



## User Manual

## VECTOR™ Mod B & VECTOR 23

Operating & Operator Maintenance  
Instructions

## VECTOR = 4 instruments in 1:

### • Binoculars

Superb optics in a robust, watertight, rubber-armoured casing.

### • Digital Compass

Displays magnetic azimuth or grid azimuth in degrees, gon or mils.

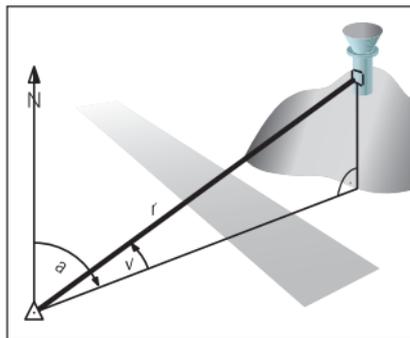
### • Laser Rangefinder

Measures from 5 m to over 20 km (depending on model, visibility and nature of target objects).

### • Inclinometer

Displays vertical angles between  $-45^\circ$  and  $+45^\circ$ .

As its name implies, the VECTOR measures the polar vector from your position to the target object.



- r Range** (slope distance)
- a Azimuth** (bearing, horizontal direction, angle between north and object)
- v Vertical angle** (inclination, elevation)



For safe use of the VECTOR, please note the detailed safety directions included in this manual.

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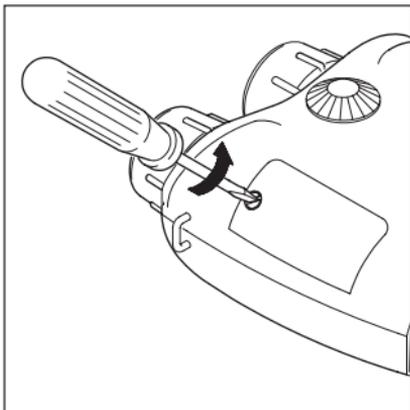
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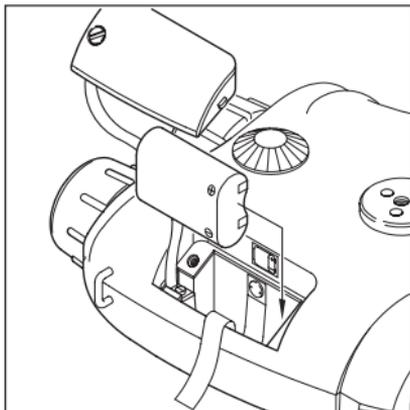
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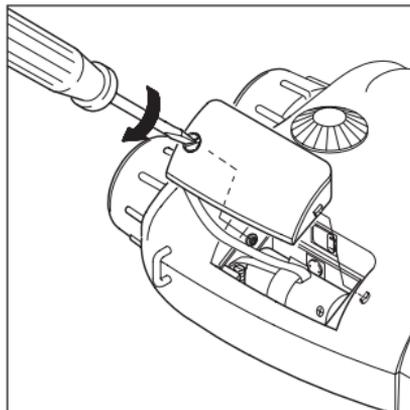


Open the battery compartment using a suitable tool, or a coin. Insert a 6V lithium battery, type 2CR5 or equivalent. Ensure that the drawing ribbon lies above the securing tape of the battery cover. Keep the battery cover seals and the instrument case clean.



Refit the battery cover and re-tighten the screw.

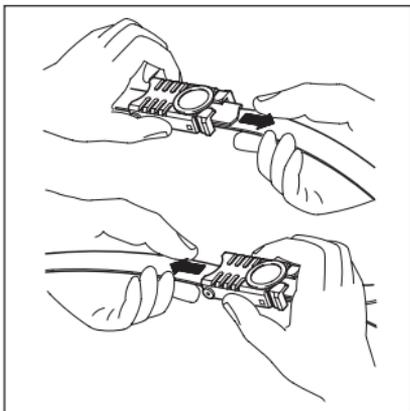
The VECTOR monitors the battery's condition. If the display shows "Lob Att", this indicates that the battery is used up. You can still get readings, but the battery needs to be replaced soon.



The "Lob Att" display may also appear under cold conditions, since low temperature reduces the battery performance.

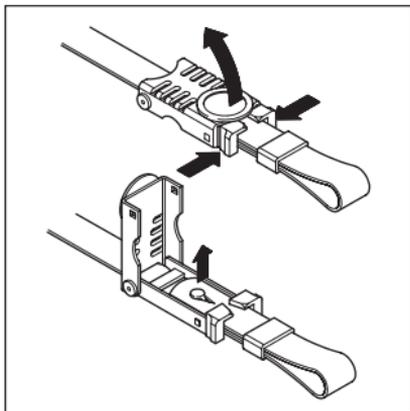
**i** Remove the VECTOR battery before a prolonged period of non-use. Use non-magnetic batteries only!

## Adjusting the neck strap



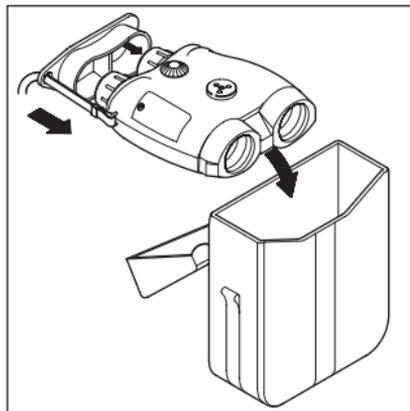
Adjust the length of the neck strap by pulling the strap slowly but firmly around the back of the catch.

## Removing the neck strap



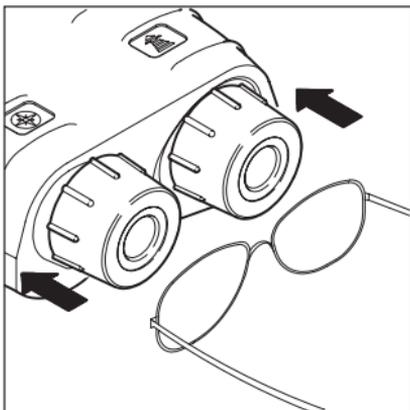
Open both catches: Squeeze the two clips together and lift the cover. Remove the strap ends and pull them through the lugs on the VECTOR.

## Storing the VECTOR



**i** To protect from dirt: Always fit the eyepiece cover and keep your VECTOR in its pouch when not in use.

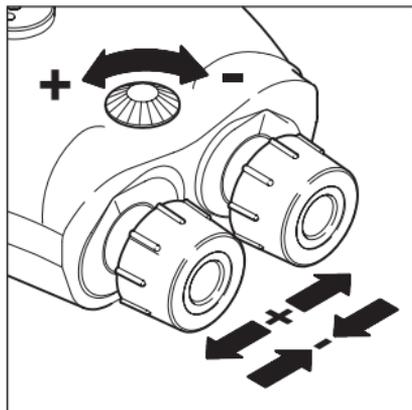
## ***Eyepiece viewing distance***



When using the VECTOR with glasses, push the eyecups fully inwards.

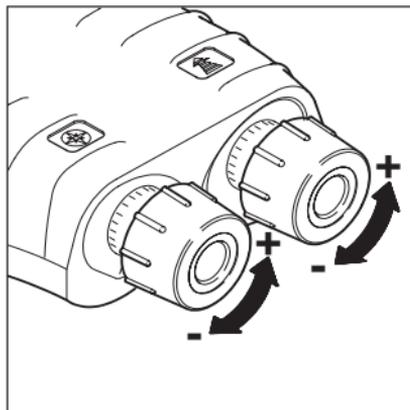
When using the VECTOR without glasses, pull the eyecups out to the stop.

## ***Eye-base adjustment***



Turn the adjusting knob until the left and right fields of view fuse to form a circular image.

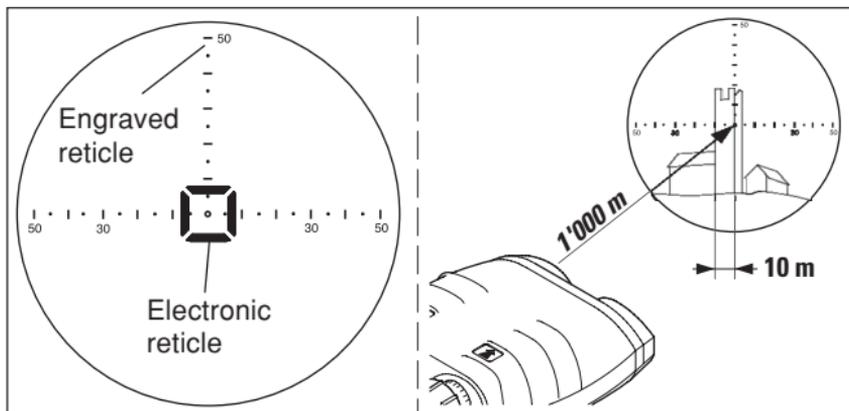
## ***Dioptric adjustment***



Sight on an object farther than 100 m away and rotate the eyepieces to obtain a sharp image. Standard setting: 0 dioptres.

**i** If the VECTOR is being used by a number of different people, remember your personal dioptric setting.

## Reticle - Aiming mark



### Glass reticle

An engraved reticle (optional for certain models) can be used in place of the electronic reticle.

(see also page 25)

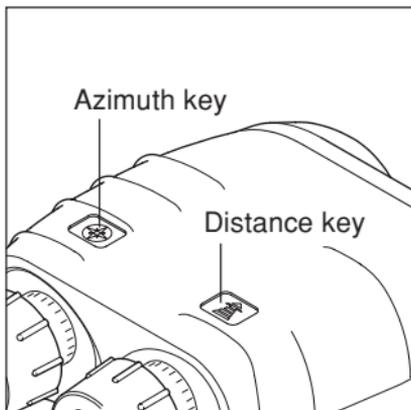
Line spacing: 10 mils

Line-point spacing: 5 mils

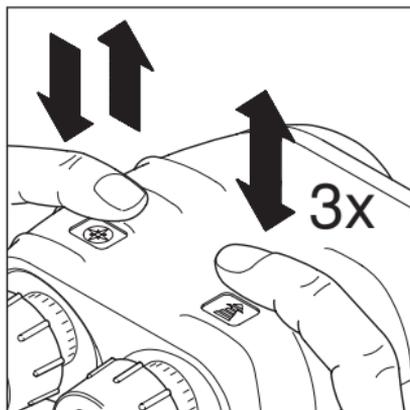
**i** 1 mil corresponds to 1 m spacing at a distance of 1 km.

In the sample above it's 10 mil and therefore 10 m.

## Using the VECTOR



The VECTOR is operated entirely by means of the keys on the top of the casing.



Key operation is indicated by the following symbols:

Downward arrow: press and hold down the key.

Upward arrow: release the key

Double arrow: press and release the key (click)

Double arrow plus a number:  
Press and release the key in rapid succession (e.g. triple click)

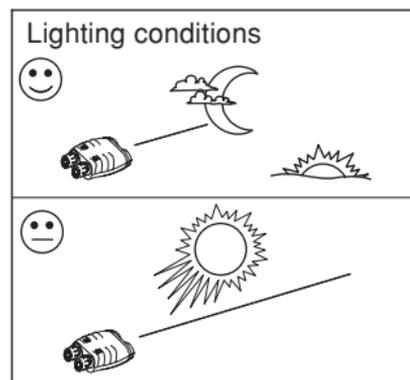
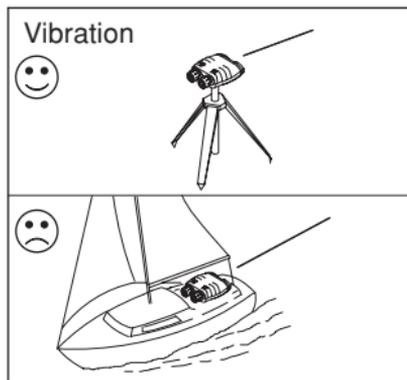
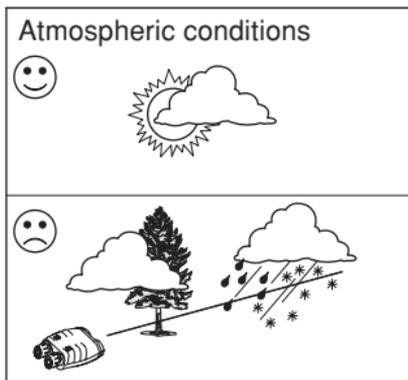
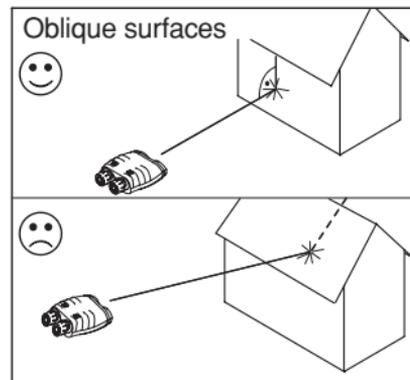
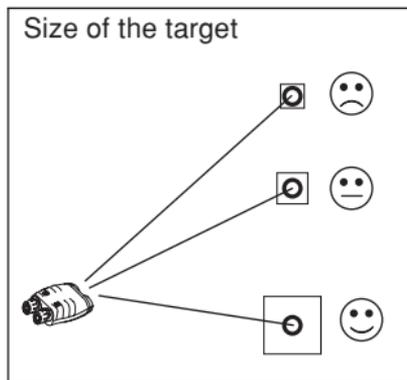
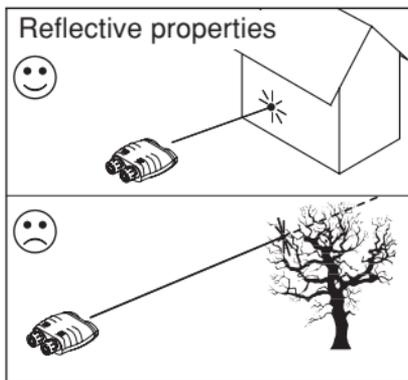
Sight the object to be measured using the engraved aiming mark or the electronic reticle. Hold the VECTOR steady during measurement. The VECTOR displays the measurement result, then switches itself off automatically after a few seconds.

