

# ProLine<sup>®</sup> v3

User Guide

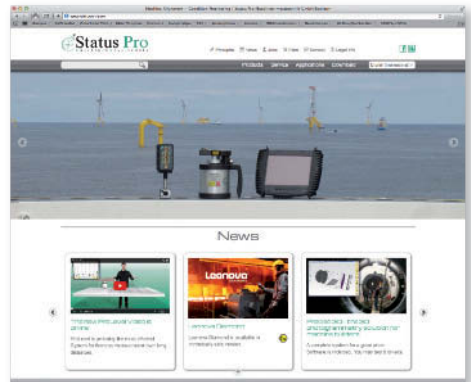


# Software ProLine®v3

We would like to congratulate you on the purchase of your Status Pro Software. Before initial usage you should carefully read the safety instructions as well as the user guidelines contained in this manual. We wish you every success when using this Measurement Instrument.

Please note: User Manuals can be amended when improvements or changes to the product range have been carried out. Use the link below to make sure you have the most up to date version of your User Guide:

[www.statuspro.com](http://www.statuspro.com).



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# 1 System Components

## 1.1 Laser Source

Status Pro puts two types of Laser at your disposal enabling complete flexibility, regardless of your straightness task:

### T250 – Block Laser (BG 830750)

The T250 Laser is a highly developed Laser source especially for use in tight spots. The T250 as well as the T330 offer a laser beam of extreme high quality. The angle of the laser beam as well as the parallel shift can be adjusted over the 4 differential screw elements. Power for the laser is supplied through a mains cable.



### T330 – Self levelling sweep Laser (BG 830203)

The T330 sweep laser delivers, in addition to the beam for straightness, a laser plane perpendicular to the linear beam. This laser plane enables flatness measurements to be carried out, using the self levelling properties of the T330 if needed. Ease of use and flexibility are keywords when describing the T330, making complex geometrical tasks a lot simpler. Power is supplied either through a mains cable or using batteries.

Different types of Laser Receiver as well as their fixing assemblies can be chosen depending on the Laser type and the task at hand. Adapting the Laser and the sensor to your particular machine and needs should be discussed together with your Status Pro representative.



## 1.2 Laser Receiver

When measuring straightness or linearity, a dual axis receiver is the standard choice. This kind of receiver facilitates the measurement of the X and Y axes (side and height) simultaneously. A Receiver for use with the T330 Sweep Laser can be chosen if a single axis measurement or a flatness measurement is required. Each of the system combinations have their particular advantages.

### **R545 – Dual-Axis Laser Receiver (BG 830450)**

The R545 is a precise and robust 2D laser position detector for measuring guides and other similar tasks. The Receiver communicates with the Display Unit using Bluetooth technology.



### **R540 – Dual-Axis Laser Receiver (BG 830440)**

The R540 is used in exactly the same way as the R545 but has a stepped sensor head enabling measuring very close to the object. Adverse



effects caused through angular deviation along the measurement object are minimized.

### R280 – Laser Receiver (BG 831500)

The R280 is a robust sensor for use with the rotating beam of the T330. The R280 has a measurement range of 40mm. The measuring distance between T330 and R280 is up to 80 metres. Communication between the R280, the T330 and Remote Control (RC310) is over Infra-red, communication between R280 and Display Unit (UMPC) is over Bluetooth. A button for triggering a measurement remotely is also housed within the sensor, ensuring complete concentration on the measurement.



### R310 – Laser Receiver (BG 830140)

The R310 is a robust sensor for use with the rotating beam of the T330. The R310 has a measurement range of 80mm. The measuring distance between T330 and R310 is up to 80 metres. Communication between the R310, the T330 and Remote Control (RC310) is over Infra-red. An LED display and a touchpad for the menu make the R310 into a complete measurement equipment in itself without the need for software or a PC. An optional Bluetooth attachment is available for use with the UMPC and software.



## 1.3 Supplementary components

### Leica DISTO™ – Bluetooth Distance measurement Eqpt. (FIX DISTO-P II)

The D8 Disto from Leica is presently the only distance measuring instrument on the market that can reliably deliver readings per Bluetooth to an external Display or measurement PC. This makes the D8 ideal for use with the ProLine Software. Using this equipment the measurement sensor distance is logged automatically, allowing fully automated measuring.



### μLevel – Digital Spirit-Level with Bluetooth (BT 840100/1)

μLevel is the high precision Spirit-Level with a resolution of 1/1000mm for use when assembling and /or measuring your machines; very useful in Quality Control. Thanks to its ease of use and easy to read display, the μ-Level is very popular with “the guys on the shop floor”. The Bluetooth capability allows the connection of an external display unit allowing the placing of the Level within the machine, and comfortable analysis of the results outside of the machine.

In conjunction with the ProLine measurement system, the twist of a Linear Guide as well as the Dual-Axis Straightness can be reliably measured.



## 2 System set-up

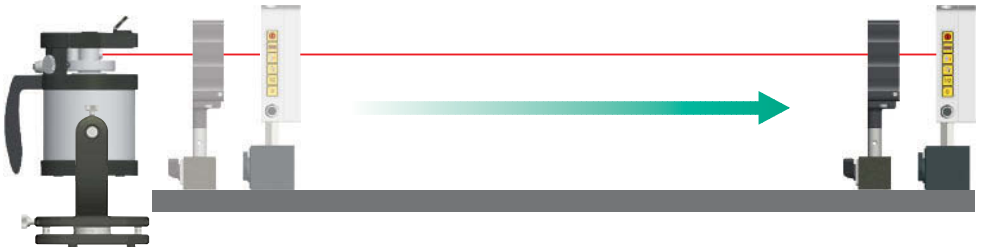
### 2.1

#### Setting up the T330 (rotating beam) with the R280 / R310

The T330 is used when measuring with either the R280 or the R310. The Laser plane provides a reference against which we can measure. To carry out a measurement, the rotating beam of the T330 has to be aligned parallel to the measurement object, then the axis can be measured using the sensor. If necessary, the second axis can also be measured after aligning the T330 laser appropriately. The advantage of this measurement is that the set-up is very quick, and if needed, the whole object can be adjusted "in level", the disadvantage is that only one axis can be measured per measurement.

#### Measuring the Y-axis (Height)

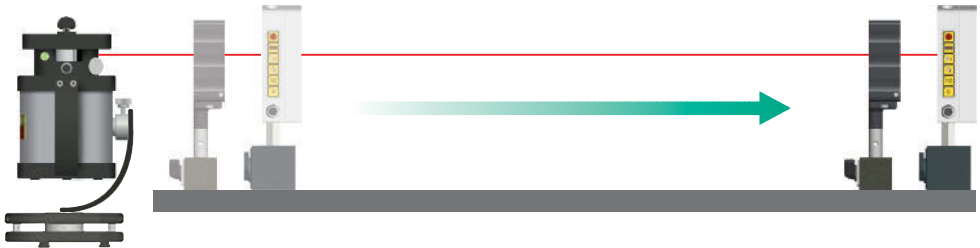
- 1) Position the T330 Sweep Laser in the upright position in front of the guide.
- 2) Position the Sensor (R280 or R310) at the start of the guide then zero the receiver.
- 3a) Using Levelling: Press the self levelling button then wait for the laser to complete adjustment. If necessary adjust the laser height again.
- 3b) Without levelling: move the receiver to the end of the guide and adjust the beam to zero using either the RC310 or the arrow buttons (see T330 User Guide).
- 4) To measure, start nearest to the Laser, trigger a measurement then move further along the guide, measuring step by step by step until completed.





## Measuring the X-Axis (Side)

- 1) Position the T330 Sweep Laser in the lying position in front of the guide.  
The laser plane is now vertically parallel to the side of the guide.
- 2) Position the receiver (R280 or R310) at the start of the guide.
- 3) Adjust the T330 to the middle of the sensor using the Tilt/Swivel Adapter, then zero the sensor. Move the receiver to the far end of the guide, then adjust the laser towards zero using either the RC310 or the arrow keys on the laser (see T330 User Guide).
- 4) To measure, start nearest to the Laser, trigger a measurement then move further along the guide, measuring step by step until completed.



