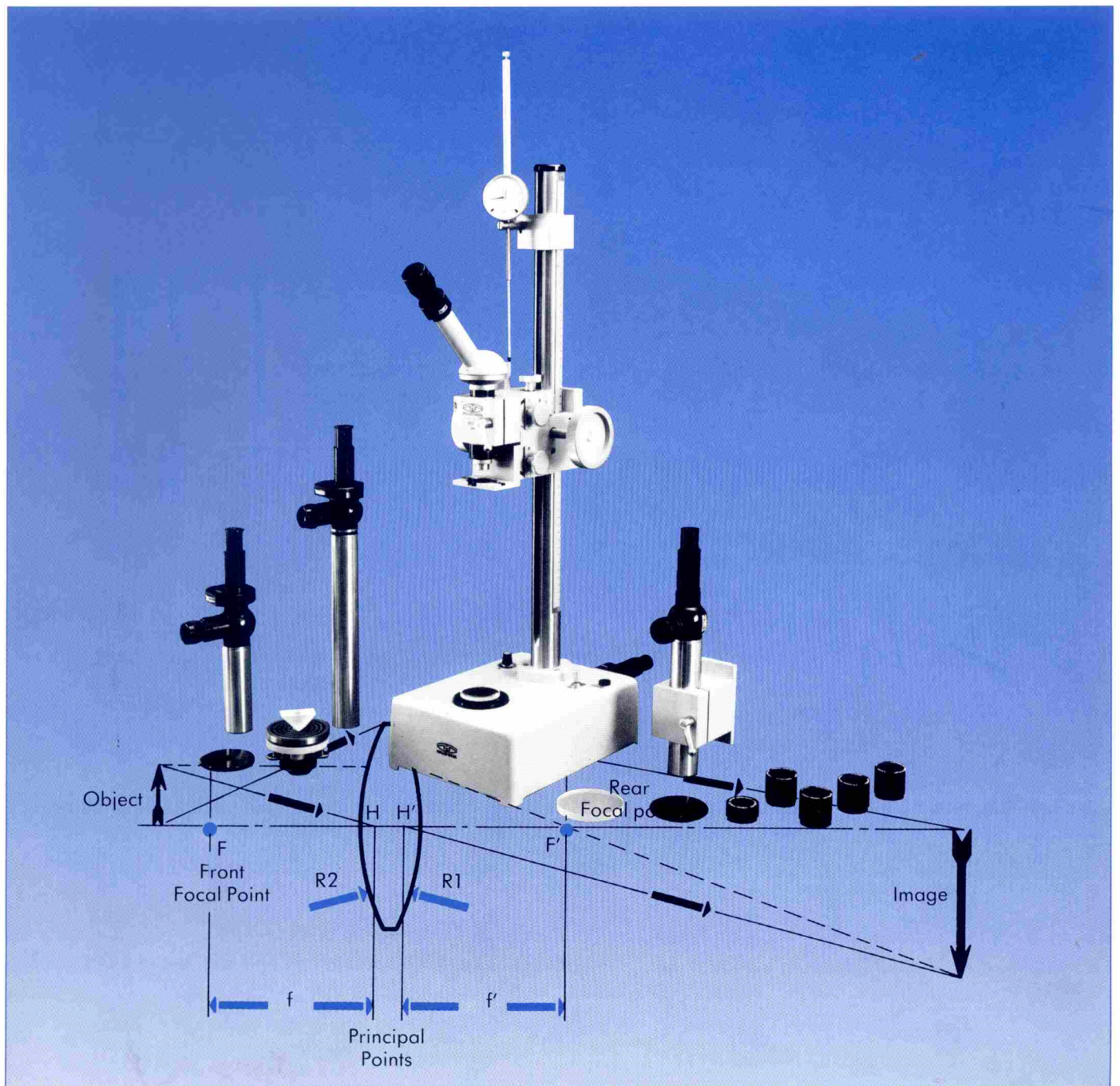


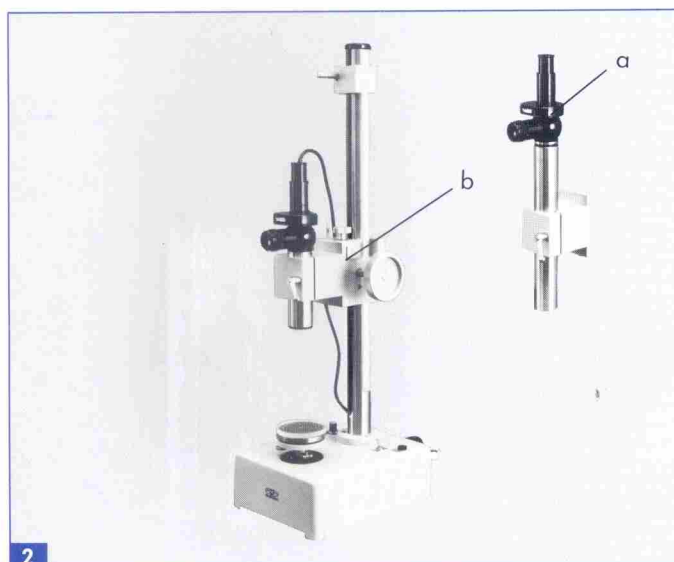


Measuring Equipment
for Lenses and Optical Systems

MELOS 500



MELOS 500 Universal Measuring Combination



Exceptional Versatility

Based on the experience and the requirements of our own optical manufacturing a modular testing system has been created offering an optimal solution to the most measuring problems in the optical field:

- Testing focal length of positive/negative components and systems
- Testing back focal length
- Measuring radius of concave/convex spherical surfaces
- Checking wedges and plane-parallel plates
- Checking angles and pyramidal errors of prisms
- Interferometrical measurements of flatness and parallelism
- Typical measurements with autocollimation method

Modular Design

The extreme versatility of this optical instrument results from the modular set-up featuring a multitude of typical measuring combinations. All the modular units are available as individual or complete instruments, no setting-up is necessary. With minimal expenses you can change a Focometer [1] into an Optical Spherometer [3] or an Angle Testing Instrument [2].

Low-Cost Alternative

The modular design enables an easy and quick conversion or extension of measuring capabilities using the same basic instrument.

Thus you have a low-priced alternative to extend and fit your test equipment if and when you need it.

Widespread Applications

The variety of measuring possibilities, the easy operation and the short test time enable the unrestricted application in the field of:

