



TRIOPTICS

See the Difference.

Our Products



From Production To Testing:

The Global Standard for Precision and Innovation

Optical systems have changed the world and will continue to do so in the future. TRIOPTICS is perfectly tuned into the future of these technologies. From the system for refractive index measurements to different lens testing systems with an autocollimator as basic measurement head, through to MTF testing systems and camera module testers, we offer the right measurement system for each process step.

[German high-tech engineering expertise since 1991](#)

The synthesis of optics and electronics was the strategic impetus for the founding of TRIOPTICS. And it is our foundation for future success.

It's one pillar of our approach to tackling the breathtaking pace of innovation in the optical technologies market.

The second pillar is expertise: excellent scientists, engineers, technicians and sales staff, who have joined our company and made TRIOPTICS what we are today: one of the world's leading developers and suppliers of optical measurement and production systems.



OptiCentric®

Optical Centration Measurement and Active Alignment of Lenses and Lens Systems

This product group sets the standard worldwide in optical centration measurement of lenses and lens assemblies. With high centration measurement accuracy and their intuitive, integrated operation, OptiCentric® systems have become indispensable in modern optical engineering.

OptiCentric® Measurement

Optical Centration Measurement of Lenses and Lens Systems

Our OptiCentric® measurement systems are leaders in the centration measurement of single lenses and complex lens systems. They measure the lens centration and other parameters for the quality testing of lenses and optical systems.

- High measurement accuracy of $< 1 \mu\text{m}$
- Exchangeable head lenses for a virtually unlimited measurement range
- A lot of additional upgrades and accessories in a modular design, fully integrated into the software



OptiCentric® 100

The industry standard for centration measurement of lenses and lens systems

OptiCentric® Alignment

Optical Centration Measurement and
Active Alignment of Lenses and Lens Systems

If lenses are not only being measured, but also actively aligned, TRIOPTICS offers combined systems that build on the proven measurement technology and that are expanded with components for aligning, cementing and bonding.

- High-precision alignment of lenses $< 2 \mu\text{m}$
- SmartAlign technology that is used for the active alignment to a mechanical or optical axis

OptiCentric® Bonding 5D

Active alignment and
bonding of lenses
in five degrees of freedom





ATS 200

The first alignment turning station for centration measurement, alignment and machining of mounted lenses

ATS

Alignment Turning Station for Centration Measurement, Alignment and Manufacturing of Mounted Lenses

The ATS series is designed to meet the demands of high performance optics manufacturing. The ATS is a combination of a compact and extremely stable turning machine and TRIOPTICS' proven centration measurement device, the OptiCentric®.

These devices allow the mount edge and the flange surfaces of mounted spherical, aspheric and cylindrical lenses to be manufactured such that the symmetry axis of the mount coincides with the optical axis of the lens. The beneficial design of the equipment ensures that mounted UV or IR lenses are machined with equal accuracy and without limitation.

Advantages of the ATS from TRIOPTICS:

- Highest accuracy with a remaining centration error after machining less than $< 1 \mu\text{m}$ for the production of high performance optics
- One combined software for measurement and manufacturing process for easy handling
- Production of mounted spherical, aspherical and cylindrical lenses for UV, VIS and IR applications

OptiSurf®

High-precision Measurement of Center Thicknesses and Air Gaps within Lens Assemblies

OptiSurf® measures the center thicknesses and air gaps of single lenses, plane optics and lenses within an optical system. The low-coherence interferometer determines all surface distances within an optical system in a single scan operation. OptiSurf® offers crucial advantages:

- Measurement accuracy of $0.15 \mu\text{m}$
- Measurement up to an optical thickness of 800 mm in just one scan operation
- Excellent software simplifies data import, measurement and analysis of measurement results

Especially designed for center thickness measurement of single lenses and doublets in production OptiSurf® LTM offers high-precision measurement results of up to $\pm 0.5 \mu\text{m}$ with a high lens throughput. The non-contact measurement helps protect sensitive surfaces during measurement.