## 2.2

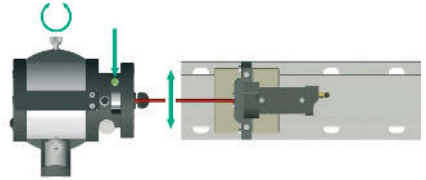
### Setting up the T330 (static beam) with the R540 / R545

The main advantage of using the R545 / R540 is that both axes are measured in one measurement. When measuring using the T330 Laser and the R540 / R545, the static or stationary beam of the T330 is used. Measurements in level are also possible using the T330. To carry out a measurement, the T330 beam is aligned parallel to the guide in X & Y (height & side) as both axes will be measured simultaneously, as follows:

#### Aligning the laser beam to the measurement object

- 1) Position the T330 Sweep Laser in the lying position in front of the guide.
- 2) Mount the R540 / R545 onto the guide as near as possible to the T330 Laser.
- 3) Align the Laser coarsely to the middle of the receiver using the height adjustment on

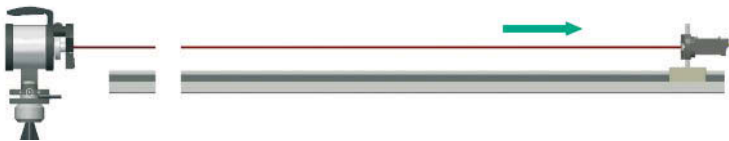
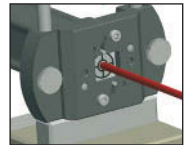
the tripod legs as well as the horizontal adjustment on the Tilt/Swivel adapter. Use the spirit levels to check!



- 4) If measuring "in level", the self-levelling function should now be activated by pressing the levelling button on the T330. Automatic levelling follows. If a measurement "in level" is not required, the T330 has to be finely adjusted in the vertical as well as the horizontal axis, as follows:



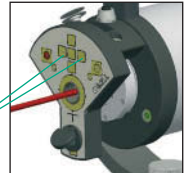
- 5) Finely adjust the laser beam to the middle of the receiver using the height adjustment on the tripod as well as the horizontal adjustment on the Tilt/Swivel adapter.
- 6) Now move the R5XX to the position farthest away from the laser.



- 7) Bring the laser beam back to the middle of the receiver using either the RC310 remote control or the arrow buttons on the T330 touchpad.



arrow keys



Repeat steps 5 –8 returning the R5XX to the position nearest to the T330 before carrying out! Remember!

- Parallel shift is adjusted using the tripod for the height and the Tilt/Swivel adapter for the side, with the receiver as near as possible to the laser.
- Angular correction is adjusted using the RC310, or the arrow buttons on the laser,



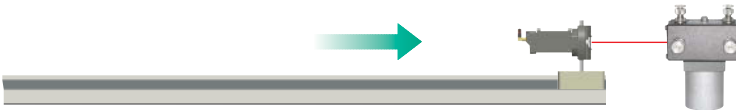
with the receiver as far away as possible from the laser.

## 2.3 Setting up the T250 with the R540 / R545

To carry out a measurement, the T250 beam is aligned parallel to the guide in X & Y (height & side) as both axes will be measured simultaneously. The T250 offers excellent stability and complete ease of use.

### Aligning the laser beam

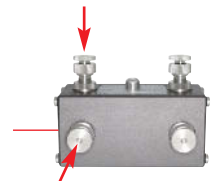
- 1) Mount the T250 on a tripod or other suitable attachment in front of the guide.



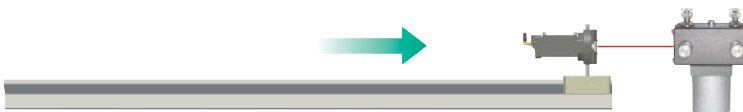
- 2) Mount the R540 / R545 onto the guide as near as possible to the T250 Laser.
- 3) Align the Laser coarsely to the middle of the receiver carrying out the adjustments over the tripod or the mounting attachment.
- 4) Move the R5XX to the position farthest away from the laser.



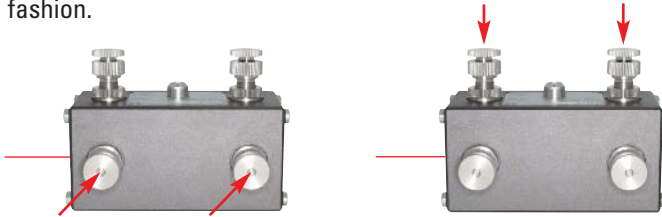
- 5) Now adjust the angular error using the two front screw elements (X1 / Y1) until the laser hits the centre of the receiver.



- 6) Move the receiver back to the position nearest to the laser.



- 7) Adjust the laser beam to the centre of the receiver, screwing for each axis both screw elements (X1+X2, side) and (Y1+Y2, height) equally in or out to adjust the beam in a parallel fashion.



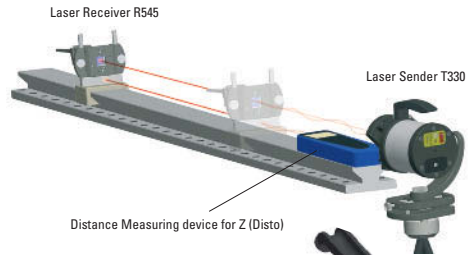
- 8) Return the receiver to the furthest away position and adjust the angular error using the two front screw elements (X1 / Y1) until the laser hits the centre of the receiver again. Repeat steps 6 – 8 if necessary to ensure the laser is central in the nearest and farthest points.

## 2.4 Measuring with a distance measurement instrument (Disto™)

When measuring with ProLine it is also possible to measure and record the distance between laser and receiver (Z-axis). The Leica Disto™ with Bluetooth Interface harmonises perfectly with the ProLine software and is available through Status Pro.

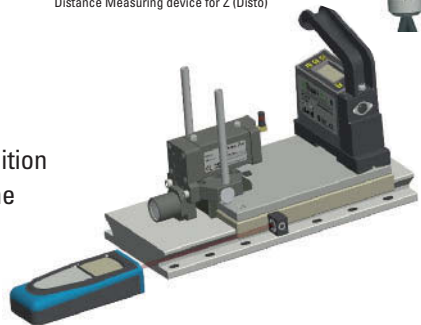
### Setting up the Disto™

The Disto™ is simply placed at the start of the guide and the directed at the attachment on which the receiver is mounted, ensuring the laser makes "contact" along the entire measurement distance.



## 2.5 Measuring with $\mu$ -Level

When using the Dual Axis Laser Receiver in addition to the  $\mu$ -Level, the horizontal "Roll" as well as the horizontal and vertical shift can be measured. The Roll movement has a direct influence upon the horizontal shift.



## 3 Software Installation and set-up

If you have purchased a complete measurement package with Display Unit (UMPC) from Status Pro, the installation and setting up will have already been completed, you simply unpack the system, turn on and measure! If you have purchased the software without a PC or need to install an upgrade, proceed with the installation as follows:

### 3.1 Installation with the Windows Installer

You will have received a file named "ProLineV3\_Setup.exe". "Double-click" the file, then follow the instructions carefully.

If you are installing an upgrade and have already stored some measurements, be sure not to overwrite the data-base or the license files! You will be prompted to make a choice during the installation procedure.



The standard installation path: C:\Programme\Status Pro\ProLine V3.

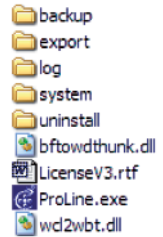


#### Attention!

If you are using Windows 7 or 8, you have to create a separate folder on your hard drive! Windows prevents access to the files in the default program folder, and it may lead to storage problems! Create a folder C:\Applications, for example, into which you install the software from Status Pro! Now you can select the folder during installation.

The ProLine V3 file contains sub-files and other data:

- backup → Here is where the system back-ups are stored
- export → Exported data and measurements are stored here
- log → If problems arise, valuable trouble-shooting information is stored here
- system → Databases, license keys and system adjustment parameters are stored here.



The ProLine.exe file installs the program. During the process, a link to start the software will be placed on your desktop.



Pro Line V3

### 3.2 Installation without the Installer

If you have received the software as a complete file (as above after installation), you can freely designate a drive and file and place a link onto the desktop yourself. The program can be used without installing if all the relevant information is complete.

If you have received a ProLine.exe as an upgrade, simply replace the old "exe" in the ProLine V3 directory with the newer version. The file contains all the program information.

