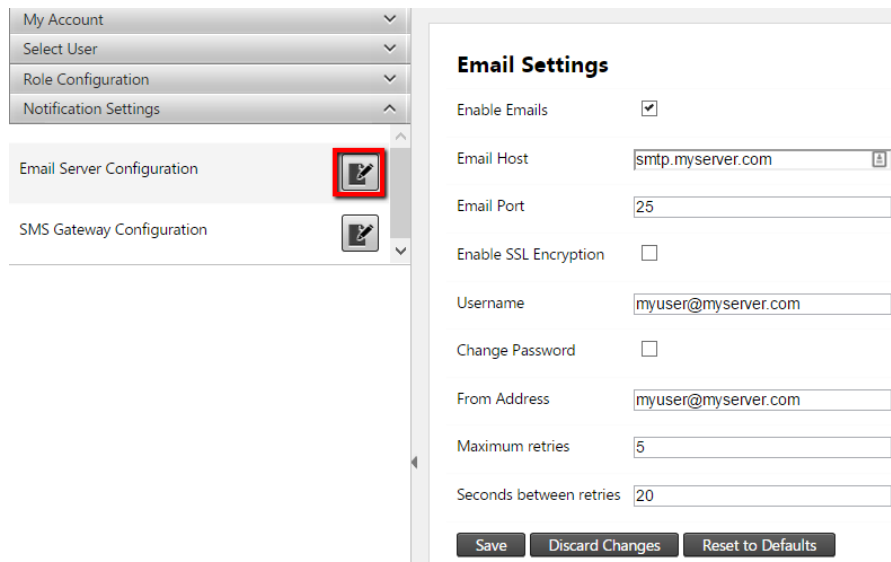
Before you can continue to invite the first user to the system you need to ensure that the system emails are working.

The Trimble 4D Control Web application ships with an email configuration that will work “out of the box”, provided that your firewall allows traffic through port 587.

You can either leave this configuration as is, or you can change this configuration to send emails via another mail server. **We however advise that you change the default email settings since you may encounter throughput issues when sharing the same email infrastructure with other T4D installations.**

Edit the setting and test your settings afterwards (there is a Test button that you can use to send yourself and email).

If you are unsure of the settings, please ask your system administrator for assistance.



Email Settings

Enable Emails

Email Host

Email Port

Enable SSL Encryption

Username

Change Password

From Address

Maximum retries

Seconds between retries

18.4.2 SMS Configuration Settings





You can also receive notifications via a SMS gateway.



Step 1: Click Edit SMS Gateway Configuration icon.

Step 2: Fill in the information as required.

Step 3: Test your settings!

NB: Please register at Clickatell (www.clickatell.com) to obtain account details for SMS sending functionality.

My Account 
Select User 
Role Configuration 
Notification Settings 

Email Server Configuration 
SMS Gateway Configuration 

SMS Settings

SMS Gateway

In order to send SMS messages via the [Clickatell](#) gateway, you will need to:

