

THE ORIGINAL LASER DISTANCEMETER



User Manual

Version 1.0

English

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DISTO special⁵ hand-held laser meter Congratulations on your purchase of a DISTO™.

This User Manual contains important safety directions (see section "Safety directions") as well as instructions on use of the instrument. Read carefully through the User Manual before you switch on the instrument.

Product identification

The identification label for your product is fitted on the front. The serial number is in the battery compartment. Enter model and serial number in your User Manual, and always refer to this information when you need to contact your agency or service centre.

Model: DISTO™
Serial no.:
Date of purchase

International Manufacturer's

Warranty

Leica Geosystems AG offers its customers a two (2) year warranty on DISTO instruments. For more information, refer to *www.disto.com*.

In case of a defect, please contact the dealership near you.

Symbols used

The symbols used in the User Manual have the following meanings:

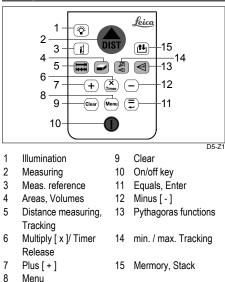
WARNING:

Indicates a potentially hazardous situation or an unintended use which, if not avoided, will result in death or serious injury.

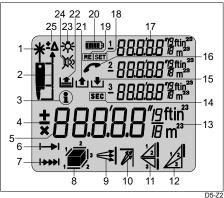
Indicates a potentially hazardous situation or an unintended use which, if not avoided, may result in minor injury and/or in appreciable material, financial and environmental damage.

Important paragraphs which must be adhered to in practice as they enabled the product to be used in a technically correct and efficient manner.

Keypad



Display



Laser "on"

- 2 Measurement reference (front/ stand/ rear)
- 3 Information
- 4 Display of the mathematical signs/operations
- 5 Main display (e.g. measured distance)
- 6 Distance measurement
- 7 Tracking

- Area/ Volume
- 9 min. Tracking

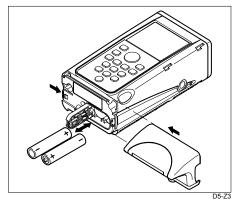
8

- 10 max. Tracking
- 11 Pythagoras function
- 12 Pythagoras function with partial height
- 13 Units with exponents (²/ ³)
- 14 Time symbol for time delay release
- 15 Save constant
- 16 Contact customer service
- 17 3 auxiliary displays (e.g. previous values)
- 18 SET
- 19 RESET
- 20 Battery display
- 21 Recall stored constant (max. 10)
- 22 Recall last 15 values
- 23 Illumination (on/ off)
- 24 Beep (on/ off)
- 25 Offset setting

How to Use the Instrument

Inserting / replacing the batteries

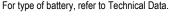
1 Depress the locking clip and slide end piece to the right.



2 Remove battery cover. Replace batteries.



Appears on the display if battery voltage is too low.



Fit batteries the right way round.

- Use only Alkaline batteries.
- 3 Push in end piece and listen for locking click sound.

DISTO™ Switching on/off

Briefly press.

The illumination, Battery and Beep symbols are displayed until the first key press.

The instrument can be switched off from any menu point.

The instrument switches off automatically after 90 seconds if no key is pressed.

Clear key



The clear key resets the instrument to Normal Mode, i. e. it is set to zero (=Clear).

The clear key may be pressed before or after a measurement/ calculation.

In Menu Mode it resets to Normal Mode.

During a function (area, volume or Pythagoras) the single measurements can be deleted step by step and remeasured.

Used to exit menu settings without saving changes.

Illumination



Briefly press.

Illumination is switched on/off with a key press.

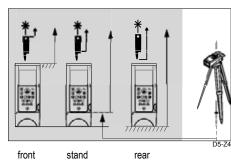
Illumination switches off after 30 seconds if no key is pressed.

Reference setting

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Press until desired reference setting appears.

Possible settings



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At the back of the instrument is a 1/4" camera thread for the stand



Changes are lost when instrument is switched

Basic setting: rear reference

Measuring

Distance measurement



DIST

Press and the laser is switched on, the instrument is in"Pointing Mode".

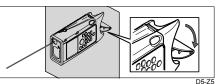
A second press starts the distance measurement.

