Instruction Manual

TESA CLINOBEVEL 3

ELECTRONIC INCLINOMETER

05330210: TESA CLINOBEVEL 3 **± 60°,** Cast iron, rust protected

05330211: TESA CLINOBEVEL 3 **± 60°,** Aluminium, black anodized

05330212: TESA CLINOBEVEL 3 **± 10°,** Cast iron, rust protected

05330213: TESA CLINOBEVEL 3 **± 10°,** Aluminium, black anodized

05330214: TESA CLINOBEVEL 3 **High Precision ± 1°,** Cast iron, rust protected

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1 INTRODUCTION

1.1 Acknowledgements

Dear user,

We would like to thank you for having chosen TESA as your metrology partner. We thank you for your confidence in purchasing one of our high-end inclinometers TESA CLINOBEVEL 3.

Your metrological concerns are important to us and we are convinced that this instrument will meet your expectations. We are constantly striving to develop solutions adjusted to your needs.

The result? Your satisfaction for many years. Our pleasure? To know that our products help you meet your needs in research, development and production in a quick and efficient way, and for a long time.

The whole TESA team welcomes you to our family of TESA product users.

Your TESA team

1.2 Warning

This instruction manual must be read by every technician or operator before the installation, maintenance or use of the instrument. Not adhering to certain instructions regarding its use could lead to malfunction or deterioration of the instrument.

1.3 Copyright (document)

The German version is the reference language. All other language versions are only translations.

1.4 Preamble

The TESA CLINOBEVEL 3 is the result of more than 70 years of experience in the conception and production of high-precision measurement equipment. It has been designed to meet the needs of a production environment and to offer its users an affordable, quick and precise way for dimensional control of small or large workpieces in workshops or laboratories.

This document describes the different procedures to be followed in order to allow for a quick and easy handling of our inclinometer TESA CLINOBEVEL 3.

1.5 Symbols

Several different types of symbols are used in this manual. They give important information that has to be taken into account in order to correctly use the measuring instrument.

Position	Description
	Not adhering to these instructions can lead to incorrect measurement results.
	Corresponds to an assistance for better use.

2 PRESENTATION

2.1 General description

TESA CLINOBEVEL are electronic inclinometers specially designed for direct measurement of any angle of inclined surfaces up to ± 60°. Since they make use of the force of gravity, these instruments also serve as precision levels for accurate levelling on machines, devices etc. Both measuring faces that are arranged horizontally and vertically on the solid instrument body serve as resting points on the inclined surface to be inspected.

Due to their possible orientation in any direction, every TESA CLINOBEVEL is also suited for comparative measurement where the difference between both values obtained from two successive measurements is shown on the display. In addition, these electronic inclinometers also permit straightness and flatness inspection of scales, surface plates or machine parts through single measurements performed step by step according to a defined grid combined with value processing.

Providing ease of handling, TESA CLINOBEVEL 3 is the favourite for checking horizontal and vertical surfaces.

TESA CLINOBEVEL 3 is available with 3 measurement zones: ±1°, ±10°, ±60°.

TESA CLINOBEVEL 3 with the measuring ranges ±10° and ±60° is available in cast iron and aluminium.

The version with the measuring range ±1° is only available in cast iron and its measuring bases on the left and bottom are precisely scraped.

The TESA CLINOBEVEL 3 allows wireless data transmission to an Android device. The app can be downloaded from the Play Store.

Various parameters can be set and changed in the TESA CLINOBEVEL 3 like

- Various colour profiles
- Various display methods, including bar graphs or precision levels
- Measuring mode

  etc.

can be set and changed.

The TESA CLINOBEVEL 3 contains a high-precision inclination sensor which is optimized for the measuring range of the instrument. The measuring principle of this sensor is based on the deflection of a membrane suspended between two electrodes, which functions as a pendulum. The membrane builds a differential capacitor with the two electrodes.
Inclining the sensor respectively the measuring instrument moves the pendulum which changes the capacities. This change of capacities is used as the primary signal for the calculation of the inclination angle. The system is insusceptible to external electromagnetic influences. In the TESA CLINOBEVEL 3 this primary signal is transformed into an inclination value basing on a curve of reference points and displayed.

2.2 Operation/ Short description

No.	Description
1	Wooden thermal protection handle
2	Keys
3	External connection
4	Measuring units
5	Battery display
6	Function indicator and infrared indicator
7	Sensor address
8	Main display
9	Cross vial

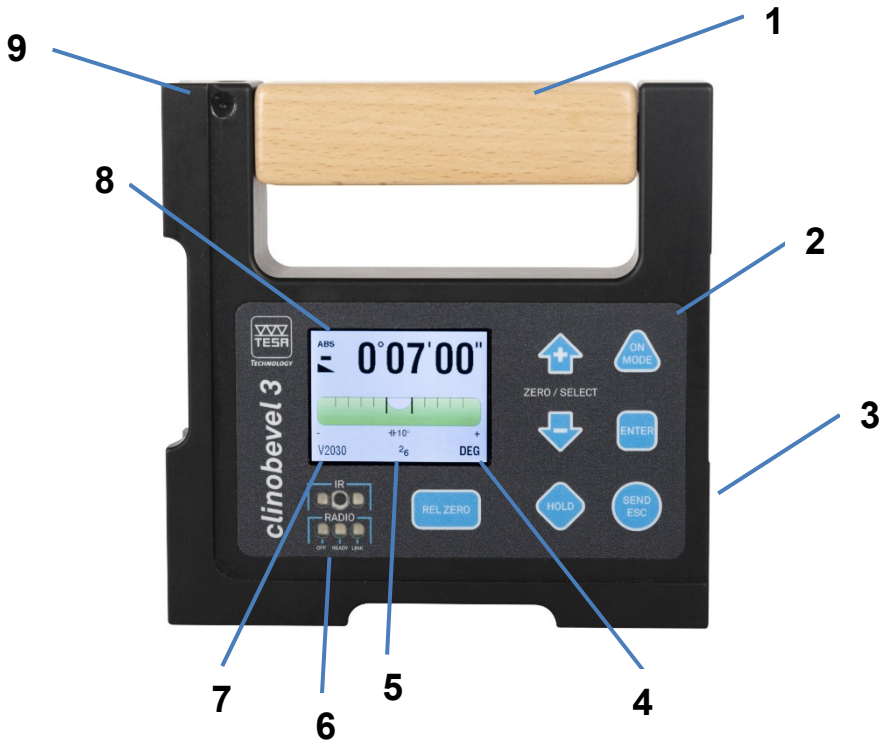


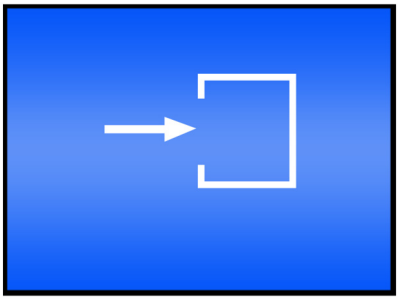
Fig. Description of the constitutive elements of the TESA CLINOBEVEL 3

2.3 Overview keyboard and display

ON/MODE	ON/OFF or select menu
ENTER	confirm selection or save entry
SEND/ESC	send current inclination or Unfreeze measuring value and send HOLD-inclination or escape from the menu
ZERO/SELECT	ZOOM IN / ZOOM OUT or next /previous option
HOLD	Freeze measuring value
REL ZERO	Use current inclination as relative Zero

2.4 How to switch the instrument ON and OFF

To switch ON



Keep the key ON/MODE (AN / MODUS) pressed until the display and all LEDs are lit and release the key. The instrument will automatically shut off 60 minutes after the last key operation.

The instrument carries out a short function test and establishes connections to other instruments, if any had been available.

The instrument changes into measuring mode. The settings, which were used prior to switching the instrument off, are reloaded.

- The TESA CLINOBEVEL 3 features an automatic shut off mechanism. In normal mode the instrument is automatically switched off 60 minutes after the last key operation. This automatic shut OFF function can be deactivated with the ON sequence described below or by using an external power supply.
- If you keep the ON/MODE key pressed **for more than 10 seconds**, the automatic OFF function is deactivated. This is indicated by blinking LEDs.

To switch OFF:

Keep the ON/MODE key pressed **longer than 3 seconds** until the display disappears. All settings are kept and will be reloaded again next time the instrument is switched on.

2.5 Key functions

ON/MODE	**ON/MODE - Key**

Function - 1 -	To switch the TESA CLINOBEVEL 3 on. When for starting the key ON/MODE is pressed, a grey picture will appear on the screen and all LEDs will be illuminated. After releasing the key, the TESA CLINOBEVEL 3 is switching to the measuring mode. The current inclination is displayed in the mode and unit which was saved last. In case of an error the respective error message is shown in the display. The instrument will automatically shut of 60 minutes after the last key operation. If the key ON/MODE is pressed **for more than 10 seconds** the LEDs start blinking and **the automatic off function is deactivated**. **Exception**: If the TESA CLINOBEVEL 3 is powered from an external power supply, the automatic off function is deactivated, and the instrument will remain on.
Function - 2 -	To switch off, press the key ON/MODE **more than 3 seconds**, until the display disappears.
Function - 3 -	With the key ON/MODE you open the menu selection. Pressing the key repeatedly will move the cursor down to the desired position.
Function - 4 -	While setting a value with the key ON/MODE the default value can be recalled.

