proceq

ZRS 6060
Retroreflectometer
Firmware as from v.1.0

Instruction manual

Index

Exclusion of liability

Illustrations, descriptions as well as the technical specifications conform to the instruction manual on hand at the time of publishing or printing.

However, Proceq SA policy is one of continuous product development. All changes resulting from technical progress, modified construction or similar are reserved without obligation for Proceq SA to update.

Some of the images shown in this instruction manual may be of a pre-production model and/or are computer generated; therefore, the design / features of the delivered product may differ in various aspects.

The instruction manual has been drafted with the utmost care. Nevertheless, errors cannot be entirely excluded. The manufacturer will not be liable for errors in this instruction manual or for damages resulting from any errors.

The manufacturer will be grateful at any time for suggestions, proposals for improvement and indications of errors.

1 Description of device

The ZRS 6060 is an ergonomic retroreflectometer for determination of night visibility (coefficient of retroreflection R_A and R') of traffic signs, safety garments and other reflective materials with measurement of three different observation angles at the same time.

In particular, this instrument has the following features

- The very first retroreflectometer with LED illumination system and with a 3.5" high resolution colour touchscreen with adjustable display inclination for excellent visibility under all lighting conditions, even in bright sunlight
- Innovative options to customize the reflectometer to personal requirements: integrated 5-megapixel camera, WAAS GPS-unit, holster and handles
- Easy and quick calibration with only a single working standard
- For all kinds of retroreflective materials and colours with automatic colour indication
- Continuously updated average value; each single measurement is stored additionally
- Integrated measurement of temperature (°C / °F) and relative humidity (% rF)
- Measurements can be evaluated with the included mapping and data analysis software „MappingTools"
- Easy to operate with multilingual menu navigation
- Sturdy construction and ergonomic design

2 Safety information

2.1 Symbols used

This note comprises instructions needed to follow directions, specifications, proper working procedure and to avoid data loss, damage or destruction of the instrument.

This note signifies a warning about dangers to life and limb if the apparatus is handled improperly. Observe these notes and be particularly careful in these cases. Also inform other users on all safety notes. Besides the notes in this instruction manual the generally applicable safety instructions and regulations for prevention of accidents must be observed.

2.2 Safety notes and hints

It is strictly forbidden to open the housing of the ZRS 6060! If not observed, all guarantee and liability claims to Proceq SA will be void.

The ZRS 6060 is a high quality, state of the art instrument and is safe to operate. Nevertheless, risks may occur during improper use.

Every person working with the ZRS 6060 or maintaining the ZRS 6060 must read and understand the manual completely in particular the safety precautions and warnings.

The ZRS 6060 is exclusively intended for determination of the night visibility (coefficient of retroreflection R_A and R') of traffic signs, safety garments and other reflective materials with measurement of three different observation angles at the same time. Any other use is considered as not being in accordance with the intentions of the manufacturer. The manufacturer is not liable for damage resulting from inappropriate application. The user bears full responsibility.

Never leave the ZRS 6060 under direct sunlight exposure over a longer period. Always store it in it´s shoulder bag.

Unauthorized modifications and changes of the ZRS 6060 are not allowed.

Unauthorized reproduction is not permitted.

Proceq SA refuses all warranty and liability claims for damages caused by usage of the ZRS 6060 in combination with **non-original accessories**, or accessories from 3rd party suppliers.

All maintenance and repair work which is not explicitly allowed and described in this manual (see chapter 16.1 on page 59) shall only be carried out by **Proceq SA** or your authorized Proceq agent, failure to comply voids warranty.

Make sure that the ZRS 6060 is turned off and unplugged before any maintenance.

For the operation of the ZRS 6060 apply all local safety regulations.

3 Delivery of device

3.1 Damages during carriage

On receipt of the goods, check for any visible damages on the packaging. If it is undamaged you may sign the receipt of the goods. If you do suspect by your visual inspection that damage has occurred, make a note of the visible damage on the delivery receipt and request the courier to countersign it. Moreover, the courier must be held responsible for the damage in writing.

If any damages are discovered during unpacking, you have to inform and hold the courier-liable immediately in the following way: “When opening the parcel, we noticed that … etc. “This superficial checking of the goods has to be done within a time limit set by the carrier, which is normally 7 days. However, this period may vary depending on the courier. Hence, it is recommended to check the exact time limit when receiving the goods.

If there are any damages also inform your authorized Proceq agent or **Proceq SA** immediately.

3.2 Shipment

Should the device be transported again, it must be packaged properly. Preferably use the original packaging for later shipments. Additionally, use filling material in the package to protect the device from any shock during carriage.

3.3 Standard delivery

The following parts are included in the delivery:

1 Retroreflectometer	
1 calibration standard / front plate	
1 battery charger (100 – 240V, 50-60 Hz)	
1 mapping and data analysis software „MappingTools“	
1 USB-cable for data transfer to computer	
1 certificate of manufacturer	
1 certificate of calibration	
1 shoulder strap	
1 shoulder bag	

3.4 Shoulder bag

The ZRS 6060 is delivered in a shoulder bag. Whenever you want to transport the instrument, use this shoulder bag. Additionally, for shipments the shoulder bag has to be put into a cardboard box and protected with filling material. The shoulder bag is at the same time an optimal storage case for the ZRS 6060. The calibration standard / front plate always has to be mounted on the ZRS 6060 before stowing it in the shoulder bag.

3.5 Options with modification of the ZRS 6060 (built-in)

WAAS GPS-unit	
holster	
barcode reader QR barcode reader	
5-megapixel camera	

It is recommended to buy any desired built-in options when purchasing the ZRS 6060. All options can be retro-fitted, but some require return to the manufacturer for installation.

3.6 Options without modification of the ZRS 6060

portable USB-printer	

handle 1.2 m	
extendable handle from 1.7 m to 3 m (66.9” – 118.1”) extendable handle from 2.2 m to 4 m (86.6” – 157.5”)	
adapter for illumination (entrance) angle 20°	
adapter for illumination (entrance) angle 30°	
adapter for illumination (entrance) angle 40°	
adapter for illumination (entrance) angle 45°	
voltage converter DC/AC 12V/230V to be plugged into the cigarette lighter	

Proceq SA refuses all warranty and liability claims for damages caused by usage of the ZRS 6060 in combination with **non-original accessories**, or accessories from 3rd party suppliers.

4 Device overview

(1) **On/off button**
(2) Measuring button
(3) **Quick start menu button**
(4) **Touchscreen with adjustable display inclination**
(5) **Handle**
(6) **Integrated battery**
(7) **Calibration standard / front plate**
(8) **Suspension clip**
(9) **Cover of connection socket for battery charger and optional handles**
(10) **Cover string**
(11) **Label**
(12) **Host USB-interface (type A)**
(13) **Mini USB-interface (type B)**
(14) **Thread socket for mounting optional handles**
(15) **Measuring area**
(16) **Adjusting screw for display inclination resistance of touchscreen**

4.1 Adjustable display inclination

The ZRS 6060 is equipped with an adjustable display inclination. This ensures an optimal visibility of the display in all conditions.
Pull the upper part of the display ahead until you reach the optimal angle. The display inclination can be adjusted seamlessly between the standard vertical position and the maximum tilted position.

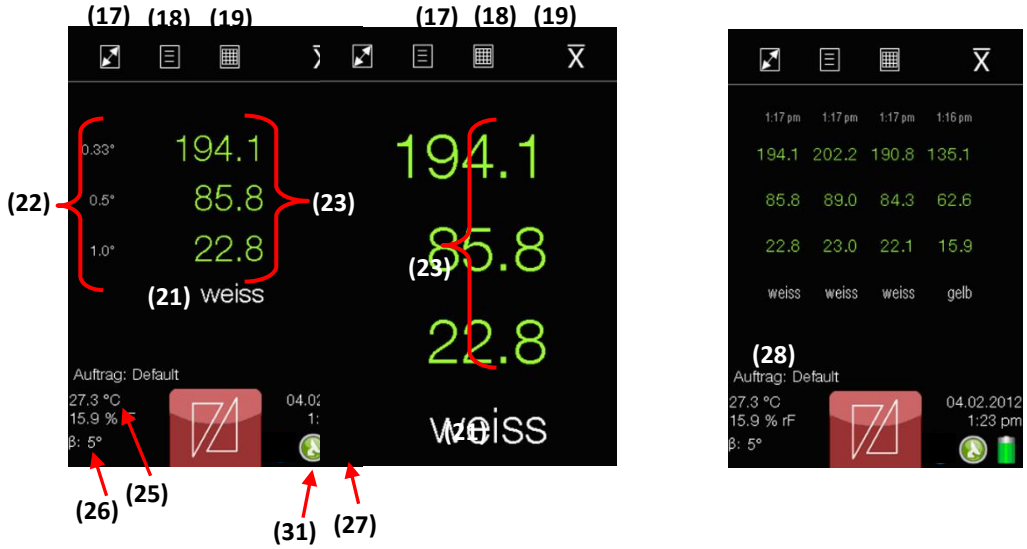
Standard position | One of many positions | Maximum tilted position

Always put the adjustable display back into the standard vertical position before storage.