The result is displayed immediately in the selected unit.

With the instrument on and the laser off, it is in æ "Normal Mode"

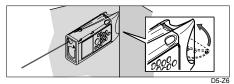
æ With the laser on, it is in "Pointing Mode".

Measuring from flat planes



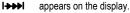
For stable measuring turn bumper 90°.

Measuring from corners



Continuous measurement (Tracking)





Continuous measurement is started and the result is displayed.



Press to end Tracking Mode. Last result is shown in the display.

Example: Stake off distance



Laser in continous operation



- Press until a long "beep" is heard. Now the laser is activated permanently.
- A distance measurement is triggered each time the key is pressed.

DIST

Press to end continuous laser operation.

Time delay release

Instrument must be in Pointing Mode.

Timer

- Press and hold until desired time delay has been reached (max. 60 seconds).
- SEC
- appears on the display.

Once the key is released, the remaining seconds (e.g. 59, 58, 57...) are displayed, until measuring.

The last 5 seconds are counted down with a "beep".

After the last "beep", the measurement is made and the value displayed.

Example: Measuring without any key activation.

Calculations

Area

\frown	

Press until

appears on the display. The side to be measured blinks.

Make 2 measurements (I x w).

The result and the two partial results appear on the display.

Volume



appe

appears on the display. The side to be measured blinks. en

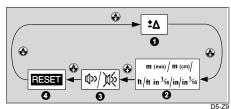
Make 3 measurements (I x w x h).

The result and the three partial results appear on the display.

Press until

Menu/ Settinas

With this menu settings on the user level are possible. The user can configure the instrument to his/her own specific and personal needs.



- Measure with offset (add/reduce)
- Selecting measuring units
- Beep
- Reset

Calling up a menu:



- Press until desired menu point appears or with key [+ / -] switch between the various menu points.
- t II
- Confirm selection, activate menu point.

(Menu)

or with key [+ / -] change setting as desired.

Confirm selection, reset to Normal Mode, Ţ

P "Clear Entry" may also be used (e.g. to cancel a selection).

14' 06" 1/16 = ' " ¹/₁₆

in = 0.0 in

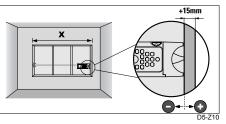
in $1/16 = 0^{1}/_{16}$

Selecting units

Selectable units:

- m (mm) = 0.000 m _ _
- m (cm) = 0.00 m _
- ft = 0.00 ft
- ft in $1/16 = 0.00 \, {}^{1}/{}_{16} {}^{\text{ft in}}$

Measure with offset



Call up menu point.

<u>*Δ</u> blinks on the display. With key [+ / -] set desired offset (=shifting reference) (e.g. 0.015m); quick set by keeping key pressed.

For larger steps hold additionally. X Timer/

Offset can be positive (add) or negative æ (reduce)!

Confirm setting. Ξ

~ ±Δ

Is displayed continuously if offset $\neq 0$.

Subject to set offset, the measured results are P displayed.

Using this function you can measure with rough size, as an example!

Please make this a rule: After rough size measurement always set the DISTO[™] to offset 0.000: Call up function as described

Press. (Clear

Ξ

~

Confirm function





æ After making/changing settings, it is imperative that a test measurement is performed.

Resetting

Call up menu point.

starts blinking on the display. RE SET

With key [+ / -] select components to be reset. To choose from:



Stack/ Mermory



Stack and Constant

If additional symbols, e.g. measuring frequency and units are shown in the display, the following values are reset:

Offset (=0), Beep (On) and Units (meter) _



Selected components are reset: back to Measuring Mode.

Functions

Save values (constants)

Measure/ calculate desired value (e.g. height of room, area, volume).

Press longer.





starts to blink on the display.

With key [+ / -] adjust value as desired (e.g. from 2.297m to 2.300m).

X For larger steps press and hold additionally. Timer/

Press to adjust unit (2/3).



The adjustment is for m, m² and m³ rsp. ft, ft² and

Confirm.



and a number (=memory location) starts to blink.

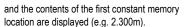
With key [+ / -] select memory location (1-10).



Recalling the constant Press briefly.



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With key [+ / -] select desired mermory (1 to 10).

