

SCHWIND

eye-tech-solutions



Focus on performance

The SCHWIND AMARIS product family



RETINALAB
OPHTHALMOLOGY

Distributor

SCHWIND AMARIS®

TREAT



Our SCHWIND AMARIS® product family

Setting the standard in refractive and therapeutic corneal surgery

With years of valuable feedback from users, SCHWIND has refined the AMARIS excimer technology, crafting it with features designed to enhance surgical convenience and provide a comprehensive solution for both refractive and therapeutic needs. Each model of AMARIS brings something unique to the table.

Progress through innovation

As a leading pioneer in the field of refractive surgery solutions, SCHWIND is committed to pushing the boundaries of innovation. With a focus on continuous improvement, the company works tirelessly to enhance the performance and efficiency of its laser technology. By incorporating the latest advancements, SCHWIND aims to not only deliver superior outcomes for patients but also ensure that surgeons have the most reliable tools at their disposal. The dedication to care translates into improved precision, fast procedures, and thus, enhanced patient satisfaction.

With every breakthrough, SCHWIND is determined to provide peace of mind to surgeons, knowing they can trust SCHWIND AMARIS to potentially deliver high-quality results.

AMARIS Family

Comprises of three excimer lasers, each with distinct features:

SCHWIND AMARIS 1050RS –
The evolutionary premium model

SCHWIND AMARIS 750S –
The powerful performance laser

SCHWIND AMARIS 500E –
The efficient compact model

The intelligent thermal control with SCHWIND AMARIS distributes laser pulses in a way that prevents excessive local heating, reducing the risk of tissue damage and enhancing healing.¹ SCHWIND AMARIS platform integrates advanced eye tracking paired with aspheric ablation profiles planned via the SCHWIND CAM, alongside precise corneal and ocular diagnostics. These features collectively enable customized refractive outcomes.

As a whole, SCHWIND AMARIS product family is supplemented by SCHWIND CAM treatment planning modules for a wide range of applications and the possibility to connect all SCHWIND technologies for easy and secure data flow.

Please refer to list of publications on SCHWIND AMARIS product family on our website:
<https://www.eye-tech-solutions.com/en/infocenter/publications>

¹ High-speed recording of thermal load during laser trans-epithelial corneal refractive surgery using a 750 Hz ablation system. J Optom. De Ortueta D, Arba-Mosquera S, Magnago T. 2019 Apr – Jun.



»» I chose SCHWIND AMARIS technology because I strived for the highest quality available in the market. AMARIS offers an extremely wide range of applications in refractive and therapeutic corneal surgery. ««

Shady Awwad, American University of Beirut, Lebanon

Addressing the growing demand for innovative solutions from users and patients

The SCHWIND AMARIS family is a fusion of functionality, high performance and safety

Patient expectations are constantly increasing with regard to treatment methods and the results attainable in corneal surgery. If you can offer the shortest treatment times with perfect results, you have the upper hand. This is where the SCHWIND AMARIS family of laser systems sets a new standard, delivering greater safety and patient comfort.

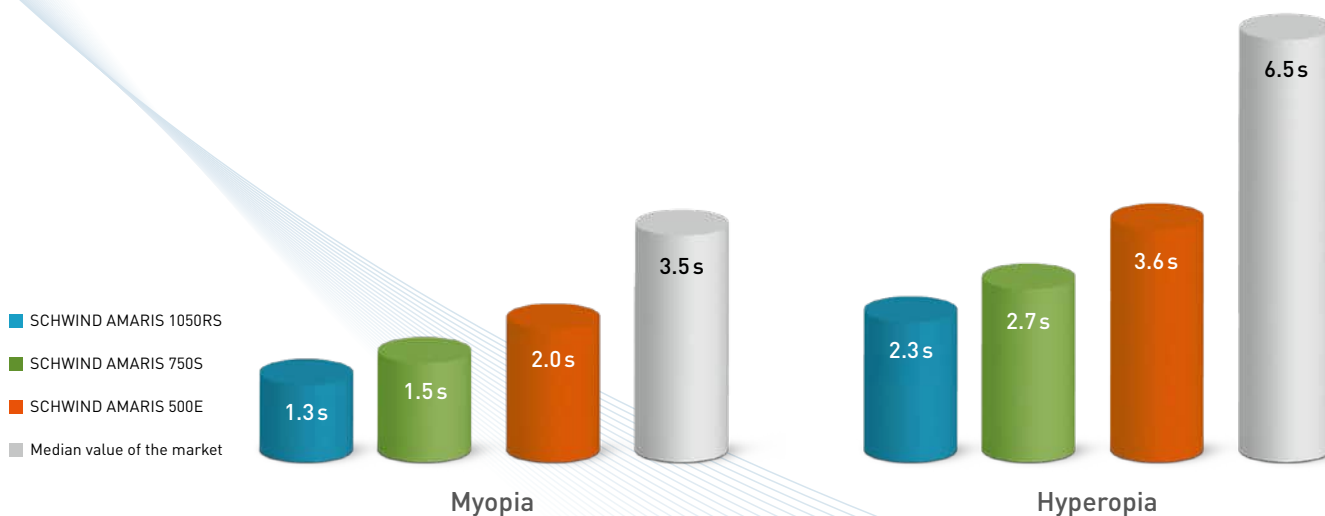
Innovative and reliable

The SCHWIND AMARIS 1050RS is a major milestone in refractive corneal surgery, achieving a repetition rate of 1050 Hz, currently is one of the highest of any excimer laser in the market. This innovative excimer laser decreases the extremely short ablation time of the product family even further, to 1.3 seconds per dioptre² – the ablation times achieved with the AMARIS 750S and AMARIS 500E are no less impressive. In practical terms this means shorter treatment times and minimised risk of corneal dehydration. Moreover, the length of time the patient has to fixate on the green light is significantly shorter.