OptiSurf®

Measures center thickness of lenses and air gaps within lens systems



OptiSurf® LTM

Optimized for center thickness measurement of single lenses and doublets in production



ImageMaster® PRO 10

MTF production tester
with outstanding speed
and performance



ImageMaster® HR

The preferred MTF test station
for R&D labs worldwide

ImageMaster®

Measurement of the Optical Imaging Quality (MTF) of Optics and a Multitude of other Parameters

The ImageMaster® product line has been specifically developed to measure the imaging quality of optics via the MTF (Modulation Transfer Function) and a multitude of other optical parameters such as focal length, distortion, chromatic aberrations, etc. All existing optics can be precisely measured: from high-performance camera lenses, high-resolution endoscopes, military vision devices, ophthalmic lenses, singlets and doublets or plastic molded lenses.

ImageMaster® R&D Line

The ImageMaster® R&D line represents the highest accuracy and flexibility in optics testing. Thanks to the modular, extensible design of the equipment, it can be individually customized to specific requirements. The measuring instruments can be configured for testing a wide variety of optical systems such as:

- Object in infinite and finite object distance
- Focusing and afocal systems
- All spectral ranges from UV to VIS and IR

ImageMaster® PRO

The ImageMaster® PRO series is the world leader in the mass-production testing of camera lenses for mobile phones and digital cameras. The ImageMaster® PRO units are also regarded as the most successful test systems in the production of individual lenses and samples on a wafer-level basis.

- Measurement time per sample less than 1.3 sec per sample (ImageMaster® PRO 10)
- High accuracy of 1.5 % MTF off-axis (ImageMaster® PRO 10)

ProCam® and CamTest

Active Alignment, Assembly and Testing of Camera Modules

TRIOPTICS offers a series of high accurate measurement and production instruments for camera module production. It is easily adaptable to various customer applications and well suited to face the upcoming challenges on the high-end consumer and industrial camera module market.

ProCam®

The need for high volume assembly together with the demand for improved quality makes the ProCam® technology an ideal solution to meet production challenges. The optimization of the image quality by using active alignment technologies leads to a decrease of production rejects i.e. camera modules with insufficient image quality. The increase in yield and image quality at the same time makes active alignment a more cost-efficient production method for high-end camera applications.

CamTest

The CamTest portfolio includes measurement systems with test charts for applications with finite object distance, as well as innovative solutions with collimators for infinite and variable object distances. Motorized focusable collimators make it possible to use software-controlled infinite and finite object distance configurations in the same measurement application. Finally, testing in very wide field of view configurations (up to 180°) is possible with this technology.

CamTest Smart

Versatile measurement system
for camera modules



ProCam® Align Smart

Active alignment and assembly
of camera modules

OptiTest®

Visual Optical Measurement Instruments

Optical testing tasks often require special testing devices that are specifically tailored to the particular application. TRIOPTICS provides a great number of proven optical and mechanical base components that enable fast and cost-effective setup of special test devices. The OptiTest® components include:

- Telescopes
- Collimators
- Autocollimators (autocollimating telescopes)
- Mechanical and optical accessories (e.g. mirrors and holders)

The OptiTest® system has a modular design, so that the base components are interchangeable and compatible with each other. Measurement setups can therefore easily be made ready, converted and adapted to new tasks.