- Ξ -
- Confirm; value is ready to be used for (e.g. calculating an area) or

Recall last measured value (Stack)

(H)

Briefly press twice

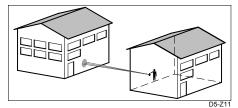
and the last value in the display is shown.

With key [+ / -] select desired value (max. 15!).

- Ξ -
- Confirm: value is ready to be used for (e.g.
- calculating an area).



Tracking - Minimum



Determine the minimum dimension, e.g. ceiling height, without having to precisely align to the normal.

_ ₩

Press until



appears on the display.

Aim DISTO[™] approximately at the target point.



Activate continuos measurement with a brief press.

Move the DISTO[™] a large amount around the target point.



Stop continuous measurement.

DIST

(room) diagonal.

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Press until

height of room).

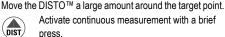
nearly parallel to each other.

Tracking - Maximum

æ

appears on the display.

Determine maximum dimension, e.g. to determine the



8

DIST The largest measurement is displayed (e.g. 12.314m = diagonal of room).

Stop continuous measurement.

Slowly rotate the DISTO[™] to the right/ left past the corner.

Calculations

Partial heights, partial distances

Make measurement

Add by [+] key/ Subtract by[-] key. Make additional measurements.

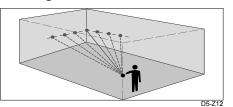
= Result Ξ **~**

P In the same way chain values (= any amount of distance measurements) and sums of areas/ volumes can be added up.

During calculations "Clear" is available as long R as the function has not been executed!



Functions



The smallest measurement is displayed (e.g. 3.215m =

Both planes (e.g. floor/ ceiling, walls) must be

Multiplication

Make measurement (e.g. 8.375m). Multiplication by pressing [x] key. Additional measurements (e.g. 8.375m).



= Area (e.g. 29.313m²)

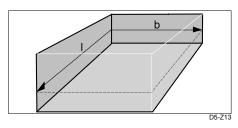
The volume can be calculated by an additional multiplication following an area calculation. This function can be used for calculating areas or volumes with individual partial heights/ partial distances. Doubling a measured value

It is easy to double the measured values, e.g. to determine the length of walls in a room: Make measurement. Add by [+] key. Make additional measurements.

= Sum (=half circumference)

With key [+] repeat, double measured value.

= Sum (=circumference)



Pythagoras, height/ width measurement

The measuring sequence must be adhered to in any case!

All three (two) points must be on a vertical or horizontal line in the plane of the wall!

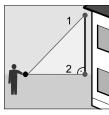
With each of the distance measurements you can use:

- a simple distance measurement,
- a value from stack/ mermory or
- a measurement with time delay release.

For short distances, a good base behind the instrument is sufficient for mechanical alignment.

You will obtain the best results if the DISTO[™] is rotated around a fixed point (rear edge, thread position) and the axis of the laser beam passes through this axis. So do not simply place the DISTO[™] on a camera tripod. In this case the axis of the laser beam is approx. 70 to 100mm above the centre of rotation - this can lead to significant variations in the height.

Determination with two points



Press until

For estimating the height/ width of buildings. Very useful for making measurements from standing position (no bending) if the height is determined with two or three distances.

en



appears on the display; laser is activated and "1 ----" starts blinking.



Aim at the upper point (1).



Trigger measurement; do not move the instrument!

Value is accepted.



appears on the display and "2 ---" starts blinking.

Point the DISTO[™] approximately horizontal (2).



Functions

Press, a continuous measurement is triggered.

Move the DISTO[™] a large amount around the ideal measurement point.



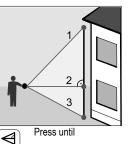
4

DIST

DIST

Stop of continuous measurement. The height and width are displayed from measurements (Pythagoras).

Detemination with 3 points



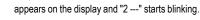
appears on the display; laser is activated and "1
---" starts blinking.

Aim at the upper point (1).

Trigger measurement; do not move the instrument!

10

Value is accepted.



Point the DISTO[™] approximately horizontal (2).



Press, a continuous measurement is triggered.

Move the DISTO[™] a large amount around the ideal measurement point.



Stop of continuous measurement.

Value is accepted and and on the display "3 ---" starts blinking.