4.2 Main window

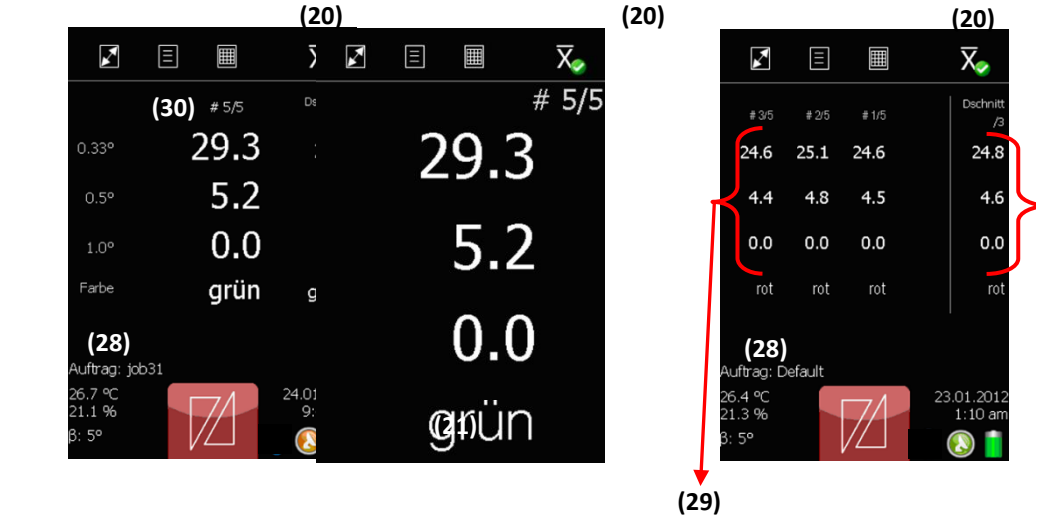
Display view in single mode

Main window Enlarged view Overview



Display view in average mode

Main window Enlarged view Overview



(3) **Quick start menu** 

(17) Enlarged view icon 

(18) Overview icon 

(19) Main window icon 

(20) Average mode is activated 

(21) Colour identification of measuring sample determined atomatically

(22) Observation angle

(23) Single values of observation angle

(24) Average value of observation angle

(25) Temperature and relative humidity

(26) Illumination (entrance) angle

(27) Battery status

(28) Current job

(29) Last single measurement in average mode

(30) Number of single measurements of the current calculated average value

(31) GPS-status

5 Setting up

Press the on/off button shortly  to switch on the unit.

Older ZRS 6060 versions can be put into stand-by mode. This enables a fast switch-on in a few seconds. To switch the unit into stand-by-mode, press the on/off button shortly.
If the battery was completely empty or the unit was not used for a longer period, it takes about 30 seconds to boot up, as the ZRS 6060 was shut off completely. To shut off the unit completely, press the on/off button for at least 8 seconds.

 Press the measuring button continuously during switch-on to get directly to the language settings.

The „auto off time“ and in case of older units the „auto sleep time“ can be set in the menu, see chapter 13.6.4 “Power” on page 51.

6 Navigation

6.1 Activation / Deactivation

Certain functions can be activated / deactivated by tipping on the corresponding icon on the display.
This is either shown with a white tick on green background  for active functions, a green tick  for chosen menu options, a yellow highlight e.g.  for active control elements or a grey highlight e.g.  for chosen measurements.

6.2 Scrolling

For scrolling use either the navigation arrows  and  or your fingers by pressing and pulling into the desired direction.

6.3 Exit

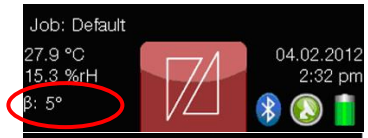
The measuring mode can be opened by triggering the measuring button from every function. The only exceptions are functions with a “cancel” button  . These have to be interrupted first by pressing the  button. In certain functions there is a backwards arrow  to get back a level.

7 Calibrate

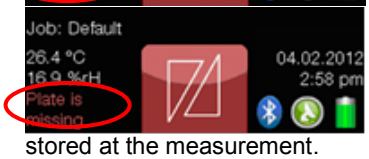
7.1 Front plate with calibration standard

The front plate with calibration standard should always be mounted on the ZRS 6060. For measurements, it must be mounted in the measuring position, for calibration in the calibration position.

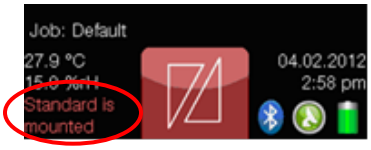
Mounted in the Measuring position | Removing calibration standard, turning and remounting | Mounted in the calibration position



If the front plate with calibration standard is properly mounted in the measuring position, no status message will be displayed.



If the front plate with calibration standard is not mounted, the status message „Plate is missing“ is displayed. Should you carry out a measurement without front plate, the illumination angle 0° will be stored at the measurement.



If the front plate with calibration standard is properly mounted in the calibration position, the status message „Standard is mounted“ is displayed. Should you carry out measurements with mounted calibration standard, this information will be stored with the measurements.

Depending on version, there are two front plates with calibration standard – with illumination angle (β) +5°and with illumination angle (β) -4°

Backside of a front plate with calibration standard as an example

Label of the calibration standard with following information:
- article number
- serial number
- illumination (entrance) angle (β)
- observation angles
- calibration values
- expiry date of calibrationstandard

calibration standard – measured in factory

After the expiry date of the calibration standard a factory calibration of the ZRS 6060 and its corresponding calibration standard is required. Contact either **Proceq** or your authorized Proceq agent.

The calibration standard delivered with the ZRS 6060 is not interchangeable and is valid only for the delivered instrument.

Always protect the calibration standard from dust, moisture and other environmental factors, keep it mounted on the ZRS 6060 and store the instrument in its shoulder bag.

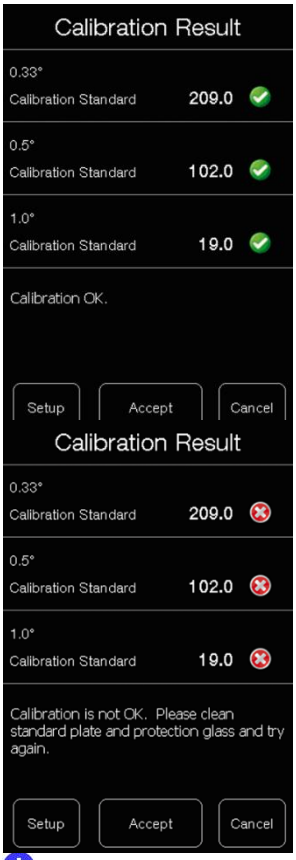
7.2 Cleaning of the calibration standard

The calibration standard can be cleaned using standard window cleaner and a soft cloth.

A damaged or a polluted calibration standard may cause incorrect calibration and therefore incorrect measuring results.

7.3 Calibration on calibration standard

Should the unit indicate that the calibration is outdated or it is required by the regulations, the ZRS 6060 has to be calibrated. The calibration interval can be changed as described in chapter 13.6.9 “Calibration” on page 53.



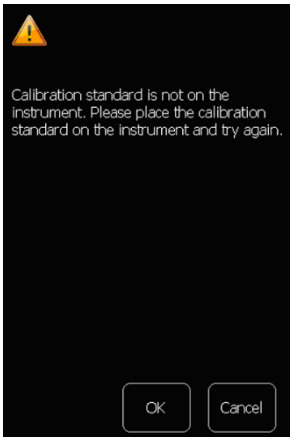
Press the symbol  and  to open the calibration function. By pressing Calibrate you trigger the calibration.

After calibration a message is displayed showing the calibration results. Confirm the successful calibration with Accept.

Should the calibration not be OK (e.g. the standard or the optical window is damaged or soiled), the instrument will inform accordingly

Reject the wrong calibration with Cancel, eliminate the cause e.g. by cleaning and recalibrate.

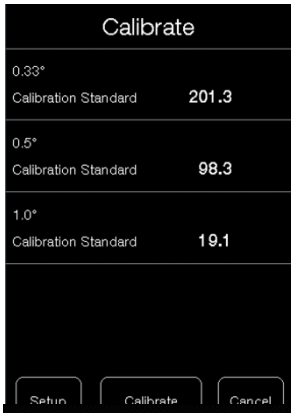
Should the calibration still not be OK after trying several times and despite cleaning the calibration standard and the optical window, it might be necessary to send the instrument to the manufacturer for maintenance and calibration. Please contact Proceq or your authorized Proceq agent.



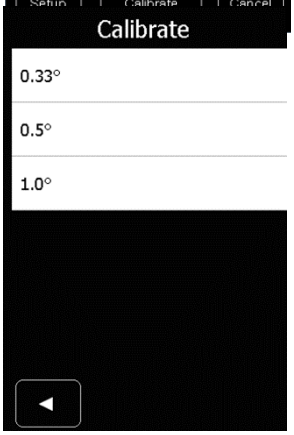
Make sure that the front plate with the calibration standard is placed correctly. It needs to be mounted in the calibration position, otherwise an error message will be displayed. The front plate has to latch audibly.