Whether 1050, 750 or 500 Hz, each of our laser systems is equipped with an advanced eye tracker, which compensates for eye movements in up to seven dimensions.

All the laser systems in the AMARIS family offer the combined advantages of tried and tested AMARIS technology – from Automatic Fluence Level Adjustment right through to Intelligent Thermal Effect Control. A specific Plume Evacuation System can remove particles from the ablation area and allows to reduce the existing smell during cornea ablation. And the SCHWIND CAM software facilitates individual and tailor-made treatment planning. All these advantages add up to one thing in particular: focus on patient results ensuring safety, comfort and precision.

»» The clinical results with the SCHWIND AMARIS laser are the best I have ever seen. ««
 Michiel Luger, MD, Bergman Clinics, Utrecht, Netherlands



SCHWIND AMARIS product family: ablation time per dioptre (s/D)²

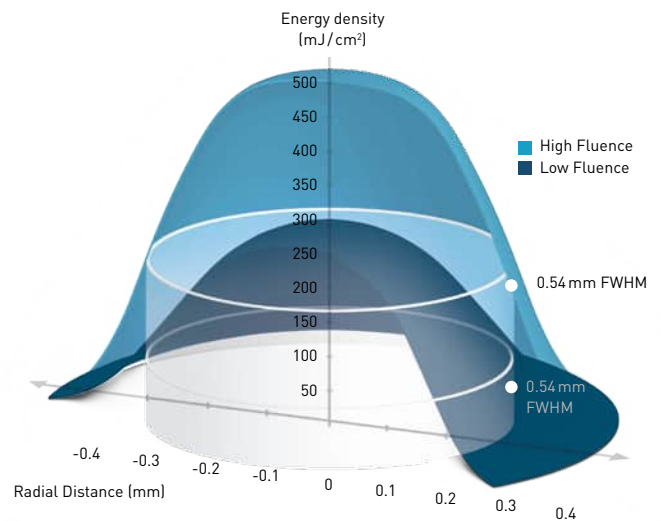
² LASIK myopia without astigmatism, 12.5 mm vertex distance, 6 mm optical zone

AFLA

An ideal balance

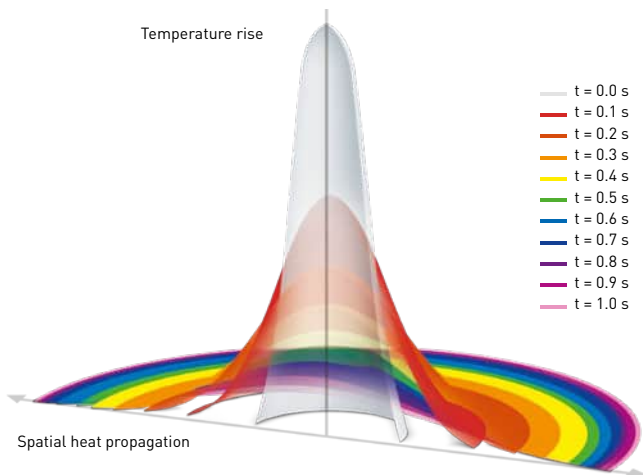
With the Automatic Fluence Level Adjustment (AFLA), the SCHWIND AMARIS product family achieves desired level of corneal smoothing even at the highest ablation speed.¹ Researchers at SCHWIND have developed an algorithm that ensures an ideally balanced ratio between the total number of laser pulses and the energy delivered.

About 80 percent of the ablation is performed with a high fluence value. For the fine modelling – the remaining 20 percent – AFLA automatically switches to a lower fluence. The result is optimum smoothing of the cornea. Through the extremely small beam size and Super-Gaussian beam profile, you achieve desired ablation smoothness.

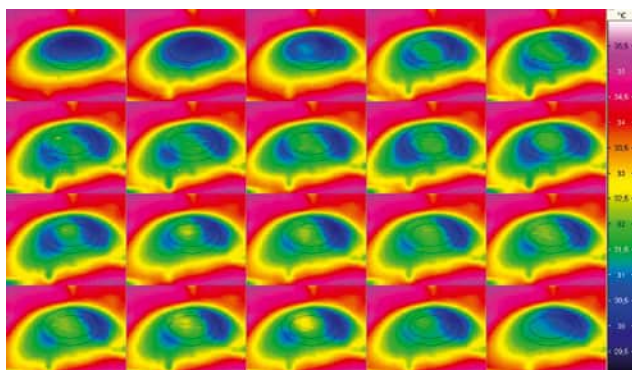


Automatic Fluence Level Adjustment

Ideal balance between the total number of laser pulses and energy delivered



Heat propagation of a laser pulse with the ITEC method



Corneal temperature measurements with an infrared thermographic camera

ITEC

Gentle even at the highest speeds

Intelligent Thermal Effect Control (ITEC) is the name of the thermal control process that prevents damage to the surrounding corneal tissue, even at the very high ablation speeds of the SCHWIND AMARIS product family. ITEC ensures that the laser pulses are distributed in a thermally optimised, dynamically adapted way, which gives the individual position on the cornea sufficient time to cool off. The following pulses can therefore approach an already cooled position faster. ITEC is better than the static processes. Studies using an infrared thermographic camera have proven that the corneal tissue only heats up minimally, even at high ablation speeds.¹