OptiTest®

Modular visual optical
measurement instruments

TriAngle

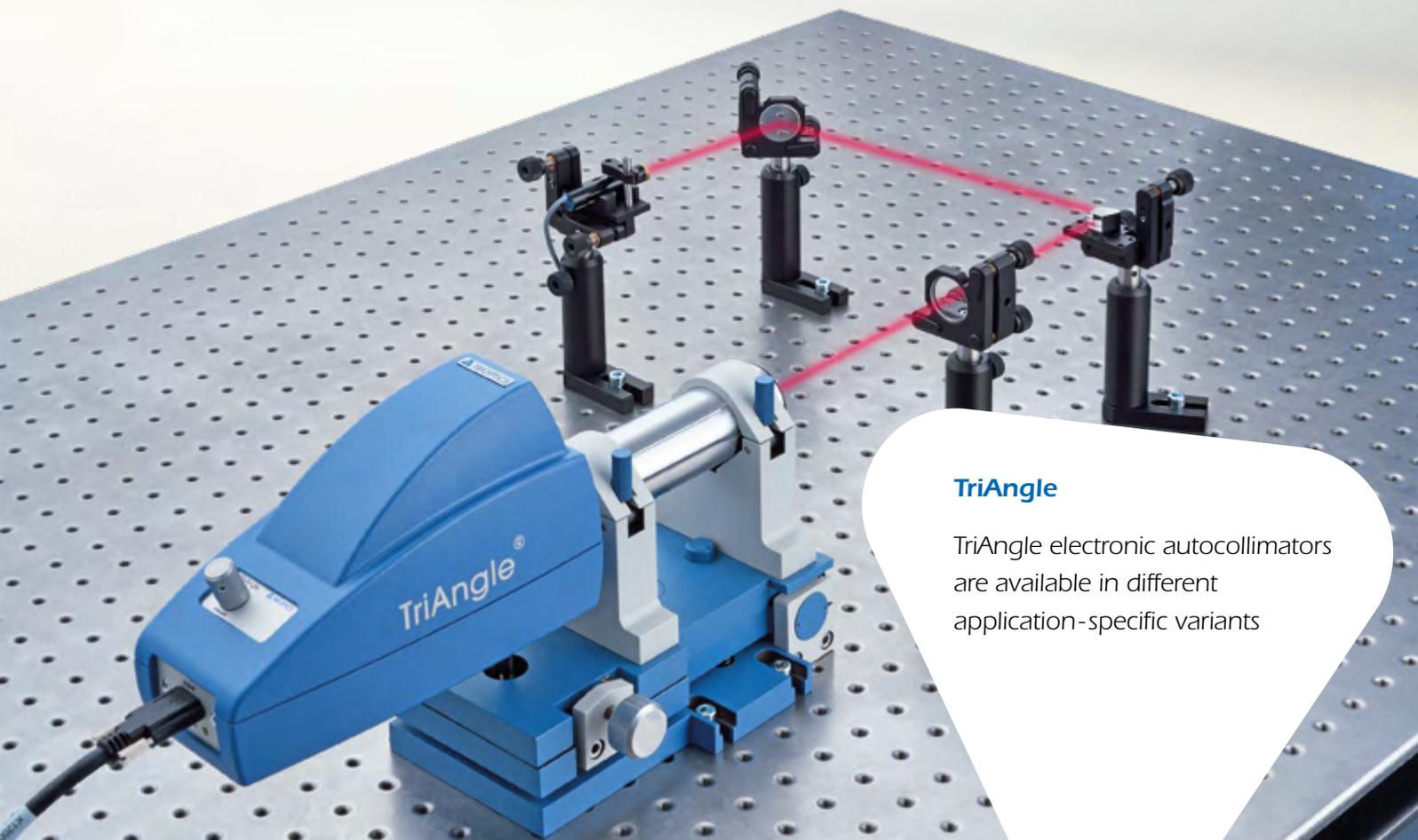
Electronic Autocollimators for Optical Angle Measurement

The electronic autocollimators of the TriAngle series are non-contact optical test instruments for the precise measurement of the angular position of optical or mechanical parts with a specularly reflecting surface. They are used for the high-precision alignment or positional control of optical or precision-mechanical components.

The TriAngle series is characterized by:

- A wide measurement range and accuracies from 2.5 arc sec to 0.2 arc sec depending on the focal length, ranging from 100 mm to 1000 mm
- Modern camera sensors provide high angular resolution and reproducible results
- Many predefined measurement applications integrated in the easy-to-use OptiAngle software.
- Single-cable connection to PC

The available focal lengths and proven software already cover the most common applications. The modular design means the models can also be flexibly adapted to specific requirements.