7.4 Calibration on second calibration standard

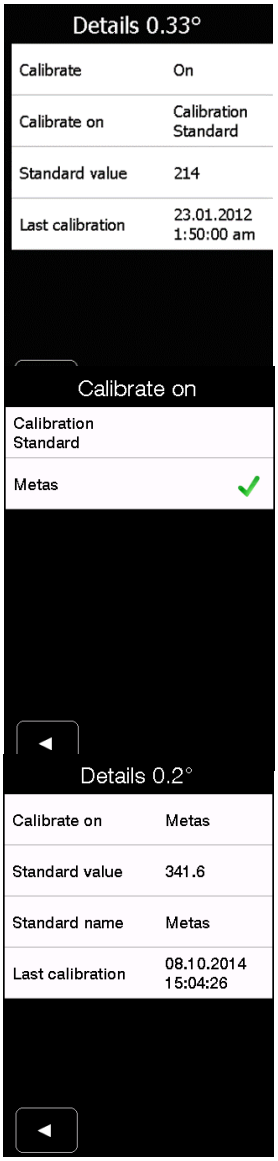
It is possible to calibrate the ZRS 6060 on a second calibration standard. (e.g. prescribed by the company or authority)



Press the symbols  and  to open the calibration function. Now click on  to open the calibration settings.



The settings for each observation angle have to be made separately.
Tap the corresponding line to select an observation angle.



Here you can see and change the calibration setup settings of the chosen observation angle.
Tap on the row „Calibrate on“ to select the standard onto which the chosen observation angle will be calibrated.

Tap the corresponding row to select the second calibration standard.
In the default settings the second calibration standard is called „Metas”.
The selected calibration standard is indicated by ✓.

After the second calibration standard has been selected, the „calibration settings“ of the chosen observation angle will be displayed automatically. The standard value and name can be set here by tapping on the corresponding row.

Here the value of the second standard can be inserted. This might be a known reference value of an internal sample or a value measured by an official institute. After the input has been confirmed by tapping „OK“, the menu item „calibration settings“ will be displayed automatically.

Please observe that the R_A value of samples may change over time as retroreflective materials are subject disruption. In this case you either need to re-certify the value of the second calibration standard on a regular basis or replace it.

The appropriate name of the second calibration standard can be entered here. Afterwards confirm by „OK“. After confirmation the menu item „calibration settings“ will be displayed automatically. Tap the backward arrow to get back to the calibration function.

After the values for every observation angle have been set accordingly, you are able to carry out a calibration on your second standard in the same way as calibrating on the regular calibration standard.

8 Measure

8.1 General

There are many different reflective materials which can be measured with the ZRS 6060 depending on the model.
The following table helps to choose the correct version.

Version	Illumination angle β	Observation angle α	Application
6060.ASTM	-4°	0.20°, 0.5°, 1°	
6060.CD	5°	0.20°, 0.33°, 0.5°	
6060.DE	5°	0.20°, 0.33°, 1°	
6060.EN	5°	0.2°, 0.33°, 2°	
6060.CEN	5°	0.33°, 0.5°, 1°	
6060.A.S *	-4°	0.20°, 0.33°, 0.5°, 1°, 1.5° oder 2° *	Depending on selection
6060.C.S *	5°		

*(Please select 3 observation angles α)

8.2 Practical examples

Measurements of traffic signs and licence plates. According to standard, choose the appropriate version from the table.

Measurements of contour markings of heavy and long vehicles and their trailers. According to standard, choose the appropriate version of the ZRS 6060 from the table.

Measurement of safety garments (Warning clothes).
According to standard, choose the appropriate version of the ZRS 6060 from the table.

For some applications it might be useful to have one or several of our options. Refer to chapter 3.5 on page 11 for an overview of available options.

8.3 Preparation and safety precautions

The standard delivery includes a shoulder strap. When you are not carrying the ZRS 6060 in the shoulder bag, we recommend using the shoulder strap.

Secure the ZRS 6060 by connecting the safety clip of the shoulder strap to the suspension clip on the handle of the ZRS 6060.
To avoid accidental dropping of the device, it is recommended to carry the shoulder strap around the neck.

8.4 Single measurements

Place the ZRS 6060 on the product to be measured.
Press the measuring button (2) to trigger a measurement.
The measuring period is about. 2-3 seconds.

In the main view, the measurement values will be shown next to each observation angle after a successful reading.
To edit or delete a measurement, refer to chapter 8.8 “Edit, delete and store measurements” on page 28.
Using the default settings, the measuring values appear in white. If the „pass/fail“ mode is activated, the measuring values will appear in green or in red. Refer to chapter 8.6 “Pass/Fail measurements” on page 26.

To change the settings of the measuring mode, refer to chapter 13.2 “Navigation in the menu” on page 47.

Tap on the symbol for an enlarged view.

Tap on the symbol for an overview of the last measurements.

8.5 Average measurements

To trigger average measurements, the symbol on the display has to be activated.
Press the measuring button (2) to trigger a measurement. The measuring period takes about 2-3 seconds.

The last single values are displayed in the left column and are numbered in the header. The current average value is displayed on the right and the number of single measurements is displayed in the header of the column.
To edit or delete a measurement, refer to chapter 8.8 “Edit, delete and store measurements” on page 28.
Using the default settings, the measuring values appear in white. If the „pass/fail“ mode is activated, the measuring values will appear in green or in red. Refer to chapter 8.6 “Pass/Fail measurements” on page 26.
To change the settings of the measure mode, refer to chapter 13.2 “Navigation in the menu” on page 47.

Tap on the symbol for an enlarged view.

Tap on the symbol for an overview of the last measurements.

8.6 Pass/Fail measurements

Tap on the symbols and , then select “measuring mode” to activate the „pass/fail“ function. Minimum requirements for the retroreflective material to be measured can be defined for each observation angle by setting a lower reference value. If the minimum requirements are fulfilled (pass), the measuring values appear in green. Should the measured value not reach the minimum requirements (fail), the measured values are displayed in red.

8.7 Interval timer measurements

Tap on the symbols and , then select „Timers“ and „Interval timer“ to activate interval timer measurements.
With this function continuous measurements will be taken.

8.8 Edit, delete and store measurements

Tip on the corresponding row to e.g. delete a measurement. An editing window appears and the measurements can be edited, deleted or saved. Deleting several measurements at the same time is possible in the archive, see chapter 11 “Archive” as from page 39 via „Jobs“ see chapter 13.5 “Jobs” on page 49 or using the MappingTools software (see separate instruction manual).

Top list

Middle list

Bottom list

Here additional information can be added using the touchscreen. The entered information will be added to all future readings until the additional information will be edited again.

There is also possible to add the additional information later on in the archive as described in chapter11 “Archive” as from page 39.
For faster editing, it is possible to connect a keyboard to the USB-interface.

Sample of information which can be inserted additionally either directly in the measuring mode or in the archive.

Press 12? to get to the number keyboard.

Press @# to get to the special sign keyboard.

To get back to the standard keyboard press aBc.

9 Quickstart menu

Press to get to the quickstart menu.

This is an option at extra cost. Therefore this icon will only be displayed if the WAAS GPS-unit has been purchased. For further information see chapter 10.4 “WAAS GPS-unit” on page 35.

All stored files are located in the archive. The measurements can be edited, deleted, exported to USB flash drive as well as printed out here. For further information please refer to chapter 11 “Archive” as from page 39.

Connect the ZRS 6060 with an external printer e.g. the portable USB-printer. Press the desired measurement to print out the test report. If no measurement is selected the last one will be printed. The default settings which information will be included in the measuring report can be changed in the menu as described in chapter 13.6.8 “Printer” on page 53.

Press Calibrate to trigger a calibration. After the calibration a message appears about the successful calibration or about the deviation. With Accept the calibration will be confirmed. For further information please refer to chapter 7 “Calibrate” as from page 18.

10 Options

10.1 Illumination adapters

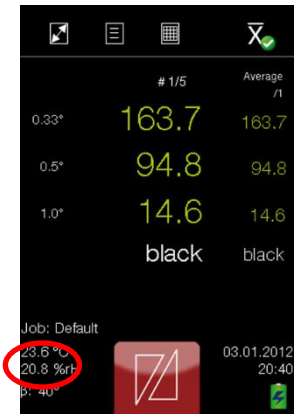
Should you require additional illumination (entrance) angles, use optional illumination adapters. The available illumination adapters are listed in chapter 3.6 on page 11.

The mounting and removal of the optional illumination adapter is always the same procedure independent on which model you choose.

Mounting and removal of front plate with calibration standard

Removal and mounting of illumination adapters

Mounted illumination adapter



The used illumination angle is always shown in the display of the main view and this information is stored to each measurement.

Make sure that the front plate with calibration standard is always removed before mounting an adapter.

Always mount the front plate with calibration standard before storing the instrument.

There is no difference in carrying out the measurements with or without adapters. See also chapter 8 „Measure“ as from page 24.

