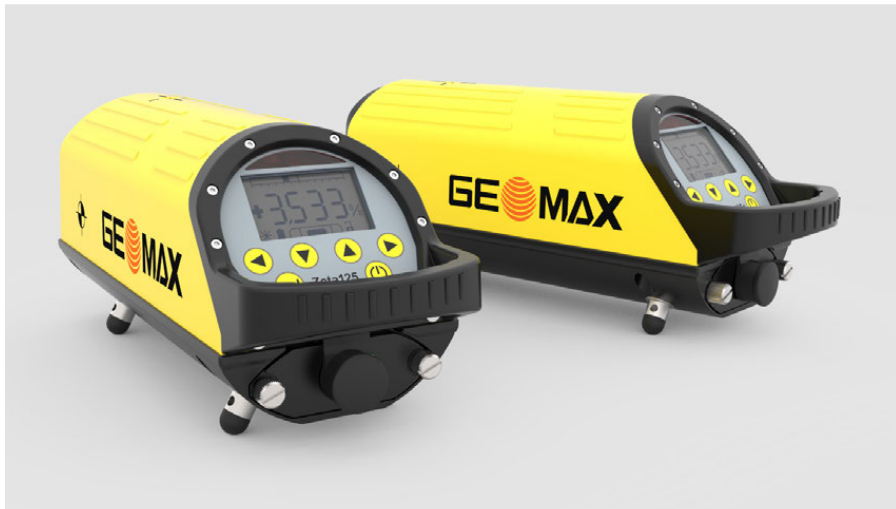


QBL/GeoMax Arrow4/Arrow4s



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GE  **MAX**

User Manual
Version 1.0

Introduction

About the instrument

The Arrow4 pipe laser is built to withstand the harsh environment of the construction site.

The integrated Li-Ion battery with internal charge control provides a long operating time. The battery can be recharged in the instrument. The battery can be recharged while the instrument is working.

The functional range makes it easy to use and quick to align desired slope for all pipe laying applications. The laser offers a large grade setting from – 10% to + 40%. The line control adjustment can be done with the remote control even at far distances.

The Arrow4s version has an automatic cross axis levelling and an extra scan beam for aligning and to orientate the laser beam direction.

The auto target helps aligning the Arrow4s.

The auto target can be placed in a pipe or on a grade rod, post or pole outside of the trench. In order to align the Arrow4s, the auto target is set up at the opposite side of the pipe. After pressing the auto alignment button, the laser beam of the Arrow4s automatically aligns to the position of the auto target.



This manual contains important safety directions as well as instructions for setting up the product and operating it. Refer to "1 Safety Directions" for further information.

Read carefully through the User Manual before you switch on the product.

Available Documentation

Name	Description
User Manual	All instructions required in order to safely operate and handle the product throughout its life cycle can be found here.



Read and follow the User Manual before using the product.



Keep all documentation for future reference!

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Table of Contents

In this manual	Chapter	Page
	1 Safety Directions	6
	1.1 General	6
	1.2 Definition of Use	8
	1.3 Limits of Use	9
	1.4 Responsibilities	10
	1.5 Hazards of Use	11
	1.6 Laser Classification	15
	1.7 Electromagnetic Compatibility EMC	19
	1.8 FCC Statement, Applicable in U.S.	21
	2 Container Contents	24
	3 Product Overview	25
	3.1 Batteries	27
	3.1.1 Operating Principles	27
	3.1.2 Changing the Battery	28
	3.1.3 Charging the Battery	31
	3.2 Basic Handling	32
	3.3 Remote Control	42

4	Menu	45
5	Auto Target	51
5.1	Product Overview	52
5.2	Changing the Battery	58
5.3	Basic Handling	59
5.3.1	Turning On / Turning Off	59
5.3.2	Auto Alignment Procedure	61
5.4	Troubleshooting	63
6	Care and Transport	65
6.1	Maintenance	65
6.2	Transport	66
6.3	Storage	66
6.4	Cleaning and Drying	67
7	Technical Data	68
7.1	Technical Data	68
7.2	Conformity to National Regulations	71

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1 Safety Directions

1.1 General

Description




The following directions enable the person responsible for the product, and the person who actually uses the equipment, to anticipate and avoid operational hazards.


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

Symbols

The symbols used in this manual have the following meanings:

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Type	Description
 DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
 WARNING	Indicates a potentially hazardous situation or an unintended use which, if not avoided, could result in death or serious injury.
 CAUTION	Indicates a potentially hazardous situation or an unintended use which, if not avoided, may result in minor or moderate injury.

Type	Description
NOTICE	Indicates a potentially hazardous situation or an unintended use which, if not avoided, may result in appreciable material, financial and environmental damage.
	Important paragraphs which must be adhered to in practice as they enable the product to be used in a technically correct and efficient manner.

1.2 Definition of Use

Intended use

- Remote control of product.
 - The instrument projects a collimated beam of laser light for the purposes of alignment of gravity flow pipelines.
 - The laser beam can be detected by viewing it on an opaque red target.
-

Reasonably foreseeable misuse

- Use of the product without instruction.
 - Use outside of the intended use and limits.
 - Disabling safety systems.
 - Removal of hazard notices.
 - Opening the product using tools, for example screwdriver, unless this is permitted for certain functions.
 - Modification or conversion of the product.
 - Use after misappropriation.
 - Use of products with recognisable damages or defects.
 - Use with accessories from other manufacturers without the prior explicit approval of GeoMax.
 - Inadequate safeguards at the working site.
 - Controlling of machines, moving objects or similar monitoring application without additional control- and safety installations.
-

1.3 Limits of Use

Environment

Suitable for use in an atmosphere appropriate for permanent human habitation: not suitable for use in aggressive or explosive environments.