TriAngle

TriAngle electronic autocollimators are available in different application-specific variants

PrismMaster®

Goniometer for the Angular Measurement of Prisms, Polygons and Wedges

The goniometers of the PrismMaster® series are used for angular measurements on prisms, polygons and other plano-optical components. Whether for use in optical manufacturing or in the laboratory – the PrismMaster® precision goniometers offer crucial advantages:

- Outstanding absolute accuracy achieved in a single measurement
- World's highest measurement accuracy of up to 0.25 arc sec
- Fully automatic measurement process for pre-defined samples
- Deflection angle and refractive index calculation by means of software and without any additional accessories
- Flexible goniometer for quality assurance in optics manufacturing – PrismMaster® Flex

The PrismMaster® series offers high flexibility and allows the measurement of large prisms and polygons through to microprisms. The solid granite base guarantees high mechanical and thermal stability and is a prerequisite for the excellent measurement accuracy.

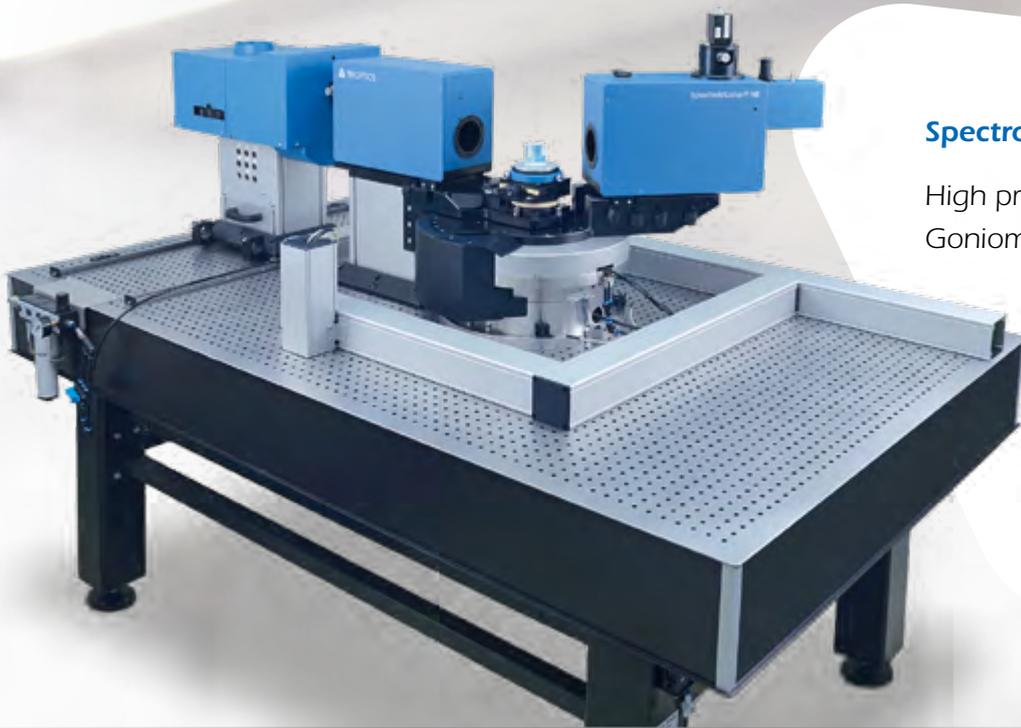
PrismMaster® 300 HR

Fully automatic measurement procedures ensure ease of use



SpectroMaster®

Spectrometer-Goniometer for Determining the Refractive Index



SpectroMaster® 600 HR

High precision Spectrometer-Goniometer

The SpectroMaster® Spectrometer-Goniometer are used for the precise determination of the refractive index and for the dispersion of optical glass and crystalline materials in the UV, VIS and IR spectral ranges.

The SpectroMaster® 600 HR is currently the most accurate commercially available measurement system for determining the refractive index with the following specifications:

- System accuracy for angle measurement: ± 0.2 arcsec
- UV 195 nm–365 nm: 3×10^{-6} (repeatability)
- VIS to NIR 365 nm–1014 nm: $\pm 2 \times 10^{-6}$ (accuracy)
- SWIR 1014 nm–2325 nm: $\pm 5 \times 10^{-6}$ (repeatability)
- Available wavelength range from 195 nm to 12000 nm

The SpectroMaster® 300 MAN works with refractive optics and is therefore limited to the spectral range from 365 nm to 1014 nm.