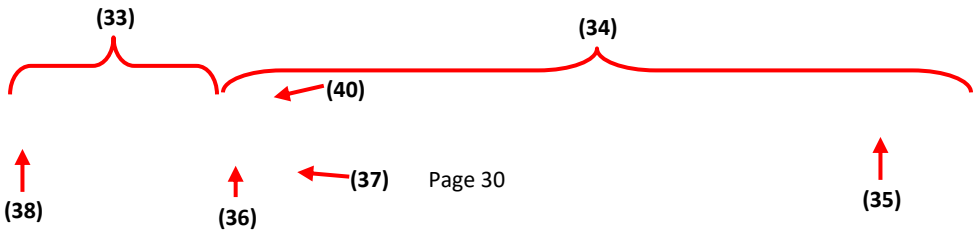
10.2 Handles

For reaching high positioned traffic signs or retroreflective markings on heavy and long vehicles and their trailers, we offer different handles. The available handles are listed in chapter 3.6 on page 11.

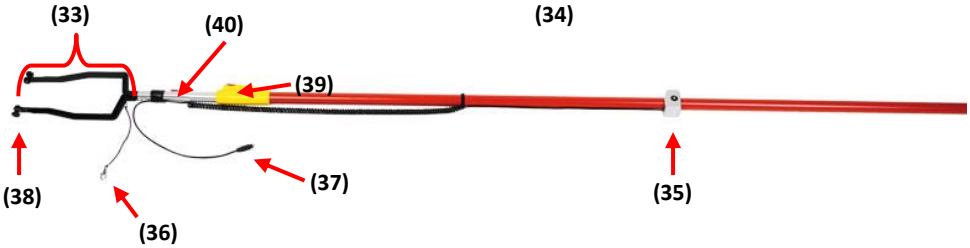
10.2.1 Mounting of the handles

The handles are supplied dismounted. They consist of the following parts:

Handle 1.2 m (47.2“)



Extendable handle from 2.2 m to 4 m (86.6” – 157.5”)



(33) Fork
(34) Handle
(35) Remote measuring button
(36) Strain relief with safety clip
(37) Remote connection
(38) Fixing screw
(39) Extension button
(40) Fork release button

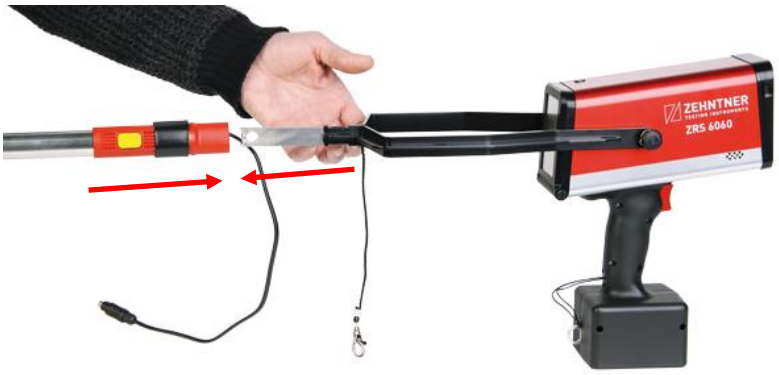
- Pull on the fixing screw (38), so that the tip of the screw is behind the support.




- Pull back the screws on both sides and slide the fork over the ZRS 6060. Afterwards tighten the screws on both sides.

If you ordered the handle as an option later, you need to remove the two black screws on the side of the instrument first to be able to mount the support.

- Connect the fork with the handle.



- Secure the ZRS 6060 by connecting the strain relief with safety clip (36) to the ZRS 6060.

- Now remove the protective cover of the ZRS 6060 connection socket by pulling on the cover string.
- Plug the remote connection (37) into the connection socket of the ZRS 6060.

- Now you are ready to carry out measurements on high position traffic signs or retroreflective markings on heavy and long vehicles and their trailers.

10.2.2 Dismounting

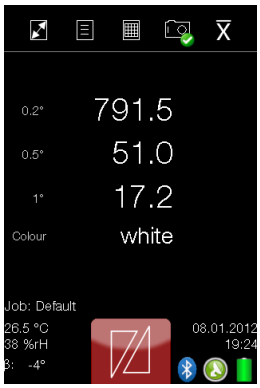
When dismounting the handles, you need to proceed in reversed order. To disconnect the fork and handle, you need to press the fork release button (40) before disconnecting.

10.3 Camera

The ZRS 6060 can be equipped with a 5-megapixel camera providing additional information on the measurement. The camera is installed on the top of the ZRS 6060.

Press  to activate the camera.
The instrument indicates the following steps: „Pull measure trigger to take picture“. The process can be ended by pressing “Cancel”.

After a picture has been taken the unit asks to accept. If a new picture has to be made press „Retake“ otherwise press „Accept“.



After the picture has been accepted, the camera symbol is active . From now on the same picture will be stored with every measurement until the camera symbol will be deactivated.
If measurements with new picture are required, repeat the process. Measurements with pictures can be seen in the archive. Please refer to chapter 11 “Archive” as from page 39.

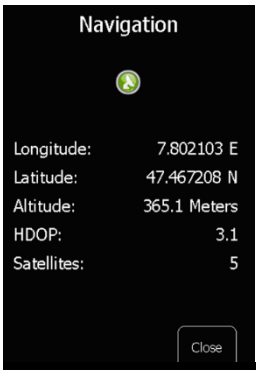
10.4 WAAS GPS-unit

The ZRS 6060 offers the possibility to store the GPS-coordinates of a measurement. If the ZRS 6060 is equipped with WAAS GPS-unit and is switched on, there will be a GPS status indication beside the battery status indication.

GPS status indication on the display

No GPS Signal	The WAAS GPS-unit is not able to receive a positioning signal. The coordinates cannot be displayed.
Weak GPS Signal	The WAAS GPS-unit is receiving the positioning signal. The quality of the GPS signal is poor.
Normal GPS Signal	The WAAS GPS-unit is receiving the positioning signal. The quality of the signal is fine.
Intense GPS Signal	The WAAS GPS-unit is receiving the positioning signal. The signal quality is very good.

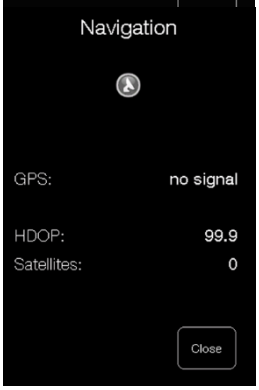
The quality of the GPS Signal basically indicates how many satellites are used to determine the position of the ZRS 6060. Better signal quality means more precision of the coordinates.
The GPS status indication is related to the HDOP (Horizontal Dilution of Precision). This provides information about the quality of the received GPS data.



After switching on the ZRS 6060, connecting the WAAS GPS unit can take up to 15 minutes until the unit is receiving coordinates.
Ensure clear view to the sky to receive good signals.

Press  and 

to see the GPS-coordinates.
By triggering a measurement the GPS-coordinates will be stored in the archive.



The WAAS GPS-unit is not able to receive a positioning signal. The coordinates cannot be displayed.
In this case, no GPS-coordinates will be stored with the measurement.

The performance of the WAAS GPS unit can be affected by narrow streets and high buildings that prevent clear view to the sky. In some cases it is not possible to receive coordinates indoors.

Technical data of the WAAS GPS-unit:

Accuracy:	min. ± 15 meters, <± 3 meters under good conditions
Earth Datum Index:	WGS84

10.5 Barcode reader and QR barcode reader

10.5.1 General

The ZRS 6060 can be equipped with a barcode reader or with a QR barcode reader. Both will be mounted on the top of the ZRS 6060.
The dimensions are: 98 mm x 28 mm x 40 mm.
The weight is approx. 104 g.

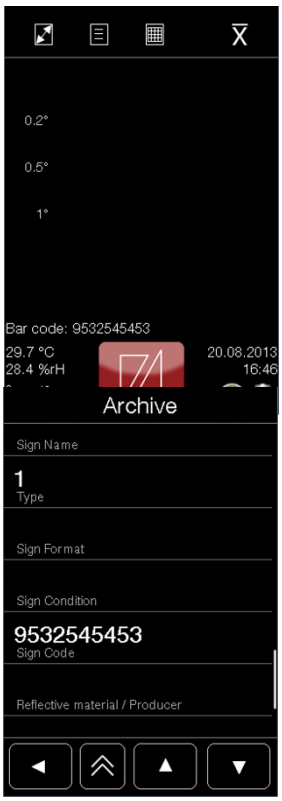
The glass on the front side of the barcode and QR barcode readers is an optical filter. Take care that it will not be scratched or broken. If soiled, clean with a microfiber cleaning cloth. Never use strong detergents or solvents.

10.5.2 Barcode measurements

Before triggering a measurement the barcode needs to be read. Switch on the ZRS 6060 and place it closely to the barcode and lift it up and down until the barcode is recognised by the barcode reader.

While scanning the barcode, the barcode reader emits a red laser beam.

Should the laser dot not change to a laser beam by lifting the ZRS 6060 up and down, hold something in front of the barcode reader.



The recognition of the barcode is confirmed with a short beep and the barcode is displayed in the main view and overview.

Trigger a measurement.

After the measurement or measurement series is completed, the barcode will no longer be stored and will not be displayed for the next measurement.

The barcode stored with a measurement is listed in the row “Sign Code”. This information can be accessed through „edit“, as described in chapter 8.8 “Edit, delete and store measurements” on page 28 or in the archive, see chapter 11 “Archive” as from page 39.