DANGER

Local safety authorities and safety experts must be contacted before working in hazardous areas, or close to electrical installations or similar situations by the person in charge of the product.



The following advice is only valid for battery charger, power adapter and car adapter.

Environment

Suitable for use in dry environments only and not under adverse conditions.



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1.4 Responsibilities

Manufacturer of the product

GeoMax is responsible for supplying the product in a safe condition. This includes the product documentation and original accessories.

Person responsible for the product

The person responsible for the product has the following duties:

- To understand the safety instructions on the product and the instructions in the user manual.
 - To ensure that it is used in accordance with the instructions.
 - To be familiar with local regulations relating to safety and accident prevention.
 - To inform GeoMax immediately if the product and the application becomes unsafe.
 - To ensure that the national laws, regulations and conditions for the operation of e.g. radio transmitters or lasers are respected.
-

1.5 Hazards of Use



CAUTION

Watch out for erroneous measurement results if the product has been dropped or has been misused, modified, stored for long periods or transported.

Precautions:

Periodically carry out test measurements and perform the field adjustments indicated in the user manual, particularly after the product has been subjected to abnormal use and before and after important measurements.



WARNING

Inadequate securing of the working site can lead to dangerous situations, for example in traffic, on building sites, and at industrial installations.

Precautions:

Always ensure that the working site is adequately secured. Adhere to the regulations governing safety and accident prevention and road traffic.



CAUTION

If the accessories used with the product are not properly secured and the product is subjected to mechanical shock, for example blows or falling, the product may be damaged or people can sustain injury.

Precautions:

When setting-up the product, make sure that the accessories are correctly adapted, fitted, secured, and locked in position.

Avoid subjecting the product to mechanical stress.

**WARNING**

During the transport, shipping or disposal of batteries it is possible for inappropriate mechanical influences to constitute a fire hazard.

Precautions:

Before shipping the product or disposing of it, discharge the batteries by running the product until they are flat.

When transporting or shipping batteries, the person in charge of the product must ensure that the applicable national and international rules and regulations are observed. Before transportation or shipping contact your local passenger or freight transport company.

**WARNING**

High mechanical stress, high ambient temperatures or immersion into fluids can cause leakage, fire or explosions of the batteries.

Precautions:

Protect the batteries from mechanical influences and high ambient temperatures. Do not drop or immerse batteries into fluids.

**WARNING**

If battery terminals are short circuited e.g. by coming in contact with jewellery, keys, metalized paper or other metals, the battery can overheat and cause injury or fire, for example by storing or transporting in pockets.

Precautions:

Make sure that the battery terminals do not come into contact with metallic objects.



The following advice is only valid for battery charger, power adapter and car adapter.



WARNING

If you open the product, either of the following actions may cause you to receive an electric shock.

- Touching live components
- Using the product after incorrect attempts were made to carry out repairs

Precautions:

Do not open the product. Only GeoMax authorised service workshops are entitled to repair these products.

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**WARNING**

If the product is improperly disposed of, the following can happen:

- If polymer parts are burnt, poisonous gases are produced which may impair health.
- If batteries are damaged or are heated strongly, they can explode and cause poisoning, burning, corrosion or environmental contamination.
- By disposing of the product irresponsibly you may enable unauthorised persons to use it in contravention of the regulations, exposing themselves and third parties to the risk of severe injury and rendering the environment liable to contamination.

Precautions:

The product must not be disposed with household waste. Dispose of the product appropriately in accordance with the national regulations in force in your country. Always prevent access to the product by unauthorised personnel.

Product-specific treatment and waste management information can be received from your GeoMax dealer.

1.6 Laser Classification

General

The following chapters provide instructions and training information about laser safety according to international standard IEC 60825-1 (2014-05) and technical report IEC TR 60825-14 (2004-02). The information enables the person responsible for the product and the person who actually uses the equipment, to anticipate and avoid operational hazards.



According to IEC TR 60825-14 (2004-02), products classified as laser class 1, class 2 and class 3R do not require:

- laser safety officer involvement,
- protective clothes and eyewear,
- special warning signs in the laser working area

if used and operated as defined in this User Manual due to the low eye hazard level.



National laws and local regulations could impose more stringent instructions for the safe use of lasers than IEC 60825-1 (2014-05) and IEC TR 60825-14 (2004-02).

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General

The laser source built into the product produces a visible laser beam which emerges from the laser aperture.

The laser product described in this section is classified as laser class 3R in accordance with:

- IEC 60825-1 (2014-05): "Safety of laser products"

Direct intrabeam viewing may be hazardous (low eye hazard level), in particular for deliberate ocular exposure. The beam may cause dazzle, flash-blindness and after-images, particularly under low ambient light conditions. The risk of injury for laser class 3R products is limited because of:

- a) unintentional exposure would rarely reflect worst case conditions of (e.g.) beam alignment with the pupil, worst case accommodation,
- b) inherent safety margin in the maximum permissible exposure to laser radiation (MPE)
- c) natural aversion behaviour for exposure to bright light for the case of visible radiation.

Description	Value
Maximum average radiant power	<5 mW, Class 3R
Pulse duration	Continuous wave
Pulse repetition frequency	n.a.
Wavelength	639 nm
Beam divergence	9 mrad (parallel) x 21 mrad (perpendicular)
NOHD (Nominal Ocular Hazard Distance) @ 0.25 s	Meets class 3R laser source specifications

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CAUTION

From a safety perspective, class 3R laser products should be treated as potentially hazardous.