- System accuracy for refractive index measurement: 5×10^{-6}
- System accuracy for angle measurement: ± 0.5 arc sec

WaveSensor® and WaveMaster®

Wavefront and Surface Topography Measurement with Shack-Hartmann Sensors

Aspheric lenses are of increasing importance in today's optical industry. In a multitude of different areas of application single aspheric lenses are used instead several spherical lenses to build compact imaging systems. Thereby, the size and the weight of the systems are considerably reduced.

These systems have to be checked not only for their imaging properties after completion of the production process, but also after individual steps in the production process during the assembly.

Here WaveSensor® and WaveMaster® are able to measure a very broad range of spherical and aspherical lenses as well as partially or fully assembled lens systems due to their large dynamic range. In addition, the high measurement frequency allows for real time testing and analysis.



WaveSensor® Compact 2

Surface topography measurement with Shack-Hartmann sensors

WaveMaster® PRO 2

Wavefront analysis of lens batches or wafers in production



μPhase®

Measurement of Optical Surfaces and Wavefronts

μPhase® systems are ideal optical measuring instruments for the accurate and rapid testing of coated and uncoated glass, metal, ceramic, plastic and other surfaces with optical or precision-mechanical quality, and they can also be used for testing complete optical systems. The non-contact measurement method prevents damage to the sample being measured while giving the most exact evaluation of the entire surface or wavefront. The compact Twyman-Green interferometer is suitable for both production and quality management departments and for complex measurement tasks in research and development. Thanks to its flexible features, the μPhase® can also be used as a Fizeau interferometer.

- Compact and modular design
- For flat, spherical or aspheric samples up to 150 mm diameter
- Optionally with motorized automatic radius measurement
- Extensive and proven μShape™ measurement and analysis software
- Hardware and software can also be upgraded if required

μPhase® Sensor

Basis for flexible interferometer solutions
in production and laboratory



μPhase® Vertical

Surface and radius measurement
automated in one system



OptiSpheric®

Universal Measurement Instruments for the Optical Testing of Spherical Lenses

OptiSpheric® is the industry standard for non-contact testing of single lenses and is used worldwide to fully measure and qualify optical components and systems.

Typical measurements are:

- Positive and negative effective focal length (EFL)
- Back focal length (BFL)
- Radius of curvature (ROC)
- Flange focal length (FFL)
- Modulation transfer function (MTF) on axis
- Measurement of wedge angles (optional)

The reliable measurement values show the highest possible accuracy. Measurements are user-friendly and quick to ensure a high sample throughput rate. This is also supported by the tried-and-tested OptiSpheric® software that meets the requirement of optics manufacturing with regard to easy and intuitive operation.



OptiSpheric®

Non-contact measurement of
focal length, MTF, radius and
back focal length



OptiSpheric® IOL PRO 2

The gold standard for fully automated IOL measurements in production

WaveMaster® IOL 2

Power mapping of IOLs using wavefront measurement



OptiSpheric® IOL and WaveMaster® IOL

Comprehensive Measurement of Intraocular Lenses (IOLs) for Ophthalmology

For the specific task of measuring intraocular lenses for the ophthalmic industry, TRIOPTICS provides two solutions: OptiSpheric® IOL series and WaveMaster® IOL 2. For both a model eye can be provided for in situ measurements.

OptiSpheric® IOL

Products from the OptiSpheric® IOL series represent the industry standard for testing intraocular lenses. Our customers rely on high-precision measurements in research and development as well as in production. The transparent measurement process permits the easy definition of important parameters for all modern lens types in accordance with ISO 11979.

WaveMaster® IOL 2

WaveMaster® IOL 2 permits the complete mapping even of highly complex monofocal and toric spherical or aspherical intraocular lenses by means of wavefront analysis with a Shack-Hartmann sensor. In a quick measurement, the optical power, aberrations and the modulation transfer function are determined precisely.

