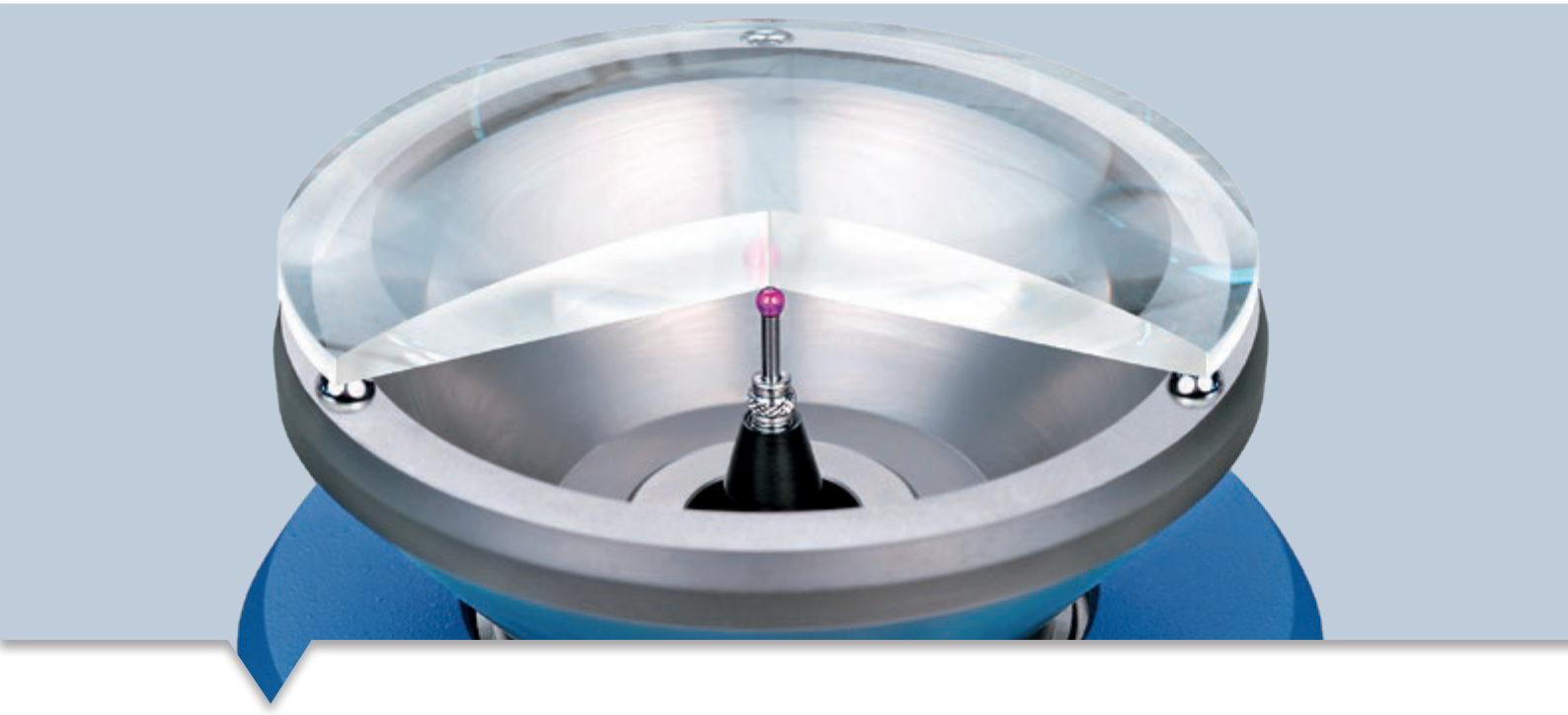
TRIOPTICS
See the Difference



SpheroCompact® & Spherotronic

Spherometers for tactile radius measurements

Passion for optics

TRIOPTICS develops and produces the world's largest range of optical measurement and manufacturing technology for the development, quality control and production of lenses, lens systems and camera modules.

Spherometer

Fast and efficient radius of curvature measurements

Spherometers made by TRIOPTICS are used worldwide by optics companies and laboratories for the precise measurement of the radius of curvature of lenses. The radius of curvature is determined by the tactile measurement of the sagittal height of the curved surface.

The long-term accuracy and automated functions of our spherometers are highly appreciated in laboratory and manufacturing environments. The SpheroCompact® and Spherotronic thus represent the industry standard.

Advantages at a glance

All TRIOPTICS spherometers – SpheroCompact® and Spherotronic – are used to determine the radius of curvature of concave and convex lenses. They feature:

- **High precision and stability**
  High-precision linear gauges and measuring rings allow radius measurements with a measurement accuracy of up to ±0.005 %. The integrity of the samples is ensured, of course.

- **Traceability**
  The certified measuring rings and precision optical flats allow traceability of the measuring accuracy to international standards. This sophisticated technology is therefore regarded as the gold standard for laboratories and manufacturing. The reliable measurement can be used for quality control purposes as early as during the manufacturing process, since the sample does not have to be polished prior to the measurement.