Precautions:

- 1) Prevent direct eye exposure to the beam.
- 2) Do not direct the beam at other people.



CAUTION

Potential hazards are not only related to direct beams but also to reflected beams aimed at reflecting surfaces such as prisms, windows, mirrors, metallic surfaces, etc.

Precautions:

- 1) Do not aim at areas that are essentially reflective, such as a mirror, or which could emit unwanted reflections.
- 2) Do not look through or beside the optical sight at prisms or reflecting objects when the laser is switched on, in laser pointer or distance measurement mode. Aiming at prisms is only permitted when looking through the telescope.

Labelling



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1.7 Electromagnetic Compatibility EMC

Description

The term Electromagnetic Compatibility is taken to mean the capability of the product to function smoothly in an environment where electromagnetic radiation and electrostatic discharges are present, and without causing electromagnetic disturbances to other equipment.



WARNING

Electromagnetic radiation can cause disturbances in other equipment.

Although the product meets the strict regulations and standards which are in force in this respect, GeoMax cannot completely exclude the possibility that other equipment may be disturbed.



CAUTION

There is a risk that disturbances may be caused in other equipment if the product is used with accessories from other manufacturers, for example field computers, personal computers, two-way radios, non-standard cables or external batteries.

Precautions:

Use only the equipment and accessories recommended by GeoMax. When combined with the product, they meet the strict requirements stipulated by the guidelines and standards. When using computers and two-way radios, pay attention to the information about electromagnetic compatibility provided by the manufacturer.

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**CAUTION**

Disturbances caused by electromagnetic radiation can result in erroneous measurements.

Although the product meets the strict regulations and standards which are in force in this respect, GeoMax cannot completely exclude the possibility that the product may be disturbed by intense electromagnetic radiation, for example, near radio transmitters, two-way radios or diesel generators.

Precautions:

Check the plausibility of results obtained under these conditions.

**CAUTION**

If the product is operated with connecting cables attached at only one of their two ends, for example external supply cables, interface cables, the permitted level of electromagnetic radiation may be exceeded and the correct functioning of other products may be impaired.

Precautions:

While the product is in use, connecting cables, for example product to external battery, product to computer, must be connected at both ends.

1.8 FCC Statement, Applicable 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 the 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 GeoMax for compliance could void the user's authority to operate the equipment.

Labelling

Type: Zeta125s
Art.No.: 829480
Power: 10.8V^{nom} / 2.7A
S.No.:

CE Manufactured for
 GeoMax AG
 CH-9443 Widnau
 Made in the USA

GE MAX

acc. to IEC 60825-1:2014 / A = 620-690nm, P = <1mW, t = 1x10⁻⁵s
 Complies with FDA performance standards for laser products
 except for deviations pursuant to Laser Notice Nr. 50 July 24, 2007
 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.

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Labelling

Type: Remote target for Zeta pipe laser
Art.No.: 829483
Power: 6V^{nom}

CE

GE MAX Manufactured for
 GeoMax AG
 CH-9443 Widnau
 Made in the USA

008383_001

Labelling

Type: ZRC 125/150
Art.No.: 829482
Manufactured for
GeoMax AG
CH-9443 Widnau
Made in the USA



GEOMAX



008384_001

Labelling

Type: Li-Ion battery pack
Li-Ion Battery
Art.No.: 821886
10.8V ~ / 2.75Ah
12A / 29Wh
S.No.:
Made in the USA



3ICR19/66

GEOMAX

Manufactured for
GeoMax AG
CH-9443 Widnau



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.

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2 Container Contents

Container for instrument

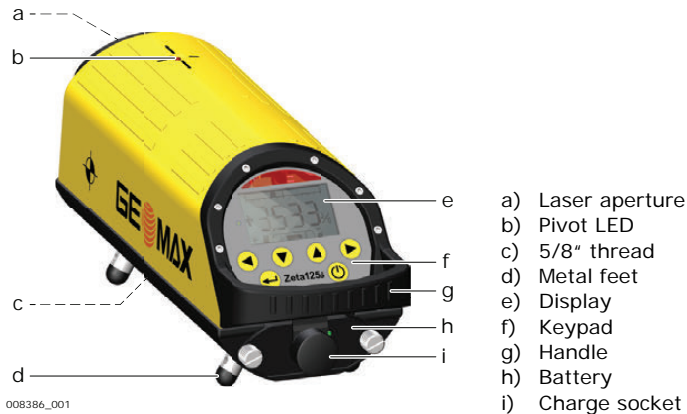


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- a) Instrument
- b) Universal target for 150/200/250 mm pipes
- c) Auto Target
- d) Charger
- e) Leg depot
- f) Manual
- g) Target plate insert for universal target
- h) Spare battery
- i) Clip-in target plate for 125 mm pipes
- j) Remote control
- k) Universal compartment: Manuals, spare cables, target plate etc.







3 Product Overview

Instrument components



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Keypad

Key	Description
	Left arrow key
	Down arrow key
	Up arrow key
	Right arrow key
	Enter key
	ON/OFF key

3.1 Batteries

3.1.1 Operating Principles

First-time use / Charging batteries

- The battery must be charged prior to using it for the first time.
- The permissible temperature range for charging is between 0°C to +40°C/ +32°F to +104°F. For optimal charging, we recommend charging the batteries at a low ambient temperature of +10°C to +20°C/+50°F to +68°F if possible.
- It is normal for the battery to become warm during charging. Using the chargers recommended by GeoMax, it is not possible to charge the battery if the temperature is too high.
- For Li-Ion batteries, a single refreshing cycle is sufficient. We recommend carrying out a refreshing cycle when the battery capacity indicated on the charger or on a GeoMax product deviates significantly from the actual battery capacity available.