» The thermal control technology and ablation control with two fluence levels play a very important role, especially in biological terms: the less the biological interaction with the corneal tissue, the more reliably wounds can heal. «

Jorge Alió, MD, Vissum Medical Ophthalmologic Corporation, Alicante, Spain

Safety in up to seven dimensions

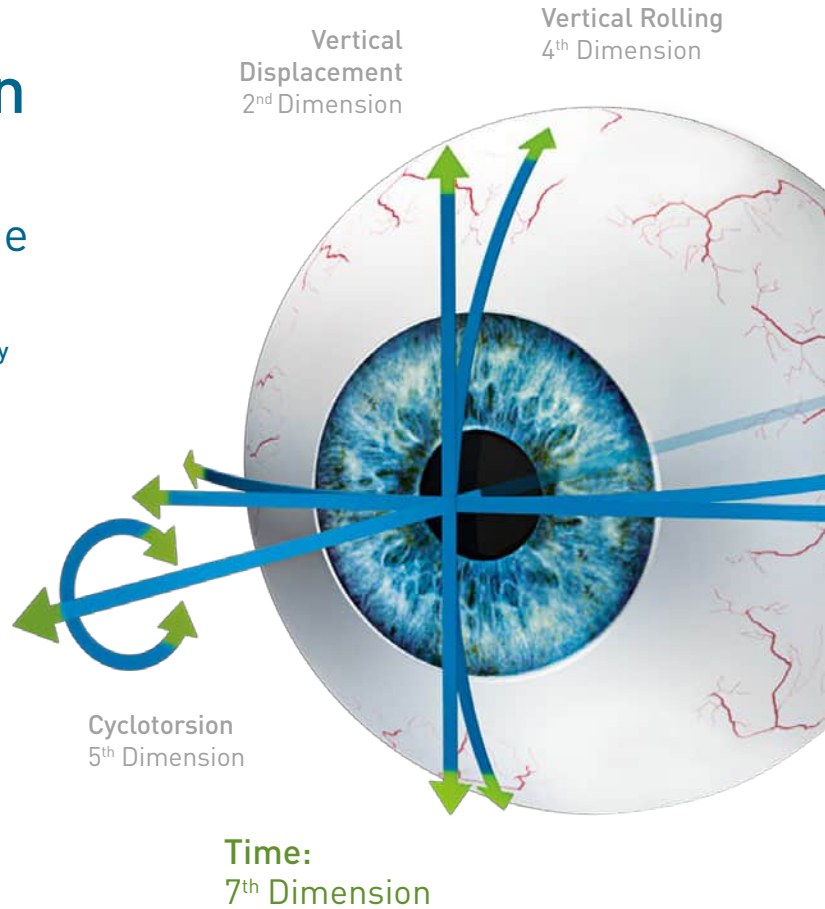
Eye tracking in space and time

Unsurpassed: the innovative SCHWIND AMARIS technology combines speed and precision in new dimensions. The 1050 Hz eye tracker actively compensates for every eye movement – in five to seven dimensions, depending on the AMARIS model – and offers you an unprecedented level of safety.

On average, the eyes move involuntarily 90 micrometres per millisecond in every direction, even during fixation. Consequently, precise centration and constant positioning of the eye is vitally important if high precision is to be achieved with eye laser surgery. The eye tracking features of the SCHWIND AMARIS technology potentially enables improved precision.

