



Operating Instructions

Telescopic Sight

ZF 6-24x72 SAM

330285-0000.000

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Preliminary Remarks

- 1 The ZF 6-24x72 Telescopic Sight SAM is a fine electronical- mechanical optical precision instrument.

Exact knowledge of the device is required for

- correct handling,
- reliable functioning during operation,
- maintenance of long life-span

- 2 Important instructions for technical security are especially emphasized



ATTENTION for working methods, which must be exactly followed, in order to avoid damage or destruction of the device.



CAUTION for working methods, which must be exactly followed, in order to avoid that persons are harmed.



NOTE technical requirements the user of the device must especially pay attention to.

- 3 Reference to illustrations and location numbers are stated in brackets, Example: (2/3) means illustration 2, location number 3.

4 Manufacturer



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- 5 If you have found errors or have ideas to contribute to a better manual, please contact us. We are grateful for suggestions originating from practical use.

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Safety Regulations

- Use of the device as directed is essential for safe operation. Therefore, familiarize yourself thoroughly with the contents of these operating instructions. This manual must always be kept accessible at all times.
- The device may only be operated with the accessories described in these operating instructions. Other accessories may only be used if their safety unobjectionable usability has been proven by the manufacturer. The operator or user must convince himself hereof.
- Modifications and repairs may only be performed by the manufacturer or persons explicitly authorized by him. The manufacture is not liable for damages due to unauthorized performed modifications or repairs of the devices. In addition, all warranty claims then become invalid.
- Accident prevention regulations must be observed in accordance with the legal requirements.
- The use of the device may only be permitted by trained and qualified persons having knowledge of the valid safety regulations. It is the responsibility of the operator of the equipment to train and instruct the operating personnel accordingly.
- Before putting the systems into operation their proper condition must be verified.
- Under no circumstances look through the sight at the sun or laser light sources. This could lead to serious eye injuries.
- Carl Zeiss Optronics GmbH shall not be liable for any damage or consequential damage caused by software or incorrectly entered values.

1

Description

1.1 Designation

Usual Name: Telescopic Sight 6-24x72 SAM
(**S**niper **A**uxiliary **M**odule)
Short Name: SAM
Part Number: 330285-0000-000

1.2 Determined Use

The telescopic sight 6-24x72 SAM (SAM) is used by the shooter in combination with a sniper rifle for the identification, acquisition and sighting of a target. The built-in reticle illumination enables aiming during twilight conditions. Internal display of set or calculated elevation and windage, cant indicator, and various sensor measurements make operation easier and also improve accuracy when shooting.

An integrated ballistic calculator increases hit accuracy, particularly first hit probability, through an option allowing the selection of different types of ammunition.

The SAM is equipped with parallax compensation from 50 m to ∞ .



NOTE

The SAM is available in two versions: either with a mount inclination angle of 0 MOA, or of 30 MOA.
The first units were supplied with a 25 MOA mount.

1.3 Marking

The SAM is marked on the upper and lower side of the eyepiece unit and on the mount (Illustration 1).
In addition to the logo and serial number, the inclination angle is also marked on the mount (1/1).

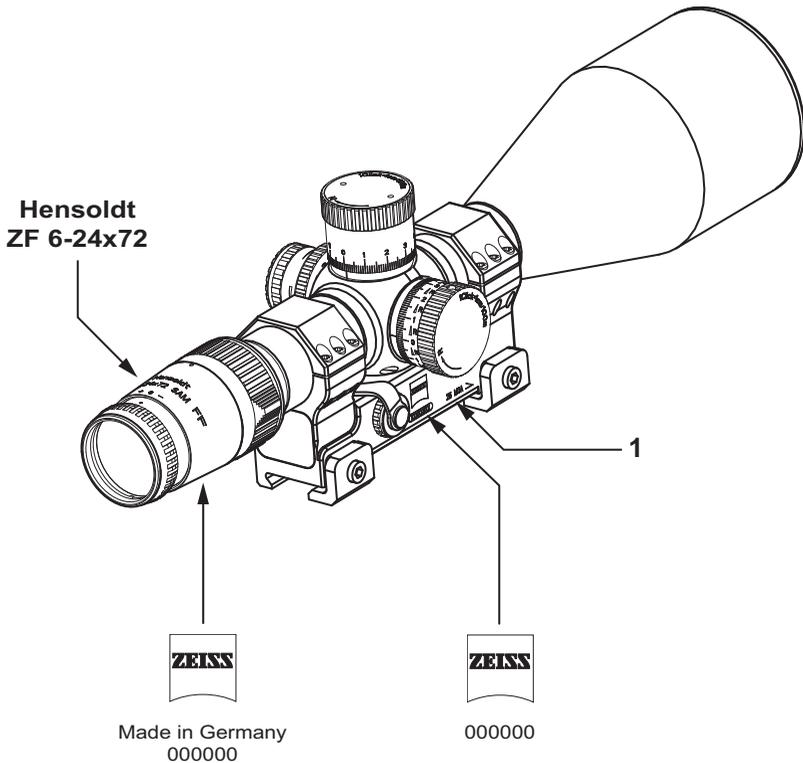


Illustration 1 Marking

1 Mount inclination angle

1.4 Technical Data

Dimensions

	Length	Width	Height
SAM with mount	390 mm*	94 mm*	94 mm*

* Dimensions can differ slightly depending on adjustment settings.

Weight

SAM with mount 1,750 g

Electrical Data

Reticle illumination	red
7 segment display	red
Temperature sensor	-40° C / +70° C
Angle sensor	± 75°
Interface	input output
Automatic reticle illumination shutoff	after 3 hours
Scope power supply	button cell 3 V CR 2032 to -20° C or 3 V BR 2032 to -40° C
Mount power supply	2 lithium batteries 3 V, CR123 A

Optical Data

Magnification	6x–24x
Entry pupil	72 mm
Exit pupil.....	12 mm–3 mm
Field of view at 1000 m	61 m–17 m
Interpupillary distance	ca. 80 mm
Parallax compensation	50 m – ∞
Resolution	min 2.5"
Diopter adjustment	-2.5 dpt – +2 dpt
Transmission	ca. 90%

Superelevation angle adjustment

- per click for elevation and windage 0.1 mrad \triangleq 1 cm/100 m

Max. adjustment path

- Elevation \pm 120 cm/100 m

- Azimuth \pm 60 cm/100 m

Reticle

Distance between dots 10 cm/100 m
(at magnification = 12x)

Distance between centering bars 100 cm/100 m
(at magnification = 12x)
(See Fig. 4)

1.5 Design and Function

1.5.1 General

The SAM is a monocular/monobjective telescope with a lens erecting system and 6x to 24x magnification. The reticle of the telescopic sight can be illuminated and brightness regulated.

A ballistic calculator and sensors are built into the mount. The ballistic calculator uses the sensor measurements to calculate the entered values. An air humidity of 50% is always used for calculations. The corrected elevation and windage values, as well as the sensor values, can be viewed. The information is displayed in the field of view by means of a beam splitter in the eyepiece.

Ammunition, weapon and settings data are read-in via a data interface.

The parallax between reticle pattern and image scene can be continuously compensated for target distances of 50 m to ∞ .

Sealing elements in the scope prevent moisture from entering, so the telescopic sight is always usable even during sudden temperature changes, rain, snow or fog.

The supplied scope protection cap (2/1) protects the front lens from damage during transport.

The SAM can be used on a weapon with different types of ammunition and also for different types of weapon. The values are saved in the ballistic dataset and zeroing mode. The user must assign the ballistic dataset of the weapon and also note the position of the SAM on the weapon.

Which functions are displayed in the SAM depends on the configuration, carried out using a PC or laptop. Instructions for full configuration are described below.

When configuring, ensure that metric units are used. The description uses a metric configuration.

The messages in the display are shown in Appendix A.

Appendix B describes the error code messages.



NOTE

The datasets in *Ballistic dataset* mode “-bal-“ (b 1 to b 4; tab_1 to tab_4 and Clic) are assigned to the corresponding zeroing data. It is possible to zero all the datasets successively.

The user can decide for which ballistic dataset the turrets will be mechanically set to 0, as this is only possible in one dataset.

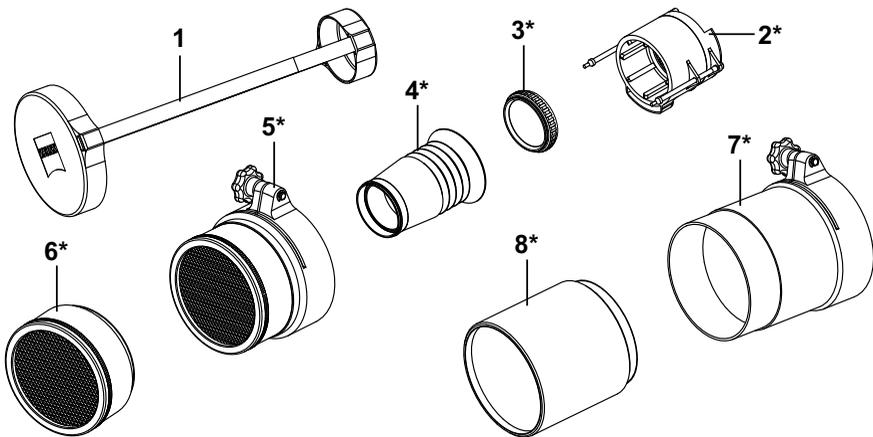
The saved data are retained even if the SAM is switched off and stored without batteries for a long time.

1.5.2 Mountable Accessories (optional)

The rubber protection ring can be replaced by the eyeguard (2/4), which is screwed in front of the eyepiece. It prevents the user being blinded by too intensive sunlight and disturbing optical reflections. It also prevents optical reflections of facial skin when using a night sight attachment.

The supplied baffles (2/5) and (2/6) can, if required, be fitted onto or in front of the objective (3/1). The threaded baffle, complete (2/6) is screwed in front of the objective and the clampable baffle (2/5) is fitted on the objective and clamped tight. They have the following functions:

- prevent reflections of the incident backlight towards target (camouflage),
- protect the user from obliquely incident sunlight.



* Accessories are only supplied as an optional extra.

Illustration 2 Mountable accessories

- | | | | |
|---|----------------------|---|--|
| 1 | Scope protection cap | 6 | Baffle, threaded,
complete* |
| 2 | Polarization filter* | 7 | Backlight tube, clampable* |
| 3 | Yellow filter* | 8 | Backlight tube, threaded,
complete* |
| 4 | Eye guard* | | |
| 5 | Baffle, clampable* | | |

Instead of the baffles, one of the backlight tubes (2/7) and (2/8) can be fitted in front of the objective.

The threaded backlight tube (2/8) is screwed onto the objective (3/1) and the clampable backlight tube (2/7) is mounted on the objective (3/1) and clamped tight. They prevent the user being blinded by backlight.

For a low-contrast image it is possible to screw on a yellow filter (2/3) in front of the eyepiece.

In order to sight a target at certain angular ranges through reflecting glass disks, a polarization filter (2/2) can be fitted to the eyepiece. The filter reduces reflections of the sighted glass disk.

The scope may only be mounted on the weapon by authorized qualified personnel or gunsmiths.

1.5.3 Functions

The SAM is equipped with the following functions:

- ON/OFF switch
- Brightness control for reticle and display
- Mechanical vertical and horizontal adjustment
- Ballistic calculator
- Mode selection (see Section 1.6)
- Battery status indicator
- Air pressure sensor
- Temperature sensor
- Cant sensor, elevation and azimuth
- Error code display
- Bushing for programming interface.

The display can show the following data:

- Elevation and windage clicks
- Temperature
- Air pressure
- Angle of site
- Operating functions
- Cant angle (continual LED display)
- Wind speed and direction
(after manual entry and only in CALC mode)

1.5.4 Design

The SAM consists of:

- eyepiece (3/6)
- magnification adjustment with erecting system (3/5)
- tube (3/14),
- objective (3/1), and
- mount (3/8).

The index mark for diopter zero setting is located on the eyepiece (3/6). The eyepiece is screwed into the eyepiece tube (3/7). The following are engraved on the eyepiece tube: "0" mark, the direction indicator for diopter adjustment, device marking and the index mark for magnification adjustment.

The magnification adjustment with erecting system (3/5) is fixed to the tube (3/14). The magnification values are marked on the magnification adjustment ring. When changing magnification the magnification of the reticle pattern remains **unchanged**.

The internal display (Illustration 11) consists of five 7-segment displays and two LEDs for the cant indicator, and is built into the erecting system. The display is in red.

Integrated in the tube (3/14) are the mounts for elevation and windage adjustment. The rotary knob for elevation adjustment (3/3), windage adjustment (3/4), parallax compensation (3/2) and rotary knob for controlling reticle illumination (3/13) are fixed outside the tube.