**i** You can prolong the display period by holding down the measuring key while the result is displayed.

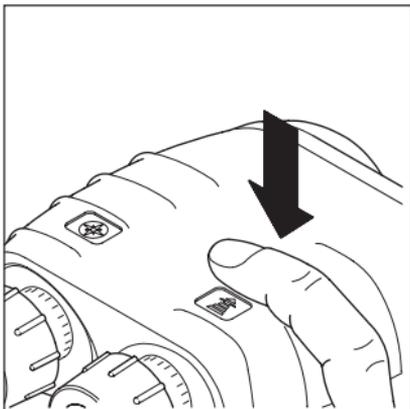
**i** The underscore sign "\_" is used as decimal point.  
(e.g.  $14\_7^\circ = 14.7^\circ$ ,  
 $1230\_5 = 1230.5\text{m}$ )

## Distance measurements

## Factors affecting measurement range

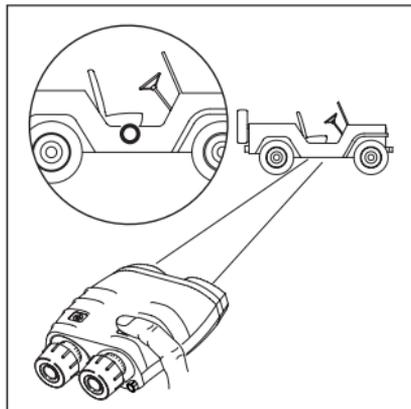


## ***Distance measurement (slope distance)***

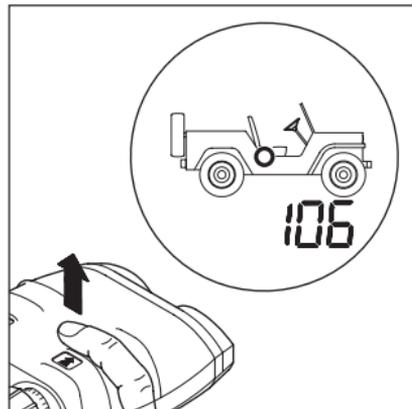


Press and hold the distance key.

**i** Turning the electronic reticle on and off:  
see pages 24, 25.



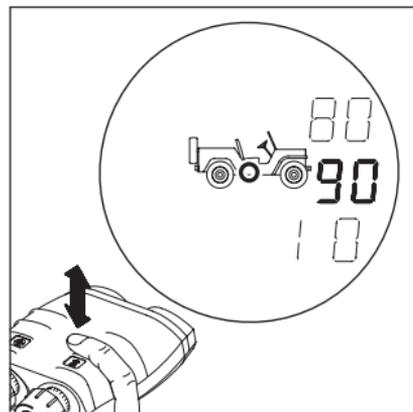
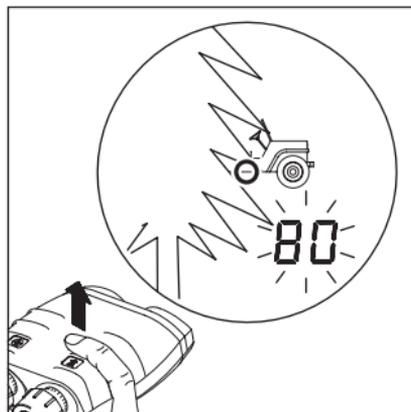
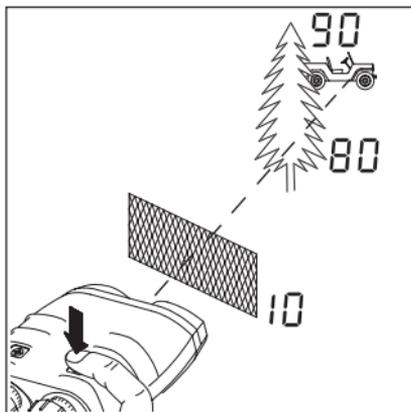
Sight the pointing circle on the object.



Hold the VECTOR steady as you release the distance key.  
Read off the distance.  
If "----" appears in the display, the object lies outside the measuring range, or measuring conditions are poor (see page 11).

**i** Setting measurement units and distance gate: see pages 28, 29.

## Multiple object measurement



Up to 3 separate distances can be obtained with a single measurement, for example when:

- the laser beam passes through objects in front of the main target (bushes, shrubs, etc.)
- there are reflective objects behind the main target (mountains, etc.)

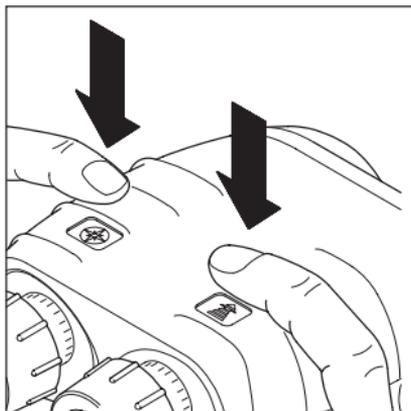
**i** To use this feature, "3 dIS" must be activated via the configuration menu; see pages 24, 25 .

Sight on the most visible portion of the object. Operate the VECTOR as described under "distance measurement".

The distance display blinks for a few seconds after a multiple distance measurement. Click the distance key repeatedly to obtain all the measured distances in succession.

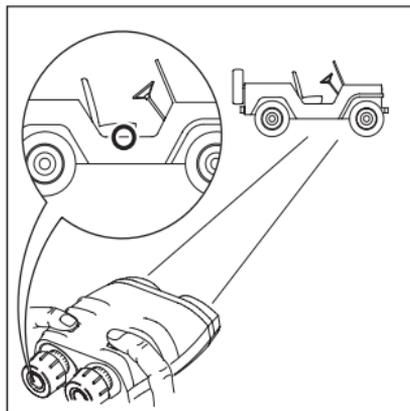
**i** The order of the displayed ranges is: strongest, second strongest and third strongest detected echo.

## ***Combined measurement with data transfer (slope distance, azimuth, inclination)***



Measurement data is transmitted via the (optional) interface cable immediately after the measurement is taken.

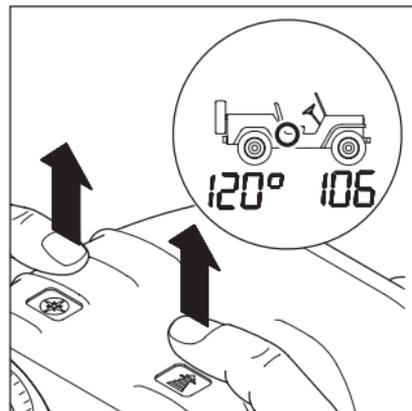
It is not possible to store measurement data in the VECTOR itself.



Hold down both keys simultaneously (or the remote fire button); the current azimuth appears and updates twice per second.

Sight the object with the pointing circle.

Release both keys (or the remote fire button) while holding the VECTOR steady.

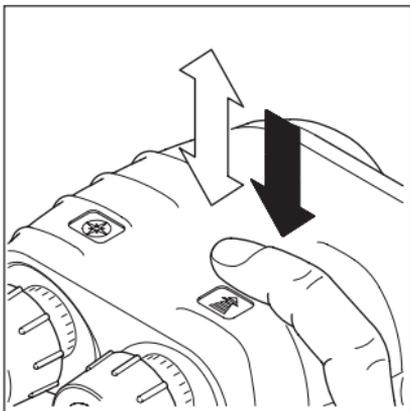


The azimuth appears at the left and the slope distance at the right of the field of view.

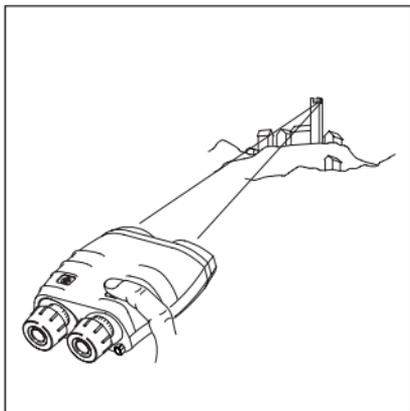
The inclination angle is not displayed, but it is sent via the data interface.

**i** Setting measurement units: see page 28.

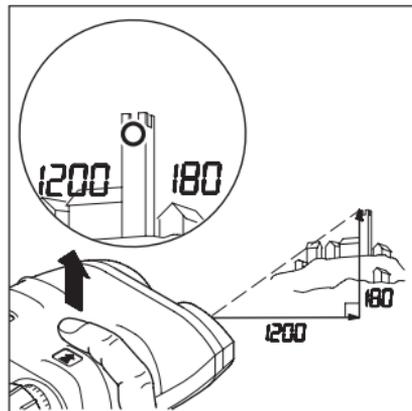
## ***Horizontal dist. and height difference between your position and a remote object***



Click the distance key once, then immediately press and hold it down.



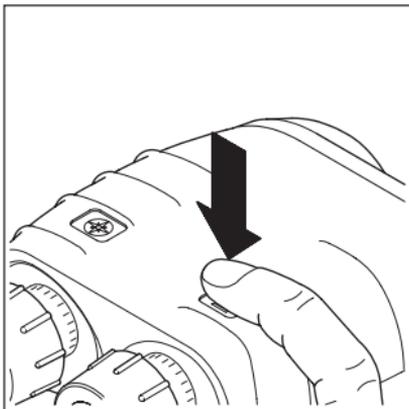
Sight the object with the pointing circle.



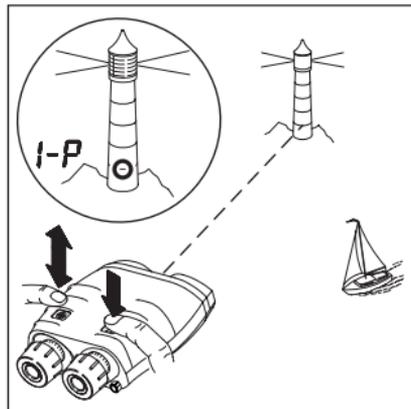
Release the distance key while holding the VECTOR steady. The horizontal distance appears at the left and the height difference at the right of the field of view.

**i** Setting measurement units: see page 28.

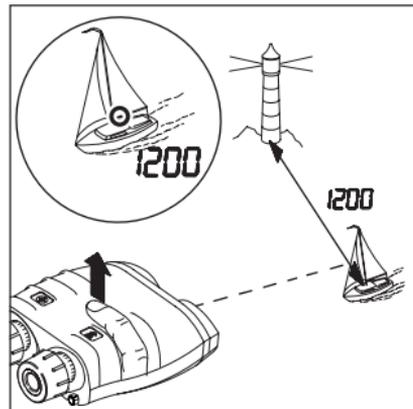
## Slope distance between two objects



Press and hold the distance key.



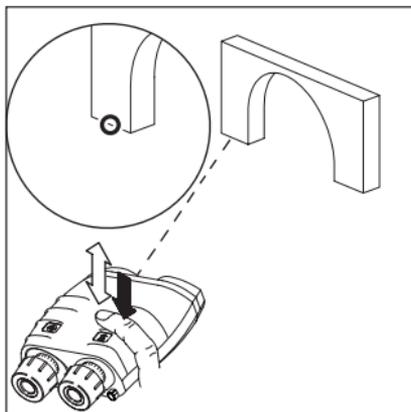
Sight the first object with the pointing circle.  
Click the azimuth key (> 0.5 s) while holding the VECTOR steady.  
The first object measurement is confirmed (1-P = first point).



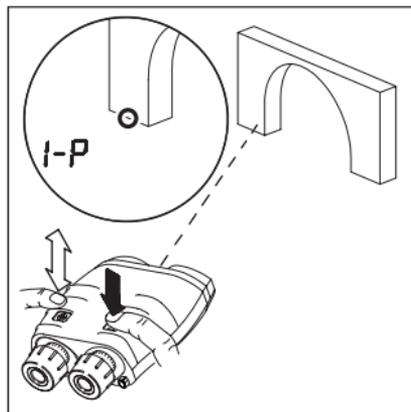
Sight the second object with the pointing circle.  
Release the distance key while holding the VECTOR steady.  
The slope distance between the two objects is displayed.

**i** Setting measurement units:  
see page 28.

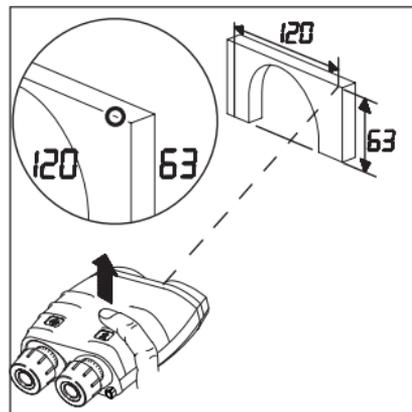
## Horizontal and vertical distance between two objects



Click the distance key once, then immediately press and hold it down.



Sight the first object with the pointing circle.  
Click the azimuth key (> 0.5 s) while holding the VECTOR steady.  
The first object measurement is confirmed (1-P = first point).



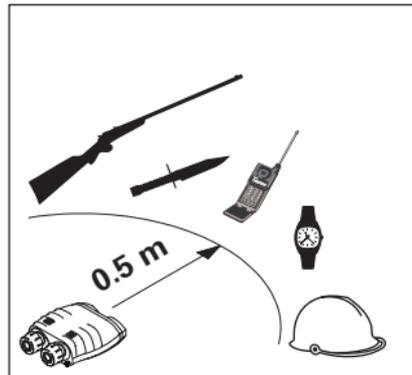
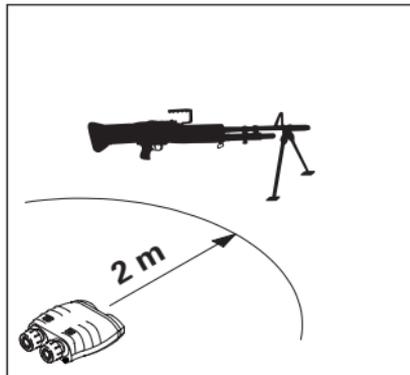
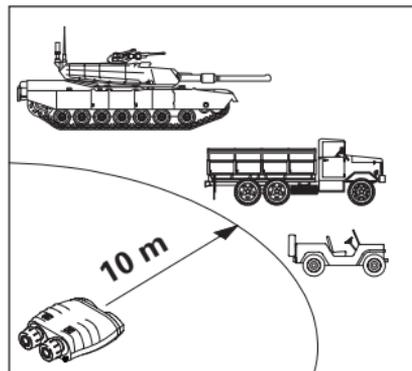
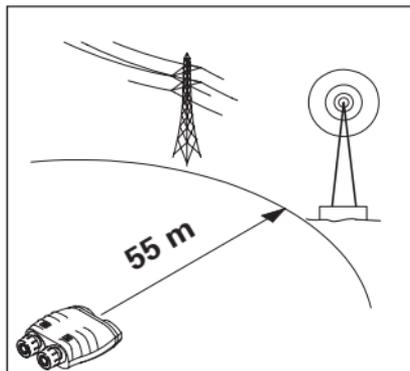
Sight the second object with the pointing circle.  
Release the distance key while holding the VECTOR steady.  
The horizontal distance appears at the left and the vertical distance at the right of the field of view.