### 3.3 Connecting the receiver

When you run the program for the first time, no receivers are connected (unless you have purchased a complete system from Status Pro). If no receivers have been connected the sensor icons have a cross through them!



To connect a sensor, turn on the sensor and if applicable turn on the external Bluetooth pack. Enter the Toolbar by pressing the bottom left icon from the start screen. Then click the toolbox icon from the toolbar.



In the Toolbox you will find a magnifying glass symbol in the bottom left hand corner

of the screen. Pressing this icon will open the Device Manager:

### 3.3.1 Choice of receiver/sensor

In the "Select Device" window you can choose which sensor is to be connected; either a measurement sensor or a Disto.

Make your choice accordingly, then press the magnifying glass icon (bottom left). The "Search for Devices" window will now be visible.

### 3.3.2 Sensor search

In the "Search for Devices" window, a complete search of the environment is made listing all COM-und Bluetooth Ports with the available sensors. Simply choose the appropriate instrument on the pull-down screen, Receiver, Disto or  $\mu$ Level-Symbol, and then press the magnifying glass symbol. A list of sensors in the vicinity will be shown. Choose as necessary and then confirm by pressing the „tick" symbol.



Repeat the process if you wish to connect a Disto™ or a second sensor. To do this, choose the appropriate device from the "Select Device" window then press the "OK" symbol.

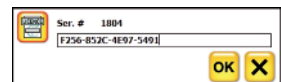
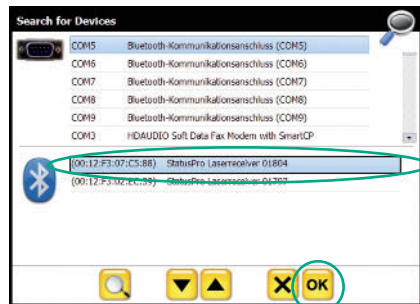
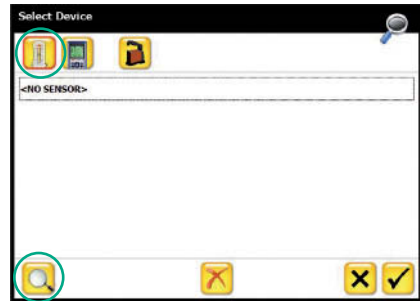
All sensors that have been found and connected using the "Search for Devices" window will be displayed in the "Select Devices" window. If several measurement sensors, ie. R280 or R545 are registered with the software, a quick change between sensors is possible over the "Select Device" window.



Choose your desired device over the "Select Devices" window then press the large "tick" in the display; the chosen sensor will now be connected.

### 3.3.3 Assigning a license key

After initial connection of a measurement device, you will be prompted to enter a license key. You should have received a



copy of the code with the equipment documentation.

Simply enter the supplied 16 digit code (with or without hyphens) then confirm by pressing "OK".



A large green "tick" will appear if the license key was entered correctly, acknowledge by pressing the "tick" adjacent.

### 3.3.4 Connection status

When all required sensors are „connected“ with the software, the symbols at the top right hand corner of the screen will be coloured red and yellow.



- 1) Bluetooth on the Display Unit is turned off: No sensors are connected  
→ Check that the UMPC Bluetooth function has been activated.
- 2) Bluetooth is available but no sensor has been connected  
→ If you have not connected your sensors with the ProLine software, proceed as described in paragraphs 3.3.1 – 3.3.3. Ensure the sensors, and if applicable, the Bluetooth unit is turned are turned on and then re-start the ProLine software.
- 3) Bluetooth is available, sensors have been connected but are not turned on / active  
→ Check to see if the software is in "Pause" modus (Toolbar, pause symbol).  
→ Click the sensor symbol once to activate a quick search for sensors that have already been connected. If there are no further problems, the symbol should change to yellow/red.



# 4 ProLine V3 - User Interface

## 4.1 2D View - Main or Measurement screen

When you start the program, the software searches and connects the pre-paired sensors (see previous chapter) and you will be presented with an empty measurement matrix.

**1** Max

measurement name

**2** X

Y

point name or comment

#	X	Y	Dist	Q	MODE?	°
1	mm 0,000	mm 0,000	mm 0	µRad	N/V	300,0

**3**

**4** [Icons: Wrench, Target, 0, Sine wave, DEL, Pause, XY, 3D, Help, Stop]

**5** [Icons: Sensor connection, Battery level, Stop]

**6** [Icon: Battery level]

- 1** Display mode
- 2** Graphic display for X and Y axis
- 3** Measurement values
- 4** Main task bar
- 5** Status display (sensor connection)
- 6** Remaining battery power for the PC and for the measurement sensor

At the top of the screen (Measurement name) you can enter the measurement name, which will be displayed throughout the measurement. Below the measurement graphics, where ("point name or comment") is displayed, you can enter comments about the point being measured. Simply click the space to enter your names or comments.

### 4.1.1 Display mode



The magnifying glass signifies that you are in the Zoom Mode, pull your stylus from the top left hand to the bottom right hand corner to zoom in.



Click on the left hand (Zoom) magnifying glass to change to Move Mode. When this is activated you can move around the zoomed screen using the stylus or your finger.



Click on the Max Icon to return to the Full Screen Mode.

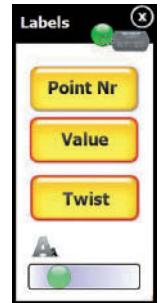


By clicking the "X,Y,Z" Icon repeatedly you can toggle through, Measurement point (MP) displaying; No information, MP with MP Number and MP with measured value.



In the "Labels" pop-up you can choose which information is to be displayed: Point Nr, Value and Twist. Furthermore, you can adjust the size of the text in the display.

These properties can be assigned to the first measurement and also to the second measurement as required.



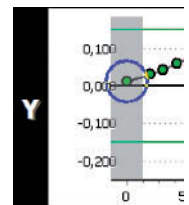
By clicking on the Point Size Icon you can reduce or increase the point size within the measurement graphic.



Click the "cake" symbol to obtain a complete analysis of the quality of the selected measurement point. See chapter 6 -Point Quality.

### 4.1.2 2D-Graphic display

2 Dimensional Graphic display for the X and Y Axes. If fields of tolerance have been entered, they will be displayed as a green line above and below the 0-line.

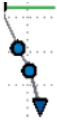




Points above the desired tolerance are displayed in red.

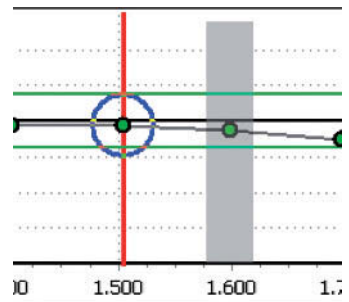


Points within the tolerances are displayed in green.



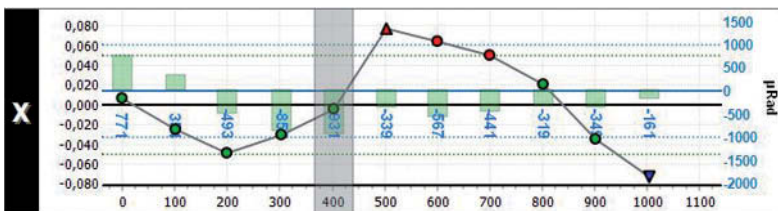
Points below the desired tolerance are displayed in blue.  
Maximum and Minimum are displayed as a triangle.

- A selected measured point is highlighted with a grey bar as shown in the diagram on the right at 1600 mm.
- The present position is signified by a red line as displayed in the diagram on the right, at 1500 mm.
- When the present position is over a previously measured point, a blue circle will appear. The blue circle is an “Auto-snap” function allowing the previously measured point to be substituted. The tolerance for how near to the previously measured point the present position has to be, can be set as wished in the menu (default is 10 mm).