The elevation mechanism can be adjusted through ± 120 clicks, corresponding to two rotations of the elevation adjustment knob. The knob is engraved with numbers from 0 to 11, which are to be multiplied by 10. The scale is divided into tenths and the values can be read off using the index mark (4/9). The elevation adjustment knob has an engraved arrow indicating the direction and deviation per click.

For better orientation at larger adjustment ranges an additional tangible and audible click detent is available every 10 clicks (10 cm/100 m) as subdivision. The elevation mechanism incorporates an encoder with transfers the values to the ballistic calculator.

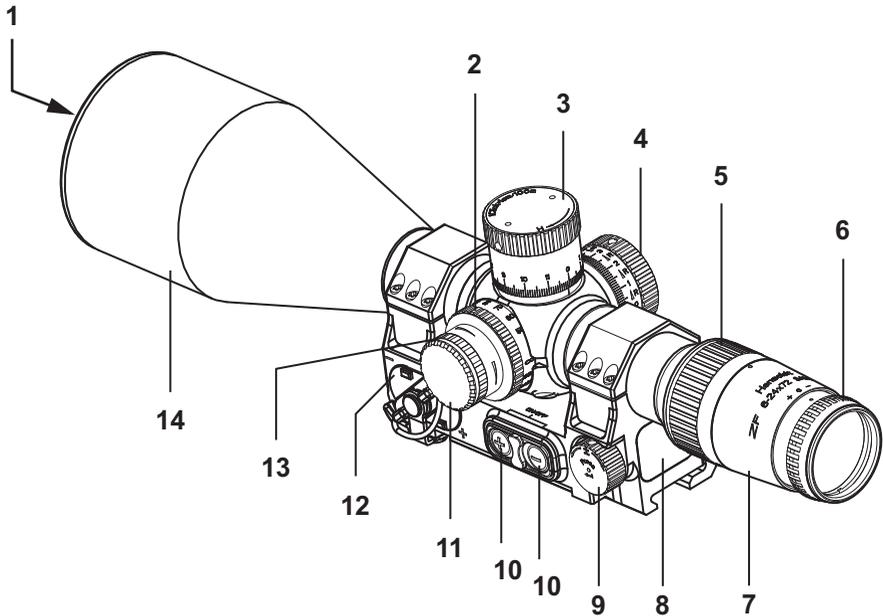


Illustration 3 Design, left

- | | |
|---|---|
| 1 Objective | 7 Eyepiece tube |
| 2 Rotary knob for parallax compensation | 8 Mount |
| 3 Rotary knob for elevation adjustment | 9 Setting wheel |
| 4 Rotary knob for windage adjustment | 10 Mode selection buttons |
| 5 Magnification adjustment with erecting system | 11 Battery compartment, scope |
| 6 Eyepiece | 12 Battery compartment, mount |
| | 13 Rotary knob for illumination control |
| | 14 Tube |

The windage adjustment can be adjusted through ± 60 clicks. The windage adjustment knob (4/4) is engraved with settings of ± 6 , which are to be multiplied by 10. The scale is divided into tenths and the values can be read off using the index mark (4/8). The windage adjustment knob has engraved arrows indicating direction and deviation per click.

The windage adjustment incorporates an encoder which transfers the values to the ballistic calculator.

The scope battery compartment (3/11) for a button cell is built into the illumination control knob (3/13). The button cell powers the reticle illumination and illumination control.

The reticle illumination is switched on by turning the illumination control knob (3/13) and switched off by pressing. When illumination is switched off the selected brightness is saved.

The illumination control knob (3/13) has no end stop and when switched on has an idle range of $\pm 45^\circ$.

The reticle illumination shuts off automatically after three hours.

Only part of the reticle is illuminated see (Illustration 7).

When a new battery is needed (low batt.) the reticle illumination fluctuates in brightness with a frequency of approx. 1 Hz.

The parallax compensation knob (3/2) enables the scene to be adjusted to give a sharp image in a range from 50 m to ∞ . The distances are engraved on the parallax compensation knob. The value set can be read off the housing recess.

The objective (3/1) is built into the tube.

On the right side of the mount (4/2) are the clamps (4/6) and screws (4/3) with which the SAM is fixed to the weapon. In addition, a guide bracket (4/7) is screwed to the base of the mount, which ensures a secure fit to the rifle rail.

The protective cap for the interface (4/5) is attached by a rubber strap to the mount so it cannot be lost and is screwed onto the bushing. It protects the socket from dirt and damage.

Via the bushing and the connector cable all relevant data for the SAM can be read in and out.

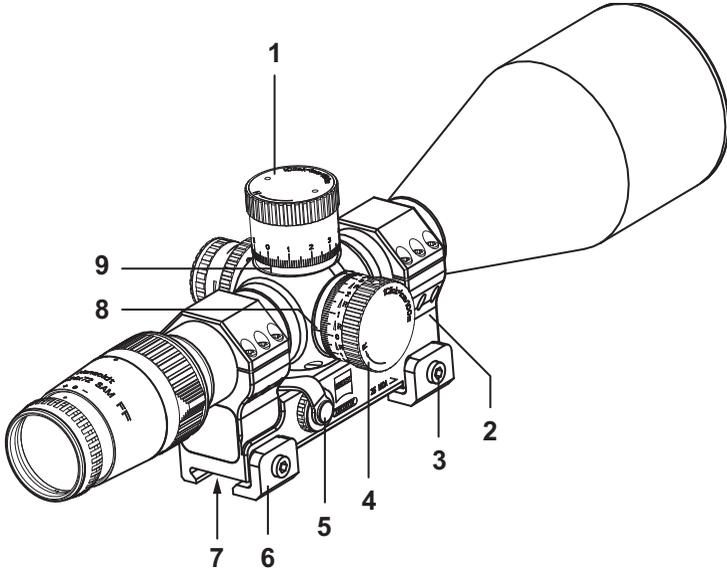


Illustration 4 Structure, right side

- | | |
|--|------------------------|
| 1 Rotary knob for elevation adjustment | 6 Clamps |
| 2 Mount | 7 Guide bracket |
| 3 Screw | 8 Index mark windage |
| 4 Rotary knob for windage adjustment | 9 Index mark elevation |
| 5 Protective cap for interface | |

On the left side of the mount is the built-in mount battery compartment (3/12), which is closed by a cover. It is attached to the mount with a rubber strap. A sealing ring is fitted in the battery compartment cover. The battery compartment cover is secured with a clip.

Symbols for the battery position are marked adjacent and on the bottom of the battery compartment.

The batteries provide the power for the electronics in the mount, the display and the encoder in the scope.

When a new battery is needed (low batt.) the reticle illumination fluctuates in brightness with a frequency of approx. 1 Hz.

Adjacent the battery compartment on the left side of the mount, are the two mode selection buttons (3/10). The button is pressed to access the next mode.

The SAM is switched into Standby mode by pressing the two mode selection buttons. Zeroing values and turret-reference values are saved even when the device is switched off.

On the same side of the mount near the mode selection buttons is the setting wheel (3/9). Pushing the setting wheel enables submenus to be accessed or settings confirmed; turning the wheel enables values to be changed. In addition the brightness of the 7-segment display in each mode can be adjusted by simultaneously pushing and turning the setting wheel.

If the plus and minus mode selection buttons (3/10) and the setting wheel are simultaneously pushed, an overwrite mode is accessed, in which set values can be overwritten.

This function also enables the SAM to be switched off in OFF mode. The set turret-reference values will be deleted when switching off.

There are three temperature sensors in the mount, an air pressure sensor and an angle sensor.

1.5.5 Reticle

The reticle pattern of the SAM consists of the centering bars (5/2) with graduations and the lead circles (MIL-dots) (5/3).

The distances and dimensions of the reticle correspond to MIL-dot Gen II™ reticle pattern and are shown in (Illustration 5) and (Illustration 6).

The MIL-dots (5/3) have an outer diameter of 0.2 mrad (2 cm/100 m) and an inner diameter of 0.1 mrad (1 cm/100 m).

The values for the distances between the centering bars and MIL-dots are only valid at a magnification of 12x (5/1). At other magnification settings the values must be determined and the distances between the dots estimated, e.g. at 24x magnification half the value (5 cm/100 m).

The reticle pattern is only partly illuminated by the reticle illumination in the center. The illuminated reticle pattern is shown in (Illustration 7).

The center cross (7/2) is 10 cm x 10 cm/100 m and the distance between the orientation lines (7/1) is 1 m/100 m.

Bar width: 4 mm/100 m

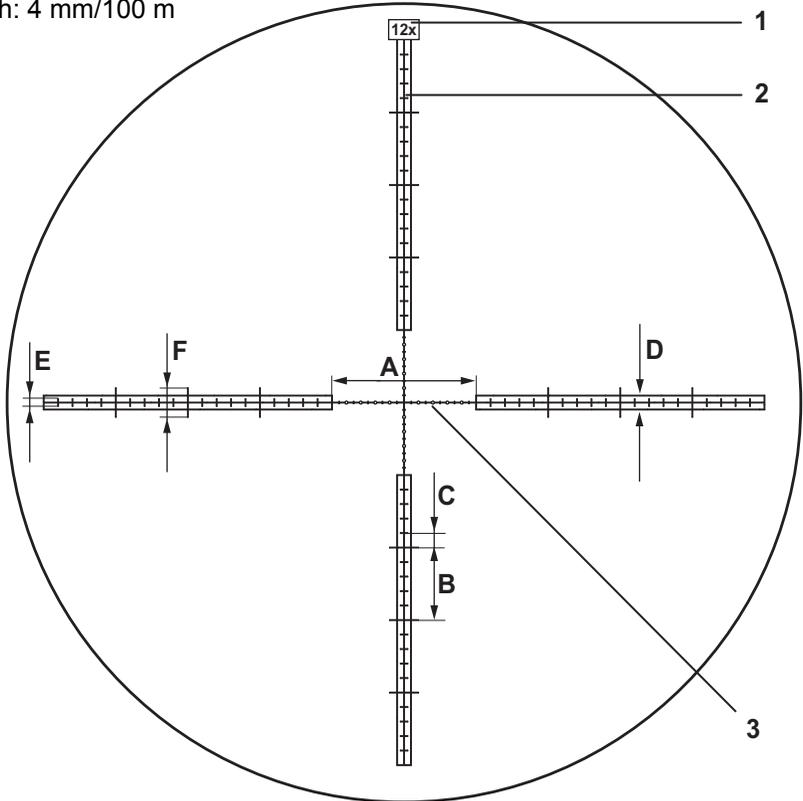


Illustration 5 Reticle pattern

- | | | | |
|---|---|---|--|
| 1 | Information 12x magnification | C | Distance between the graduation marks, short 10 cm/100 m |
| 2 | Centering bars | D | Width of centering bars 7.5 cm at 100 m |
| 3 | Lead circles (mil-dots) | E | Length long graduation mark 10 cm/100 m |
| A | Distance between the centering bars 1m/100 m | F | Length short graduation mark 5 cm/100 m |
| B | Distance between the graduation marks, long 50 cm/100 m | | |

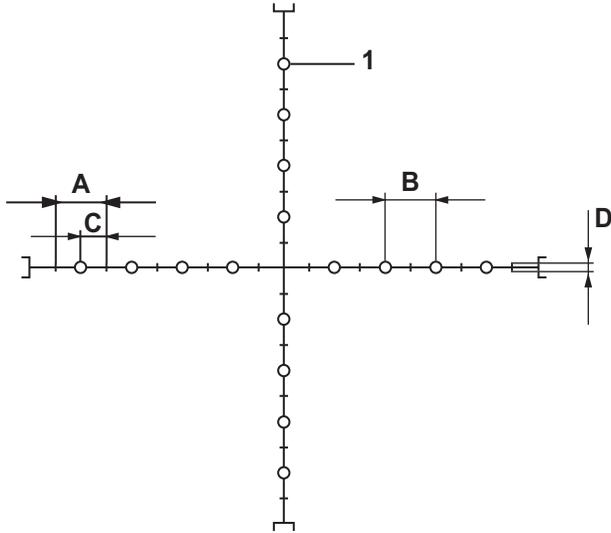


Illustration 6 Detail of reticle pattern

- | | | | |
|---|--|---|---|
| 1 | Lead circles (mil-dots) | C | Distance between lead circle and graduation mark 5 cm/100 m |
| A | Distance of graduation marks 10 cm/100 m | D | Height of graduation marks 1.5 cm/100 m |
| B | Distance of lead circles 10 cm/100 m | | |



Illustration 7 Illuminated reticle pattern

- | | |
|---|--------------------------------------|
| 1 | Orientation lines (distance 1m/100m) |
| 2 | Center cross (10 cmx10cm/100 m) |



1.5.6 Function

The parallel rays coming from the target at the ∞ setting of the parallax compensation knob, are imaged vertically and laterally inverted by the objective (8/1) via the field lens (8/10) in the first image plane (8/2).