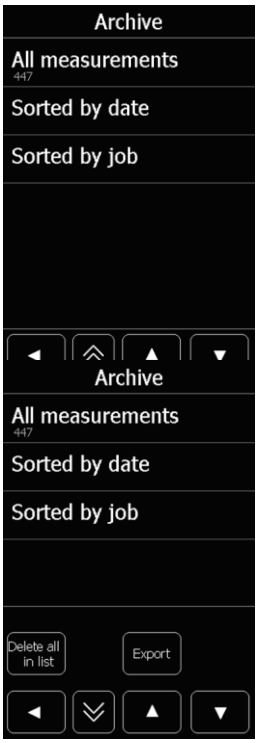
10.5.3 QR barcode measurements

Measurements with the QR barcode reader are carried out in the same way as with the barcode reader. Please refer to chapter 10.5.2 “Barcode measurements” on page 37.

11 Archive

All stored files are located in the archive. Press  and  to get to the archive. The measurements can be edited, deleted, exported to a USB flash drive or printed out here.

11.1 Sorting of the measurements



Here the measurements can be sorted according to the following criteria:

- By date (grouped by date)
- By job (grouped by job)
- Last measurement
- All measurements (sorted by date and time, the last measurement is on top)

Press the corresponding row to show the respective list. Here you also have the possibility to delete to entire archive.

To export or delete the complete list, press the icon  .

Press  to delete the complete list. The message displayed thereupon must be confirmed with „Yes“ or rejected with „No“.

The deletion of the archive cannot be undone. All data will be lost irrevocably. Only delete an archive if you no longer need the data. It is recommended to make a back-up copy on your computer or on a USB flash drive.

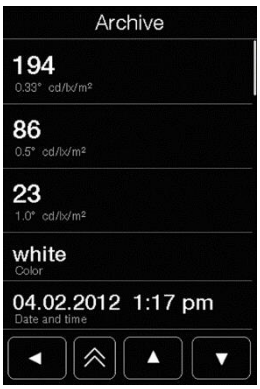
Press  to export the measuring data to a USB flash drive.

11.2 Overview measurements (sorted)

The first column shows the observation angles and the second column the respective measuring values. The colour of the retroreflective material, date, time, and in the case of average measurements the number of single measurements e.g. (5), as well as the job are listed in the third column. Press on a row to get additional information on the entry.
You get a list of all measurements stored under the job “Default” if you have chosen at the sorting of measurements “by job” and afterwards the job “Default”. If you press the button “Delete all in list” in this selection every single measurement stored under the job “Default” will be deleted at once.

Here you can delete single entries or open the quick entry information by pressing on the button “More”. Further details will be displayed and additional information can be added here. Fehler! Textmarke nicht definiert.

11.3 Detailed entry information



In a measurement entry you first find the measuring values, the date / time and on which standard the instrument has been calibrated.

Furthermore, additional information such as temperature and humidity is available. If the instrument is equipped with the respective options additional information will be displayed e.g. the GPS-coordinates.
“On Standard: True” means that the measurement has been conducted while the front plate with calibration standard was mounted in calibration position. Such a measurement must not be used for the evaluation of a retroreflective material.

11.4 Input of additional information

Further below in this list, you can add or edit additional information to the measurement entry such as location, street and so on.

For changing the location, press on this row and afterwards on the icon „Edit“.

Press 12? for the number keyboard.

Press @# for the special signs keyboard.

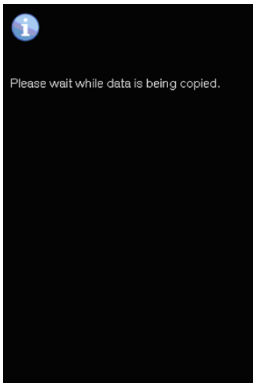
Press aBc for the standard keyboard.

11.5 Printing of a measuring report

Connect the ZRS 6060 with an external printer e.g. our optional portable USB-printer

Press Print to print out the current test report.
The default settings about which information will be included in the test report can be changed in the menu as described in chapter 13.6.8 “Printer” on page 53.

11.6 Storing the measuring data on USB flash drive



Connect a USB-flash drive to the USB-interface (host).

Press Export to store all measuring entries of the current database on the USB flash drive. The exported measurements can be opened on a computer using the mapping software MappingTools. The use of MappingTools is described in the separate instruction manual. The measuring data will remain in the archive. If desired, you can delete them.

12 Data export and MappingTools software

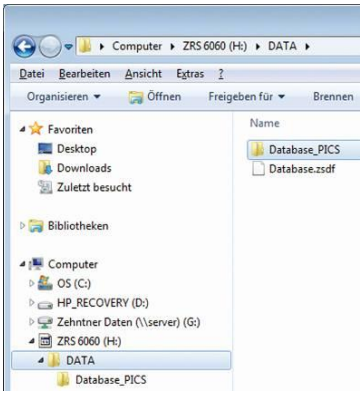
12.1 Interfaces

The ZRS 6060 is equipped with the following interfaces for data export:

- Host USB-interface (type A) for external units such as USB-flash drive and keyboard.
- Client USB-interface (type B mini) for connection to a computer.

12.2 PC Mode

Connect the ZRS 6060 with a USB-cable to a computer. On the touchscreen of the ZRS 6060 the message „PC Mode" will be displayed.



After the instrument has been recognized, it will appear as a drive in Windows Explorer, similar to the picture on the left. Now you can make a back-up copy of (the files Database.zsdf and the folder "Database_PICS) on your local hard disk.

You can also open the measuring archive on the ZRS 6060 using our free mapping software MappingTools.

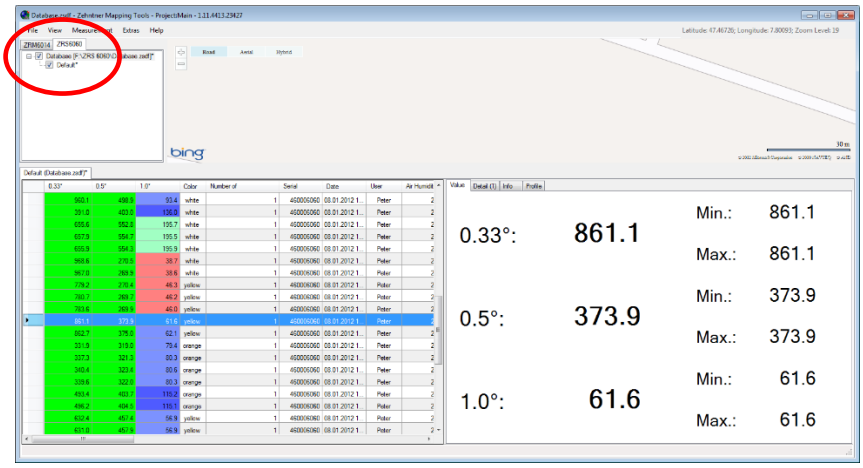
12.3 Storing the measuring data on a USB flash drive

Alternatively, the archive can be stored on a USB flash drive as described in chapter 12.3 "Storing the measuring data on a USB flash drive" on page 43.

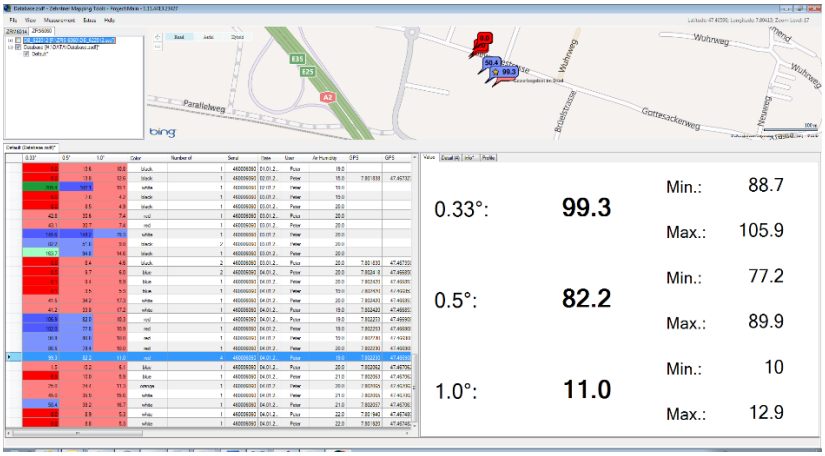
12.4 Mapping and data analysis software MappingTools

For displaying and evaluating measurements run the free software MappingTools on your computer. For information on installation and working with the mapping software MappingTools, please refer to the separate instruction manual.

After opening the program, you need to tick the desired archives so that they will be displayed in MappingTools. If the measurements have been taken without the optional WAAS GPS-module, the mapping browser will show you a random map. The mapping browser can be deactivated as described in the separate instruction manual MappingTools.



If the ZRS 6060 is equipped with the optional WAAS GPS-module and there was a valid signal during the measurements, then they will be displayed in the mapping browser.



