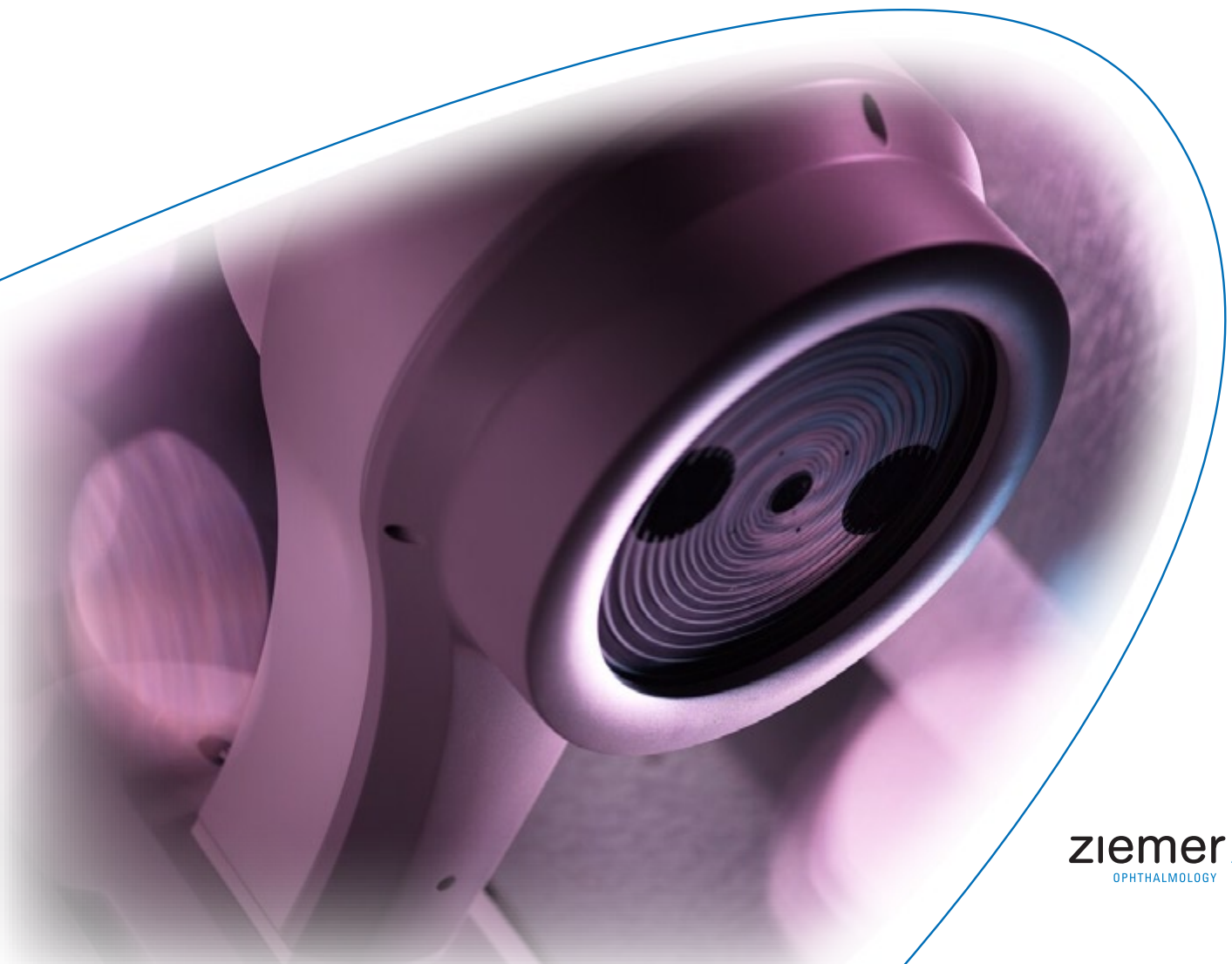


GALILEI[™]
DUAL SCHEIMPFLUG ANALYZER

**Beyond Topography.
Precision mapping of Cornea
and Anterior Segment.**





GALILEI™

DUAL SCHEIMPFLUG ANALYZER

The GALILEI™ Dual Scheimpflug Analyzer is a high precision optical system for corneal topography and three dimensional analysis of the anterior eye segment, based on a Revolving Dual Channel Scheimpflug Camera and a Placido Disk.

GALILEI™ combines the advantages of two technologies: Placido imaging furnishes high accuracy curvature data, while Scheimpflug imaging is optimal for precise elevation data.



Ziemer Group

We develop and produce diagnostic and surgical products for the ophthalmic market that distinguish themselves from established standards in terms of usability, precision, quality, and productivity.

