Periscope System SERO 400

ZEISS

We make it visible.

SERO 400 –
The ideal design for new submarines and retrofit programmes

- High-performance optics
- Two-axis line-of-sight stabilisation
- Modular design
- 3-stage optical magnification changer
- Full combat system integration
- ESM-EW/GPS antenna interface
- Camera sensor integration
- Antenna interface

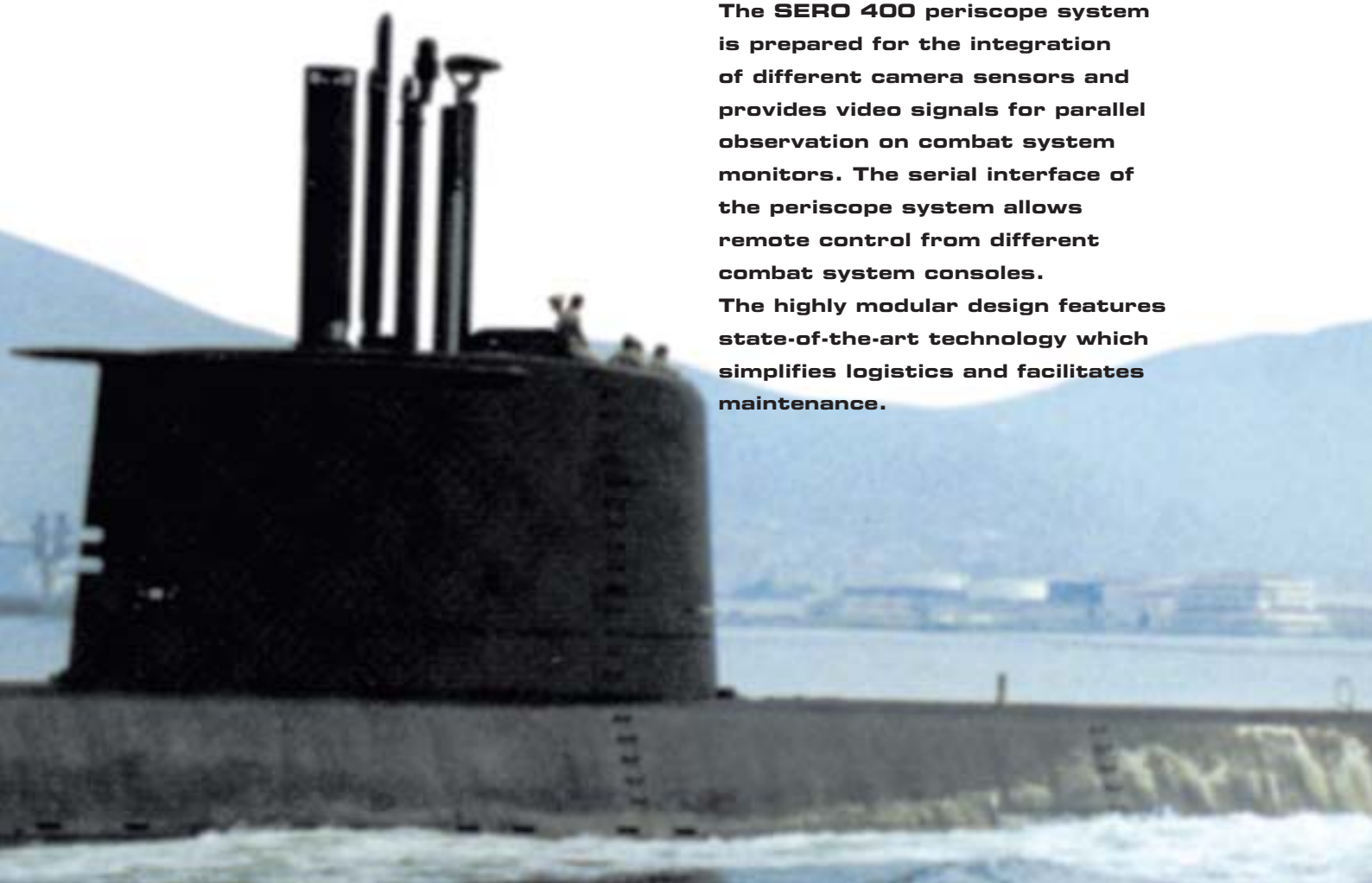
The SERO 400 periscope system completes the line of successful submarine periscopes designed and produced by Carl Zeiss Optronics GmbH. The SERO 400 periscope system can be used for either new build or retrofit applications and can be combined with the OMS 100 optronics mast system.