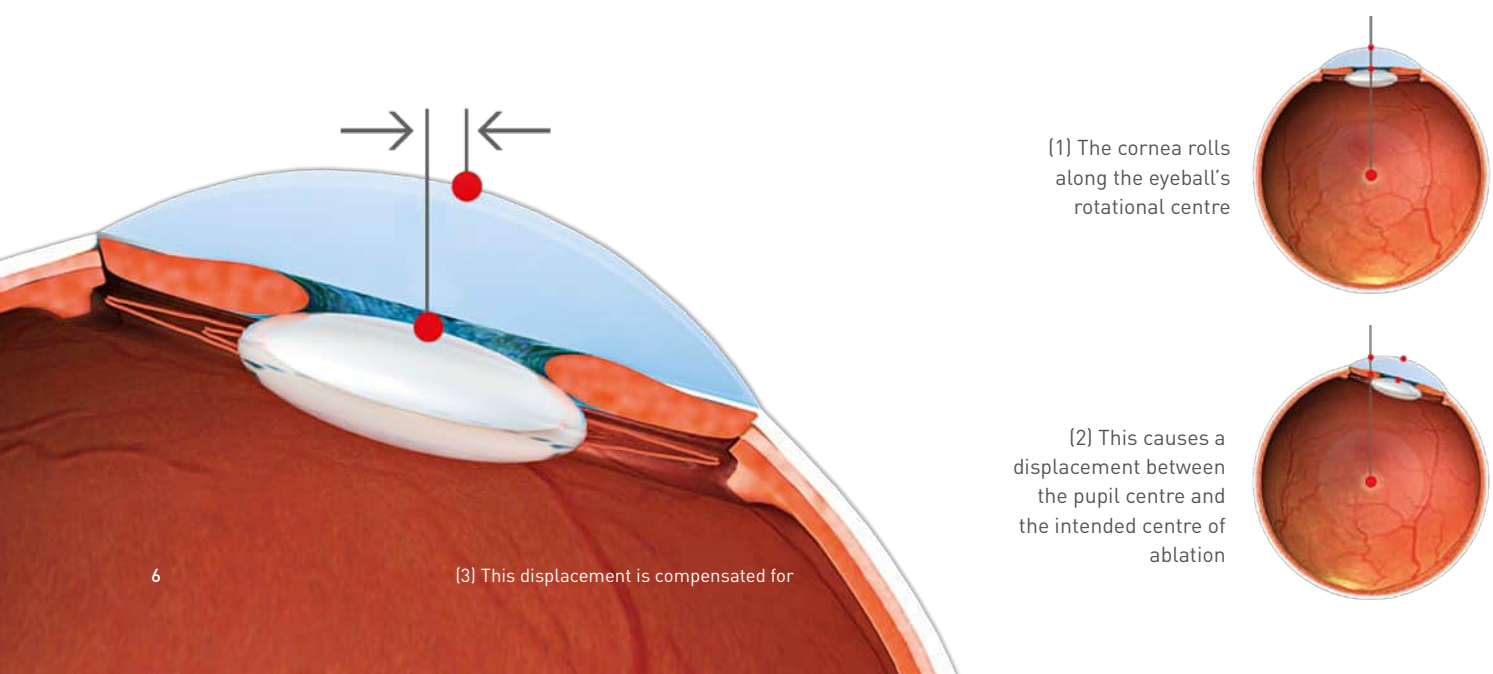
Compensation for eye movements in the 1st to 5th dimensions

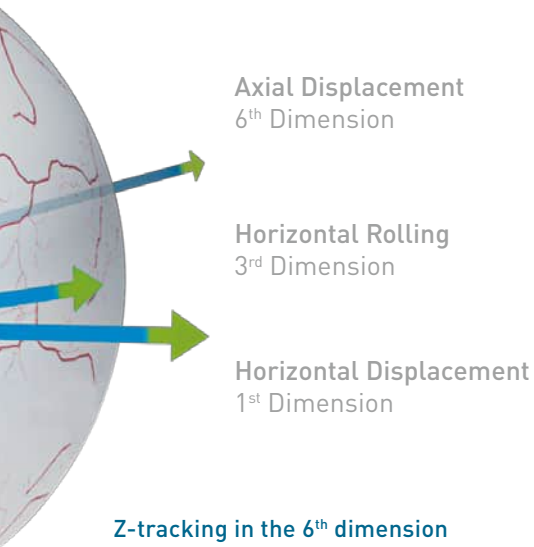
In addition to linear eye movements in the 1st and 2nd dimensions, the advanced eye tracker technology detects and compensates for the horizontal and vertical rolling movements, i. e. the 3rd and 4th dimensions.



In the 5th dimension, it compensates for static and dynamic cyclotorsion, or in other words torsional differences between the upright and supine position of the patient as well as rotating movements of the eye during laser treatment.

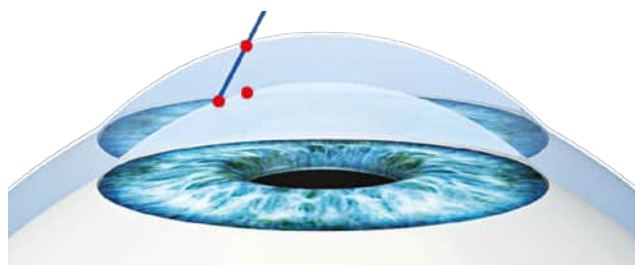
Compensation for rolling movements in the 3rd and 4th dimensions



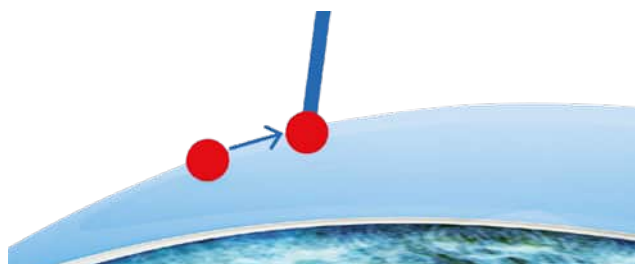


Z-tracking in the 6th dimension

Eye movements along the z-axis, i.e. the 6th dimension, result from the upward and downward movements of the head or the eyes. With z-tracking, the laser pulses are repositioned in order to actively compensate for positioning errors resulting from deviations along the z-axis.