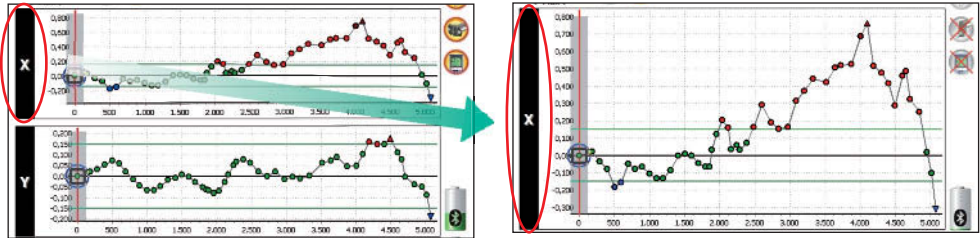
### 2-Dimensional View when measuring "twist" with the $\mu$ Level

- When using the  $\mu$ -Level in addition to the laser receiver, the values for the horizontal roll movement will be shown in the display for the X-axis.
- The measurement values for the  $\mu$ -Level are displayed as a bar above or below the zero line.
- A scale in  $\mu$ -Rad is displayed at the right hand side of the X-axis view:



### Maximising the X or the Y display

By clicking the black bar containing the axis title, the chosen axis diagram will be maximised. By clicking again, both axes diagram will be displayed again.



### 4.1.3 Measurement values

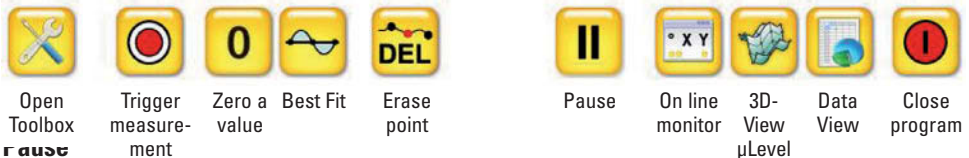
In the diagram below, the values for the present position are displayed in red and the values for the selected or highlighted point are displayed in gray.

#	-	X	-0,025	Y	0,008	DIST	100	Q	18	°	300,0
1	mm	0,000	mm	0,000	mm	0	µRad	0			0,0

Point-Nr.      Laser-Receiver X-Value      Laser-Receiver Y-Value      DISTO Distance      µLevel Value      Laser-Receiver Angle

### 4.1.4 Main task bar

Use the task bar to enter the menu, trigger a measurement, zero a measured point etc.



By pressing the pause icon you can activate the pause function where the sensors are temporarily deactivated. This may be useful for the analysis of a complete measurement.



To reactivate the sensors just press the icon again. You may need to click on the sensor icons in the main window upper right to reconnect the sensors manually.

### 4.1.5 Status display

The status display shows if Bluetooth is activated and if sensors are connected,

(see 3.3.4 Connection status).

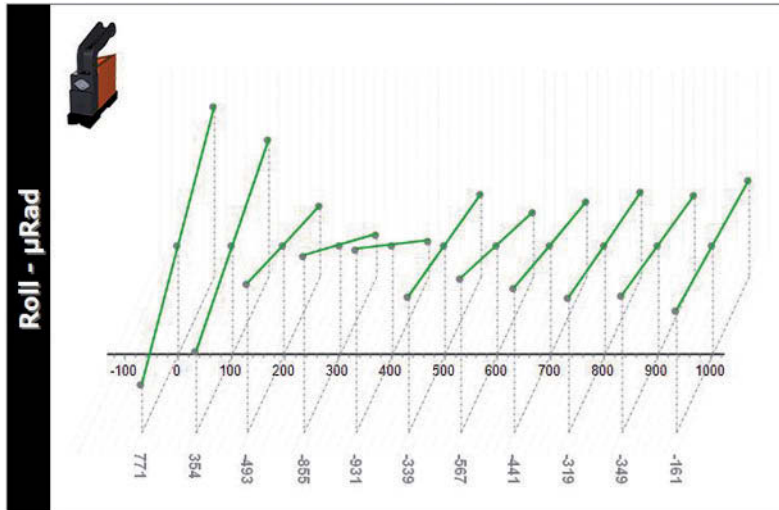
### 4.1.6 Power display

The remaining battery power of the sensor (upper) and of the Display Unit (lower) can be observed here. If the Display Unit is connected to the mains supply, a cable will be visible as in the picture to the right.



### 4.1.7 3D graphics display for Level

By pressing the 3D button in the main display, the display of the roll-behaviour appears: This is represented in three dimensions, how strong the measuring object is laterally tilted during the measurement.



## 4.2 Data view

Title		GUIDE-M1		Date		2014-01-22		Time		16:07:02	
Nr	X [mm]	Delta	Y [mm]	+/- Z [mm]	+/- Twist [µRad]	Temp	Name				
1	0	0	0,006	-0,059	0	21,4°	P# [0]				
2	102	102	-0,025	-0,028	-418	21,4°	P# [1]				
3	199	97	-0,049	0,017	-1264	21,4°	P# [2]				
4	304	105	-0,031	0,055	-1626	21,5°	P# [3]				
5	403	99	-0,005	0,054	-1702	21,5°	P# [4]				
6	502	99	0,077	0,025	-1110	21,5°	P# [5]				
7	600	98	0,064	0,005	-1339	21,6°	P# [6]				
8	700	100	0,050	-0,018	-1212	21,6°	P# [7]				
9	802	102	0,021	-0,036	-1090	21,6°	P# [8]				
10	902	100	-0,035	-0,025	-1120	21,6°	P# [9]				
11	1004	102	-0,073	0,009	-932	21,6°	P# [10]				

Tolerance:	Y [mm]	0,049	0,000	0,077	-0,073	0,150
0,050	Z [mm]	0,037	0,000	0,055	-0,059	0,114

Tolerance:	1000	Twist [µRad]	493	-1074	0	-1702	1702
------------	------	--------------	-----	-------	---	-------	------

### 1 4.2.1 Measurement values

All measured values are visible in the diagram, as shown above. The values within the set tolerances are displayed in green, values that are outside and too high are displayed in red. Values that are outside the tolerances and are too low are displayed in blue. Next to the value, in small grey script, is a value indicating the quality / stability of the measured point. These values are the Standard Deviation of the Median (Med.Std.Dev.) (see Chapter 6).

For measurements with  $\mu$ Level, the measured values are also listed in the table (Twist [µRad]).

Using the horizontal scroll bar you can access further columns containing additional Information:- point-name, the date and the time. etc.

### 2 4.2.2 Measurement analysis

In the lower box, the analytical data are summarized according to the prescribed tolerance in the first row of the X-axis and in the second row of the Y-axis:

- Standard deviation of the axis
- Average value for the axis
- Highest measured value in the axis
- Lowest measured value in the axis
- Sum of the highest and lowest points (Peak-Peak).

### 3 4.2.3 Navigation



Using the arrow button you can scroll through the data if all values are not displayed. Alternatively, click in the table (hold left mouse button or your finger when using the touchscreen) and the tables are shifted up or down.



As with many other database programmes you can sort the values either; highest to lowest or vice versa by clicking the symbol in the header of the column.



The "csv" button exports the present measurement (see 4.3).



If two measurements are loaded, the data table of each measurement can be shown via the buttons I and II.

## 4.3 Export

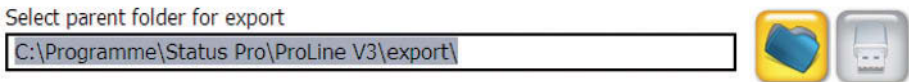
The "csv" button exports the actual measurement. On pressing the button, another window opens prompting you to specify where the measurement shall be saved to.

### 4.3.1 Export path

The default is set to the export file within the program directory. If a differing directory or file location is needed, click on the file button to the right of the dialogue window and specify accordingly.



If a USB or pen drive is connected to the computer, the measurement can be saved directly to the same. The USB icon to the right will be activated if a pen drive is connected. A file named "export" will be created automatically.



### 4.3.2 Export contents

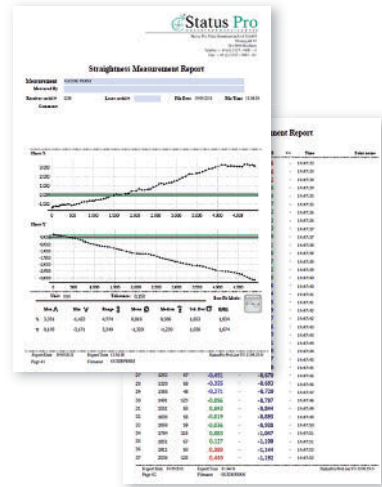
The current measurement will be exported with all the zoom, zero's and compensations that have been used whilst evaluating the measurement. Additional to the .csv file (comma separated values), which can be opened with Excel for further evaluation, diagrams of the axes (Y&X) in Bitmap form as well as a complete Report (.pdf) will also be exported. A corporate symbol can be pasted onto the .pdf report if desired. To do this, simply click the Status Pro symbol at the top right corner and then choose the appropriate symbol from elsewhere. The symbol should have a maximum size of 745x144 Pixels. The symbol will be centrally placed, and if the symbol is larger than 745x144 Pixel the exceeding information will be cropped.