GALILEI Functionalities:

- High Resolution Scheimpflug Images
- Pachymetry
- Corneal and Lens Topography
- 3D Anterior Chamber Analysis
- Lens Thickness
- Corneal and Lens Densitometry
- Pupillometry

Technical Features

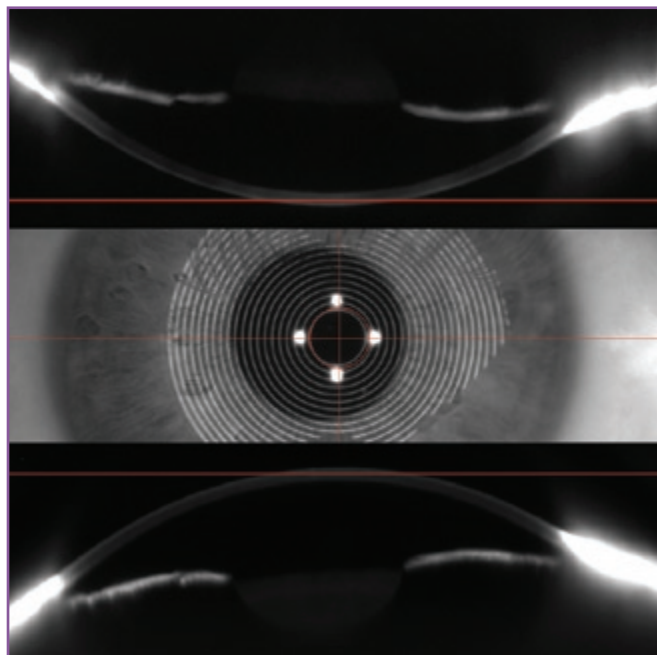
Dual Scheimpflug Imaging

Merging of Placido and Scheimpflug data

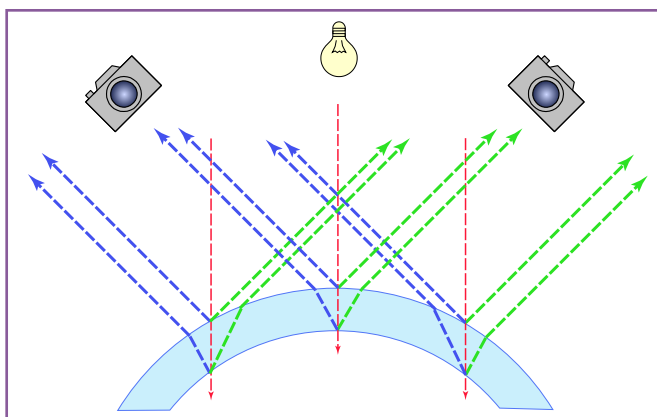
Although the resolution of Scheimpflug images is high enough to deliver accurate profile data, it is insufficient to calculate central corneal power (curvature data) with acceptable accuracy. GALILEI™ overcomes this limitation by merging Placido and Scheimpflug data, acquired simultaneously by the two techniques, into a comprehensive single data set. This is essential for obtaining highest accuracy for both elevation and curvature data across the entire cornea.

Near/Far Fixation Target

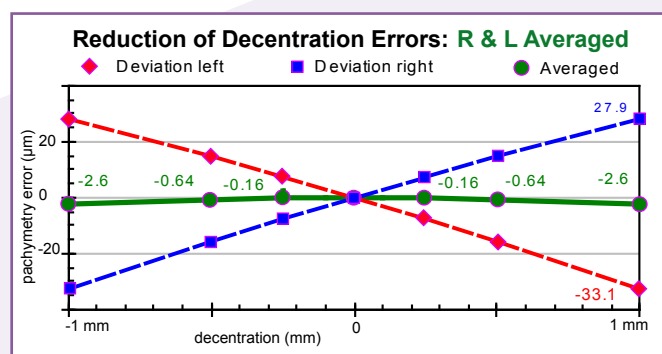
The GALILEI™ Dual Scheimpflug Analyzer features an adjustable near/far fixation target that allows the examination of the anterior chamber, crystalline lens, and any intraocular lenses at different accommodation states.



The software interface allows the user to view the acquired Placido or Top View image (center) and simultaneously acquired Scheimpflug images, left (top) and right (bottom). This combined image is used for aligning the optics module in front of the patient's eye.



Living human eyes are always in motion. Therefore, the rotational device axis may become decentered from the aligned vertex position during the course of the rotational scan acquisition. In this situation, the projected slits impinge upon the anterior surface at different angles, resulting in two apparent slit images representing a different relative thickness. 1 mm of deviation may generate errors of up to 30 μm in apparent thickness.



Simple averaging (green line) of the thicknesses in the two corresponding Scheimpflug views (red and blue lines) reduces the decentration error by a factor of 10, without the need for correcting the misalignment.