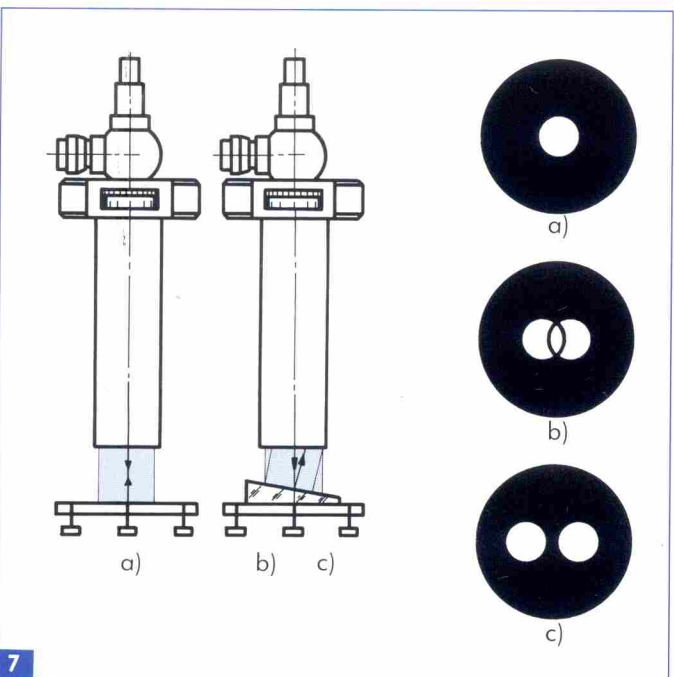
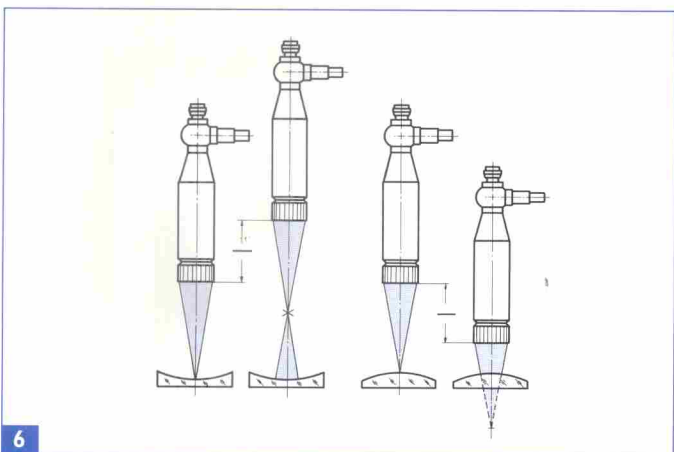
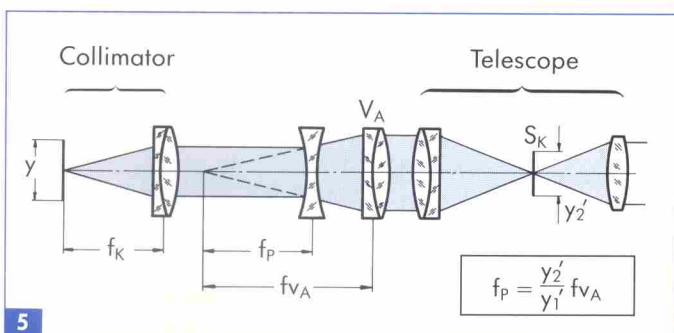
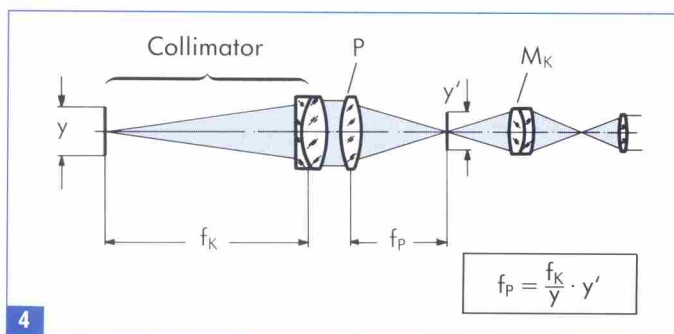
- manufacturing of optical components
- quality control and quality assurance
- laboratory tests and measurements

[1] Focometer for positive (a) and negative (b) focal lengths

[2] Angle Testing Instrument with autocollimator $f = 300 \text{ mm}$ (a) and $f = 140 \text{ mm}$ (b)

[3] Optical Spherometer for concave/convex radii

Measuring Principle



Testing Focal Length [4] [5]

● Positive focal length

Collimator K is set to infinity. A graduated scale y in the focal plane of the collimator is being projected into the focal plane of the specimen P. The image y' can be measured with the measuring unit M_K . The constant size f_K has been considered by the graduation of the measuring scale so that a direct read-off of the focal length value f_P is possible.

● Negative focal length

The measuring unit is exchanged for a Telescope or an Autocollimator. By means of the eyepiece scale S_K , the image size y_1' of the graduated scale y is determined. A suitable achromat is mounted on the telescope. After setting in the focal plane of the specimen the image size y_2' is determined and the focal length calculated.