## 4.4 Report

The exported report contains all the relevant details of the measurement:

- Desired corporate symbol
- Measurement name
- Who carried out the measurement
- Laser / Receiver Serial numbers
- Date / Time
- Comments
- X and Y axes diagrams
- Statistics
- Type of compensation (ie. Best-fit)
- Complete chart of the data

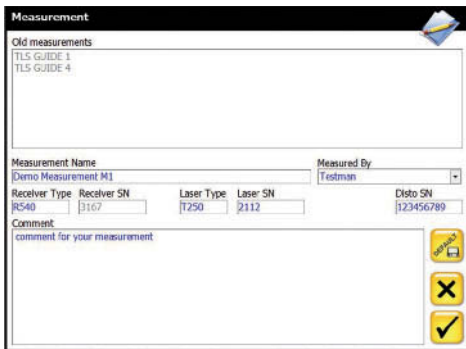


If two measurements were loaded during the export, the data tables and statistics are exported for both measurements.

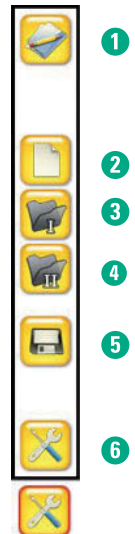
If a  $\mu$ Level measurement was made, the graphics and data of this measurement will also be exported.

## 4.5 Toolbar

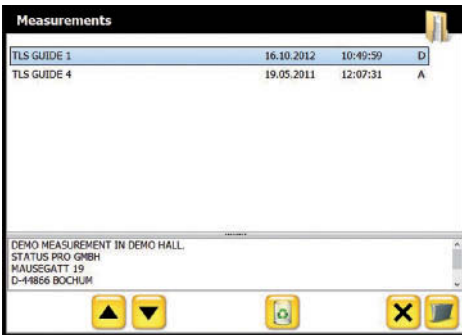
Click on the tool symbol in the bottom left hand corner of the screen to open the tool bar.



- 1 The edit button allows you to enter information about the measurements that are saved, The information is also exported to the report header.

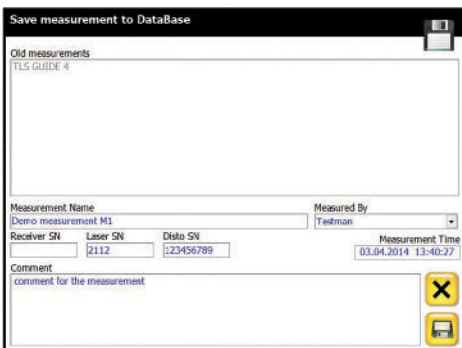


- Known Surveyors already stored can be re-called here.
  - The serial number of the laser receiver is automatically detected when connected.
  - The settings can be stored permanently by pressing DEFAULT button.
- 2 The edit button allows amendments or comments to be added to the report. The addition/amendment will be saved with the measurement.
  - 3 The folder button “I” opens a saved measurement.



You can choose the measurement to be reviewed from this screen then press the open folder button. All measurement are stored with a date and time stamp. Comments to a chosen measurement will be visible in the comments box at the bottom of the screen. A chosen measurement can be deleted by pressing the waste bin button after highlighting the measurement to be deleted.

- 4 The folder button “II” opens a second measurement for comparison with the first one.
- 5 The floppy disk button saves the measurement.



- You can enter a store name, enter or select the surveyor, deposit information about the devices and enter a comment for the measurement.
- By double-clicking on an entry from the list of available measurements, this name is entered in the field "Measurement Name".

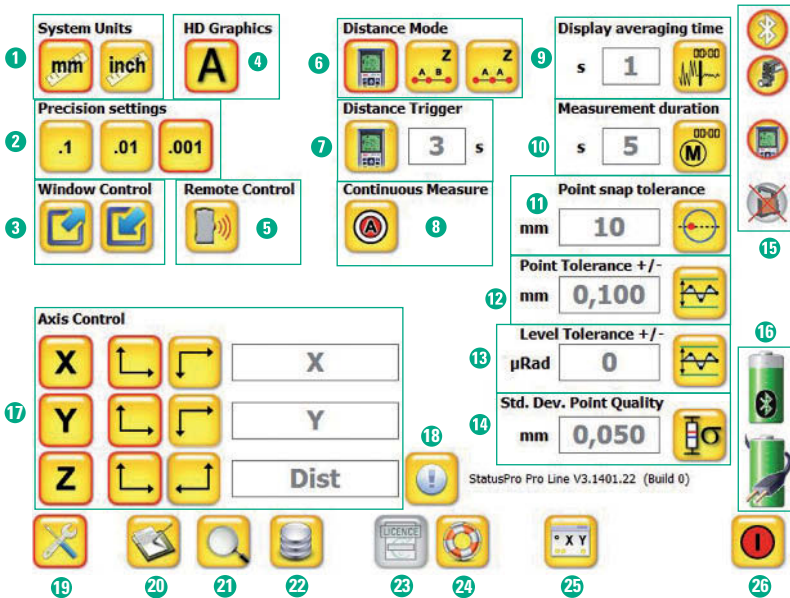
- A Measurement name can be used only once. If the floppy disk button is grayed out

(disabled) there is probably already a measurement with this name. Simply change the name or add a suffix to allocate a unique name.

- 6 To enter the menu and parameter level (Toolbox), click on the toolbox button within the toolbar.

### 4.6 Toolbox

All parameters concerning the measurement can be viewed and/or edited in the toolbox.



#### Toolbox functions:

- 1 **System units** → Metric units (mm) or Inches (inch).
- 2 **Precision settings** → Resolution accuracy in 1/10, 1/100 or 1/1000 mm.
- 3 **Window Control** → Adjust screen size (for screen resolutions > 800x600).
- 4 **HD Graphics** → Smoother display. (Turn off for slow computers)

- 5 **Remote Control** → For use with the R280 laser receiver (See the user manual R280).
- 6 **Distance Mode** → Z-value recording manually or via Disto (See 5.2).
- 7 **Distance Trigger** → Automatic distance trigger measurement mode (see 5.3).
- 8 **Continuous Measure** → Continuous Measure (see 5.4).
- 9 **Display averaging time** → Averaging of the measured value.  
Over the time set an appropriate number of measurements is recorded, averaged and displayed. About 4 values are measured per second. The higher the averaging time, the calmer (and more stable) is the measured value display.
- 10 **Measurement duration** → Measuring time / averaging.  
Over the time set, an appropriate number of measurements is recorded, averaged and stored as measured value. About 4 values are measured per second. The higher the averaging time, the more accurate the measurement, as spikes are ignored and fluctuations are compensated.
- 11 **Point snap tolerance** → Snap radius for point override.  
If the current position is within the set catch radius when re-measuring, then the previous measurement value will be over-written. For example, if a point was measured at 650 mm distance, then it will only be overwritten if the current position is within +/- 10 mm from this point. If it is 11mm or more to the nearest point, a new point will be created.
- 12 **Point Tolerance + / -** → Guideline limits in + / - mm above and below the 0-axis.  
Measurements within these guidelines will be displayed green.
- 13 **Level Tolerance + / -** → Guideline limits in + / - µ-Rad above and below the 0-axis for µLevel readings.
- 14 **Std.Dev.Point Quality** → Tolerance limit for measuring the quality of each individual point (see 6.2).
- 15 **Sensor connection status** → Status of the connection to sensors (see 3.3.4).
- 16 **Battery Status** → Displays the level of system batteries :-sensor (upper) and the battery for the display unit (lower).
- 17 **Axis Control** → Orientation and labelling of the axes (see 4.7).
- 18 **SW. Version Info** → Information about the current version ProLine V3.  
(Includes the Date: V3.1401.22 = ProLine V3 from 22/01/2014)
- 19 **Open toolbar**
- 20 **Log-Info** → Information about the program sequences. (Only of use in a support case)
- 21 **Search for sensors**
- 22 **Database management** (see 4.8)
- 23 **License input**

- 24 **Status Pro Quick Support** → Opens a TeamViewer window that allows an employee of the Status Pro support team access to your computer. Please open only after a telephone request.
- 25 **Measurement monitor**
- 26 **Exit program**

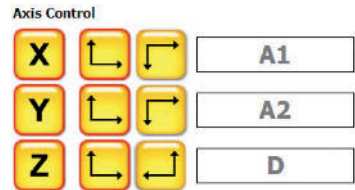
## 4.7 Axis Control

The titling of the axes as well as the prefix definition(+ or -) can be set here.