ENTER	**ENTER – key**

Function - 1 -	The key ENTER is used to confirm a chosen function or to save a value entered.
Function - 2 -	In the function "**REL ZERO**" or "**ABS ZERO**" the measuring can be started, or an ongoing measurement can be finished by pressing the key ENTER.

REL ZERO	**REL ZERO - key**

Function - 1 -	The key REL ZERO serves for setting the actual inclination as the relative Zero.

SEND/ESC	**SEND/ESC- key**

Function - 1 -	The key SEND/ESC is used to transmit measuring values to the RS485 port. The measured values can also be transmitted via the same interface to a PC or laptop for further processing (e.g. hyperterminal). **Data format OUT port:** [sss xxxxxx sn.nnnnnn<cr>] sss = 0 ... 255 - continuous number x xxxxxx = Serial number and type of sensor (example: N2673L TESA CLINOBEVEL 3) sn.nn sn.nnnnnn = +9.999999 - Positive out of measuring range -9.999999 - Negative out of measuring range other value - angular value in rad e.g. +0.226349 transmission format: asynchron, 7Bit, 2 Stopbits, No Parity, 9600 Baud
Function - 2 -	Cancel (unfreeze) the "**HOLD**"- function to return to the **measuring mode**. At the same time the HOLD value is sent to the RS-485 port.
Function - 3 -	**Escape** function from the menu

ZERO/SELECT	**ZERO/SELECT - key**

Function - 1 -	The key ZERO/SELECT is used to • changing the scale in the display • increase / decrease the display range. This function can, however, be disabled in the instrument settings.
Function - 2 -	The key ZERO/SELECT is used to select possible adjustments, such as • menu selection • modification of a figure in the menu

HOLD	**HOLD - key**

Function - 1 -	The key HOLD serves for "freezing" a measuring value. The measured value is displayed until the TESA CLINOBEVEL 3 returns to measuring mode by pressing the key **SEND**.
Function - 2 -	In the functions "**REL.ZERO**" and "**ABS.ZERO**" the key HOLD is used for reading in the actual measuring value again during the manual entering.

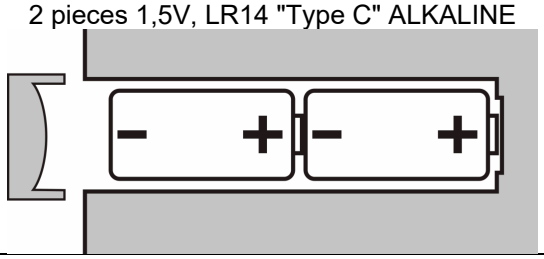
2.6 Batteries / Rechargeable batteries

The two batteries are shipped separately. It is strongly recommended to remove the batteries during transport or longer storage.
The battery voltage is shown in the display e.g. **2_7 (2,7 Volt)**.

The lowest possible voltage is **1,7 Volt.** After a further voltage drop a blinking battery symbol

will appear. The batteries must then be exchanged immediately.

The TESA CLINOBEVEL 3 needs 2 batteries or 2 rechargeable batteries 1,5V, LR14 "Type C".

2 pieces 1,5V, LR14 "Type C" ALKALINE	
	

As an end user you are forced by law (battery directive) to return all used batteries and accumulators, a disposal through household waste is prohibited.
Batteries/accumulators containing contaminants are marked with the symbol shown, which clearly indicates the prohibition of disposal through household waste.
You can dispose of your used batteries/accumulators free of charge at the collecting points of your community, your TESA reseller or at each location selling batteries/accumulators. You thus fulfil your legal obligation and contribute to the protection of the environment.

2.7 Possible configurations of the TESA CLINOBEVEL 3

TESA CLINOBEVEL 3 as stand-alone instrument

TESA CLINOBEVEL 3 with an Android device as remote display

3 DISPLAY

3.1 Scaling of the display

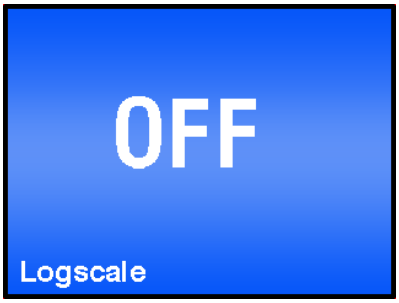
For an optimal use of the graphic display, you have various options for scaling.

With the linear scaling the display precision remains constant over the full range. With the keys ZERO/SELECT ▲▼ the resolution can be changed. Thus, also the range being displayed will be changed. The following ranges can be selected, whereas certain restrictions may be possible depending on the display type: 60°, 45°, 20°, 10°, 5°, 2°, 1°, 30', 12'. The range of 12' in the bar graph is the highest possible resolution of the instrument, i.e. 5" for each pixel.
In the TESA CLINOBEVEL 3 *High Precision* the following ranges can be selected:
1°, 30', 12', 6', 3', 1'.

With the logarithmic scaling the display precision around Zero is the highest and it is reduced continuously with higher inclination values. Around Zero the resolution corresponds to the unit selected.

In the adjustments of the instrument you can switch between linear and logarithmic scaling.

Using the key ON/MODE ▲ select the menu point [Options] and confirm your selection with ENTER ■. Select now [Logscale] and confirm with ENTER ■.



Switch the logarithmic scaling on or off using the keys ZERO/SELECT ▲▼. The display will show the requested state of the instrument. Confirm with the key ENTER ■.

The measuring instrument returns to the measuring mode. If the logarithmic scaling is enabled, the symbol "LOG" will appear below the graph.

3.2 Display types

The display type can be selected in the menu "display".

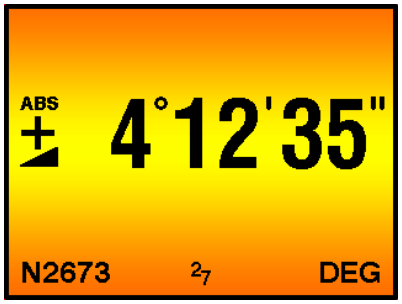
Using the key ON/MODE ▲ select the menu point [display] and confirm your selection with ENTER ■.

Select the required display type using the keys ZERO/SELECT ▲▼ and confirm your selection with the key ENTER ■.

The measuring instrument returns to the measuring mode

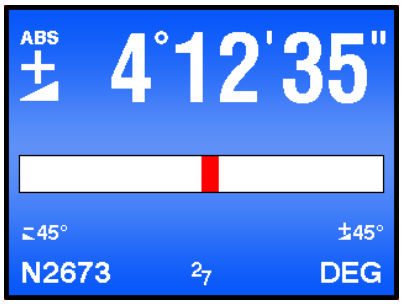
The following display types are available in the TESA CLINOBEVEL3 :

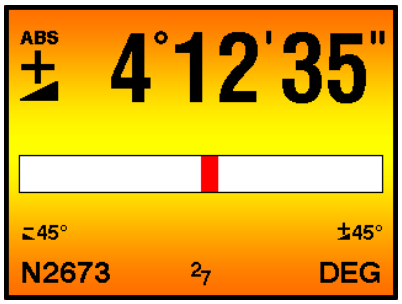
Numeric display



Numeric display plus bar graph

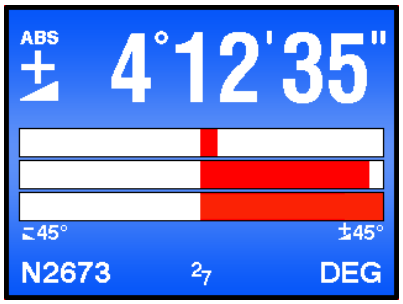
Display ranges:
60°, 45°, 20°, 10°, 5°, 2°, 1°, 30', 12',
for *TESA CLINOBEVEL 3 High Precision*
1°, 30', 12', 6', 3', 1'.

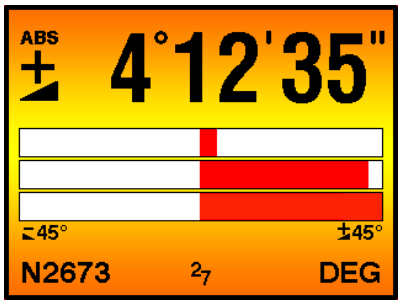




Numeric display plus 3 bars, each with a 10 times higher resolution

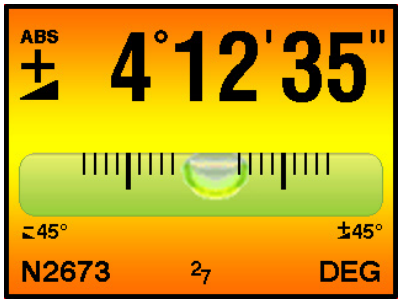
Display ranges:
60°, 45°, 20°, 10°, 5°, 2°, 1°, 30', 12',
for TESA CLINOBEVEL 3 *High Precision*
1°, 30', 12', 6', 3', 1'.





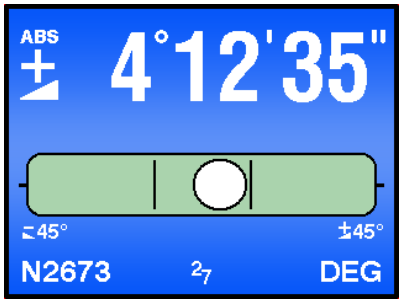
Numeric display plus vial (spirit level)

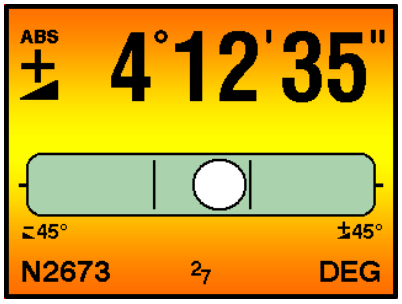
Display ranges:
60°, 45°, 20°, 10°, 5°, 2°, 1°, 30', 12',
for TESA CLINOBEVEL 3 *High Precision*
1°, 30', 12', 6', 3', 1'.