By adjusting the parallax compensation knob the field lens is shifted in a longitudinal direction, whereby the rays, coming from the relevant finite distance, are imaged in the first image plane. The reticle and the focused scene coincide and are therefore imaged parallax-free.

The lenses of the magnification adjustment with erecting system (8/9), which can be moved towards each other in longitudinal direction, enable the image to be pictured upright and non-reversed in the second image plane (8/3), in which the reticle (8/4) is located. Here it is viewed magnified in the eyepiece (8/5).

The eyepiece is adjustable by +2 to -2.5 diopter.

The exit pupil (8/6) lies approx. 80 mm in front of the first eyepiece lens.

The data shown in the 7-segment display (8/8) are imaged in the ray path by means of the mirror (8/7) and displayed together with the scene in the eyepiece (8/5).

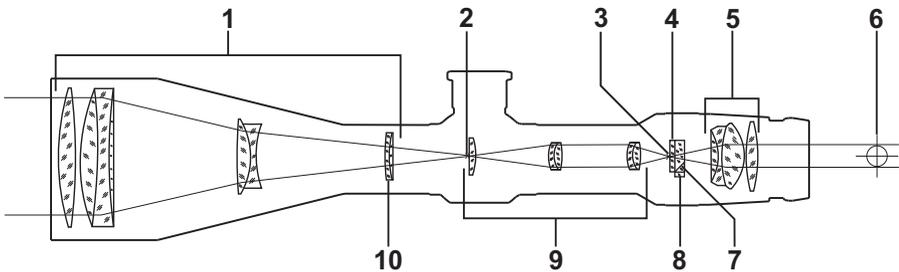


Illustration 8 Optical structure

- | | |
|----------------------|---------------------|
| 1 Objective | 6 Exit pupil |
| 2 First image plane | 7 Mirror |
| 3 Second image plane | 8 7-segment display |
| 4 Reticle | 9 Erecting system |
| 5 Eyepiece | 10 Field lens |

1.6 Mode Functions

1.6.1 General

The mode functions are of two types: display mode and function mode. In display mode, values can only be displayed but not changed. In the function modes, submenu items can be selected or values changed. Different mode functions are selected using mode selection buttons (3/10) and confirmed by pressing the setting wheel (3/9). Different submenu items are selected or settings changed by turning the setting wheel.

If a function is not available due to missing data or required settings which have not been performed a message is given in the display.

Which mode functions are available in SAM depends on the settings made via a laptop or PC.

1.6.2 Display Mode

1.6.2.1 Battery Indicator

The battery indicator is automatically displayed after the device is switched on. The battery indicator can also be accessed using the mode selection buttons (3/10).

In battery mode the display shows the battery capacity with two broken lines and in mains mode with three broken lines (see Illustration 9).

The upper or center line indicate the battery status. The battery is fully charged when all five lines can be seen.



Battery operation

Mains operation

Illustration 9 Battery indicator

1.6.2.2 Air Pressure Display

The air pressure display can be accessed by pressing the mode selection buttons (3/10). The value is measured by the sensor and identified in the display with the letter "P" (see Illustration 10).



Illustration 10 Air pressure indicator

Only the Calculation mode takes account of the air pressure when calculating the delta values. In the other modes any compensation required due to changed air pressure must be determined from tables and applied manually by adjusting the elevation knob.

1.6.2.3 Cant Angle Display

Tilting of the rifle is shown in all modes by two LEDs. If the weapon is not tilted the two LEDs are off. The direction of cant is shown by the corresponding LED lighting up (left or right).



Illustration 11 Display, complete

Illustration 11 shows the complete display.

1.6.2.4 Angle of Site Display

The angle of site measured by the sensor can be shown by pressing the mode selection buttons (3/10). The value is identified with the letter "A" and the sign is **only** displayed for negative angles of inclination (see Illustration 12)



Illustration 12 Angle of site indicator

The angle of site is taken into account in the Calculation and Range mode.

1.6.3 Functions Mode

1.6.3.1 Turret Reference (rEF)

The Reference mode can be accessed by pressing the mode selection buttons (3/10) (see Illustration 13). In reference mode the turrets are set to the reference values and saved. The sub-menu is accessed by pressing the setting wheel (3/9).



Illustration 13 Reference indicator

1.6.3.2 Elevation Position Display

The elevation turret position can be shown by pressing the mode selection buttons (3/10) and the current elevation turret value appears in the display. (see Illustration 14). The identification letter is “H” and **only** negative values are displayed with a sign, based on the saved zeroing position.



Illustration 14 Elevation position indicator

When the elevation turret has been adjusted, the program automatically switches from the set mode into the elevation display mode, shows the new position of the elevation turret for between 5 sec. and 2 min and then returns to the set mode.



NOTE

If the SAM has not been zeroed only absolute values are displayed.

1.6.3.3 Windage Position Display

The windage turret position can be shown by pressing the mode selection buttons (3/10) and the current elevation turret value appears in the display (see Illustration 15). The identification letter is “S” and the direction of rotation of the windage adjustment knob is indicated by “r” or “L”, based on the saved zeroing position.



Illustration 15 Windage position indicator

When the windage turret has been adjusted, the program automatically switches from the set mode into the windage display mode, shows the new position of the windage turret for between 5 sec. and 2 min and then returns to the set mode.



NOTE

If the SAM has not been zeroed only absolute values are displayed.

1.6.3.4 Temperature averaged

The temperature can be displayed by pressing the mode selection buttons (3/10). The average value from the three sensors is displayed (see Illustration 3).



Illustration 16 Temperature indicator

The submenu can be accessed by pressing the setting wheel (3/9). This is indicated by flashing of the “o” sign and the identification letter “C”. The temperature can be set manually by turning the setting wheel. If the setting wheel is pressed again the measured value is again displayed.

If the “o” sign and letter “C” are flashing then it is a manually set temperature.

1.6.3.5 OFFset VO/bc (oFSEt)

The OFFset VO mode (muzzle velocity)/bc (ballistic coefficient) is accessed by pressing the mode selection buttons (3/10) and is identified in the display (Illustration 17).



Illustration 17 Offset VO/bc

The submenu is accessed by pressing the setting wheel (3/9) and the two values can be shown in the display. The two values can be overwritten by pressing the mode selection buttons and the setting wheel (3 Push).

1.6.3.6 Ballistic Dataset (-bAL-)

The Ballistic Dataset mode is accessed by pressing the mode selection buttons (3/10) and is identified in the display (Illustration 18).

In the submenu it is possible to select from four ballistic tables (tAb_1 to tAb_4), four ballistic datasets (b1 to b4) or „no ballistics“ (Clic).

The submenu is accessed by pressing the setting wheel (3/9) and the display shows the last set dataset with flashing of the first two characters or last character of the identification code.

In No Ballistics mode the SAM operates as an optical scope, with the advantage that elevation and windage values are shown in the display, based on the saved zeroing position.



Illustration 18 Ballistic dataset

In this mode it is not possible to use the Calculation mode.

The ballistic tables and ballistic datasets are prepared on a PC or laptop. The datasets, including No Ballistics, must then be transferred from the PC or laptop to the SAM.

1.6.3.7 Ballistic Calculation or Ballistic Table (CALC)

The ballistic calculation mode or ballistic table (CALC) is accessed by pressing the mode selection buttons (3/10) and is identified in the display (Illustration 19).



Illustration 19 Calculation indicator

If no ballistic values have been entered, “**nodAt**” appears in the display and the “**CALC**” mode can not be used.

The submenu is opened by pressing the setting wheel (3/9) and the various submenu options can then be accessed.

If the turrets are not referenced the display shows “**norEF**”.

If the SAM has not been zeroed the display shows “**no_0**”.

If the elevation turret adjustment has insufficient travel, the ballistic calculator calculates and displays the elevation turret setting. The number of dots from the center point is then counted and shown. They must be counted from the center point of the reticle downwards. The counted dot updates the windage turret position to the calculated scope angle and must be aimed at the target.

1.6.3.8 Zeroing Mode

The zeroing mode is accessed by pressing the mode selection buttons (3/10) and the display shows “**--0--**” (Illustration 20).



Illustration 20 Zeroing mode

The submenu is opened by pressing the setting wheel (3/9) and the various submenu options can be accessed.

If the turrets are not referenced the display shows “**norEF**”.

If the weapon has been zeroed the display shows “**donE_**”.

1.6.3.9 Off Mode (-OFF-)

The Off mode is accessed by pressing the mode selection buttons (3/10), the display shows “-OFF-“ (Illustration 21).

To switch to Standby mode, press and hold both mode selection buttons simultaneously until the display switches off.

If you want to switch off the SAM, press and hold the mode selection buttons and setting wheel (3/9)

simultaneously until the center lines in the display have run back from left to right and the display switches off (see (Illustration 22).



Illustration 21 Off mode



Illustration 22 Switching off the SAM



NOTE

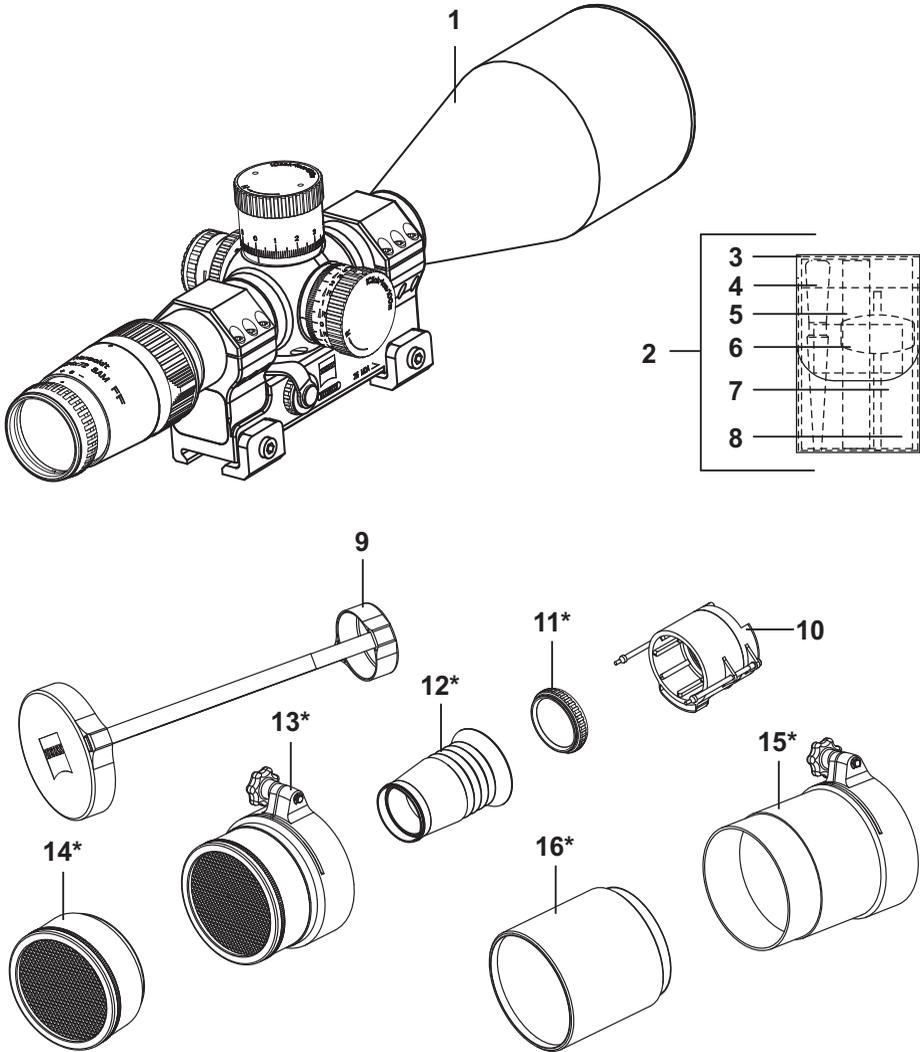
If the SAM is switched off or the batteries removed, **only** the turret reference data are deleted.

If the button combination is released while the lines are still running back, the SAM remains fully operational.

1.7 Scope of Supply

The telescopic sight will be delivered to customers in a standard commercial carton. It can then be stored in the transport and storage case together with the weapon and supplied to the end user.

The parts stored in the tool kit bag are not illustrated.



* Accessories are only supplied as an optional extra.