### 4.7.1 Axis definition

The system standard is X=side or horizontal, Y=height or vertical and Z= distance between sensor and laser. If different names are required you can change these at will.

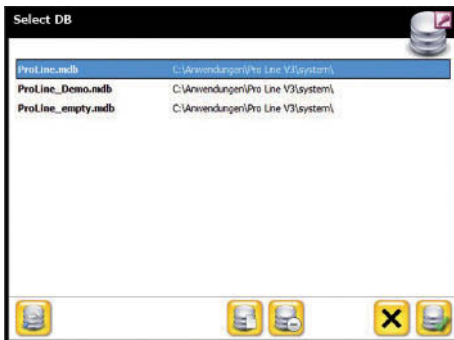
Example: X = A1 | Y = A2 | Z = D



### Value prefix

If you are using a different Co-ordinate system to that of the sensor, then you can change the prefix of the value to plus or minus using the arrow symbols as required.

## 4.8 Database Management



You can create databases at will, enabling secure file organization.. When you open the database management, you will see the available databases in the program directory. You can either select one, create a new one, or delete one marked from the list. The bottom left button with the magnifying glass will update the list. Cancel the operation via the button with the cross.

# 5 ProLine v3 – carrying out a measurement

## Preparation

- Set up your measurement equipment as described in chapter 2, turn on all equipments then start the software.
- Make sure that the sensor, Disto and  $\mu$ Level are connected with the software (see 3.3.4)
- Checks the parameters within the Toolbox and menu, then choose the distance measuring method. There are three distance measurement methods:
  - 1) Manual entry
  - 2) Distance Trigger measuring
  - 3) Continuous measuring

## 5.1 Manual entry

There are three sub modes available when measuring in the Manual mode:

### Distance Mode



- a) Measuring using the Disto:

The Z distance is transmitted to the PC over Bluetooth. Simply move the sensor along the guide to measure all three axes (X,Y&Z)



- b) Measuring without a Disto with differing distances between measurement points: You will be prompted to enter the distance at each point before the measurement can be recorded.



- c) Measuring without a Disto with similar distances between measurement points: You will be prompted to enter a distance at the start of a measurement, the distance for every new point will be recorded automatically.

## 5.2 Automatic Distance Triggering

When measuring in this mode, the Disto is used as a distance trigger. After measuring and recording a value, the sensor has to be moved a certain distance before a new value can be recorded.



Measure → move sensor → sensor is stationary → delay time → next measurement →

### Adjustments for the Distance Trigger

The period of time (delay time) the sensor has to be stationary before the value is recorded can be set here.

In the system.ini file (Directory/ProLine V3/system/system.ini) you can set the minimum distance the sensor has to be moved between points before a new measurement can be triggered (TriggerReArmBand). The Trigger Death Band is principally the sensors way of knowing that it is stationary, the death band can allow a certain amount of fluctuation due to vibration etc. The higher the value, the more fluctuation is allowed.

[DIST\_TRIGGER]

TriggerTime=3

TriggerDeathBand=5

TriggerReArmBand=20

Delay time [sec]

Fluctuation tolerance when stationary [+/- mm]

Minimum distance to the next point [+/- mm]

## 5.3 Continuous measuring

This mode allows non stop measuring without the need for manual triggering of a measurement. The measurement is started by pressing the measurement button. The system measures continuously until the trigger is pressed again. The measurement frequency can be chosen by entering a value (in secs) in the Measurement Duration pull down.

The default is 0 secs., 3 secs = a measurement every 3 secs.

Continuous Measure



Measurement duration



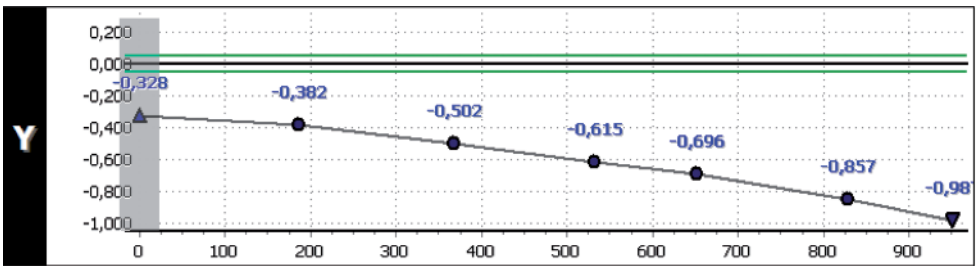
# 6 Analysis

## 6.1 Analysis of the laser measured values

It is possible to carry out a measurement without having to align the laser beam exactly parallel to the measurement object. This can result in measurement values that are way outside the tolerances set, as seen in the picture below.

In the following example, the Y axis of a measurement will be evaluated:

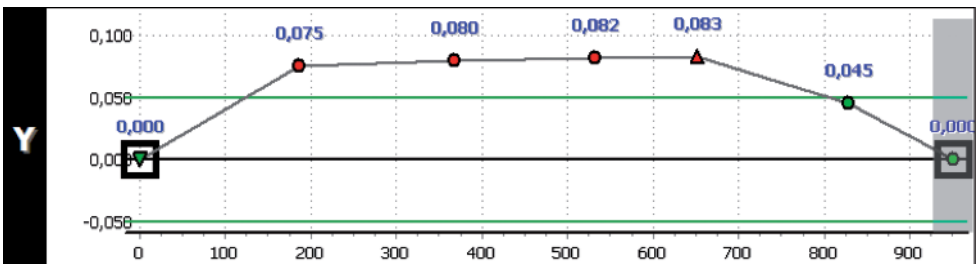
- 1) First case: the laser beam in this case was not aligned parallel to the object, resulting in raw-data values between  $-0,328$  bis  $-0,987$  mm. Die Tolerances were set at  $\pm 0,05$ .



- 2) Second case: The first and the last measurement points have been "zeroed" using the Zero button. This method shows the straightness of the guide or object. The measurement points lay between 0,000 und 0,083 mm, four of the points are not within the set tolerances and should be corrected.



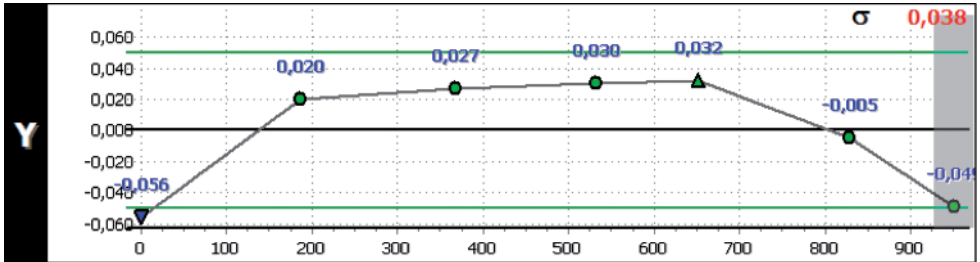
- 3) In case three, the "Best-Fit" compensation has been chosen. In this mode a straight





line to which the smallest possible distance between each of the points and the straight line is calculated, is placed through all the points. In this mode, there is only one point outside the tolerances (0,006) which requires correction.

### Conclusion:



If you need an objective analysis of the straightness of an object, then the Best Fit method is the most suitable method.