Numeric display plus simple vial (spirit level)

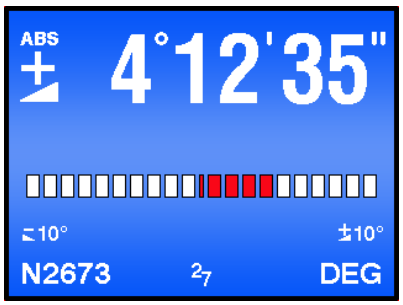
Display ranges:
60°, 45°, 20°, 10°, 5°, 2°, 1°, 30', 12',
for TESA CLINOBEVEL 3 *High Precision*
1°, 30', 12', 6', 3', 1'.

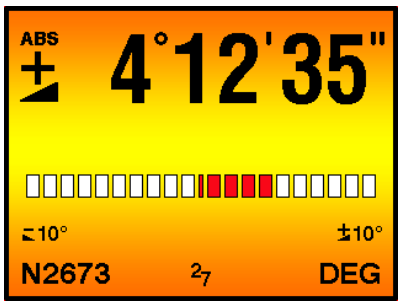




Numeric plus LED-display

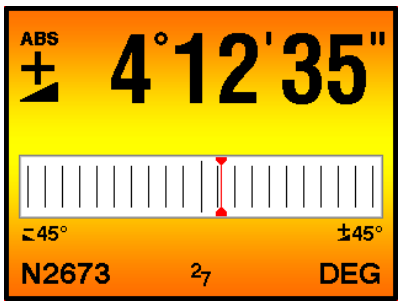
Display ranges:
60°, 45°, 20°, 10°, 5°, 2°, 1°, 30', 12',
for TESA CLINOBEVEL 3 *High Precision*
1°, 30', 12', 6', 3', 1'.





Numeric display plus pin

Display ranges:
60°, 45°, 20°, 10°, 5°, 2°, 1°, 30', 12', for TESA CLINOBEVEL 3
High Precision
1°, 30', 12', 6', 3', 1'.



3.3 Background colour

In the adjustments of the instrument the background colour can be selected. Depending on the brightness of the colour selected the colour of the fonts and the symbols will change between black and white.

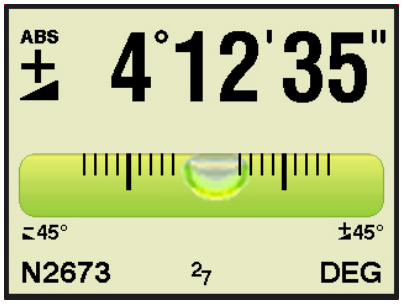
Using the key ON/MODE select the menu point [Options] and confirm your selection with ENTER. Select now [Display Settings] and confirm with ENTER.

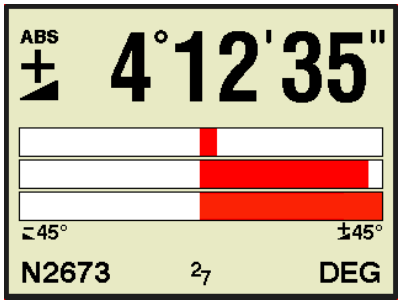
With the keys ZERO/SELECT select the background colour and confirm the selection with the key ENTER.

The measuring instrument returns to the measuring mode.

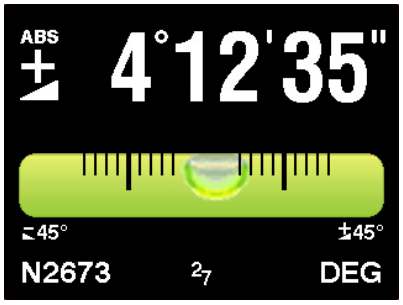
The following background colours are available in the TESA CLINOBEVEL3:

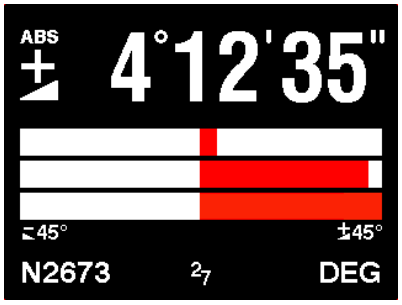
Background colour beige



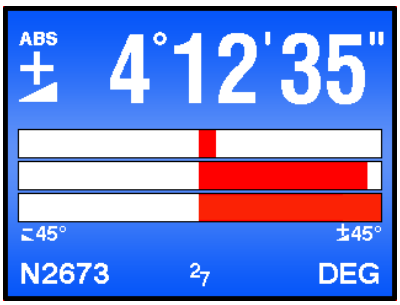


Background colour black

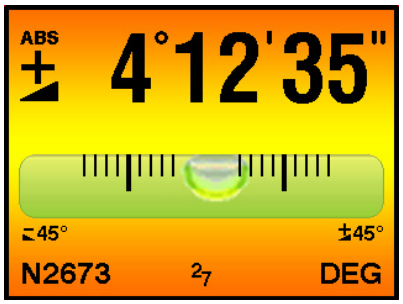


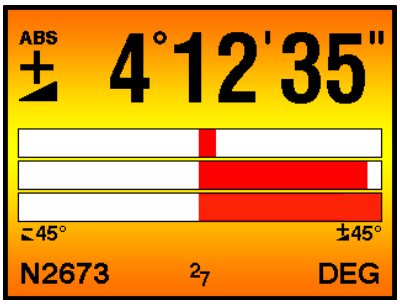


Background colour blue



Background colour orange





3.4 Display brightness

In the adjustments of the instrument the brightness of the display can be adjusted in order to adapt it to the environmental conditions and to optimise the battery life time. Thus, two different values can be set for the battery operation and the operation with an external power supply

Using the key ON/MODE select the menu point [Options] and confirm your selection with ENTER. Select now [Display Settings] and confirm with ENTER.
Using the keys ZERO/SELECT select [Brightness] for the adjustment when using an external power supply and [Brightness Battery] for the adjustment in battery operation. Confirm this selection with ENTER.

With the keys ZERO/SELECT you can adjust the brightness required. The display will show the power consumption in a range from 10% to 100% of the maximum brightness. Only steps of 10% are possible. Confirm the adjustment with the key ENTER.
With the key ON/MODE the default value of 50% will be recalled.

The measuring instrument returns to the measuring mode.

3.5 Short description of the individual display areas

In the main display the actual measuring value will be displayed

Direction of the inclination A symbol indicates the direction of the inclination of the value displayed.

inclined to the right (positive inclination)

declined to the right (negative inclination)

on hold The HOLD function is activated, i.e. the measuring value is "frozen".

ABS	The absolute measurement is activated.
REL	Relative measurement is activated, i.e. the measuring value is the difference between the current and the reference plane, i.e. the relative base.
displaying range 60°	Shows the selected displaying range. The displaying range can be adjusted using the keys ZERO/SELECT provided that this function is enabled in the options.
scale division 5°	Angle between two tick marks.
scale division LOG	Indicates that the logarithmic scale is in use. If this sign is missing, the linear scale is in use.
Serial number	Shows the serial number of the instrument.
Battery voltage 2_6	Display of the current battery voltage (example: 2,6 V). The lowest possible voltage is 1,7 Volt. After a further voltage drop a blinking battery symbol will appear. The batteries must then be exchanged immediately.
Measuring unit	Display of the measuring unit in use. There are 10 basic units available, whereas for each setting various options can be selected. Depending on the unit set, the last digit of the display will be rounded to 5" or to the next lower integer value. (e.g. 20 µm/m)

3.6 Mirroring the display

With the two keys ENTER and ZERO/SELECT the display can be turned by 180 deg.

First press ENTER then ZERO. This function can be disabled in "options".

With this function the values displayed can be perfectly seen from all possible angles.

4 TECHNICAL SPECIFICATIONS

Measuring range	**± 1°** **(± 20 mm/m)**	**± 10°**	**± 60°**
Part number **Cast iron, rust protected** **Aluminium, black anodized**	**05330214**	**05330212** **05330213**	**05330210** **05330211**
Resolution **(Depending on display units set)**	0,005 mm/m (1″)	0,010 mm/m (2″)	0,025 mm/m (5″)
Max. permissible error **(T = 20ºC)** αtot = measuring range α = measuring value	α ≤ 0,5 αtot: 1% α (min. 1 digit) α > 0,5 αtot: 0,01 (2 | α | - 0,5 αtot)	3,6″ + (0,06 % α)	12″ + (0,027% α)
Temperature coefficient **(DIN 2276/2) / °C (Ø 10 °C)**	0,1 % αtot	0,03 % α	
Setting time	< 5 sec		
Digital output	USB / RS-485, asynchr., 7 DataBits, 2 Stopbits, No Parity, 9600 Baud		
Batteries **Size LR14, Type C** **Lifetime**	2 x 1,5 V (NiMH, NiCd, NiZn) 25 hours		
Dimensions, weight **Housing / Net weight** **Cast iron, rust protected** **Aluminium, black anodized**	150 x 150 x 40 mm / 3,45 kg 150 x 150 x 40 mm / 1,5 kg		
Temperature range **Operating temperature** **Storage temperature**	0° to 40 °C. -20° to 70 °C.		
Two prismatic measuring bases **Flat measuring base**	Ø 19 ... 108 mm, on the left and bottom Right		
Countries for which the wireless transmitter is approved	EU, Canada, Japan, and USA. For other countries, please contact us.		