Aim at the lower point (3).



Trigger measurement; do not move the instrument!

The height and width are displayed from three measurements (Pythagoras).

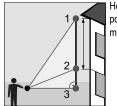
Determination of a partial height with 3 points

appears on the display; laser is activated and

Trigger measurement; do not move the

Value is accepted and on the display "2 ---" starts blinking.

Trigger measurement; do not move the



Press until

instrument!

instrument!

"1 ---" starts blinking.

Aim at the upper point (1).

 \triangleleft

1/2

DIST

DIST

DIST

Value is accepted.

Height determination between point 1 and point 2 with three measured points.



Press, a continuous measurement is triggered.

appears on the display and "3 --- " starts blinking.

Move the DISTO[™] a large amount around the ideal measurement point.



€

DIST

Stop of continuous measurement. The height and width are displayed between point 1 and 2 (Pythagoras).

User Information

Range

In daylight (outdoors) always work with a laser viewfinder. If necessary, shade the target. If required, use a target plate.

Increased range:

At night, at dusk and when target area is in the shade.

Reduced range:

E.g., to mat green and blue surfaces (also plants or trees).

Rough surfaces

On a rough surface (e.g. coarse plaster) measure against the centre of the illuminated area.

To avoid measuring to the bottom of plaster joints: Use target plate, 3M "Post-it" or board.

Transparent surfaces

To avoid measuring errors, do not measure towards colorless liquids (e.g. water) or (dust free) glass, styropor. or similar semi- permeable surfaces. For materials and liquids unfamiliar to you always take a trial measurement.

When aiming through panes of glass, of if there are several objects in the line-of-sight erroneous measurements can occur.

Wet, smooth or high-gloss surfaces

- 1 Aiming at a "Acute" angle deflects the laser beam. The DISTO[™] may receive a signal that is too weak (error message 255).
- 2 If aiming at a right angle, the DISTO[™] may receive a signal that is too strong (error message 256).

Inclined, round surfaces

Can be measured with the laser.

Requirement: There is enough area on the target surface for the laser spot.

Free-handed aiming

(approx. 20 - 40 m):

From about 30 m, use target plate 563875 (DIN C6) rsp. 723385 (DIN A4). Use a tripod, if required.

- White surface: to 30 m
- Brown surface: from 30 m on

Safety Instructions

The following directions should enable the person responsible for the DISTO[™], and the person who actually uses the instrument, to anticipateand avoid operational hazards.

The person responsible for the instrument must ensure that all users understand these directions and adhere to them.

Use of the instrument

Permitted use

The permitted use of the DISTO[™] are the following:

- Measuring distances
- Computing areas and volumes
- Storing measurements

Prohibited use

- Using the instrument without instruction
- Using outside the stated limits
- Deactivation of safety systems and removal of explanatory and hazard labels

- Opening of the equipment by using tools (screwdrivers, etc.), as far as not specifically permitted for certain cases
- Carrying out modification or conversion of the product
- Use after misappropriation
- Use of accessories from other manufacturers without the express approval of Leica Geosystems.
- Deliberate or irresponsible behaviour on scaffolding, when using ladders, when measuring near machines which are running, or near parts of machines or installations which are unprotected
- Aiming directly into the sun
- Deliberate dazzling of third parties; also in the dark
- Inadequate safeguards at the surveying site (e.g. when measuring on roads, etc.)

Prohibited use can lead to injury, malfunction, and material damage. It is the task of the person responsible for the instrument to inform the user about hazards and how to counteract them. The DISTO[™] is not to be operated until the user has been instructed.

Limits of use



See section "Technical Data"

Environment:

Suitable for use in an atmosphere appropriate for permanent human habitation. <u>Cannot be used in an aggressive or explosive environment</u>. Use in rain is permissible for limited periods.

Areas of responsibility

Responsibilities of the manufacturer of the original equipment Leica Geosystems AG, CH-9435 Heerbrugg (kurz Leica Geosystems):

Leica Geosystems is responsible for supplying the product, including the User Manual and original accessories, in a completely safe condition.

Responsibilities of the manufacturer of non-Leica accessories:

The manufacturers of non-Leica accessories for the DISTO™ are responsible for developing, implementing and communicating safety concepts for their products. They are also responsible for the effectiviness of these safety concepts in combination with the Leica Geosystems equipment.