Measuring Radius of Curvature [6]

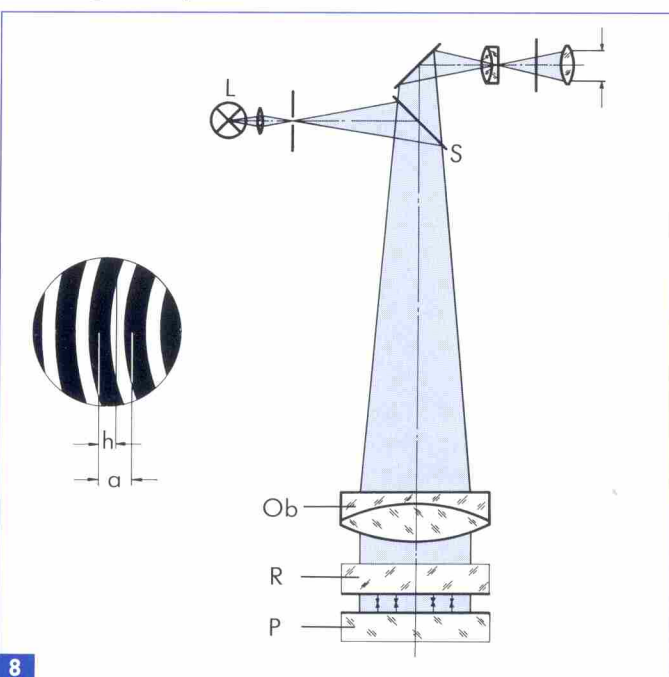
The Autocollimator is adjusted to a finite distance. Autocollimation images occur in vertex and centre of curvature of the surface. The displacement "l" from one sharp setting to the other corresponds to the radius of curvature r .

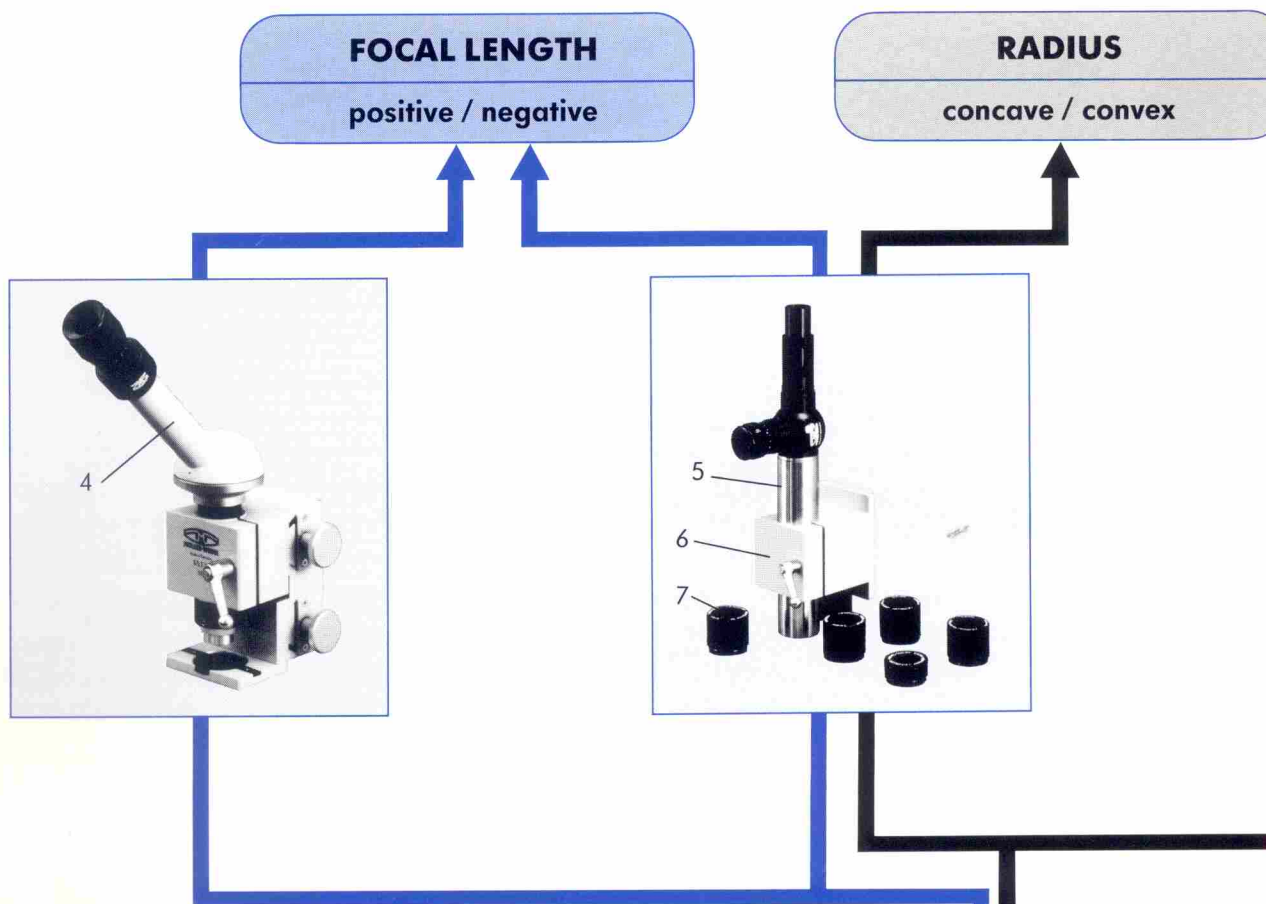
Testing Parallelism and Angles [7]