Remark: As a standard the instrument is delivered with batteries of Type C
Rechargeable batteries (accumulators) have to be recharged outside of the instrument

5 DELIVERY CONTENTS

5.1 System components

Each configuration is composed of the following elements:

Description
TESA CLINOBEVEL 3 electronic inclinometer
2 calibration pins for quick calibration / Q.CALIB (only for version ±60°)
Infrared remote control, article number 05360014 (only for version ±1°)
2 batteries LR14
Case
Instruction Manual

5.2 Packaging

The elements that constitute the packaging of the TESA CLINOBEVEL 3 are very important, therefore you should keep them. It is absolutely necessary to use the original packaging when transporting the instrument in order to avoid any unfortunate deterioration which could cause malfunction or complete impossibility to use the instrument.

6 INSTALLATION, SECURITY & MAINTENANCE

6.1 Location

The instrument has to be installed in a location satisfying the general required conditions, but also the specific and very precise conditions regarding the environment, power supply, etc. It is essential to be able to identify important factors and to correctly prepare the zone the instrument is installed and used in.

6.2 Place of use

In order to use the instrument correctly, the following precautions have to be taken into account:

- Avoid placing the instrument close to a window, door, cooling or heating system.
- Avoid causing recurrent temperature variations due to direct exposure of the instrument to the sun.

6.3 Lighting

Use indirect or fluorescent light. Avoid direct exposure to the sun or any other strong light.

6.4 Measuring surface

Choose a surface free of any vibrations that could lead to measurement or reading errors despite the stability of the mechanical and electronic components.

Make sure that the surface can carry the weight of the machine and the workpiece to be measured. Ideally, the surface should not have any splits or joints.

It is recommended to use a measuring surface that is big enough to enable smooth and easy movements of the instrument around the workpiece to be measured if the latter cannot be displaced manually.

6.5 Cleanliness

Make sure that the measuring surface is clean, so that there is no dust, condensation or metal filings.

6.6 Vibrations

Floors of companies are constantly at risk of vibration due to different reasons:
CNC and other machines, transportation vehicles and any other source of vibrations. These vibrations can directly influence the metrological performances of the machine.

6.7 Care of the batteries

Make sure that the batteries are inserted properly. Follow the symbols showing you the correct way to position the POSITIVE (+) and NEGATIVE (-) ends of the batteries. Keep battery contact surfaces clean by gently rubbing with a clean pencil eraser or cloth. Remove all used batteries from the device at the same time, then replace them with new batteries of the same size and type. Store batteries in a cool, dry place at normal room temperature. Remove batteries from devices that will be stored for extended periods. Don't dispose of batteries in a fire - they may rupture or leak. Don't recharge a battery unless it is specifically marked "rechargeable."

Operating temperature (min/max):	0°C to +40°C
relative humidity:	max. 85%

7 FUNCTIONS

7.1 Functions List Selection

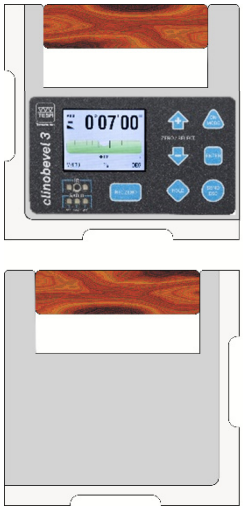
The TESA CLINOBEVEL 3 offers a wide range of functions and adjustment possibilities. The list of functions appears when the key ON/MODE is pressed. With the keys ZERO/SELECT the desired function can be selected and with ENTER it will be started. If during 10 seconds no further key is operated, the function list will be left. With the key SEND/ESC a function selected can be abandoned. Already entered changes of parameters will be rejected and the TESA CLINOBEVEL 3 will return to the previously used display mode.

Here after the single functions will be described.

7.2 Set absolute zero

Absolute Zero means that the instrument shows the measuring value "0" if the measuring surface of the instrument is aligned exactly according to gravity.

The absolute zero is used as the base for absolute inclination measurements. In order to achieve the best possible precision please observe that the measuring object (support) and the TESA CLINOBEVEL 3 have the same temperature and that the instrument is in operation for several minutes before starting a measurement. Mark the precise position and particularly the direction of the TESA CLINOBEVEL 3 in order to be able to turn the instrument by 180 degrees and to put it in opposite direction at the very same spot.



Measurement "A"

Rotation of the measuring instrument on the spot by

Measurement "B"

The absolute zero will be determined from a **reversal measurement** (two measurements in opposite direction but at the same spot). Use for this procedure an adequate surface (rigid and stable support, as flat as possible and as horizontal as possible), where you put the TESA CLINOBEVEL 3. Mark the position and the direction of the TESA CLINOBEVEL 3 precisely and turn it on the same spot by 180 degrees.

$$\text{ZERO OFFSET} = \frac{\text{Messung A} + \text{Messung B}}{2}$$

The ZERO-OFFSET will be stored in the TESA CLINOBEVEL 3

EXAMPLE:

Using the key ON/MODE select the menu point [Abs.Zero] and confirm your selection with ENTER.

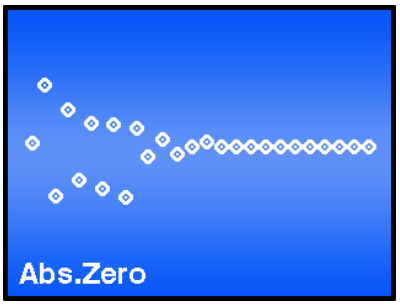
In the display the position of the instrument for the first measurement will be shown.

Put the TESA CLINOBEVEL 3 to the first position.

Start the first measurement pressing the key ENTER or with the remote control.

During the measurement the display will graphically show the current measurement.

Complete the measurement with the key ENTER or with the remote control. After 15 seconds the measuring value will automatically be read.



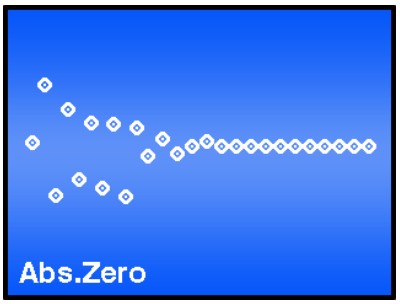
After a successful reading of the first measuring value the position of the instrument for the second measurement will appear in the display.

Put the TESA CLINOBEVEL 3 to the second position (turn the instrument by 180 degrees in the horizontal).

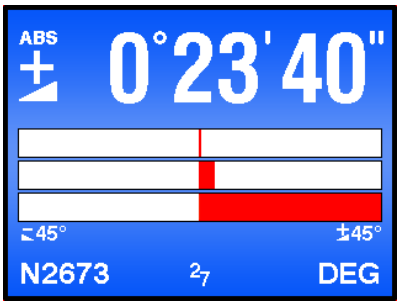
Start the second measurement as well pressing the key ENTER or with the remote control.

During the measurement the display will graphically show the current measurement.

Complete the measurement with the key ENTER or with the remote control. After 15 seconds the measuring value will automatically be read.



After termination of the reversal measurement the display for the actual measurement under consideration of the ZERO OFFSET will appear on the screen.



The value of the "Zero-Offset" determined by a reversal measurement corresponds to the deviation of the zero point of the TESA CLINOBEVEL 3 compared to the absolute Zero. The displayed measuring value corresponds to the value of the TESA CLINOBEVEL 3 minus the Zero-OFFSET.

Value displayed = Value of the TESA CLINOBEVEL 3 - "Zero-Offset"

The reversal measurement described above should be repeated periodically in order to achieve a high measuring precision, particularly when the TESA CLINOBEVEL 3 has not been in use for a longer period.

7.3 Selection of the measuring unit / UNIT

You can change the measuring unit of the inclination values displayed. If you start the function [UNIT] the list of the available measuring units will appear. With the keys ZERO/SELECT you can now select the preferred measuring unit. For memorizing the measuring unit selected you press now the key ENTER. The measuring unit will remain active until you change it again according to the above procedure.

The following **measuring units** can be chosen.

xxxx.xx	**mm/m**	mm per m / 2 decimals
xxx.xxx	**mm/m**	mm per m / 3 decimals *
xx.xxxx	**"/10"**	inch per 10 inches / 4 decimals
xx.xxxx	**"/12"**	inch per 12 inches / 4 decimals
xxxx.xx	**mRad**	Milliradian / 2 decimals
xxxx.xx	**mm/REL**	mm in relation to the relative base / 2 decimals
xxx.xxx	**mm/REL**	mm in relation to the relative base / 3 decimals*
xx.xxxx	**"/REL**	inches in relation to the relative base / 4 decimals
xxxx.xx	**A ‰**	artillerie-permille
xxxx.xx	**‰**	permille
xxx.xxx°	**DEG**	degrees / 3 decimals
xxx° xx'	**DEG**	degrees / minutes
xx° xx' xx"	**DEG**	degrees / minutes / seconds
xxxx' xx"	**DEG**	minutes / seconds
xxxxxx"	**DEG**	seconds
xxxxx.x"	**DEG**	seconds*
xxx.xxx	**GON**	Gon / 3 decimals

7.4 Units with relative base length

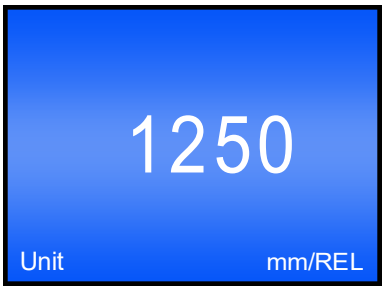
The units mm/REL and "/REL are related to a relative, this means selectable, base length. After selecting one of these units, the relative base length must be entered.