Responsibilities of the person in charge of the instrument:

WARNING:

The person responsible for the instrument must ensure that the equipment is used in accordance with the instructions. This person is also accountable for the deployment of personnel and for their training and for the safety of the equipment when in use.

The person in charge of the instrument has the following duties:

- To understand the safety instructions on the product and the instructions in the User Manual.
- To be familiar with local safety regulations relating to accident prevention.
- To inform Leica Geosystems immediately if the equipment becomes unsafe.

Hazards in use

Important hazards in use

WARNING:

The absence of instruction, or the inadequate imparting of instruction, can lead to incorrect or prohibited use, and can give rise to accidents with far-reaching human, material and environmental consequences.

Precautions:

All users must follow the safety instructions given by the manufacturer and the directions of the person responsible for the instrument.

Watch out for erroneous distance measurements if the instrument is defective or if it has been dropped or has been misused or modified.

Precautions:

Carry out periodic test measurements. Particularly after the instrument has been subject to abnormal use, and before, during and after important measurements.

Make sure the DISTO $^{\rm TM}$ optics is kept clean and that there is no mechanical damage to the bumpers.

WARNING:

Insufficient securing or marking of your measurement site could cause a dangerous situation on the public highway, building site, or in the factory, etc.

Precautions:

Always ensure your measurement site is appropriately secured. Obey the local accident prevention regulations, and road safety rules, at all times.

CAUTION:

In using the instrument for distance measurements or for positioning moving objects (e.g. cranes, building equipment, platforms, etc.) unforeseen events may cause erroneous measurements.

Precautions:

Only use this product as a measuring sensor, not as a control device. Your system must be configured and operated in such a way, that in case of an erroneous measurement, malfunction of the device or power failure due to installed safety measures (e.g. safety limit switch), it is assured that no damage will occur.



WARNING:

Dispose of the equipment appropriately in accordance with the regulations in force in your country. Always prevent access to the equipment by unauthorized personnel.

CAUTION: 尒

Be careful when pointing a telescope towards the sun, because the telescope functions as a burning glass and can injure your eyes and/or cause damage inside the DISTO™

Precautions:

Do not point the telescopic viewer directly at the sun.

Laser classification

The DISTO[™] produces a visible laser beam which emerges from the front of the instrument.

It is a Class 2 laser product in accordance with:

- IEC60825-1 : 1993 "Radiation safety of laser products"
- EN60825-1 : 1994 "Radiation safety of laser products"

It is a Class II laser product in accordance with:

 FDA 21CFR Ch.I §1040 : 2001 (US Department of Health and Human Service, Code of Federal Regulations)

Laser Class 2/ II products:

Do not stare into the laser beam or direct it towards other people unnecessarily. Eye protection is normally afforded by aversion responses including the blink reflex.

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WARNING:

Looking directly into the beam with optical aids (e.g. binoculars, telescopes) can be hazardous.

Precautions:

Do not look directly into the beam with optical aids.



Looking into the laser beam may be hazardous to the eyes.

Precautions:

Do not look into the laser beam. Make sure the laser is aimed above or below eye level. (particularly with fixed installations, in machines, etc.)

WARNING:

Looking right at the reflected laser beam in a DISTO operated with telescopic viewfinder could be dangerous when you aim at areas that reflect like a mirror, or emit reflections unexpectedly (e.g. a mirror, metallic surfaces, windows, prisms, liquids).

Precautions:

If you are using a telescopic viewfinder, do not aim at areas that are reflective like a mirror, or which could produce unintended reflections (e.g. mirrors, metallic surfaces, windows, prisms).

Electromagnetic Compatibility(EMC)

The term "electromagnetic compatibility" is taken to mean the capability of the DISTO™ to function smoothly in an environment where electromagnetic radiation and electrostatic discharges are present, and without causing electromagnetic interference to other equipment.

WARNING:

Electromagnetic radiation can cause interference in other equipment.

Although the DISTO[™] meets the strict regulations and standards which are in force in this respect, Leica Geosystems cannot completely exclude the possibility that interference may be caused to other equipment.

FCC statement (applic. in U.S.)