The supporting table is set perpendicular to the Autocollimator axis. After placing the specimen on the table, the parallel beam is reflected on the both surfaces of the specimen, and two images of the pinhole-diaphragm are produced. The relative position of the two images gives the information about the parallelism: (a) parallel, (b) within the tolerance, (c) out of the tolerance.

Interferometric Measurement of Flatness [8]

The ray bundle from the lamp L is reflected on the mirror S, leaves the objective Ob as parallel beam and is reflected between reference flat and specimen surface P. As result interference fringes of equal thickness (Fizeau) appear. The value of the unplaneness is given by the ratio h/a .



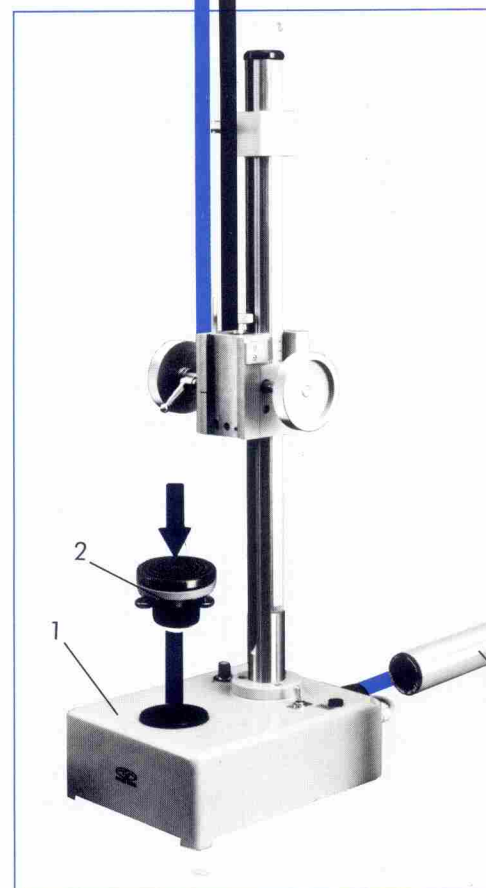


Focometer for positive Focal Lengths

- Vertical stand D 40 with elevat. mechanism [1]
- Measuring collimator [3]
- Measuring unit [4]
- Dial gauge 100 mm (option)

Focometer for negative Focal Lengths

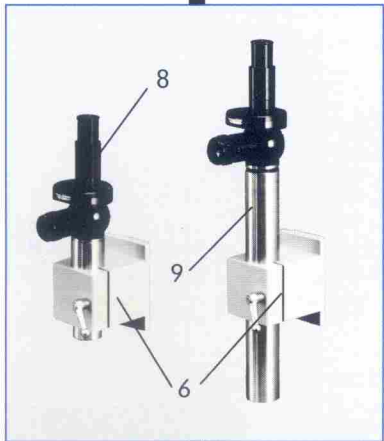
- Vertical stand D 40 with elevat. mechanism [1]
- Measuring collimator [3]
- Clamp holder D 40 [6]
- Autocollimator AKR 200/40/14,7 [5]
- Lens attachment [7]
- Dial gauge 100 mm (option)