Example: **mm/REL /** mm in relation to a relative base / 2 decimals.

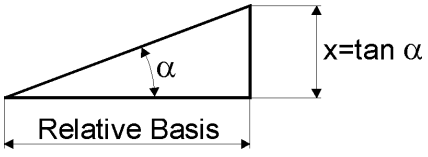
After the selection of the measuring unit in our example the stored base length of 1000 mm will appear.

With the keys ZERO/SELECT the proposed base length can be modified. The newly entered value can finally be confirmed with the key ENTER. With the key ON/MODE the default value 1000 mm will be recalled.

The following measurements are now related to a base length of 1250 mm.



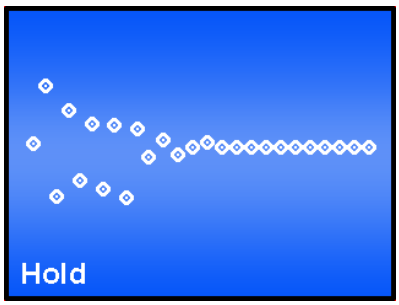
When measuring in the "relative zero" mode, the height "**X**" will be displayed as linear measure in the selected unit and in relation to the set base length (in **mm** or **inches**).



7.5 HOLD function

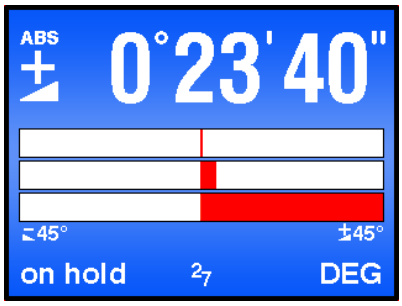
The key function HOLD ◆ (measuring value frozen) can be applied in all measuring modes.

Put the TESA CLINOBEVEL 3 on a stable support. Press now the key HOLD ◆. While the TESA CLINOBEVEL 3 is waiting for a valid measuring value the display will show graphically the measuring values read in the form of a shoal of points. As it is practically impossible to obtain a valid measuring value during manipulation, the instrument can be set to the final position even after activating the key.



Complete the measurement with the key ENTER ■ or with the remote control. After 15 seconds the measuring value will automatically be read.

By pressing the key HOLD ◆ again, a new valid measuring value will be read.



With the key SEND/ESC ● the "frozen" measuring value will be transmitted via the "**RS485**" port to a connected PC/Laptop with an RS232 interface. At the same time the instrument will return to the measuring mode.

The function SEND can also be initiated from the PC/Laptop connected by sending "P" (as a letter) via the RS-232 port.

7.6 Selection of the filter under different measuring conditions / FILTER

A number of different predefined filters can be selected.

Description of the different filter types:

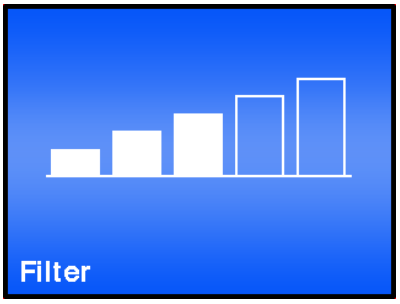
- FILTER 1: No filtering, no integration of the measuring values (**T** const. = 0.33Sek.)
- FILTER 2: Floating average of 3 measuring values (**T** const. = 1 sec.)
- FILTER 3: Floating average of 15 measuring values (**T** variable = 0.33 … 5 sec.)
- FILTER 4: Floating average of 6 measuring values (**T** const. = 2 sec.)
- FILTER 5: Floating average of 15 measuring values (**T** const. = 5 sec.)

T: Response time when changing the position. For filter 3 the actual change of the measuring value will define the number of values to be used for calculating the floating average. With a considerable change the number of values will be reduced with minute fluctuations the number will be increased.

Filter type 3 is the factory setting.

Using the key ON/MODE ▲ select the menu point [FILTER] and confirm your selection with ENTER ■ .

Using the keys ZERO/SELECT ▲▼, you can now select the filter type desired and then confirm it with ENTER ■.



7.7 Absolute measurement

As a factory setting the TESA CLINOBEVEL 3 will be programmed for absolute measurement.

If this is not the case, select the function [Absolute]. After confirming this function with the key ENTER the instrument is ready for measurements in the mode "ABSOLUTE".

The displayed measuring value corresponds to the value of the TESA CLINOBEVEL 3 minus the ZERO-OFFSET.

Value displayed = Value of the TESA CLINOBEVEL 3 - “ZERO OFFSET”

7.8 Relative measurement / REL ZERO

Important preliminary remark:

The "REL ZERO OFFSET" determined for a relative measurement will be superposed to the "ZERO OFFSET", e.g. determined by a reversal measurement.

The "REL ZERO OFFSET" will be stored in the TESA CLINOBEVEL 3 and can be re-called again and again. When starting the next relative measurement, the REL ZERO OFFSET entered or determined the last time will be displayed. The value can either be confirmed, newly entered or set to zero.

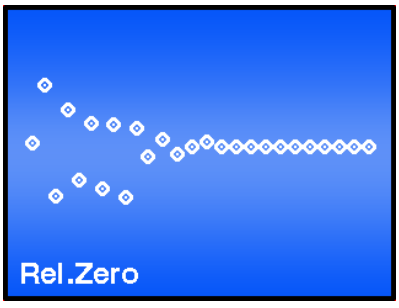
VALUE displayed =
Value of the TESA CLINOBEVEL 3 - "ZERO-OFFSET" - "REL ZERO-OFFSET"

Abbreviated procedure with the key REL ZERO:

Put the measuring instrument on the reference surface. The display shows the value -7‘00‘‘. This corresponds to the absolute inclination of the reference surface.

Set the TESA CLINOBEVEL 3 to the correct position and press the key REL ZERO.

After 15 seconds the measuring value will automatically be read.



During the measurement the display will graphically show the current measurement.

Complete the measurement with the key ENTER or with the remote control. After 15 seconds the measuring value will automatically be read.

On the screen the display for the actual measurement will appear now under consideration of the ZERO-OFFSET.

The **value** displayed **is "0"** and represents the position of the reference defined.

The complete procedure is he following:

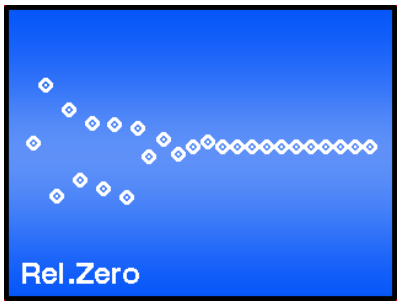
Put the measuring instrument on the reference surface. The display shows the value -7'00". This corresponds to the absolute inclination of the reference surface.

Select the function [REL ZERO] and confirm this selection with ENTER.

On the display the position of the instrument for the measurement will be shown.
With the key ON/MODE you can at this stage open the manual entry in order to enter a reference value defined by yourselves.

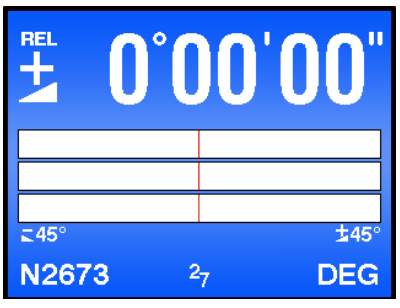
Set the TESA CLINOBEVEL 3 to the correct position and press the key ENTER to read the value. Alternatively, the measuring can also be started using the remote control.

During the measurement the display will graphically show the current measurement.



Complete the measurement with the key ENTER or with the remote control. After 15 seconds the measuring value will automatically be read.

On the screen the display for the actual measurement will appear now under consideration of the ZERO-OFFSET.



The **value** displayed **is "0"** and represents the position of the reference defined.

The values stored in the registers "**ZERO**" and/or "**Rel Zero**" can be changed or deleted as follows:

Select with the key ON/MODE the function [REL ZERO] or [ABS ZERO] and confirm this selection with ENTER. Press now again the key ON/MODE . The offset value stored will be displayed. Press now the keys ZERO/SELECT until the display shows the desired value. Using the key ON/MODE, the value can directly be set to "0". With the key ENTER the value displayed will be stored and the procedure terminated. With the key SEND/ESC the procedure will be abandoned without change. After that the TESA CLINOBEVEL 3 will return to the measuring mode.

Use this procedure if you have to set one of these registers to an exact value, e.g. 5°.

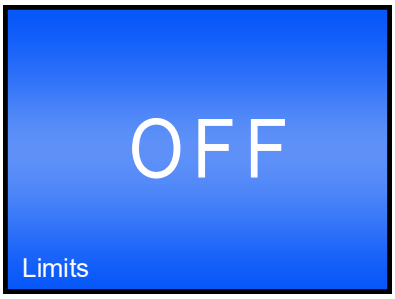
7.9 Measurement with Limits / LIMITS

If you intend to set off an "Alarm" when a defined limit is exceeded this can be realised using the function "LIMITS".