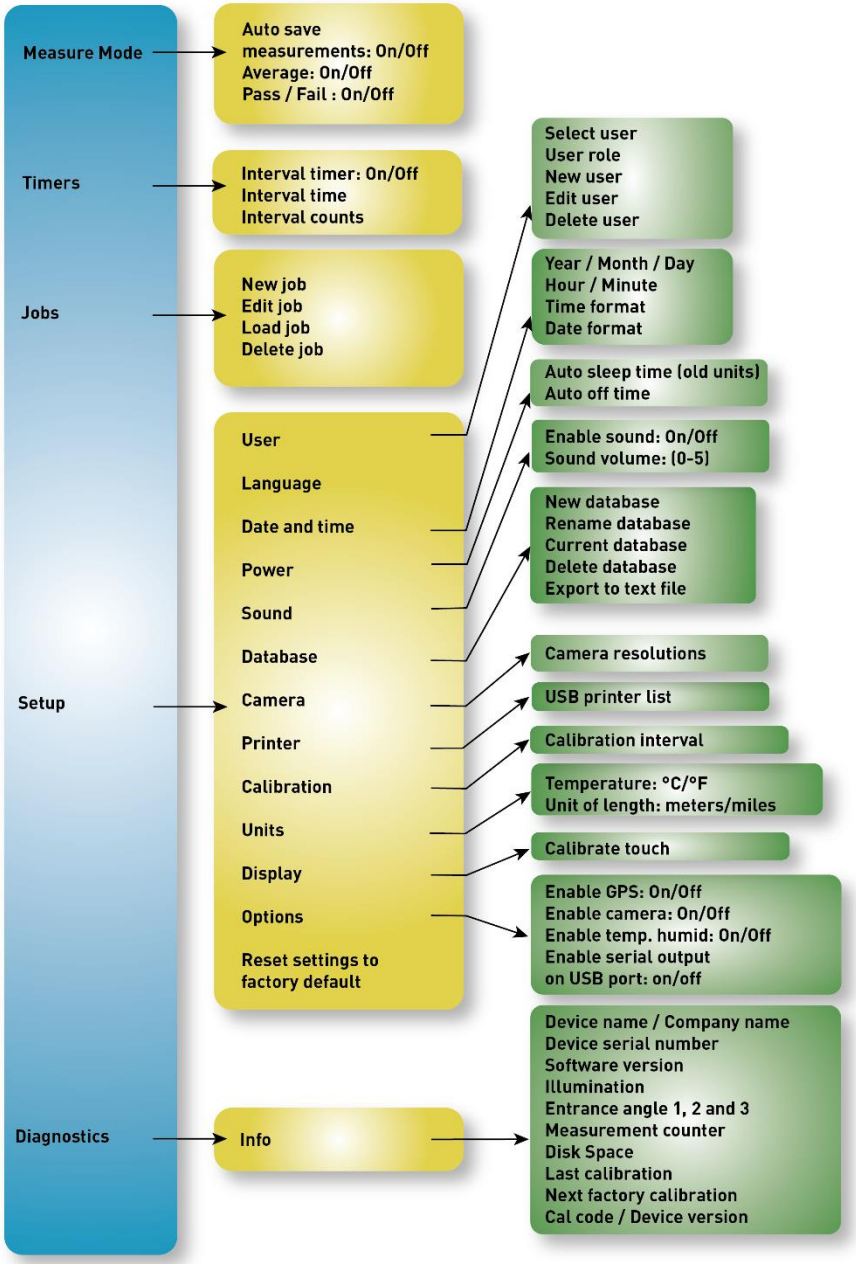
12.5 Data export to Microsoft® Excel

After opening the measuring data using the MappingTools you are able to export them to Microsoft Excel. This is described in the separate instruction manual MappingTools. An Excel-Measuring report may look as follows:

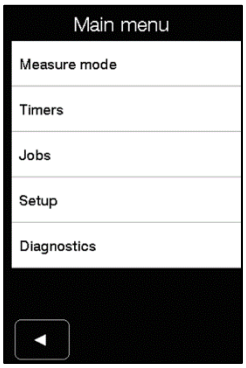
Job Name:	Default				
Device Name:	ZRS 6060				
Serial Number:	460006060				
Date	**0.33° (cd/lx/m²)**	**0.5° (cd/lx/m²)**	**1.0° (cd/lx/m²)**	**Location**	**Serial Number**
06.01.2012 00:51	208.8	102.1	19	Dubai	460006060
06.01.2012 00:57	18.9	9.3	4.7	Dubai	460006060
06.01.2012 00:59	13	8.1	3.3	Dubai	460006060
08.01.2012 15:49	177.4	82.8	17	Sissach	460006060
08.01.2012 16:06	26.2	12.4	2.5	Sissach	460006060
08.01.2012 16:07	960.2	498.6	93.5	Sissach	460006060
08.01.2012 16:09	391	403	136	Sissach	460006060
08.01.2012 16:20	657.9	554.7	195.5	Sissach	460006060
08.01.2012 16:22	967	269.9	38.6	Sissach	460006060
03.01.2012 18:36	**82.2**	**51.6**	**9.8**	**Basel**	**460006060**
04.01.2012 03:23	**99.3**	**82.2**	**11**	**Sissach**	**460006060**

13 Menu

13.1 Menu structure

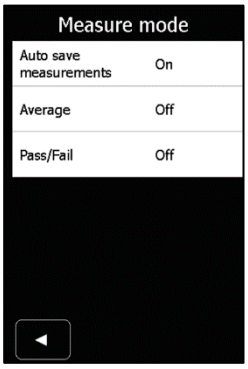


13.2 Navigation in the menu



Press and to get to the menu where several settings can be set.
On the top of each window you can read in which menu you are.
Navigate in the menu as described in chapter 6 “Navigation” on page 17.

13.3 Measure mode



Press and to get to „Measure mode“ in order to change the settings of the measure mode.

13.3.1 Auto save measurements

Press and and select „Measure mode“ to change these settings.
The default settings is „On“. In this mode measurements will be stored in the archive automatically.

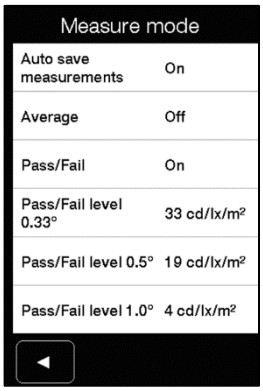
13.3.2 Average

Press and and select „Measure mode“ to activate average readings.

A faster way is to press the symbol in the main window.

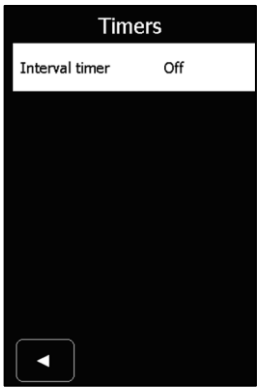
If the symbol is shown, the average reading is activated.

13.3.3 Pass/Fail

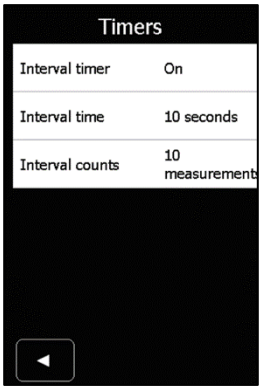


Press and and select „Measure mode“ to activate the pass/fail function.
Minimum reference value for a specimen of retroreflective material (e.g. traffic sign, safety garments etc.) can be defined for each observation angle by setting a lower limit.
If a measured value exceeds this minimum value, the criterion is fulfilled and the measuring values appear green. Otherwise they will be red.

13.4 Timer – Interval timer

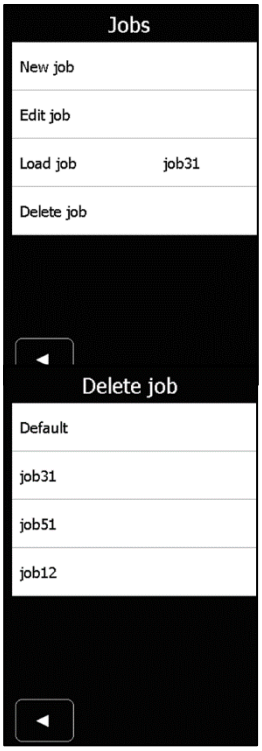


Press and and select „Timers“ to activate the interval timer.
With this function continuous measurements will be taken. The measurements will be taken continuously until the indicated number of interval counts has been reached.



If the interval timer is activated, the current setting for the interval time and interval counts can be seen. To change these settings, press on the respective row.
The interval time can be set between 5 and 1000 seconds.
The interval counts can be set between 2 and 500.

13.5 Jobs



Press and and select „Jobs“ to relate measurements to a specific job.
Depending on the type of your organization (contractor, road laboratory, manufacturer etc.) a job could be a specific client, the development of product “xy”, a special project and so on.
If you do not change anything in this menu, the job “default” will be indicated in the measuring mode.

To delete a job, press on the row „Delete job“ and select the job to be deleted. It is recommended to make a back-up copy on your computer or on a USB flash drive.
Confirm the message if you really want to delete the job.