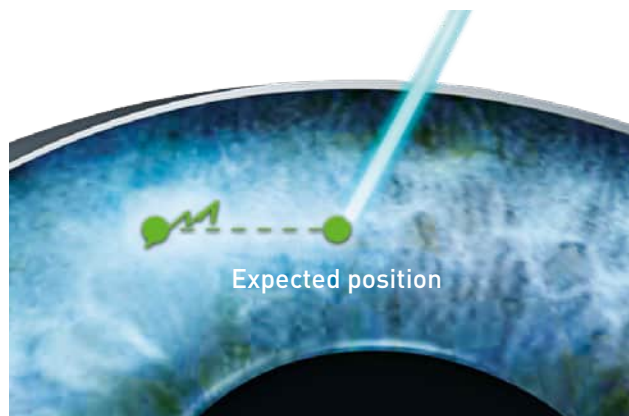
Positioning error along the z-axis



Repositioning of the laser pulses

Latency-Free Tracking in the 7th dimension

The state-of-the-art Latency-Free Tracking considers the time factor, i.e. the 7th dimension. Latency-Free Tracking compensates for eye movements that occur in the period between acquisition of the eye-tracker image and triggering of the subsequent laser pulses. The eye tracker performs a motion analysis on the basis of previous eye positions during the treatment.



Latency-Free Tracking

It then calculates, for all six dimensions, where the corneal target position will be at the moment of the next two consecutive pulses. The scanner moves to this position before the next pulse is triggered. The laser system knows when and where future laser pulses need to be triggered. The effect of this is latency-free ablation – and an ideal combination of speed and precision during the laser treatment.

Features for even more precision

The combination of many advantages in an innovative system makes the SCHWIND AMARIS technology the leading eye-tracking solution. This includes Pupil Centroid Shift Compensation. Simultaneously with pupil detection, the eye tracker also detects the limbus and considers the pupil shift under different light conditions.

The advantage for the patient: Reduced chances of decentration and pupil dilating medication is not necessary prior to treatment. Automatic monitoring of the pupil size during static cyclotorsional control ensures additional safety. The illumination is automatically adjusted so that the pupil size does not significantly change as compared to its size during the pre-operative stage.

»» The main benefit of the AMARIS product family compared to other laser systems is the sophisticated eye tracking technology, which is highly efficient at tracking and compensating for the eye movements with unprecedented precision. As a result, patients rightly feel more secure during their treatment. ««

David Kang, MD, Eyereum Eye Clinic, Seoul, South Korea

1050 Hertz

7D Eye Tracking (Latency-Free Tracking)



The evolutionary premium model SCHWIND AMARIS 1050RS

The SCHWIND AMARIS 1050RS is the product of continuous development work and is the most powerful excimer laser in the AMARIS product family. The innovative laser system delivers an unsurpassed repetition rate of 1050 Hz – currently one of the highest of all excimer lasers on the market – and consequently an extremely short ablation time of just 1.3 seconds per dioptre.³ That means even greater safety and comfort for the patient. The risk of the cornea drying out is minimised, and the length of time the patient has to fixate on the green light is reduced. It is a performance leap that increases safety and enhances patient comfort.

Active 7D eye tracking means that the SCHWIND AMARIS 1050RS combines space and time in an innovative technology.

The state-of-the-art “Latency-Free Tracking” (virtual) takes account of eye movements occurring during the period between acquisition of the eye-tracker image and triggering of the subsequent laser pulses – thus, the new target position is known in advance. The ablation process without latency error offers enhanced precision to patient.

³ LASIK Myopia without astigmatism, 12.5 mm vertex distance, 6 mm optical zone

The powerful performance laser

SCHWIND AMARIS 750S

The SCHWIND AMARIS 750S offers high performance, proven outcomes and safety. The laser system ablates the cornea at two different fluence values, thereby achieving a good combination of speed and precision. A very fine laser spot, with a diameter of just 0.54 millimeters (FWHM) ensures smooth corneal modelling.

With a repetition rate of 750 Hz, the SCHWIND AMARIS 750S achieves very short treatment times. The 6D eye tracker takes 1050 measurements per second to monitor the exact position of the eye in six dimensions. It actively compensates for any deviation with an ablation time of up to 1.5 seconds per dioptre.¹



750 Hertz

6D Eye Tracking (Z-Tracking)



500 Hertz

5D Eye Tracking (Advanced Cyclotorsion Control)

The efficient compact model

SCHWIND AMARIS 500E

The SCHWIND AMARIS 500E combines efficiency and safety. Automatic Fluence Level Adjustment (AFLA) ensures an optimal balance between the total number of laser pulses and the energy delivered. The result is fast ablation with advanced smoothing of the cornea. The laser system,

with a 500 Hz repetition rate, is well complemented by a 5D eye tracker, which compensates for eye movements in five dimensions. The SCHWIND AMARIS 500E is trusted by eye surgeons, and the outstanding performance of this compact laser system is verified by numerous studies.⁴⁻⁶

⁴ SmartSur^{FACE} transepithelial photorefractive keratectomy with mitomycin C enhancement after small incision lenticule extraction. Gab-Alla AA. Eye Vis (Lond). 2021 Sep 1;8(1):28.