- **Versatility**
  The selection of the model and associated selection of measuring rings with various diameters can be adapted to individual requirements and are versatile in their use.

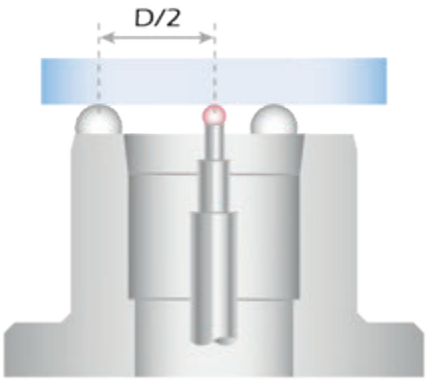
Spherometer

Measurement principle

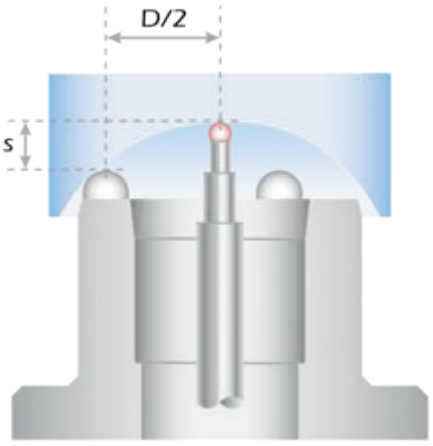
A prerequisite for precise measurements using the SpheroCompact® and Spherotronic is knowledge of the exact size of the rings used. Thus, during the calibration process at TRIOPTICS, their radius is determined with highest accuracy and certified in an individual calibration sheet.

Before starting the measurements, a precision optical flat is placed on the selected spherometer ring. This determines the reference position (zero point) for the subsequent sample measurement. In the second step, the sample is placed on the ring.

The spherometer measures the sagittal height of the curved lens surface. The radius of curvature is quickly determined from the relationship between the sagittal height and radius.



Determination of the reference position using a precision optical flat.



The radius of curvature is calculated from the known radius of the measuring ring (D/2) and the measured sagittal height (s).

Compared to other measurement methods, such as interferometry, tactile radius measurements offer considerable advantages:

- The spherometer is a cost-efficient alternative that offers comparable accuracy.
- The short setup time ensures fast working processes.
- The measurement method is easy to learn and use – very little operator training is required.
- Unpolished surfaces can be measured.

Spherometer

Product overview

TRIOPTICS offers three different spherometers according to their use and the requirements placed on them.

- **SpheroCompact®:**
  The simple, yet precise spherometer for use in manufacturing

- **SuperSpherotronic® HR:**
  High-precision radius measurement for manufacturing and laboratory applications

- **UltraSpherotronic®:**
  For the highest precision requirements for radius measurements and calibrations of reference samples

SpheroCompact®

The SpheroCompact® is particularly flexible and versatile due to its compact design and easy operation. Its price-performance ratio makes it the ideal measuring system for manufacturing applications. It can be used universally, since it can also measure strongly curved convex and concave surfaces with very small radii of curvature ranging from +2.5 mm and -4 mm respectively, with accuracies of up to ±0.05 %.

The hand switch is used to bring the linear gauge into contact with the sample. After activating the measurement process, the SpheroPRO software outputs the determined radius of curvature and performs a statistical evaluation of measurement repetitions.

Accessories

TRIOPTICS offers a selection of precision rings as accessories for the SpheroCompact®. Ruby balls are used to hold the sample. Since the measuring precision increases with the ring size, TRIOPTICS recommends selecting the largest possible ring for each test sample.

- **Standard set (diameter):**
  12.5 mm, 25 mm, 50 mm, 75 mm, 100 mm, 125 mm

- **Special sizes (diameter):**
  6 mm, 20 mm, 30 mm, 38 mm, 40 mm, 150 mm, 225 mm

An additional foot switch is available to activate the measuring process.

Precision rings with ruby balls for the SpheroCompact®

Spherotronic

Configuration

Both the SuperSpherotronic® HR and UltraSpherotronic® determine the radius of curvature of convex and concave surfaces up to +4 mm and -6 mm respectively. The balls of the measuring ring which holds the sample during the measurement process, are made of tungsten carbide and are extremely resistant to mechanical deformation. The large 60 mm displacement range of the linear gauge also allows high precision measurements of samples with large lens diameters and strongly curved surfaces.

The stable tabletop devices are easily operated using the buttons built into the base. They move the linear gauge upwards and downwards and start the measuring process. All other settings as well as the output of the measurement results are controlled by the SpheroPRO software.

The SuperSpherotronic® HR for measuring the radius of curvature with an accuracy of up to ±0.01 %

The SuperSpherotronic® HR and UltraSpherotronic® differ in their degree of measuring accuracy:

- Thanks to the built-in Heidenhain linear gauge, the SuperSpherotronic® HR achieves an accuracy of up to ±0.01 %.
- In contrast, the UltraSpherotronic® achieves a measurement precision of ±0.005 %, making it particularly suitable for use in laboratories for calibrating reference samples.