13.6 Setup

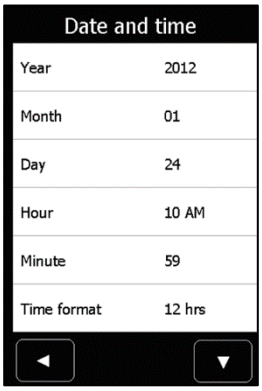
13.6.1 User

Press and and select „Setup“ to open the menu item „User“.
Adding different users enables relating measurements to a specific operator and to store user specific settings. If no user has been added, the default user „Peter” will be assigned to each measurement. The operator will be shown on the bottom of the printed measuring report.
If you are logged in as a certain user and change any setting, they will be stored automatically in this user's profile. E.g. if you have chosen the user profile „Jim” and you set the sound to volume „3” and the language to “French”, these settings will be stored in the user profile. User “James” prefers the sound volume at 4 and the language “English”. If you switch between these two users, all stored settings will be adjusted accordingly.

13.6.2 Language

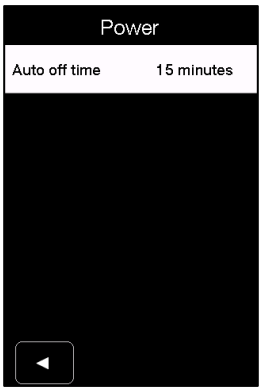
Press and and select „Setup“ to choose the required language.
If a wrong language was selected and you are not able to get back to the language setup, switch off the ZRS 6060 by pressing the on/off button long. Press the measuring button continuously during switching on to get directly to the language settings.
If you want to contribute and translate a new language or if you have some comments on an existing language, please feel free to contact Proceq.

13.6.3 Date and time



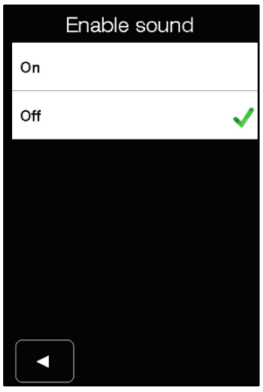
Press  and  select „Setup“ to set date and time.

13.6.4 Power



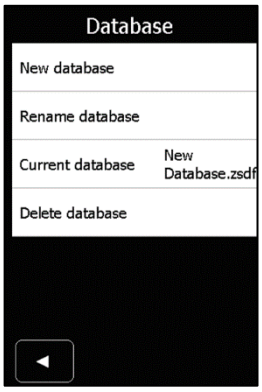
Press  and  and select „Setup“ to change „auto off time“. At low battery status, the indicated time is reduced automatically. A time period between 2 and 120 minutes can be chosen. The instrument can also be switched off manually by pressing the on/off button  long.
In case of older units the „auto sleep time“ can be adjusted here. You can choose between 5 and 30 minutes.

13.6.5 Sound



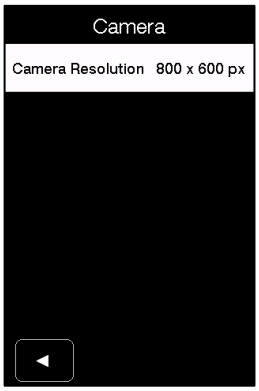
Press  and  and select „Setup“ to activate or deactivate the sound which will be played when a measurement is completed.
The sound volume can be set between 1 and 5.

13.6.6 Database



Press and and select „Setup“ to open the menu item „Database“.
Here you can create a new database, open, rename or delete an existing database and export a database.
Tip on the required row.
Sometimes it is helpful to store all measurements for a specific project in a new database.
Before deleting a database it is recommended to make a back-up copy on a computer or USB flash drive. Deleting the database cannot be undone, all data will be lost irrevocably.
Confirm the message to finish delete database.

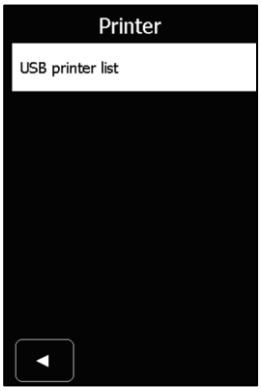
13.6.7 Camera



Press and and select „Setup“ to open the menu item „Camera“.
The resolution of the camera can be set here to the following selections:

- 800 x 600 px
- 1600 x 1200 px
- 2592 x 1944 px

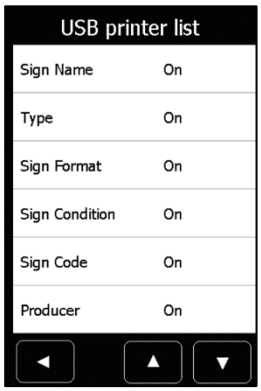
13.6.8 Printer



Press  and 

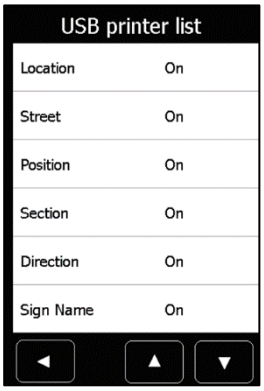
and select „Setup“ to open the menu item „Printer“.
In this menu you can set which information will be included in the test report printed by a USB printer.

Top list

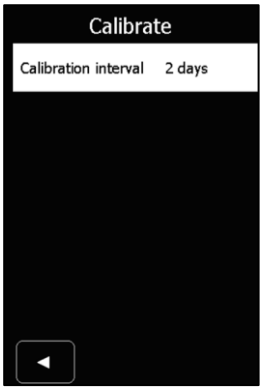


Middle list

Bottom list



13.6.9 Calibration

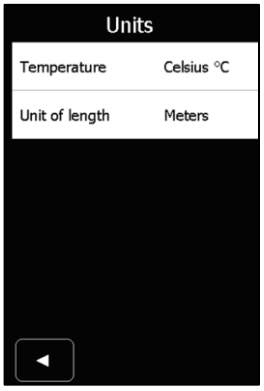


After expiry of the selected calibration interval, the ZRS 6060 will remind you that a calibration is due.

Press  and 

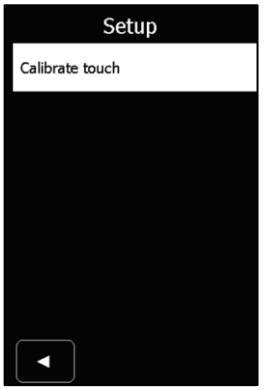
and select „Setup“ to set the required calibration interval between 1 and 49 days.

13.6.10 Units



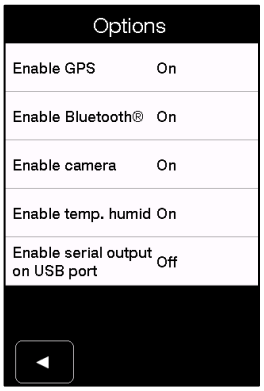
Press and and select „Setup“ to select the units for temperature and length.
You can choose between Celsius (°C) and Fahrenheit (°F), and between meters and miles respectively.

13.6.11 Display



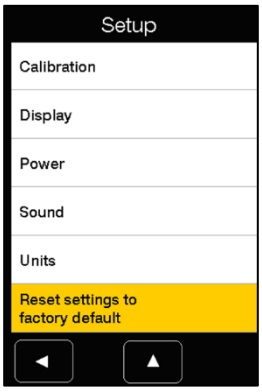
Press and and select „Setup“ to open this menu item.
Zehntner calibrates the touchscreen. However, in the course of time the precision of the touchscreen may abate. In this case it might be helpful to recalibrate the touchscreen.

13.6.12 Options



Press and and select „Setup“ to open the menu item „Options“.
In this menu additional functions can be activated or deactivated. These settings are stored in the user profile.

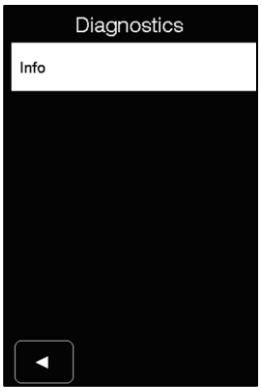
13.6.13 Reset settings to factory default



Press  and 

and select „Setup“ to reset the equipment to factory settings.
The reset to factory default cannot be undone. If you are sure to carry out the reset to the factory default you need to confirm the message with „Yes”.

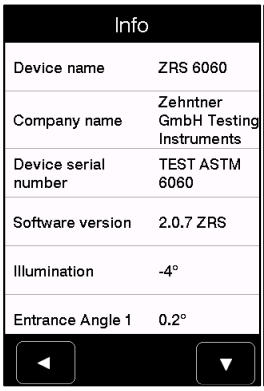
13.7 Diagnostics

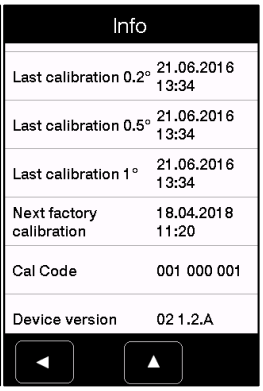


Press  and 

and select „Setup“ to receive information on the instrument.

The following information is available in this menu item:

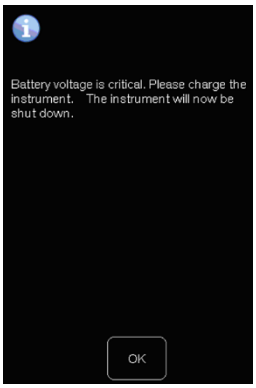




14 Built-in battery and charging

14.1 Battery

The built-in Li-Ion-Mn battery has a very large capacity which is monitored continuously. When the state of charge is running low the battery symbol is shown on the display and the battery has to be charged.