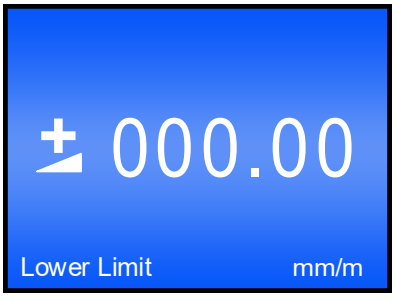
The function "LIMITS" allows defining an upper and a lower **limit**. If this set limit is exceeded respectively under-run, a horizontal bar in the display will start blinking. A blinking bar above the displayed value means that the upper limit has been exceeded. If the blinking bar is below the lower limit has been under-passed. Through the RS485 port a message will be sent.

Using the key ON/MODE select the menu point [LIMITS] and confirm your selection with ENTER.

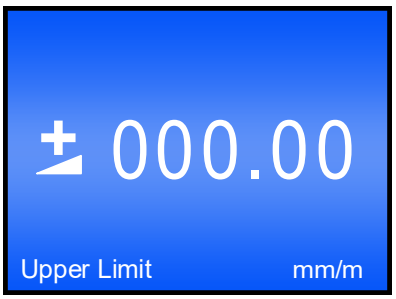
Switch the function [LIMITS] on using the keys ZERO/SELECT and confirm with the key ENTER.



You can now enter the lower limit. The value is adjusted with the keys ZERO/SELECT. Confirm your entry with the key ENTER. With the key ON/MODE the default value will be recalled.

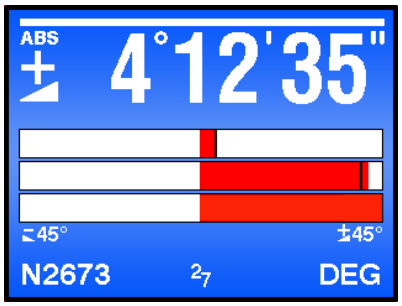


Now you can enter the upper limit. The value is adjusted with the keys ZERO/SELECT the entry is confirmed with the key ENTER. With the key ON/MODE the default value will be recalled.



The measuring instrument returns to the measuring mode.

If during the measurement the **lower respectively the upper limit is exceeded** a blinking horizontal bar will appear above respectively below the inclination value. Via the RS485 port a respective message will be sent.



It is possible to set the lower limit above the upper limit. In this case a respective message will be sent via the RS-485 port continuously.

Data format at the RS-485 interface

Upper Limit [sss xxxxxt UL sn.nnnnnn sm.mmmmmm<cr>]
Lower Limit [sss xxxxxt LL sn.nnnnnn sm.mmmmmm<cr>]

sss = 0 .. 255 - continuous number

xxxxxx = Sensor Serial Number and Type
N2673L TESA CLINOBEVEL 3

sn.nnnnnn = +9.999999 - Positive Overrange
-9.999999 - Negative Overrange
other value - angular value in rad e.g. +0.226349
sm.mmmmmm = limit defined

7.10 Quick calibration / Q.CALIB

The TESA CLINOBEVEL 3 with the measuring range ±60° is equipped with an integrated calibration set-up for a quick calibration procedure which enables the calibration without complex means. On the backside of the TESA CLINOBEVEL 3 precisely manufactured and placed holes are available for installing the dowel pins as calibration aids. These pins are part of the delivery and can be inserted into the holes. With the quick calibration method, the values at + and - 45° as well as the exact zero value can be adjusted. By this procedure the instrument can be set to a very high precision.

Attention: Before a quick calibration can be performed, the local gravity must be set. To do this, use the function [Gravity], which is described in section 8.9. Relative offset must be turned off. During quick calibration the absolute offset will be set to zero. Therefore, at the end the correction of the zero point (absolute Zero) must be determined by a reversal measurement.

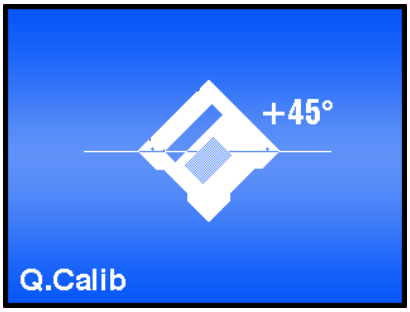
The calibration procedure is as follows:

1	Start the TESA CLINOBEVEL 3 in the measuring mode "Absolute" and set the local gravity.	Point 8.9 Gravitation and 7.7 Absolute measurement
2	Select the function [QUICK CALIB] using the key ON/MODE and confirm with ENTER.	

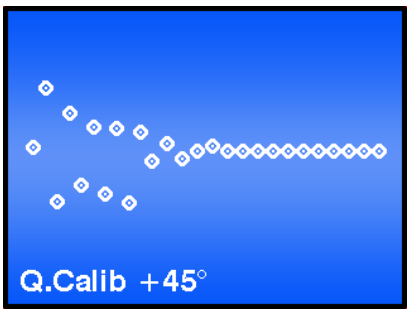
Correction of the value at +45°.

3

The dowel pins delivered are to be inserted in such a way that the instrument would display +45° when two pins are on a horizontal plane. Align the instrument with the pins inserted on the edge of a measuring and setting plate
To start the calibration, press the key ENTER and hold the instrument still.
Alternatively, the calibration can also be released with the remote control.



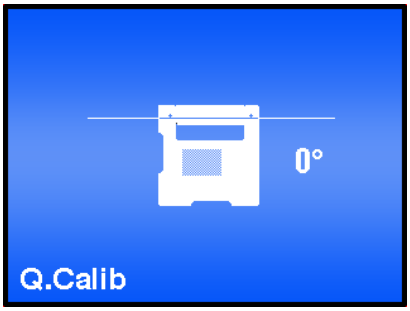
The correction value at +45° is determined.



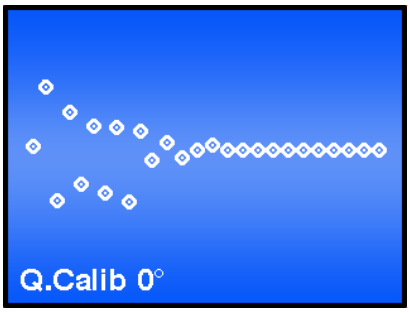
Correction of the value at 0°.

4

The dowel pins delivered are to be inserted now in such a way that the calibration at 0° can be defined.
To start the calibration, press the key ENTER and hold the instrument still.
Alternatively, the calibration can also be released with the remote control.



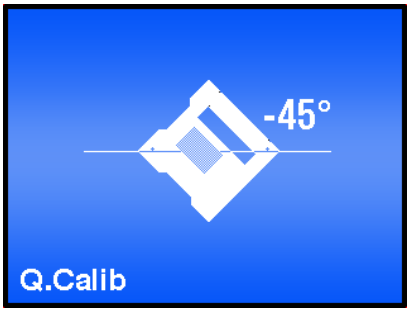
With the key ON/MODE you can at this point open the manual entry in order to enter a predefined correction value.



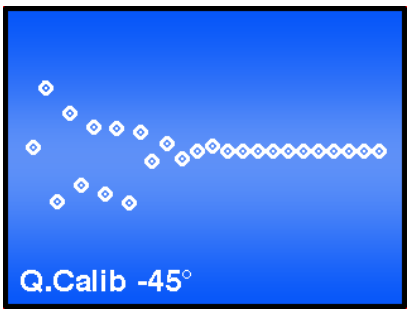
Correction of the value at **-45°**.

5

The dowel pins delivered are to be inserted now in such a way that the calibration at -45° can be defined.
To start the calibration, press the key ENTER and hold the instrument still.
Alternatively, the calibration can also be released with the remote control.



With the key ON/MODE you can at this point open the manual entry in order to enter a predefined correction value.
The correction value at -45° is determined.



6 After a successful calibration the instrument will be re-started.

7 Finally, the correction of the zero point (absolute Zero) must be determined by a reversal measurement.

8 The TESA CLINOBEVEL 3 has now been re-calibrated and can be used for further measurements.

The calibration aids (dowel pins) delivered must be stored cleaned and grease applied. Also, the holes in the instrument must remain free from dust and dirt.

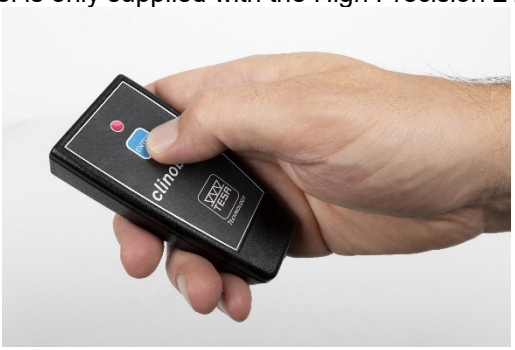
7.11 Infrared remote control

Procedure:

- The measuring or display instrument must be started
- Keep one of the keys on the measuring or display instrument pressed
- Point the IR remote control in the direction of the measuring or display instrument
- Press the **actuator key** on the IR remote control until both red IR LEDs are lighting up
-

The remote control is used for the calibration processes: the absolute zero setting, the relative zero setting and the Quick calibration.

The infrared remote control is only supplied with the High Precision ±1° version.



7.12 Connection to an ANDROID device as remote display

- Download the app **TESA CLINOBEVEL 3** from the Google Play Store
- Switch on the TESA CLINOBEVEL 3.