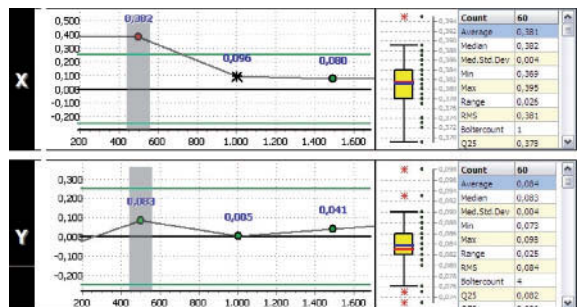
If corrective work is to be carried out, then you should take into account that there may be fixed points within the machine that can't be adjusted. In this case, method two would be the best choice as it allows these fixed points to be zeroed. All other points are then corrected to the fixed points.

## 6.2 Analysis of the laser measuring quality

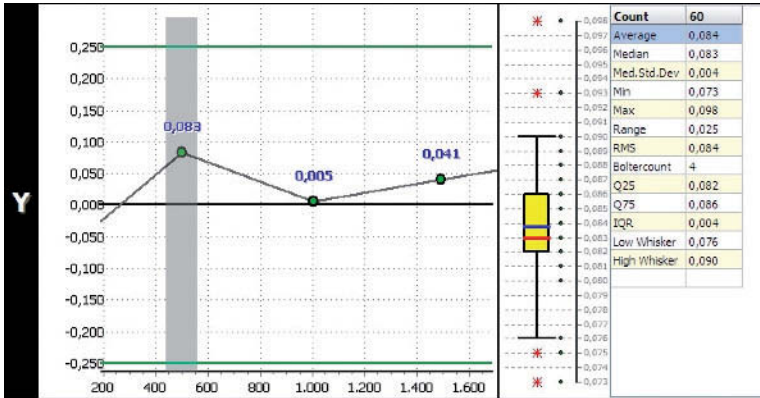
During the measurement procedure other values for each point are also collected and saved for further analysis. This information can be called upon to assess the quality of a particular measurement value. Press the Point Quality button to obtain information about the chosen measurement point.

The graphic illustration as a table of values as well as a box diagram appears from the side for evaluation.

In the following example, the gray marked point with a measurement



duration of 15 secs. Was chosen for analysis:



The Box plot shows the distribution and the calculated average value. The table shows all the statistical values of the measurement point.

**Count** Number of recorded values (eg: 60).

**Average** Average of all the values. (eg: 0,084 – highlighted in blue) Blue line in the yellow area.

**Median** Simplified average value without bolter values (eg: 0,083). Red line in the yellow area.

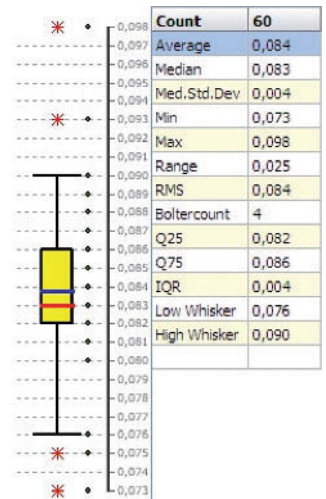
**Med.Std.Dev** Standard deviation of the median or Standard deviation of the measurement without bolter values (eg: 0,004).

**Min** Absolute lowest value (eg: 0,073).

**Max** Absolute highest value (eg: 0,098).

**Range** Range of values between absolute lowest and absolute highest value (eg: 0,025).

**RMS** Root mean square. Assessment of the deviation,



- similar to the Standard Deviation (eg: 0,084).
- Boltercount** Number of bolter or spike values. (eg: 4 – In the diagram, bolter values are marked with a red asterisk.
- Q25** Lower Quartile border\* (eg: 0,082 – In the diagram, the lowest part of the yellow area).
- Q75** Upper Quartile border\* (eg: 0,086 – In the diagram, the highest part of the yellow area).
- IQR** Inter Quartile Range. 50% of all values are present within this area (eg: 0,004 – Yellow area in the diagram).
- Low Whisker** Lower border for runaways or outliers (Bolters).  
The border is defined as follows:  
 $Q25 - 1,5 * IQR = 0,082 - 1,5 * 0,004 = 0,076$ .  
Lower horizontal black line in the diagram).
- High Whisker** Upper border for runaways or outliers (Bolters).  
The border is defined as follows:  
 $Q75 + 1,5 * IQR = 0,086 + 1,5 * 0,004 = 0,092$ .  
Because there are no values between 0,090 and 0,092, the next lower value is chosen as the border.  
Upper horizontal black line in the diagram.

In the table to the right you can see all 60 values measured within the 15 second measurement duration for the chosen measurement point.

The Upper and the Lower Quartile borders are clearly visible.

In the Toolbox, the Std. Dev. Point Quality is adjustable.

In the Illustration above, the values outside this area will be marked with an asterisk.

The Measurement Point Analysis is always based on the raw data from the measurement, Best Fit compensation or zeroed points have no influence.

\* = Quartile: The quartiles of a set of values are the three points that divide the data set into four equal groups each containing 25%.

	Pnr	Y
1	41	0,098
2	40	0,093
3	46	0,090
4	42	0,089
5	44	0,088
6	49	0,088
7	56	0,088
8	47	0,087
9	51	0,087
10	57	0,087
11	58	0,087
12	45	0,086
13	48	0,086
14	50	0,086
15	55	0,086
Q75		
16	39	0,085
17	54	0,085
18	59	0,085
19	0	0,084
20	1	0,084
21	12	0,084
22	14	0,084
23	29	0,084
24	43	0,084
25	52	0,084
26	53	0,084
27	2	0,083
28	3	0,083
29	4	0,083
30	5	0,083
31	7	0,083
32	8	0,083
33	9	0,083
34	10	0,083
35	11	0,083
36	13	0,083
37	15	0,083
38	16	0,083
39	17	0,083
40	27	0,083
41	28	0,083
42	30	0,083
43	31	0,083
44	6	0,082
45	18	0,082
Q25		
46	21	0,082
47	22	0,082
48	25	0,082
49	26	0,082
50	19	0,081
51	20	0,081
52	23	0,081
53	24	0,081
54	32	0,081
55	33	0,080
56	34	0,080
57	38	0,080
58	36	0,076
59	35	0,075
60	37	0,073

**Example:**

The first/lower Quartile (Q25) cuts off lowest 25% of data.

The second Quartile (median) cuts data set in half.

The third/upper Quartile(Q75) cuts off highest 25% of data.

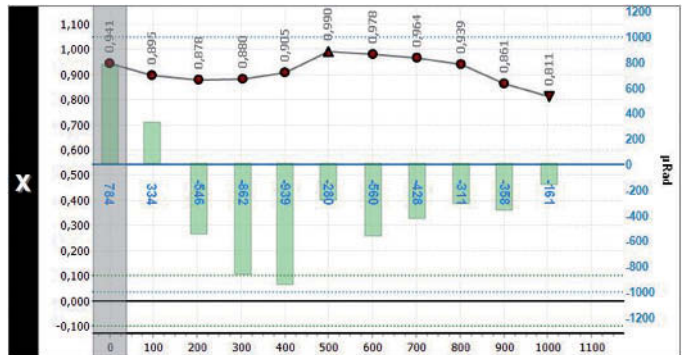
The difference between the upper and lower quartiles is called the Interquartile Range (IQR) and contains 50% of the data.

### 6.3 Analysis of $\mu$ Level measured values

In contrast to the laser measured values, there is no best-fit in the  $\mu$ Level measurements. The values can only be set to zero at any given point, all other values are then added with the amount of the zeroed point.

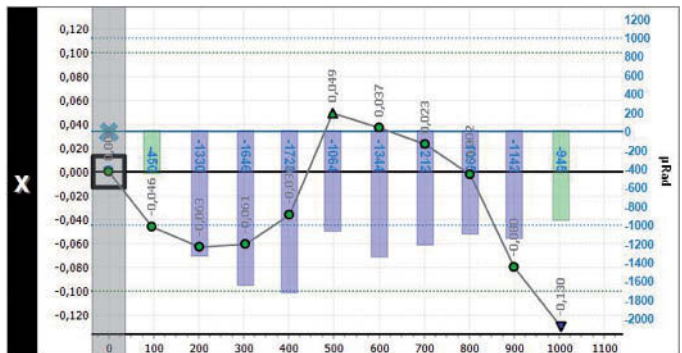
**Example:**

The first graph shows the measurement with unedited **raw data**.