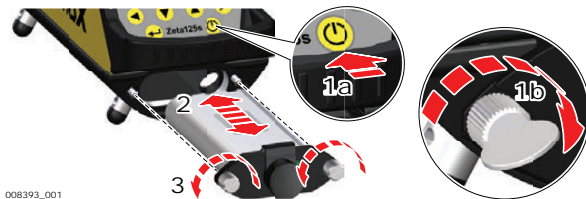
Operation / Discharging

- The batteries can be operated from -20°C to +55°C/-4°F to +131°F.
- Low operating temperatures reduce the capacity that can be drawn; high operating temperatures reduce the service life of the battery.



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3.1.2 Changing the Battery

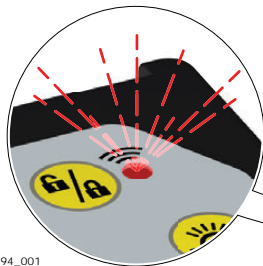
Insert and remove the battery of the Arrow4



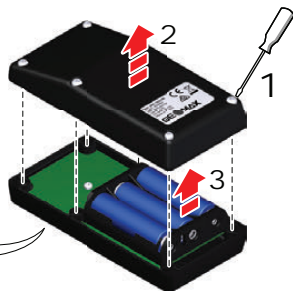
008393_001

Step	Description
1.	Turn off the laser and remove the two screws from the battery pack with a coin for example. The screws are captive at the battery pack to avoid losing them.
2.	Insert the new battery pack.
3.	Pull the screws tight. Otherwise water can come into the battery case and can damage the battery.
	To turn on the Arrow4 after long time storage without battery pack: Reinsert the battery pack and press the ON/OFF key  for approximately 3 seconds.



Insert and remove the battery of the remote control




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Step	Description
	If the LED on the remote control is flashing red while sending, the batteries are low.
1.	Loosen the six screws on the back case of the remote control to open the battery housing.
2.	Take the back case.
3.	Replace the batteries.
	Always use three new batteries size AA (LR6) of the same type.

Step	Description
	Do not mix new and old batteries. Mixing old and new batteries decreases the battery lifetime.
4.	Check <ul style="list-style-type: none">• the correct position of the back case.• that the back case is free from dirt.
5.	Close the housing and tighten the six screws to make sure that the remote control is waterproof.

3.1.3 Charging the Battery

Charge internal battery

The instrument has integrated rechargeable batteries.







To operate the instrument in case of an empty battery: Use the optionally available battery cable to connect the charge socket of the instrument with a 12 V car battery.

Step	Description
1.	Connect the charger to an AC outlet.
2.	Remove the protection cap onto the charge socket of the Arrow4.
3.	Attach the plug to the charge socket of the Arrow4.
4.	Plug the power cord into an external power supply. Charging starts.
	The charge LED right of the charge socket on the battery pack is <ul style="list-style-type: none">• red while charging is in progress.• green when charging is completed.
	The charging procedure stops automatically when the maximum charge is reached. The maximum charging time is five hours.
5.	After charging is completed, always place the protection cap onto the charge socket of the Arrow4 to protect it from dirt.

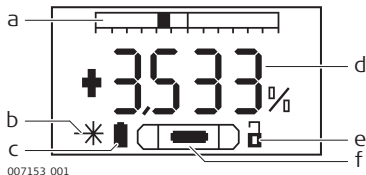
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3.2 Basic Handling

Turning on

Step	Description	
1.	Press the ON/OFF key  .	
2.	Each time the laser is switched on, the battery power level is tested. The display shows the start-up screen first and then the capacity of the battery.	   <small>008396_001</small>
3.	After initialising the laser beam automatically, the system moves to the last entered grade.	
4.	A flashing laser beam symbol indicates the active self levelling. When the symbol is lit, the laser is levelled and the laser beam is continuously on.	







Display









- a) Line control laser position
- b) Laser beam status
- c) Battery status
- d) Electronic vial
- e) Key lock status
- f) Laser beam grade

Entering a grade

Refer to "4 Menu" for instructions how to set the entry format to percent or per mil.

Step	Description
1.	 Press the Enter key  on the keypad.
2.	  Use the right/left arrow key to set the position of the comma.
3.	 Press the Enter key  to confirm the position of the comma

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Step	Description
4.	<p>Set positive/negative grade. Select and set individual digits for grade values:</p> <p>  Use the right/left arrow key to select the digit that must be changed.</p> <p>  Use the up/down arrow key to change the value.</p>
5.	<p> Press the Enter key  to confirm the setting. The laser adjusts to the setting entered.</p>

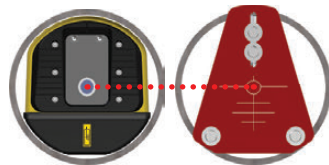
Setup preparation

Use in large diameter or water bearing pipes

Unscrew the standard 150 mm feet extensions and screw on the optional available base feet extensions.

Use in pipes with 125 mm diameter

Place the laser without metal feet and with the optional clip-in target plate.



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Use with standard, fixed target

Use the same base feet extensions for the laser and the target plate.

Use with universal target

Step	Description
1.	Adjust the target plate to the pipe diameter.
2.	Move the target plate in the base until the mark is on the line of the feet length mounted at the laser.
3.	Tighten the target plate in place.