**i** Setting measurement units: see page 28.

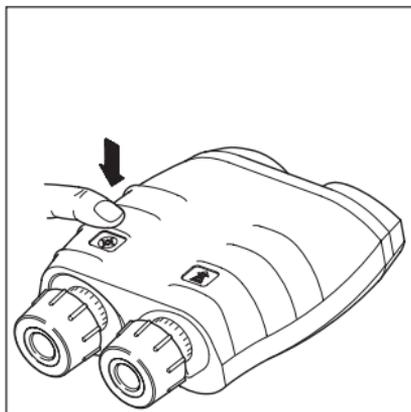
The VECTOR has a digital compass that works similarly to a magnetic compass. Metal objects, magnetic fields and electronic devices (e.g. radio) can cause errors in directional readings. Nonmagnetic metals and alloys do not affect the compass readings.

### **i** Countermeasures:

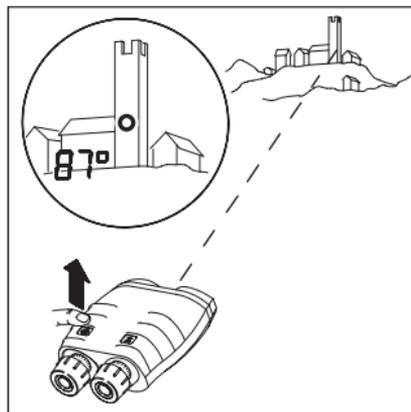
- Use non-magnetic batteries only!
- Calibrate the compass (see pages 33–37) after every battery change.
- Observe the minimum safe distances shown opposite when making azimuth measurements or calibrating the compass:



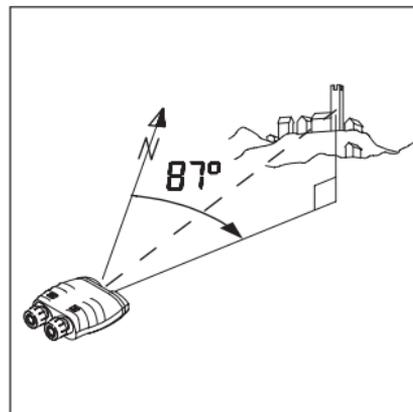
## Azimuth measurement



Press and hold the azimuth key. The current azimuth appears. The display updates twice per second.

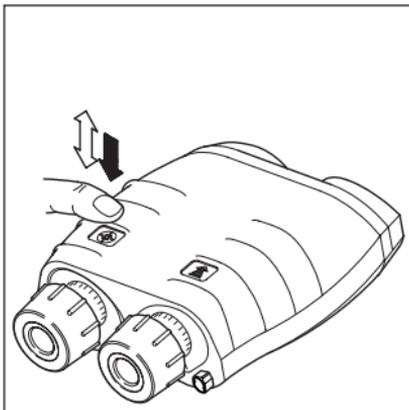


Sight the object with the pointing circle, then release the azimuth key while holding the VECTOR steady. The most recently measured azimuth is displayed.

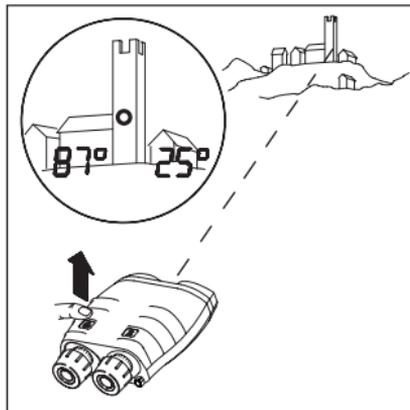


**i** Setting measurement units: see page 28.

## Combined azimuth and inclination angle measurement



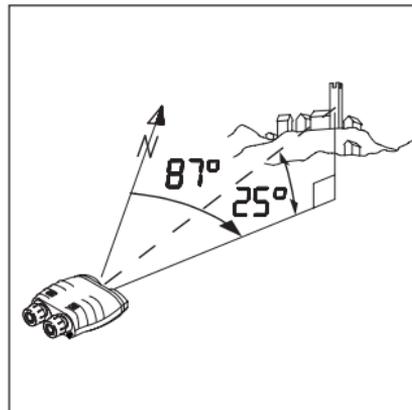
Click the azimuth key once, then immediately press and hold it down.



The following items appear in the field of view:

- the current azimuth at the left
- the current angle of inclination at the right.

Azimuth and Inclination will update twice per second as long as the operator continues to hold down the azimuth key.

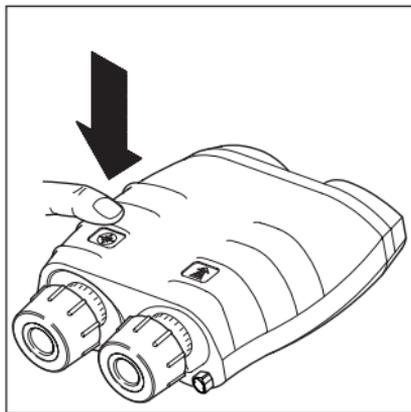


Sight the object with the pointing circle, then release the azimuth key while holding the VECTOR steady.

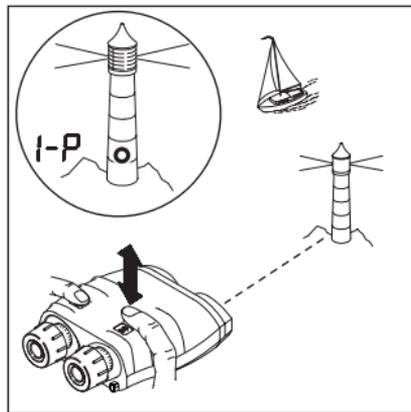
The azimuth and angle of inclination to the object are displayed.

**i** Setting measurement units: see page 28.

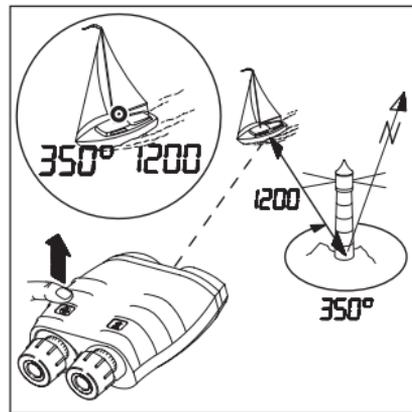
## Azimuth and horizontal distance between two objects



Press and hold the azimuth key.  
The current azimuth appears.



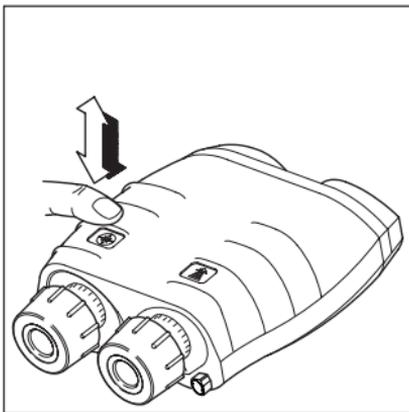
Sight the first object with the  
pointing circle.  
Click the distance key (> 0.5 s)  
while holding the VECTOR  
steady.  
The first object measurement is  
confirmed (1-P = first point).



Sight the second object with the  
pointing circle.  
Release the azimuth key while  
holding the VECTOR steady.  
The azimuth appears at the left  
and the horizontal distance at  
the right of the field of view.

**i** Setting measurement units:  
see page 28.

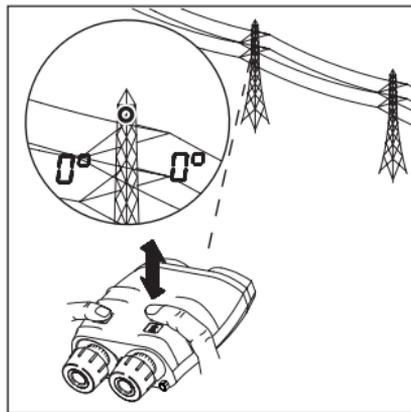
## Relative horizontal and vertical angle



Click the azimuth key once, then immediately press and hold it down.

The following items appear in the field of view:

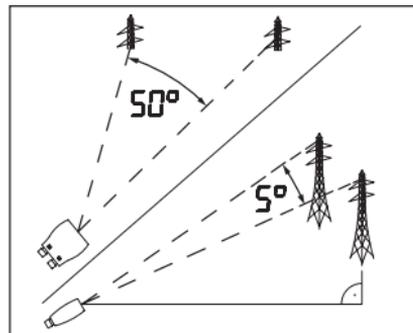
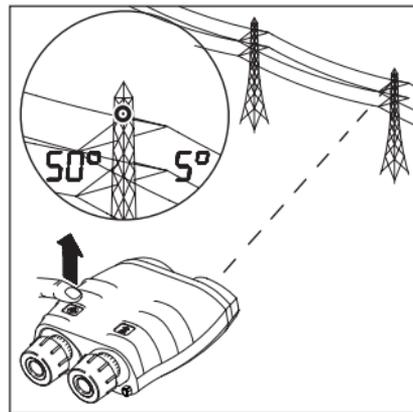
- the current azimuth at the left
- the current angle of inclination at the right



Sight the first object with the pointing circle.

Click the distance key while holding the VECTOR steady. Both angles are set to zero.

Sight the second object and release the azimuth key. The relative angles appear in the field of view.



## Data transfer

## Connecting/disconnecting the interface cable

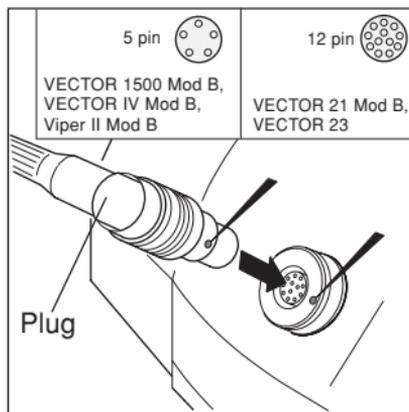
On the underside of the VECTOR is a socket for sending data to:

- personal computers or laptops
- modems
- fire control systems
- PLGR / DAGR / GARMIN GPS

**i** Our customer service will be pleased to inform you about special accessories for transmitting and analysing data. (cables see page 61).

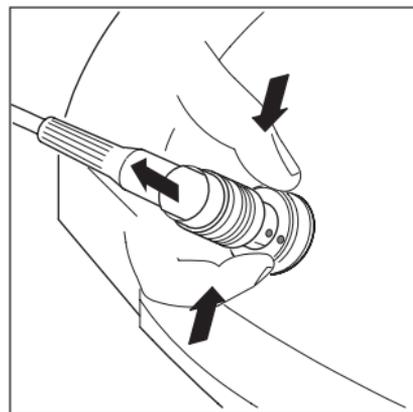
### Caution

Incorrect handling can damage the socket and optional interface cable.



### To plug:

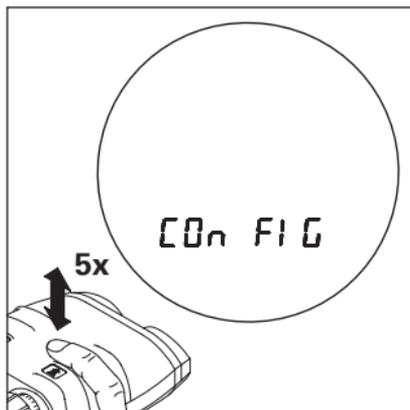
Align the respective markings on the plug and socket. Slide the plug carefully into the socket until the locking mechanism engages.



### To unplug:

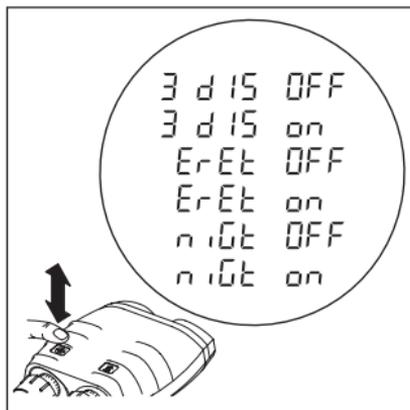
Grasp the plug grip

- between two fingers,
- draw it carefully back to the stop.
- pull back a little harder until the plug slips out of the socket.



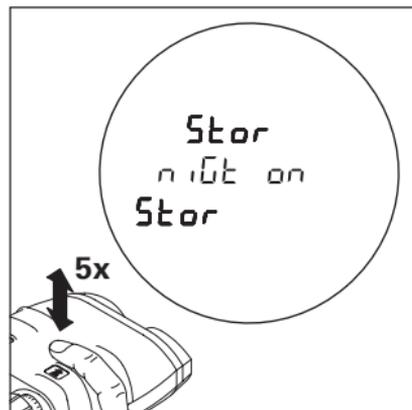
Various instrument functions are switched on and off via the configuration menu.

Click the distance key five times in rapid succession. "CO n FIG" appears for a short instant.



Click the azimuth key until the desired function status appears.

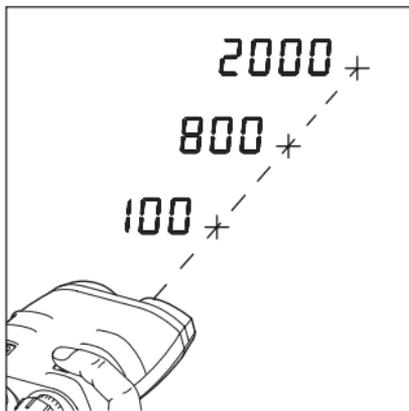
**i** The various functions are described in detail on the following pages.



Click the distance key five times in rapid succession to save your settings.

If the distance key is not correctly clicked five times, the previous settings remain unchanged and "Old Conf" is displayed.