Illustration 23 Scope of supply

Item.	Qty.	Designation	Part Number Stock Number
1	1	Telescopic Sight 6-24x72, SAM, 0 MOA Telescopic Sight 6-24x72, SAM, 25 MOA	330285-9002.000 330285-9904.000 1240-12-380-2510
2	1	Tool Kit Bag with Contents	330296-9016.000
3	1	Bag TT CIG BAG	000000-0479.887
4	1	Dust Brush	000000-0150.354
5	1	Optics Cleaning Cloth	000000-0150.697
6	1	Screwdriver	000000-0454.683
7	1	Microfibre Cleaning Cloth	Z-1051
8	1	Scope Protection Cap	330296-8025.000
9	1	Polarization Filter*	000000-0454.268
10	1	Yellow Filter*	330296-9026.000
11	1	Eyeguard*	330296-9031.000
12	1	Baffle, clampable*	330296-9028.000
13	1	Baffle, threaded, complete*	330296-9032.000
14	1	Backlight Tube, clampable*	330296-9027.000
15	1	Backlight Tube, threaded, complete*	330296-9024.000
n.ill.	1	Button Cell 3 V BR 2032	commercially available
n.ill.	1	Button Cell 3 V CR 2032	000000-0180.502
n.ill.	2	Lithium Battery 3 V, CR 123A	commercially available
n.ill.	1	Operating Instructions	OpIn 330285-0000.000

* Accessories are only supplied as an optional extra.

2

Operation and Maintenance

2.1 Operating Instructions

2.1.1 General

The telescopic sight is an electronical, fine-mechanical optical precision instrument. It must be treated with care and not roughly handled and no force applied. The device should be protected against heavy blows and vibration. When not in use the telescopic sight should be removed from the rifle and stored appropriately.

To use the special SAM functions it is necessary for data to be read in through the interface and the SAM configured.

Without these functions the SAM can be used as a normal telescopic sight.



CAUTION Under no circumstances look through the telescopic sight at the sun or laser light sources! This could cause serious eye injury.

2.1.2 Replacing the Batteries

2.1.2.1 Replacing the Battery in the Scope

- (1) Hold the illumination control knob (24/5) and unscrew the SAM battery compartment cover (24/3). Replace sealing ring (24/1) if necessary.



NOTE While unscrewing, hold on to the battery compartment cover, since it is spring loaded and would otherwise jump off.

- (2) Remove the SAM battery (24/2).
- (3) Press the new battery in the holder with the positive pole facing the cover (Illustration 24).
- (4) Correctly position the cover against the illumination control knob. Push and screw tight while holding the knob stationary.

2.1.2.2 Replacing the Batteries in the Mount

- (1) Open clip (24/6) on the battery compartment cover for the mount (24/4).
- (2) Turn the clip to the right until the fastener lies outside the locking slots (24/9).
- (3) Remove the cover. Replace sealing ring (24/7) if necessary.



NOTE The battery compartment cover for the mount is attached to prevent it from getting lost.

- (4) Remove the batteries (24/8) and insert new batteries as indicated on the housing (Illustration 24).
- (5) Correctly position the cover, press against the battery compartment and turn left to lock.
- (6) Close the clip on the cover.

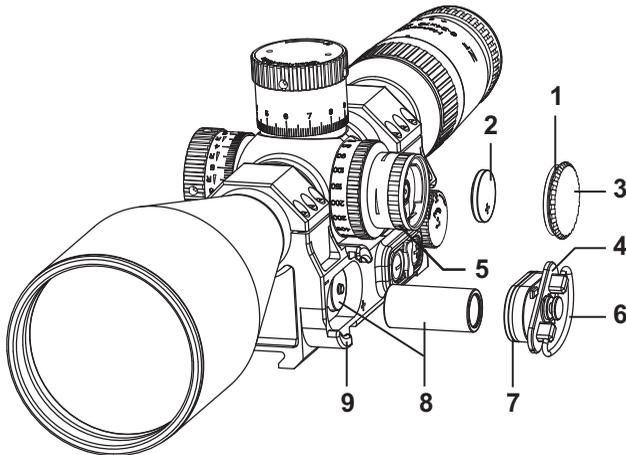


Illustration 24 Replacing the batteries

- | | |
|---------------------------------------|---------------------------|
| 1 Sealing ring | 6 Clip |
| 2 Battery for SAM (CR 2032) | 7 Sealing ring |
| 3 Battery compartment cover for SAM | 8 Batteries, 2x (CR 123A) |
| 4 Battery compartment cover for mount | 9 Locking groove,2x |
| 5 Illumination control knob | |

2.2 Operation

2.2.1 Mounting the SAM

- (1) Loosen the two screws (25/1) on the mount.
- (2) Fit the SAM on the weapon with the clamp resting in the weapon rail and the guide bracket (25/3) in the groove of the weapon rail. The distance on the rail is to be determined for each user.
- (3) Tighten the two screws (25/1).

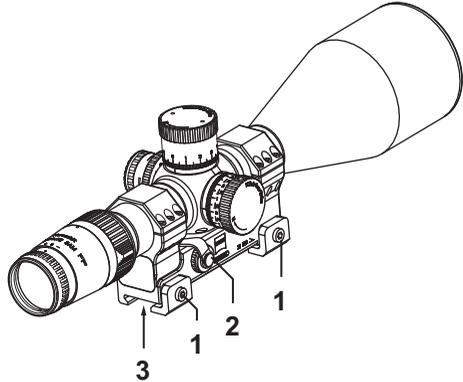


Illustration 25 Mounting the SAM

- 1 Screw, 2x
- 2 Cap for interface socket
- 3 Guide bracket

2.2.2 Referencing the Turrets

- (1) Mount the SAM as described in section 2.2.1.
- (2) Remove the scope protection cap (2/1).
- (3) Focus the reticle by turning the diopter adjustment (31/5).

- (4) Switch on the SAM by pressing simultaneously the two mode selection buttons (31/7) and (31/8). For approx. 5 sec. the display shows all segments and the two LEDs (Illustration 26).



Illustration 26 Display, complete

- (5) The *Battery Indicator* mode (Illustration 9) is then displayed. Adjust the display brightness by simultaneously pressing and turning the setting wheel (31/6).

- (6) Select *Turret Referencing* mode “-rEF-” by pressing the mode selection button “+” (31/7) or “-” (31/8) (Fig.).



Illustration 27 Referencing of turrets

- (7) Press the setting wheel (31/6). “Li_Hr” appears in the display (Illustration 27).



NOTE If “donE_” appears in the display (Illustration 28), the turrets are already referenced and the next mode can be selected.

- (8) Turn the elevation adjustment knob (31/2) and windage adjustment knob (31/3) rightwards all the way to the stop and then turn back as far as the next full click.

- (9) Confirm by pressing the setting wheel (31/6). When the turrets have been successfully referenced, “rEAdy” appears in the display (Illustration 29).



Illustration 28 Command already executed

If the turrets have not been successfully referenced, “no_Sy” appears in the display (Illustration 30). Press the setting wheel again and repeat from step (7).



Illustration 29 Ready

- (10) Turn the windage adjustment knob (31/3) back by 60 clicks and the elevation adjustment knob (31/2) by 220 clicks.



Illustration 30 Turret referencing not carried out

- (11) Select the next mode by pressing the “+” (31/7) or “-” (31/8) mode selection button.

2.2.3 Selecting the Ballistic Dataset

- (1) Mount and adjust the SAM as described in sections 2.1.2 to 2.2.2.
- (2) Select *Ballistic Dataset* mode “-bAL-“ (Illustration 18) by pressing the “+” (31/7) or “-” (31/8) mode selection button.
- (3) Access the submenu by pressing the setting wheel (31/6). The display shows the last used dataset with the last character flashing (or first two characters for the *No Ballistics* setting (Clic) (Illustration 33)).
- (4) Turn the setting wheel (31/6) to select one of the four *Ballistic Datasets*, one of the four *Ballistic Curves*, or *No Ballistics*.
- (5) Press the setting wheel (31/6) to select the ballistic dataset. It is shown in the display with last character flashing e.g. “-b1-“ (Illustration 32).
- (6) Select the next mode by pressing the “+” (31/7) or “-” (31/8) mode selection button.

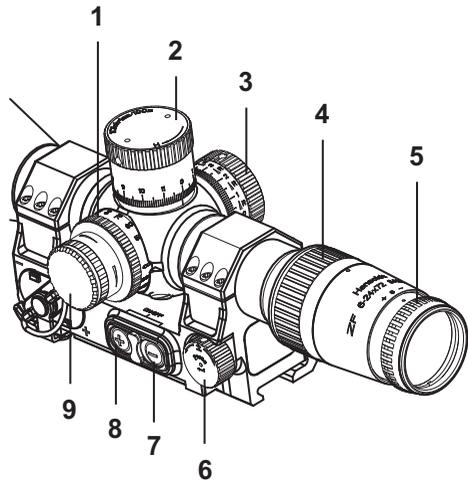


Illustration 31 Operation

- 1 Parallax compensation knob
- 2 Elevation adjustment knob
- 3 Windage adjustment knob
- 4 Magnification adjustment with erecting system
- 5 Diopter adjustment
- 6 Setting wheel
- 7 Mode selection button “+”
- 8 Mode selection button “-”
- 9 Illumination control knob

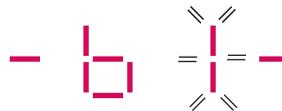


Illustration 32 Ballistic data set 1

2.2.4 Zeroing the SAM

2.2.4.1 Zeroing the SAM in “No Ballistics” Mode

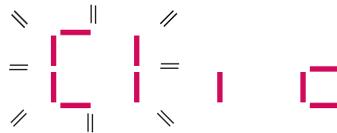
- (1) Mount and adjust the SAM as described in sections 2.1.2 to 2.2.2.
- (2) Place a test target at the desired zeroing distance, align the line of bore of the weapon to the target, and fix the weapon. The cant indicator LEDs must be off.
- (3) In poor light conditions, switch on the reticle illumination with illumination control knob (31/9) and adjust as required.



NOTE

When switched on, the illumination control knob has an idle range of $\pm 45^\circ$. There is no end stop and maximum brightness has been reached if intensity remains unchanged while turning.

- (4) Set the desired magnification using the adjustment ring (31/4).
- (5) Focus the target by turning the parallax compensation knob (31/1).
- (6) Align the crosshairs with the target by turning the windage adjustment knob (31/3) and elevation adjustment knob (31/2).
- (7) Select the ballistic dataset *No Ballistics* “**Clic**” as described in section 2.2.3 (Illustration 33).
- (8) Select *Zeroing* “**--0--**” by pressing the “+” (31/7) or “-” (31/8) mode selection button (Illustration 20).



- (9) Select the submenu by pressing the setting wheel (31/6).
If “**norEF**” appears in the display (Illustration 34), the turrets must first be referenced as described in section 2.2.2.



- If “**donE_**” appears in the display (Illustration 28), the SAM has already been zeroed for this mode.



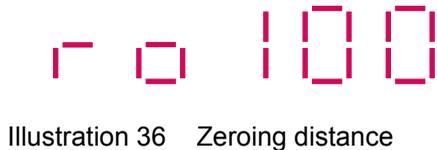
Pressing the setting wheel again brings up the zeroing distance “**ro with a value**” and a further press displays “**3PuSh**” (Illustration 35). If you do **not** wish to overwrite the zeroing data, select the next mode by pressing the “+” (31/7) or “-” (31/8) mode selection button. If you wish to overwrite the zeroing data, press and hold the two mode selection buttons (31/7) and (31/8) simultaneously with the setting wheel (31/6) until “**ro100**” appears in the display (Illustration 36).



NOTE

During first zeroing in *No Ballistics* mode, “**ro**” and “**rS**” are not displayed for information. The “**3PuSh**” function and message are also not shown. The display shows “**ro100**” and the zeroing distance can be immediately entered.

- (10) When “**ro100**” (Illustration 36) appears in the display, set the zeroing distance by turning the setting wheel (31/6) and confirm the value by pressing the setting wheel. The display shows “**FirE**” (Illustration 37).



- (11) Fire a dispersion pattern.

- (12) Determine the deviation and correct the SAM line of sight using the elevation adjustment knob (31/2) and the windage adjustment knob (31/3).

(13) Fire another dispersion pattern and, if necessary, again correct the line of sight.

(14) Press the setting wheel. "SCALE" appears in the display (Illustration 38).



(15) If the two scales for this mode are to be mechanically set to zero, carry out the steps described in section 2.2.5.

Illustration 38 Set scales

(16) Press the setting wheel. "rEAdy" appears in the display (Illustration 29).

The zeroed positions for the elevation turret and windage turret are thus saved for "0".

If the SAM is not going to be mechanically zeroed for this dataset, it is advisable to note the elevation and windage deviations compared to the mechanical "zero".