150 mm diameter:



200 mm diameter:



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**250 mm
diameter:**



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Setup

Step	Description
1.	Set up the laser in the pipe at the front side.
2.	Align the cross axis using the electronic level vial shown in the display.
3.	For Arrow4: Wait until the electronic level vial moves to the middle position. The cross axis is aligned automatically.
4.	Place the target at the opposite side of the pipe. Align the target with the level vial.
5.	Adjust the line direction using the remote control. Refer to "Keys".
6.	Move the pipe to the correct height and direction. When the beam is in the target sign the pipe is in the desired slope.

Aligning the laser line to the target

Press the corresponding arrow key on the laser or on the remote control. The beam movement starts slowly and increases in speed while an arrow key is pressed.



On the remote control: The direction of the arrow keys corresponds to the direction of the line movement when the remote control is used from the target side. If the remote control is used from the display side of the laser, the azimuth direction is opposite the arrow direction.



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Refer to "3.3 Remote Control" for a detailed description of the remote control.

**Laser beam
flashing
frequency**

Type	Description	To do
_____ Permanently on	Levelling finished Grade value reached	Adjust the pipe
— — — — — Flashing constantly	Laser is levelling Laser symbol is flashing	Wait until level is reached
— — — — — — — 2 x short	Cross Axis Warning Angle error too large	Adjust laser position to the level vial
	Levelling range exceeded (+/-END)	Change inclination of the laser until END disappears
. Flashing fast	Aligning function	After ending this mode the laser switches to normal function

Laser beam unstable and spot size changing

Refraction can be the reason for:

- an unstable laser beam on the target.
- changes in the laser spot size.

Air turbulence in the pipe cause refraction. The effect occurs particularly, when a wet or cold pipe is heated up quickly through the sunlight. The rising air deflects the laser beam and causes a flicker.



Ventilate the pipe or place laser and target temporarily on top of the pipe. When the pipe is dry or heated up to the ambient level, the laser spot is stable again.

Resetting

Line control adjustment - right/left movement

Press the right and left arrow keys on the keypad simultaneously for 2 seconds. The laser beam moves back to the centre position automatically.



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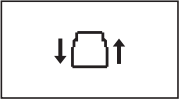
Entered gradient to 0.000%

Press the up and down arrow keys simultaneously.



Warning messages

Possible warning messages, their reasons and necessary actions are:

Warning message	Description	To do
 <p data-bbox="372 366 438 377">007168_001</p>	Self-levelling range exceeded	Change the tilt of the laser as shown in the display until warning message disappears. Self levelling starts again automatically.
<p data-bbox="380 415 583 477">— — — — — —</p> <p data-bbox="372 498 637 555">Laser beam flashing 2 x short AND</p>  <p data-bbox="372 698 438 708">007169_001</p>	Cross axis range exceeded Example: Rotating the pipe while working.	Move the instrument so that the level vial in the instrument display is in middle position. Refer to "SETTINGS menu" for information on turning on/off the warning.
Service	Service Display 1500 h operating hours are reached.	Contact your service centre for checking the laser. The instrument can be used unrestricted in the meantime.

Warning message	Description	To do
Error 0	Data Error The instrument turns off automatically.	1) Turn laser off and on again. 2) Check calibration. 3) If the message appears again, contact your service centre.

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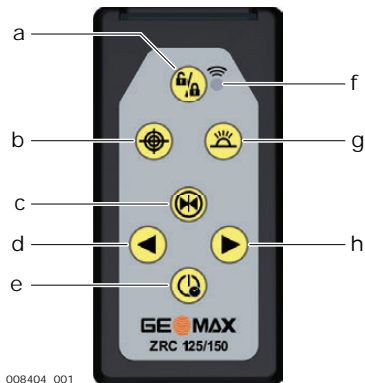
3.3 Remote Control

Functions of the remote control

The laser can be used with the remote control.

LED and Keypad on the remote control

Diagram







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- a) Key lock function
- b) Auto alignment function
- c) Line control adjustment (up movement in calibration mode)
- d) Left arrow key
- e) Sleep mode (down movement in calibration mode)
- f) LED
- g) Key for Pivot LED (on the Zeta125)
- h) Right arrow key




LED on the Remote Control

Status	Description
LED is flashing green	A key on the remote control is pressed.
LED is flashing red	The batteries of the remote control are low.

Keys








Key	Description
	Use the left and right arrow keys for line control adjustment. The direction of the beam travel corresponds to the arrows, when the remote control is used from the target side.
	To reset the line control adjustment, press this key for 2 seconds. The laser beam automatically moves back to the centre position.
	Press this key to put the laser into sleep mode. The display shows SLEEP and the laser turns off. This saves power consumption. Press the key again to turn on the laser. All settings remain the same as when the unit was put into sleep mode.
	Press this key to activate the key lock function: The display shows a lock symbol. All keys on the remote control and on the laser are locked. Locked keys avoid unintentional change when the laser is in use. To deactivate the function press the lock key again.

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Key	Description
	<p>Press this key to turn on the Pivot LED on the upper housing of the instrument. The LED is used for correct alignment outside of the manhole. The LED automatically turns off after one minute.</p>
	<p>Alignment function: This function is used to align the laser beam above the pipe trench.</p> <p>Arrow4: The laser beam moves to the maximum upper position. In this mode the laser beam flashes fast to avoid unintentional use. Use the up and down arrow keys to adjust the height of the laser beam. These keys can stop the upward movement of the beam, if the height of the measuring rod is reached earlier.</p> <p>Arrow4: Press the key to turn on the second laser scan beam.</p> <p>The beam position can now be aligned manually or with the right/left arrow keys. Press the key again to leave the mode.</p> <p> Remark for Arrow4 without automatic cross axis levelling: While aligning, take care that the cross axis is levelled with the level vial in the display.</p>

4 Menu

Access to the SET UP Menu

Step	Description
	Notice: The SET UP menu can also be accessed by using the keys on the remote control. The functions on the remote control are the same and the lock key  on the remote control corresponds to the Enter key  on the laser keypad.
1.	Set the grade of the laser to 0.000% and turn off the laser.
2.	Turn the laser on again. The start screen appears and the state of the battery is displayed.
3.	Press the up arrow key  and Enter key  simultaneously until the SET UP screen appears.
	The active menu step is highlighted and > is displayed in front of the line.
4.	Press  to open the menu option.