## Measuring 3 distances

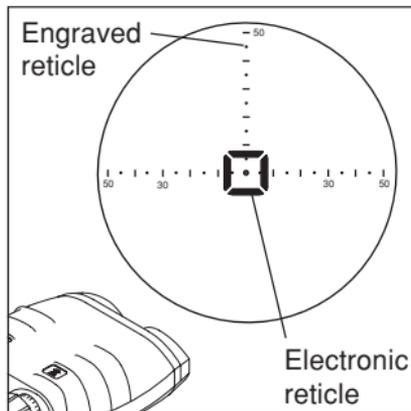


Function: 3dIS on/OFF  
(3 Distances)

This function

- is normally turned **OFF**;
- allows up to 3 distances to be displayed from a single measurement (see page 13).

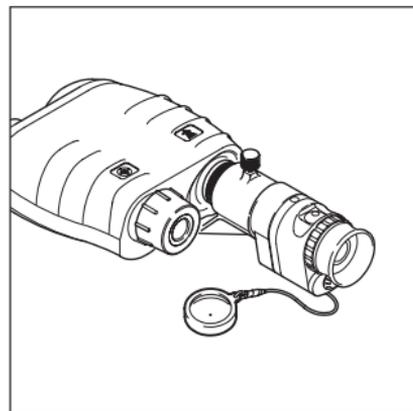
## Electronic reticle



Function: ErEt on/OFF  
(Electronic Reticle)

The electronic reticle is by default **OFF**.

## Night vision device

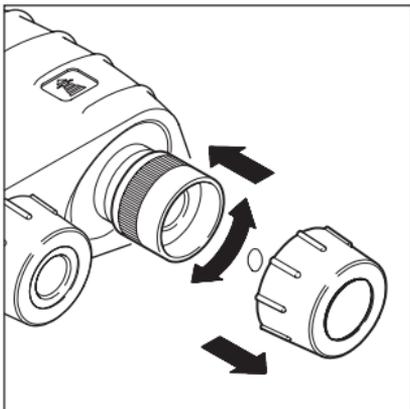


Function: niGt on/OFF  
(Night Vision)

This function

- is normally turned **OFF**;
- reduces the display brightness;
- is needed only when a night vision device is attached.

## Using the VECTOR with a night vision device

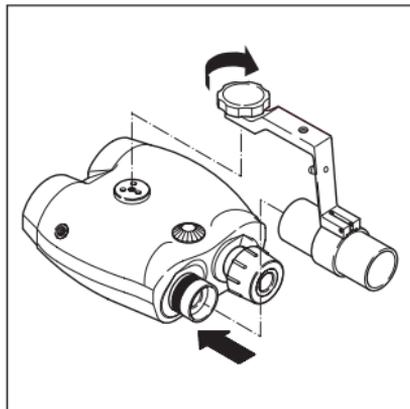


Activate the "niGt" function in the configuration menu (see pages 24, 25).

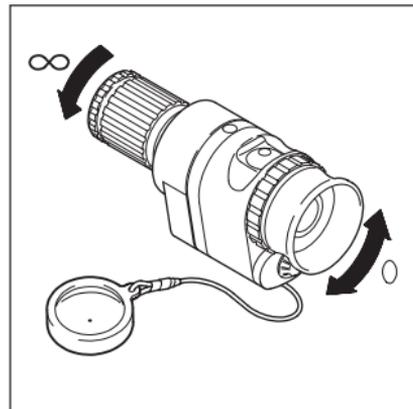
Remove the eyecup from the right eyepiece.

Rotate the right eyepiece to adjust it to 0 dioptres.

Then slide the eyepiece fully inwards.



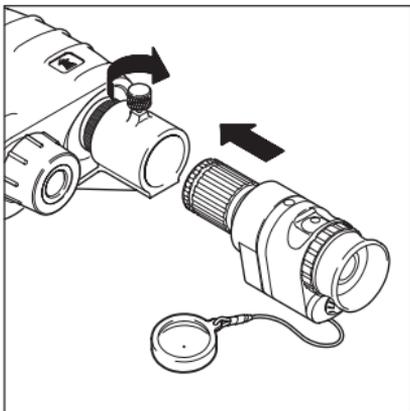
Fit the adapter, and screw it firmly to the tripod bush.



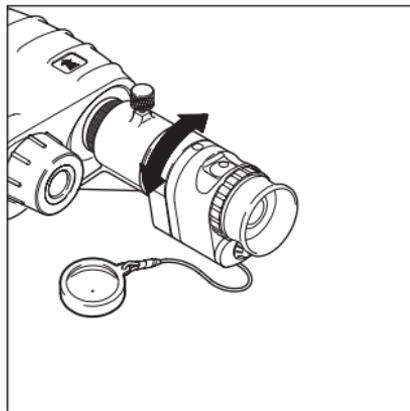
Adjust the eyepiece on the night vision device to suit your eyesight. Standard setting: 0 dioptres.

Remove the protective lens cap. Rotate the lens to the "∞" end-stop.

## Using the VECTOR with a night vision device (continued)



Carefully slide the night vision device into the adapter and clamp it using the knurled locking screw.



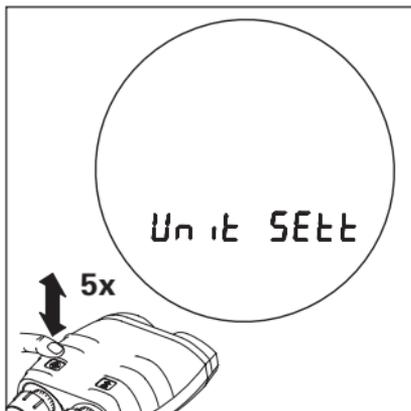
At observation distances below 100 m, focus the night vision device by rotating its casing.



When you finish using the night vision device, return to the normal "niGt OFF" setting.

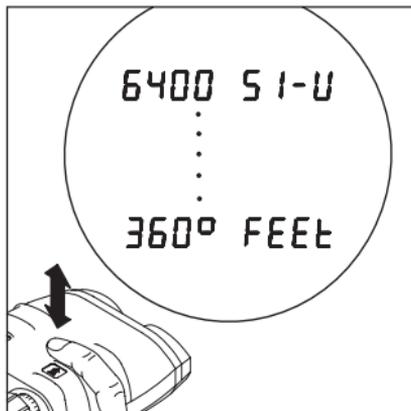


"niGt on" is displayed, when function is activated and used in daylight conditions.



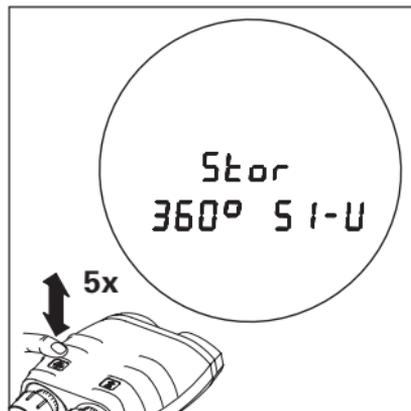
Various angle and distance measurement units may be set via the configuration menu.

Click the azimuth key five times in rapid succession. "Unit SEt" appears briefly, followed by the measurement units currently in use by the VECTOR.



Click the distance key until the desired units appear in the field of view:

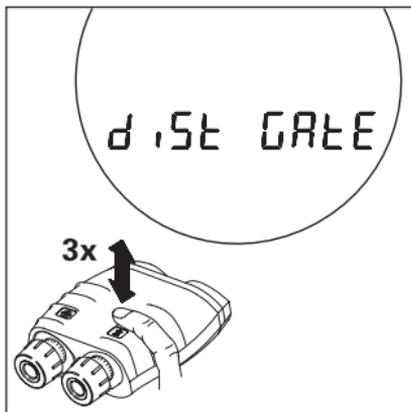
- at the left: angular unit in mils, gon or degrees
- at the right: distance unit in metres (SI-Unit), yards, or feet.



Click the azimuth key five times in rapid succession to save your preferred units.

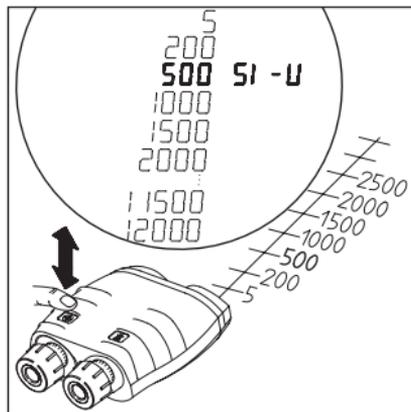
If the azimuth key is not correctly clicked five times, the previous settings remain unchanged and "Old Unit" is displayed.

## Distance gate



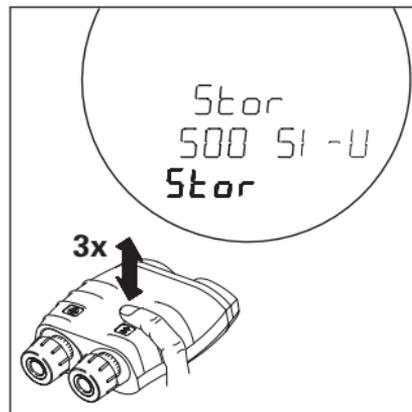
In certain applications, it may be desirable to limit the closest distance that the VECTOR will measure.

Click the distance key three times in rapid succession. "diSt GAtE" appears, followed by the current setting.



Click the azimuth key until the desired minimum distance appears (e.g. 500 m). Depending on VECTOR model the distance gate limits will be different.

**i** Setting the minimum distance to "5 SI-U" disables the distance gate (default gate = 5m).



Click the distance key three times in rapid succession to save the setting. If you do not press the distance key, the previous setting remains unchanged and "Old Gate" is displayed.

**i** "GAtE on" is displayed when closer ranges are measured.

## ***Declination compensation Declination display***

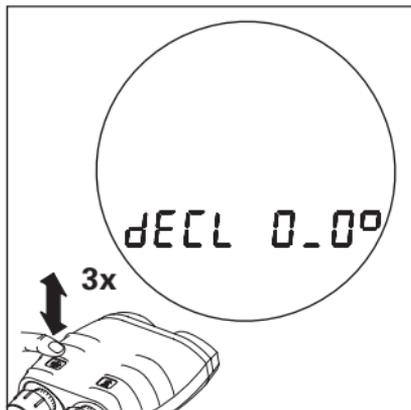
Declination represents the deviation between magnetic north and grid north.

### Declination

- varies from location to location
- varies from time to time
- is specified on most land and sea maps

**To refer the azimuth angle to grid north:** enter the local declination value into the VECTOR.

**To refer the azimuth angle to magnetic north:** enter a zero declination value into the VECTOR.



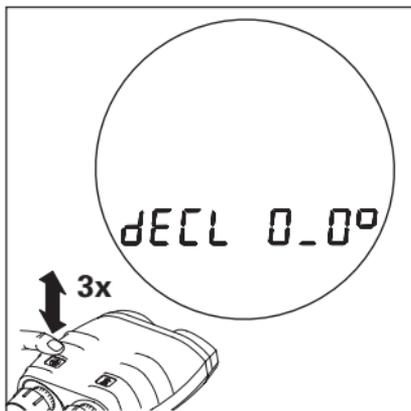
Click the azimuth key three times in rapid succession. The current declination value is displayed for 10 seconds. The VECTOR displays "Old dECL" before switching itself off (the declination value is unchanged).

Declination is displayed in the currently selected angular units (see page 28).

**i** The stored declination value

- is reset to 0 when the measurement units are changed;
- is retained when the battery is exhausted or replaced;
- is factory-set to 0.

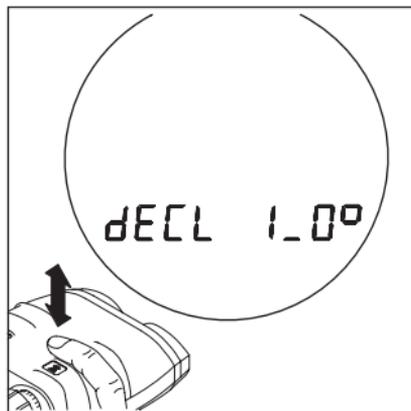
## Declination setting/correction



Click the azimuth key three times in rapid succession. The stored declination value is displayed.



When used with PLGR (or other device determining declination (MAGVAR)) declination must be set at "0".

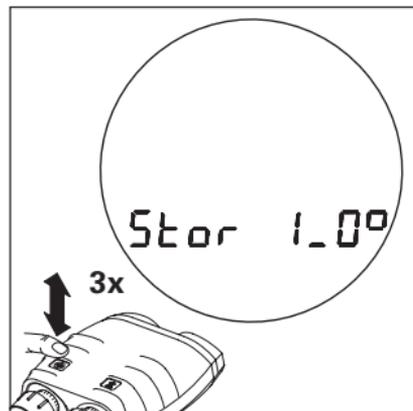


### Distance key

- short click: the declination value changes by one unit per click.
- long click (> 0.5 s): the declination value changes continuously.



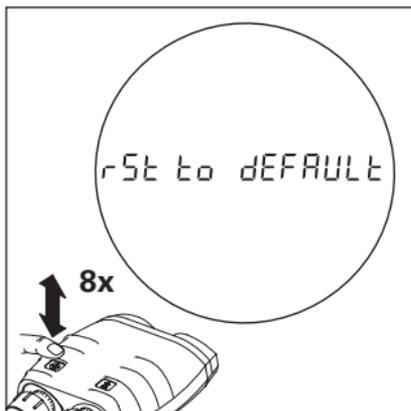
Use the azimuth key to change between increment and decrement !



Click the azimuth key three times in rapid succession to store the new declination value.

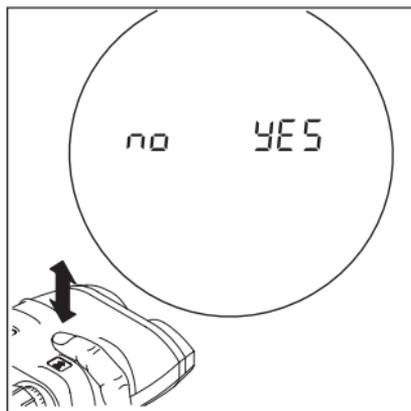
If the azimuth key is not correctly clicked three times, the previous settings remain unchanged and "Old dECL" is displayed.