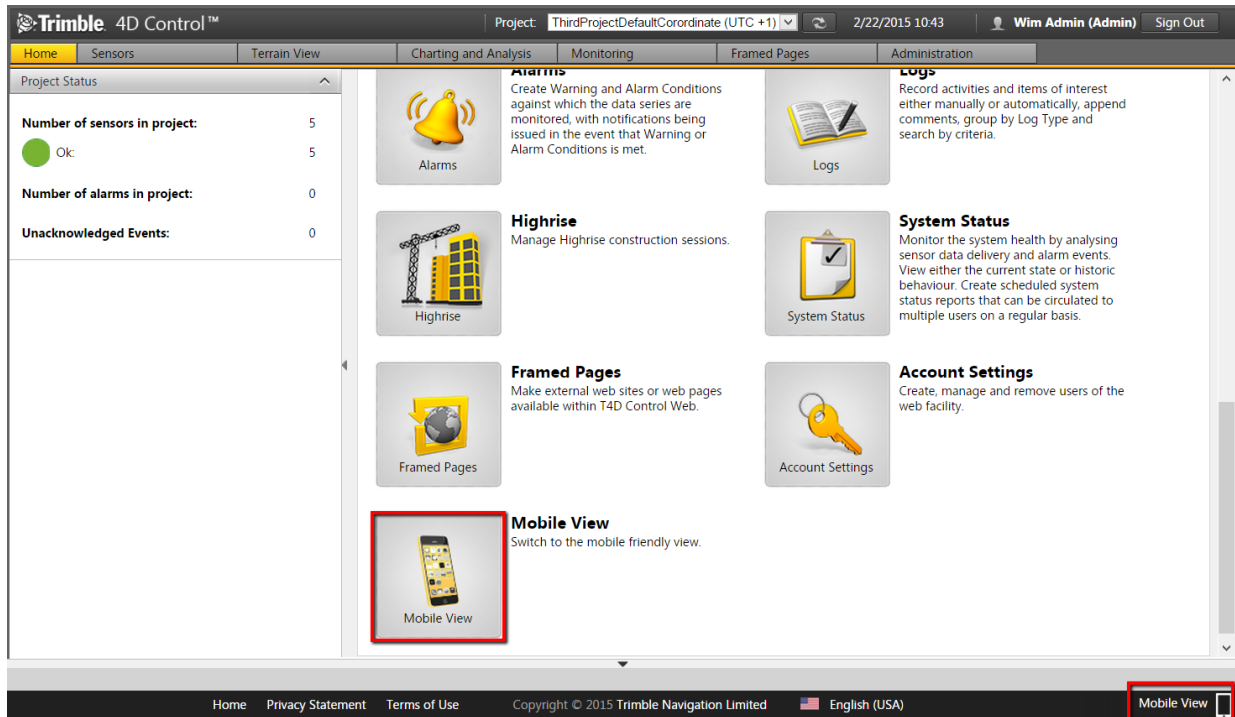
1. Register with [Clickatell](#)
2. Add the [SOAP Api](#) to your Clickatell Products
3. Supply your Clickatell SOAP Api ID, Username and Password below

Retry Count
Retry Wait Seconds
Clickatell SOAP Api
Clickatell Username
Clickatell Password
Clickatell Send From

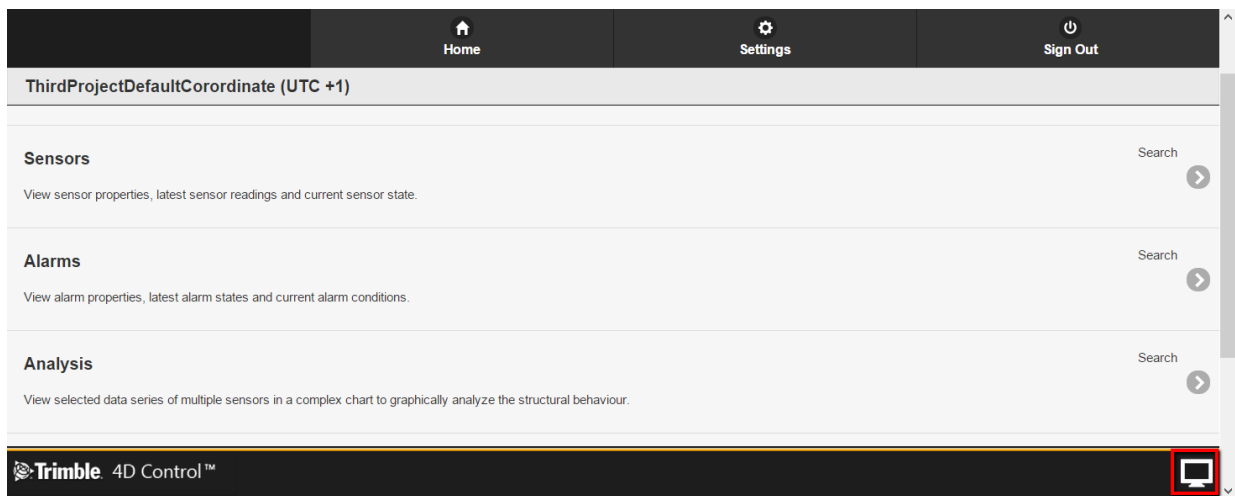
19 Mobile View

The T4D Control suite was also optimized to have a friendly interface for smaller screens such as mobile phones.