Units to Systems

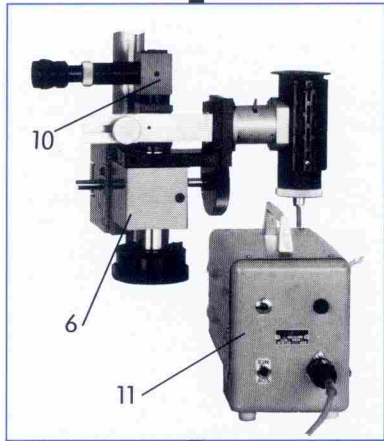
ANGLE

parallel plates / prisms



FLATNESS

$\varnothing 28\text{ mm} / \lambda / 30$



Optical Spherometer

- Vertical stand D 40 with elevat. mechanism 1
- Tilttable table D 80 2
- Clamp holder D 40 6
- Autocollimator AKR 200/40/14,7 5
- Lens attachment 7
- Dial gauge 100 mm (option)

Parallelism and Angle Testing Instrument

- Vertical stand D 40 with elevat. mechanism 1
- Tilttable table D 80 2
- Clamp holder D 40 6
- Autocollimator AKR 140/40/14,7SWL 8 or AKR300/40/14,7SWL 9
- with diaphragm turret

Interferometer

- Vertical stand D 40 with elevat. mechanism 1
- Tilttable table D 80 2
- Clamp holder D 40 6
- Interference attachment D 28 10
- Power supply Hg/Cd 11
- Transmission flats
- Holder for miniature camera (option)

Technical Data

Testing focal length

Optical measure	Measuring range mm	Accuracy
Focal length/ back focal length	+ 5 ... + 550 - 5 ... - 575	0.3 % 0.5 %

Criteria for selection of the lens attachment: The focal length of the lens attachment must be approx. 20 mm longer than that of the specimen.

Measuring radii of curvature

Optical measure	Measuring range mm	Accuracy
Radii of curvature	+ 5 ... + 490 - 5 ... - 525	0.02 to 0.2 %

Measuring range of the achromatic objectives:

Lens attachment	Radius measuring range	
	concave surfaces	convex surfaces
f = 50	up to 525 mm	up to 30 mm
f = 90	up to 450 mm	up to 70 mm
f = 140	up to 400 mm	up to 120 mm
f = 200	up to 340 mm	up to 180 mm
f = 300	up to 240 mm	up to 280 mm
f = 500	up to 40 mm	up to 490 mm

Testing parallelism and angles

Optical measure	Tolerances of pinholes	Accuracy
Parallelism errors of transparent plates	f = 140 mm: 0,5', 1', 2', 3', 4', 5' f = 300 mm: 10'', 20'', 30'', 1', 2', 3'	better than 8'' with AKR f = 140 better than 3'' with AKR f = 300
Angle errors of 90° prisms	f = 140 mm: 15'', 30'', 1', 1.5', 2', 2.5' f = 300 mm: 5'', 10'', 15'', 30'', 1', 1.5'	better than 4'' with AKR f = 140 better than 2'' with AKR f = 300
Angle errors of prism roofs	f = 140 mm: 7.5'', 15'', 30'', 45'', 1', 1.25' f = 300 mm: 2.5'', 5'', 7.5'', 15'', 30'', 45''	with AKR f = 140 2-3'' with AKR f = 300 1-2'' with AKR f = 500 0,5-1''