WARNING:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- · Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

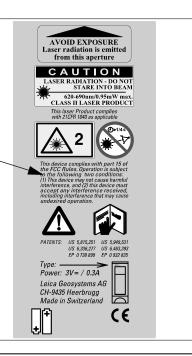
Consult the dealer or an experienced radio/TV technician for help.

WARNING:

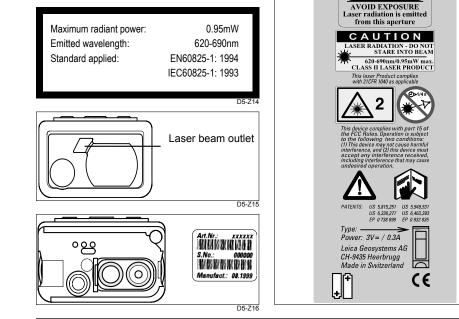
Changes or modifications not expressly approved by Leica Geosystems for compliance could void the user's authority to operate the equipment.

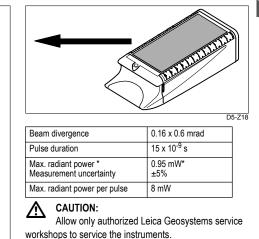
Product labelling:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.



Labelling





Leica DISTO™ special⁵ 1.0.0 en

17

D5-717

Technical Data

Measuring accuracy	
Measuring accuracy (2x standard deviation) DISTO™ special ⁵	typ.: ± 1,5mm / max.: ± 3mm*
Smallest unit displayed	1mm**
Range (from about 30m, use	
target plate)	0.2m up to 200 m * **
Time for a measurement dist / tro	
Ø Laser spot (at distance)	6 / 30 / 60 mm (10 / 50 / 100 m)
Illumination	1
Multiline display	1
Multifunctional bumper	1
Time delay release	1
Pocket calculator	1
Tracking	1
Constant	10 values
min./ max. Tracking.	1
Pythagoras	1
Mermory (Stack)	15 Werte
Battery, Type AA, 2x 1.5V	up to 10'000 measurements (only with Alkaline batteries!)
Splash and dust proof	IP54 acc. IEC529: splash proof, dust proof
Dimension	172 x 73 x 45 mm
Measuring accuracy of bubble	1°
Temperature range	
Storage	-25°C to +70°C
Operating	(-13°F to +158°F) -10°C to +50°C
oporag	(-14°F to +122°F)

Message Codes

Error message



appears beside the message number on the display.

Message Code	Cause	Remedy
203	Wrong sequence with Pythagoras meas.	Carry out measurement in correct sequence
204	Calculation error	Repeat procedure
252	Temperature too high, above 50°C (measuring)	Cool down instrument
253	Temperature too low, below -10°C (measuring)	Warm up instrument
255	Receiver signal too weak, measurement time too long, distance <200 mm	Use target plate measurement time >10 sec.
256	Received signal too powerful	Use target plate (correct side)
257	Wrong measurement, ambient brightness too high	Use target plate
260	Laser beam interrupted	Repeat measurement
	All other messages	Call service "System"

18

In case of this message switch on/off instrument several times and check if message is still displayed. Then call service and specify the message displayed.

Care

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Look after the optical surfaces with the same care that you would apply to spectacles, cameras and field glasses.

Maximum deviation occurs under unfavorable conditions, such as in bright sunlight or when measuring to inadequately reflecting surfaces. For distances over 30m-without using a target plate- themaximum deviation may increase by ± 0.1 mm/m to maximum ± 10 mm. For more information, refer to

www.disto.com.

** As of 100m the measuring units are displayed in cm.

All illustrations, descriptions and technical specifications are subject to change without prior notice. Leica Geosystems AG, Heerbrugg, Switzerland has been certified as being equipped with a quality system which meets the International Standards of Quality Management and Quality Systems (ISO standard 9001) and Environmental Management Systems (ISO standard 14001).



Total Quality Management - Our commitment to total customer satisfaction

Ask your local Leica Geosystems agent for more information about our TQM program.

Pat. No.

٠	US 5,815,251
•	US 5,949,531
•	US 6,336,277
•	US 6,463,393
•	EP 0738 899
•	EP 0932 835



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