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INFO menu

This screen shows:

- the software version,
- the working hours of the instrument and
- internal adjustment values for authorised service centres.


All fields are display only fields.

Next step

Press  to return to the **SET UP** menu.


SETTINGS menu
Cross warning settings

The settings on this screen define the behaviour of the cross axis warning. Refer to "Warning messages" for a description of the warning.

Option	Description
ON	Press  to change between ON and OFF . To activate the cross axis warning. The laser beam shortly flashes two times when the cross axis position is out of self-levelling range.
OFF	To deactivate the cross axis warning. The laser beam stays on continuously, even when the cross axis position is out of self-levelling range.


Units display settings

The settings on this screen define the units displayed.

Option	Description
PRC	Press  to change between PRC and PRM .
PRM	Percent
PRM	Per mil

Next step

EN

Step	Description
1.	Move the cursor to EXIT .
2.	Press  to return to the SET UP menu.

CALIBRATION menu


The settings on this screen change the adjustment of the laser.

Responsibilities and operation

The user can calibrate the instrument. Carry out the calibration attentively and carefully. The user takes full responsibility for failures at measurements and/or consequential damages through wrong calibration.

If you feel unsure about doing the calibration, contact your authorised dealer or GeoMax.




Test to see if a horizontal calibration is required

Step	Description
1.	Define a horizontal 60 m distance between a reference point and target point.  Defining a horizontal distance using an optical level: In a distance of 30 m from the level, define a reference point by a yardstick. Turn the level by 180 degrees. Define a target point in a distance of 30 m from the level.
2.	Place the laser at 0.000% at the reference point.
3.	Measure the height difference between the reference and the target point. Write down the value.
4.	Move the laser beam to the target point.

Step	Description
5.	Measure the height difference between the target and the reference point. Write down the value.
6.	Subtract the values for the two height differences. Over a distance 60 m, the result must be less than 3 mm.
7.	If the value is larger, repeat step 2. to 6. to make sure that the measuring points are correct.
8.	If the failure is reproducible, calibrate the laser. Run through the steps in the next table.

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Calibration


Step	Description
	The calibration has to be done by a qualified authority.
	Place the pipe laser on a horizontally aligned base.
1.	Press  to select MAIN AXIS . WAIT is displayed.
2.	Wait until SET is displayed.

Step	Description
3.	Use the arrow up and down keys on the remote control to change the calibration value. The height of the laser beam changes with the calibration value.
4.	Wait until SET is displayed.
5.	Repeat step 3. and 4. if necessary.
6.	<ul style="list-style-type: none"> • To save the position: Press the lock symbol on the remote control. • To leave the calibration mode without storing the change: Turn off the laser.

SERVICE menu

The SERVICE menu is PIN protected. The menu is only accessible by authorised service centres.

Next step

Step	Description
1.	Move the cursor to EXIT .
2.	Press the Enter key  to return to the SET UP menu.

5 Auto Target

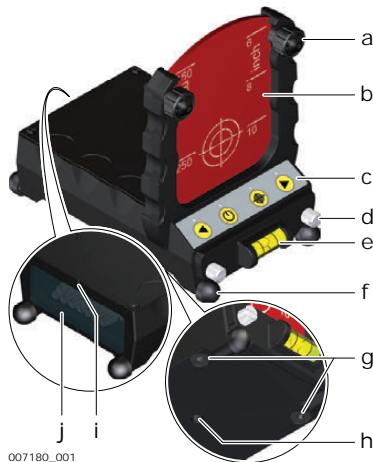
Proper use

The instrument is for aligning pipes in the desired direction and the grade. The unit is unsuitable for different application and does not function as intended with non-approved modifications or accessories. Opening the instrument (except exchanging the battery) or making any other modifications does adversely affect the intended function.

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5.1 Product Overview

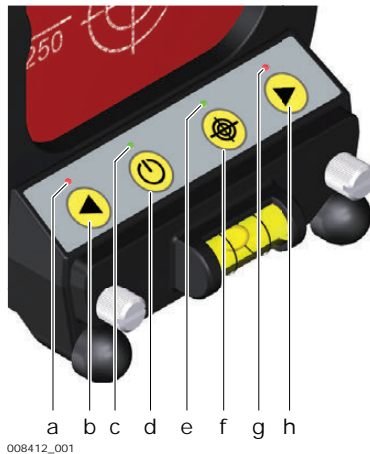
Instrument components



007180_001

- a) Secure Knob for pipe target
- b) Pipe target
- c) Keypad
- d) Secure Knobs for battery compartment
- e) Level vial
- f) Rubber feet
- g) Screws for pipe target holder
- h) 1/4" thread
- i) Laser reception field
- j) IR transmission field

Keypad













008412_001






- a) Left LED (red)
- b) Left arrow key
- c) ON/OFF LED (green)
- d) ON/OFF key
- e) Auto alignment LED (green)
- f) Auto alignment key
- g) Right LED (red)
- h) Right arrow key

EN






Functions of the keys



Key	Description
	When facing the laser: Moves the laser beam to the left.
	Switches the auto target on or off.
	Starts the auto alignment function.
	When facing the laser: Moves the laser beam to the right.
 + 	Switches between narrow mode and wide mode .
 + 	Starts the detector mode.
 + 	Starts the detector mode.