## Setting VECTOR back to factory settings



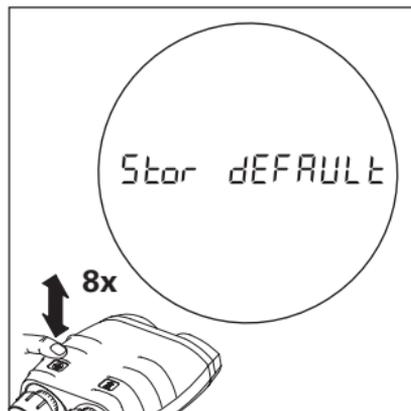
Click the azimuth key eight times in rapid succession.

"rSt to dEFAULT" is displayed followed by "no YES".



**YES:** Click on distance key (allows to change back to factory settings)

**no:** Click on azimuth key (keeps current settings)



Click the azimuth key eight times in rapid succession to set VECTOR to factory settings. "Stor dEFAULT" is displayed.

If not done correctly, the settings remain unchanged and "no CHAnGE" is displayed.

### How?

There is a choice of three calibration procedures:

- **12 point calibration - Handheld**  
(Recommended)  
Provides good precision.
- **4 point calibration - Handheld**  
May achieve adequate precision for many applications if time does not permit a 12 point calibration.
- **12 point calibration - Tripod mounted**  
May achieve best precision, requires specified tripod (e.g. SST3-2)

### When?

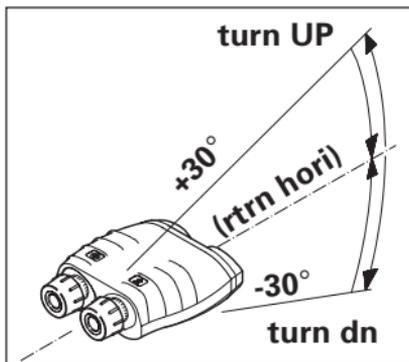
- After every battery change.
  - After the VECTOR has been exposed to strong magnetic fields.
  - When metallic parts have been attached to the VECTOR (e.g. night vision device).
  - After movement greater than 20 km and/or to a different terrain type.
- i** Check the stored declination after every compass calibration, and correct if necessary.

### Where?

In an open area (e.g. a field) at an adequate distance from buildings and metallic objects (see page 18). Ensure that there are no buried pipes, cables, etc. in the vicinity.

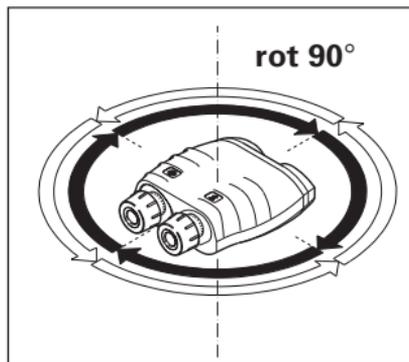
- i** Never calibrate the compass inside a building, or in the vicinity of disruptive magnetic fields!

## General instructions (continued)



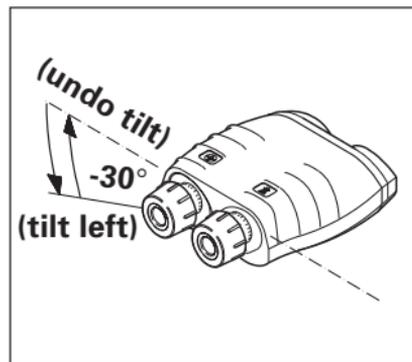
The VECTOR needs to be swivelled in various directions during calibration. Instructions for the required direction of movement appear successively in the display:

turn UP ..... tilt upwards  
rtrn hori ..... return to horizontal  
turn dn ..... tilt downwards  
rot 90° ..... rotate by 90°  
rot 60° ..... rotate by 60°  
rot -60° ..... rotate by -60°



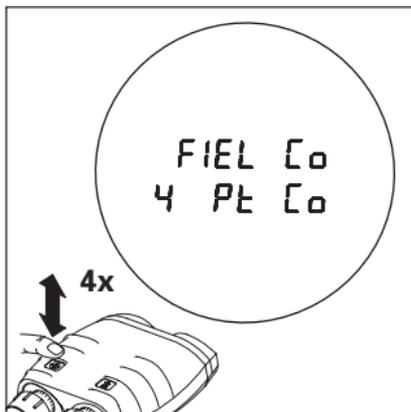
tilt LEFT..... tilt the left side of the VECTOR downwards  
undo tilt ..... return to horizontal  
too FAR ..... reverse direction  
PrES butn ..... press button

**Always turn in the same direction** for all "rot 90°" instructions.



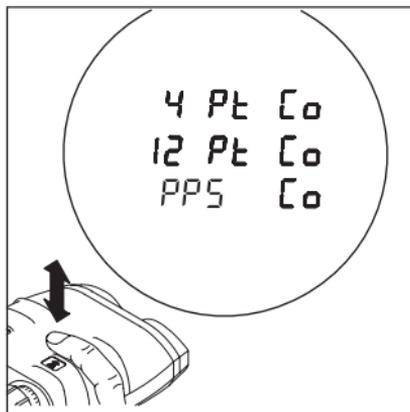
**Important:**  
Perform each movement **slowly and steadily**, until the next instruction appears.  
When you see the "StOP" instruction, **immediately hold the VECTOR still** and on no account move it while "StOP" is displayed.

## Hand held and tripod

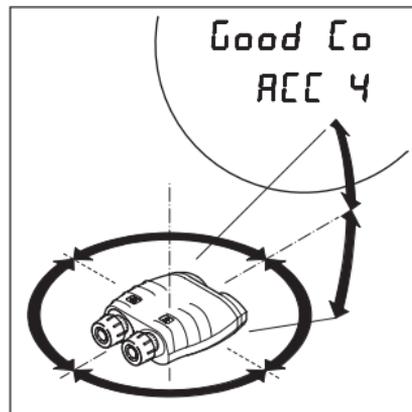


Point the VECTOR roughly northwards.

Click the azimuth key four times in rapid succession. "FIEL Co" appears briefly, followed by "4 Pt Co" for the regular 4 point calibration.



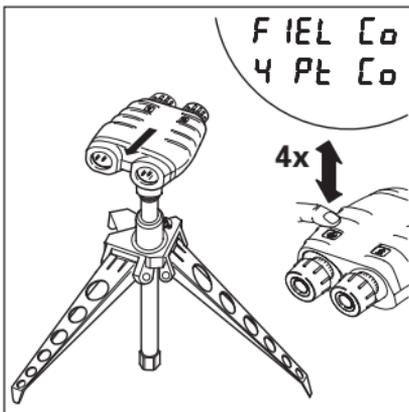
**i** If you want to perform the 12 point calibration click the distance key when "4 Pt Co" is displayed until the desired option is displayed. The selected procedure starts automatically in a few moments. Move the VECTOR according to the displayed instructions (see page 34).



After the last instruction, analysis begins and the electronic reticle blinks for a few seconds. You then see

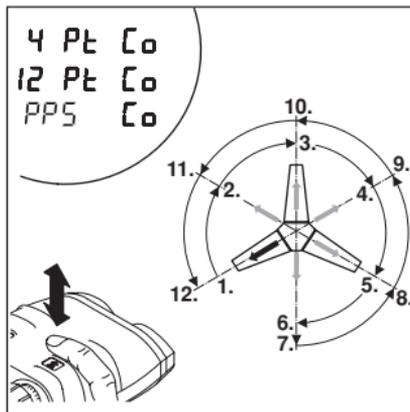
- "Good Co" followed by accuracy value
- "bAd Co" followed by accuracy value or "rES Co"
- "ACC": accuracy value in units selected

## Tripod

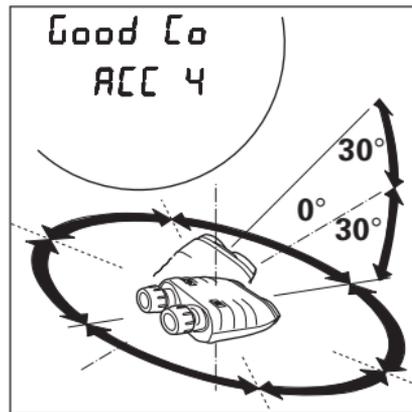


Place the VECTOR on mini-tripod SST3-2 or equivalent and level 30° downwards (see marking on tripod).

Click the azimuth key four times in rapid succession. "FIEL Co" appears briefly, followed by "4 Pt Co".



Now press the distance key until "PPS Co" is displayed. The calibration procedure starts automatically in a few moments. Proceed as described before. As a help for "rot 60°": rotate from the first tripod foot to the middle position between this and the next foot, then to the next foot and so on.



After the last instruction and the analysis the accuracy value is displayed.

**i** Measurements 1-6 are made at 30° down from horizontal. Measurements 7-12 are made at 30° up from horizontal.

## Results

Magnetic interference can still lead to inaccurate measurements, even if calibration was successful. For this reason, you should verify compass accuracy after a successful calibration: perform several azimuth measurements on known landmarks and compare the results.

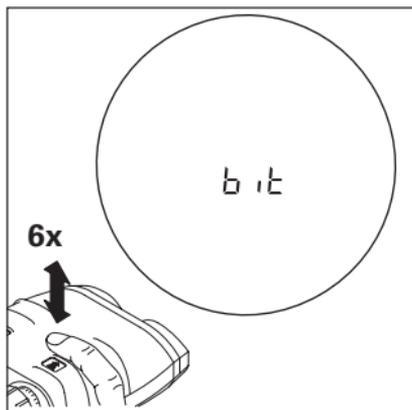
After calibration, the VECTOR acts on the measurement results as follows:

Acc (mil)	Display	Process
1 - 20	"Good Co" "ACC xx"	The newly determined constants are automatically stored.
21 - 90	"bAd Co" "ACC xx"	The newly determined constants are automatically stored.
> 90	"bAd Co" "rES Co"	Reset constants to factory values.

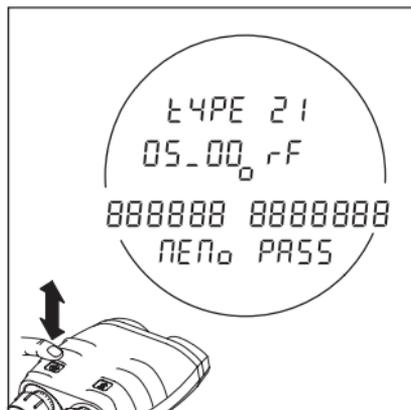
Possible causes of calibration failure:

- The VECTOR was moved while a "StOP" instruction was displayed.
- Movements performed too fast, or jerkily.
- Strong magnetic disturbances in the vicinity.

**i** If you get a "bAd Co", reattempt calibration until "Good Co" appears. Consider moving to an alternative position.



Click the distance key six times in rapid succession. "bit" appears briefly, the test procedure starts automatically.



Use the azimuth key to scroll through the list. Otherwise after some seconds it's proceeded automatically.

1. Software type:  
e.g. tYPE 21
2. Software version:  
e.g. 05\_00 rF  
Enabled options are indicated by characters:  
"F" Fall of Shot  
"r" PLGR interface  
"b" Bluetooth interface  
"A" GARMIN interface  
"L" Data Recall
3. All display segments on:  
888888 888888
4. Memory test:  
MEMo PASS / FAIL

## **Troubleshooting**

<b>Problem</b>	<b>Possible cause</b>	<b>Solution</b>
You cannot see a circular image with both eyes.	Eye-base or eyecup incorrectly adjusted.	Adjust the eye-base or eyecup following the instructions on page 8.
	Eyes are not positioned on the VECTOR's optical axis.	Reposition your head, or the instrument.
Measurements cannot be taken.	The battery has run out.	Replace the battery. Preferably use SANYO type.
	Battery contacts corroded.	Clean the battery contacts.
	Low temperature reduces battery performance.	Carry the VECTOR close to your body.
	Extreme heat shortens battery life.	Do not store the battery at temperatures in excess of +70°C.

## ***Troubleshooting (continued)***

<b>Problem</b>	<b>Possible cause</b>	<b>Solution</b>
"- - -" appears in the display when distance is measured.	<p>The distance is outside the specified measuring range.</p> <p>Inadequate reflectance:</p> <ul style="list-style-type: none"><li>• object too small or inaccurately targeted;</li><li>• The VECTOR was shaken during measurement;</li><li>• Bad weather conditions (haze, fog, turbulence).</li></ul>	<p>See the specified measuring range on page 49-51.</p> <p>See the list of factors affecting measuring range on page 11.</p>
"GAtE on" appears in the display when distance is measured	Measured distance lies within the distance gate.	Reduce or turn off the distance gate, following the instructions on page 29.

## ***Troubleshooting (continued)***

<b>Problem</b>	<b>Possible cause</b>	<b>Solution</b>
Distance display blinks.	Multiple object measurement is activated: see page 13.	Click the distance key to display distances in succession (see page 13).
These symbols are displayed during azimuth measurement:  _ _ _ _ - _ _ - - _ _ - _ _ _ -	The permissible angle has been exceeded:  tilted too far upwards tilted too far downwards tilted too far to the right tilted too far to the left	Do not over-tilt or bank the VECTOR.

## ***Troubleshooting (continued)***

<b>Problem</b>	<b>Possible cause</b>	<b>Solution</b>
Inaccurate azimuth measurement values.	<p>Incorrect declination value has been stored.</p> <p>Disruptive magnetic fields at the measuring position.</p> <p>Calibration in an area with magnetic interference.</p> <p>Altered magnetic conditions within the instrument after a battery change.</p>	<p>Store the correct declination value (see pages 30, 31).</p> <p>See the factors affecting measurement accuracy on page 18.</p> <p>Recompensate the compass (see pages 33–37).</p> <p>Recompensate the compass. (see pages 33–37).</p>
The expected display does not appear after clicking a key several times.	Key was pressed too slowly, or with insufficient force.	Press and release the key in rapid succession. Always press the key down until there is an audible click.

## ***Troubleshooting (continued)***

<b>Problem</b>	<b>Possible cause</b>	<b>Solution</b>
The electronic reticle and display are not visible.	"niGT" is activated, for use with a night vision device.  Dioptric is out of focus.	Select "niGT OFF" in the configuration menu (see pages 24, 25).  Adjust dioptric setting
The electronic reticle is not visible.	"ErET OFF" is selected (for use with a glass reticle).	Select "ErET on" in the configuration menu (see pages 24, 25).
"Lo bAtt" is displayed.	The battery is used up.  Reduced battery performance at low temperature.	You can still get some readings, but the battery needs to be replaced soon.  You can still get some readings, but the VECTOR or the battery needs to be warmed up (e.g. on your body).