⁵ Stability of corneal topography and aberrometry after hyperopic laser in situ keratomileusis with a 500-Hz excimer laser platform: A 3-year follow-up study. Plaza-Puche AB, Vargas V, Yébane P, Arba-Mosquera S, Alio JL. Eur J Ophthalmol. 2020 Nov;30(6):1238-1245.

⁶ Single-step transepithelial photorefractive keratectomy in high myopia: qualitative and quantitative visual functions. Adib-Moghaddam S, Soleyman-Jahi S, Adili-Aghdam F, Arba Mosquera S, Hoorshad N, Tofighi S. Int J Ophthalmol. 2017 Mar 18;10(3):445-452.

Differences at a glance



AMARIS 1050RS



AMARIS 750S



AMARIS 500E

Laser Parameters			
Repetition rate	1050 Hz	750 Hz	500 Hz
Ablation time (s/D) (LASIK Myopia, without astigmatism, 12.5 mm vertex distance, 6 mm optical zone)	1.3 s	1.5 s	2.0 s
Eye Tracker (basic version 4D)	7D maximum	6D maximum	5D maximum
Reaction time (system as a whole)	Zero latency (with Latency-Free Tracking)	3 ms	3 ms
6 th dimension: Z-tracking	Optional	Optional	-
7 th dimension: Latency-Free Tracking	Optional	-	-
Design/Features			
Base unit	Design base, high-gloss paint finish	Design base	Functional base
Laser arm	90° swivelling	90° swivelling	-
Plume Evacuation System	Integrated	Integrated	Optional (External)
Patient Bed			
SCHWIND Patient Bed	Optional	Optional	Optional
SCHWIND Patient Bed EVO	Optional	Optional	-

Great results for better vision



Superfast eye-tracking
(Latency-free)



True customization



Thermal control



Automated cyclotorsion
compensation



Outcome
visualisation

SCHWIND ATOS®



With CenTrax®
Fully automated centration

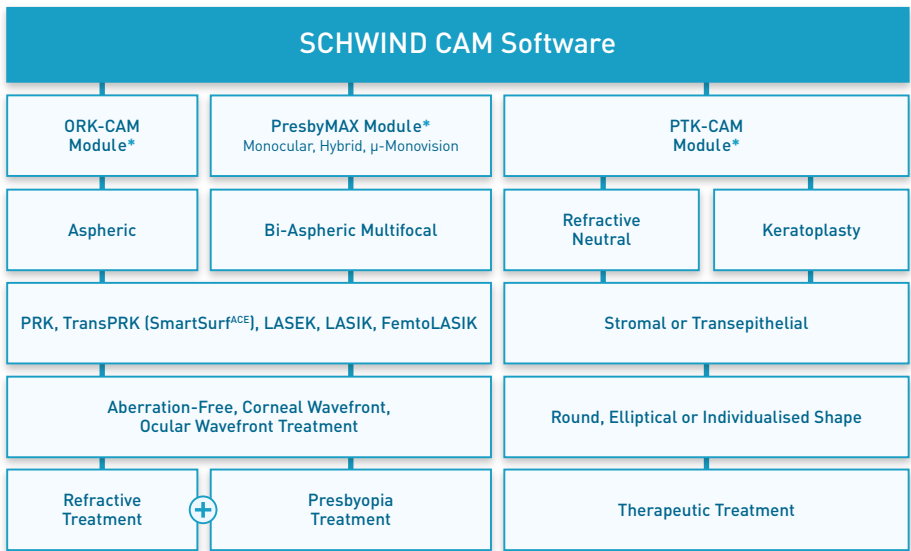
SCHWIND AMARIS[®] 1050RS

Streamlined data
connectivity with
diagnostics

CustomEyes[®]
PresbyMAX[®]
SCHWIND Foresight[®]

Plan individually for each situation

Comprehensive treatment planning with complete diagnostic data

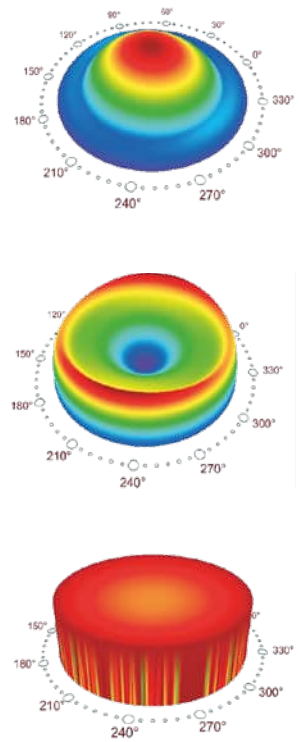


Each treatment is different. That is why the entire AMARIS product family, with the modular SCHWIND CAM software, makes it possible for you to plan treatment individually for your patients across an exceptionally wide range of applications in corneal surgery. Whether corneal or ocular wavefront, pachymetry or epithelial data – all the required diagnostic information are incorporated into planning.

You can be sure that you will not leave out any detail important for the individual ablation.

* with Static Cyclotorsion Control

SCHWIND CAM modules and the advantages for you



ORK-CAM:

A one-of-a-kind intelligent planning tool for wide-ranging and tailor-made refractive laser treatment. Aspheric ablation profiles are employed for both aberration-free and customised treatments based on (total) corneal or ocular wavefront data.