Comprehensive Software Packages

The GALILEI™ Dual Scheimpflug Analyzer comprises a System Software (operating system and camera controls) and a Basic Applications Software Package.

Several additional, mutually independent, optional software packages allow to customize the GALILEI system to the individual needs of the user.

Basic Software Package

Includes corneal and lens topography, best sphere fit elevations, pachymetry, 3D anterior chamber analysis, tools for manual measurements, lens densitometry, zonal fit differences, keratoconus screening, and the patient management database.

Optional Software Packages

Software Package for separate PC Workstation

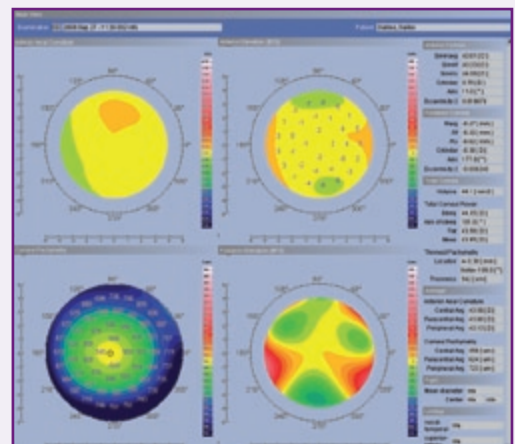
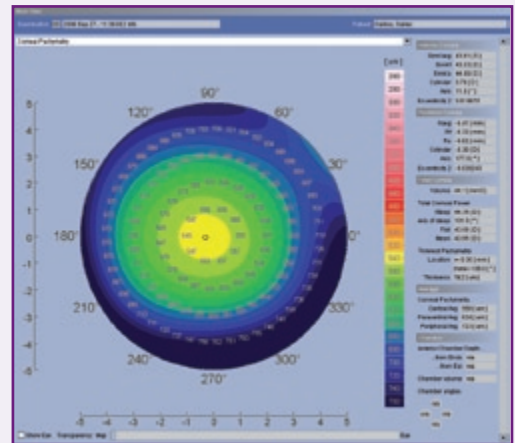
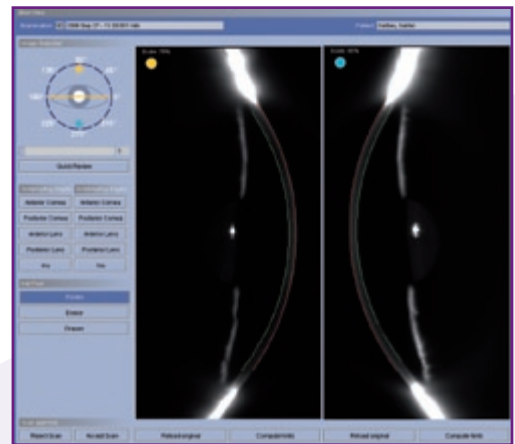
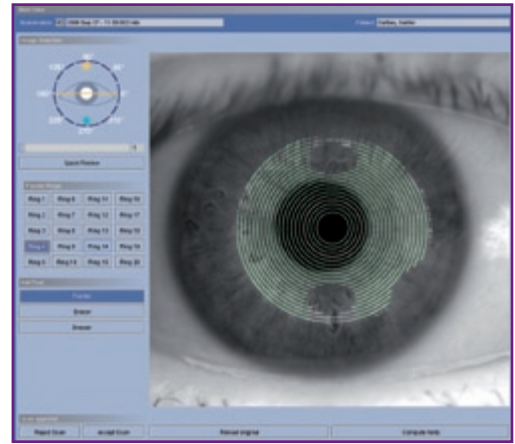
Allows data analysis on a separate PC. Measurement data in the patient management database can be accessed directly across a local network.

Accommodation Package

Software package to control the position of the fixation target. The target can be set to different fixed positions, or it can be moved from near to far (or vice versa) during the scan.

Wavefront Package

Includes Anterior Corneal and Total Corneal Wavefront, Modulation Transfer Function, Point Spread Function, and Image Formation on Point Spread Function.



Some typical views generated by the GALILEI's software:

(top) Placido edge detection. Automatically detected ring edges may be verified and manually adjusted.

(upper center) Scheimpflug edge detection. Detected anterior and posterior edge of cornea may be viewed for verification and manual adjustment of any detection errors.

(lower center) Pachymetry map, as an example for a wide variety of different single map views available.

(bottom) Refractive report, presenting anterior axial curvature (upper left), anterior best fit sphere BFS (upper right), pachymetry map (lower left), and posterior best fit sphere (lower right).

The Optical Scheimpflug Condition

Scheimpflug imaging differs from conventional techniques in that the object plane, lens plane, and image plane are not parallel to each other, but intersect in a common straight line. The major advantage of the Scheimpflug geometry is that a wide depth of focus is achieved.