## ***Troubleshooting (continued)***

<b>Problem</b>	<b>Possible cause</b>	<b>Solution</b>
"niGT on" is displayed.	"niGT" is activated, for use with a night vision device but used in daylight conditions.	Select "niGT OFF" in the configuration menu (see pages 24, 25).
Calibration can not be completed.	Timing out of calibration (nothing in display).  Going too far on a command	Turn / tilt farther or move faster.  Turn / tilt more slowly and stop at the appropriate time.
Measurement data not being received at PLGR	Interface cable not properly connected.  Combined measurement not being used.	Adjust cable connection.  Press range and azimuth buttons simultaneously.
"PC Con" flashes in field of view when plugged to PLGR	'PC Con' selected	Change to "PLGr Con" (see page 63)

## ***Troubleshooting (continued)***

<b>Problem</b>	<b>Possible cause</b>	<b>Solution</b>
"bt FAIL" is displayed. Data could not be transmitted via Bluetooth communication.	The Bluetooth receiver device: <ul style="list-style-type: none"><li>• is turned off</li><li>• out of range</li><li>• antenna is shielded</li><li>• is not configured properly</li></ul>	Follow the instruction for the Bluetooth interface settings according to page 66.

### **Intended purpose**

The VECTOR

- is designed as a navigation aid;
- is to be used in addition to other instruments or techniques;
- must never be used as a sole navigation instrument.

### **Limitations of use**

The VECTOR must not be used in the vicinity of sensitive electrical equipment.

All other usage limitations are mentioned in the technical specifications.

### **Inappropriate use**

- VECTOR deployment without prior knowledge of the operating instructions and safety notices.
- Changes and modifications to the VECTOR by the customer.
- Use of third-party accessories not expressly approved by Vectronix AG.

Inappropriate use brings the risk of

- injuries;
- instrument errors;
- damage to property;
- malfunction;

### **Blinding hazard**

- Do not look into powerful light sources with the VECTOR.
- Do not open the VECTOR. The built-in laser can cause eye injuries.

### **Explosion hazard**

The battery must not be

- short-circuited;
- recharged;
- mechanically modified;
- placed in fire or heated above +85°C with the VECTOR.

## ***Safety notices (continued)***

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### **Physical injury hazard**

- Do not place the VECTOR on a vehicle parcel-shelf or dashboard – risk of injury when braking.
- Check the carrying strap at regular intervals, and replace it if damaged.

### **Environmental hazard**

The VECTOR contains certain components that should be treated as hazardous waste, and must therefore be disposed of via a specialist dealer.

Deposit used batteries at a proper collection point.

### **Avoiding storage and transport damage**

- When not in use, always keep the VECTOR in its pouch with the eyepiece protection caps fitted.
- Remove the battery prior to prolonged storage. Battery leakage can damage the VECTOR!
- Observe the permissible storage temperatures.
- Do not expose the VECTOR to strong mechanical shocks or abrupt temperature transitions during transport (moisture condensation).
- Use the pouch and transit case or equivalent packaging for shipment.

### **Avoiding measurement errors**

- Note the factors affecting measurement accuracy (see pages 11, 18).
- Always perform test measurements after the VECTOR has been exposed to rough handling (vibration, falls, etc.), and before carrying out important measurement tasks.

The VECTOR's performance and serviceability are conditional on regular care and immediate attention to problems:

- Do not touch glass lenses with fingers.
- Do not soil the operating keys with oil or grease.
- Avoid abrupt temperature transitions, since these can cause condensation moisture to develop inside the VECTOR.

The VECTOR does not need special care or cleansers.

Therefore

- do not use any kind of impregnated cloth intended for cleaning spectacle lenses,
- do not use any solvent except water, e.g. no alcohol or cleansers.

### **Lens cleaning**

Particles of dirt should be blown off or removed using a soft brush. Finger prints may be cleaned first by wiping with a damp cloth, followed by soft, clean optical tissue or chamois leather.

### **Cleaning the casing**

Wipe the casing with a damp cloth.

Pay special attention to dirt and grease around the keys.

Blow out the VECTOR interface cable socket, and clean it carefully.

Allow the VECTOR to dry fully before packing.

### **Cleaning the interface cable**

Protect the cable from damp and dirt as much as possible! Wipe the cable with a damp cloth. Blow out soiled cable plugs with clean air, and leave them to dry.

## Technical data

Rangefinder	VECTOR 23	VECTOR 21 Mod B
Laser type: IR diode	1550 nm	1550 nm
Eye safety	Class 1	Class 1
Safety standards	IEC 60825-1 Ed 1.2: 2001-08 ANSI Z 136.1 (2000) FDA 21 CFR, Ch 1§ 1040 (1988)	IEC 60825-1 Ed 1.2: 2001-08 ANSI Z 136.1 (2000) FDA 21 CFR, Ch 1§ 1040 (1988)
Range capability	25 m - 25000 m	5 m - 12000 m
Specified performance	10200 m	5500 m
• Visibility	20 km	10 km
• Target size	2.3 x 2.3 m	2.3 x 2.3 m
• Albedo	0.3	0.3
• Detection probability	>90%	>90%
Accuracy (1 $\sigma$ )	$\pm$ 5 m (500 m - 12000 m)	$\pm$ 5 m
False alarm rate	< 2%	< 2%
Beam divergence	< 0.3 mil	0.4 x 0.7 mil
Display resolution	1 Meter / 1 foot / 1 yard	1 Meter / 1 foot / 1 yard

## ***Technical data (continued)***

<b>Rangefinder</b>	<b>VECTOR IV Mod B Viper II Mod B</b>
Laser type: IR diode	1550 nm
Eye safety	Class 1
Safety standards	IEC 60825-1 Ed 1.2: 2001-08 ANSI Z 136.1 (2000) FDA 21 CFR, Ch 1§ 1040 (1988)
Range capability	5 m - 6000 m
Specified performance	4000 m
• Visibility	20 km
• Target size	8 x 8 m
• Albedo	0.4
• Detection probability	>90%
Accuracy (1 $\sigma$ )	$\pm$ 3 m
False alarm rate	< 2%
Beam divergence	2 x 2 mil
Display resolution	1 Meter / 1 foot / 1 yard

## Technical data (continued)

Rangefinder	VECTOR 1500 Mod B	VECTOR 1500 GMD Mod B
Laser type: IR diode	860 nm	860 nm
Eye safety	Class 1	Class 1
Safety standards	IEC 60825-1 Ed 1.2: 2001-08 ANSI Z 136.1 (2000) FDA 21 CFR, Ch 1§ 1040 (1988)	IEC 60825-1 Ed 1.2: 2001-08 ANSI Z 136.1 (2000) FDA 21 CFR, Ch 1§ 1040 (1988)
Range capability	5 m - 2500 m	5 m - 2500 m
Specified performance	1500 m	1500 m
• Visibility	10 km	10 km
• Target size	4 x 4 m	4 x 4 m
• Albedo	0.4	0.4
• Detection probability	>90%	>90%
Accuracy (1 $\sigma$ )	$\pm 2$ m	$\pm 1$ m
False alarm rate	< 2%	< 2%
Beam divergence	$\leq 1.5$ mil	$\leq 1.5$ mil
Display resolution	1 Meter / 1 foot / 1 yard	distance: 0.5 Meter / 1 foot / 0.5 yard height: 0.1 Meter / 1 foot / 0.1 yard

## ***Technical data (continued)***

<b>Optics</b>	<b>VECTOR 1500 Mod B VECTOR 1500 GMD Mod B VECTOR IV Mod B Viper II Mod B VECTOR 21 Mod B</b>	<b>VECTOR 23</b>
Magnification	7x	10x
with Binocular Enhancer (BE-10xT)	10x	14x
Clear objective diameter	42 mm	42 mm
Exit pupil diameter	6 mm	4.2 mm
Eye relief	18 mm	18 mm
Field of view @ 1000 meters	120 m	84 m
Eye-base adjustment	58.5-71.5 mm	58.5-71.5 mm
Focus	fixed	fixed
Dioptric correction	> $\pm 4$ dpt	> $\pm 4$ dpt
1064nm laser protection, attenuation factor	O.D. > 5	O.D. > 5

## ***Technical data (continued)***

---

### **Magnetic compass (azimuth and inclination)**

Azimuth measurement range .....	360° / 6400 mils / 6300 mils / 6000 mils / 400 gon
Accuracy (1 $\sigma$ ):	
Azimuth .....	$\pm 10$ mil / $\sim 0.6^\circ$
Inclination .....	$\pm 3$ mil / $\sim 0.2^\circ$
Display resolution .....	1° / 1 mil / 1 gon
Maximum inclination / bank angle .....	$\pm 45^\circ$
Compass calibration .....	user initiated, menu driven
Declination:	
Array (adjustable) .....	$\pm 99.9^\circ$ / 999 mil / 99.9 gon
Increment .....	0.1° / 1 mil / 0.1 gon

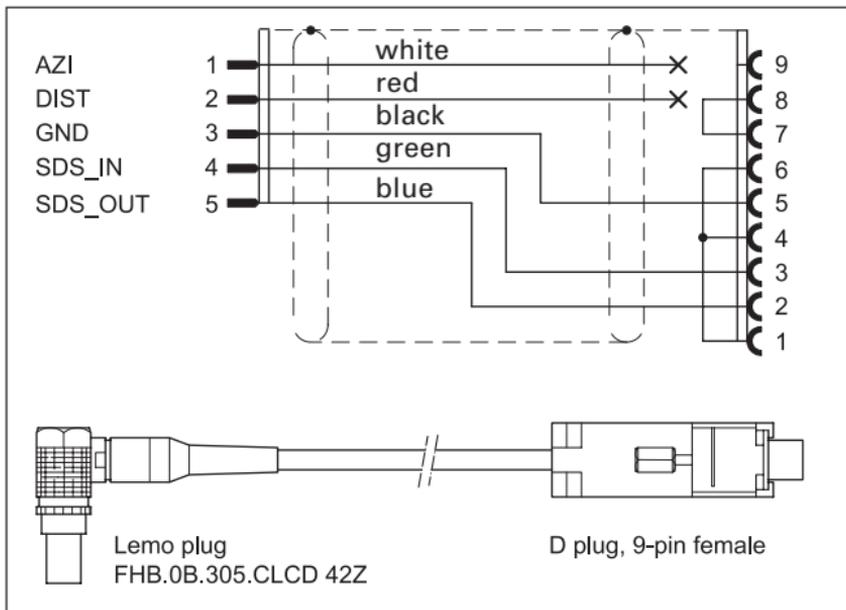
## ***Technical data (continued)***

---

### **Miscellaneous**

Power supply .....	6V lithium battery (type 2CR5)
Battery capacity .....	approx. 3000 measurements
Protective covering .....	environmentally sealed, impact-resistant rubber armour casing
Immersion proofing .....	10 min. in 1 m depth of water
Operational temperature range .....	-35° to +63° / -31°F to +145°F
Storage temperature range (without battery) .....	-40° to +85° / -40°F to +185°F
Shock resistance .....	40 g / 11 ms / xyz axes
Vibration resistance .....	10 to 500 Hz for 10 minutes
Dimensions .....	205 x 178 x 82 mm / 8.1 x 7.0 x 3.2 in
Tripod bushing thread .....	A 1/4"
Weight .....	1710 g / 60.3 oz (including eyepiece protection and battery type 2CR5)
Interface .....	RS 232

## Cable configuration to PC for VECTOR IV Mod B, Viper II Mod B, VECTOR 1500 Mod B

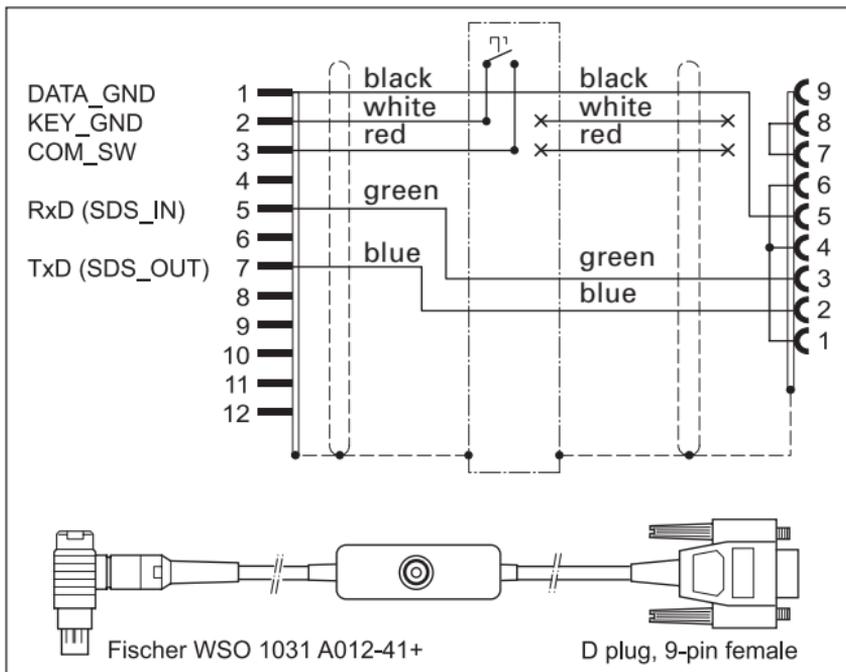


### Interface parameters

Interface .....	RS 232
Data transmission .....	bidirectional
Baud rate .....	9600 bps
Parity .....	none
Data bits .....	8
Stop bits .....	1
Handshake .....	none

The optional interface cable is intended for connection to a PC serial interface with a 9-pin D plug.

## Cable configuration to PC for VECTOR 21 Mod B, VECTOR 23



### Interface parameters

Interface .....	RS 232
Data transmission .....	bidirectional
Baud rate .....	9600 bps
Parity .....	none
Data bits .....	8
Stop bits .....	1
Handshake .....	none

The optional interface cable is intended for connection to a PC serial interface with a 9-pin D plug.

## Data transfer format to PC for VECTOR IV Mod B, Viper II Mod B, VECTOR 1500 Mod B

Every measurement (distance, azimuth, inclination) is transmitted as 10 ASCII characters:

Z	XXXXXX	XY	<CR>
Start character	Measurement value	Checksum	End character

A complete set of measurements therefore consists of 30 ASCII characters.