LED indicators

LED	Description	
<p>Left LED (red):</p>  <p>008420_001</p>	Flashing	The auto target has received the rotating laser beam on the left side of the reception field, and the auto alignment is starting in narrow mode.
<p>ON/OFF LED (green):</p>  <p>008421_001</p>	Solid	The auto target is on. Auto alignment is not running yet, or has been successfully finished.
<p>Auto alignment LED (green):</p>  <p>008422_001</p>  <p>008423_001</p>	Solid Flashing	Auto alignment is running and seeking the centre of the auto target in narrow mode. Auto alignment is running and seeking the auto target in wide mode.
<p>Right and left (red):</p>  <p>008424_001</p>	Solid	Auto target is in wide mode.

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LED	Description	
 <p>008425.001</p>	Flashing	Auto target has timed out.
<p>Left (red) and ON/OFF LED (green):</p>  <p>008426.001</p>	Solid	In laser receiver mode: The rotating laser beam is to the left of the centre.
<p>Right (red) and ON/OFF (green):</p>  <p>008427.001</p>	Solid	In laser receiver mode: The rotating laser beam is to the right of the centre.
<p>Indication for a second after power-on:</p>  <p>008428.001</p>  <p>008429.001</p>	-	Battery level: 25% Battery level: 50%

LED	Description	
 <p data-bbox="372 220 452 234">008430_001</p>	-	Battery level: 75%
 <p data-bbox="372 329 452 342">008431_001</p>	-	Battery level: 100% Power off

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5.2 Changing the Battery

Insert and remove the batteries

The auto target is powered by 4 AA Alkaline batteries.



008432_001

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Step	Description
1.	Remove the two screws from the battery compartment with a coin for example. The screws are captive at the battery pack to avoid losing them.

Step	Description
2.	Remove or change the batteries.
3.	Close the battery compartment and pull the screws tight.

5.3 Basic Handling

5.3.1 Turning On / Turning Off

Turning on

To turn on the auto target, press the ON/OFF key .

The LED's light up for a second to indicate the remaining battery power. Refer to **LED indicators**.

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Handling

The auto target can be used with three different modes:

- **narrow mode:** auto alignment with a narrow reception field ($\pm 3^\circ$),
- **wide mode:** auto alignment with a wide reception field ($\pm 6^\circ$)
- **detector mode**




The **narrow mode** is faster than the **wide mode**. Align the auto target with $\pm 3^\circ$ to the centre of the auto target.

Switching between narrow mode and wide mode

Step	Description
1.	Press the ON/OFF key  to power down the auto target.
2.	With the auto target powered down, press and hold the  auto alignment key and at the same time turn on the auto target.
3.	Release both, the ON/Off key  and the  auto alignment key at the same time.
4.	Once the auto target is on: If the two outside red LEDs are lit solid, the auto target is in wide mode. If the two outside red LEDs are not lit, the auto target is in narrow mode. The auto target starts with the mode that was activated last.

Detector mode

With the detector mode you can use the auto target like a typical detector. To enter the detector mode:

With the auto target powered down, press and hold the ON/OFF key  and the left arrow key  or right arrow key .

5.3.2 Auto Alignment Procedure

Step 1

Auto target in pipe

Attach the auto target to the optional bracket, which allows you to put it onto a grade rod, post, stake or pole. Be sure not to move the auto target during the auto alignment procedure. It is best to use a ranging pole support or bi-pod to fix the post or pole during the alignment procedure. You do not need the red target plate.

Align the Arrow4s manually, $\pm 3^\circ$ for narrow mode or $\pm 6^\circ$ for wide mode, into the direction of the auto target.

Narrow Mode $\pm 3^\circ$: Auto alignment needs up to 2.5 min

Wide Mode $\pm 6^\circ$: Auto alignment needs up to 3.5 min



The nearer the auto target is to the laser, the longer needs the auto alignment procedure.

Step 2


Switch on the auto target and check, which mode is activated - narrow or wide mode. If necessary, switch the mode.



Before you start the auto alignment procedure, ensure that there is free sight between the Arrow4s and the auto target. While the auto alignment is running, nobody must move through the area.

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Step 3

To start the auto alignment procedure, press the auto alignment key . The green auto alignment LED is flashing and the main beam of the Arrow4s switches off. Facing the Arrow4s from the auto target, the Arrow4s pivots to the right. The vertical rotating beam switches on and the auto alignment procedure begins. The vertical rotating beam pivots to the left. The green auto alignment LED continues to stay lit. The Arrow4s pivots back to the auto target until it hits the reception field of the auto target. Once the vertical rotation beam of the Arrow4s hits the reception field of the auto target, the left red LED starts flashing.

Auto alignment procedure successful

When the middle of the reception field is hit, the vertical laser beam switches off and the pivoting stops. The main beam of the Arrow4s switches on.

A successful auto alignment procedure is indicated as follows:

- The green ON/OFF LED on the auto target lights up
- The display of the Arrow4s shows this symbol: 



To protect the auto target, you can now switch off the auto target and replace it with a standard target.

Step 4**Fine positioning**


If you are not satisfied with the accuracy of the auto alignment, you can fine adjust the alignment of the Arrow4s beam. To adjust the laser beam you can either use the left/right arrow keys on the auto target or on the Arrow4s.

5.4 Troubleshooting



Auto alignment procedure fails

If the auto alignment procedure fails it is indicated as follows:

Behaviour on the auto target:

- The red left and right LEDs on the auto target are flashing and
- The green ON/OFF LED lights up until you press the green ON/OFF key . Otherwise the auto target switches off automatically after 10 min.