AKR = Autocollimator; '' = arc sec; f = focal length

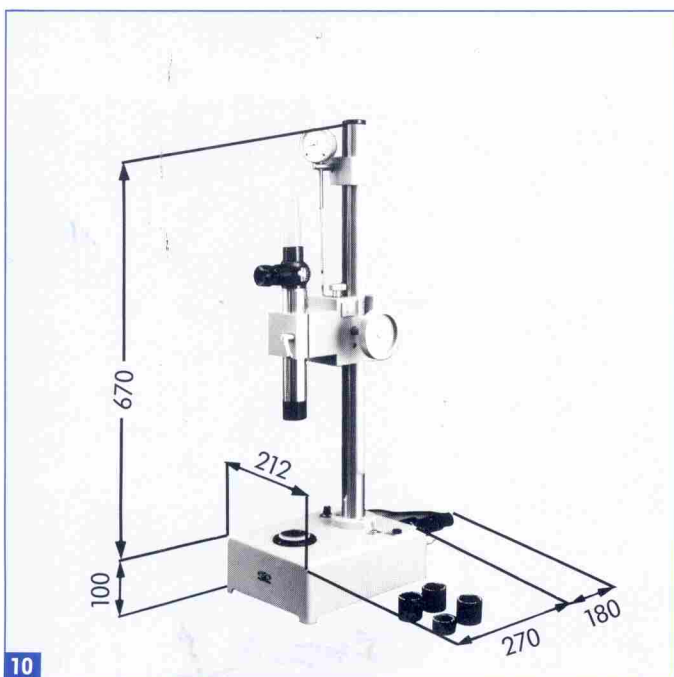
Measurement of flatness ^[9]

Optical measure	Measuring range mm	Accuracy
Flatness of reflecting surfaces	Ø 28	$\lambda/30$
Parallelism	Ø 28	4''

As light source acts a Hg-Cd spectrallamp with wave length $\lambda = 546/480/650$ nm.

Dimensions and weight ^[10]

Coarse of elevating mechanism	approx. 550 mm
Resolution	0.1mm with vernier
	0.01mm with dial gauge
Weight net	approx. 20 kg
Mains supply	220 V / 50 Hz, 110 V / 60 Hz



Standard Configurations

From the multitude of conceivable variants typical combinations are selected.
Other configurations meeting specific requirements can be easily realised with minimal expenditure.

Instrument	Ident. No.										
Measuring combination focal length/radii/angle	235 105										
Measuring combination focal length/radii	235 104										
Focometer for positive systems	235 102										
Focometer for negative systems	235 103										
Optical Spherometer	235 106										
Parallelism and angle testing instrument $f = 140$	235 107										
Parallelism and angle testing instrument $f = 300$	235 108										
Interferometer IV-28	235 109										
Vertical stand D 40, complete	235 101										
Modular units	Ident. No.										
Vertical stand D 40 with elevat. mechanism	235 201	•	•	•	•	•	•	•	•	•	•
Clamp holder D 40	235 211	•	•	•	•	•	•	•	•	•	•
Tilttable table D 80 – M 32 x 2	235 215	•	•	•	•	•	•	•	•	•	•
Spec. Collimator (assembly by Möller only)	–							•	•	•	•
Measuring Head for Focometer	235 221							•	•	•	•
Interferometer attachment D 28	235 251		•								
Power supply for interferometer illumination	243 131		•								
AKR 200/40/14,7 S 304 / S 201	229 204							•	•	•	•
Lens attachment $f = 50/16$ D 40	221 048							•	•	•	•
Lens attachment $f = 90/16$ D 40	221 051							•	•	•	•
Lens attachment $f = 140/28$ D 40	221 053							•	•	•	•
Lens attachment $f = 200/28$ D 40	221 055							•	•	•	•
Lens attachment $f = 300/28$ D 40	221 059							•	•	•	•
Lens attachment $f = 500/28$ D 40	221 063							•	•	•	•
Lens attachment $f = 600/28$ D 40	221 067							•	•	•	•
AKR 140/40/14,7 pinhole diaphragm turret SWL	229 323							•			•
AKR 300/40/14,7 pinhole diaphragm turret SWL	229 325			•							
Accessories											
Dial gauge 100 mm with holder	235 230							•	•	•	•
Cold light source 150 W with flexible light-conductive fibre for stronger illumination: Light conductive fibre-illumination 150 W	217 331			•	•	•	•		•	•	
Accessories for Interferometer IV-28											
Reference plate D 28 $\lambda/30$ with box	235 121		•								
Reference plate D 28 $\lambda/30$, R 50 % with box	235 122		•								
Holder for miniature camera	235 123		•								



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