Before and after this continuous string, a steady logic 1 is transmitted while the VECTOR is powered on.

**i** If interface setting is in "PC Con", azimuth will be transmitted with currently set declination.

Start character for measurement value:

d ..... distance  
 a ..... azimuth  
 e ..... angle of inclination (elevation)

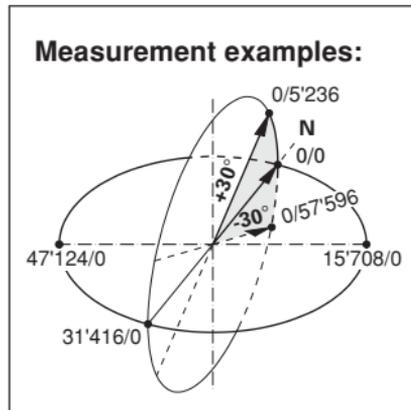
Start character for error report:

C ..... compass error  
 R ..... distance error

Measurement value: 6 integer digits or six-digit hexadecimal error code.

The data transmitted comprises:

- distance in centimetres, with 0.5 m resolution
- azimuth and inclination in milliradians (full circle = 6'283.2 mrad) and 0.2 mrad resolution.



Checksum: 2 hexadecimal digits. These correspond to the 8 LSBs (least significant bits) of the ASCII measurement value and the start character.

End character: 1 position for line feed (CR).

## Data transfer format for PC for VECTOR 21 Mod B, VECTOR 23

Azimuth and inclination are transmitted as 10 ASCII characters; 11 for distance data:

Z	XXXXXX	XY	<CR>
Start character	Measurement value	Checksum	End character

A complete set of measurements therefore consists of 31 ASCII characters.

Before and after this continuous string, a steady logic 1 is transmitted while the VECTOR is powered on.

**i** If interface setting is in "PC Con", azimuth will be transmitted with currently set declination.

Start character for measurement value:

v ..... distance  
 a ..... azimuth  
 e ..... angle of inclination (elevation)

Start character for error report:

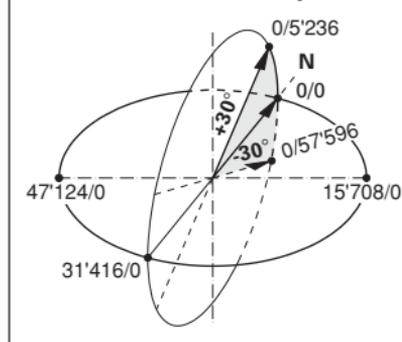
C ..... compass error  
 R ..... distance error

Measurement value: 7 integer digits for distance, 6 for azimuth and inclination or six-digit hexadecimal error code.

The data transmitted comprises:

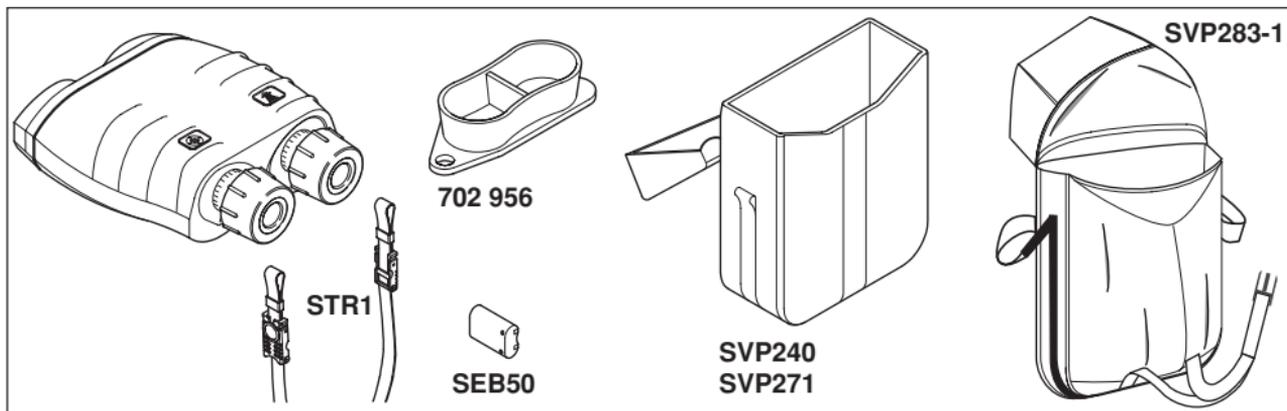
- distance in centimeters, with 0.5 m resolution
- azimuth and inclination in milliradians (full circle = 6,283.2 mrad) and 0.2 mrad resolution.

### Measurement examples:



Checksum: 2 hexadecimal digits. These correspond to the 8 LSBs (least significant bits) of the ASCII measurement value and the start character.

End character: 1 position for line feed (CR).

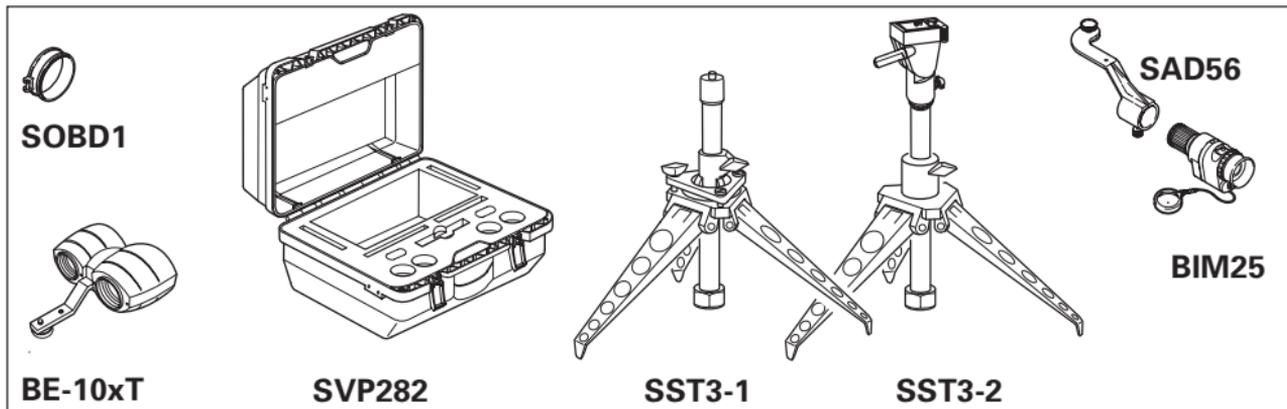


<b>Order no.</b>	<b>Description</b>
—	VECTOR™
535 314	SEB50 lithium battery, 6 volt, type 2CR5
636 965	STR1 neck strap
702 956	Eyepiece protection cover

**Optional equipment:**

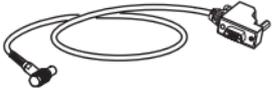
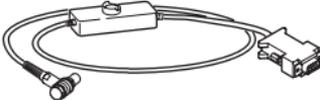
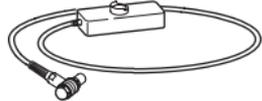
636 895	SVP240 grey pouch with accessories
664 654	SVP271 camouflage pouch with accessories
724 453	SVP283-1 pouch for VECTOR plus mini-tripod SST3-1

## Accessories



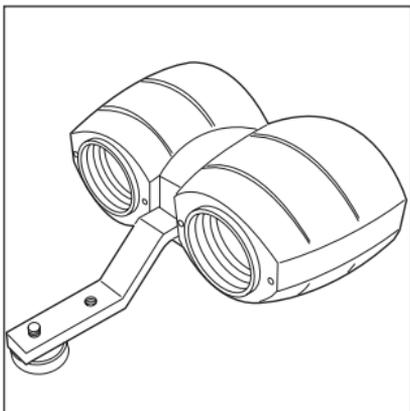
Order no.	Description
664 671	SOBD1 objective cap (order 2 pcs.)
901 793	BE-10xT Binocular Enhancer
667 484	SVP282 transit case
664 868	SST3-1 mini-tripod, non-magnetic
729 452	SST3-2 mini-tripod, non-magnetic with pan/tilt head
—	BIM25 night vision device
725 273	SAD56 adapter for night vision device

## Cables

 <p><b>VECTOR IV Mod B, Viper II Mod B, VECTOR 1500 Mod B</b> (5 pin LEMO connector)</p> <p><b>SEV48</b> </p> <p><b>SEV63</b> </p> <p><b>SEV83</b> </p>	 <p><b>VECTOR 21 Mod B, VECTOR 23</b> (12 pin Fischer connector)</p> <p><b>SEV72</b> </p> <p><b>SEV73</b> </p> <p><b>SEV80</b> </p> <p><b>SEV82</b> </p>
----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

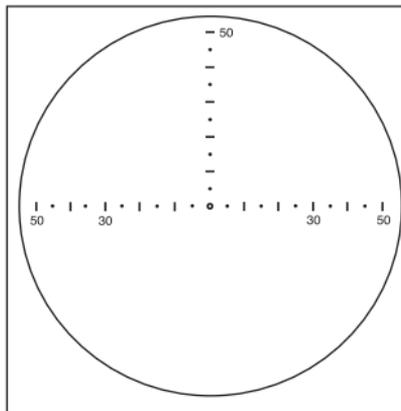
Order no.	Description
706 271	SEV48 data cable to PC for VECTOR IV Mod B, Viper II Mod B, VECTOR 1500 Mod B
721 951	SEV63 data cable to PLGR for VECTOR IV Mod B, Viper II Mod B, VECTOR 1500 Mod B
902 984	SEV83 data cable to GARMIN 12/12XL for VECTOR IV Mod B, Viper II Mod B, VECTOR 1500 Mod B
901 600	SEV72 data cable with trigger to PC for VECTOR 21 Mod B, VECTOR 23.
901 601	SEV73 data cable with trigger to PLGR for VECTOR 21 Mod B, VECTOR 23.
901 856	SEV80 remote cable with trigger for VECTOR 21 Mod B, VECTOR 23.
902 983	SEV82 data cable to GARMIN 12 / 12XL for VECTOR 21 Mod B, VECTOR 23.

## Reticle with Binocular Enhancer



### Binocular Enhancer

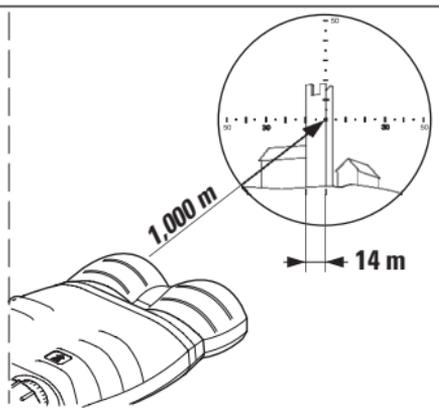
- Increase in range performance up to 35% (average 25%)
- Enhanced magnification (see technical data page 52)



### Glass reticle and Binocular Enhancer

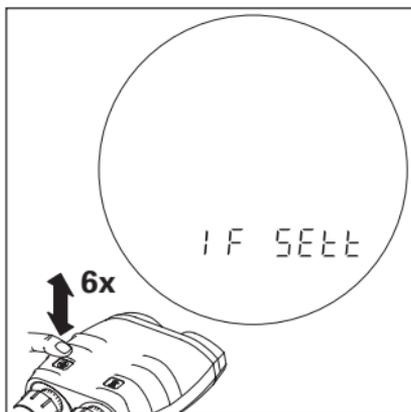
The size factor of the glass reticle changes when used together with the Binocular Enhancer

Line spacing: 7 mils  
Line-point spacing: 3.5 mils

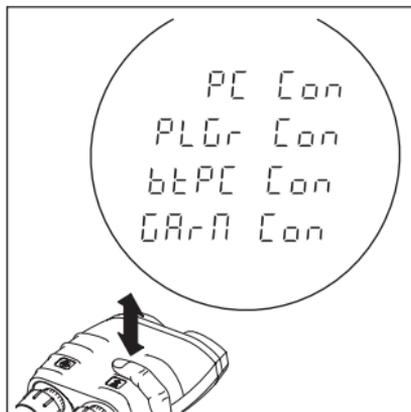


**i** 1 mil corresponds to 1.4 m spacing at a distance of 1 km.

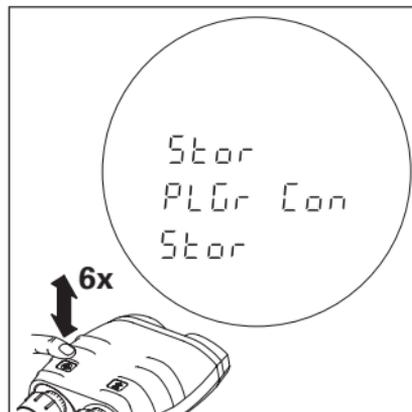
In the sample above it's 10 mil and therefore 14 m.



Various interface settings can be set. Click the azimuth key six times in rapid succession. "IF SEtt" appears briefly in the field of view, followed by the current setting. If "IF SEtt" doesn't appear, no options are enabled.



Click the distance key until the desired interface setting appears. The choice depends on enabled options. The various settings are described in detail on the following pages.



Click the azimuth key six times in rapid succession to store the setting. The message "Old rS" is displayed if the setting was not stored.

## ***Interface Settings (continued)***

---

### **Overview Interface Settings**

- PC Con:** Setting for communication with PC. Data transfer via PC cable. Interface parameters (RS232) and data transfer format see pages 55-58.
- PLGr Con:** Setting for communication with PLGR +96 / PLGR II  
Data transfer via PLGR cable.
- bt PC Con:** Setting for wireless Bluetooth communication with PC format.  
Allows data transfer via Bluetooth and PC cable.  
Interface parameters (RS232) and data transfer format see pages 55-58.
- GARM Con:** Setting for communication with GARMIN GPS 12 / 12XL  
Data transfer via GARMIN cable.

 Use the function “Combined Measurement with data transfer” to transmit measurement data (see page 14).

## PLGR+96 / PLGR II Settings

---

### Setting the VECTOR

- Store the Interface setting "PLGr Con".



When used with PLGR declination must be set at "0" (see pages 30, 31)

### Setting the PLGR+96 / PLGR II

- Set the tracking mode to **CONT**.
- Select the position format which corresponds to the map being used.
- Select the appropriate ELEV units.
- Select the appropriate ELEV reference.
- Select the appropriate ANG units.
- Select the ANG reference (Grid).
- Select the datum which corresponds to the map being employed.