The SAM can then also be used as a standard telescopic sight without electronic support.

(17) Select the next mode by pressing the "+" (31/7) or "-" (31/8) mode selection button.

2.2.4.2 Zeroing the SAM with Ballistic Dataset

- (1) Mount and adjust the SAM as described in sections 2.1.2 to 2.2.2.
- (2) Place a test target at the desired zeroing distance, align the line of bore of the weapon to the target, and fix the weapon. The cant indicator LEDs must be off.
- (3) In poor light conditions, switch on the reticle illumination with illumination control knob (31/9) and adjust as required.



NOTE

When switched on, the illumination control knob has an idle range of $\pm 45^\circ$. There is no end stop and maximum brightness has been reached if intensity remains unchanged while turning.

- (4) Set the desired magnification using the adjustment ring (31/4).
- (5) Focus the target by turning the parallax compensation knob (31/1).
- (6) Align the crosshairs with the target by turning the windage adjustment knob (31/3) and elevation adjustment knob (31/2).
- (7) Select one of the *ballistic datasets* “-b1-” to “-b4-“, as described in section 2.2.3.
- (8) Select the *Zeroing* mode “--0--” by pressing the “+” (31/7) or “-” (31/8) mode selection button (Illustration 20).
- (9) Select the submenu by pressing the setting wheel (31/6).
If “norEF” appears in the display (Illustration 34), the turrets must first be referenced as described in section 2.2.2.
If “donE_” appears in the display (Illustration 28), the SAM has already been zeroed for the selected ballistic dataset. Pressing the setting wheel again brings up the zeroing distance “ro with a value” and a further press displays the value for scale zeroing “rS with a value”. Pressing the setting wheel again displays “3PuSh” (Illustration 35)

If you do **not** wish to overwrite the zeroing data, select the next mode by pressing the “+” (31/7) or “-” (31/8) mode selection button. If you wish to overwrite the zeroing data, press and hold the two mode selection buttons (31/7) and (31/8) together with the setting wheel (31/6) until “ro100” appears in the display (Illustration 36).



NOTE

When first zeroing a dataset, “ro” and “rS” are not displayed for information. The “3PuSh” function and message are also not shown. The display shows “ro100” and the zeroing distance can be immediately entered.

(10)

When “ro100” appears in the display (Illustration 36), set the zeroing distance by turning the setting wheel (31/6) and confirm the value by pressing the setting wheel. The submenu *Wind Speed* “SP 0” appears in the display (Illustration 39)

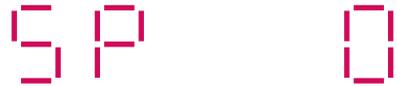


Illustration 39 Wind speed

(11)

Enter the wind speed in m/s by turning the setting wheel (31/6) and confirm the value by pressing the setting wheel. The submenu *Wind direction* is displayed with a running bar on the left-hand side and the number 12 on the right-hand side (Illustration 40).



Illustration 40 Wind direction

(12)

Enter the wind direction by turning the setting wheel (31/6) and confirm by pressing the setting wheel. The display shows “FirE” (Illustration 37).



NOTE

The wind direction is entered according to a clock dial. 12 o'clock is the sighting direction (weapon position). The direction from which the wind is blowing is entered.

- (13) Fire a dispersion pattern.
- (14) Determine the deviation and correct the SAM line of sight using the elevation adjustment knob (31/2) and the windage adjustment knob (31/3).

- (15) Fire another dispersion pattern and, if necessary, again correct the line of sight.



- (16) Press the setting wheel. Illustration 41 Scale value "rS100" appears in the display (Illustration 41).



NOTE

The scale value (rS) is usually set to the same value as the zeroing distance (ro).
If the SAM is zeroed to a different distance than the one wished for the elevation turret scale, then the latter distance is to be entered under rS.
Example: ro = 300 m. But the "0" should be for 100 m, rs = 100

- (17) Set the scale value (rS) by turning the setting wheel (31/6) and confirm by pressing the setting wheel. The display shows "dH 0" or "dH with a



Illustration 42 Delta elevation

value" (Illustration 42). This value depends on the previously entered values for ro and rS.

- (18) If necessary, set the display value to zero by turning the elevation adjustment knob (31/2) and confirm by pressing the setting wheel (31/6). The display shows "dS 0" or "dS with a



Illustration 43 Delta windage

value" (Illustration 43). The value depends on the settings for wind speed "SP 0" (Illustration 39) and *Wind Direction* (Illustration 40).

- (19) If necessary, set display value to zero by turning the windage adjustment knob (31/3) and confirm by pressing the setting wheel (31/6).

- The display shows “SCALE” (Illustration 38).
- (20) If the two scales for this mode are to be mechanically set to zero, carry out the steps described in section .
- (21) Press the setting wheel. “rEAdy” appears in the display (Illustration 29).
The zeroing positions for the elevation turret and windage turret are thus saved as “0”.
If the SAM is not going to be mechanically zeroed for this dataset, it is advisable to note the elevation and windage deviations compared to the mechanical “zero”.
The SAM can then also be used as a standard telescopic sight without electronic support.
- (22) If necessary, zero the remaining three ballistic datasets, as described in section 2.2.4.2.
- (23) Select the next mode by pressing the “+” (31/7) or “-” (31/8) mode selection button.

2.2.4.3 Zeroing the SAM with Ballistic Curve

- (1) Mount and adjust the SAM as described in sections 2.1.2 to 2.2.2.
- (2) Place a test target at the desired zeroing distance, align the line of bore to the target, and fix the weapon. The cant indicator LEDs must be off.



NOTE

It is recommended to always round the zeroing distance to a multiple of 100m, i.e 100m, 200m etc. Do not position the test target at intermediate distances such as 150m.

- (3) In poor light conditions, switch on the reticle illumination with illumination control knob (31/9) and adjust as required.



NOTE

When switched on, the illumination control knob has an idle range of $\pm 45^\circ$. There is no end stop and maximum brightness has been reached if intensity remains unchanged while turning.

- (4) Set the desired magnification using the adjustment ring (31/4).
- (5) Focus the target by turning the parallax compensation knob (31/1).
- (6) Align the crosshairs with the target by turning the windage adjustment knob (Illustration 31) and elevation adjustment knob (31/2).
- (7) Select one of the *ballistic curves* “tAb_1” to “tAb_4”, as described in section 2.2.3.
- (8) Select the *Zeroing* mode “--0--” by pressing the “+” (31/7) or “-” (31/8) mode selection button (Illustration 20).
- (9) Select the submenu by pressing the setting wheel (31/6).
If “norEF” appears in the display (Illustration 34), the turrets must first be referenced as described in Section 2.2.2.
If “donE_” appears in the display (Illustration 28), the SAM has already been zeroed for the selected ballistic curve.

Pressing the setting wheel again brings up the zeroing distance “**ro with a value**” and a further press displays the value for scale zeroing “**rS with a value**”. Pressing the setting wheel again displays “**3PuSh**” (Illustration 35).

If you do **not** wish to overwrite the zeroing data, select the next mode by pressing the “+” (31/7) or “-” (31/8) mode selection button.

If you wish to overwrite the zeroing data, press and hold the two mode selection buttons (31/7) and (31/8) together with the setting wheel (31/6) until “**ro100**” appears in the display (Illustration 36).



NOTE

When first zeroing a dataset, “**ro**” and “**rS**” are not displayed for information. The “**3PuSh**” function and message are also not shown.

The display shows “**ro100**” and the zeroing distance can be immediately entered.

- (10) When “**ro100**” appears in the display (Illustration 36), set the zeroing distance by turning the setting wheel (31/6) and confirm the value by pressing the setting wheel.
The display shows “**FirE**” (Illustration 37).
- (11) Fire a dispersion pattern.
- (12) Determine the deviation and correct the SAM line of sight using the elevation adjustment knob (31/2) and the windage adjustment knob (31/3).
- (13) Fire another dispersion pattern and, if necessary, again correct the line of sight.
- (14) Press the setting wheel (31/6). “**rS with set ro value**” appears in the display.



NOTE

The scale value (rS) is usually set to the same value as the zeroing distance (ro).

If the SAM is zeroed to a different distance than the one wished for the elevation turret scale, then the latter value is to be entered.

-
- (15) Set the scale value (ro) by turning the setting wheel (31/6) and confirm by pressing the setting wheel.
The display shows “dH 0” or “dH with a value” (Illustration 42). This value depends on the previously entered values for ro and rs.
 - (16) If necessary, set display value to zero by turning the elevation adjustment knob (31/2) and confirm by pressing the setting wheel (31/6).
The display shows “SCALE” (Illustration 38).
 - (17) If the two scales for this ballistic curve are to be mechanically set to zero, carry out the steps described in section .
 - (18) Press the setting wheel. “rEAdy” appears in the display (Illustration 29).
The zeroing positions for the elevation turret and windage turret are thus saved as “0”.
If the SAM is not going to be mechanically zeroed for this dataset, it is advisable to note the elevation and windage deviations compared to the mechanical “zero”.
The SAM can then also be used as a standard telescopic sight without electronic support.
 - (19) If available, zero the remaining three ballistic curves, as described in section 2.2.4.3.
 - (20) Select the next mode by pressing the “+” (31/7) or “-” (31/8) mode selection button.

2.2.5 Setting the Turrets to Zero Mechanically

- (1) Zero selected ballistic dataset, as described in Section 2.2.4.
- (2) Loosen two setscrews (44/2) so the elevation adjustment knob (44/1) can be easily turned but not removed.
- (3) Move zero on elevation adjustment knob (44/1) so that it coincides with the elevation index mark (44/5).
- (4) Press elevation adjustment knob (44/1) down and tighten the two setscrews (44/2).
- (5) Loosen two setscrews (44/3) so the windage adjustment knob (44/4) can be easily turned but not removed.
- (6) Move zero on windage adjustment knob (44/4) so that it coincides with the windage index mark (44/6).
- (7) Press windage adjustment knob (44/4) against the tube and tighten the two setscrews (44/3).

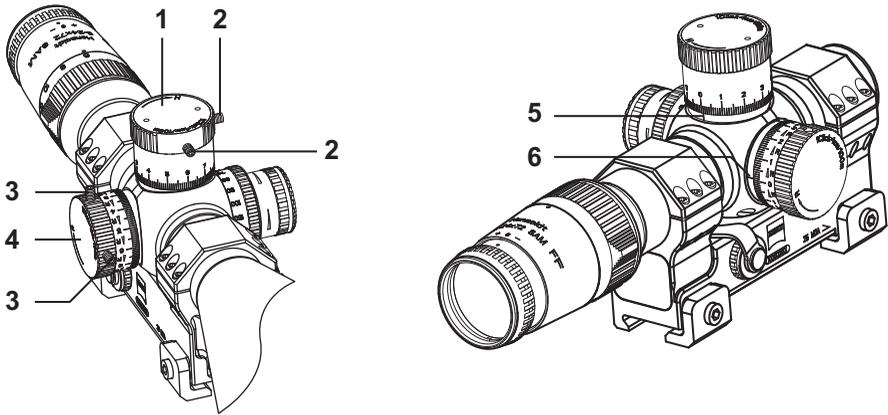


Illustration 44 Setting knobs to zero

- | | |
|-----------------------------|---------------------------|
| 1 Elevation adjustment knob | 4 Windage adjustment knob |
| 2 Setscrew, 2x | 5 Elevation index mark |
| 3 Setscrew, 2x | 6 Windage index mark |

2.2.6 Changing Temperature Value

- (1) Select Average Temperature mode by pressing the “+” (31/7) or “-” (31/8) mode selection button. The measured value is indicated in the display (Illustration 16)



NOTE If the last two characters “°C” flash in the display, a manual value is set (Illustration 45). Press the setting wheel to access *Measured Value* mode. The average value measured by the sensors is displayed.

- (2) Press the setting wheel (31/6). The last two characters “°C” begin to flash (Illustration 45).
- (3) Set the temperature by turning the setting wheel (31/6) and confirm by pressing the setting wheel.

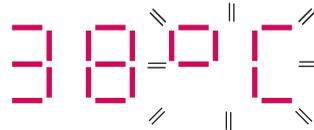


Illustration 45 Manual temperature indication

- (4) Press the setting wheel (31/6) again to set Measured Value mode.
- (5) Select the next mode by pressing the “+” (31/7) or “-” (31/8) mode selection button.

2.2.7 Changing Offset Muzzle Velocity (Vo)/ Ballistic Coefficient (bc)

- (1) Select *Offset Vo/bc* “oF-SEt” mode by pressing the “+” (31/7) or “-” (31/8) mode selection button (Illustration 17).