ANDROID APP ON Google play

- Select the “BT Discoverable” (BT visibility) function and change the status to ON
- Start the app
- The app searches for TESA CLINOBEVEL 3 in the area. After a short time, your instrument should be visible with a green background
- Select the device.

The "BT Discoverable" function only needs to be switched on the very first time a connection is established. Afterwards, the two paired devices will automatically find each other again.

8 OPTIONS

8.1 Options menu

The options serve for entering the basic adjustments of the measuring instrument. The access to the options can be protected with a PIN code in order to avoid unauthorised modifications.

The following options are available:

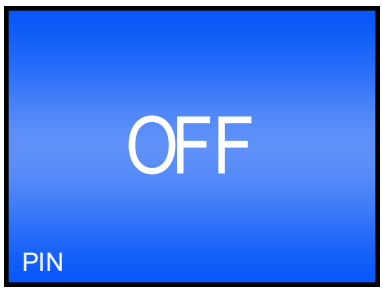
- **Option "Set PIN code"**
  With this option it is possible to block the entering of options with a PIN code.
- **Option "Display Settings"**
  With this option basic settings of the display, such as the brightness and colour pattern, are possible.
- **Option "Logscale"**
  With this option the logarithmic scaling can be switched on or off.
- **Option "Programmable Keys"**
  With this option it is possible to switch the scale-functions of the keys <ZERO/SELECT> and the functions of the key <REL:ZERO> on or off.
- **Option "Functions ON/OFF"**
  With this option specific functions can be switched on or off. Functions switched off will no longer appear in the main menu.
- **Option "Hide disabled Functions ON/OFF"**
  If this option is enabled, disabled functions will not be shown.
- **Option "Radio ON/OFF"**
  With this option the wireless data transmission can be activated or deactivated.
- **Option "Gravitation"**
  With this function the correction of the gravitation can be switched on or off and the local gravity force can be entered.
- **Option "Version"**
  With this option the version of the firmware will be displayed.
- **Option "Reset Quick Calibration"**
  The values of the quick calibration will be deleted and replaced by the factory set values (only with the option Quick Calibration).
- **Option "Factory Reset"**
  A complete factory reset will set the instrument to the factory (default) settings as it has been configured at the factory. All personal settings get lost.
- **Option "Function Check"**
  A function check of the instrument will be performed.

8.2 Set PIN code

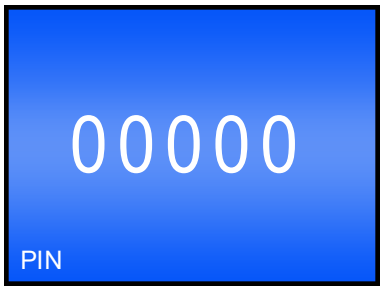
In order to protect the settings of the TESA CLINOBEVEL 3 against unauthorised changes you have the possibility to block the entering of options with a PIN code.

Using the key ON/MODE select the menu point [Options] and confirm your selection with ENTER. Select now [Set PIN code] and confirm with ENTER.

Switch the blocking of options with the keys ZERO/SELECT to ON and confirm with the key ENTER.



You can now enter your PIN code. The value is adjusted with the keys ZERO/SELECT. With the key ON/MODE the standard value 00000 will be recalled for the PIN code.
Confirm your entry with the key ENTER.



As a factory setting the PIN code is deactivated.

8.3 Display settings

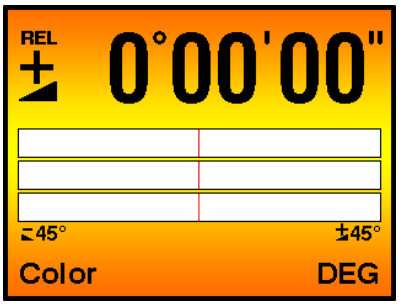
In the display settings, the brightness of the display, the brightness in the energy safe mode and the colour pattern can be adjusted individually. The brightness is indicated as a percentage of the maximum brightness. As the power consumption is considerably reduced with a reduced brightness, it is recommended to use in the energy safe mode a brightness of 50 % (default).
With the colour pattern the background colour can be adjusted. The colour of the fonts changes according to the brightness of the background between black and white. The default background colour is beige.

Using the key ON/MODE select the menu point [Options] and confirm your selection with ENTER. Select now [Display Settings] and confirm with ENTER.

With the keys ZERO/SELECT select the display option you would like to change and confirm the selection with the key ENTER.

In the brightness adjustments you can increase or reduce the brightness using the keys ZERO/SELECT. The range is from 10% to 100%. With the key ON/MODE the default value of 50% will be recalled. Confirm the new value with the key ENTER.

In the colour adjustments you can select the preferred colour using the keys ZERO/SELECT. Confirm your choice with the key ENTER.



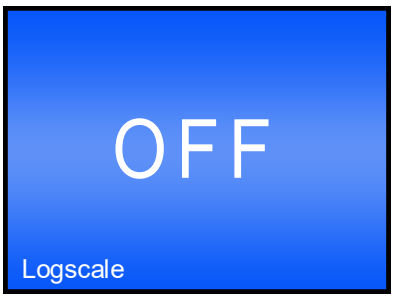
The measuring instrument returns to the measuring mode.

8.4 Logarithmic scaling

With the option “Logscale” the logarithmic scaling can be switched on or off.

Using the key ON/MODE select the menu point [Options] and confirm your selection with ENTER. Select now [Logscale] and confirm with ENTER.

Switch the logarithmic scaling on using the keys ZERO/SELECT and confirm with the key ENTER.



The measuring instrument returns to the measuring mode.

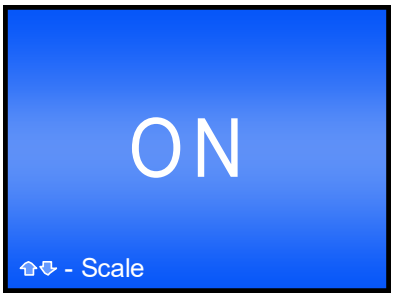
8.5 Function keys

With the option “Programmable Keys” it is possible to switch the function of the keys ZERO/SELECT and of the key REL ZERO on or off.

Using the key ON/MODE select the menu point [Options] and confirm your selection with ENTER. Select now [Programmable Keys] and confirm with ENTER.

With the keys ZERO/SELECT select the key you would like to switch on or off and confirm the selection with the key ENTER.

With the keys ZERO/SELECT you can switch the selected key on or off. In the display the selected status will be shown. ON means enabled, OFF means disabled. Confirm with the key ENTER.



The list of the programmable keys will be shown again. For switching another key on or off, repeat the procedure as described above. In order to store the settings, select "Ok" and confirm with the key ENTER.

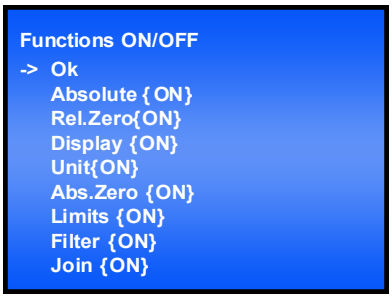
The measuring instrument returns to the measuring mode.

8.6 Switching functions on or off

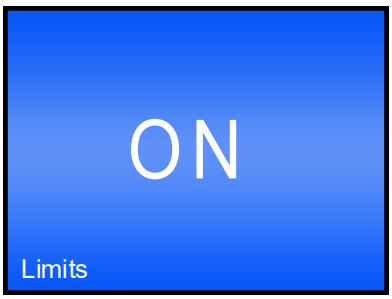
With the option "Functions ON/OFF" the provided menu functions can be switched on or off. Thus, the menu displayed can be adjusted to the needs of the user.

Using the key ON/MODE select the menu point [Options] and confirm your selection with ENTER. Select now [Functions ON/OFF] and confirm with ENTER.

With the keys ZERO/SELECT select the function that you would like to switch on or off and confirm the selection with the key ENTER.



With the keys ZERO/SELECT you can switch the selected function on or off. In the display the selected status will be shown. ON means enabled, OFF means disabled. Confirm with the key ENTER.



The list of the switchable menu functions will be shown again. For switching another function on or off, repeat the procedure as described above. In order to store the settings, select "Ok" and confirm with the key ENTER.

The measuring instrument returns to the measuring mode.

8.7 Hide disabled Functions

With the setting "Hide disabled Functions ON/OFF" the disabled functions will not be shown. The list of functions will only show those functions which are enabled. If this adjustment is not activated, disabled functions will be shown in the list of functions in grey fonts.

Using the key ON/MODE select the menu point [Options] and confirm your selection with ENTER. Select now [Hide disabled Functions ON/OFF] and confirm with ENTER.

Switch the setting "Hide disabled Functions ON/OFF" on using the keys ZERO/SELECT and confirm with the key ENTER.

The measuring instrument returns to the measuring mode.

8.8 Switch wireless connection on/off

With the setting “Radio ON/OFF” the wireless connection can be activated or deactivated.

Using the key ON/MODE select the menu point [Options] and confirm your selection with ENTER. Select now Radio ON/OFF] and confirm with ENTER.

Switch the wireless connection on using the keys ZERO/SELECT and confirm with the key ENTER.

The measuring instrument returns to the measuring mode.

8.9 Gravitation

The inclination displayed by the TESA CLINOBEVEL 3 is based on the gravitation. Around the globe the gravitation is, however, not constant but it varies with the latitude and with the height above sea level. Furthermore, variations of the density in the lithosphere cause additional local deviations.
As an example, the gravity at sea level is

- 9,78033 m/s^2 at the equator,
- 9,80620 m/s^2 at 45 degrees of latitude,
- 9,83219 m/s^2 at the poles.