To switch to the Mobile View, simply click in the far bottom right corner of the screen (or the icon on the home page).



In order to switch back to the normal Desktop View, simply click again in the far bottom right corner of the screen.



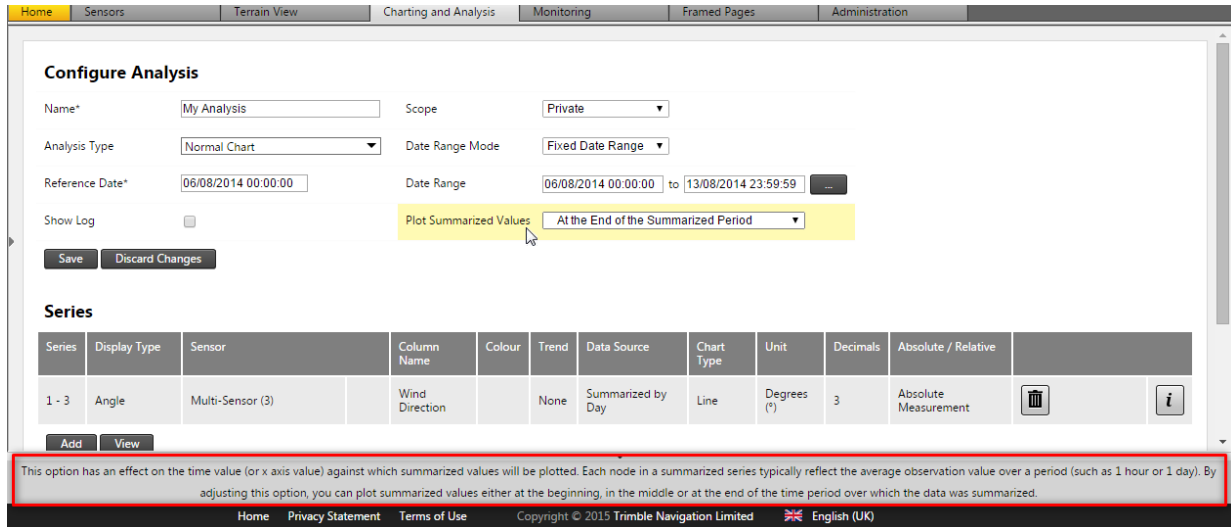
20 Further reading

For information on how to install Trimble 4D Control please refer to our installation guide at:
http://setup-guide.web.t4d.trimble.com/version4.4/Trimble_4D_Control_Web_Installation_Guide_v1.10.pdf

For information about Monitoring infrastructure please refer to the Trimble website at:
<http://www.trimble.com/infrastructure/monitoring.aspx>



There are quite a few details that we have not covered in this manual, nonetheless the user can explore the functionality of T4D by means of the **context sensitive help** provided on almost all interface controls of Trimble 4D Control. Context sensitive help will appear at the bottom of the page whenever the user hovers the mouse cursor over an interface control.

Below is an example of the context sensitive help provided for the "Plot Summarized Values" option of an Analysis:



The screenshot shows the 'Configure Analysis' form in the Trimble 4D Control web interface. The form includes fields for Name, Scope, Analysis Type, Date Range Mode, Reference Date, Date Range, and Show Log. The 'Plot Summarized Values' dropdown menu is highlighted in yellow, and a context-sensitive help tooltip is visible at the bottom of the page.

Series

Series	Display Type	Sensor	Column Name	Colour	Trend	Data Source	Chart Type	Unit	Decimals	Absolute / Relative	
1 - 3	Angle	Multi-Sensor (3)	Wind Direction		None	Summarized by Day	Line	Degrees (°)	3	Absolute Measurement	 

Plot Summarized Values At the End of the Summarized Period

This option has an effect on the time value (or x axis value) against which summarized values will be plotted. Each node in a summarized series typically reflect the average observation value over a period (such as 1 hour or 1 day). By adjusting this option, you can plot summarized values either at the beginning, in the middle or at the end of the time period over which the data was summarized.

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