Behaviour on the Arrow4s:

- The main beam of the Arrow4s moves back to the starting position and is flashing. 
- The display of the Arrow4s shows this symbol: 

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If the auto alignment procedure fails it can have the following reasons

- a) There was not permanently free sight between Arrow4s and the auto target, for example a person moves through the beam during the auto alignment procedure.
- b) The alignment of the Arrow4s was not in the $\pm 3^\circ$ or $\pm 6^\circ$ area of the auto alignment modes.

If the Alignment of the Arrow4s was not in $\pm 3^\circ$ or $\pm 6^\circ$ area, precede as follows:

Step	Description
1.	If the narrow mode is activated: Switch to the wide mode.
2.	If the wide mode is activated: Set up the laser again. Make sure, that the laser hits the middle of the auto target with an accuracy of $\pm 6^\circ$.

Resetting the Zeta125s

Use one of the following methods to reset the Arrow4s:

- Power down the auto target. Press the ON/OFF key for 2 seconds, until the main beam of the Arrow4s is lit permanently.
- Power down the Arrow4s and switch it on again.

Switching the auto alignment mode

Refer to **Switching between narrow mode and wide mode.**

6 Care and Transport

6.1 Maintenance

General information

All electronic components are enclosed in robust housings to safeguard them against mechanical damage. Servicing the system only requires a minimum of time.

Periodic checks

The user is responsible for regular checks of the instrument by the manufacturer or one of its authorised service centres. A calibration interval of one year is recommended.

Check the instrument before use. The manufacturer and its representatives are not responsible for any damages resulting from using a maladjusted instrument.

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6.2 Transport

Transport in the field

When transporting the equipment in the field:

- always carry the product in its transport container and secure it.
-

Transport in a road vehicle

Never carry the product loose in a road vehicle, as it can be affected by shock and vibration. Always carry the product in its transport container, original packaging or equivalent and secure it.

Shipping

When transporting the product by rail, air or sea, always use the complete original GeoMax packaging, transport container and cardboard box, or its equivalent, to protect against shock and vibration.

Field adjustment

Periodically carry out test measurements and perform the field adjustments indicated in the User Manual, particularly after the product has been dropped, stored for long periods or transported.

6.3 Storage

Product

Respect the temperature limits when storing the equipment, particularly in summer if the equipment is inside a vehicle. Refer to "7 Technical Data" for information about temperature limits.

6.4 Cleaning and Drying

Basic Cleaning

Basic cleaning is recommended to ensure proper functionality of the instrument.

- Blow off dust.
- Use only a clean, soft, lint-free cloth for cleaning. If necessary, moisten the cloth with water or pure alcohol. Other liquids and solvents than water or alcohol may attack the polymer components.



Only use filtered, oilfree compressed air to blow off dust and for cleaning purpose.

Cables and plugs

Keep plugs clean and dry. Blow away any dirt lodged in the plugs of the connecting cables.

Damp products

Dry the product, the transport container, the foam inserts and the accessories at a temperature not greater than 40°C/104°F and clean them. Remove the battery cover and dry the battery compartment. Do not repack until everything is dry. Always close the transport container when using in the field.

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7 Technical Data

7.1 Technical Data

Accuracy

At 20 °C: $\pm 10''$ / ± 4.8 mm at 100 m

Range

Levelling range: -15% / +45%
 Grade range: Direction: $\pm 10^\circ$
 Grade: -10% / +40%
 Operation range: > 200 m

Instrument dimensions

Length [mm]	Height [mm]	Thickness [mm]
305	105	113

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Weight

2.1 kg

Power supply

Internal power supply: Li-Ion battery, controller charged
 Internal supply voltage:

- 230 V/110 V AC power supply with charger
- Nominal voltage 24 V DC supply with accessories cable

Operating time

40 h

Charging times

Maximum 5 h

Environmental specifications

Temperature

Type	Operating temperature [°C]	Storage temperature [°C]
Instrument	-20 to +50	-20 to +70

Ingress protection against water, dust and sand

Type	Protection
Instrument	IP68 (IEC 60529)

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Humidity

Type	Protection
Instrument	Max 95 % non condensing The effects of condensation are to be effectively counteracted by periodically drying out the instrument.

Charger LDG125

Input:	100 - 240 V AC / 47 - 63 V ACHz
Output:	15 V / 2.0 A

Auto target

Detected wavelength:	635 nm
Detection range:	Narrow = +/- 3° Wide = +/- 6°
Operation range:	1.5 – 120 m
Accuracy:	+/- 2 mm/120 m at 20°C
Operating temperature range:	-20°C to +50°C
Storage temperature range:	-20°C to +70°C
Power supply:	4 x 1.5V AA Alkaline batteries
Operating time:	250 alignment procedures
Protection class:	IP68 (underwater and dust proof)
Instrument dimensions:	Length [mm] x Height [mm] x Thickness [mm]
	150 x 100 x 130
Weight	0.6 kg

7.2 Conformity to National Regulations

Conformity to national regulations

For products which do not fall under R&TTE directive:



Hereby, GeoMax AG, declares that the product/s is/are in compliance with the essential requirements and other relevant provisions of the applicable European Directives. The declaration of conformity is available from GeoMax AG.

- Japanese Radio Law and Japanese Telecommunications Business Law Compliance.
 - This device is granted pursuant to the Japanese Radio Law and the Japanese Telecommunications Business Law.
 - This device should not be modified (otherwise the granted designation number will become invalid).

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833009-1.0.0en

Original text

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