With a precision of ±0.005 %, the UltraSpherotronic® is used to calibrate reference samples.

Spherotronic

Upgrades and Accessories

With their extensive range of accessories, the SuperSpherotronic® HR and UltraSpherotronic® are easily adaptable to a wide variety of samples and conditions of use.

Precision rings

The precision rings for the SuperSpherotronic® HR and UltraSpherotronic® are equipped with tungsten carbide balls. Since the measuring precision increases with the ring size, TRIOPTICS recommends selecting the largest possible ring for each test sample.

The following ring sizes are available:

Precision rings with tungsten carbide balls for the SuperSpherotronic® HR and UltraSpherotronic®

- **Standard set (diameter):**
  7.8 mm, 14 mm, 20 mm, 28 mm, 38 mm, 60 mm, 90 mm, 120 mm
- **Special sizes (diameter):**
  12 mm, 48 mm, 75 mm, 150 mm, 225 mm

Mechanical pressure pad

The mechanical pressure pad ensures a constant and fixed contact pressure between the sample and ring. It is particularly useful for small lenses with a low net weight. If required, the mechanical pressure pad can simply be placed on the Spherotronic.

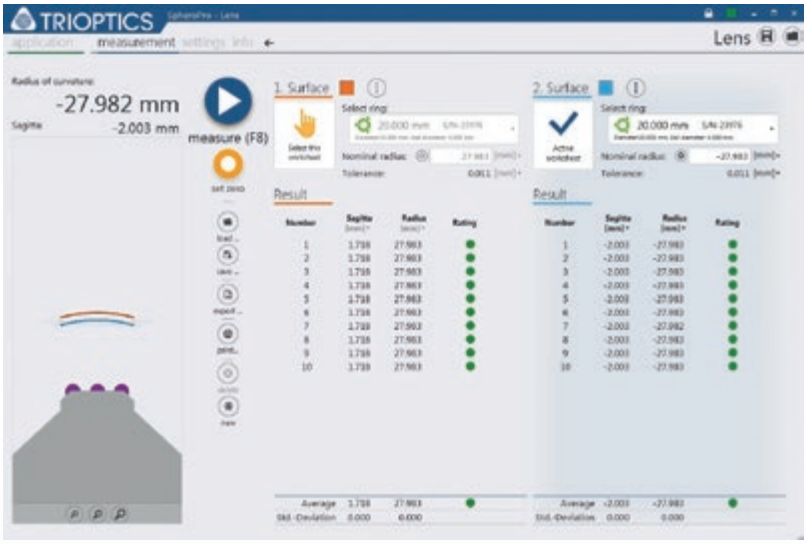
Foot switch for activating the measurement process

In addition to the software and the control-button on the base of the Spherotronic, the optional foot switch offers another option for activating the measuring process. This allows the operator to efficiently use his/her hands to handle samples, especially during serial measurements.

SpheroPRO

Key features

All TRIOPTICS spherometers are operated with the user-friendly SpheroPRO software. The software was designed to optimally meet the requirements of real-life applications and can also be operated via touchscreen monitor. The intuitive user menu enables the easy, quick and error-free determination of the radius of curvature of lenses via pre-configured measurement programs. A schematic representation of the measured radius of curvature (concave or convex) provides direct control of the current test step. Quality control is ensured by means of a continuous statistical evaluation of the measurement results.



The SpheroPRO software is easy to operate via a touchscreen interface and enables a quick evaluation of the measurement results.

Key features

- Quick plausibility check of the test step and measurement process through a schematic representation of the radius of curvature (convex/concave) and current number of measurements
- Continuous quality control through statistical evaluation of measurements, including mean value, standard deviations and pass/fail analysis
- Compact but comprehensive documentation in measurement certificates that can be stored digitally and printed
- Ring calibration data is easy to import and, if necessary, update for product extensions or product inspections
- Designed for touchscreen operation

Technical data

Type	SpheroCompact®	SuperSpherotronic® HR	UltraSpherotronic®
Radius of curvature (convex)	+2.5 mm to +∞	+4 mm to +∞ 1)	+4 mm to +∞ 1)
Radius of curvature (concave)	-4 mm to -∞	-6 mm to -∞	-6 mm to -∞
Travel distance of linear encoder	±12.5 mm	±30 mm	±30 mm
Diameter of sample (convex)	6 mm to 500 mm	8 mm to 500 mm	8 mm to 500 mm
Diameter of sample (concav)	6 mm to 500 mm	12 mm to 500 mm	12 mm to 500 mm
Measurement accuracy 2)	Up to ±0.05 %	Up to ±0.01 %	Up to ±0.005 %
Control unit	Separate control unit	Integrated into instrument base	Integrated into instrument base

The maximum measurment accuracy depends on the radius of the lens and the ring used.

Accessoires	SpheroCompact®	SuperSpherotronic® HR	UltraSpherotronic®
Interchangeable precision rings with various diameters	■	■	■
Mechanical pressure pad		■	■
Foot switch	■	■	■

■ Optional configuration

TRIOPTICS

See the Difference

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