Illustration 46 Vo value

The Vo value is displayed (Illustration 46). If “nobAL” appears in the display (Illustration 47), a ballistic dataset must first be selected as described in section 2.2.3.



Illustration 47 No ballistic



NOTE

The offset values can only be changed in ballistic datasets b1 to b4.
If the display is flashing, a manual Vo value is set.

- (2) If it is necessary to reset the manual Vo value to the preset Vo value, press and hold the setting wheel (31/6) until the display returns to the preset Vo value and stops flashing.

- (3) Press the setting wheel (31/6) to display the *bc Information* submenu “-bc-” (Illustration 48).



Illustration 48 bc submenu

If no bc value is entered in the ballistic dataset, “3PuSh” appears in the display (Illustration 35).



NOTE

The bc value is not included in every ballistic dataset. It is not then possible to select the bc value. If the display flashes, a manual bc value is set. The values shown in the display (Illustration 46 and Illustration 49).

- (4) Press the setting wheel (31/6) again. The display shows the set bc value (Illustration 49).



Illustration 49 bc value



NOTE

If a manual bc value is entered, the display flashes. An underscore “_” shows the decimal point position. The “0” is not displayed.

- (5) If it is necessary to reset the manual bc value to the preset bc value, press and hold the setting wheel (31/6) until the display returns to the preset bc value and stops flashing.
- (6) Press the setting wheel (31/6). “3PuSh” appears in the display (Illustration 35).
If you do **not** wish to overwrite the data, select the next mode by pressing the “+” (31/7) or “-” (31/8) mode selection button.
If you wish to overwrite the data, press and hold the two mode selection buttons (31/7) and (31/8) together with the setting wheel (31/6) until the Vo value “V 870” appears in the display (Illustration 46). The “V” in the display must flash.
- (7) Set the new Vo value by turning the setting wheel (31/6).
- (8) Confirm the Vo value by pressing the setting wheel (31/6). The submenu *Setting bc* “-bc-” is displayed (Illustration 48). The display must flash.
- (9) Press the setting wheel (31/6) again. The bc value appears in the display (Illustration 49). The initial dash must flash.
- (10) Set the new bc value by turning the setting wheel (31/6).



CAUTION

The bc value may **only** be changed by authorized qualified persons.

- (11) Confirm the bc value by pressing the setting wheel (31/6). The display shows “rEAdy” (Illustration 29).
- (12) Select the next mode by pressing the “+” (31/7) or “-” (31/8) mode selection button.

2.2.8 Shooting in Calculation Mode

2.2.8.1 Shooting in Calculation Mode with Ballistic Dataset



NOTE The SAM must be zeroed as described in section 2.2.4. Distances are indicated in meters or yards.

- (1) Mount and adjust the SAM as described in sections 2.1.2 to 2.2.3.
- (2) In poor light conditions, switch on the reticle illumination with illumination control knob (31/9) and adjust as required.



NOTE When switched on, the illumination control knob has an idle range of $\pm 45^\circ$. There is no end stop and maximum brightness has been reached if intensity remains unchanged while turning.

- (3) Sight the target, ensuring that the two cant indicator LEDs are off.
- (4) Set the desired magnification using the adjustment ring (31/4).
- (5) Focus the target by turning the parallax compensation knob (31/1).



NOTE If the SAM is used with a night vision attachment (NSV), set the parallax compensation knob to " ∞ " and after adjusting "Focusing" on the NSV, adjust parallax on the scope, if necessary.

- (6) Select the *Ballistic Calculation* or *Ballistic Table* mode by pressing the "+" (31/7) or "-" (31/8) mode selection button. The display shows "CALC_" mode (Illustration 19).

- (7) Select the submenu by pressing the setting wheel (31/6). The display shows "r with a value" (Illustration 50). If "norEF" appears in the display (Illustration 34), the turrets must be referenced as described in section .



Illustration 50 Distance setting

If "no__O" appears in the display (Illustration 51), the SAM has not been zeroed for this ballistic dataset and must be zeroed as described in section 2.2.4.2.



Illustration 51 Not zeroed

- (8) Set range by turning setting wheel (31/6) and confirm by pressing the setting wheel. The display shows the wind speed setting "SP 0" (Illustration 39).
- (9) Enter the wind speed in m/s by turning the setting wheel (31/6) and confirm by pressing the setting wheel. The display shows the wind direction, with a running bar on the left-hand side and the number 12 on the right-hand side (Illustration 40).



NOTE This display does not appear if the wind speed is "0".

- (10) Enter wind direction by turning setting wheel (31/6) and confirm by pressing the setting wheel. The display shows *Sighting Target* "-----" (Illustration 52).



Illustration 52 Sighting the target



NOTE The wind direction is entered according to a clock dial. 12 o'clock is the sighting direction (weapon position). The direction from which the wind is blowing is entered.

- (11) Align crosshairs approximately with target, ensuring that the two cant indicator LEDs are off and then press the setting wheel. The display shows the elevation turret correction “dh with value” (Illustration 42).



NOTE

If the elevation turret adjustment has insufficient travel, the display shows “Oor_H” (Illustration 53).

The weapon elevation angle is too high, the display shows “Er 32” (Illustration 54).

The crosshairs must be **approximately** aligned with the target to **measure** the angle of site.

- (12) Set the display reading to “0” by turning elevation adjustment knob (31/2) and confirm by pressing the setting wheel (31/6).



Illustration 53 Elevation turret travel too small

The display shows the windage correction “dS with value” (Illustration 43).

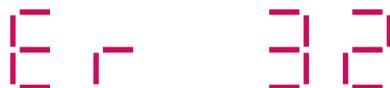


Illustration 54 Weapon elevation angle too high

If the display shows the mil-dot reading e.g. “dot 3” (Illustration 55), count the indicated dot number on the reticle. This dot corresponds to the target mark for the entered target distance.



Illustration 55 Mil-dot display

Then press the setting wheel, the display shows “dS with value” (Illustration 43).

- (13) Set the display reading to “0” by turning windage adjustment knob (31/3) and confirm by pressing the setting wheel (31/6).



Illustration 56 Readiness to fire

The display shows the readiness to fire “d with set target distance” (Illustration 56).

-
- (14) Again sight the target, ensuring that the two cant indicator LEDs are off and fire.
 - (15) If the range needs to be changed, set the new range by turning the setting wheel (31/6) and confirm the value by pressing the setting wheel.
The wind speed setting “SP 0” is shown in the display (Illustration 39).



NOTE The new range must be confirmed within 2 seconds, otherwise the previous value is retained.
When making the new setting, the first letter of the display changes from “d” to “r”.

- (16) Continue as described from step (9).
- (17) Select the next mode by pressing the “+” (I) or “-” (31/8) mode selection button.
- (18) If the SAM is no longer needed, select the *Off* “-OFF-” mode (Illustration 21) by pressing the “+” (31/7) or “-” (31/8) mode selection button.
- (19) To switch to Standby mode, press and hold both mode selection buttons (31/7) and (31/8) simultaneously until the display switches off. If you want to switch off the SAM, press and hold the mode selection buttons and setting wheel (31/6) simultaneously until the center lines in the display have run back from left to right and the display switches off (Illustration 22).



NOTE If the SAM is switched off or the batteries removed, **only** the turret referencing data are deleted.

2.2.8.2 Shooting in Calculation Mode with Ballistic Curve



NOTE

In this mode the SAM uses a ballistic table that has been previously entered via PC software. Apart from the angle sensor, the sensors are **not** used. The SAM must be zeroed as described in section 2.2.4. Distances are indicated in meters.

- (1) Mount and set up the SAM as described in section 2.1.2 to 2.2.3.
- (2) In poor light conditions, switch on the reticle illumination with illumination control knob (31/9) and adjust as required.



NOTE

When switched on, the illumination control knob has a range of $\pm 45^\circ$. There is no end stop and maximum brightness has been reached if intensity remains unchanged while turning.

- (3) Sight the target, ensuring that the two cant indicator LEDs are off.
- (4) Set the desired magnification using the adjustment ring (31/4).
- (5) Focus the target by turning the parallax compensation knob (31/1).



NOTE

If the SAM is used with a night vision attachment (NSV), set the parallax compensation knob to “ ∞ ” and after adjusting “Focusing” on the NSV, adjust parallax on the scope if necessary.

- (6) Select the *Ballistic Calculation* or *Ballistic Table* mode by pressing the “+” (31/7) or “-” (31/8) mode selection button. The display shows “rAngE” (Illustration 57) to indicate that a ballistic table has been selected from the ballistic dataset.



Illustration 57 Ballistic table display in Ballistic Calculation mode

- (7) Press the setting wheel (31/6). The display shows a distance from the ballistic table, e.g. “r 136” (Illustration 58). If “no--0” appears in the display (Illustration 51) the SAM has not been zeroed for this ballistic table and must first be zeroed as described in section 2.2.4.3.



Illustration 58 Distance display for ballistic table

- (8) Set the closest value for the target distance from the ballistic table by turning the elevation adjustment knob (31/2). If necessary, determine values from an external ballistic table if there is crosswind and enter using the windage adjustment knob (Illustration 31).



NOTE The display always moves to the next value in the available ballistic table. If the display switches from “r” to “H”, then the adjustment range lies outside the ballistic table and the set click values will be displayed, starting from the zero position.

- (9) Sight the target. The new angle of site will be measured and calculated with the set elevation value. Press the setting wheel (31/6). The display switches to the elevation correction submenu, e.g. “dH 0” (Illustration 42).



NOTE On level ground or for insignificant angles of site, firing can be immediately commenced without checking or correcting the elevation correction value by pressing the setting wheel.

- (10) If necessary, set the display to “O” by turning the elevation adjustment knob (31/2).

-
- (11) Confirm the value by pressing the setting wheel (31/6). The display again shows the range using the ballistic table (Illustration 58).



NOTE

Through correcting with the elevation adjustment knob it is possible that another ballistic table value is displayed, depending on the size of the correction value.

- (12) Sight the target again and shoot, ensuring that the two cant indicator LEDs are off.
- (13) If the range needs to be changed, continue from step (8).
- (14) Select the next mode by pressing the “+” (31/7) or “-” (31/8) mode selection button.
- (15) If the SAM is no longer needed, select the *Off* “-OFF-” mode (Illustration 21) by pressing the “+” (31/7) or “-” (31/8) mode selection button.
- (16) To switch to Standby mode, press and hold both mode selection buttons (31/7) and (31/8) simultaneously until the display switches off.
If you want to switch off the SAM, press and hold the mode selection buttons and setting wheel (31/6) simultaneously until the center lines in the display have run back from left to right and the display switches off (Illustration 22).



NOTE

If the SAM is switched off or if the batteries are removed, **only** the turret referencing data are deleted.

2.2.9 Shooting without Ballistic Values



NOTE The SAM must be zeroed as described in section 2.2.4. In this mode the click values are shown in the display. The measured sensor data of the SAM are **not** taken into account.

- (1) Mount and set up the SAM as described in sections 2.1.2 to 2.2.2.
- (2) Set *No Ballistics* “Clic” mode in the *Ballistic Dataset* “-bal-” mode, as described in section 2.2.3.
- (3) In poor light conditions, switch on the reticle illumination with illumination control knob (31/9) and adjust as required.



NOTE When switched on, the illumination control knob has a range of $\pm 45^\circ$. There is no end stop and maximum brightness has been reached if intensity remains unchanged while turning.

- (4) Set display to “0” by turning elevation adjustment knob (31/2) and windage adjustment knob (31/3).
- (5) Set the elevation and windage scale to “0” as described in section 2.2.5.



NOTE If the SAM is used without electronics, it can only be used with the mechanical indicators on the knobs and without cant indicators. The reticle brightness can also be adjusted.

- (6) Set the desired magnification using the adjustment ring (31/4).

- (7) Focus the target by turning the parallax compensation knob (31/1).



NOTE

If the SAM is used with a night vision attachment (NSV), set the parallax compensation knob to “∞” and after adjusting “Focusing” on the NSV, adjust parallax on the scope if necessary.

- (8) Select the *Elevation Position Indicator* or *Azimuth Position Indicator* mode by pressing the “+” (31/7) or “-” (31/8) mode selection



Illustration 59 Turrets not referenced

button. The display shows

e.g. “H- 15” (Illustration 14) or “Sr 12” (Illustration 15).

If “H_nor” is shown in the display (Illustration 59), the turrets must be referenced as described in section 2.2.2.

- (9) Set the clicks for the target distance on the scale ring of the elevation adjustment knob (31/2) according to the external ballistic table.



NOTE

To assist the use of the adjustment rings, every tenth click is designed to be more detectable and louder.