The proper datum must be selected. Improper datum selection will result in poor target position accuracy.

- Set the AUTOMATIC OFF TIMER to OFF.
- Set the SERIAL mode to standard.

### Additional setting for PLGR II

- Configure port C to IP.
- Configure the remaining ports to IP (or RTCM-NMEA).
- Set the port C baud rate at 9600-9600.
- Change the LRF mode to **TARGETING**.



Azimuth in VECTOR and Azimuth on PLGR+96 PLGR II will be different due to declination angle.

If attempting to use PLGR while "PC Con" is set, the warning "PC Con" flashes in the field of view.

## Bluetooth Settings

---

### Setting the VECTOR

- Store the interface setting “btPC Con”
- “bt PAIr” blinks in the field of view.  
The Bluetooth module is turned on and allows the pairing with a Bluetooth receiver device. The pairing mode maybe terminated manually by pressing the azimuth or distance key or automatically after approx.100sec.  
“bt End” is displayed for a short instant.

### Messages:

- “bt Stby” The Bluetooth module is turned on and ready to transmit.
- “bt FAIL” Bluetooth data transfer failed
- “bt End” The Bluetooth module is shut down.
- “bt PAIr” The Bluetooth module is turned on and ready for pairing with a Bluetooth receiver device.



When not using Bluetooth it is recommended to permanently disable the Bluetooth communication by choosing the interface setting “PC Con”.



Transmission range depends on various influences. Best results are achieved with “free line of sight” between VECTOR and receiver device.  
Avoid shielding (e.g. hands around Bluetooth antenna or aluminum hard case for receiver device).

The integrated Bluetooth module complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) it may not cause harmful interferences, and (2) it must accept any interferences received, including interferences that may cause undesired operation.

## **GARMIN 12 / 12XL Settings**

---

### **Setting the VECTOR**

- Store the interface setting “**GArM Con**”



Declination in VECTOR will be considered and must be set according to the current location.

### **Setting the GARMIN GPS 12 / 12XL**

System Setup:

- Set the mode to NORMAL.

Navigation Setup:

- Select the position format which is corresponding to the map being used (UTM / UPS). Select the map datum which corresponds to the map being used (WGS84).
- Select the appropriate units (METRIC)
- Select the appropriate heading reference (GRID) and heading unit (MILS)

Interface Setup:

- Set the data protocol to GRMN / GRMN
- Set the GARMIN GPS 12XL as HOST



The proper datum must be selected. Improper datum selection will result in poor target position accuracy.

### **Operation**

After triggering the measurement, the data is sent to the GARMIN and in the display appears “MESSAGE! PRESS PAGE”.

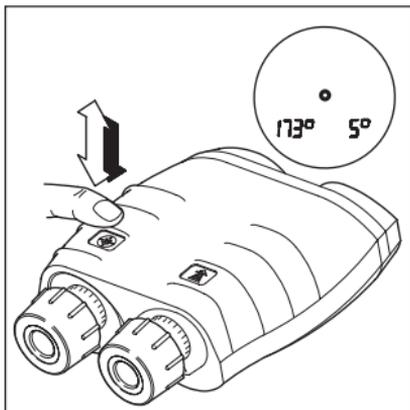
Press “PAGE” and “TRANSFER HAS BEEN COMPLETED” appears. Press “PAGE” again to return to the previous view.

The “MAP SCREEN” is best to view targets. The last target is displayed with a “+” and named “TGT”. Mark the “TGT” and the current azimuth and distance to the target is shown at the top of the screen. Press “ENTER” to view the corresponding coordinates and altitude.



The azimuth and distance displayed at the top of the MAP SCREEN show the current distance and heading to the target. When GARMIN is moving, the azimuth and distance will change accordingly.

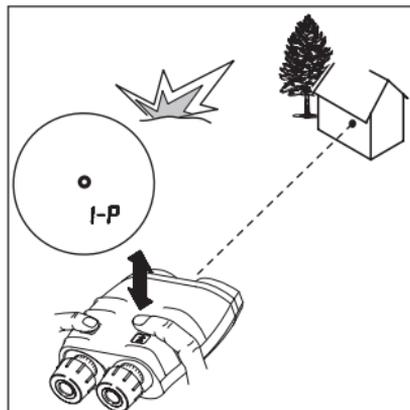
## Fall of shot - FOS



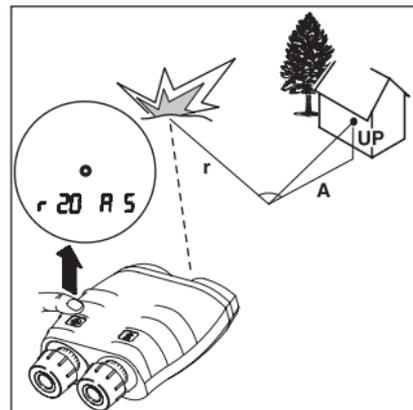
Click the azimuth key once, then immediately press and hold it down.

The following items appear in the field of view:

- the current azimuth at the left
- the current angle of inclination at the right



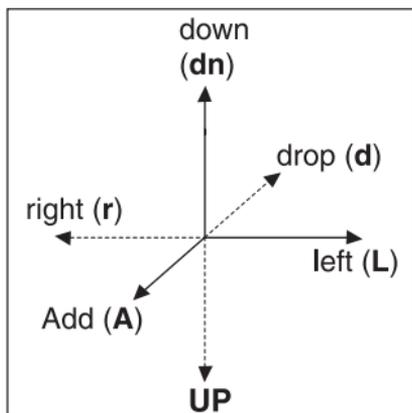
Sight the **target** with the pointing circle. Click the distance key (> 0.5 s) while holding the VECTOR steady - "1-P" appears.



Sight the **FOS** and release azimuth key while holding the VECTOR steady.

The **corrections** (L.. / r.., A.. / d..) from FOS to target appear first.

## Fall of shot - FOS (continued)



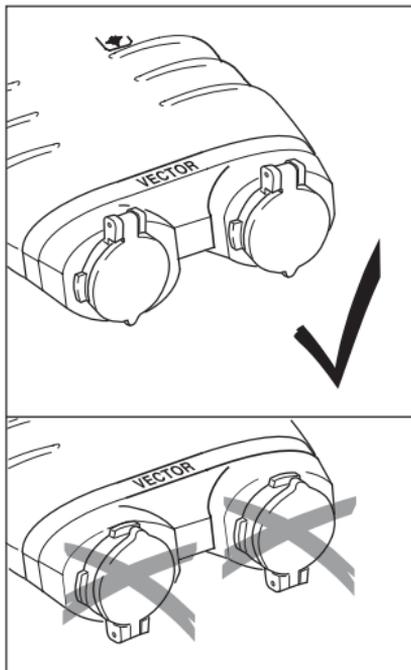
**i** The display time can be extended, by holding down the distance key during the time the parameters are shown.

Click distance key to display height correction (UP.. / dn..).  
Click distance key to display **corrections** again.

Example: Is a shot left and short, the correction is **r..** and **A..** with a figure.

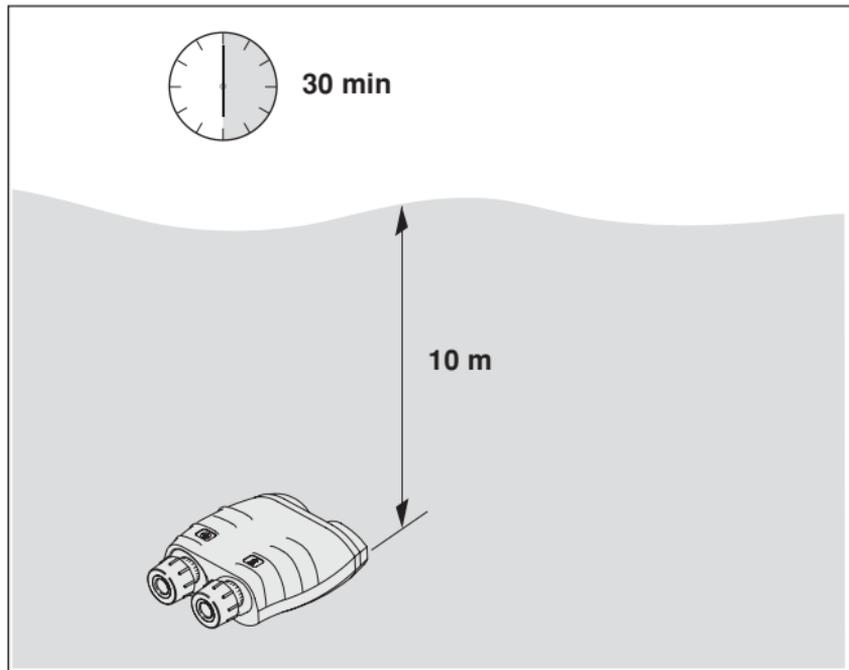
## Objective cap

Mounting the objective cap with glint protection (SOBD2)

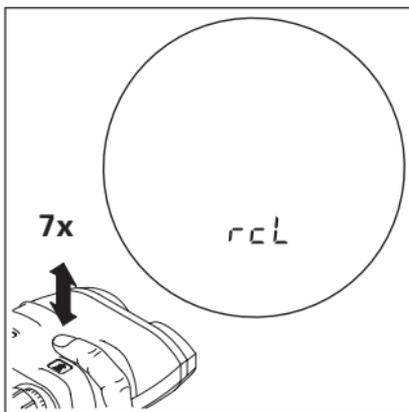


## Casing seal

Special seals increase water immersion resistance to 30 minutes in 10 m water depth.



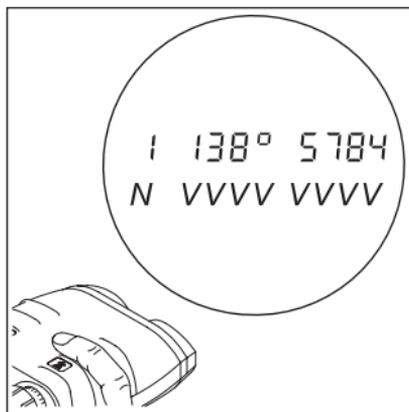
## Data Recall



### Data recall

In the data recall menu the last nine measurements can be displayed again.

Click distance key seven times in rapid succession. For a short time, "rcL" appears in the field of view.



Automatically, the last measurement appears, identified by the number "1" at the very left.

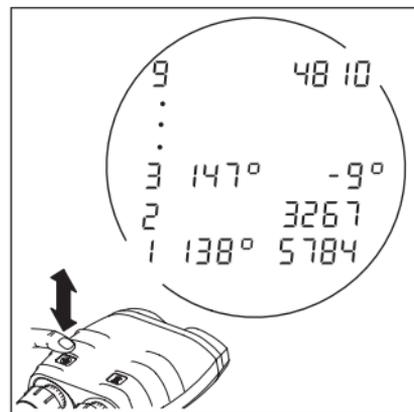
Explanation of display:

N=Number of measurement (1-9)

"1"= last measurement

"2"= second but last,  
and so on

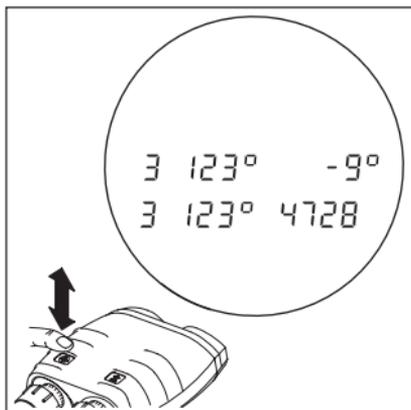
V=Display of measurement  
values



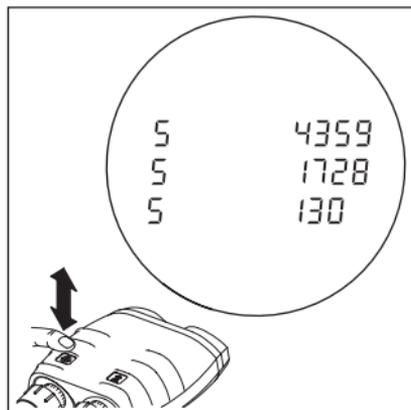
Click azimuth key repeatedly to obtain the last nine measurements in succession.

**i** While displaying measurements with more than two values the number N at the very left stays the same (e.g. combined measurement "Distance/Azimuth/Inclination" or "Multiple Object Measurement").

## Data Recall (continued)



While showing a combined "Distance/Azimuth/Inclination" measurement, azimuth (left) and slope distance (right) appear first. Click azimuth key again to obtain inclination (right) and azimuth again (left). As it is the same measurement, the number N at the very left does not change.



While showing a multiple object measurement, the displayed value blinks. Click azimuth key repeatedly to obtain all measured distances in succession. All values taken during the same measurements have the same number N at the very left.

**i** The value is displayed for approx. 10 seconds, before automatically exiting the recall mode. During this time, no measurements can be made! To exit the recall mode manually, press distance key seven times in rapid succession. Afterwards, the device is ready to measure again.

A battery change will delete the memory (displayed as "----"). Incomplete measurements will not be stored (displayed as "----").

The values in the memory are always displayed in the currently set units.

Measurements which are filtered out due to activated distance gate will not be stored.

## ***Customer service***

Our customer and information service will be glad to offer assistance if your instrument requires maintenance, if it sustains damage, or if you require any other information:

Vectronix AG  
Max-Schmidheiny-Strasse  
CH-9435 Heerbrugg  
(Switzerland)

Telephone: +41 71 726 72 00  
Fax: +41 71 726 72 01  
Internet: [www.vectronix.ch](http://www.vectronix.ch)

## ***Quality system***

SQS certification attests that Vectronix operates a quality management system that complies with international standards for quality and quality management systems (ISO 9001) and environmental management systems (ISO 14001).



Total Quality Management – our commitment to total customer satisfaction. Ask your local Vectronix representative for more information about our TQM programme.

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Switzerland.

## ***Eye safety***

IEC 60825-1 Ed 1.2 (2001-08)  
ANSI Z 136.1 (2000)  
FDA 21 CFR Ch 1§ 1040 (1988)





902466-1.5en  
Printed in Switzerland  
Copyright by Vectronix AG  
Heerbrugg, Switzerland, VI 2006  
Original text

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