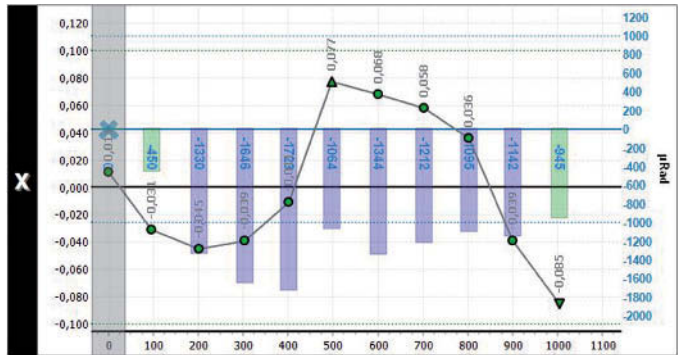
In the second graph, the **first point was zeroed**:

- Laser measurement was shifted by the amount of the first point (- 0.941 mm)
- The  $\mu$ Level measurement has been shifted by the amount of the first point (-784  $\mu$ m).

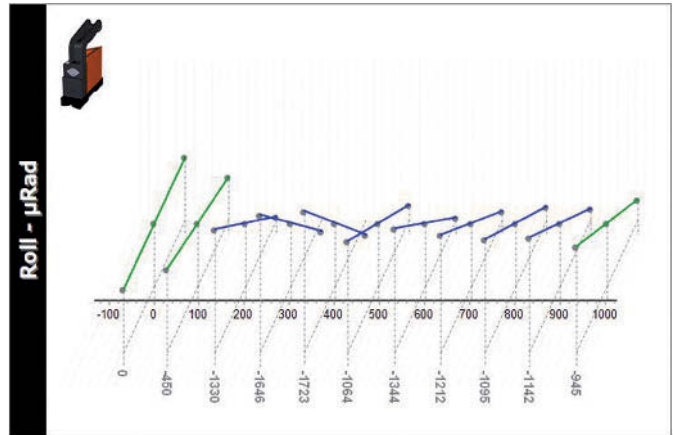


In the third chart the **best-fit adjustment** has been activated:

- The laser measurement was compensated to Best-Fit
- The  $\mu$ Level measurement remained unchanged, point 1 is set to Zero.



The fourth graphic shows the last result in **3D**.



## 7 Accessories



### **Display Unit DU 320 (IT 200410)**

Display unit / ultramobile - PC based. For industrial use; with rubberprotector grips. The PC has internal and external batteries, with "hot swap" feature and communication over Bluetooth.



### **Laser T250 (BG 830750)**

T250 Package comes complete with Power Supply Cable and Adapter for use with the Borealign Package or for use with a Tripod. The Laser beam is adjustable in offset and in angle.

Perfect for measuring straightness or for measuring bearing ways in engines for example.

### Laser T330 (BG 830203)

The T330 self-levelling sweep laser provides the laser source in the measurement system. A Laser Receiver measures the position of the beam. The self-levelling feature as well as complete ease of use are both features which make the T330 unbeatable when measuring straightness, level and flatness. Complex geometrical tasks can also be accomplished simply and speedily.



### Laser receiver R540 (BG 830440)

2-Axes Laser Receiver with Wireless comms.  
 Incl. Hand Reader Mobi 940, Antenna and charging cable.  
 The R540s unique stepped design allows low positioning directly within the object. This minimises any falsifying of the measurement due to angular deviation.



### Laser receiver R545 (BG 830450)

2-Axes Laser Receiver with Wireless comms.  
 Incl. Hand Reader Mobi 940, Antenna and charging cable. Measurement range 16 x 16 mm.  
 Physical Detector size 22 x 22 mm.  
 Resolution: 1µm. Includes built-in Inclinometer.





### Leica DISTO™

#### Bluetooth distance measuring device

(FIX DISTO-P II)

The D8 Disto is currently the only available distance measuring device on the market which is able to transmit the measured values via Bluetooth to a display unit. This makes it the ideal partner for the ProLine Software. This device automatically gives you information about the position of the laser receiver. Furthermore it makes an automatic measurement possible.



### μLevel – Digital Level with Bluetooth (BT 840100/1)

μLevel is a high-precision tilt measurement system ( $1 \mu\text{m} / \text{m}$ ) for machine measurement, assembly and quality control. Due to the extremely easy handling and easy to read measurement data, the system is very popular with mechanics. Via the Bluetooth interface, an external display can be used which makes it possible to use the level on a component without having to read it directly. In conjunction with the ProLine packages the μLevel can be used as a sensor for Twist measurements.



### Battery pack for the DU320 (IT 200207)

External Battery Pack for the DU310 and DU320. The UMPC has an internal battery which allows a "Hot Swap" of the external battery. Continuous measuring is possible with two battery packs and the external charger pack.



### External battery charger DU320 (IT 200208)

External charging station for the battery packs of the DU310 & DU320.

Continuous measuring is possible with two battery packs and this external charging station.



### Tripods for the Lasers and/or Sensors (FIX STATIV-01-P ... FIX STATIV-04-P)

#### Tripod 01-P:

Height range 545 mm – 935 mm, weight 5,5 kg

#### Tripod 1.5-P:

Height range 760 mm – 1450 mm, weight 12 kg

#### Tripod 02-P:

Height range 870 mm – 1900 mm, weight 12 kg

#### Tripod 03-P:

Height range 1160 mm – 2520 mm, weight 13 kg

#### Tripod 04-P:

Height range 1880 mm – 3910 mm, weight 19 kg



## 8 Products and Services

**Geometrical measurement techniques and alignment have been an issue since the pyramids.**

Today the measurement and alignment of machinery components is an integral part of the assembly and quality control process. Be it linear guides, presses, flange connections, drive shafts or cylinder rolls, the precision of the alignment has a significant effect on the functionality of the component. The alignment of these machinery components will often affect the quality of the manufactured product and also the life-time of the machine components themselves.

The use of a laser beam reference together with tradition industrial measurement techniques has made it possible to build tools which simplify these alignment procedures.

Status Pro develops and manufactures laser alignment equipment and we are committed to this process.

Most of our customers are machine builders, assembly and quality control people. Typically our customers require a complete solution package including on-site training and support. When a customised solution is required, modifications are often necessary, be it in software, mechanical adaptations or the sensor housing itself in order to meet customer requirements. We are interested in long-term customer relationships and therefore this is also part of our service.

**We and our partner companies all over the world also provide alignment and industrial surveying services.**

We invite you to visit our web site [www.statuspro.com](http://www.statuspro.com).  
For more information just call us at +49 (0) 2327 - 9881 - 0.



# 9 Declaration of conformity

In accordance with the EMC Directive 2004/108/EC, the Low Voltage Directive 73/23/EEC, **including amendments by the CE-marking Directive 93/68/EEC & EC directives RoHS, 2011/65/EU.**

<b>Type of equipment</b>	Alignment System
<b>Brand name or trade mark</b>	Status Pro Maschinenmesstechnik GmbH
<b>Type designation(s) / Model no(s)</b>	T330 – BG 830203, /1, /2, /3 T250 – BG 830750 R545 – BG 830450 R540 – BG 830440
<b>Manufacturer's name, address, telephone &amp; fax no</b>	Status Pro Maschinenmesstechnik GmbH Mausegatt 19 D-44866 Bochum Germany Tel.: +49 (0) 2327 / 9881 – 0 Fax: +49 (0) 2327 / 9881 – 81

*The following standards and/or technical specifications, which comply with good engineering practice in safety matters in force within the EEA, have been applied:*

#### **Standard / Test report / Technical construction file / Normative document**

Emission:	EN 61000-6-3:2007.
Immunity:	EN 61000-6-2:2005, EN 61000-4-2, -3.
ISO9001:2008	Ref. No / Issued by: DNV Certification No. 2009-SKM-AQ-2704 / 2009-SKM-AE-1419.

The laser is classified in accordance with the International Standard IES-60825-1:2007, USA FDA Standard 21 CFR, Ch I, Part 1040.10 and 1040.11 except for deviations pursuant to laser notice No. 50, dated June 24, 2007.

The wireless device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) this device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

#### **Additional information**

The products have been CE-marked in 2004.

As manufacturer, we declare under our sole responsibility that the equipment follows the provisions of the Directives stated above.

#### **Place and date of issue**

Bochum, 2014-04-01

Signature of authorized person



David Foley, Managing Director



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