- (10) Set windage adjustment knob (31/3) according to measured cross-wind and data from an external ballistic table.
- (11) Sight the target and shoot, ensuring the two cant indicator LEDs are off.
- (12) While shooting, make corrections to the dispersion pattern by turning the elevation adjustment knob (31/2) and windage adjustment knob (31/3).
- (13) Select the next mode by pressing the “+” (31/7) or “-” (31/8) mode selection button.
- (14) If the SAM is no longer needed, select the *Off* “-OFF-” mode (Illustration 21) by pressing the “+” (31/7) or “-” (31/8) mode selection button.

-
- (15) To switch to Standby mode, press and hold both mode selection buttons (31/7) and (31/8) simultaneously until the display switches off.
If you want to switch off the SAM, press and hold the mode selection buttons and setting wheel (31/6) together until the center lines in the display have run back from left to right and the display switches off (Illustration 22).



NOTE If the SAM is switched off or if the batteries are removed, **only** the turret referencing data are deleted.

2.3 Operation under Special Climatic and other Conditions

2.3.1 General

- (1) Precision optical and electronic instruments should function under special climatic conditions exactly as under normal conditions.
- (2) Operation and maintenance under special climatic conditions requires special care, however, to ensure the telescopic sight remains operational and protected against increased wear and tear.

2.3.2 Use at Low Temperatures

- (1) Protect the telescopic sight against extreme temperature fluctuations. If it is brought into a higher temperature room, place it in a case beforehand. Do not open the cover until the sight has reached ambient temperature.
- (2) Remove outer condensation with a soft clean cloth. Dry optical components with the optical cleaning cloth.
- (3) Condensation inside the telescopic sight indicates that the device is not sealed properly. Should condensation remain and appear repeatedly, return sight for inspection of sealing and rectification.
- (4) At low temperatures movable parts such as the adjustments can become stiff. This can usually be resolved by repeatedly moving the relevant parts. If the parts can only be moved with difficulty or not at all, then slow warming is necessary.
This can be achieved by rubbing with a cloth. It is preferable, however, to gradual warm the scope in a room as described in (1) above. Under no circumstances should an optical instrument be warmed up too intensely or quickly, since the glass parts may crack. Therefore do not use open flames, blowtorches or similar methods on the scope.
- (5) Do not breathe on glass components to warm them up.
- (6) As described in section 1.5.4, when a new battery is needed (low. batt.) the reticle illumination pulsates.
Since battery power drops at low temperatures, it is possible for the "low. batt." display to be activated (at approx. -40 °C), even though battery capacity may still be adequate.

2.3.3 Use at High Temperatures

- (1) Ensure the telescopic sight is particularly well protected against dust and sand, especially bearing and sliding parts, as well as glass components.
- (2) Keep rubber parts flexible by rubbing them with talcum powder.

2.3.4 Use at High Humidity

- (1) High humidity and salty air enhance corrosion.
- (2) Ensure that the surface of the sight is kept in good condition.
- (3) Rectify damage to the finish immediately.
- (4) Replace sights which are not sealed properly or return them for repair.

2.4 Maintenance

Maintenance includes

- Detecting and reporting malfunction, damage and reduced performance
- Checking completeness of accessories
- Cleaning

Users should carry out the work described in the Maintenance Plan (section 2.4.2) **before** and **after** use.

Repair work that goes beyond the described activities may only be performed by Carl Zeiss Optronics or our authorized representatives.

Should a malfunction occur during use which cannot be rectified, please contact:

	<p>Carl Zeiss Optronics GmbH Carl Zeiss Group Wetzlar Site Gloelstrasse 3-5 35576 Wetzlar Germany Phone: +49 6441 404-358 TeleFax: +49 6441 404-322 E-Mail: info.optronik.wetzlar@zeiss.de Internet: www.zeiss.com/optronics</p>
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2.4.1 Commodities

- Optical cleaning cloth or optical cleaning paper
- Cleaning cloth
- Spirit
- Disinfectant
- Ethanol

2.4.2 Maintenance Plan

Item	Component	Inspection	No. of items to be inspected	Auxiliary Material, actions	Section	When? before, after
1	Battery	performance, leakage	2	replace battery	2.4.3	b, a
2	Scope protection cap	damage, cleanness	2	replace cap,	2.4.4	b, a
				clean with cleaning cloth	2.4.4	b, a
3	Objective and eyepiece	damage cleanness	2	return for repair,	2.4.5	b, a
				clean optics	2.4.5	b, a
4	Housing components	mechanical damage, corrosion, cleanness	1	return for repair,	2.4.6	b, a
				clean with cleaning cloth	2.4.6	b, a
5	Illumination switch, elevation adjustment knob, windage adjustment knob	damage, movement, function, cleanness, legibility of symbols	6	return for repair,	2.4.7	b, a
				clean with ethanol, return for repair	2.4.7	b, a
					2.4.7	b, a
6	Battery compartment cover	damage, function	2	return for repair	2.4.6	b, a

2.4.3 Battery

When battery no longer has sufficient charge or there are signs of leakage (spots), it must be replaced.



CAUTION -Do not store the telescopic sight with battery installed.
-Only use leakproof batteries.



NOTE -Do not dispose of batteries in domestic waste, but use collection point.



2.4.4 Scope Protection Cap

Inspect scope protection cap for:

- secure fit
- damage
- cleanness.

Clean scope protection cap with a damp cleaning cloth and rub dry.

2.4.5 Cleaning of Optics and Inspection

Inspect eyepiece (3/6) and objective (3/1) for

- damage
- cleanness.

If eyepiece or objective is damaged, return telescopic sight for repair.

Remove any slight contamination on glass surfaces first with a dust brush and then clean with optical cleaning cloth. To do this, breathe on glass and rotate cloth in a circular movement from the middle to the edge of the glass surface. Only use dust brush and optical cleaning cloth for cleaning glass components. Replace cleaning cloths frequently.

To remove heavy residue on glass surfaces use water and dishwashing detergent. Dab wet glass surfaces dry with optical cleaning cloth.

2.4.6 Housing (Tube) and Mount

Inspect housing for:

- mechanical damage
- damaged finish
- corrosion
- cleanness.

If housing parts are damaged or corroded, return the scope for repair.
Do not oil or grease mechanical components, controls, gear mechanisms etc.

Remove loose dust or dirt with a soft, dry cleaning cloth.
Remove caked dirt with a damp cleaning cloth.

Inspect the sealing rings (24/1) and (24/7) in the battery compartment covers (24/3) and (24/4) for damage and cleanness. Replace, if necessary.

Inspect the interface socket cap (25/2) for damage and secure fit.

2.4.7 Operating Controls

Inspect the illumination control knob (31/9) with on/off switch, elevation adjustment knob (31/2), windage adjustment knob (31/3), parallax compensation knob (31/1), magnification adjustment ring with erection system (31/4), mode selection buttons (31/7) and (31/8), setting wheel (31/6), eyepiece diopter adjustment (31/5), and the eyepiece display (Illustration 11) for

- visible damage
- movement
- function
- cleanness
- legibility of symbols.

If one of the controls is missing, hard to move or malfunctioning, return telescopic sight for repair. Do not oil or grease controls.
Clean controls with a cleaning cloth and ethanol.

2.5 Fault Finding and elimination

Fault	Cause	Elimination
Reticle pattern not illuminated	Battery discharged	Replace battery in SAM (see. 2.1.2). If necessary, return telescopic sight for repair.
no display	Battery discharged	Replace battery in mount (see. 2.1.2). If necessary, return telescopic sight for repair.
Image misted	Moisture inside telescopic sight	Return telescopic sight for repair.
Reticle pattern blurred, image blurred	Eyepiece not focused, eyepiece or objective dirty, eyepiece or objective misted outside, objective misted inside, parallax adjustment incorrect	Focus eyepiece Clean eyepiece and / or objective (see. 2.4.5). Clean eyepiece and / or objective (see. 2.4.5). Return telescopic sight for repair. Adjust parallax. If necessary, return telescopic sight for repair.
No high-contrast image with night vision attachment	Parallax compensation not adjusted correctly	Adjust parallax compensation (see 2.1.2). If necessary, return telescopic sight for repair.
Error message in display	Operating error, SAM faulty	Localize fault from error table (see Appendix B). If necessary, return telescopic sight for repair.

2.6 Transport

Before the telescopic sight is transported it must be securely packed in commercial packing to prevent any damage.

2.7 Storage

The telescopic sight can be stored for unlimited time.

Before storage

- perform the steps described in the maintenance plan (section 2.4.2)
- remove regular or rechargeable batteries
- store all components in a dry place.

During storage, inspect the sight once a year for

- proper storage (-55°C to $+50^{\circ}\text{C}$)
- faultless condition

After storage and before taking into operation

- perform the steps described in the maintenance plan (section 2.4.2)
- follow the steps described in sections 2.1.2 to 2.2.2
- check for completeness

3

Mounting Optional Accessories

3.1 Mounting Threaded Baffle, complete

- (1) Remove scope protection cap (2/1).
- (2) Screw threaded baffle, complete (60/7) into the objective (60/11) and gently tighten.
- (3) If the baffle is no longer required, unscrew it from the objective and store.

3.2 Mounting Threaded Backlight Tube, complete

- (1) Remove scope protection cap (2/1).
- (2) Screw the threaded backlight tube, complete (60/8) into the objective (60/11) and gently tighten.
- (3) If the backlight tube is no longer required, unscrew it from the objective and store.

3.3 Mounting Clampable Baffle

- (1) Remove scope protection cap (2/1).
- (2) Loosen clamping screw (60/5).
- (3) Fit clampable baffle (1) onto the objective (60/11) and tighten clamping screw.
- (4) If the baffle is no longer required, loosen clamping screw, remove baffle and store.

3.4 Mounting Clampable Backlight Tube

- (1) Remove scope protection cap (2/1).
- (2) Loosen clamping screw (60/10).
- (3) Fit clampable backlight tube (60/9) onto the objective (60/11) and tighten clamping screw.
- (4) If the backlight tube is no longer required, loosen the clamping screw, remove backlight tube and store.

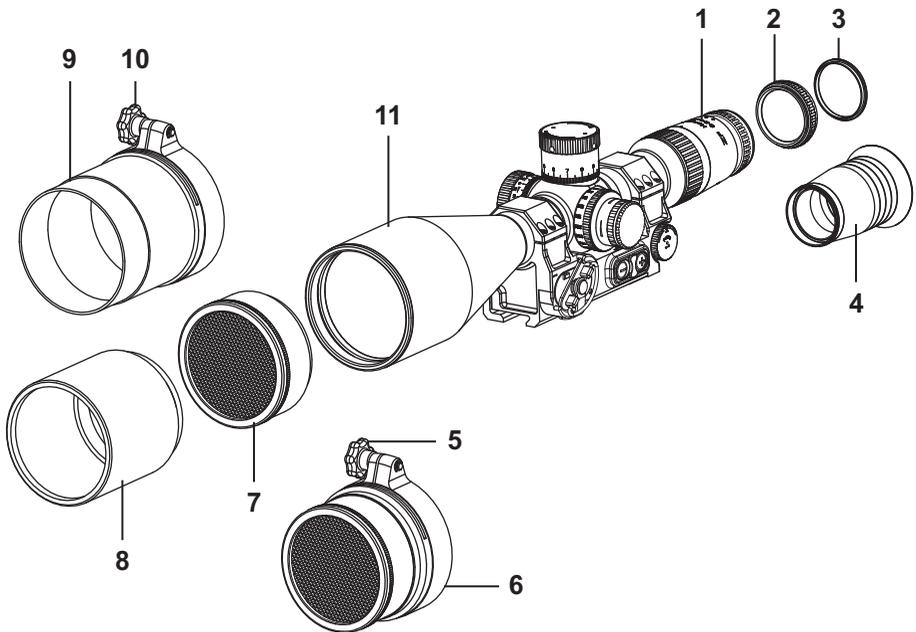


Illustration 60 Mounting accessories

- | | |
|--------------------------|--------------------------------------|
| 1 Eyepiece tube | 7 Baffle, threaded, complete |
| 2 Yellow filter | 8 Backlight tube, threaded, complete |
| 3 Rubber protection ring | 9 Backlight tube, clampable |
| 4 Eyeguard | 10 Clamping screw |
| 5 Clamping screw | 11 Objective |
| 6 Baffle, clampable | |

3.5 Mounting Yellow Filter

- (1) Remove scope protection cap (I).
- (2) Unscrew rubber protection ring (I) from eyepiece tube (I).



NOTE Loosen rubber protection ring with a cloth or flat hand without pressing too tightly.

- (3) Screw yellow filter (I) into the eyepiece tube and gently tighten.
- (4) Screw rubber protection ring into the yellow filter and gently tighten.
- (5) If the yellow filter is no longer required, unscrew rubber protection ring from yellow filter.
- (6) Unscrew yellow filter from the eyepiece and store.
- (7) Screw rubber protection ring into the eyepiece and gently tighten.