PresbyMAX:

This module is ideal for safe and efficient treatment of patients with emmetropia, myopia, hyperopia and astigmatism, whose accommodative response is limited. PresbyMAX is based on bi-aspheric ablation profiles.

PTK-CAM:

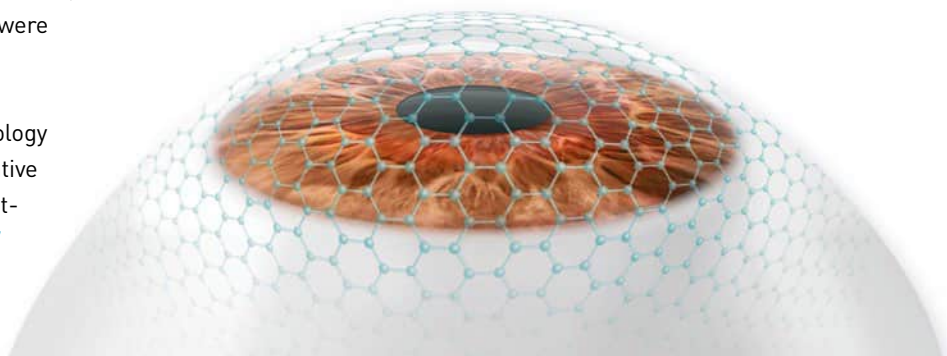
This module supports you in performing therapeutic treatments. Superficial as well as deep corneal scars and corneal degenerations can be exactly localized and treated with a procedure in which the corneal tissue is ablated in either a circular, elliptical or an individualised shape. You can choose between a more superficial refraction-neutral or a deep ablation for performing laser keratoplasty.

Very smooth cornea

For the AMARIS laser, the geometric corneal model, the ablation pulse and the pulse distribution were optimised based on extensive research.

The result: the innovative SmartPulse Technology improves vision quality in the early postoperative phase of all treatment methods. Surface treatments as SmartSurf^{ACE} benefit in particular,⁷ since a LASIK flap does not contribute to smoothing of the stromal surface until it regenerates.

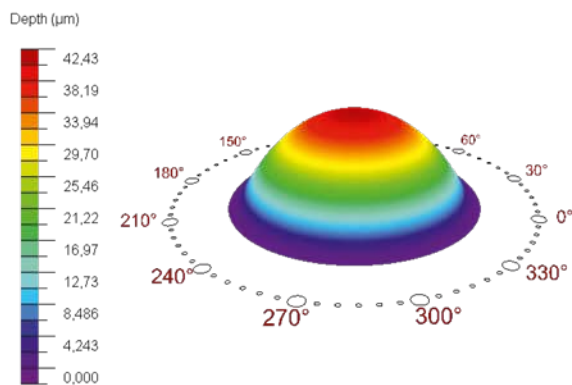
A 3D fullerene model is used to give a very accurate depiction of the cornea



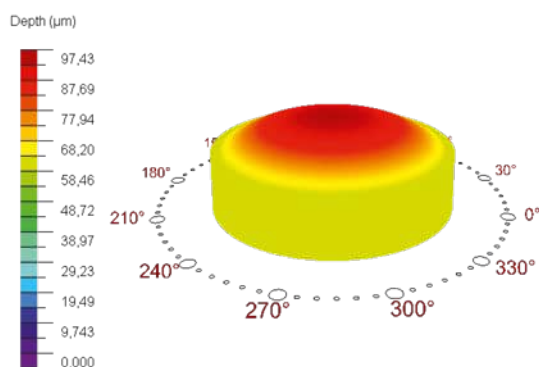
⁷ Multi-Centre Evaluation of TransPRK outcomes with SCHWIND AMARIS using SmartPulse Technology. Lin DT, Vinciguerra P, Arbelaez MC, Awwad ST, Kang D, Luger MHA, de Ortueta D, Tan J. SCHWIND study 2015

Touch-free treatment with SmartSurf^{ACE}

Innovation that delivers results



PRK profile in myopia treatment



SmartSurf^{ACE} profile in myopia treatment

SmartSurf^{ACE} combines the benefits of touch-free TransPRK surface treatment with innovative SmartPulse Technology.^{8,9}

It works without touching the eye. There is no suction, no blade and no incision – vision is corrected through the top layers of the cornea with SCHWIND AMARIS technology, gently, touch-free, in a single step. The treatment with SmartSurf^{ACE} on regular corneas speeds up the healing process and yields good vision quality even in high myopic eyes.

The advantages over other surface treatment methods are obvious – the epithelium is removed more precisely, more uniformly and more easily than with manual or alcohol-assisted debridement.

SmartSurf^{ACE} is suitable for any laser candidate as well as patients with thin corneas, corneal pathologies or complex topographies.

⁸ One-Year Visual and Refractive Outcomes of SmartPulse® Technology in Transepithelial Photorefractive Keratectomy for Myopic and Astigmatic Patients. Margarit DA, Stanca HT, Mocanu V, Munteanu M, Ferrari F, Marius S. J Clin Med. 2024 Oct 17;13(20):6182

⁹ Trans advanced surface laser ablation (TransPRK) outcomes using SmartPulseTechnology. Aslanides IM, Kymionis GD. Cont Lens Anterior Eye. 2017 Feb;40(1):42-46

SCHWIND Foresight®

Post-operative corneal visualisation

SCHWIND Foresight is an intuitive and sophisticated software solution to visualise the effect on the cornea of each individual therapeutic and refractive surgery treatment upon planning. Foresight creates a virtual replica of the individual patient's cornea. Based on it, surgeons can dry run surgery, reflect their planning and educate their patients about the planned ablation profile and the expected outcome.