In order to prevent damage to the battery, the instrument switches off automatically before the battery is completely drained. The ZRS 6060 announces this by displaying the symbol and a message.
In order to preserve the battery, the „Auto off time“ can be changed, as described in chapter 13.6.4 “Power” on page 51.

14.2 Battery status indication on the display

Battery is empty. The instrument switches off automatically.

Battery is soon empty. The instrument should be charged.

approx. 50%

approx. 80%

100% battery is fully charged

Instrument is connected to the battery charger -> the charging status is indicated on the battery charger.

Charging cycle

The charge indicator light on the charger shows the charging status of the battery in the charging cycle:

- red: the unit is fast charging. The charge current is maximum and the charger is in continuous mode.
- orange: the charging cycle “final charge” is active. The battery is now charged at approx. 80 %. The battery charger is in continuous mode.
- green: the battery is fully charged and the charger is in trickle charge mode.

14.3 Charging

To charge the battery, plug the charger plug into the socket on the ZRS 6060 and connect the charger to a wall socket (100 – 240 V, 50 - 60 Hz). The special plug on the charger has a reverse polarity protection. The unit can be used and turned off or on while charging.
For disconnecting the charger press on the “push button” on the plug of the battery charger.

the battery should always be charged completely and only with the supplied charger.

The battery may only be replaced by Proceq or by an authorized Proceq agent.

If the unit hasn´t been used for a longer period of time, e.g. several months, it should be charged before using.

15 Status and error messages

15.1 General

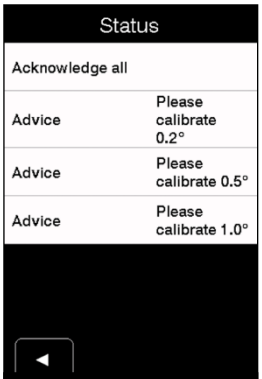
If an error message appears on the display, press on the warning triangle to get a more detailed explanation of the error. The error message disappears if you press “acknowledge”.

15.2 Status message “Battery voltage is critical”

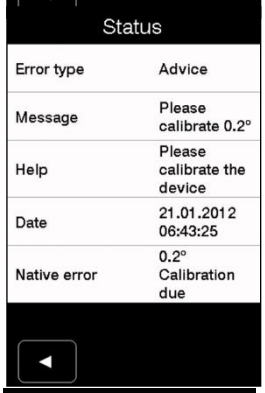
For detailed information please refer to chapter 14 „Built-in battery and charging“ on page 56.

15.3 Status message “Please calibrate 0.2°”

Press the warning triangle for detailed information.



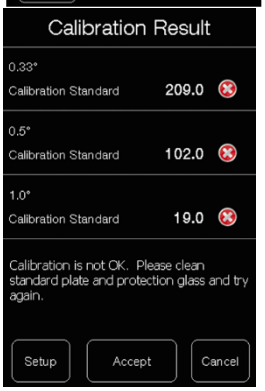
Press one of the error messages for more detailed information.



For solving this problem carry out the calibration as described in chapter 7 “Calibrate” as from page 18.
To skip the calibration you can press “Acknowledge all” and the status message will disappear.

Carry out the calibration for all observation angles.

The calibration interval can be changed as described in chapter 13.6.9 “Calibration” on page 53.

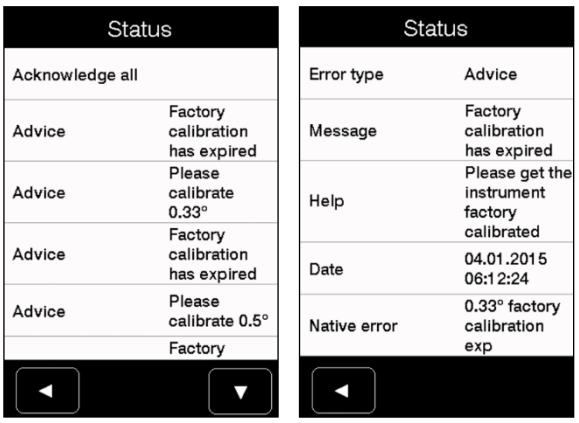


15.4 Error message “Calibration is not OK”

In order to prevent an unintentional calibration to wrong values (e.g. if the standard is damaged or soiled or the measurement opening of the instrument is soiled), the instrument informs you accordingly. We recommend rejecting this calibration by pressing and determine the cause e.g. cleaning the calibration standard as described in chapter 7.2 on page 19.

If it is still not possible to carry out a proper calibration after several attempts even after cleaning the standard and measurement opening it might be necessary to send the instrument to the manufacturer for maintenance and calibration. Contact either Proceq or your authorized Proceq agent.

15.5 Error message “Factory calibration has expired”



Tip on the warning triangle then on „Factory calibration has expired“ for more detailed information.

The instrument has been calibrated in the factory 2 years ago. It should be sent back to Zehntner for maintenance and calibration. Contact Proceq or your authorized Proceq agent for returning the unit.

15.6 Reset of ZRS 6060

If the firmware of the ZRS 6060 freezes, reset the instrument by shutting it off completely by pressing the on/off button long.

16 Maintenance and cleaning

16.1 Maintenance carried out by the user

You may only carry out the following maintenance and repair yourself:

- Outer cleaning of the apparatus (see chapter 16.2)
- Adjustment of display inclination smoothness (see chapter 16.3)

All other maintenance and repair operations may only be conducted by Proceq or your authorized Proceq agent, otherwise all warranty voids.

16.2 Cleaning

We recommend to have the instrument checked and calibrated by Zehntner every two years. Furthermore you should clean the measurement opening regularly using the supplied microfiber cleaning cloth. Remove the front plate with calibration standard before cleaning. Should you not be able to sufficiently clean it with the supplied microfiber cleaning cloth, use a little bit of window cleaner.

Clean the aluminium housing with a clean soft tissue and a commercial cleaning agent like window cleaner.

- Do not use strong acids or alkaline liquids.
- **The housing may not be opened under any circumstances** since the measuring geometry would be misaligned. The measuring geometry can only be adjusted by means of special testing equipment in our factory.
- The instrument consists of delicate optical and electronic precision parts. Do not drop it and protect it from shocks, moisture and dust. Please store the instrument including its accessories in the shoulder bag.
- Make sure that the ZRS 6060 is turned off and unplugged from the battery charger before maintenance.
- During cleaning take care that under no circumstances cleaning liquid flows into the interior of the instrument. The function of electrical or optical components could be impaired.
- Never immerse the unit in water or in other fluids: Danger of short circuit.

16.3 Adjustment of display inclination resistance

The force needed to tilt the display can be adjusted.

We recommend using a plastic tool for fixing the screw in order to avoid scratches. Another possibility would be to use a coin e.g. the EUR 1.00 or 2.00 coin.

For tightening turn the fixing screw clockwise. For loosening, turn it anticlockwise.

17 Technical specifications

Illumination angle ß	-4°				+5°				
Observation angle α	**0.2°**	**0.33°**	**0.5°**	**1°**	**0.2°**	**0.33°**	**1°**	**1.5°**	**2°**
ASTM E1709	•								
ASTM E1809 (withdrawn)	•								
ASTM E2540			•						
CUAP 01.06/04	•	•	•	•	•	•	•	•	•
DIN 67520					•	•	•	•	•
EN 12899-1					•	•			•
BS EN 12899 Annex A						•	•	•	
DIN EN ISO 20471					•	• **	• **	• **	
MUTCD	•								

** (If also equipped with observation angle 0.2°)

Measuring area:	Ø 25 mm (0.98“)
Measuring sensor:	adapted to V (λ)
Measuring range:	0 - 2‘000 $cd \cdot lx^{-1} \cdot m^{-2}$
Measuring period:	approx. 3 seconds
Memory:	1 GB SD flash memory, about 1‘000‘000 measurements without pictures or about 1‘000 up to 10‘000 with pictures, depending on picture resolution
Interface:	Host USB (type A), Client Mini USB (type B)
Touchscreen:	3.5“ colour, TFT (LCD), LED backlight, HVGA resolution
External charger:	100 - 240 V / 50 - 60 Hz, 50 VA, universal
Battery:	Li-Ion-Mn, 14.4 V, 6.5 Ah
Charging time:	approx. 3 hours
Life cycle LED:	approx. 500'000 measurements
Operating temperature:	-10°C to + 50°C (12 °F to 122 °F)
	barcode reader: -10° C bis + 45° C (12 °F to 113 °F)
Relative humidity:	10 % to 95 % rF, non condensing
	barcode reader: 20% to 85% rF,
Storage temperature:	- 20°C to + 55°C
	Barcode reader: 20% to 90% rF
Dimensions (LxWxH):	220 mm x 85 mm x 290 mm (8.66” x 3.35” x 11.42”)
Weight:	1.9 kg (4.19 lbs)
Warranty:	2 years

General:

Excess voltage category:	II
Degree of soiling:	2
Altitude:	up to 2.000 m above sea level

A

B

C

D

E

F

G

H

I

J

L

M

T

U

W

Version 2.1 dated 08.08.2017