In the following table the values of gravity for some cities are listed.

Amsterdam	9,813	Istanbul	9,808	Paris	9,809
Athens	9,807	Havana	9,788	Rio de Janeiro	9,788
Auckland, NZ	9,799	Helsinki	9,819	Rome	9,803
Bangkok	9,783	Kuwait	9,793	San Francisco	9,800
Brussels	9,811	Lisbon	9,801	Singapore	9,781
Buenos Aires	9,797	London	9,812	Stockholm	9,818
Kolkata	9,788	Los Angeles	9,796	Sydney	9,797
Cape Town	9,796	Madrid	9,800	Taipei	9,790
Chicago	9,803	Manila	9,784	Tokyo	9,798
Copenhagen	9,815	Mexico City	9,779	Vancouver, BC	9,809
Nicosia	9,797	New York	9,802	Washington, DC	9,801
Jakarta	9,781	Oslo	9,819	Wellington, NZ	9,803
Frankfurt	9,810	Ottawa	9,806	Zurich	9,807

The TESA CLINOBEVEL 3 was calibrated with a local gravitational force of **9,807 m/s^2**.
The inclinations displayed are therefore correct only in this location where exactly the same gravitational force is acting. In different places the displayed value must be corrected. If on the TESA CLINOBEVEL 3 the correction of the local gravity is switched on, the inclination measured will be corrected accordingly before the value is displayed.

The correction is calculated according the following formula:

$$\alpha_{eff} = \arcsin\left(\frac{g_c}{g_m}\sin(\alpha_m)\right)$$

whereas

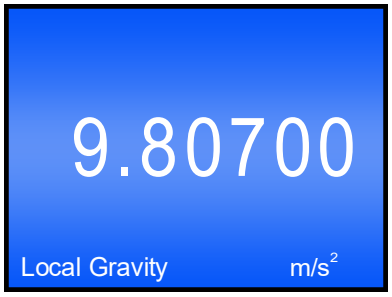
g_c	Gravity at the location of calibration
α_m	Angle displayed at measuring site
g_m	Gravity at the measurement location
α_{eff}	Effective angle

In order to switch the correction of the local gravity on respectively off, proceed as follows:

Using the key ON/MODE select the menu point [Options] and confirm your selection with ENTER. Select now [Gravity] and confirm with ENTER.

Switch the correction of the gravitation on using the keys ZERO/SELECT and confirm with the key ENTER.

Now you can enter the value of the local gravity. The value is adjusted with the keys ZERO/SELECT.
With the key ON/MODE the standard value 9.807 m/s^2 will be recalled.
Confirm your entry with the key ENTER.



The measuring instrument returns to the measuring mode.

8.10 Firmware Version

With this option information about the installed firmware and the configuration can be displayed.

Using the key ON/MODE select the menu point [Options] and confirm your selection with ENTER. Select now [Version] and confirm with ENTER.

The following information will be displayed:

- Serial number of the instrument
- Number of the firmware
- Firmware release date
- Instrument type (wireless / cable)
- Serial number of the integrated sensor
- Measuring range
- Quick Calibration (ON/OFF)

After 10 seconds or with the key ENTER this display will be left.

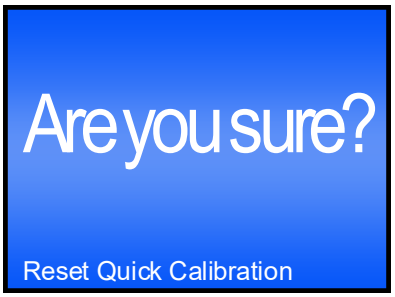
The measuring instrument returns to the measuring mode.

8.11 Reset quick calibration

The data of the quick calibration will be deleted and replaced by the factory default values.

Using the key ON/MODE select the menu point [Options] and confirm your selection with ENTER. Select now [Reset Quick Calibration] and confirm with ENTER.

In order to prevent a resetting by error the question "Are you sure?" will appear. If you really want to delete the data of the quick calibration, press now the key ENTER. After 10 seconds or with the key SEND/ESC the instrument will return to the measuring mode.



8.12 Reset to factory settings

A complete factory reset will reset the instrument to the state as it has been configured at the factory. All personal settings get lost.
The TESA CLINOBEVEL 3 will be set to the following standard configuration:

Standard values:	
Measuring mode:	absolut
measuring unit:	DEC xx°xx'xx"
relative base:	1000 mm
absolute Zero point (ZERO-OFFSET):	0
relative Zero point (REL ZERO-OFFSET):	0
Filter No. 3	
Display vial	
Limits	OFF;
Upper Limit	0
Lower Limit	0
Scale	maximum range
Pairing	not paired
PIN code	OFF; Code = 00000
Display settings	Colour blue, Saturation 100%, Saturation Power saving mode 50%
Logarithmic scaling	OFF
Function keys	all keys enabled;
Switching functions on or off	all keys enabled;
Hide disabled functions	OFF
Wireless connection	ON, if available
Gravitation	OFF; Value = 9.807 kg·m/s^2

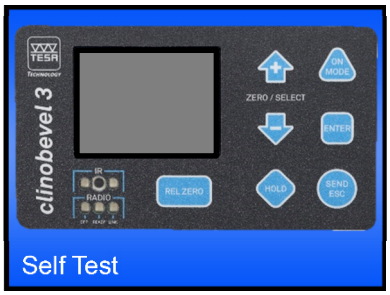
Using the key ON/MODE select the menu point [Options] and confirm your selection with ENTER. Select now [Factory Reset] and confirm with ENTER.

In order to prevent a resetting by error the question "Are you sure?" will appear. If you really want to delete all personal settings, press now the key ENTER. After 10 seconds or with the key SEND/ESC the instrument will return to the measuring mode.

8.13 Function check

At the start of the instrument a system test will be performed, checking the most important functions. In addition to this test the function of the keys and of the LEDs can be checked.
Using the key ON/MODE select the menu point [Options] and confirm your selection with ENTER. Select now [Self Test] and confirm with ENTER.

On the display, the control panel of the TESA CLINOBEVEL 3 is sketched with its keys and LEDs. If any key on the control panel or the key on the infrared remote control is pressed, the real LEDs as well as those on the display will lit. In addition, the key pressed will be marked. Each key will create an individual pattern. Thereby the real LEDs and those on the display must be identical. If this is not the case, either a key or a LED is defective.



After 10 seconds without activating any key the instrument will leave the function check mode. The measuring instrument returns to the measuring mode.

9 READING OUT MEASURIEMENT DATA WITH THE HYPERTERMINAL

1. Open your terminal program

2. Enter the COM port connected to the TESA CLINOBEVEL 3.

3. Enter the parameters

Bits per Second: 9600
Data bits: 7
Parity: none
Stopbits: 2
Protocol: none

4. Repeatedly pressing the key SEND/ESC on the TESA CLINOBEVEL 3, the actual value will be transmitted in [Rad].

Alternatively it can be called from the terminal program by sending the ASCII value "**P**" to the instrument.

10 ERROR MESSAGE

After the start of the instrument the TESA CLINOBEVEL 3 performs a function check. If any errors are detected, the **instrument must be returned to the TESA reseller**. A proper functioning cannot be guaranteed. The following error messages may appear:

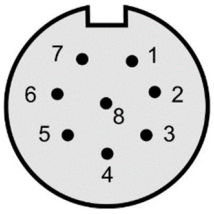
- Display is blinking grey mottled. Programme memory is defective
- Display blinks two times grey mottled Display error

- **ERROR 1** General instrument defect
- **ERROR 2** No calibration data available
- **ERROR 3** Sensor not found
- **ERROR 4** Wireless module not found
- **ERROR 5** Defective flash memory
- **ERROR 6** Defective EEPROM

11 PIN-DEFINITION

RS-232 / RS-485

BINDER Series 712
8 pol.
(female)



RS-485

Port	Signal	Pin type	Pin function
1	VPP	Power in	Unregulated Power
2	VSS	GND	Ground
3	VDD	Power out	Power +5V
4	RTA	Input/Output	RS-485-Line A
5	RTB	Input/Output	RS-485-Line B
6	-	-	-
7	-	-	-
8	KEY	Input	Trigger key

12 ACCESSORY

The following accessory is available:
Infrared remote control, article number 05360014
Cable RS484/USB to computer, article number S53300166

13 DECLARATION OF CONFORMITY

We thank you for your confidence in purchasing this product. We hereby certify that it was inspected in our works.

We declare under our sole responsibility that its quality is in conformity with all technical standards and data as specified in our sales literature (instruction manual, leaflet, general catalogue).
In addition, we certify that the measuring equipment used to check this product refers to national standards. The traceability is ensured by our Quality Assurance system.

Quality Assurance

14 WARRANTY

TESA shall remediate any operating defects resulting from a manufacturing defect, within the limit of the following provisions. The regular warranty shall cover the first year from the date of sale.

In justified warranty cases, TESA shall choose one of the following services:

– free repair by TESA or a TESA-certified service shop, or
– free replacement, or
– credit note for the product subject to the claim.

All other services or compensation under a warranty claim are excluded.

The warranty shall not cover any damage resulting from incorrect, incompetent or negligent use, a maintenance defect or failure, external influences, failure to comply with service instructions, or any other hazard, including cases of force majeure.

(Extract from our general sales conditions 2012 edition)