The Scheimpflug principle has been applied in ophthalmology to obtain optical sections of the entire anterior segment of the eye, from the anterior surface of the cornea to the posterior surface of the lens. This type of imaging allows assessment of anterior and posterior corneal topography, anterior chamber depth, as well as anterior and posterior topography of the lens.

Dual Scheimpflug Imaging

The principle advantage of Dual Scheimpflug imaging is that corresponding corneal thickness data from each view can simply be averaged to compensate for unintentional misalignment, which results in a corrected measurement value at the corresponding location. The dual Scheimpflug imaging principle is independent of inclined surfaces, and thus allows accurate pachymetry without knowledge of the actual decentration of the slit from the apex. Living human eyes are always in motion even under perfect fixating conditions, and scanning takes time. Therefore, the rotational device axis may become decentered from the aligned apex position during the course of the rotational scan acquisition. In this situation, the projected slits impinge upon the anterior surface of the cornea inclined, resulting in two apparent slit images deviated from each other in thickness. The reciprocal relationship of the dual views allows simple averaging of the corresponding thickness values to correct the values at each of the slit positions. The dual Scheimpflug system has only to take into account decentration and allocate each averaged thickness and posterior height value to its proper location, whereas single Scheimpflug systems additionally have to make estimations on the variable surface inclination for calculating correct thicknesses or posterior heights.



GALILEI is a complete, self-contained system that includes the optical module, high-performance computer and LCD monitor, and a movable, height-adjustable table with headrest.

Key advantages of Dual Scheimpflug Imaging with integrated Placido topography:

- Direct measurement of anterior corneal surface curvature
- Direct measurement of elevation of all anterior segment structures
- Pachymetry calculation that is insensitive to decentration
- Motion correction from top view camera
- Greater coverage area in combining both technologies
- Same reference axis for both technologies.

Technical Data



System Dimensions	
Dimensions (HxDxW) of optics module	507 x 301 x 293 mm (20 x 12 x 11.5")
Dimension (HxDxW) of system with table	1235–1435 mm (H) x 612 mm (D) x 930 mm (W) (49–57" x 24" x 37")
Weight of optics module	11 kgs (24 lbs)
Weight of complete system with table	
Power requirement	110–120 VAC, 50–60 Hz, fused 8A 220–230 VAC, 50–60 Hz, fused 6.3A

System Characteristics	
Measuring principle	Rotational scan of Dual Scheimpflug slit images, merged with Placido Disk images
Scheimpflug camera:	1000 x 1000 pixel CCD
Top view camera	1024 x 786 pixel CCD
Placido disk	20 monochrome rings, 200 mm diameter
Observation illumination	Infrared LED 810 nm
Slit illumination	Blue LED light (UV free), 470 nm

System Dimensions	
No. of Scheimpflug images per scan	typically 15–60 (settable by user)
No. of measured data points per scan	> 122'000
Time for a full scan	1–2 secs
Total area covered	14 mm diameter

Data Processing and System Control	
Computer	Dual Core Processor
Operating System	Windows XP Professional
Storage Capacity	2 GB RAM; 240 GB Hard Disk
Monitor	17" LCD monitor, 1280 x 1024 pixel

Product Information

- **Manufacturer:** SIS Surgical Instrument Systems AG, CH-2562 Port, Switzerland (a Ziemer Group Company)
- **Sales & Service:** Ziemer Ophthalmic Systems AG, CH-2562 Port (Switzerland) and its network of established ophthalmic equipment distributors. Visit www.ziemergroup.com for details.
- **Availability:** Europe: CE-marked. USA: FDA 510(k) cleared. For other countries, availability may be restricted due to local regulatory requirements; please contact Ziemer Ophthalmics for details.
- **Configuration:** self-contained system includes: optics module containing dual Scheimpflug camera, top view camera, Placido disk, and auxiliary monitor, mounted on a joystick-controlled cross-slide; computer with 17" LCD color monitor, keyboard & mouse; table on wheels, with motorized height adjustment.
- **Accessories:** optional printer (not supplied; any Windows-compatible printer with USB connection may be used. Reference target (included with system).
- **Service:** Regular Maintenance and Repair Service is available from the manufacturer and from local certified Service Centers (please contact your local distributor or consult the Ziemer Group website for address information). Regular performance checks are recommended and may be performed by the user by means of the reference target supplied, or by service centers and distributors. If the test reveals a need for recalibration, the device must be serviced by a Service Center. Convenient Maintenance and Service Contracts are available.
- **Warranty:** Ziemer's GALILEI system comes with a 12-month limited warranty on parts and workmanship. Please consult Ziemer Ophthalmic Systems' Warranty Terms for details.
- **Caution:** Federal (U.S.) law restricts this device to sale by or on the order of a physician.



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