D-275 Automatic Alignment Telescope

For Alignment and/or Measurement of 5 Axes of Components in Optical Beam Paths and Subassemblies

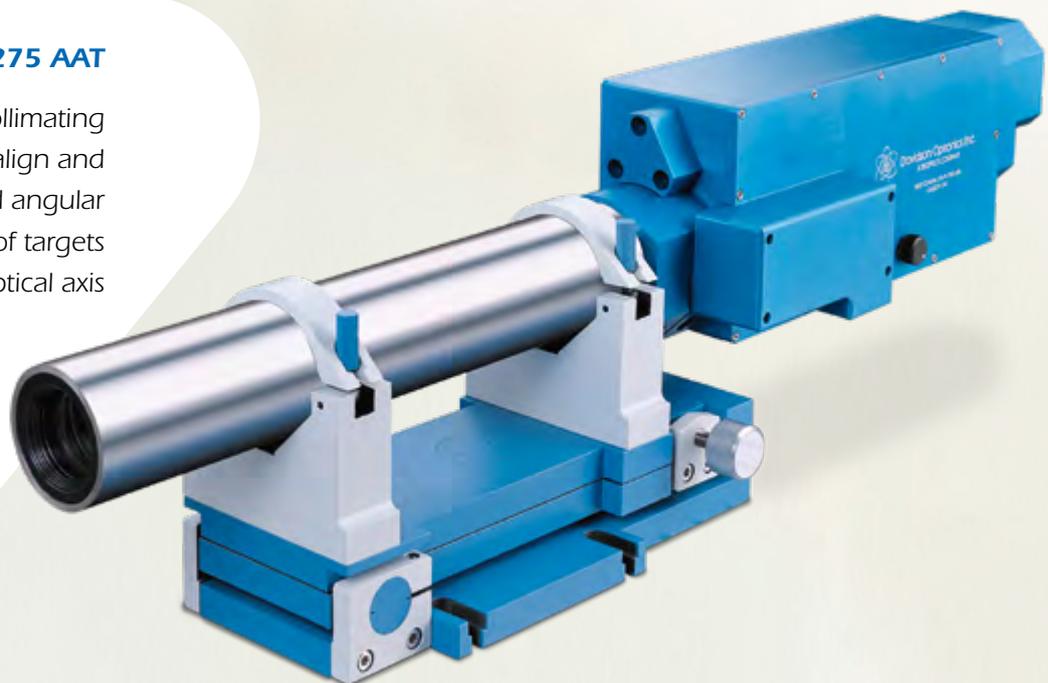
The D-275 Automatic Autocollimating Alignment Telescope focuses from 40 cm to infinity, to align and measure the location and angular orientation of any number of targets along its optical axis. Since the mechanical axis of the tube and the optical axis of the instrument are parallel within 1 arc second, the instrument is easily adaptable to mounts, jigs, stages, and various setups and setups using a dial indicator. A reflective surface may be used to be established normal to the optical axis by utilizing the autocollimating feature. The D-275 Automatic Alignment Telescope provides the flexibility to align most complex optical assemblies and beam paths.

Key Features:

- Only fully automated telescope for alignment and/or measurement of the 5 axes of components in optical beam paths and subassemblies
- Calibration certified & traceable to NIST standards
- Remotely controllable using TCP/IP
- User friendly software