The SERO 400 periscope system allows excellent observation in daylight and, equipped with an LLLTV camera or thermal imager, also by night.

The SERO 400 periscope system can be used to monitor the sea surface and air space in order to collect navigation data and to detect and identify targets.

The SERO 400 periscope system is prepared for the integration of different camera sensors and provides video signals for parallel observation on combat system monitors. The serial interface of the periscope system allows remote control from different combat system consoles.

The highly modular design features state-of-the-art technology which simplifies logistics and facilitates maintenance.



Configuration

The SERO 400 periscope system consists of the following basic modules:

■ Head assembly with gyro-stabilised elevation axis, 3-stage optical magnification changer, heatable window and interface for supporting an ESM-EW/GPS antenna.
As an option, the head assembly can be covered with a RAM coating and equipped with an eyesafe laser rangefinder and/or a thermal imager.

■ Periscope mast with illuminatable reticule for different head versions. The length of the mast can be adapted to different classes of submarines.

■ Motor drive unit with brushless DC motor and relative bearing indication ring.

■ Hoisting yoke for hoisting and retracting the periscope with a hoisting device.

■ Ocular box with electrical drives for beamsplitter, camera selector, filter wheel, optical rangefinder and focusing of the camera sensors, allowing full remote control from different combat consoles via serial interface.
The ocular box provides a binocular eyepiece with variable diopter settings and heatable eyepiece window. Also included are exchangeable control panels with loudspeakers. The two handles allow the periscope operator to control the line of sight in azimuth and elevation.
The modularity of the ocular box of the SERO 400 ensures that the latest sensor technologies can be integrated. The ocular box can be equipped with a high-resolution colour or black/white camera as well as an LLLTV camera. The upgrade with a night vision sensor provides full 24 hour operational capability. The ocular box of the SERO 400 is prepared for the integration of the newest generation of digital still cameras.
The daylight and night vision sensor images can be displayed on monitors of different consoles and recorded on video tapes or solid-state recorders.

Specification

SERO 400

Optical Data

Magnification	1.5x, 6x, 12x
Field of view (h x v)	
M = 1.5x	36° x 28°
M = 6x	8° x 6.5°
M = 12x	4.2° x 3.4°

Mechanical Interface

Periscope length	specific to application, typically approx. 11 m
Tube diameter	190.5 mm
Ocular box diameter	610 mm
Mass of periscope	approx. 1,250 kg

Camera Sensors (optional)

High resolution colour or black/white TV camera	
Picture elements (h x v)	752 x 582
Low light level TV camera	
Sensitivity	min. 10-4 Lux
Video Output	ITU-R BT 470-6 B/G
High resolution digital still camera	
Picture elements	> 2.5 Megapixels

Laser Rangefinder (optional)

Eyesafe, wave length	1,543 nm
Range	400 yds to ≥ 10,000 yds

Line of Sight

Stabilisation	2-axis line-of-sight stabilisation (azimuth and elevation)
Elevation range	- 15° to + 60°, (optional + 75°)
Azimuth range	n x 360 °

Environmental Conditions

Operating temperature	
Outboard equipment	- 35 °C to + 60 °C
Inboard equipment	0 °C to + 55 °C
Storage temperature	- 40 °C to + 70 °C

Subject to changes in design and further technical development

53-1231-e Printed in Germany ZD-TS-V2004 Noo
Subject to change.

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