CustomEyes®

True customization for clear vision

CustomEyes with SCHWIND AMARIS offers an advanced, personalized approach to laser vision correction, utilizing wavefront technology. High-resolution diagnostic devices (e. g. SCHWIND PERAMIS, MS-39, SIRIUS+) can measure the fine details of the cornea's front and back surface as well as they can calculate the total irregularities/errors of the eye. The incorporation of these data into the SCHWIND treatment planning module enables a highly personalized treatment profile with SCHWIND AMARIS.

C-eye Corneal Crosslinking

The integrated solution with SCHWIND AMARIS excimer lasers

C-eye* puts modern CXL technology together with SCHWIND AMARIS excimer lasers. This lets you perform CXL quickly and easily following a refractive or therapeutic laser treatment, without requiring the patient to change position. The device and the patient's eye are aligned precisely and easily using the joystick of the AMARIS' patient bed.

If there is a laser treatment following CXL, the SCHWIND AMARIS adjusts for the change in ablation behaviour¹⁰ with a specially adapted profile.

Benefits at a glance

- Optimized CXL workflow with SCHWIND AMARIS
- Elevated safety and effectiveness through preset application protocols and special irradiation profile
- Wide range of applications and high variability
- Treatment of ultrathin corneas (sub400)
- Simple operation and mobility



* Manufacturer of the diagnostic devices and C-eye: C.S.O.S.R.L – COSTRUZIONE STRUMENTI OFTALMICI 50018 Scandicci (Firenze) ITALY – V.Degli Stagnacci 12/E

¹⁰ Determination of the excimer laser ablation rate in previously cross-linked corneas. J Refract Surg. 2014 Sep;30(9):628-32. Richo O, Hafezi F et al.

SCHWIND AMARIS® Product Family

	AMARIS 1050RS	AMARIS 750S	AMARIS 500E
Laser Parameters			
Repetition rate	1050 Hz	750 Hz	500 Hz
Intelligent Thermal Effect Control	✓	✓	✓
SmartPulse Technology	✓	✓	✓
0.54 mm beam size, Super-Gaussian profile (FWHM)	✓	✓	✓
Beam delivery – flying spot with Automatic Fluence Level Adjustment	✓	✓	✓
Eye Tracking Features			
1050 Hz sampling rate	✓	✓	✓
Latency time of laser system	Zero latency (with Latency-Free Tracking)	3 ms	3 ms
Pupil and limbus tracking: Pupil Centroid Shift Compensation, Automatic Pupil Size Control	✓	✓	✓
Eye Tracking Dimensions			
1 st and 2 nd dimensions: Compensation of lateral movements	✓	✓	✓
3 rd and 4 th dimensions: Rolling balance	✓	✓	✓
5 th dimension: Advanced Cyclotorsion Control – static (option), dynamic	✓	✓	✓
6 th dimension: Z-tracking (option)	✓	✓	-
7 th dimension: Latency-Free Tracking (option)	✓	-	-
SCHWIND CAM Software			
ORK-CAM module: Refractive treatment	✓	✓	✓
PresbyMAX module: Presbyopia treatment (per procedure fee)	✓	✓	✓
PTK-CAM module: Therapeutic treatment (keratoplasty as option)	✓	✓	✓
SCHWIND Foresight (separate Software, as option) combined with CAM modules	✓	✓	✓
Ergonomics			
90° swivelling laser arm	✓	✓	-
Up to 90° swivelling patient bed (optional motor drive)	✓	✓	✓
Working distance of 193 mm	✓	✓	✓
Monitor with laser integrated Computer	✓	✓	✓
Further Features			
Diagnostic slit lamp – swivelling on 2 axes, 4 selectable diaphragms (option)	✓	✓	✓
Observer camera, integrated video recording and HDMI output (option)	✓	✓	✓
Cross laser for patient adjustment (option)	✓	✓	-
SCHWIND MEDNET network solution (option)	✓	✓	✓
Plume Evacuation System	✓	✓	Optional
C-Eye Corneal Crosslinking* with sliding unit (option)	✓	✓	✓
Patient Bed			
SCHWIND Patient Bed	Optional	Optional	Optional
SCHWIND Patient Bed EVO	Optional	Optional	-

* Manufacturer of the diagnostic devices and C-eye: C.S.O.S.R.L – COSTRUZIONE STRUMENTI OFTALMICI 50018 Scandicci (Firenze) ITALY – V.Degli Stagnacci 12/E
Compliance: CE conformity in accordance with Medical Device Directive (MDD) 93/42/EEC or Medical Device Regulation (EU) 2017/745 (MDR)

Optimum functionality, reliability and compliance with all legal regulations can only be assured through the use of products supplied by SCHWIND – whether as single items or as a combined system.

Selected functionalities and features are available only in combination with certain hardware and software deliverables.