3.6 Mounting Eyeguard

- (1) Remove scope protection cap (2/1).
- (2) Unscrew rubber protection ring (60/3) from eyepiece tube (60/1) or yellow filter (60/2) and store.



NOTE Loosen rubber protection ring with a cloth or flat hand without pressing too tightly.

- (3) Screw eyeguard (60/4) into the eyepiece tube or yellow filter.
- (4) If the eyeguard is no longer required, unscrew eyeguard from the eyepiece tube or yellow filter and store.
- (5) Screw rubber protection ring into the eyepiece and gently tighten.

3.7 Mounting Polarization Filter

- (1) Remove scope protection cap (2/1).
- (2) Fit polarization filter (61/3) onto the eyepiece tube (61/1) with retaining bracket (61/2) facing up. Refocus reticle by turning the polarization filter and knurling (61/4) until the target is clearly seen.



NOTE By turning the polarization filter the eyepiece is adjusted. It is also possible to mount the polarization filter on top of the yellow filter. The eyeguard must not be screwed on.

- (3) If the polarization filter is temporarily no longer required, pull cap (61/5) off upwards and fold back. Place strap in retaining bracket (see Illustration 62).
- (4) If the polarization filter is no longer required, remove it from the eyepiece tube and store.

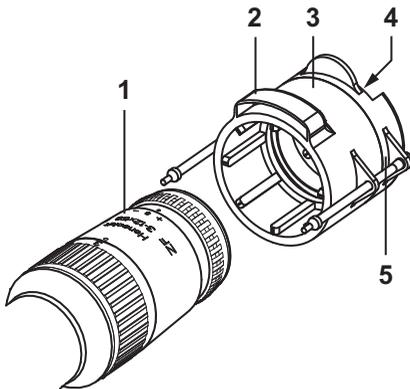


Illustration 61 Eyepiece with closed polarization filter

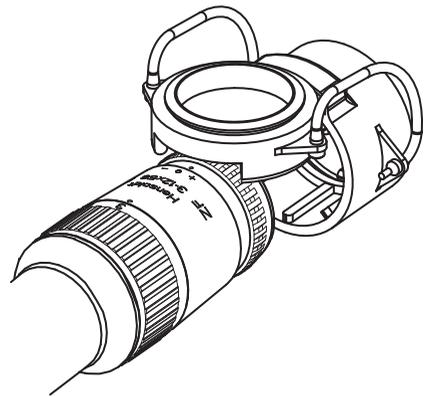
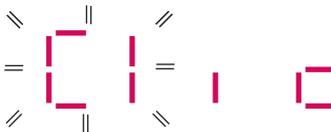


Illustration 62 Eyepiece with open polarization filter

- 1 Eyepiece tube
- 2 Retaining bracket
- 3 Polarization filter
- 4 Knurling
- 5 Cap

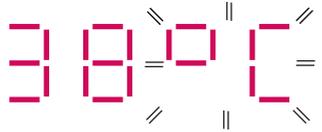
Possible Display Messages in SAM

Display Message	Description
	<p>When switching on, the display is shown for approx. 5 sec. The user can check whether all the segments are displayed (see 2.2.2).</p>
	<p>In <i>Angle of Site</i> mode (Angle) the current elevation angle is shown. Only negative values are shown with a sign.</p>
	<p>In <i>Ballistic Calculation or Ballistic Table</i> mode, shows that a ballistic dataset is selected (Calculation) (see 1.6.3 and 2.2.8).</p>
	<p>This <i>display</i> stands for the <i>No Ballistics</i> option in <i>Ballistic Dataset</i> mode. In this mode the SAM works completely mechanically, without ballistic calculation functions, and shows the click position in the display 2.2.</p>
	<p>Blinking of the first two letters indicates that the mode has been selected (see 2.2.3 and 2.2.4.1).</p>
	<p>After setting the shot values and sighting the target in <i>Ballistic or Ballistic Table</i> mode, the elevation delta value is shown. The display can be set to "0" by turning the elevation adjustment knob 2.2.</p>

Display Message	Description
	<p>Indicates that this step has already been completed and the next mode can be selected (done) 2.2.</p>
	<p>If there is insufficient travel in the elevation adjustment mechanism, this indicates the number of dots to be counted on the reticle (see 2.2.8.1).</p>
	<p>After setting the shot values and sighting the target in <i>Ballistic or Ballistic Table</i> mode, the windage delta value is shown. The display can be set to “0” by turning the windage adjustment knob 2.2.</p>
	<p>Shows the set range and readiness to fire. (distance (see 2.2.8.1))</p>
	<p>When zeroing the weapon with SAM in <i>Zeroing mode</i>, the user is told to fire a shot group (fire) (see 2.2.4.1).</p>
	<p>Shows the user when in <i>Elevation Turret Position</i> mode that the turrets are not referenced. (high no reference) (see 2.2.8.2).</p>
	<p>In <i>Elevation Turret Position</i> mode shows the clicks set for elevation. Only negative values are shown with a sign (see 1.6.3.2 and 2.2.9).</p>

Display Message	Description
	<p>In <i>Turret Referencing mode</i> the turrets must be put into Turret Referencing position. (limit high right) (see 2.2.2).</p>
	<p>Appears when in <i>Ballistic Dataset mode</i> no ballistic data have been selected (no ballistic data) (see 2.2.7).</p>
	<p>Shows the user that the turrets are not referenced (no reference) (see 2.2.2).</p>
	<p>Appears in the display if in <i>Turret Referencing mode</i> the turrets were not in the correct position and no referencing was carried out (no synchronisation) (see 2.2.2).</p>
	<p>Shows the user in <i>Ballistic Calculation and Ballistic Table mode</i> that the selected ballistic dataset was not zeroed (not zeroed) (see 2.2.8.1).</p>
	<p>Appears in display if adjustment range of elevation turret is insufficient (out of range) (see 2.2.8.1).</p>
	<p>Appears in display if <i>Offset V0/bc mode</i> has been selected (see 2.2.7).</p>

Display Message	Description
	<p>Indicates the current air pressure in hPa when in <i>Air Pressure</i> mode (see 1.6.2.2).</p>
	<p>Shows the user in <i>Ballistic Calculation</i> or <i>Ballistic Table</i> mode that a ballistic curve is selected (range) (see 2.2.8.2).</p>
	<p>Appears in display when a setting or entry has been successfully completed (ready) 2.2.</p>
	<p>Shows the user in <i>Zeroing</i> mode the zeroing distance (range 0) (see 2.2.4).</p>
	<p>Shows the user in <i>Zeroing</i> mode the value to which the scale on the elevation adjustment knob is set (range scale) (see 2.2.4).</p>
	<p>Shows the user in <i>Ballistic Calculation</i> or <i>Ballistic Table</i> mode the range or target distance setting (range) (see 2.2.8).</p>
	<p>Appears in display if the scales of the knobs can be mechanically set to "0" 2.2.</p>
	<p>Shows the user in <i>Windage Turret Position</i> mode that the turrets are not referenced. (side no reference) (see 2.2.9).</p>

Display Message	Description
	<p>Shows the set wind speed in <i>Zeroing</i> mode and in <i>Ballistic Calculation</i> or <i>Ballistic Table</i> mode (speed) (see 2.2.4 and 2.2.8.1)</p>
	<p>In <i>Windage Turret Position</i> mode shows the user the number of clicks set for windage. The second letter indicates the direction of rotation (side right) (see 1.6.3.3 and 2.2.9).</p>
	<p>Shows the user in <i>Ballistic Dataset</i> mode that the ballistic curve, here 1, has been selected (table_1) (see 2.2.4.3).</p>
	<p>Shows the user in <i>Ballistic Dataset</i> mode that the ballistic curve, here 1, is set or has been confirmed (table_1) (see 2.2.4.3).</p>
	<p>Shows the V0 value in <i>Offset V0/bc</i> mode (see 2.2.4.3).</p>
	<p>Shows the average measured temperature in <i>Average Temperature</i> mode (see 2.2.4.3).</p>
	<p>Shows the manually set temperature in <i>Average Temperature</i> mode (see 2.2.4.3).</p>

Display Message	Description
	<p>Shows the user that it is necessary to press and hold the mode selection buttons simultaneously with the setting wheel to access the overwrite mode (3 push) 2.2.</p>
	<p>Appears in display if the <i>Ballistic Dataset</i> mode has been selected (ballistic) (see 2.2.3).</p>
	<p>Appears in display if the <i>ballistic coefficient</i> has been selected when in <i>Offset V0/bc mode</i> (ballistic coefficient) (see 2.2.7).</p>
	<p>Appears in display if the <i>Turret Referencing mode</i> has been selected (reference) (see 1.6.3.1 and 2.2.2).</p>
	<p>Shows the user in <i>Ballistic Dataset</i> mode that the ballistic dataset, here 1, has been selected (ballistic) (see 2.2.3).</p>
	<p>Shows the user in <i>Ballistic Dataset</i> mode that the ballistic dataset, here 1, is set or has been confirmed (ballistic) (see 2.2.3).</p>
	<p>Appears in display if the <i>Off mode</i> has been selected (off) (see 1.6.3.9 and 2.2).</p>

Display Message	Description
	<p>Appears in display if the <i>Zeroing</i> mode has been selected (zeroing) (see 1.6.3.8 and 2.2.4).</p>
	<p>Shows the user the value of the ballistic coefficient when in <i>Offset V0/bc</i> mode (see 2.2.7).</p>
	<p>Shows the user in <i>Zeroing</i> mode or in <i>Ballistic Calculation and Ballistic Table</i> mode that having entered wind speed it is necessary to set wind direction (see 2.2.4.2 and 2.2.8.1).</p>
	<p>Shows the user in <i>Ballistic Calculation and Ballistic Table</i> mode with a selected <i>ballistic dataset</i>, that the target should be resighted (see 2.2.4.2).</p>
	<p>When switching off the SAM in <i>Off</i> mode, the movement of the center lines indicates that the SAM is being switched off (only turret referencing values are lost) (see 1.6.3.9 and 2.2).</p>
	<p>Indicates the battery charge after switching on the SAM or in <i>Battery Indicator</i> mode when not connected to mains supply (see 1.6.2.1, 2.2.8 and 2.2.9).</p>

Display Message	Description
	Indicates the battery charge after switching on the SAM or in <i>Battery Indicator</i> mode when connected to mains supply (see 1.6.2.1, 2.2.8 and 2.2.9).

Error Code Messages

An example error code is shown in Illustration 63.

This table uses normal print.

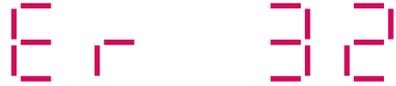


Illustration 63 Example error

Error Code	Description
Error 1 – 3	Sensors for temperature or air pressure faulty. Measured or entered data do not allow further calculation.
Error 4, 5, 6	Error calculating cw/Mach values. Check cw/Mach table, is not correct. Error calculating cw/Mach values. Check cw/Mach table, is not correct.
Error 7	Error calculating trajectory. Check computing parameters. (environmental, shot data), possible faulty sensor (pressure, temperature).
Error 8	Error calculating trajectory. Check computing parameters. (environmental, shot data), possible faulty sensor.
Error 9	Error calculating trajectory. Check computing parameters. (environmental, shot data), possible faulty sensor.
Error 10	Error in cw/Mach values. Check cw/Mach table, is not correct.
Error 11	Angle of departure invalid
Error 12	Missing or invalid weapon barrel length (PC software /ballistics)
Error 13	Bullet velocity too low (≤ 0). Range too long

Error Code	Description
Error 14, 15	Bullet velocity too low (≤ 0). Range too long
Error 16	Not allocated
Error 17	cw/Mach value table not correct, or not complete
Error 18	cw/Mach value table not correct, or not complete
Error 19	cw/Mach value table not correct, or not complete
Error 20	Error calculating trajectory
Error 21	Error calculating trajectory (intersection with target line not found). Distance of optical axis to rifle barrel too large or range too small
Error 22	cw/Mach value table not correct, or not complete
Error 23	Error calculating trajectory (intersection with target line not found). Distance of optical axis to rifle barrel too large or range too small
Error 25 to 28	cw/Mach value table not correct, or not complete
Error 29	cw/Mach value table not correct, or not complete
Error 30	cw/Mach value table not correct, or not complete
Error 31	cw/Mach value table not correct, or not complete
Error 32	cw/Mach value table not correct, or not complete
Error 33	cw/Mach value table not correct, or not complete
Error 34	Too many calculation steps. Combination of long range and extreme angle of site. Example: 2000 m at $\angle 60^\circ$