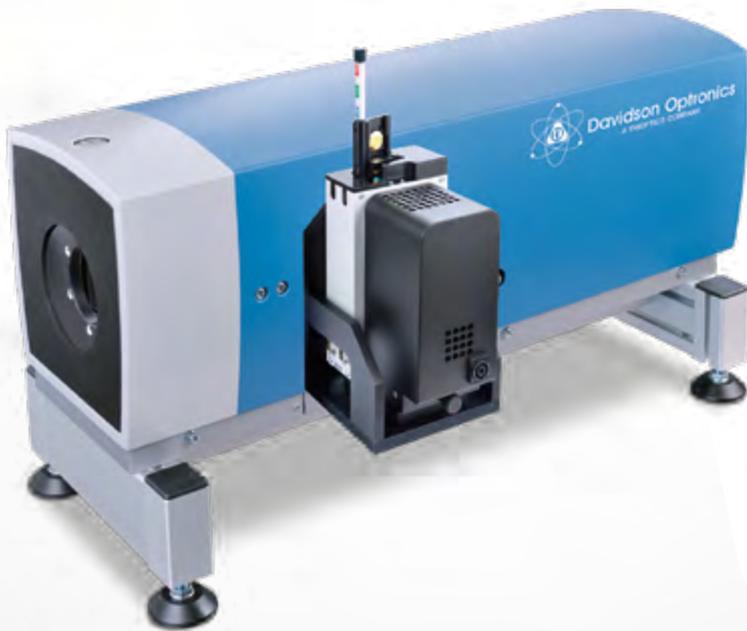
D-275 AAT

Automatic Autocollimating Alignment Telescope to align and measure the location and angular orientation of any number of targets along its optical axis



Mirror Collimators

Fully Aligned Target Projector for Testing and Adjusting Optical Systems in IR, VIS and UV



Mirror Collimator

The Mirror Collimator is available with different focal lengths and clear apertures

The Davidson Optronics Mirror Collimators project an illuminated test chart to infinity. Typical applications include testing and adjusting cameras used in aviation and space. Mirror collimators provide plane wave fronts by off-axis parabolic mirrors with unobstructed apertures. As opposed to lens collimators, that have limited spectral ranges and chromatic aberrations, mirror collimators do not show chromatic aberrations and have a wide applicable spectral range. Other focal lengths and clear apertures are available on request. Due to the modular design, customized collimators can be designed and fabricated in a short lead time.

Key Features:

- Fully aligned plug-and-play system
- Mirrors made of low thermal expansion glass-ceramics
- Certified wave front accuracy and focal length
- Modular target generator with lamp house, filter/target changers and chopper
- Quick mount system for fast exchange of target generator

Spherometers

Universal Measurement Instruments for the Tactile Testing of Spherical Lenses

Spherometers from TRIOPTICS are used around the world in hundreds of optics companies and laboratories for the precise determination of radii of curvature. Our spherometers have become the industry-wide standard for ultra-precise radius measurements and the calibration of test plates. The long-term accuracy and automated features in particular of our spherometers are highly valued in laboratory and production environments.

- High-quality mechanical components ensure maximum stability
- Radius measurement accuracy of up to 0.005 % and repeatability of up to 0.001 %



SuperSpherotronic® HR

Tactile radius measurement
with the highest precision

TRIOPTICS worldwide



Locations

Germany

TRIOPTICS Headquarters

Strandbaddamm 6
22880 Wedel, Germany
Tel.: +49 4103 18006 0
sales@trioptics.com
www.trioptics.com

TRIOPTICS Wetzlar Branch

sales@trioptics.com
www.trioptics.com

TRIOPTICS Berlin

support@trioptics-berlin.com
www.trioptics-berlin.com

China

TRIOPTICS China

info@trioptics-china.com
www.trioptics-china.com

France

TRIOPTICS France

contact@trioptics.fr
www.trioptics.fr

India

HP Instruments

hpi@hpinstruments.com
www.hpinstruments.com

Israel

Prolog Optics

info@prologltd.com
www.prologoptics.com

Japan

TRIOPTICS Japan

info@trioptics.jp
www.trioptics.jp

Korea

TRIOPTICS Korea

info@trioptics.co.kr
www.trioptics.co.kr

Russia

URAN

info@uran-spb.ru
www.uran-spb.ru

Singapore

TRIOPTICS Singapore

danny.ng@trioptics.com.sg
www.trioptics.com.sg

Taiwan

TRIOPTICS Taiwan

info@trioptics.tw
www.trioptics.com.tw

Turkey

Optomek

info@optomek.com.tr
www.optomek.com.tr

United Kingdom

Armstrong Optical

info@armstrongoptical.co.uk
www.armstrongoptical.co.uk

USA

TRIOPTICS USA

sales@trioptics-usa.com
www.trioptics-usa.com

Vietnam

TECOTEC

hanoi@tecotec.com.vn
www.tecotec.com.vn



TRIOPTICS GmbH

Strandbaddamm 6 · 22880 Wedel · Germany · Tel. +49 4103 18006-0 · info@trioptics.com · www.trioptics.com